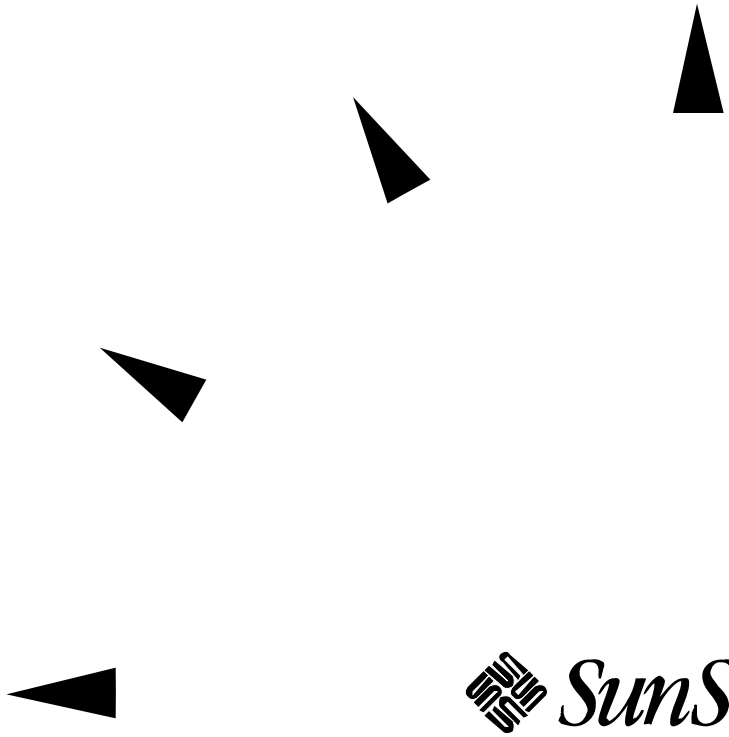
Solaris PEXlib Reference Manual



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NAME

intro – introduces the PEXlib graphics library

DESCRIPTION

PEXlib is a programmer's interface to the PEX protocol. PEX is an extension to the X window system for supporting three-dimensional graphics.

The application can query the existence of the PEX server extension by calling **XQueryExtension** using the name, **PEX_NAME_STRING,** defined in PEXlib include files.

To begin using PEXlib, the application must initialize PEXlib by calling **PEXInitialize**(3) before calling any PEXlib function which takes a display argument. Functions which do not take a display argument may be called prior to calling **PEXInitialize**(3)**. PEXInitialize**(3) must be called for each display connection the application will use. Failure to call **PEXInitialize**(3) will result in undefined behavior for functions which take a display argument. Termination of PEXlib occurs implicitly at either program end or **XCloseDisplay.**

There are four other functions that should be called during initialization to determine what features and parameters are supported by each particular PEX server implementation. These functions are **PEXGetExtensionInfo**(3)**, PEXGetImpDepConstants**(3)**, PEXGetEnumTypeInfo**(3)**,** and **PEXMatchRenderingTargets**(3)**. PEXGetExtensionInfo**(3) returns information about the PEX server extension such as protocol version, vendor string, release number and subset support. **PEXGetImpDepConstants**(3) returns information about supported implementation-dependent constants. **PEXGetEnumTypeInfo**(3) returns information about supported enumerated types. **PEXMatchRenderingTargets**(3) returns information about supported drawable types.

Some PEXlib functions allocate memory on behalf of the application. Memory allocation often occurs in the case of inquiry functions where the size of data to be returned is unknown. Applications must use **XFree** to deallocate memory that has been allocated for them by PEXlib, unless a specific function is provided to free memory allocated for particular PEXlib objects. Where necessary, the specific function for deallocation is noted in the description of the function which allocates the memory. Memory allocated by PEXlib is considered to be "owned" by PEXlib; the application must not modify pointers to memory returned by the library nor attempt to free such memory except by the specified interfaces. Data structure fields other than pointers to memory can be changed without consequence.

PEXlib is designed as an extension to Xlib using the same transport and error mechanisms as Xlib. This includes all requests, replies, events and errors. This means synchronization (e.g. **XSync** and **XSynchronize**) will have the same effect on PEXlib requests as they do on Xlib requests. PEX events also are treated in the same way as X events (e.g. use **XNextEvent**).

PEXlib functions usually do not check for invalid parameters. Applications should be careful to pass correct data to PEXlib. Incorrect values sent to the PEX server extension will cause an error event to be returned to the client. These errors are asynchronous, and so are difficult to trace to a particular Xlib or PEXlib call unless using **XSync** or **XSynchronize .** Note these functions should be used with prudence, since they slow client programs significantly.

By default, when an error event is returned by the server, Xlib prints a message and the application does not continue. The application can register its own error handler by calling **XSetErrorHandler .**

The floating point format used by PEXlib is the format native to the architecture of the client machine (i.e. the machine on which the application executes). All floating point values are expected to be in that native format, with a few exceptions for functions which allow the application to specify the floating point format. Those functions which allow the application to specify a floating point format deal primarily with application data that is already in protocol format, or data that the application wants to be encoded into protocol format for its own use.

When the server to which PEXlib is sending data does not support the floating point format native to PEXlib, PEXlib will choose an appropriate format which is supported by the server and convert into that format when formatting protocol to send to that server. In cases where PEXlib must choose a non-native floating point format, the application can determine the format chosen by calling This is useful with those functions dealing with protocol formatted data to help avoid unnecessary format conversions when sending the data to the PEX server.

The PEXlib specification currently defines function bindings and include files for the C language only. The specification is intended to work for both ANSI C and Kernighan and Ritchie (K&R) C compilers.

The **< X11/PEX5/PEX.h >** and **< X11/PEX5/PEXlib.h >** include files contain constant definitions, macros, and data structures used by PEXlib. **< X11/PEX5/PEXlib.h >** automatically includes **< X11/PEX5/PEX.h >.** Some data structures have fields named "reserved". These fields are necessary to align the data correctly for efficient transfer to the protocol transport buffer. Any values assigned to these fields will be ignored.

The library is specified in the compilation command as "-lPEX5".

NAME

PEXAccumulateState – Accumulate Rendering Pipeline State

SYNTAX

void PEXAccumulateState(Display **display*, PEXRenderer *renderer*, unsigned long *count*, PEXElementRef **elements*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of a renderer resource.
count	The number of elements.
elements	A pointer to the structure element reference path.

RETURNS

None

DESCRIPTION

This function accumulates the state that would be in effect if a traversal were done to the element specified in the path. If the *renderer* state is **PEXIdle,** the request is ignored.

The accumulation of rendering pipeline state begins with the current pipeline attributes. A linear traversal down the specified path is then made and the structure *elements* that lie along the specified path are examined in order. Any element that contains an output command that would modify the pipeline state (i.e. output attributes) is sent to the renderer for processing. All other output commands (i.e. output primitives and structure output commands) are skipped. The traversal is flat meaning that the current pipeline attributes will not be saved when a structure in the path is executed. However, the current path offset is incremented for each output command that is encountered during the state accumulation.

DATA STRUCTURES

```
typedef XID     PEXRenderer;
typedef XID     PEXStructure;

typedef struct {
        PEXStructure    structure;
        unsigned long   offset;
} PEXElementRef;
```

ERRORS

BadPEXPath
The specified path is invalid.

BadPEXRenderer
The specified renderer resource identifier is invalid.

SEE ALSO

PEXBeginRendering(3)
PEXCreateStructure(3)
PEXCreateRenderer(3)

NAME

PEXAddToNameSet – Add Names to Name Set

SYNTAX

void PEXAddToNameSet(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned long *count*, PEXName **names*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
count	The number of names.
names	An array of names to be added to the current name set.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which adds the specified list of *names* to the current name set. If any name is outside the supported range, that name is ignored.

DATA STRUCTURES

typedef unsigned long PEXName;

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateNameSet(3)
PEXRemoveFromNameSet(3)
PEXGetImpDepConstants(3)

NAME

PEXAnnotationText – 3D Annotation Text Primitive

SYNTAX

void PEXAnnotationText(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **origin*, PEXCoord **offset*, int *length*, char **string*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
offset	The relative position of the text string from the origin.
length	The number of bytes in the text string.
string	A pointer to the text string.

RETURNS

None

DESCRIPTION

This function creates an annotation text output primitive.

The first character set in the text font will be used.

The *origin* defines, in modeling coordinates, the position of the first character in the text *string*. The *offset* specifies an offset from the *origin* in normalized projection coordinates. The point where the text *string* is placed is called the annotation point. The annotation point is computed by adding the value of *offset* to the transformed *origin* point. The z-component of the annotation point specifies the x-y plane in normalized projection coordinate space on which the annotation text *string* is placed.

Depending on the text attribute source flag values, the text color, text precision, character expansion, character spacing, and text font index attributes are either obtained directly from the current text attribute values or from the entry in the text bundle specified by the current text bundle index attribute. The annotation text height, annotation text path, annotation text alignment, annotation text up vector, and annotation text style are also used to render the text *string*.

The annotation text string's color is affected only by the depth-cueing computation (the reflectance stage of the rendering pipeline affects only surface primitives) and is mapped to a device color. The entire annotation text primitive is clipped if the *origin* is clipped. If the *origin* is not clipped, the annotation text is clipped according to text clipping rules. The connection line, if any, is clipped according to polyline clipping rules, except that modeling clipping is ignored. The current set of polyline attributes is used to render the connection line.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetATextHeight(3)
PEXSetATextUpVector(3)
PEXSetATextPath(3)
PEXSetATextAlignment(3)
PEXSetATextStyle(3)
PEXSetTextBundleIndex(3)

NAME

PEXAnnotationText2D – 2D Annotation Text Primitive

SYNTAX

void PEXAnnotationText2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord2D **origin*, PEXCoord2D **offset*, int *length*, char **string*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
offset	The relative position of the text string from the origin.
length	The number of bytes in the text string.
string	A pointer to the text string.

RETURNS

None

DESCRIPTION

This function creates a 2D annotation text output primitive.

This primitive functions like **PEXAnnotationText**(3) except that the *origin* and *offset* positions are specified using only x- and y-components, and the z-component is always assumed to be zero. This primitive is two-dimensional only in that the z-component is implied, since geometry transformations are still carried out in three dimensions.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetATextHeight(3)
PEXSetATextUpVector(3)
PEXSetATextPath(3)
PEXSetATextAlignment(3)

PEXSetATextStyle(3)
PEXSetTextBundleIndex(3)

NAME

PEXApplicationData – Structure Application Data

SYNTAX

void PEXApplicationData(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
length	The length, in bytes, of the application data.
data	A pointer to the application data.

RETURNS

None

DESCRIPTION

This function creates an application data output command which has no visible effect when rendered. It is typically used to store arbitrary application data in a structure.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXBeginPickAll – Begin Renderer Pick All

SYNTAX

void PEXBeginPickAll(Display **display*, Drawable *drawable*, PEXRenderer *renderer*, long *structure_id*, int *method*, int *send_event*, int *max_hits*, int *pick_device_type*, PEXPickRecord **pick_record*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
renderer	The resource identifier of the renderer.
structure_id	A value to be used as the structure identifier for the root of the structure network.
method	The pick all method (**PEXPickAllAll** or **PEXPickAllVisible**).
send_event	**TRUE** or **FALSE** — specifying whether the server should send an event when the maximum number of hits is reached.
max_hits	The maximum number of hits to be returned.
pick_device_type	The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).
pick_record	A pointer to the pick data record.

RETURNS

None

DESCRIPTION

This functions starts an immediate-mode pick, setting the renderer's renderer state to **PEXPicking.** When the renderer state is **PEXPicking,** primitives are hit tested instead of converted to pixels. All picked primitives are recorded until reaching the maximum hits specified is reached. Additional picked primitives will not be recorded. Once the the maximum number of hits is reached, subsequent primitives may be ignored.

The supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3)**.** The specified structure identifier will be inserted as the first structure component in the returned pick path(s).

If the *send_event* flag is **True,** and the pick *method* is **PEXPickAllAll,** then a **PEXMaxHitsReached** event is sent from the server to the client whenever the maximum number of hits is reached by the server, if the event is supported (see **PEXGetImpDepConstants**(3)). Upon receiving the event, the application should stop sending primitives and process the recorded hits. If the pick *method* is **PEXPickAllVisible,** a complete set of primitives must be sent to the server before determining which primitives are picked.

If the specified drawable does not have the same root and depth as the drawable used to create the renderer, or, if the specified drawable is not one of the supported drawables returned by **PEXMatchRenderingTargets**(3)**,** a match error is generated. If the renderer state is set to **PEXRendering** or **PEXPicking** when this function is called, then the operation in progress is aborted, the **PEXBeginPickAll** function is completed, and a

BadPEXRendererState error returned.

All functions which process output commands or manipulate attributes (i.e. all output command functions, **PEXBeginStructure**(3)**, PEXEndStructure**(3)**, PEXRenderElements**(3)**,** and **PEXAccumulateState**(3)) can be called when the renderer state is **PEXPicking.** They will have the same semantics except that primitives are hit tested instead of converted to pixels.

DATA STRUCTURES

```
typedef  XID     PEXRenderer;

typedef union {
        PEXPDNPCHitVolume           volume;
        PEXPDDCHitBox                       box;
        PEXPickDataRecord           data;
} PEXPickRecord;

typedef PEXNPCSubVolume     PEXPDNPCHitVolume;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;

typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D     position;
        float                distance;
} PEXPDDCHitBox;

typedef struct {
        short     x;
        short     y;
} PEXDeviceCoord2D;

typedef struct {
        unsigned short          length;         /* number of bytes in record */
        char                        *record;
} PEXPickDataRecord;
```

```
typedef struct {
        int                     type;
        unsigned long           serial;         /* # of last request processed by server */
        Bool                    send_event;     /* true if this came from a SendEvent reques
        Display                 *display;       /* Display the event was read from */
        PEXRenderer             renderer;
} PEXMaxHitsReachedEvent;
```

ERRORS

BadAlloc
The server failed to allocate resources necessary to complete request.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or the specified renderer resource was not created with a compatible drawable.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

BadValue
The pick record contains invalid data, or the pick device type is invalid.

SEE ALSO

PEXEndPickAll(3)
PEXPickAll(3)
PEXGetImpDepConstants(3)

NAME

PEXBeginPickOne – Begin Renderer Pick One

SYNTAX

void PEXBeginPickOne(Display **display*, Drawable *drawable*, PEXRenderer *renderer*, long *structure_id*, int *method*, int *pick_device_type*, PEXPickRecord **pick_record*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
renderer	The resource identifier of the renderer.
structure_id	A value to be used as the structure identifier for the root of the structure network.
method	The pick one method (**PEXPickLast, PEXPickClosestZ, PEXPickVisibleAny, PEXPickVisibleClosest**).
pick_device_type	The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).
pick_record	A pointer to the pick data record.

RETURNS

None

DESCRIPTION

This functions starts an immediate-mode pick, setting the renderer's renderer state to **PEXPicking.** When the renderer state is **PEXPicking,** primitives are hit tested instead of converted to pixels. For pick one, a hierarchical path to the picked primitive will be maintained.

Standard pick one methods are **PEXPickLast, PEXPickClosestZ, PEXPickVisibleAny** and **PEXPickVisibleClosest.** The supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3)**.** The specified structure identifier will be inserted as the first structure component in the returned pick path.

If the specified drawable does not have the same root and depth as the drawable that was used to create the renderer, or, if the specified drawable is not one of the supported drawables returned by **PEXMatchRenderingTargets**(3)**,** a Match error will be generated. If the renderer state is set to **PEXRendering** or **PEXPicking** when this function is called, then the operation in progress is aborted, the **PEXBeginPickOne** function is completed, and a **BadPEXRendererState** error is sent.

All functions which process output commands or manipulate attributes (i.e. all output command functions, **PEXBeginStructure**(3)**, PEXEndStructure**(3)**, PEXRenderElements**(3)**,** and **PEXAccumulateState**(3)) can be called when the renderer state is **PEXPicking.** They will have the same semantics except that primitives are hit tested instead of converted to pixels.

DATA STRUCTURES

```
typedef  XID     PEXRenderer;

typedef union {
        PEXPDNPCHitVolume       volume;
        PEXPDDCHitBox           box;
        PEXPickDataRecord       data;
} PEXPickRecord;

typedef  PEXNPCSubVolume    PEXPDNPCHitVolume;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;

typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D     position;
        float                distance;
} PEXPDDCHitBox;

typedef struct {
        short     x;
        short     y;
} PEXDeviceCoord2D;

typedef struct {
        unsigned short          length;         /* number of bytes in record */
        char                    *record;
} PEXPickDataRecord;
```

ERRORS

BadAlloc
The server failed to allocate resources necessary to complete request.

BadDrawable
The specified *drawable* resource identifier is invalid.

BadMatch
The specified *drawable* is unsupported, or the specified renderer resource was not created with a compatible drawable.

BadPEXRenderer
The specified *renderer* resource identifier is invalid.

BadPEXRendererState
The specified *renderer* was in an invalid state.

BadValue
The pick record contains invalid data, or the pick device type is invalid.

SEE ALSO

PEXEndPickOne(3)
PEXPickOne(3)

NAME

PEXBeginRendering – Begin Rendering

SYNTAX

void PEXBeginRendering(Display **display*, Drawable *drawable*, PEXRenderer *renderer*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
renderer	The resource identifier of a renderer.

RETURNS

None

DESCRIPTION

This function initializes the specified *renderer* and binds the specified *drawable* to it. Subsequent output primitive commands sent to *renderer* produce output to the specified drawable. The renderer's pipeline state is initialized to the values in its pipeline context, or to default values if there is no pipeline context. This function causes the renderer's renderer state to be set to **PEXRendering** and its current path to be set to <0,0>. The renderer's HLHSR mode is used to initialize hidden surface computations. (For example, the z-buffer is initialized if the HLHSR mode is set to **PEXHLHSRZBuffer** or **PEXHLHSRZBufferID.)**

If the renderer's state is **PEXRendering** or **PEXPicking** when this request is received, an implicit end rendering or picking request is performed before the begin rendering request is executed. Output commands received by a renderer are ignored if the state is not **PEXRendering** or **PEXPicking.**

DATA STRUCTURES

```
typedef XID     PEXRenderer;
```

ERRORS

BadAlloc
The server failed to allocate the resource.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or the specified renderer resource was not created with a compatible drawable.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

SEE ALSO

PEXCreateRenderer(3)
PEXEndRendering(3)

NAME

PEXBeginStructure – Save Rendering Pipeline State

SYNTAX

void PEXBeginStructure(Display **display*, PEXRenderer *renderer*, long *structure_id*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of a renderer.
structure_id	A value to be used as an application-specified structure identifier.

RETURNS

None

DESCRIPTION

Application programs can use this function to simulate the effects of the execute structure output command. This request saves the rendering pipeline attributes in the specified *renderer*. This request also increments the element offset of the last entry in the renderer's current path. The function then adds the structure id and an element offset of zero to the renderer's current path.

The rendering pipeline's global transform attribute is set to the matrix computed by concatenating the current local transform and current global transform matrices. The local transform matrix is then set to the identity matrix.

DATA STRUCTURES

typedef XID PEXRenderer;

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

SEE ALSO

PEXEndStructure(3)
PEXExecuteStructure(3)
PEXCreateRenderer(3)

NAME

PEXBuildTransform – utility function

SYNTAX

void PEXBuildTransform(PEXCoord *fixed_point*, PEXVector *trans_vector*, double *angle_x*, double *angle_y*, double *angle_z*, PEXVector *scale_vector*, PEXMatrix *matrix_return*)

PARAMETERS

fixed_point	Origin for scaling and rotation.
trans_vector	Translation vector.
angle_x	Angle of rotation about X axis, in radians.
angle_y	Angle of rotation about Y axis, in radians.
angle_z	Angle of rotation about Z axis, in radians.
scale_vector	Vector of scale factors for X, Y and Z.
matrix_return	Matrix into which result is stored.

RETURNS

None

DESCRIPTION

This function builds a transformation matrix that scales by the values in the scale vector about the fixed point, rotates about the X, Y and Z axes using the fixed point as the center of rotation and then translates according to translation vector, in that order.

ERRORS

None

SEE ALSO

PEXBuildTransform2D(3)

NAME

PEXBuildTransform2D – utility function

SYNTAX

void PEXBuildTransform2D(PEXCoord2D **fixed_point*, PEXVector2D **trans_vector*, double *angle_z*, PEXVector2D **scale_vector*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

fixed_point	Origin for scaling and rotation.
trans_vector	Translation vector.
angle_z	Angle of rotation about Z axis, in radians.
scale_vector	Vector of scale factors for X and Y axes.
matrix_return	Matrix into which result is stored.

RETURNS

None

DESCRIPTION

This function builds a 3X3 transformation matrix that scales by the values in the scale vector about the fixed point, rotates about Z axis using the fixed point as the center of rotation and then translates according to translation vector, in that order.

ERRORS

None

SEE ALSO

PEXBuildTransform(3)

NAME

PEXCellArray – 3D Cell Array Primitive

SYNTAX

void PEXCellArray(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **point1*, PEXCoord **point2*, PEXCoord **point3*, unsigned int *col_count*, unsigned int *row_count*, PEXTableIndex **color_indices*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
point1	The first cell array definition point.
point2	The second cell array definition point.
point3	The third cell array definition point.
col_count	The number of cell columns (number of cells in the X direction).
row_count	The number of cell rows (number of cells in the Y direction).
color_indices	An array of color table index values which specify the color of each cell.

RETURNS

None

DESCRIPTION

This function creates a 3D cell-array output primitive.

A 3D cell-array primitive is a parallelogram of equally-sized cells, each of which is a parallelogram with a single color. Each cell has a width defined by:

$$width = \frac{\sqrt{(point\,1 \rightarrow x - point\,2 \rightarrow x)^2 + (point\,1 \rightarrow y - point\,2 \rightarrow y)^2 + (point\,1 \rightarrow z - point\,2 \rightarrow z)^2}}{col\_count}$$

and a height defined by:

$$height = \frac{\sqrt{(point\,1 \rightarrow x - point\,3 \rightarrow x)^2 + (point\,1 \rightarrow y - point\,3 \rightarrow y)^2 + (point\,1 \rightarrow z - point\,3 \rightarrow z)^2}}{row\_count}$$

Cell colors are specified in a one-dimensional array where the colors are stored in row-major order. The first color in the array is the color at the cell at the corner of point1, and subsequent colors represent the colors of cells proceeding to *point2*.

If any color index is not defined, color index one is used. If color index one is not defined, the resulting color is implementation-dependent. The column count and row count can not be zero.

DATA STRUCTURES

typedef unsigned short PEXTableIndex;

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXCellArray2D – 2D Cell Array Primitive

SYNTAX

void PEXCellArray2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord2D **point1*, PEXCoord2D **point2*, unsigned int *col_count*, unsigned int *row_count*, PEXTableIndex **color_indices*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
point1	The first cell array definition point.
point2	The second cell array definition point.
col_count	The number of cell columns (number of cells in the X direction).
row_count	The number of cell rows (number of cells in the Y direction).
color_indices	An array of color table index values which specify the color of each cell.

RETURNS

None

DESCRIPTION

This function creates a 2D cell-array output primitive.

A 2D cell-array is a rectangle of equally-sized cells, each of which is a rectangle which has a single color. The primitive is specified by two points which define a rectangle aligned with the modeling coordinate axes. The width and height of each cell is defined as in **PEXCellArray**(3) where the z component is zero.

All other aspects of this primitive are the same as **PEXCellArray**(3)**.**

DATA STRUCTURES

typedef unsigned short PEXTableIndex;

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXChangeNameSet – Change Name Set

SYNTAX

void PEXChangeNameSet(Display **display*, PEXNameSet *nameset*, int *action*, unsigned long *count*, PEXName **names*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
nameset	The resource identifier of the name set.
action	Type of change to be made (**PEXNSAdd, PEXNSRemove, PEXNSReplace**).
count	The number of names.
names	An array of names.

RETURNS

None

DESCRIPTION

This function modifies the specified name set resource. The list of *names* is added to the name set if the specified *action* is **PEXNSAdd,** removed from the name set if the specified *action* is **PEXNSRemove,** or used to replace the *names* currently in the name set if the specified *action* is **PEXNSReplace.** If requested to remove a name that does not exist, it is silently ignored.

DATA STRUCTURES

```
typedef XID           PEXNameSet;
typedef unsigned long PEXName;
```

ERRORS

BadPEXNameSet
The specified name set resource identifier is invalid.

BadValue
The specified value for *action* parameter is invalid.

SEE ALSO

PEXCreateNameSet(3)
PEXGetNameSet(3)

NAME

PEXChangePickDevice – Change Pick Device Attributes

SYNTAX

void PEXChangePickDevice(Display **display*, PEXWorkstation *workstation*, int *pick_device_type*, unsigned long *value_mask*, PEXPDAttributes **values*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

pick_device_type The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).

value_mask A mask indicating which attributes to return.

values A pointer to the pick device attribute values.

RETURNS

None

DESCRIPTION

This function will modify the attributes of a pick descriptor for the PHIGS *workstation* resource specified. The descriptor to be modified will be the currently-defined descriptor for the pick device of the type specified. Supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3)**.** The value mask indicates which attributes are to be changed. The value mask is constructed by OR'ing together the following constants:

PEXPDPickStatus
PEXPDPickPath
PEXPDPickPathOrder
PEXPDPickIncl
PEXPDPickExcl
PEXPDPickDataRec
PEXPDPromptEchoType
PEXPDEchoVolume
PEXPDEchoSwitch

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        unsigned short          status;
        PEXPickPath             path;
        int                     path_order;
        PEXNameSet              inclusion;
        PEXNameSet              exclusion;
        PEXPickRecord           pick_record;
        PEXEnumTypeIndex        prompt_echo_type;
        PEXViewport             echo_volume;
        int                     echo_switch;
```

```
} PEXPDAttributes;

typedef struct {
        unsigned long                   count;          /* number of elements */
        PEXPickElementRef               *elements;
} PEXPickPath;

typedef struct {
        PEXStructure            sid;
        unsigned long           offset;
        unsigned long           pick_id;
} PEXPickElementRef;

typedef  XID    PEXStructure;

typedef  XID    PEXNameSet;

typedef union {
        PEXPDNPCHitVolume       volume;
        PEXPDDCHitBox           box;
        PEXPickDataRecord       data;
} PEXPickRecord;

typedef  PEXNPCSubVolume    PEXPDNPCHitVolume;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;

typedef struct {
        float    x;
        float    y;
        float    z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D    position;
        float               distance;
} PEXPDDCHitBox;

typedef struct {
        short    x;
        short    y;
} PEXDeviceCoord2D;
```

```
typedef struct {
        unsigned short          length;         /* number of bytes in record */
        char                    *record;
} PEXPickDataRecord;

typedef  short   PEXEnumTypeIndex;

typedef struct {
        PEXDeviceCoord          min;
        PEXDeviceCoord          max;
        PEXSwitch               use_drawable;
        unsigned char           reserved[3];
} PEXViewport;

typedef struct {
        short    x;
        short    y;
        float    z;
} PEXDeviceCoord;

typedef  unsigned char          PEXSwitch;
```

ERRORS

BadPEXNameSet
The specified name set resource identifier is invalid.

BadPEXPath
The specified path is invalid.

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

BadValue
The specified pick device type is invalid, a specified value is invalid, or an invalid bit set in the value mask.

SEE ALSO

PEXGetPickDevice(3)
PEXGetEnumTypeInfo(3)

NAME

PEXChangePipelineContext – Change Pipeline Context

SYNTAX

void PEXChangePipelineContext(Display **display*, PEXPipelineContext *context*, unsigned long **value_mask*, PEXPCAttributes **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
context	The resource identifier of the pipeline context.
value_mask	A pointer to an array of three unsigned long.
values	A pointer to new values for attributes in the pipeline context.

RETURNS

None

DESCRIPTION

This function changes components of the specified pipeline *context* to the *values* specified. The value mask indicates which attribute values are specified. **PEXSetPCAttributeMask**(3) and **PEXSetPCAttributeMaskAll**(3) can be called to setup the value mask.

DATA STRUCTURES

typedef XID PEXPipelineContext;

See also **PEXlib.h.**

ERRORS

BadPEXColorType
The specified color type is invalid or unsupported.

BadPEXNameSet
The specified name set resource identifier is invalid.

BadPEXPipelineContext
The specified pipeline *context* resource identifier is invalid.

BadValue
A specified value is out of range, or an invalid bit is set in the value mask.

SEE ALSO

PEXCreatePipelineContext(3)
PEXGetPipelineContext(3)
PEXSetPCAttributeMask(3)

NAME

PEXChangeRenderer – Change Renderer Attributes

SYNTAX

void PEXChangeRenderer(Display **display*, PEXRenderer *renderer*, unsigned long *value_mask*, PEXRendererAttributes **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of the renderer.
value_mask	A mask indicating the renderer attributes to be changed.
values	A pointer to new values for the renderer attributes.

RETURNS

None

DESCRIPTION

This function modifies attributes of the specified *renderer* resource. The value mask indicates the attribute *values* to be modified. The value mask is constructed by OR'ing together the following constants:

PEXRABackgroundColor	**PEXRAInvisibilityIncl**
PEXRAClearImage	**PEXRALightTable**
PEXRAClearZ	**PEXRALineBundle**
PEXRAClipList	**PEXRAMarkerBundle**
PEXRAColorApproxTable	**PEXRANPCSubVolume**
PEXRAColorTable	**PEXRAPatternTable**
PEXRADepthCueTable	**PEXRAPickExcl**
PEXRAEchoMode	**PEXRAPickIncl**
PEXRAEdgeBundle	**PEXRAPickStartPath**
PEXRAHLHSRMode	**PEXRAPipelineContext**
PEXRAHighlightExcl	**PEXRATextBundle**
PEXRAHighlightIncl	**PEXRATextFontTable**
PEXRAInteriorBundle	**PEXRAViewTable**
PEXRAInvisibilityExcl	**PEXRAViewport**

Note that the renderer's current path and renderer state attributes cannot be set explicitly using this function.

DATA STRUCTURES

typedef XID PEXRenderer;

See also **PEXlib.h.**

ERRORS

BadMatch
The specified lookup table resource was not created with a drawable compatible with the drawable used to create the renderer resource.

BadPEXLookupTable
The specified lookup table resource identifier is invalid.

BadPEXNameSet

The specified name set resource identifier is invalid.

BadPEXPipelineContext
The specified pipeline context resource identifier is invalid.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadValue
A specified value is out of range, or an invalid bit is set in the value mask.

SEE ALSO

PEXCreateRenderer(3)
PEXGetRendererAttributes(3)
PEXGetRendererDynamics(3)

NAME

PEXChangeSearchContext – Change Search Context

SYNTAX

void PEXChangeSearchContext(Display **display*, PEXSearchContext *context*, unsigned long *value_mask*, PEXSCAttributes **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
context	The resource identifier of the search context.
value_mask	A mask indicating the search context attributes to be changed.
values	A pointer to new values for the specified search context attributes.

RETURNS

None

DESCRIPTION

This function modifies the attributes of the specified search *context* resource. The value mask indicates which *values* are specified. The value mask is constructed by OR'ing together the following constants:

PEXSCPosition
PEXSCDistance
PEXSCCeiling
PEXSCModelClipFlag
PEXSCStartPath
PEXSCNormalList
PEXSCInvertedList

DATA STRUCTURES

```
typedef XID     PEXSearchContext;

typedef struct {
        PEXCoord                position;
        float                   distance;
        unsigned short          ceiling;
        Bool                    model_clip_flag;
        PEXStructurePath        start_path;
        PEXListOfNameSetPair    normal;
        PEXListOfNameSetPair    inverted;
} PEXSCAttributes;

typedef struct {
        float   x;
        float   y;
        float   z;
} PEXCoord;
```

```
typedef struct {
        unsigned long           count;          /* number of elements */
        PEXElementRef           *elements;
} PEXStructurePath;

typedef struct {
        PEXStructure            structure;
        unsigned long           offset;
} PEXElementRef;

typedef  XID     PEXStructure;

typedef struct {
        unsigned short          count;          /* number of pairs */
        PEXNameSetPair          *pairs;
} PEXListOfNameSetPair;

typedef struct {
        PEXNameSet    inclusion;
        PEXNameSet    exclusion;
} PEXNameSetPair;

typedef  XID     PEXNameSet;
```

ERRORS

BadPEXNameSet
The specified name set resource identifier is invalid.

BadPEXPath
The specified path is invalid.

BadPEXSearchContext
The specified search context resource identifier is invalid.

BadValue
A specified value is out of range, or an invalid bit is set in the value mask.

SEE ALSO

PEXCreateSearchContext(3)
PEXGetSearchContext(3)

NAME

PEXChangeStructureRefs – Change Structure References

SYNTAX

void PEXChangeStructureRefs(Display **display*, PEXStructure *old_structure*, PEXStructure *new_structure*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
old_structure	The resource identifier of the structure no longer to be referenced.
new_structure	The resource identifier of the structure now referenced.

RETURNS

None

DESCRIPTION

This function changes execute structure elements in the server that reference the specified old structure into execute structure elements which reference the specified new structure. Both structures must already exist as valid structure resources.

Any references to the new structure that existed before this request are not affected. If there were references to the old structure and the new structure does not exist, an error is returned and no action is taken.

On all PHIGS workstation resources where the new structure is not already posted and the old structure is posted, the new structure is posted with the same priority as the old structure and the old structure is unposted.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXGetStructureInfo(3)
PEXGetStructuresInNetwork(3)
PEXGetAncestors(3)
PEXGetDescendants(3)

NAME

PEXCopyBytesToOC – Copy Encoded Output Commands

SYNTAX

void PEXCopyBytesToOC(Display **display*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
length	The number of bytes to copy.
data	A pointer to the output command data.

RETURNS

None

DESCRIPTION

This function copies the specified number of bytes of data to the transport buffer.

It is recommended that the number of bytes be a multiple of four as the protocol format requires output commands to be aligned on four-byte boundaries. It is the application's responsibility to ensure that alignment restrictions are met.

PEXStartOCs(3) must be called prior to this.

ERRORS

None

SEE ALSO

PEXStartOCs(3)
PEXFinishOCs(3)
PEXGetOCAddr(3)

NAME

PEXCopyElements – Copy Elements

SYNTAX

void PEXCopyElements(Display **display*, PEXStructure *src_structure*, int *src_whence1*, long *src_offset1*, int *src_whence2*, long *src_offset2*, PEXStructure *dst_structure*, int *dst_whence*, long *dst_offset*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
src_structure	The resource identifier of the source structure.
src_whence1	A value specifying, with *src_offset1*, the first limit of the range of elements to be copied (**PEXBeginning, PEXCurrent, PEXEnd**).
src_offset1	The offset from *src_whence1* denoting the first limit of the range of elements to be copied.
src_whence2	A value specifying, with *src_offset2*, the second limit of the range of elements to be copied (**PEXBeginning, PEXCurrent, PEXEnd**).
src_offset2	The offset from *src_whence2* denoting the second limit of the range of elements to be copied.
dst_structure	The resource identifier of the destination structure.
dst_whence	A value specifying, with *dst_offset*, the position at which the elements are inserted into the destination structure (**PEXBeginning, PEXCurrent, PEXEnd**).
dst_offset	The offset from *dst_whence* denoting the position at which the elements are inserted into the destination structure.

RETURNS

None

DESCRIPTION

This function copies a range of elements from the specified source structure to the specified destination structure.

If a computed offset is less than zero, it is set to zero before obtaining the element information. If a computed offset is greater than the number of elements in the structure, the offset is set to the offset of the last element in the structure.

The source structure and destination structure can be the same. In this case, the copy operation proceeds as though the indicated range were copied to a temporary location and then inserted relative to the destination position.

After the copy operation, the element pointer of the destination structure is updated to point at the last element copied into the destination structure. The editing mode attribute of the destination structure is ignored during this request. The copied elements are always inserted into the destination structure and are never used to replace existing structure elements.

DATA STRUCTURES

```
typedef XID    PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for whence parameter is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXCopyLookupTable – Copy Lookup Table

SYNTAX

void PEXCopyLookupTable(Display **display*, PEXLookupTable *src_table*, PEXLookupTable *dst_table*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
src_table	The resource identifier of the source lookup table.
dst_table	The resource identifier of the destination lookup table.

RETURNS

None

DESCRIPTION

This function copies entries from the source lookup table to destination lookup table, after first deleting all entries in the destination lookup table. Both tables must already exist as valid lookup table resources. Both must have been created for the same class of drawables, and both must be the same table type.

DATA STRUCTURES

```
typedef XID    PEXLookupTable;
```

ERRORS

BadMatch
The specified lookup tables were not created with compatible drawables.

BadPEXLookupTable
A specified lookup table resource identifier is invalid, or the table type is unsupported.

SEE ALSO

PEXCreateLookupTable(3)

NAME

PEXCopyNameSet – Copy Name Set

SYNTAX

void PEXCopyNameSet(Display **display*, PEXNameSet *src_nameset*, PEXNameSet *dst_nameset*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
src_nameset	The resource identifier of the source name set.
dst_nameset	The resource identifier of the destination name set.

RETURNS

None

DESCRIPTION

This function copies the contents of the source name set to the destination name set. Both must already exist as valid name set resources. All values already in the destination name set are overwritten.

DATA STRUCTURES

```
typedef XID    PEXNameSet;
```

ERRORS

BadPEXNameSet
The specified name set resource identifier is invalid.

SEE ALSO

PEXCreateNameSet(3)

NAME

PEXCopyPipelineContext – Copy Pipeline Context

SYNTAX

void PEXCopyPipelineContext(Display **display*, unsigned long **value_mask*, PEXPipelineContext *src_context*, PEXPipelineContext *dst_context*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
value_mask	A pointer to an array of three unsigned long.
src_context	The resource identifier of the source pipeline.
dst_context	The resource identifier of the destination pipeline context.

RETURNS

None

DESCRIPTION

This function copies attributes from the source pipeline context to the destination pipeline context. Both must already exist as valid pipeline context resources. Only the attributes indicated by the value mask are copied and the remainder of the attributes are left as they were. **PEXSetPCAttributeMask**(3) and **PEXSetPCAttributeMaskAll**(3) can be called to setup the value mask.

DATA STRUCTURES

```
typedef XID PEXPipelineContext;
```

ERRORS

BadPEXPipelineContext
A specified pipeline context resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO

PEXCreatePipelineContext(3)
PEXSetPCAttributeMask(3)

NAME

PEXCopySearchContext – Copy Search Context

SYNTAX

void PEXCopySearchContext(Display **display*, unsigned long *value_mask*, PEXSearchContext *src_context*, PEXSearchContext *dst_context*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
value_mask	A mask specifying which attributes are to be copied.
src_context	The resource identifier of the source search context.
dst_context	The resource identifier of the destination search context.

RETURNS

None

DESCRIPTION

This function copies attributes from the source search context to the destination search context resource. Both must already exist as valid search context resources. Attributes indicated by the value mask are copied and the remainder of the attributes are left unchanged. The value mask is constructed by OR'ing together the following constants:

PEXSCPosition
PEXSCDistance
PEXSCCeiling
PEXSCModelClipFlag
PEXSCStartPath
PEXSCNormalList
PEXSCInvertedList

DATA STRUCTURES

```
typedef XID    PEXSearchContext;
```

ERRORS

BadPEXSearchContext
A specified search context resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO

PEXCreateSearchContext(3)

NAME

PEXCopyStructure – Copy Structure

SYNTAX

void PEXCopyStructure(Display **display*, PEXStructure *src_structure*, PEXStructure *dst_structure*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
src_structure	The resource identifier of the source structure.
dst_structure	The resource identifier of the destination structure.

RETURNS

None

DESCRIPTION

This function copies elements in the source structure to the destination structure. Both structures must already exist as valid structure resources. Elements already in the destination structure are overwritten. The element pointer and editing mode attributes of the source structure are copied to the destination structure as well.

DATA STRUCTURES

```
typedef XID PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXCountOCs – Count Output Commands in an Encoded List

SYNTAX

unsigned long PEXCountOCs(int *float_format*, unsigned long *length*, char **encoded_ocs*)

PARAMETERS

float_format	The floating point format of the encoded output commands (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
length	The length, in bytes, of the encoded output commands.
encoded_ocs	A pointer to the encoded output commands.

RETURNS

The number of output commands represented in the encoded output commands.

DESCRIPTION

This function has no visible effect. This function returns the number of output commands in the encoded list of output commands.

A count of zero will be returned if the specified floating point format is not supported.

ERRORS

None

SEE ALSO

PEXDecodeOCs(3)

NAME

PEXCreateLookupTable – Create Lookup Table

SYNTAX

PEXLookupTable PEXCreateLookupTable(Display **display*, Drawable *drawable*, int *table_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
table_type	The type of lookup table to be created (see the *Description* section).

RETURNS

The resource identifier of the newly-created lookup table.

DESCRIPTION

This function creates a lookup table resource of the specified type and returns the resource identifier of the new lookup table. The returned identifier is used to refer to the created lookup table. The type of lookup table to be created must be one of the following:

PEXLUTColorApprox
PEXLUTColor
PEXLUTDepthCue
PEXLUTEdgeBundle
PEXLUTInteriorBundle
PEXLUTLight
PEXLUTLineBundle
PEXLUTMarkerBundle
PEXLUTPattern
PEXLUTTextBundle
PEXLUTTextFont
PEXLUTView

The newly-created lookup table can only be used with drawables having the same depth and root as the specified drawable.

DATA STRUCTURES

```
typedef XID    PEXLookupTable;
```

ERRORS

BadAlloc
The server failed to allocate the resource.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported.

BadPEXLookupTable
The specified table type is unsupported.

BadValue

The specified table type is invalid.

SEE ALSO **PEXFreeLookupTable**(3)

NAME

PEXCreateNameSet – Create Name Set

SYNTAX

PEXNameSet PEXCreateNameSet(Display **display*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

RETURNS

The resource identifier of the newly-created name set.

DESCRIPTION

This function creates a name set resource and returns the resource identifier of the created name set. The returned identifier is used to refer to the created name set.

DATA STRUCTURES

```
typedef XID PEXNameSet;
```

ERRORS

BadAlloc
The server failed to allocate the resource.

SEE ALSO

PEXFreeNameSet(3)

NAME

PEXCreatePickMeasure – Create Pick Measure

SYNTAX

PEXPickMeasure PEXCreatePickMeasure(Display **display*, PEXWorkstation *workstation*, int *pick_device_type*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

pick_device_type The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).

RETURNS

The resource identifier of the newly-created pick measure.

DESCRIPTION

This function creates a pick measure resource of the type specified. The pick measure is initialized with the values contained in the appropriate pick device descriptor stored in the specified *workstation*. The supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3)**.**

DATA STRUCTURES

```
typedef XID    PEXWorkstation;
typedef XID    PEXPickMeasure;
```

ERRORS

BadAlloc
The server failed to allocate the resource.

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

BadValue
The specified pick device type is invalid.

SEE ALSO

PEXFreePickMeasure(3)
PEXGetEnumTypeInfo(3)

NAME

PEXCreatePipelineContext – Create Pipeline Context

SYNTAX

PEXPipelineContext PEXCreatePipelineContext(Display **display*, unsigned long **value_mask*, PEXPCAttributes **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
value_mask	A pointer to an array of three unsigned long.
values	A pointer to values to override default attribute values in the new pipeline context.

RETURNS

The resource identifier of the newly-created pipeline context.

DESCRIPTION

This function creates a pipeline context and returns its resource identifier. The value mask indicates the *values* specified. Attribute values not specified will be initialized to the default values shown in the table below. **PEXSetPCAttributeMask**(3) and **PEXSetPCAttributeMaskAll**(3) can be called to setup the value mask.

Attribute Name	Default Value
PEXPCMarkerType	PEXMarkerAsterisk
PEXPCMarkerScale	1.0
PEXPCMarkerColor	{PEXColorTypeIndexed, 1}
PEXPCMarkerBundleIndex	1
PEXPCTextFont	1
PEXPCTextPrecision	PEXStringPrecision
PEXPCCharExpansion	1.0
PEXPCCharSpacing	0.0
PEXPCTextColor	{PEXColorTypeIndexed, 1}
PEXPCCharHeight	0.01
PEXPCCharUpVector	<0.0, 1.0>
PEXPCTextPath	PEXPathRight
PEXPCTextAlignment	{PEXHAlignNormal, PEXVAlignNormal}
PEXPCATextHeight	0.01
PEXPCATextUpVector	<0.0, 1.0>
PEXPCATextPath	PEXPathRight
PEXPCATextAlignment	{PEXHAlignNormal, PEXVAlignNormal}
PEXPCATextStyle	PEXATextNotConnected
PEXPCTextBundleIndex	1
PEXPCLineType	PEXLineTypeSolid
PEXPCLineWidth	1.0
PEXPCLineColor	{PEXColorTypeIndexed, 1}
PEXPCCurveApprox	{1, 1.0}
PEXPCPolylineInterp	PEXPolylineInterpNone
PEXPCLineBundleIndex	1
PEXPCInteriorStyle	PEXInteriorStyleHollow

Attribute Name	Default Value
PEXPCInteriorStyleIndex	1
PEXPCSurfaceColor	{PEXColorTypeIndexed, 1}
PEXPCReflectionAttr	{1.0, 1.0, 1.0, 0.0, 0.0, {PEXColortypeIndexed, 1} }
PEXPCReflectionModel	PEXReflectionNone
PEXPCSurfaceInterp	PEXSurfaceInterpNone
PEXPCBFInteriorStyle	PEXInteriorStyleHollow
PEXPCBFInteriorStyleIndex	1
PEXPCBFSurfaceColor	{PEXColorTypeIndexed, 1}
PEXPCBFReflectionAttr	{1.0, 1.0, 1.0, 0.0, 0.0, {PEXColortypeIndexed, 1} }
PEXPCBFReflectionModel	PEXReflectionNone
PEXPCBFSurfaceInterp	PEXSurfaceInterpNone
PEXPCSurfaceApprox	{1, 1.0, 1.0}
PEXPCCullingMode	PEXNone
PEXPCDistinguishFlag	False
PEXPCPatternSize	<1.0, 1.0>
PEXPCPatternRefPoint	<0.0, 0.0, 0.0>
PEXPCPatternRefVec1	<1.0, 0.0, 0.0>
PEXPCPatternRefVec2	<0.0, 1.0, 0.0>
PEXPCInteriorBundleIndex	1
PEXPCSurfaceEdgeFlag	PEXOff
PEXPCSurfaceEdgeType	PEXSurfaceEdgeSolid
PEXPCSurfaceEdgeWidth	1.0
PEXPCSurfaceEdgeColor	{PEXColorTypeIndexed, 1}
PEXPCEdgeBundleIndex	1
PEXPCLocalTransform	Identity matrix
PEXPCGlobalTransform	Identity matrix
PEXPCModelClip	PEXNoClip
PEXPCModelClipVolume	NULL
PEXPCViewIndex	0
PEXPCLightState	NULL
PEXPCDepthCueIndex	0
PEXPCASFValues	PEXIndividual
PEXPCPickID	0
PEXPCHLHSRIdentifier	0
PEXPCNameSet	NULL
PEXPCColorApproxIndex	0
PEXPCRenderingColorModel	0
PEXPCParaSurfCharacteristics	{1, NULL}

DATA STRUCTURES

typedef XID PEXPipelineContext;

See also **PEXlib.h.**

ERRORS

BadAlloc
The server failed to allocate the resource.

BadPEXColorType
The specified color type is invalid or unsupported.

BadPEXNameSet
A specified name set resource identifier is invalid.

BadValue
A specified value is out of range, or an invalid bit is set in the value mask.

SEE ALSO

PEXFreePipelineContext(3)

NAME

PEXCreateRenderer – Create Renderer

SYNTAX

PEXRenderer PEXCreateRenderer(Display **display*, Drawable *drawable*, unsigned long *value_mask*, PEXRendererAttributes **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
value_mask	A mask indicating the attribute values specified.
values	A pointer to values used to override default values in the new renderer resource.

RETURNS

The resource identifier of the newly-created renderer resource.

DESCRIPTION

This function creates a renderer and returns the resource identifier of the newly-created renderer resource. The value mask indicates which attribute values are specified. Attribute values not specified will be initialized to the default values shown in the table below.

Attribute Name	Default Value
PEXRAPipelineContext	NULL
PEXRAMarkerBundle	NULL
PEXRATextBundle	NULL
PEXRALineBundle	NULL
PEXRAInteriorBundle	NULL
PEXRAEdgeBundle	NULL
PEXRAViewTable	NULL
PEXRAColorTable	NULL
PEXRADepthCueTable	NULL
PEXRALightTable	NULL
PEXRAColorApproxTable	NULL
PEXRAPatternTable	NULL
PEXRATextFontTable	NULL
PEXRAHighlightIncl	NULL
PEXRAHighlightExcl	NULL
PEXRAInvisibilityIncl	NULL
PEXRAInvisibilityExcl	NULL
PEXRAHLHSRMode	PEXHLHSROff
PEXRANPCSubVolume	{(0.0, 0.0, 0.0), (1.0, 1.0, 1.0)}
PEXRAViewport	{imp.dep., imp.dep., True}
PEXRAClipList	NULL
PEXRAPickIncl	NULL
PEXRAPickExcl	NULL
PEXRAPickStartPath	NULL
PEXRABackgroundColor	{PEXColortypeIndexed, 0}

Attribute Name	Default Value
PEXRAClearImage	False
PEXRAClearZ	True
PEXRAEchoMode	PEXNoEcho

The renderer resource may only be used in conjunction with drawables that have the same root and depth as specified drawable.

Note that the renderer's current path and renderer state attributes cannot be set explicitly using this function.

DATA STRUCTURES

typedef XID PEXRenderer;

See also **PEXlib.h.**

ERRORS

BadAlloc
The server failed to allocate the resource.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or the specified lookup table resource was not created with a drawable compatible with the specified drawable.

BadPEXLookupTable
The specified lookup table resource identifier is invalid.

BadPEXNameSet
The specified name set resource identifier is invalid.

BadPEXPipelineContext
The specified pipeline context resource identifier is invalid.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadValue
A specified value is out of range, or an invalid bit is set in the value mask.

SEE ALSO

PEXFreeRenderer(3)

NAME

PEXCreateSearchContext – Create Search Context

SYNTAX

PEXSearchContext PEXCreateSearchContext(Display **display*, unsigned long *value_mask*, PEXSCAttributes **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
value_mask	A mask indicating the attributes specified.
values	A pointer to values used to override default values in the new search context resource.

RETURNS

The resource identifier of the newly-created search context resource.

DESCRIPTION

This function creates a search context and returns the resource identifier of the created search context resource. The value mask indicates which values are specified to override the default values.

Attribute Name	Default Value
PEXSCPosition	<0.0, 0.0, 0.0>
PEXSCDistance	0.0
PEXSCCeiling	1
PEXSCModelClipFlag	False
PEXSCStartPath	NULL
PEXSCNormalList	NULL
PEXSCInvertedList	NULL

DATA STRUCTURES

```
typedef XID    PEXRenderer;

typedef XID    PEXSearchContext;

typedef struct {
    PEXCoord                    position;
    float                       distance;
    unsigned short              ceiling;
    Bool                        model_clip_flag;
    PEXStructurePath start_path;
    PEXListOfNameSetPair        normal;
    PEXListOfNameSetPair        inverted;
} PEXSCAttributes;

typedef struct {
    float       x;
    float       y;
    float       z;
```

```
} PEXCoord;

typedef struct {
    unsigned long       count;      /* number of elements */
    PEXElementRef       *elements;
} PEXStructurePath;

typedef struct {
    PEXStructure        structure;
    unsigned long       offset;
} PEXElementRef;

typedef XID             PEXStructure;

typedef struct {
    unsigned short      count;      /* number of pairs */
    PEXNameSetPair      *pairs;
} PEXListOfNameSetPair;

typedef struct {
    PEXNameSet          inclusion;
    PEXNameSet          exclusion;
} PEXNameSetPair;

typedef XID             PEXNameSet;
```

ERRORS

BadAlloc
The server failed to allocate the resource.

BadPEXNameSet
The specified name set resource identifier is invalid.

BadPEXPath
The specified path is invalid.

BadValue
A specified value is out of range, or an invalid bit is set in the value mask.

SEE ALSO

PEXFreeSearchContext(3)

NAME

PEXCreateStructure – Create Structure

SYNTAX

PEXStructure PEXCreateStructure(Display **display*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

RETURNS

The resource identifier of the newly-created structure resource.

DESCRIPTION

This function creates a structure resource and returns the resource identifier of the created structure. The returned identifier is used to refer to the created structure resource.

DATA STRUCTURES

typedef XID PEXStructure;

ERRORS

BadAlloc

The server failed to allocate the resource.

SEE ALSO

PEXDestroyStructures(3)

NAME

PEXCreateWorkstation – Create Workstation

SYNTAX

PEXWorkstation PEXCreateWorkstation(Display **display*, Drawable *drawable*, PEXLookupTable *line_bundle*, PEXLookupTable *marker_bundle*, PEXLookupTable *text_bundle*, PEXLookupTable *interior_bundle*, PEXLookupTable *edge_bundle*, PEXLookupTable *color_table*, PEXLookupTable *pattern_table*, PEXLookupTable *font_table*, PEXLookupTable *depth_cue_table*, PEXLookupTable *light_table*, PEXLookupTable *color_approx_table*, PEXNameSet *highlight_incl*, PEXNameSet *highlight_excl*, PEXNameSet *invisibility_incl*, PEXNameSet *invisibility_excl*, int *buffer_mode*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
line_bundle	The resource identifier of the line bundle lookup table.
marker_bundle	The resource identifier of the marker bundle lookup table.
text_bundle	The resource identifier of the text bundle lookup table.
interior_bundle	The resource identifier of the interior bundle lookup table.
edge_bundle	The resource identifier of the edge bundle lookup table.
color_table	The resource identifier of the color lookup table.
pattern_table	The resource identifier of the pattern lookup table.
font_table	The resource identifier of the text font lookup table.
depth_cue_table	The resource identifier of the depth cue lookup table.
light_table	The resource identifier of the light lookup table.
color_approx_table	The resource identifier of the color approximation lookup table.
highlight_incl	The name set used as the highlight inclusion set.
highlight_excl	The name set used as the highlight exclusion set.
invisibility_incl	The name set used as the invisibility inclusion set.
invisibility_excl	The name set used as the invisibility exclusion set.
buffer_mode	The workstation buffering mode (**PEXSingleBuffer** or **PEXDoubleBuffer**).

RETURNS

The resource identifier of the newly-created workstation.

DESCRIPTION

This function creates a PHIGS workstation resource and returns its resource identifier. The drawable specified is associated with the newly-created workstation resource. The named tables and name sets are also bound to the workstation resource for use during rendering. A view table that supports current and requested view table entries is allocated for the workstation automatically at creation time. The requests

PEXSetWorkstationViewRep(3) and **PEXGetWorkstationViewRep**(3) are used to modify and inquire the PHIGS workstation view table.

If the workstation is to operate in double-buffered mode and double-buffering is supported (see **PEXGetImpDepConstants**(3)), an additional image buffer will be created for the drawable in an implementation-dependent fashion. If the specified drawable is a pixmap, no double-buffering will be performed.

DATA STRUCTURES

```
typedef XID    PEXWorkstation;
typedef XID    PEXLookupTable;
typedef XID    PEXNameSet;
```

ERRORS

BadAlloc
The server failed to allocate the resource, or the server failed to allocate resources needed for double-buffering.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or a specified lookup table resource was not created with a compatible drawable.

BadPEXLookupTable
The specified lookup table resource identifier is invalid.

BadPEXNameSet
The specified name set resource identifier is invalid.

BadValue
The specified buffer mode is invalid.

SEE ALSO

PEXFreeWorkstation(3)
PEXGetImpDepConstants(3)

NAME

PEXDecodeOCs – Decode Output Commands

SYNTAX

PEXOCData *PEXDecodeOCs(int *float_format*, unsigned long *oc_count*, unsigned long *length*, char **encoded_ocs*)

PARAMETERS

float_format	The floating point format of the encoded output commands (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
oc_count	The number of output commands represented in the encoded output commands.
length	The length, in bytes, of the encoded output commands.
encoded_ocs	A pointer to the encoded output commands.

RETURNS

A pointer to the decoded output commands; a null pointer if unsuccessful or if zero output commands specified.

DESCRIPTION

This function has no visible effect. Encoded output commands are passed in and the data typically passed as parameters to output attribute or primitive functions is returned in memory allocated by PEXlib. **PEXFreeOCData**(3) should be called to deallocate the memory.

A null pointer will be returned if the specified floating point format is not supported.

Any text or annotation text primitives are returned as encoded text or encoded annotation text.

PEXCountOCs(3) can be used to determine the number of output commands in the encoded list if that information is not already available.

ERRORS

None

SEE ALSO

PEXEncodeOCs(3)
PEXCountOCs(3)

NAME

PEXDeleteBetweenLabels – Delete Elements Between Labels

SYNTAX

void PEXDeleteBetweenLabels(Display **display*, PEXStructure *structure*, long *label1*, long *label2*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
label1	The first label.
label2	The second label.

RETURNS

None

DESCRIPTION

This function deletes a range of elements from the specified *structure*. Elements between the two labels are deleted. The label elements are not deleted. A search for the first label is performed starting at the current offset plus one. A search for the second label is performed starting at the element following the first label. After the deletion operation, the *structure* element pointer is set to the pointer position at the first label.

If either of the two labels is not found between the starting point of the search and the end of the *structure*, no deletion occurs and the structure's element point is left unchanged.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXLabel
The specified label does not exist.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXLabel(3)

NAME

PEXDeleteElements – Delete Elements

SYNTAX

void PEXDeleteElements(Display **display*, PEXStructure *structure*, int *whence1*, long *offset1*, int *whence2*, long *offset2*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence1	A value specifying, with *offset1*, the first limit of the range of elements to be deleted (**PEXBeginning, PEXCurrent, PEXEnd**).
offset1	The offset from *whence1* denoting the first limit of the range of elements to be deleted.
whence2	A value specifying, with *offset2*, the second limit of the range of elements to be deleted (**PEXBeginning, PEXCurrent, PEXEnd**).
offset2	The offset from *whence2* denoting the second limit of the range of elements to be deleted.

RETURNS

None

DESCRIPTION

This function deletes a range of elements from the structure specified by *structure.*

If a computed offset is less than zero, it is set to zero before obtaining the element information. If a computed offset is greater than the number of elements in the *structure,* the offset is set to the offset of the last structure element in the *structure.* Deleting the null element is effectively a no-op. After the deletion operation, the structure element pointer is set to the element immediately preceding the range of deleted elements.

DATA STRUCTURES

typedef XID PEXStructure;

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for whence parameter is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXDeleteTableEntries – Delete Lookup Table Entries

SYNTAX

void PEXDeleteTableEntries(Display **display*, PEXLookupTable *table*, unsigned int *start*, unsigned int *count*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
table	The resource identifier of the lookup table.
start	The initial table entry to be deleted.
count	The number of entries to be deleted.

RETURNS

None

DESCRIPTION

This function deletes lookup table entries from the specified lookup table, starting at the specified entry. Entries with index values between the *start* and (start + count-1), inclusive, are deleted. Attempts to delete undefined entries are ignored.

DATA STRUCTURES

typedef XID PEXLookupTable;

ERRORS

BadPEXLookupTable
The specified lookup table resource identifier is invalid, or the table type is unsupported.

BadValue
The sum of start and count is too large, or index 0 is invalid for the specified table type.

SEE ALSO

PEXGetTableInfo(3)
PEXGetPredefinedEntries(3)
PEXGetDefinedIndices(3)

NAME

PEXDeleteToLabel – Delete Elements to Label

SYNTAX

void PEXDeleteToLabel(Display **display*, PEXStructure *structure*, int *whence*, long *offset*, long *label*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence	A value specifying, with offset, the beginning of the range of elements to be deleted (**PEXBeginning, PEXCurrent, PEXEnd**).
offset	The offset from *whence* denoting the beginning of the range of elements to be deleted.
label	The label specifying the end of the range of elements to be deleted.

RETURNS

None

DESCRIPTION

This function deletes a range of elements between a computed *offset* and a specified *label* in the specified *structure.* The computed *offset* specifies the beginning of the deletion range. The *label* specifies the end of the deletion range. Elements are deleted from the structure element immediately after the computed *offset* up to the next occurrence of the *label.* The *label* is not deleted. If *label* is not found, no elements are deleted.

If the computed *offset* is less than zero, it is set to zero before the deletion occurs. If the computed *offset* is greater than the number of elements in the *structure,* the *offset* is set to the *offset* of the last *structure* element. Deleting the zero element is effectively a no-op. After the deletion operation, the *structure* element pointer is set to the element immediately preceding the range of deleted elements.

DATA STRUCTURES

typedef XID PEXStructure;

ERRORS

BadPEXLabel
The specified label does not exist.

BadPEXStructure
The specified *structure* resource identifier is invalid.

BadValue
The specified value for whence parameter is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXLabel(3)

NAME

PEXDestroyStructures – Destroy Structures

SYNTAX

void PEXDestroyStructures(Display **display*, unsigned long *count*, PEXStructure **structures*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
count	The number of structure resource identifiers.
structures	An array of resource identifiers of the structures to be destroyed.

RETURNS

None

DESCRIPTION

This function deletes each structure in the list of structure identifiers, removes all references to it in the server, and frees all memory associated with it.

This function also removes any "execute structure" structure elements that reference a structure in the list and unposts any structure in the list from a PHIGS workstation resource to which it is posted. If a structure has any structure elements removed from it as a result of this call, its element pointer will continue to point at the same structure element. However, if the structure element being pointed at is removed, the element pointer will be positioned at the previous structure element.

Any paths in search contexts or pick measures that contain references to a deleted structure may still be inquired. However, if a path in a search context or pick measure resource which contains a destroyed structure resource identifier is later used in a **PEXSearchNetwork**(3) or **PEXUpdatePickMeasure**(3) function, a path error is generated.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXGetStructuresInNetwork(3)
PEXGetAncestors(3)
PEXGetDescendants(3)
PEXChangeStructureRefs(3)

NAME

PEXElementSearch – Element Search

SYNTAX

Status PEXElementSearch(Display *display, PEXStructure *structure*, int *whence*, long *offset*, int *direction*, unsigned long *incl_count*, unsigned short *incl_list*, unsigned long *excl_count*, unsigned short *excl_list*, unsigned long *elem_offset_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence	A value specifying, with *offset*, the offset at which the search is to begin (**PEXBeginning, PEXCurrent, PEXEnd**).
offset	The offset from *whence* at which the search is to begin.
direction	The direction of the search (**PEXForward** or **PEXBackward**).
incl_count	The number of values in inclusion array.
incl_list	An array of short integers specifying structure elements to be searched for.
excl_count	The number of values in exclusion array.
excl_list	An array of short integers specifying structure elements not to be searched for.
elem_offset_return	Returns the offset of the element located by the search.

RETURNS

Zero if unsuccessful, non-zero otherwise. The non-zero value will be either **PEXFound** or **PEXNotFound** depending upon the result of the search.

DESCRIPTION

This function searches for the first occurrence of the specified element type in the specified *structure.* The search always includes the starting element.

If the computed *offset* is less than zero, it is set to zero before the search is performed. If the computed *offset* is greater than the number of elements in the *structure,* it is set to the *offset* of the last structure element in the *structure.*

An element is selected if its element type is contained in inclusion list and is not contained in exclusion list. An element type of **PEXOCAll** causes all element types to match. If a structure element type is in both the inclusion and exclusion list, it is excluded.

The search terminates if a match is found or if the limits of the *structure* are reached. The search progresses from the start point in the specified *direction (* **PEXForward** or **PEXBackward**). This is a non-descending search; that is, the search does not include any structures referenced by "execute structure" elements. If the search finds a match, a return status of **PEXFound** and the *offset* of the matching element is returned. If the search is unsuccessful, a return status of **PEXNotFound** is returned.

The element pointer position of *structure* is not changed.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for *whence* or *direction* parameter is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXEncodeOCs – Encode Output Commands

SYNTAX

char *PEXEncodeOCs(int *float_format*, unsigned long *oc_count*, PEXOCData *oc_data*, unsigned long *length_return*)

PARAMETERS

float_format	The floating point format of the encoded output commands (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
oc_count	The number of output commands to be encoded.
oc_data	An array of the output command data.
length_return	Returns the length, in bytes, of the encoded output commands.

RETURNS

A pointer to the encoded output commands; a null pointer if unsuccessful or if zero output commands specified.

DESCRIPTION

This function has no visible effect. The data typically passed as parameters to output attribute or primitive functions is passed in and encoded into protocol formatted output commands. The encoded data is returned in memory allocated by PEXlib. **PEXFreeOCData**(3) should be called to deallocate the memory.

A null pointer will be returned if the specified floating point format is not supported.

Any text or annotation text primitives must be specified as encoded text or encoded annotation text.

ERRORS

None

SEE ALSO

PEXDecodeOCs(3)

NAME

PEXEncodedAnnoText – Encoded 3D Annotation Text Primitive

SYNTAX

void PEXEncodedAnnoText(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **origin*, PEXCoord **offset*, unsigned int *count*, PEXEncodedTextData **encoded_text*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
offset	The relative position of the text string from the origin.
count	The number of encoded text strings.
encoded_text	An array of encoded text strings.

RETURNS

None

DESCRIPTION

This function creates an annotation text output primitive.

This function is similar to **PEXAnnotationText**(3)**,** except that multiple encoded text strings are specified. Each text string in the encoded text array has a character set, a character set width, an encoding state, and a list of characters.

The character set is an index into the current font group. Font groups contain individual fonts which are numbered starting at one; a value of three selects the third font in the font group currently being used. If a character set is not available in the current font group then the entire string will be rendered using the default font group. If a character set value is not available in the default font group then that portion of the string will be rendered in an implementation-dependent manner. The character set width indicates the width or size of characters in the strings. Valid values for character set width are **PEXCSByte, PEXCSShort** and **PEXCSLong.** The encoding state is provided for use by the application and is not interpreted by the PEX server.

All other aspects of this primitive are the same as **PEXAnnotationText**(3)**.**

DATA STRUCTURES

```
typedef struct {
        unsigned short      character_set;
        unsigned char       character_set_width;    /* PEXCSByte, PEXCSShort,
                                                       PEXCSLong */
        unsigned char       encoding_state;
        unsigned short      reserved;
        unsigned short      length;
        char                *ch;
} PEXEncodedTextData;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetATextHeight(3)
PEXSetATextUpVector(3)
PEXSetATextPath(3)
PEXSetATextAlignment(3)
PEXSetATextStyle(3)
PEXSetTextBundleIndex(3)

NAME

PEXEncodedAnnoText2D – Encoded 2D Annotation Text Primitive

SYNTAX

void PEXEncodedAnnoText2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord2D **origin*, PEXCoord2D **offset*, unsigned int *count*, PEXEncodedTextData **encoded_text*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
offset	The relative position of the text string from the origin.
count	The number of encoded text strings.
encoded_text	An array of encoded text strings.

RETURNS

None

DESCRIPTION

This function creates a 2D annotation text output primitive.

This function is similar to **PEXAnnotationText2D**(3)**,** except that multiple encoded text strings are specified. Each text string in the encoded text array has a character set, a character set width, an encoding state, and a list of characters.

The character set is an index into the current font group. Font groups contain individual fonts which are numbered starting at one; a value of three selects the third font in the font group currently being used. If a character set is not available in the current font group then the entire string will be rendered using the default font group. If a character set value is not available in the default font group then that portion of the string will be rendered in an implementation-dependent manner. The character set width indicates the width or size of characters in the strings. Valid values for character set width are **PEXCSByte, PEXCSShort** and **PEXCSLong.** The encoding state is provided for use by the application and is not interpreted by the PEX server.

All other aspects of this primitive are the same as **PEXAnnotationText2D**(3)**.**

DATA STRUCTURES

```
typedef struct {
        unsigned short      character_set;
        unsigned char       character_set_width;    /* PEXCSByte, PEXCSShort,
                                                       PEXCSLong */
        unsigned char       encoding_state;
        unsigned short      reserved;
        unsigned short      length;
        char                *ch;
} PEXEncodedTextData;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetATextHeight(3)
PEXSetATextUpVector(3)
PEXSetATextPath(3)
PEXSetATextAlignment(3)
PEXSetATextStyle(3)
PEXSetTextBundleIndex(3)

NAME

PEXEncodedText – Encoded 3D Text Primitive

SYNTAX

void PEXEncodedText(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **origin*, PEXVector **vector1*, PEXVector **vector2*, unsigned int *count*, PEXEncodedTextData **encoded_text*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
vector1	A vector defining the positive x-direction of the text local coordinate system.
vector2	A vector defining the positive y-direction of the text local coordinate system.
count	The number of encoded text strings.
encoded_text	An array of encoded text strings.

RETURNS

None

DESCRIPTION

This function creates a text output primitive.

This function is similar to **PEXText**(3)**,** except that multiple encoded text strings are specified. Each text string in encoded text array has a character set, a character set width, an encoding state, and a list of characters.

The character set is an index into the current font group. Font groups contain individual fonts which are numbered starting at one; a value of three selects the third font in the font group currently being used. If a character set is not available in the current font group then the entire string will be rendered using the default font group. If a character set value is not available in the default font group then that portion of the string will be rendered in an implementation-dependent manner. The character set width indicates the width or size of characters in the strings. Valid values for character set width are **PEXCSByte, PEXCSShort** and **PEXCSLong.** The encoding state is provided for use by the application and is not interpreted by the PEX server.

All other aspects of this primitive are the same as **PEXText**(3)**.**

DATA STRUCTURES

```
typedef struct {
        unsigned short      character_set;
        unsigned char       character_set_width;    /* PEXCSByte, PEXCSShort,
                                                       PEXCSLong */
        unsigned char       encoding_state;
        unsigned short      reserved;
```

```
        unsigned short      length;
        char                *ch;
} PEXEncodedTextData;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetCharHeight(3)
PEXSetCharUpVector(3)
PEXSetTextPath(3)
PEXSetTextAlignment(3)
PEXSetTextBundleIndex(3)

NAME

PEXEncodedText2D – Encoded 2D Text Primitive

SYNTAX

void PEXEncodedText2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord2D **origin*, unsigned int *count*, PEXEncodedTextData **encoded_text*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
count	The number of encoded text strings.
encoded_text	An array of encoded text strings.

RETURNS

None

DESCRIPTION

This function creates a 2D text output primitive.

This function is similar to **PEXText2D**(3)**,** except that multiple encoded text strings are specified. Each text string in encoded text array has a character set, a character set width, an encoding state, and a list of characters.

The character set is an index into the current font group. Font groups contain individual fonts which are numbered starting at one; a value of three selects the third font in the font group currently being used. If a character set is not available in the current font group then the entire string will be rendered using the default font group. If a character set value is not available in the default font group then that portion of the string will be rendered in an implementation-dependent manner. The character set width indicates the width or size of characters in the strings. Valid values for character set width are **PEXCSByte, PEXCSShort** and **PEXCSLong.** The encoding state is provided for use by the application and is not interpreted by the PEX server.

All other aspects of this primitive are the same as **PEXText2D**(3)**.**

DATA STRUCTURES

```
typedef struct {
        unsigned short      character_set;
        unsigned char       character_set_width;    /* PEXCSByte, PEXCSShort,
                                                       PEXCSLong */
        unsigned char       encoding_state;
        unsigned short      reserved;
        unsigned short      length;
        char                *ch;
} PEXEncodedTextData;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetCharHeight(3)
PEXSetCharUpVector(3)
PEXSetTextPath(3)
PEXSetTextAlignment(3)
PEXSetTextBundleIndex(3)

NAME

PEXEndPickAll – End Pick All

SYNTAX

PEXPickPath *PEXEndPickAll(Display **display*, PEXRenderer *renderer*, int **status_return*, int **more_return*, unsigned long **count_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of the renderer.
status_return	Returns the status of the pick operation.
more_return	Returns the status of remaining picks.
count_return	Returns the number of pick paths.

RETURNS

An array of pick paths; a null pointer if unsuccessful or no pick (see also *status_return*).

DESCRIPTION

This function terminates an immediate-mode pick, returns the hierarchical pick paths of any hit primitives, and sets the renderer state to **PEXIdle.**

If one or more primitives were picked, a pick status of **PEXPick** is returned along with the pick paths. The hierarchical pick path is equivalent to the renderer's current path at the time the picked primitive was processed. If no primitives were picked, the returned pick status is **PEXNoPick,** and the returned pick paths is a null pointer. If the renderer's drawable was destroyed or resized during the pick operation, the returned pick status is **PEXAbortedPick** and the returned pick paths is a null pointer.

If all hits were recorded then **PEXNoMoreHits** is returned and the renderer's pick start path will be empty. If the maximum number of hits was reached and additional hits were detected, then **PEXMoreHits** is returned and the renderer's pick start path will be set to the last recorded hit primitive. If, after reaching the maximum number of hits, subsequent output commands were ignored, then **PEXMayBeMoreHits** is returned and the renderer's pick start path is set to the last element processed by the *renderer* before it started ignoring primitives.

If the renderer state is **PEXIdle** when this function is called, (i.e., no picking is in progress or the rendering was aborted due to a resize), the function is ignored and no error is generated. If the renderer state is currently **PEXRendering** or if the pick operation in progress is a pick one, then a **BadPEXRendererState** error is sent.

PEXlib allocates memory for the return value. **PEXFreePickPaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXRenderer;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXPickElementRef       *elements;
} PEXPickPath;
```

```
typedef struct {
        PEXStructure            sid;
        unsigned long           offset;
        unsigned long           pick_id;
} PEXPickElementRef;

typedef  XID     PEXStructure;
```

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

SEE ALSO

PEXBeginPickAll(3)
PEXPickAll(3)
PEXFreePickPaths(3)

NAME

PEXEndPickOne – End Pick One

SYNTAX

PEXPickPath *PEXEndPickOne(Display **display*, PEXRenderer *renderer*, int *status_return*, int **undetectable_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

renderer The resource identifier of the renderer.

status_return Returns the status of the pick operation.

undetectable_return Returns **True** or **False** indicating whether another pick better satisfied the pick criteria with the exception that it did not pass the pick filter test.

RETURNS

A pointer to the pick path; a null pointer if unsuccessful or no pick (see also *status_return*).

DESCRIPTION

This function terminates an immediate-mode pick, returns the hierarchical pick path to the closest or last hit primitive, and sets the renderer state to **PEXIdle.**

If a primitive was picked, the returned pick status is **PEXPick.** If no primitive was picked, the returned pick status is **PEXNoPick,** and the returned pick path is a null pointer. If the renderer's drawable was destroyed or resized during the pick operation, the returned pick status is **PEXAbortedPick** and the returned pick path is a null pointer.

If there was a primitive which more closely satisfied the pick criteria, but did not pass the pick filter test, then the undetectable pick return status will be **True.** Otherwise, it will be **False.**

If the renderer state is currently **PEXIdle** when this function is called, (i.e., no picking is in progress or the rendering was aborted due to a resize), the function is ignored and no error is generated. If the renderer state is currently **PEXRendering** or if the pick operation in progress is a pick all, then a **BadPEXRendererState** error is sent.

PEXlib allocates memory for the return value. **PEXFreePickPaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXRenderer;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXPickElementRef       *elements;
} PEXPickPath;
```

```
typedef struct {
        PEXStructure            sid;
        unsigned long           offset;
        unsigned long           pick_id;
} PEXPickElementRef;

typedef  XID     PEXStructure;
```

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

SEE ALSO

PEXBeginPickOne(3)
PEXPickOne(3)

NAME

PEXEndRendering - End Rendering

SYNTAX

void PEXEndRendering(Display **display*, PEXRenderer *renderer*, int *flush*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of the renderer.
flush	**True** or **False** — specifying whether any pending output for renderer is to be rendered onto its associated drawable.

RETURNS

None

DESCRIPTION

This function terminates rendering on the specified *renderer* resource. If *flush* is **True,** pending output is rendered onto its associated drawable. If *flush* is **False,** pending output is discarded. In either case, the renderer state is set to **PEXIdle.** If the renderer state is **PEXIdle,** the request is ignored. If the renderer state is **PEXPicking,** then an error is generated.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

SEE ALSO

PEXCreateRenderer(3)
PEXBeginRendering(3)

NAME

PEXEndStructure - Restore Rendering Pipeline State

SYNTAX

void PEXEndStructure(Display **display*, PEXRenderer *renderer*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

renderer The resource identifier of the renderer.

RETURNS

None

DESCRIPTION

Application programs can use this function to simulate the side effects of the return from an "execute structure" output command. This request restores the last-saved rendering pipeline attributes in *renderer*. This request also removes the last element reference in the renderer's current path. Subsequent output commands cause the element offset of the element reference at the end of the list to be incremented.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

SEE ALSO

PEXBeginStructure(3)
PEXExecuteStructure(3)
PEXCreateRenderer(3)

NAME

PEXEscape - PEX escape

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

PEXEscape has an implementation-dependent effect. It is provided as a way for implementation-specific functionality to be accessed. The complete interface and behavior for each specified escape identifier should be specified by the individual PEX server implementation.

The table below lists the supported escape identifiers.

Escape Identifier	Description
PEXSunEscIdDefineMarkerType	Define marker type
PEXSunEscIdChangeExtRendAttr	Change extended renderer attributes
PEXSunEscIdFlushRenderer	Flush renderer
ES_ESCAPE_DBLBUFFER	Set double buffer mode
ES_ESCAPE_SWAPBUFFER	Swap buffer
HP_ESCAPE_DFRONT	Set Draw to front or back buffer

ERRORS

BadValue
The specified escape identifier is unsupported.

SEE ALSO

PEXEscapeWithReply(3)
PEXSetEchoColor(3)

NAME

PEXEscapeWithReply - PEX Escape With Reply

SYNTAX

char *PEXEscapeWithReply(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*, unsigned long **reply_length_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

escape_id The escape identifier.

length The length, in bytes, of data for the escape request.

escape_data A pointer to data for the escape request.

reply_length_return
Returns the length, in bytes, of the reply data.

RETURNS

A pointer to the escape reply data; a null pointer if unsuccessful.

DESCRIPTION

PEXEscapeWithReply has an implementation-dependent effect. It is similar to **PEXEscape**(3) except it has return data. It is provided as a way for implementation-specific functionality to be accessed. The complete interface and behavior for each specified escape identifier should be specified by the individual PEX server implementation.

If the specified escape identifier is not supported, a value error is generated. The table below lists the supported escape identifiers.

The reply data is returned in memory allocated by PEXlib. **XFree** should be called to deallocate the memory.

Escape Identifier	Description
PEXSunEscIdGetMarkerDescr	Get marker descriptions
PEXSunEscIdGetExtRendAttr	Get extended renderer attributes
PEXSunEscIdGetExtRendAttrDyn	Get extended renderer dynamics
ES_ESCAPE_SWAPBUFFERCONTENT	Inquire update action during buffer swap

ERRORS

Escape-dependent
See documentation provided with the individual PEX server implementation.

BadValue
The specified escape identifier is unsupported.

SEE ALSO

PEXEscape(3)

NAME

PEXEscape-ES_ESCAPE_DBLBUFFER - E & S Double-Buffering Request

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

To use the E & S DoubleBufferingRequest escape, the *escape_id* parameter should be set to **ES_ESCAPE_DBLBUFFER ,** the *escape_data* parameter should be set to point to structure type *esEscapeDblBuffer*, and the *length* parameter should be set to the total length of *escape_data.*

Sending this escape when the RendererState is *Rendering* will have an effect that is implementation-dependent.

This escape is not meant to be used for mixing X and PEX graphics. Attempts to do so when the renderer is in double-buffer mode will produce implementation-dependent results.

Note: As stated in Chapter 2 and Chapter 3 of the **Solaris PEX Implementation Specification** manual, PEX does not interoperate with the MBX extension.

DATA STRUCTURES

```
typedef struct {
        Drawable        drawable;
        unsigned long   bufferMode;
} esEscapeDblBuffer;
```

Values for *bufferMode* are listed below:

Symbol	Value	Action
ES_RENDERER_DBLBUFFER	1	Allocate a back (undisplayed) buffer. Drawing commands directed at drawable will be written into the back buffer. If drawable is already double-buffered, this will have no effect.
ES_RENDERER_SINGLEBUFFER	0	Deallocate the back buffer. If drawable is already single-buffered, this will have no effect.

ERRORS

BadValue

The specified *vendorId* or *escapeType* are not supported by the server.

BadValue

Returned if *bufferMode* is neither **ES_RENDERER_SINGLEBUFFER** nor

ES_RENDERER_DBLBUFFER.

BadDrawable
The specified Drawable resource ID is invalid.

BadAlloc
The second buffer cannot be allocated.

SEE ALSO

PEXEscape(3)

NAME

PEXEscape-ES_ESCAPE_SWAPBUFFER - E & S Swap Buffer Request

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

To use the E & S SwapBufferRequest escape, the *escape_id* parameter should be set to **ES_ESCAPE_SWAPBUFFER** the *escape_data* parameter should be set to point to structure type *esEscapeSwapBuffer* and the *length* parameter should be set to the total length of *escape_data.*

This request swaps buffers on the specified drawable. The undisplayed buffer becomes the displayed buffer and the previously displayed buffer will be in a state described by the value returned by the Swap Buffer Content Escape Request.

Sending this escape when the RendererState is *Rendering* will have an effect that is implementation dependent. Sending this escape with a drawable that is not double-buffered will have no effect.

DATA STRUCTURES

```
typedef struct {
        Drawable        drawable;
} esEscapeSwapBuffer;
```

ERRORS

BadDrawable
The specified Drawable resource ID is invalid.

BadValue
The *vendorId* and the *escapeType* are not supported by the server.

SEE ALSO

PEXEscape(3)

NAME

PEXEscape-HP_ESCAPE_DFRONT - HP Set Rendering Buffer Escape

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

To use the HP SetDrawBuffer escape, the *escape_id* parameter should be set to **HP_ESCAPE_DFRONT,** the *escape_data* parameter should be set to point to structure type *hpEscapeSetRenderingBuffer,* and the *length* parameter should be set to the total length of *escape_data.*

This escape allows you to specify which buffer to draw to, allowing you, for example, to draw something immediately to the displayed buffer.

DATA STRUCTURES

The data structure for Hewlett-Packard Set Rendering buffer is defined as a data record to follow the standard escape request header data structure.

```
typedef struct {
        Drawable        drawable;
        int             render_to_front_buffer;
} hpEscapeSetRenderingBuffer
```

Possible values for *render_to_front_buffer* are defined in the header file **HPpex.h** as follows:

Symbol	Value	Action
HP_RENDER_TO_BACK_BUFFER	0	Draw to the undisplayed buffer.
HP_RENDER_TO_FRONT_BUFFER	1	Draw to the displayed buffer.

ERRORS

BadDrawable
The specified Drawable resource ID is invalid.

BadValue
The value for *render_to_front_buffer* was incorrect.

SEE ALSO

PEXEscape(3)

NAME

PEXEscape-PEXSunEscIdChangeExtRendAttr - PEX Change Extended Renderer Attributes

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

To use the Sun ChangeExtendedRendererAttributes escape, the *escape_id* parameter should be set to **PEXSunEscIdChangeExtRendAttr,** the *escape_data* parameter should be set to point to structure type *pexSunEscChangeExtRendAttr,* and the *length* parameter should be set to the total length of *escape_data.*

This escape allows modification of one or more of the extended renderer attributes. The semantics of this escape are the same as those of **PEXChangeRenderer**(3)**.**

DATA STRUCTURES

```
typedef struct {
        pexEnumTypeIndex        fpFormat B16;
        CARD16                  ununsed B16;
        XID                     id B32;  /* renderer id */
        CARD32                  itemMask;
        /* LISTofVALUE */
} pexSunEscChangeExtRendAttr;
```

Values for *itemMask* are defined in **SunPEX.h** as listed below:

Symbol	Value	Explanation
PEXRDSunAAliasMode	0x00000001	Anti-aliasing mode attribute
PEXRDSunTranspMode	0x00000002	Transparency mode attribute
PEXRDSunStereoMode	0x00000004	Stereo mode attribute
PEXRDSunSilhouetteEdgeMode	0x00000008	Silhouette edge mode attribute

SEE ALSO

PEXEscape(3)
PEXChangeRenderer(3)

NAME

PEXEscape-PEXSunEscIdDefineMarkerType - PEX Define Marker Escape

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

To use the Sun DefineMakerType escape, the *escape_id* parameter should be set to **PEXSunEscIdDefineMarkerType,** the *escape_data* parameter should be set to point to structure type *pexSunEscDefineMarkerType*, and the *length* parameter should be set to the total length of *escape_data.*

This escape allows the application to define a marker as a set of unconnected polylines. This set is constructed of point sequences; each point sequence generates connected line segments. The points are specified in marker nominal coordinates: [-1.0, 1.0] in both x and y.

DATA STRUCTURES

```
typedef struct {
        pexEnumTypeIndex        fpFormat B16;
        CARD16                  ununsed B16;
        CARD32                  marker_id;
        CARD32                  num_lists;
        /* LISTof LISTof COORD2D */
} pexSunEscDefineMarkerType;
```

ERRORS

BadValue

The length field of the escape is too small.

SEE ALSO

PEXEscape(3)

NAME

PEXEscape-PEXSunEscIdFlushRenderer - PEX Flush Renderer Escape

SYNTAX

void PEXEscape(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
escape_id	The escape identifier.
length	The length, in bytes, of data for the escape request.
escape_data	A pointer to data for the escape request.

RETURNS

None

DESCRIPTION

To use the Sun FlushRenderer escape, the *escape_id* parameter should be set to **PEXSunEscIdFlushRenderer,** the *escape_data* parameter should be set to point to structure type *pexSunEscFlushRendererData,* and the *length* parameter should be set to the total length of *escape_data.*

This escape forces all pending output commands to be either drawn or discarded.

If flush is **True,** all pending output is rendered onto the drawable associated with the renderer, or if the renderer state is *Picking,* all pending output is processed. If flush is **False,** all pending output is discarded.

If the renderer state is Idle, this escape has no effect.

DATA STRUCTURES

```
typedef struct {
        CARD32      rdr B32;
        CARD8       flush;
        CARD8       unused[3];
} pexSunEscFlushRendererData;
```

SEE ALSO

PEXEscape(3)

NAME

PEXEscapeWithReply-ES_ESCAPE_SWAPBUFFERCONTENT - E & S Inquire Swap Buffer Content Request

SYNTAX

char *PEXEscapeWithReply(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*, unsigned long **reply_length_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

escape_id The escape identifier.

length The length, in bytes, of data for the escape request.

escape_data A pointer to data for the escape request.

reply_length_return Returns the length, in bytes, of the reply data.

RETURNS

A pointer to the escape reply data; a null pointer if unsuccessful.

DESCRIPTION

To use the E & S SwapBufferContentRequest escape, the *escape_id* parameter should be set to **ES_ESCAPE_SWAPBUFFERCONTENT** the *escape_data* parameter should be set to point to structure type *esEscapeSwapBufferContent* and the *length* parameter should be set to the total length of *escape_data.*

This inquiry reports to the client what will be in the back buffer after a swap buffer escape request has occurred. Since this escape always returns the same value for a given *drawable,* it is unnecessary to issue this escape after every swap because the state of the previously displayed buffer remains consistent for *drawable.*

This inquiry returns a pointer to an unsigned long *content.* Possible values returned for *content* are listed below:

Symbol	Value	Action
ES_DB_SWAP_CONTENT_UNDEFINED	0	The content of the previously displayed buffer is undefined.
ES_DB_SWAP_CONTENT_CLEAR_TO_BACKGROUND*	1	The previously displayed buffer is cleared to background after the swap buffer request.
ES_DB_SWAP_CONTENT_UNCHANGED	2	The previously displayed buffer content is unchanged after the swap buffer request.
ES_DB_SWAP_CONTENT_FRONTBUFFER	3	The previously displayed buffer has the same content as the now currently displayed buffer after the swap buffer request.

DATA STRUCTURES

```
typedef struct {
    Drawable    drawable;
} esEscapeSwapBufferContent;
```

ERRORS

BadDrawable
The specified Drawable resource ID is invalid.

SEE ALSO

PEXEscapeWithReply(3)

NAME

PEXEscapeWithReply-PEXSunEscIdGetExtRendAttr - PEX Get Extended Renderer Attributes

SYNTAX

char *PEXEscapeWithReply(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*, unsigned long **reply_length_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

escape_id The escape identifier.

length The length, in bytes, of data for the escape request.

escape_data A pointer to data for the escape request.

reply_length_return Returns the length, in bytes, of the reply data.

RETURNS

A pointer to the escape reply data; a null pointer if unsuccessful.

DESCRIPTION

To use the Sun GetExtendedRendererAttributes escape, the *escape_id* parameter should be set to **PEXSunEscIdGetExtRendAttr,** the *escape_data* parameter should be set to point to structure type *pexSunEscGetExtRendAttr,* and the *length* parameter should be set to the total length of *escape_data.*

This escape allows inquiry of one or more of the extended renderer attributes. The semantics of this escape are the same as those of **PEXGetRendererAttributes**(3)**.**

This escape returns a pointer to reply data in the following format:

unused[20 bytes]
value(1) [4 bytes]
...
value(n) [4 bytes]

where value(i) corresponds to the i-th bit of the renderer attribute set in the *itemMask.*

DATA STRUCTURES

```
typedef struct {
    pexEnumTypeIndex    fpFormat B16;
    CARD16              ununsed B16;
    XID                 id B32;        /* renderer id */
    CARD32              itemMask;
} pexSunEscGetExtRendAttr;
```

Values for *itemMask* are defined in **SunPEX.h** as listed below:

Symbol	Value	Explanation
PEXRDSunAAliasMode	0x00000001	Anti-aliasing mode attribute
PEXRDSunTranspMode	0x00000002	Transparency mode attribute
PEXRDSunStereoMode	0x00000004	Stereo mode attribute
PEXRDSunSilhouetteEdgeMode	0x00000008	Silhouette edge mode attribute

SEE ALSO

PEXEscape(3)
PEXEscapeWithReply(3)
PEXGetRendererAttributes(3)

NAME

PEXEscapeWithReply-PEXSunEscIdGetExtRendAttrDyn - PEX Get Extended Renderer Attributes Dynamics

SYNTAX

char *PEXEscapeWithReply(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*, unsigned long **reply_length_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

escape_id The escape identifier.

length The length, in bytes, of data for the escape request.

escape_data A pointer to data for the escape request.

reply_length_return Returns the length, in bytes, of the reply data.

RETURNS

A pointer to the escape reply data; a null pointer if unsuccessful.

DESCRIPTION

To use the Sun GetExtendedRendererAttributesDynamics escape, the *escape_id* parameter should be set to **PEXSunEscIdGetExtRendAttrDyn,** the *escape_data* parameter should be set to point to structure type *pexSunEscGetExtRendAttrDyn*, and the *length* parameter should be set to the total length of *escape_data.*

This escape allows inquiry of the extended renderer dynamics. The semantics of this escape are the same as those of **PEXGetRendererDynamics**(3)**.** This information is renderer-dependent.

This escape returns a pointer to reply data *itemMask,* of type *unsigned long.*

Values for *itemMask* are defined in **SunPEX.h** as listed below:

Symbol	Value	Explanation
PEXRDSunAAliasMode	0x00000001	Anti-aliasing mode attribute is dynamic
PEXRDSunTranspMode	0x00000002	Transparency mode attribute is dynamic
PEXRDSunStereoMode	0x00000004	Stereo mode attribute is dynamic
PEXRDSunSilhouetteEdgeMode	0x00000008	Silhouette edge mode attribute is dynamic

DATA STRUCTURES

```
typedef struct {
    XID     id B32;
} pexSunEscGetExtRendAttrDyn;
```

SEE ALSO

PEXEscape(3)
PEXEscapeWithReply(3)
PEXGetRendererDynamics(3)

NAME

PEXEscapeWithReply-PEXSunEscIdGetMarkerDescr - PEX Get Marker Description Escape

SYNTAX

char *PEXEscapeWithReply(Display **display*, unsigned long *escape_id*, int *length*, char **escape_data*, unsigned long **reply_length_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

escape_id The escape identifier.

length The length, in bytes, of data for the escape request.

escape_data A pointer to data for the escape request.

reply_length_return Returns the length, in bytes, of the reply data.

RETURNS

A pointer to the escape reply data; a null pointer if unsuccessful.

DESCRIPTION

To use the Sun GetMarkerDescription escape, the *escape_id* parameter should be set to **PEXSunEscIdGetMarkerDescr,** the *escape_data* parameter should be set to point to structure type *pexSunEscGetMarkerDescr,* and the *length* parameter should be set to the total length of *escape_data.*

This escape allows inquiry of a user-defined marker.

This escape returns a pointer to reply data in the following format:

unused[20 bytes]
num_lists [4 bytes]
list(1)
¨...
list(num_lists)

Each list contains the following:

num_verts [4 bytes]
x(1) [float]
y(1) [float]
¨...
x[num_verts
y[num_verts]

DATA STRUCTURES

```
typedef struct {
    pexEnumTypeIndex    fpFormat B16;
    CARD16              ununsed B16;
    CARD32              marker_id;
} pexSunEscGetMarkerDescr;
```

SEE ALSO

PEXEscape(3)
PEXEscapeWithReply(3)

NAME

PEXExecuteDeferredActions - Execute Deferred Workstation Actions

SYNTAX

void PEXExecuteDeferredActions(Display **display*, PEXWorkstation *workstation*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

RETURNS

None

DESCRIPTION

This function causes all deferred actions on the specified workstation to be executed. This will cause all requested attributes to be made current and the corresponding update attributes to be set to **PEXNotPending.**

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

SEE ALSO

PEXRedrawAllStructures(3)

NAME

PEXExecuteStructure - Execute Structure

SYNTAX

void PEXExecuteStructure(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXStructure *structure*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
structure	The resource identifier of the structure.

RETURNS

None

DESCRIPTION

This function creates an execute structure output command which causes the specified *structure* to be executed during structure traversal. Executing a *structure* consists of these steps:

1. Save the current state of the rendering pipeline.
2. Set the global transform to the current composite modeling transform.
3. Set the local transform to the identity matrix.
4. Process all structure elements in the called structure.
5. Restore the state saved at step 1.

If *structure* does not exist at the time **PEXExecuteStructure** is processed, a **BadPEXOutputCommand** error is produced. The structure must first be created.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXBeginStructure(3)
PEXEndStructure(3)

NAME

PEXExtendedCellArray - Extended 3D Cell Array Primitive

SYNTAX

void PEXExtendedCellArray(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **point1*, PEXCoord **point2*, PEXCoord **point3*, unsigned int *col_count*, unsigned int *row_count*, int *color_type*, PEXArrayOfColor *colors*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
point1	The first cell array definition point.
point2	The second cell array definition point.
point3	The third cell array definition point.
col_count	The number of cell columns (number of cells in the X direction).
row_count	The number of cell rows (number of cells in the Y direction).
color_type	The type of color for the cell colors (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
colors	An array of colors specifying the color of each cell.

RETURNS

None

DESCRIPTION

This function creates a 3D cell array output primitive.

This function is similar to **PEXCellArray**(3)**,** except the colors are passed as either indexed color values or direct color values, depending on the color type.

DATA STRUCTURES

```
typedef union {
        PEXColorIndexed     *indexed;
        PEXColorRGB         *rgb;
        PEXColorHSV         *hsv;
        PEXColorHLS         *hls;
        PEXColorCIE         *cie;
        PEXColorRGB8        *rgb8;
        PEXColorRGB16       *rgb16;
} PEXArrayOfColor;
```

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXFetchElements - Fetch Elements

SYNTAX

Status PEXFetchElements(Display **display*, PEXStructure *structure*, int *whence1*, long *offset1*, int *whence2*, long *offset2*, int *float_format*, unsigned long **count_return*, unsigned long **length_return*, char ***ocs_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence1	A value specifying, with *offset1*, the first limit of the range of elements to be fetched (**PEXBeginning, PEXCurrent, PEXEnd**).
offset1	The offset from *whence1* denoting the first limit of the range of elements to be fetched.
whence2	A value specifying, with *offset2*, the second limit of the range of elements to be fetched (**PEXBeginning, PEXCurrent, PEXEnd**).
offset2	The offset from *whence2* denoting the second limit of the range of elements to be fetched.
float_format	The floating point format to use when formatting the output commands to be fetched (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
count_return	Returns the number of output commands returned.
length_return	Returns the length, in bytes, of the output commands fetched.
ocs_return	Returns a pointer to protocol-formatted output commands (structure elements).

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function fetches a range of structure elements from the specified *structure.*

If either computed offset is less than zero, it is set to zero before fetching the structure elements. If either computed offset is greater than the number of elements in the *structure,* it is set to the offset of the last structure element in the *structure.* The element pointer attribute of *structure* is not affected by this command. No information will be returned for inquiries on element offset zero.

An null pointer is returned is the requested floating point format is not supported.

Any text or annotation text output commands returned will be formatted as encoded text or encoded annotation text.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

typedef XID PEXStructure;

ERRORS

BadPEXFloatingPointFormat
The specified floating point format is invalid or unsupported.

BadPEXStructure
The specified *structure* resource identifier is invalid.

BadValue
The specified value for whence parameter is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXDecodeOCs(3)
PEXEncodeOCs(3)
PEXSendOCs(3)

NAME

PEXFetchElementsAndSend - Fetch Elements and Send to Display

SYNTAX

Status PEXFetchElementsAndSend(Display **src_display*, PEXStructure *structure*, int *whence1*, long *offset1*, int *whence2*, long *offset2*, Display **dst_display*, XID *resource_id*, PEXOCRequestType *req_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence1	A value specifying, with *offset1*, the first limit of the range of elements to be fetched (**PEXBeginning, PEXCurrent, PEXEnd**).
offset1	The offset from *whence1* denoting the first limit of the range of elements to be fetched.
whence2	A value specifying, with *offset2*, the second limit of the range of elements to be fetched (**PEXBeginning, PEXCurrent, PEXEnd**).
offset2	The offset from *whence2* denoting the second limit of the range of elements to be fetched.
dst_display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output commands (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function is like **PEXFetchElements**(3) except that the list of output commands are not returned to the application but are sent directly to the specified destination display.

Calling this function is similar to calling **PEXFetchElements**(3)**,** and then sending the returned list of output commands by calling **PEXStartOC**(3)**, PEXCopyBytesToOC**(3) and **PEXFinishOCs**(3)**.**

If the destination display does not support the same floating point format as the format PEXlib is using with the source display, and if PEXlib can not convert to a format supported by the destination display, the function will return unsuccessfully.

Sending output commands to a *structure* whose editing mode is **PEXStructureReplace,** is not really useful. The behavior will be unpredictable unless a request type of **PEXOCStoreSingle** is used. And, if the request type is **PEXOCStoreSingle,** each output command will simply replace the previous one sent. Applications should ensure that the structure's editing mode is **PEXStructureInsert,** when sending multiple output commands. If it is intended to replace multiple elements, the application can delete those elements first, and then insert the new ones.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXStructure
The specified *structure* resource identifier is invalid.

BadValue
The specified value for whence parameter is invalid.

SEE ALSO

PEXFetchElements(3)

NAME

PEXFillArea - 3D Fill Area Primitive

SYNTAX

void PEXFillArea(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, int *ignore_edges*, unsigned int *count*, PEXCoord **points*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape of the fill area (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
ignore_edges	A flag that determines if surface edges are rendered (**True** or **False**).
count	The number of points.
points	An array of points defining the fill area.

RETURNS

None

DESCRIPTION

This function creates a fill area output primitive.

The area is defined by the list of *points* joined together to form a planar surface. Fill areas are not strictly required to be planar, but shading artifacts may occur if a fill area is not planar or nearly so. The first vertex of the fill area is connected to the second, the second to the third, and so on. The last vertex is implicitly connected to the first.

During the rendering process, the fill area vertices are transformed to positions in device coordinates. The surface colors are affected by the reflectance calculations which uses the light state, interior style, and reflection model attributes. Surface colors are further affected by the depth-cueing computation and then mapped to device colors. Fill areas outside the currently-defined clipping volume are not displayed. Fill areas crossing the clipping volume are clipped, and only the portions inside the clipping volume are displayed.

A fill area with fewer than three vertices is considered degenerate. It is stored in a structure, but when rendered, the primitive is ignored and has no visual effect.

A fill area may cross over itself to create a complex shape. The odd-even rule is used for determining the area that lies in the interior of the fill area. The shape hint is provided to enable performance improvements for certain shapes. Fill areas that are of higher complexity than indicated by the shape hint are rendered in an implementation-dependent manner. Consequently, applications should pass **PEXShapeUnknown** as the shape unless they are certain the fill area's shape is one of the other three.

The ignore edges flag is a boolean value specifying whether surface edges are rendered. If the flag is **True,** no surface edges are rendered for the fill area. If the ignore edges flag is **False,** surface edges are rendered according to the surface edge attributes if the surface edge flag attribute is **PEXOn.** Depending on the setting of the surface edge ASF values,

the surface edges, surface edge color, surface edge type, and surface edge width attributes are obtained from one of two sources. These attributes are obtained directly from the current surface edge attribute values or from the edge bundle lookup table entry specified by the current edge bundle index attribute depending on the setting of the surface edge ASF attribute.

Depending on the setting of the surface attribute ASF values, the surface color, interior style, interior style index, surface interpolation method, and reflection model attributes are obtained from one of two sources. These attributes are obtained directly from the current surface attributes values or from the interior bundle lookup table entry specified by the current interior bundle index attribute.

When a surface is rendered, the surface color and reflection attributes are used to compute the colors of the surface if it is front-facing with respect to the point of view and the current culling mode allows front-faces to be rendered. If the surface is back-facing, the current distinguish mode is **True,** and the current culling mode allows back-faces to be rendered, the corresponding back-facing attributes are used instead.

Regardless of the fill area orientation, if the interior style is **PEXInteriorStylePattern,** the pattern size, pattern reference point and pattern reference vectors are used to pattern the fill area.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)

PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXFillArea2D - 2D Fill Area Primitive

SYNTAX

void PEXFillArea2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, int *ignore_edges*, unsigned int *count*, PEXCoord2D **points*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape of the fill area (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
ignore_edges	A flag that determines if surface edges are rendered (**True** or **False**).
count	The number of points.
points	An array of points defining the fill area.

RETURNS

None

DESCRIPTION

This function creates a 2D fill area output primitive.

This function is like **PEXFillArea**(3)**,** except that the vertices consist of only x- and y-components. The z-component is assumed to be zero. This primitive is two-dimensional only in that the z-components are implied. Geometry transformations are still carried out in three dimensions.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)

PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXFillAreaSet - 3D Set of Fill Areas Primitive

SYNTAX

void PEXFillAreaSet(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, int *ignore_edges*, int *contour_hint*, unsigned int *count*, PEXListOfCoord **point_lists*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape which describes all of the contours (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
ignore_edges	A flag that determines if surface edges are rendered (**True** or **False**).
contour_hint	A flag that indicates whether contours are disjoint or overlapping (**PEXContourDisjoint, PEXContourNested, PEXContourIntersecting, PEXContourUnknown**).
count	The number of fill areas in the set.
point_lists	A pointer to the list of point arrays defining each contour of the fill area set.

RETURNS

None

DESCRIPTION

This function creates a fill area set output primitive.

This function is similar to **PEXFillArea**(3)**,** but allows for the creation of areas with *islands* or *holes.*

If any fill area in the set has fewer than three vertices, or if there are no contours defined, the primitive is considered degenerate. The primitive is stored in a structure, but when rendered, the primitive is ignored and has no visual effect.

A fill area set consists of an array of fill areas that define "contours" (disjoint pieces or holes) making up the primitive. Each fill area, or contour, is defined by a list of vertices joined together to form a planar surface.

The contour hint provides further information about the relationships between contours in the fill area set. If the contour hint is **PEXContourDisjoint,** all contours will be spatially disjoint. No overlapping or intersection occurs between any contours in the fill area set. If the contour hint is **PEXContourNested,** contours will either be disjoint or wholly contained within another contour. No contour will have edges that intersect or are coincident with edges of any other contour. If the contour hint is **PEXContourIntersecting,** separated contours may have edges that are coincident or overlap. If the contour hint is **PEXContourUnknown** nothing is known about the interrelationships between contours. Fill area sets with contours that have higher complexity interrelationships than that indicated by the contour hint are rendered in an implementation-dependent manner.

The ignore edges flag is applied to each of the fill areas in the set.

All other aspects of this primitive are the same as **PEXFillArea**(3)**.**

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXFillAreaSet2D - 2D Set of Fill Areas Primitive

SYNTAX

void PEXFillAreaSet2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, int *ignore_edges*, int *contour_hint*, unsigned int *count*, PEXListOfCoord2D **point_lists*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape which describes all of the contours (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
ignore_edges	A flag that determines if surface edges are rendered (**True** or **False**).
contour_hint	A flag that indicates whether contours are disjoint or overlapping (**PEXContourDisjoint, PEXContourNested, PEXContourIntersecting, PEXContourUnknown**).
count	The number of fill areas in the set.
point_lists	A pointer to the list of point arrays defining each contour of the fill area set.

RETURNS

None

DESCRIPTION

This function creates a 2D fill area set output primitive.

This function is like **PEXFillAreaSet**(3)**,** except that the vertices consist of only x- and y-components. The z-component is assumed to be zero. This primitive is two-dimensional only in that the z-components are implied. Geometry transformations are still carried out in three dimensions.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)

PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXFillAreaSetWithData - 3D Set of Fill Areas Primitive With Additional Data

SYNTAX

void PEXFillAreaSetWithData(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, int *ignore_edges*, int *contour_hint*, unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, unsigned int *count*, PEXFacetData **facet_data*, PEXListOfVertex **vertex_lists*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape which describes all of the contours (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
ignore_edges	A flag that determines if surface edges are rendered (**True** or **False**).
contour_hint	A flag that indicates whether contours are disjoint or overlapping **(PEXContourDisjoint, PEXContourNested, PEXContourIntersecting, PEXContourUnknown**).
facet_attributes	A mask indicating the facet attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
vertex_attributes	A mask indicating the vertex attributes provided (**PEXGANone, PEXGAColor, PEXGANormal, PEXGAEdges**).
color_type	The type of color data provided (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
count	The number of fill areas in the set.
facet_data	A pointer to facet data.
vertex_lists	A pointer to the list of vertex arrays defining each contour of the fill area set.

RETURNS

None

DESCRIPTION

This function creates a fill area set output primitive.

This function is like **PEXFillAreaSet**(3) except that it allows additional information to be specified for each fill area and for each vertex. It is similar to **PEXFillAreaWithData**(3) but allows for the creation of areas with *islands* or *holes*. Color values passed must be of the specified color type.

The facet attributes indicate the content of the facet data. This data may be a color, a normal, or a color followed by a normal. Use the constants **PEXGANone, PEXGAColor** and **PEXGANormal** to construct a mask indicating the data provided. If specified, the facet color takes precedence over the surface color. If specified, the facet normal is used to

determine whether the fill area is back-facing.

The vertex attributes indicate the content of each fill area vertex. In addition to the coordinate (x,y,z), applications may specify a color, a normal, an edge flag, or any combination of the three specified in the order given. Use the constants **PEXGANone, PEXGAColor, PEXGANormal** and **PEXGAEdges** to construct a mask indicating the data provided. If specified, vertex colors will override facet color or the current surface color. If specified, vertex normals are taken to be normals at the vertices of the fill area.

The reflection model and the surface interpolation will affect how the additional data is used in rendering the surface. Edge controls are used to indicate those edges rendered if the surface edges are enabled. The edge control for vertex i indicates whether or not to render the edge between vertex i and vertex i+1. Surface edges are always rendered with the surface edge color and are not affected by the facet or vertex colors.

Normals are assumed to be unit length vectors. The effect if the normal is not unit length is implementation-dependent.

All other aspects of this primitive are the same as **PEXFillAreaSet**(3)**.**

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)

PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXFillAreaWithData - 3D Fill Area Primitive With Additional Data

SYNTAX

void PEXFillAreaWithData(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, int *ignore_edges*, unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, PEXFacetData **facet_data*, unsigned int *count*, PEXArrayOfVertex *vertices*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape of the fill area (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
ignore_edges	A flag that determines if surface edges are rendered (**True** or **False**).
facet_attributes	A mask indicating the facet attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
vertex_attributes	A mask indicating the vertex attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
color_type	The type of color data provided (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
facet_data	A pointer to facet data.
count	The number of vertices.
vertices	An array of vertices defining the fill area.

RETURNS

None

DESCRIPTION

This function creates a fill area output primitive.

This function is like **PEXFillArea**(3) except that it allows additional information to be specified for the fill area and for each vertex. Color values passed must be of the specified color type.

The facet attributes indicate the content of the facet data. This data may be a color, a normal, or a color followed by a normal. Use the constants **PEXGANone, PEXGAColor** and **PEXGANormal** to construct a mask indicating the data provided. If specified, the facet color takes precedence over the surface color. If specified, the facet normal is used to determine whether the fill area is back-facing.

The vertex attributes indicate the content of each fill area vertex. In addition to the coordinate (x,y,z), applications may specify a color, a normal, or a color followed by a normal for each vertex. Use the constants **PEXGANone, PEXGAColor** and **PEXGANormal** to construct a mask indicating the data provided. If specified, vertex colors will override

facet color or the current surface color. If specified, vertex normals are taken to be normals at the vertices of the fill area.

The reflection model and the surface interpolation will affect how the additional data is used in rendering the surface.

Normals are assumed to be unit length vectors. The effect if the normal is not unit length is implementation-dependent.

All other aspects of this primitive are the same as **PEXFillArea**(3)**.**

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME PEXFinishOCs – Finish Encoded Output Commands

SYNTAX void PEXFinishOCs(Display **display*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

RETURNS None

DESCRIPTION This function should be called to complete the sending of encoded output commands. The display connection is unlocked.

ERRORS None

SEE ALSO

PEXStartOCs(3)
PEXCopyBytesToOC(3)
PEXGetOCAddr(3)

NAME

PEXFreeEnumInfo – Free Memory Allocated for Enumerated Type Information

SYNTAX

void PEXFreeEnumInfo(unsigned long *count*, unsigned long **info_count*, PEXEnumTypeDesc **enum_info*)

PARAMETERS

count	The number of enumerated types.
info_count	An array of counts. This corresponds to the *info_count_return* parameter in **PEXGetEnumTypeInfo**(3)**.**
enum_info	An array of enumerated type descriptors. This corresponds to the *enum_info_return* parameter of **PEXGetEnumTypeInfo**(3)**.**

RETURNS

None

DESCRIPTION

PEXFreeEnumInfo frees memory allocated by PEXlib for the return value and return parameter in **PEXGetEnumTypeInfo**(3)**.**

ERRORS

None

SEE ALSO

PEXGetEnumTypeInfo(3)

NAME

PEXFreeFontInfo – Free Font Info Returned by PEXListFontsWithInfo and PEX-QueryFont

SYNTAX

void PEXFreeFontInfo(unsigned long *count*, PEXFontInfo **font_info*)

PARAMETERS

count	The number of font info structures.
font_info	An array of font info structures.

RETURNS

None

DESCRIPTION

This function deallocates memory returned by **PEXListFontsWithInfo**(3) and **PEX-QueryFont**(3)**.**

ERRORS

None

SEE ALSO

PEXListFontsWithInfo(3)
PEXQueryFont(3)

NAME

PEXFreeFontNames – Free Font Names Returned by PEXListFonts, PEXListFontsWithInfo

SYNTAX

void PEXFreeFontNames(unsigned long *count*, char *******font_names*)

PARAMETERS

count	The number of font names.
font_names	An array of font names (null-terminated strings).

RETURNS

None

DESCRIPTION

This function deallocates memory returned by **PEXListFonts**(3) and **PEXListFontsWithInfo**(3)**.**

ERRORS

None

SEE ALSO

PEXListFonts(3)
PEXListFontsWithInfo(3)

NAME PEXFreeLookupTable – Free Lookup Table

SYNTAX void PEXFreeLookupTable(Display **display*, PEXLookupTable *table*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
table	The resource identifier of the lookup table.

RETURNS None

DESCRIPTION This function deletes the association between the lookup table resource identifier and the lookup table. The lookup table is freed when no other resource references it.

ERRORS

BadPEXLookupTable
The specified lookup table resource identifier is invalid.

SEE ALSO **PEXCreateLookupTable**(3)

NAME

PEXFreeNameSet – Free Name Set

SYNTAX

void PEXFreeNameSet(Display **display*, PEXNameSet *nameset*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

nameset The resource identifier of the name set.

RETURNS

None

DESCRIPTION

This function deletes the association between the name set resource identifier and the name set. The name set is freed when no other resource references it.

ERRORS

BadPEXNameSet
The specified name set resource identifier is invalid.

SEE ALSO

PEXCreateNameSet(3)

NAME PEXFreeOCData – Deallocate OC Data

SYNTAX void PEXFreeOCData(unsigned long *count*, PEXOCData **oc_data*)

PARAMETERS

count	The number of output commands.
oc_data	An array of output command data.

RETURNS None

DESCRIPTION This function deallocates memory allocated by PEXlib to hold decoded output command data.

ERRORS None

SEE ALSO **PEXDecodeOCs**(3)

NAME PEXFreePCAttributes – Free Storage Returned by PEXGetPipelineContext

SYNTAX void PEXFreePCAttributes(PEXPCAttributes **values*)

PARAMETERS *values* A pointer to the pipeline context attribute values.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetPipelineContext**(3)**.**

ERRORS None

SEE ALSO **PEXGetPipelineContext**(3)

NAME PEXFreePDAttributes – Free Storage Returned by PEXGetPickDevice

SYNTAX void PEXFreePDAttributes(PEXPDAttributes **values*)

PARAMETERS *values* A pointer to the pick device attribute values.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetPickDevice**(3)**.**

ERRORS None

SEE ALSO **PEXGetPickDevice**(3)

NAME PEXFreePMAttributes – Free Storage Returned by PEXGetPickMeasure

SYNTAX void PEXFreePMAttributes(PEXPMAttributes **values*)

PARAMETERS *values* A pointer to the pick measure attribute values.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetPickMeasure**(3)**.**

ERRORS None

SEE ALSO **PEXGetPickMeasure**(3)

NAME

PEXFreePickMeasure – Free Pick Measure

SYNTAX

void PEXFreePickMeasure(Display **display*, PEXPickMeasure *pick_measure*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

pick_measure The resource identifier of the pick measure.

RETURNS

None

DESCRIPTION

This function deletes the pick measure resource and frees memory associated with it.

ERRORS

BadPEXPickMeasure
The specified pick measure resource identifier is invalid.

SEE ALSO

PEXCreatePickMeasure(3)

NAME

PEXFreePickPaths – Free Memory Allocated for Pick Paths

SYNTAX

void PEXFreePickPaths(unsigned long *count*, PEXPickPath **pick_paths*)

PARAMETERS

count	The number of pick paths.
pick_paths	An array of pick paths.

RETURNS

None

DESCRIPTION

This function deallocates memory returned by **PEXEndPickAll**(3) and **PEXPickAll**(3)**.**

ERRORS

None

SEE ALSO

PEXEndPickAll(3)
PEXPickAll(3)

NAME PEXFreePipelineContext – Free Pipeline Context

SYNTAX void PEXFreePipelineContext(Display **display*, PEXPipelineContext *context*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

context The resource identifier of the pipeline context.

RETURNS None

DESCRIPTION This function deletes the association between the pipeline context resource identifier and the pipeline context. The pipeline context is freed when no other resource references it.

ERRORS

BadPEXPipelineContext
The specified pipeline context resource identifier is invalid.

SEE ALSO **PEXCreatePipelineContext**(3)

NAME

PEXFreeRenderer – Free Renderer

SYNTAX

void PEXFreeRenderer(Display **display*, PEXRenderer *renderer*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

renderer The resource identifier of the renderer.

RETURNS

None

DESCRIPTION

This function deletes the renderer resource specified by renderer and frees the memory associated with it.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

SEE ALSO

PEXCreateRenderer(3)

NAME PEXFreeRendererAttributes - Free Storage Returned by PEXGetRendererAttributes

SYNTAX void PEXFreeRendererAttributes(PEXRendererAttributes **values*)

PARAMETERS *values* A pointer to the renderer attribute values.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetRendererAttributes**(3)**.**

ERRORS None

SEE ALSO **PEXGetRendererAttributes**(3)

NAME PEXFreeSCAttributes – Free Storage Returned by PEXGetSearchContext

SYNTAX void PEXFreeSCAttributes(PEXSCAttributes **values*)

PARAMETERS *values* A pointer to the search context attribute values.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetSearchContext**(3)**.**

ERRORS None

SEE ALSO **PEXGetSearchContext**(3)

NAME PEXFreeSearchContext – Free Search Context

SYNTAX void PEXFreeSearchContext(Display **display*, PEXSearchContext *context*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

context The resource identifier of the search context.

RETURNS None

DESCRIPTION This function deletes the search context resource and frees memory associated with it.

ERRORS

BadPEXSearchContext
The specified search context resource identifier is invalid.

SEE ALSO **PEXCreateSearchContext**(3)

NAME

PEXFreeStructurePaths – Free Structure Paths Memory

SYNTAX

void PEXFreeStructurePaths(unsigned long *count*, PEXStructurePath **paths*)

PARAMETERS

count	The number of structure paths.
paths	An array of structure paths.

RETURNS

None

DESCRIPTION

This function deallocates memory returned by **PEXGetAncestors**(3)**, PEXGetDescendants**(3)**,** and **PEXSearchNetwork**(3)**.**

ERRORS

None

SEE ALSO

PEXGetAncestors(3)
PEXGetDescendants(3)
PEXSearchNetwork(3)

NAME PEXFreeTableEntries – Free Storage associated with Tables Entries Return Parameters

SYNTAX void PEXFreeTableEntries(int *table_type*, unsigned int *count*, PEXPointer *entries*)

PARAMETERS

table_type	The type of table entries in the array.
count	The number of entries in the array.
entries	An array of table entries.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetPredefinedEntries**(3)**, PEXGetTableEntries**(3) and **PEXGetTableEntry**(3)**.**

ERRORS None

SEE ALSO
PEXGetPredefinedEntries(3)
PEXGetTableEntries(3)
PEXGetTableEntry(3)

NAME

PEXFreeWorkstation – Free Workstation

SYNTAX

void PEXFreeWorkstation(Display **display*, PEXWorkstation *workstation*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

RETURNS

None

DESCRIPTION

This function deletes the PHIGS workstation resource and frees memory associated with it.

ERRORS

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

SEE ALSO

PEXCreateWorkstation(3)

NAME PEXFreeWorkstationAttributes – Free Storage Returned by PEXGetWorkstationAttributes

SYNTAX void PEXFreeWorkstationAttributes(PEXWorkstationAttributes **values*)

PARAMETERS *values* A pointer to the workstation attribute values.

RETURNS None

DESCRIPTION This function deallocates memory returned by **PEXGetWorkstationAttributes**(3)**.**

ERRORS None

SEE ALSO **PEXGetWorkstationAttributes**(3)

NAME

PEXGDP - 3D Generalized Drawing Primitive

SYNTAX

void PEXGDP(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *gdp_id*, unsigned int *count*, PEXCoord **points*, unsigned long *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
gdp_id	The identifier of the GDP.
count	The number of points.
points	The points used by the GDP.
length	The length, in bytes, of the data.
data	Additional data used by the GDP.

RETURNS

None

DESCRIPTION

This function creates a generalized drawing primitive.

The complete interface and behavior for each GDP identifier should be available with the individual PEX server implementations. There are no standard PEX GDPs. If the specified GDP identifier is not supported, then the output command is ignored. The table below lists the supported GDP identifier.

GDP Identifier	Description
PEXSunGDP3DIdCircle	Circle
PEXSunGDP3DIdCircArc	Circular arc
PEXSunGDP3DIdCircArcClose	Circular arc close
PEXSunGDP3DIdAnnotCircle	Annotation circle
PEXSunGDP3DIdAnnotCircArc	Annotation circle arc
PEXSunGDP3DIdAnnotCircArcClose	Annotation circle arc close
PEXSunGDP3DIdEllipse	Ellipse
PEXSunGDP3DIdEllpArc	Elliptical arc
PEXSunGDP3DIdEllpArcClose	Elliptical arc close
PEXSunGDP3DIdAnnotEllipse	Annotation ellipse
PEXSunGDP3DIdAnnotEllpArc	Annotation elliptical arc
PEXSunGDP3DIdAnnotEllpArcClose	Annotation elliptical arc close
PEXSunGDP3DIdRectGrid	Rectangular grid
PEXSunGDP3DIdRadialGrid	Radial grid
PEXSunGDP3DIdTriangleList	Triangle list
ESGdpSphere	Sphere
ESGdpSphereRadius	Sphere with radius
ESGdpSphereColour	Sphere with colour

GDP Identifier	Description
ESGdpSphereRadiusColour	Sphere with radius and colour
ESGdpCylinder	Cylinder
ESGdpCylinderRadius	Cylinder with radius
ESGdpCylinderColour	Cylinder with colour
ESGdpCylinderRadiusColour	Cylinder with radius and colour

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXGDP2D - 2D Generalized Drawing Primitive

SYNTAX

void PEXGDP2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *gdp_id*, unsigned int *count*, PEXCoord2D **points*, unsigned long *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
gdp_id	The identifier of the GDP.
count	The number of points.
points	The points used by the GDP.
length	The length, in bytes, of the data.
data	Additional data used by the GDP.

RETURNS

None

DESCRIPTION

This function creates a 2D generalized drawing primitive.

The complete interface and behavior for each GDP identifier should be available with the individual PEX server implementations. There are no standard PEX GDPs. If the specified GDP identifier is not supported, then the output command is ignored. The table below lists the supported GDP identifier.

GDP Identifier Description

GDP Identifier	Description
PEXSunGDP2DIdCircle	Circle
PEXSunGDP2DIdCircArc	Circular arc
PEXSunGDP2DIdCircArcClose	Circular arc close
PEXSunGDP2DIdAnnotCircle	Annotation circle
PEXSunGDP2DIdAnnotCircArc	Annotation circle arc
PEXSunGDP2DIdAnnotCircArcClose	Annotation circle arc close
PEXSunGDP2DIdEllipse	Ellipse
PEXSunGDP2DIdEllpArc	Elliptical arc
PEXSunGDP2DIdEllpArcClose	Elliptical arc close
PEXSunGDP2DIdAnnotEllipse	Annotation ellipse
PEXSunGDP2DIdAnnotEllpArc	Annotation elliptical arc
PEXSunGDP2DIdAnnotEllpArcClose	Annotation elliptical arc close
PEXSunGDP2DIdRectGrid	Rectangular grid
PEXSunGDP2DIdRadialGrid	Radial grid

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXGSE - Generalized Structure Element

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

This function creates a generalized structure element.

The complete interface and behavior for each GSE identifier should be available with the individual PEX server implementations. If the specified GSE identifier is not supported, then the output command is ignored. The table below lists the supported GSE identifiers.

GSE Identifier	Description
PEXSunGSEIdSetHighlightColor	Set highlighting color
PEXSunGSEIdSetTextSlantAngle	Set text slant angle
PEXSunGSEIdSetAnnotTextSlantAngle	Set annotation text slant angle
PEXSunGSEIdSetStrokeAAliasParams	Set stroke anti-aliasing parameters
PEXSunGSEIdSetEndcap	Set stroke end cap
PEXSunGSEIdSetStrokeJoin	Set stroke join
PEXSunGSEIdSetSilhouetteEdgeFlag	Set silhouette edge flag
PEXSunGSEIdSetSurfTranspCoef	Set surface transparency coefficient
ESGseSphereRadius	Set sphere radius
ESGseSphereDivisions	Set sphere precision
ESGseCylinderRadius	Set cylinder radius
ESGseCylinderDivisions	Set cylinder precision

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXGSE-ESGseCylinderDivisions - E & S Cylinder Division GSE

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the E & S CylinderDivisions GSE, the *id* parameter should be set to **ESGseCylinderDivisions,** the *data* parameter should be set to point to structure type *esCylinderDivisionData*, and the *length* parameter should be set to the total length of *data.*

The E & S Cylinder Division GSE specifies the division with which cylinders are drawn. Cylinders will be drawn with *div* number of latitude lines and a corresponding number of longitude lines.

DATA STRUCTURES

The data structure for this GSE is defined in **ESproto.h** as follows:

```
typedef struct {
        CARD32          div;
} esCylinderDivisionData;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-ESGseCylinderRadius - E & S Cylinder Radius GSE

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the E & S CylinderRadius GSE, the *id* parameter should be set to **ESGseCylinderRadius,** the *data* parameter should be set to point to structure type *esCylinderRadiusData,* and the *length* parameter should be set to the total length of *data.*

Sphere GSEs that do not include a specification for radii will be rendered using an inherited radius attribute. This attribute is set in the workstation state or renderer state via the E & S Cylinder Radius GSE.

DATA STRUCTURES

The data structure for this GSE is defined in **ESproto.h** as follows:

```
typedef struct {
        PEXFLOAT      radius;
} esCylinderRadiusData;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-ESGseSphereDivisions - E & S Sphere Division GSE

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the E & S SphereDivisions GSE, the *id* parameter should be set to **ESGseSphereDivisions,** the *data* parameter should be set to point to structure type *esSphereDivisionData,* and the *length* parameter should be set to the total length of *data.*

This GSE specifies the division with which spheres are drawn. Spheres will be drawn with *div* number of latitude lines and a corresponding number of longitude lines.

DATA STRUCTURES

The data structure for this GSE is defined in **ESproto.h** as follows:

```
typedef struct {
        CARD32          div;
} esSphereDivisionData;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-ESGseSphereRadius - E & S Sphere Radius GSE

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the E & S SphereRadius GSE, the *id* parameter should be set to **ESGseSphereRadius,** the *data* parameter should be set to point to structure type *esSphereRadiusData,* and the *length* parameter should be set to the total length of *data.*

Sphere GSEs that do not include a specification for radii will be rendered using an inherited radius attribute. This attribute is set in the workstation state or renderer state via the E & S Sphere Radius GSE.

DATA STRUCTURES

The data structure for this GSE is defined in **ESproto.h** as follows:

```
typedef struct {
        PEXFLOAT      radius;
} esSphereRadiusData;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetAnnotTextSlantAngle - PEX Set Annotation Text Slant Angle

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetAnnotationTextSlantAngle GSE, the *id* parameter should be set to **PEXSunGSEIdSetAnnotTextSlantAngle,** the *data* parameter should be set to point to structure type *pexSunGseAnnotTextSlantAngle*, and the *length* parameter should be set to the total length of *data.*

This GSE causes the vertical component of subsequent annotation text output commands to be slanted from the character up vector by *slant_angle.*

The slant angle, in radians, can take values between -p / 2 and +p / 2. A negative slant angle will slant the characters in the backward direction.

DATA STRUCTURES

```
typedef struct {
        PEXFLOAT      slant_angle;
} pexSunGseAnnotTextSlantAngle;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetEndcap - PEX Set Endcap

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetEndcap GSE, the *id* parameter should be set to **PEXSunGSEIdSetEndcap,** the *data* parameter should be set to point to structure type *pexSunGseEndcap,* and the *length* parameter should be set to the total length of *data.*

This GSE specifies the style of stroke end caps.

DATA STRUCTURES

```
typedef struct {
        CARD32          prim;
        INT32           type;
} pexSunGseEndcap;
```

The *prim* field specifies which primitives this endcap-style applies to. Values for *prim* are defined in **SunPEX.h** as listed below:

Symbol	Value
PEXSunEndcapPrimLine	1
PEXSunEndcapPrimEdge	4

The *type* field specifies the endcap-style. Values for *type* are defined in **SunPEX.h** as listed below:

Symbol	Value
PEXSunEndcapTypeButt	0
PEXSunEndcapTypeSquare	1
PEXSunEndcapTypeRound	2

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetHighlightColor - PEX Set Highlight Color

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetHighlightColor GSE, the *id* parameter should be set to **PEXSunGSEIdSetHighlightColor,** the *data* parameter should be set to point to structure type *pexSunGseHighlightColor,* and the *length* parameter should be set to the total length of *data.*

This GSE sets the highlighting color to be used when highlighting subsequent output commands, overriding the color set by the other attributes.

DATA STRUCTURES

```
typedef struct {
        pexColorSpecifier       colorspec;
        /* SINGLE COLOR() */
} pexSunGseHighlightColor;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetSilhouetteEdgeFlag - PEX Set Silhouette Edge Flag

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetSilhouetteEdgeFlag GSE, the *id* parameter should be set to **PEXSunGSEIdSetSilhouetteEdgeFlag,** the *data* parameter should be set to point to structure type *pexSunGseSilhouettedEdge,* and the *length* parameter should be set to the total length of *data.*

If the value of *flag* is ON, the server will attempt to render the silhouette edges, if any, implicit in area-filling output commands.

DATA STRUCTURES

```
typedef struct {
        INT32           flag;
} pexSunGseSilhouettedEdge;
```

Values defined for *flag* in **SunPEX.h** are listed below:

Symbol	Value
PEXSunSilhouetteModeOff	0
PEXSunSilhouetteModeOn	1

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetStrokeAAliasParams - PEX Set Stroke Anti-Aliasing Parameters

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetStrokeAntiAliasingParameters GSE, the *id* parameter should be set to **PEXSunGSEIdSetStrokeAAliasParams,** the *data* parameter should be set to point to structure type *pexSunGseStrokeAAlias,* and the *length* parameter should be set to the total length of *data.*

This GSE is used to control stroke anti-aliasing for subsequent stroke primitives of width equal to one.

DATA STRUCTURES

```
typedef struct {
        CARD32          prim;
        INT32           blend_eq;
        INT32           filter_width;
        INT32           filter_shape;
} pexSunGseStrokeAAlias;
```

The *prim* field specifies the type of primitive for which this anti-aliasing specification applies. Values for *prim* are defined in **SunPEX.h** as listed below:

Symbol	Value	Explanation
PEXSunAAliasPrimLine	0x00000001	Anti-alias all polyline primitives.
PEXSunAAliasPrimMarker	0x00000002	Anti-alias all polymarker primitives.
PEXSunAAliasPrimText	0x00000004	Anti-alias all text primitives.
PEXSunAAliasPrimHollowSurf	0x00000008	Anti-alias hollow surfaces.
PEXSunAAliasPrimEdge	0x00000010	Anti-alias all edges.
PEXSunAAliasPrimAll	0xffffffff	Anti-alias all of the above.

Values for *blend_eq* are defined in **SunPEX.h** as follows:

Symbol	Value	Explanation
PEXSunAAliasBlendNone	0	Do not anti-alias.
PEXSunAAliasBlendArbitBG	1	Blend to an arbitrary background, blending on each pixel.
PEXSunAAliasBlendConstBG	2	Blend to a constant background color 0.
PEXSunAAliasBlendAddToBG	3	Blend by adding to the background.

The following value is defined for *filter_shape* in **SunPEX.h** as follows:

Symbol	Value	Explanation
PEXSunAAliasFiltShapeGaussian	0	Use a Gaussian filter.

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetStrokeJoin - PEX Set Stroke Join

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetStrokeJoin GSE, the *id* parameter should be set to **PEXSunGSEIdSetStrokeJoin,** the *data* parameter should be set to point to structure type *pexSunGseStrokeJoin,* and the *length* parameter should be set to the total length of *data.*

This GSE controls the appearance of wide-stroke joins.

DATA STRUCTURES

```
typedef struct {
        CARD32          prim;
        INT32           type;
} pexSunGseStrokeJoin;
```

The *prim* field specifies which primitives to apply the join-style to. Values for *prim* are defined in **SunPEX.h** as listed below:

Symbol	Value
PEXSunJoinPrimLine	1
PEXSunJoinPrimEdge	4

The *type* field specifies the join-style. Values for *type* are defined in **SunPEX.h** as listed below:

Symbol	Value
PEXSunJoinTypeMitred	0
PEXSunJoinTypeRound	1
PEXSunJoinTypeBeveled	2
PEXSunJoinTypeAny	3

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetSurfTranspCoef - PEX Set Surface Transparency Coefficient

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	

RETURNS

None

DESCRIPTION

To use the Sun SetSurfaceTransparencyCoefficient GSE, the *id* parameter should be set to **PEXSunGSEIdSetSurfTranspCoef,** the *data* parameter should be set to point to structure type *pexSunGseTranspCoef*, and the *length* parameter should be set to the total length of *data.*

This GSE sets a surface transparency coefficient to be applied when rendering subsequent surface primitives.

DATA STRUCTURES

```
typedef struct {
        PEXFLOAT      value;
} pexSunGseTranspCoef;
```

The *value* field can range from 0.0 to 1.0.

SEE ALSO

PEXGSE(3)

NAME

PEXGSE-PEXSunGseIdSetTextSlantAngle - PEX Set Text Slant Angle

SYNTAX

void PEXGSE(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *id*, int *length*, char **data*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
id	The identifier of the GSE.
length	The length, in bytes, of the GSE data.
data	A pointer to the GSE data.

RETURNS

None

DESCRIPTION

To use the Sun SetTextSlantAngle GSE, the *id* parameter should be set to **PEXSunGSEIdSetTextSlantAngle,** the *data* parameter should be set to point to structure type *pexSunGseTextSlantAngle*, and the *length* parameter should be set to the total length of *data.*

This GSE causes the vertical component of subsequent text output commands to be slanted from the character up vector by *slant_angle.*

The slant angle, in radians, can take values between -p / 2 and +p / 2. A negative slant angle will slant the characters in the backward direction.

DATA STRUCTURES

```
typedef struct {
        PEXFLOAT      slant_angle;
} pexSunGseTextSlantAngle;
```

SEE ALSO

PEXGSE(3)

NAME

PEXGeoNormFillArea - utility function

SYNTAX

int PEXGeoNormFillArea(unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, PEXFacetData *facet_data*, unsigned int *count*, PEXArrayOfVertex *vertices*)

PARAMETERS

facet_attributes	A mask indicating the facet attributes provided. It should contain the bit **PEXGANormal.**
vertex_attributes	A mask indicating the vertex attributes provided.
color_type	The type of color data provided.
facet_data	A pointer to facet data. This function adds the geometric normal to this data.
count	The number of vertices.
vertices	An array of vertices defining the fill area.

RETURNS

None

DESCRIPTION

This function computes the geometric normal of a fill area and stores it in the specified facet data.

The normal is computed by finding the first three non-colinear points in the specified *vertices*, forming two vectors from those points, one from the first point to the second point and one from the first point to the third point, and computing the cross product of those two vectors. The geometric normal is the normalized cross product.

The three points, A, B, and C are selected as follows. Point A is the first point in the list of vertices. Point B is the next point in the list that is not coincident with A. Point C is the next point in the list that is not colinear with A and B. If it is not possible to find three such points, the functions returns unsuccessfully.

If the facet attributes does not contain the bit **PEXGANormal,** the geometric normal is not computed. However, the function still returns successfully.

ERRORS

None

NAME

PEXGeoNormFillAreaSet - utility function

SYNTAX

int PEXGeoNormFillAreaSet(unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, unsigned int *count*, PEXFacetData **facet_data*, PEXListOfVertex **vertex_lists*)

PARAMETERS

facet_attributes	A mask indicating the facet attributes provided. It should contain the bit **PEXGANormal.**
vertex_attributes	A mask indicating the vertex attributes provided.
color_type	The type of color data provided.
count	The number of fill areas in the set.
facet_data	An array of facet data. This function adds the geometric normal to this data.
vertex_lists	A pointer to the list of vertex arrays defining each contour of the fill area set.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadPrimitive
A normal cannot be computed because all fill areas in the set are degenerate or because the vertices of all the fill areas are colinear.

DESCRIPTION

This function computes the geometric normal of a fill area set and stores it in the specified facet data.

The normal is computed by finding the first three non-colinear points in a fill area of the set, beginning with the first fill area and searching until three such points are found in a single fill area. Two vectors are formed from these points: one vector from the first point to the second point, and one vector from the first point to the third point. The geometric normal returned is the normalized cross product of those two vectors.

The three points, A, B, and C are selected as follows. Point A is the first point in the first list of vertices. Point B is the next point in that same list that is not coincident with A. Point C is the next point in that same list that is not colinear with A and B. If it is not possible to find three such points in the first list, then the rest of the lists are searched in order to select three appropriate points from a single list. If it is still not possible to find three such points in any list, the functions returns unsuccessfully.

If the facet attributes does not contain the bit **PEXGANormal,** the geometric normal is not computed. However, the function still returns successfully.

ERRORS

None

NAME

PEXGeoNormQuadrilateralMesh - utility function

SYNTAX

int PEXGeoNormQuadrilateralMesh(unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, PEXArrayOfFacetData *facet_data*, unsigned int *col_count*, unsigned int *row_count*, PEXArrayOfVertex *vertices*)

PARAMETERS

facet_attributes	A mask indicating the facet attributes provided. It should contain the bit **PEXGANormal.**
vertex_attributes	A mask indicating the vertex attributes provided.
color_type	The type of color data provided.
facet_data	An array of facet data. This function adds the geometric normal to this data.
col_count	The number of columns in the vertex array.
row_count	The number of rows in the vertex array.
vertices	A two-dimensional (row-major) array of vertices defining the quadrilateral mesh.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadPrimitive
A normal cannot be computed for one or more quadrilaterals in the mesh.

DESCRIPTION

This function computes the geometric normals of a quadrilateral mesh and stores them in the specified facet data.

The geometric normal of each quadrilateral is computed by forming two vectors from two of its sides, and computing the cross product of those two vectors. The geometric normal is the normalized cross product:

Ng = (V1 x V2) / | V1 X V2 |

Given the quadrilateral composed of four vertices, Pi,j, where i indicates the row of the point and j its column, the first vector, V1, is from Pi,j to Pi+1,j+1. The second vector, V2, is from Pi+1,j to Pi,j+1.

If the facet attributes does not contain the bit **PEXGANormal,** the geometric normal is not computed. However, the function still returns successfully.

A geometric normal is computed for all quadrilaterals where it is possible to compute one, even if a normal cannot be computed for some other quadrilaterals. An error is returned if a normal cannot be computed for one or more of the quadrilaterals in the mesh.

ERRORS

None

NAME

PEXGeoNormSetOfFillAreaSets - utility function

SYNTAX

int PEXGeoNormSetOfFillAreaSets(unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, unsigned int *set_count*, PEXArrayOfFacetData *facet_data*, unsigned int *vertex_count*, PEXArrayOfVertex *vertices*, unsigned int *index_count*, PEXConnectivityData **connectivity*)

PARAMETERS

facet_attributes	A mask indicating the facet attributes provided. It should contain the bit **PEXGANormal.**
vertex_attributes	A mask indicating the vertex attributes provided.
color_type	The type of color data provided.
set_count	The number of fill area sets.
facet_data	An array of facet data. This function adds the geometric normals to this data.
vertex_count	The number of vertices.
vertices	An array of vertices.
index_count	The number of vertex connectivity indices.
connectivity	A pointer to the list of contour connectivity data.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadPrimitive
A normal cannot be computed for a fill area set because all its fill areas are degenerate or because all the vertices of all fill areas in the set are colinear.

DESCRIPTION

This function computes the geometric normals of set of fill area sets primitive and stores them in the specified facet data.

The normals are computed by finding the first three non-colinear points in each fill area set, beginning with the first fill area of each set and searching until three such points are found in a single fill area. Two vectors are formed from these points: one vector from the first point to the second point, and one vector from the first point to the third point. The geometric normal returned is the normalized cross product of these two vectors.

The three points for each fill area set are selected as described for **PEXGeoNormFillAreaSet**(3)**.**

If the facet attributes does not contain the bit **PEXGANormal,** the geometric normal is not computed. However, the function still returns successfully.

A geometric normal is computed for all fill area sets where it is possible to compute one, even if a normal cannot be computed for some other fill area sets. The function returns unsuccessfully if a normal cannot be computed for one or more of the fill area sets.

DATA STRUCTURES

```
typedef struct {
        unsigned short          count;          /* number of lists */
        PEXListOfUShort         *lists;
} PEXConnectivityData;

typedef struct {
        unsigned short          count;          /* number of shorts */
        unsigned short          *shorts;
} PEXListOfUShort;
```

See also **PEXlib.h.**

ERRORS

None

NAME

PEXGeoNormTriangleStrip - utility function

SYNTAX

int PEXGeoNormTriangleStrip(unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, PEXArrayOfFacetData *facet_data*, unsigned int *count*, PEXArrayOfVertex *vertices*)

PARAMETERS

facet_attributes	A mask indicating the facet attributes provided. It should contain the bit **PEXGANormal.**
vertex_attributes	A mask indicating the vertex attributes provided.
color_type	The type of color data provided.
facet_data	An array of facet data. This function adds the geometric normals to this data.
count	The number of vertices.
vertices	An array of vertices defining the triangle strip.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadPrimitive
A normal cannot be computed for one or more triangles in the strip.

DESCRIPTION

This function computes the geometric normals of a triangle strip and stores them in the specified facet data.

The geometric normal of each triangle is computed by forming two vectors from two of its sides, and computing the cross product of those two vectors. The geometric normal is the normalized cross product:

Ng = (V1 x V2) / | V1 X V2 |

For the first, third, and subsequent odd-numbered triangles, the first vector (V1) is from the first point (Pi) of the triangle to the second point (Pi+1), and the second vector (V2) is from the first point of the triangle to the third point (Pi+2). For the second, fourth, and subsequent even-numbered triangles, the first vector is from the first point (Pi) of the triangle to the third point (Pi+2), and the second vector is from the first point of the triangle to the second point (Pi+1).

If the facet attributes does not contain the bit **PEXGANormal,** the geometric normal is not computed. However, the function still returns successfully.

A geometric normal is computed for all triangles where it is possible to compute one, even if a normal cannot be computed for some other triangles. An error is returned if a normal cannot be computed for one or more of the triangles in the strip.

ERRORS

None

NAME

PEXGetAncestors - Get Ancestors

SYNTAX

PEXStructurePath *PEXGetAncestors(Display *_display_, PEXStructure _structure_, int _path_part_, unsigned long _path_depth_, unsigned long *_count_return_)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
path_part	The part of the path to return (**PEXTopPart** or **PEXBottomPart**).
path_depth	The maximum number of structure network path levels to be returned in each path found.
count_return	Returns the number of paths found.

RETURNS

An array of structure paths defining the ancestors of the specified *structure;* a null pointer if unsuccessful.

DESCRIPTION

This function returns a list of structure network paths which reference the specified *structure.* Paths are returned as lists of element references, each of which is represented as a structure resource identifier and an offset that gives the element's position in the *structure.* Only unique paths are returned; in other words there will be no duplicates in the list of returned paths.

The path part must be either **PEXTopPart,** which requests that the top of the structure paths be returned, or **PEXBottomPart,** which requests that the bottom of the structure paths be returned.

The path depth specifies the maximum number of element references to be returned in each path. If the path depth is 0, the entire path is returned. If the path depth is 1, only one element reference is returned for each path. A path depth of 2 returns two elements, and so on.

Specifying a path depth of 0 and a path part of **PEXTopPart** returns the unique top parts of all paths to structure. Specifying a path depth of 1 and a path part of **PEXTopPart** returns the root structure of all structure networks which contain *structure.* A path depth of 2 and path part of **PEXBottomPart** returns all of the structure's immediate ancestors. Determine the number of references to *structure* by setting the path depth to 1 and the path part to **PEXBottomPart.**

PEXlib allocates memory for the returned ancestor information. **PEXFreeStructurePaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXStructure;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXElementRef           *elements;
} PEXStructurePath;
```

```
typedef struct {
        PEXStructure            structure;
        unsigned long           offset;
} PEXElementRef;
```

ERRORS

BadPEXStructure
The specified *structure* resource identifier is invalid.

BadValue
The specified value for path part is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXGetStructuresInNetwork(3)
PEXGetDescendants(3)

NAME

PEXGetDefinedIndices - Get Lookup Table Defined Indices

SYNTAX

Status PEXGetDefinedIndices(Display **display*, PEXLookupTable *table*, unsigned long **count_return*, PEXTableIndex ***indices_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
table	The resource identifier of the lookup table.
count_return	Returns the number of returned indices.
indices_return	Returns an array of indices to defined table entries.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns the defined indices for the specified lookup table. The index of each defined table entry is returned in a list.

PEXlib allocates memory for the returned indices. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID                PEXLookupTable;
typedef  unsigned short     PEXTableIndex;
```

ERRORS

BadPEXLookupTable
The specified lookup table resource identifier is invalid, or the table type is unsupported.

SEE ALSO

PEXCreateLookupTable(3)
PEXGetTableInfo(3)

NAME

PEXGetDescendants - Get Descendants

SYNTAX

PEXStructurePath *PEXGetDescendants(Display *_display_, PEXStructure _structure_, int _path_part_, unsigned long _path_depth_, unsigned long *_count_return_)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
path_part	The part of the path to return (**PEXTopPart** or **PEXBottomPart**).
path_depth	The maximum number of structure network path levels to be returned in each path found.
count_return	Returns the number of paths found.

DESCRIPTION

This function returns a list of structure network paths referenced by the specified *structure*. The elements of the returned array are of type **PEXStructurePath.** Paths are returned as lists of element references, each of which is represented as a *structure* resource identifier and an offset that gives the element's position in the *structure*. Only unique paths are returned; in other words, there will be no duplicates in the returned paths.

The path part must be either **PEXTopPart ,** which requests that the top of the structure paths be returned, or **PEXBottomPart ,** which requests that the bottom of the structure paths be returned.

The path depth specifies the maximum number of element references to be returned in each path. If the path depth is 0, the entire path is returned. If the path depth is 1, only one element reference is returned for each path, and so on.

For instance, specifying a path depth of 0 and a path part of **PEXTopPart** returns all paths from structure to leaf nodes in the *structure* network tree in the order they would be traversed. Specifying a path depth of 1 and a path part of **PEXBottomPart** determines the bottom-most structures of the structure network rooted at *structure*.

PEXlib allocates memory for the returned descendant information. **PEXFreeStructurePaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID     PEXStructure;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXElementRef           *elements;
} PEXStructurePath;

typedef struct {
        PEXStructure            structure;
        unsigned long           offset;
} PEXElementRef;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for path part is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXGetStructuresInNetwork(3)
PEXGetAncestors(3)

NAME

PEXGetElementInfo - Get Element Information

SYNTAX

Status PEXGetElementInfo(Display **display*, PEXStructure *structure*, int *whence1*, long *offset1*, int *whence2*, long *offset2*, int *float_format*, unsigned long **count_return*, PEXElementInfo ***info_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence1	A value specifying, with *offset1*, the first limit of the range of queried elements (**PEXBeginning, PEXCurrent, PEXEnd**).
offset1	The offset from *whence1* denoting the first limit of the range of queried elements.
whence2	A value specifying, with *offset2*, the second limit of the range of elements to be queried (**PEXBeginning, PEXCurrent, PEXEnd**).
offset2	The offset from *whence2* denoting the second limit of the range of elements to be queried.
float_format	The floating point format to use when computing element sizes (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
count_return	Returns the number element info records returned.
info_return	Returns an array of element info records describing the elements in the specified range.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns information about a range of elements from the specified structure.

If a computed offset is less than zero it is set to zero before obtaining the element information. If a computed offset is greater than the number of elements in the structure, it is set to the offset of the last structure element in the structure. The element pointer attribute of structure is not affected by this command.

Information returned about the list of inquired elements includes the type of each element and its size. The size of each element is based upon the specified floating point format. No information is returned for inquires on element offset zero. The element pointer is not affected by this function.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID     PEXStructure;

typedef struct {
        unsigned short          type;
        unsigned short          length;
} PEXElementInfo;
```

ERRORS

BadPEXFloatingPointFormat
The specified floating point format is invalid or unsupported.

BadPEXStructure
The specified *structure* resource identifier is invalid.

BadValue
The specified value for *whence* parameter is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXGetEnumTypeInfo - Get Enumerated Type Information

SYNTAX

Status PEXGetEnumTypeInfo(Display **display*, Drawable *drawable*, unsigned long *count*, int **enum_types*, unsigned long *item_mask*, unsigned long ***info_count_return*, PEXEnumTypeDesc ***enum_info_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

drawable The resource identifier of a drawable.

count The number of enumerated types.

enum_types A list of enumerated types for which information is to be returned. (See the Description for valid values.)

item_mask A mask indicating the data to be returned for each enumerated type. (See the Description for valid values.)

info_count_return
Returns an array of counts. For each enumerated type, there is an entry specifying the number of descriptors in the return value array.

enum_info_return
Returns an array of enumerated type descriptors containing the enumerated type information.

DESCRIPTION

PEXGetEnumTypeInfo allows the application to inquire the supported values for each enumerated type.It returns a descriptor for each supported value of each specified enumerated type requested. These values will be valid for all drawables having the same root window and depth as the specified drawable.

The standard PEX enumerated types are:

PEXETATextStyle	PEXETLineType
PEXETColorApproxModel	PEXETMarkerType
PEXETColorApproxType	PEXETModelClipOperator
PEXETColorType	PEXETParaSurfCharacteristics
PEXETCurveApproxMethod	PEXETPickAllMethod
PEXETDisplayUpdateMode	PEXETPickDeviceType
PEXETEscape	PEXETPickOneMethod
PEXETFloatFormat	PEXETPolylineInterpMethod
PEXETGDP2D	PEXETPromptEchoType
PEXETGDP	PEXETReflectionModel
PEXETGSE	PEXETRenderingColorModel
PEXETHatchStyle	PEXETSurfaceApproxMethod
PEXETHLHSRMode	PEXETSurfaceEdgeType
PEXETInteriorStyle	PEXETSurfaceInterpMethod
PEXETLightType	PEXETTrimCurveApproxMethod

Enumerated type descriptors are made up of an index field and a mnemonic field. The index field contains the numeric value of the supported type, and the mnemonic field contains a string describing the type.

The item mask specifies which of the fields is returned in each enumerated type descriptor. Defined values for the item mask are **PEXETCounts, PEXETIndex, PEXETMnemonic** and **PEXETAll.** If the item mask is **PEXETCounts,** no descriptor values are returned; only the counts will be returned. If the item mask is **PEXETIndex,** the supported index values are returned in addition to the counts. If the item mask is **PEXETMnemonic,** the mnemonic strings describing the supported values are returned in addition to the counts. If the item mask is **PEXETAll,** both the supported index values and the mnemonic strings are returned in addition to the counts.

PEXlib allocates memory for the returned array of counts and for the return value array of enumerated type descriptors. **PEXFreeEnumInfo**(3) should be called to deallocate this memory.

The following are the standard enumerated type index, mnemonic pairs which may be returned.

PEXETATextStyle

PEXATextNotConnected, PEXETMATextNotConnected
PEXATextConnected, PEXETMATextConnected

PEXETColorApproxModel

PEXColorApproxRGB, PEXETMColorApproxRGB
PEXColorApproxCIE, PEXETMColorApproxCIE
PEXColorApproxHSV, PEXETMColorApproxHSV
PEXColorApproxHLS, PEXETMColorApproxHLS
PEXColorApproxYIQ, PEXETMColorApproxYIQ

PEXETColorApproxType

PEXColorSpace, PEXETMColorSpace
PEXColorRange, PEXETMColorRange

PEXETColorType

PEXColorTypeIndexed, PEXETMColorTypeIndexed
PEXColorTypeRGB, PEXETMColorTypeRGB
PEXColorTypeCIE, PEXETMColorTypeCIE
PEXColorTypeHSV, PEXETMColorTypeHSV
PEXColorTypeHLS, PEXETMColorTypeHLS
PEXColorTypeRGB8, PEXETMColorTypeRGB8
PEXColorTypeRGB16, PEXETMColorTypeRGB16

PEXETCurveApproxMethod

PEXApproxImpDep, implementation-dependent string
PEXApproxConstantBetweenKnots, PEXETMApproxConstantBetweenKnots
PEXApproxWCChordalSize, PEXETMApproxWCChordalSize
PEXApproxNPCChordalSize, PEXETMApproxNPCChordalSize

PEXApproxDCChordalSize, PEXETMApproxDCChordalSize
PEXCurveApproxWCChordalDev, PEXETMCurveApproxWCChordalDev
PEXCurveApproxNPCChordalDev, PEXETMCurveApproxNPCChordalDev
PEXCurveApproxDCChordalDev, PEXETMCurveApproxDCChordalDev
PEXApproxWCRelative, PEXETMApproxWCRelative
PEXApproxNPCRelative, PEXETMApproxNPCRelative
PEXApproxDCRelative, PEXETMApproxDCRelative

PEXETDisplayUpdateMode

PEXVisualizeEach, PEXETMVisualizeEach
PEXVisualizeEasy, PEXETMVisualizeEasy
PEXVisualizeNone, PEXETMVisualizeNone
PEXSimulateSome, PEXETMSimulateSome
PEXVisualizeWhenever, PEXETMVisualizeWhenever

PEXETEscape

PEXEscapeSetEchoColor, PEXETMEscapeSetEchoColor

PEXETFloatFormat

PEXIEEE_754_32, PEXETMIEEE_754_32
PEXDEC_F_Floating, PEXETMDEC_F_Floating
PEXIEEE_754_64, PEXETMIEEE_754_64
PEXDEC_D_Floating, PEXETMDEC_D_Floating

PEXETGDP2D

There are currently no standard 2D generalized drawing primitives.

PEXETGDP

There are currently no standard 3D generalized drawing primitives.

PEXETGSE

There are currently no standard generalized structure elements.

PEXETHatchStyle

There are currently no standard hatch styles.

PEXETHLHSRMode

PEXHLHSROff, PEXETMHLHSROff
PEXHLHSRZBuffer, PEXETMHLHSRZBuffer
PEXHLHSRPainters, PEXETMHLHSRPainters
PEXHLHSRScanline, PEXETMHLHSRScanline
PEXHLHSRHiddenLineOnly, PEXETMHLHSRHiddenLineOnly
PEXHLHSRZBufferID, PEXETMHLHSRZBufferID

PEXETInteriorStyle

PEXInteriorStyleHollow, PEXETMInteriorStyleHollow
PEXInteriorStyleSolid, PEXETMInteriorStyleSolid
PEXInteriorStylePattern, PEXETMInteriorStylePattern
PEXInteriorStyleHatch, PEXETMInteriorStyleHatch

PEXInteriorStyleEmpty, PEXETMInteriorStyleEmpty

PEXETLightType

PEXLightAmbient, PEXETMLightAmbient
PEXLightWCVector, PEXETMLightWCVector
PEXLightWCPoint, PEXETMLightWCPoint
PEXLightWCSpot, PEXETMLightWCSpot

PEXETLineType

PEXLineTypeSolid, PEXETMLineTypeSolid
PEXLineTypeDashed, PEXETMLineTypeDashed
PEXLineTypeDotted, PEXETMLineTypeDotted
PEXLineTypeDashDot, PEXETMLineTypeDashDot

PEXETMarkerType

PEXMarkerDot, PEXETMMarkerDot
PEXMarkerCross, PEXETMMarkerCross
PEXMarkerAsterisk, PEXETMMarkerAsterisk
PEXMarkerCircle, PEXETMMarkerCircle
PEXMarkerX, PEXETMMarkerX

PEXETModelClipOperator

PEXModelClipReplace, PEXETMModelClipReplace
PEXModelClipIntersection, PEXETMModelClipIntersection

PEXETParaSurfCharacteristics

PEXPSCNone, PEXETMPSCNone
PEXPSCImpDep, implementation-dependent string
PEXPSCIsoCurves, PEXETMPSCIsoCurves
PEXPSCMCLevelCurves, PEXETMPSCMCLevelCurves
PEXPSCWCLevelCurves, PEXETMPSCWCLevelCurves

PEXETPickAllMethod

PEXPickAllAll, PEXETMPickAllAll
PEXPickAllVisible, PEXETMPickAllVisible

PEXETPickDeviceType

PEXPickDeviceDCHitBox, PEXETMPickDeviceDCHitBox
PEXPickDeviceNPCHitVolume, PEXETMPickDeviceNPCHitVolume

PEXETPickOneMethod

PEXPickLast, PEXETMPickLast
PEXPickClosestZ, PEXETMPickClosestZ
PEXPickVisibleAny, PEXETMPickVisibleAny
PEXPickVisibleClosest, PEXETMPickVisibleClosest

PEXETPolylineInterpMethod

PEXPolylineInterpNone, PEXETMPolylineInterpNone
PEXPolylineInterpColor, PEXETMPolylineInterpColor

PEXETPromptEchoType

PEXEchoPrimitive, PEXETMEchoPrimitive
PEXEchoStructure, PEXETMEchoStructure
PEXEchoNetwork, PEXETMEchoNetwork

PEXETReflectionModel

PEXReflectionNone, PEXETMReflectionNone
PEXReflectionAmbient, PEXETMReflectionAmbient
PEXReflectionDiffuse, PEXETMReflectionDiffuse
PEXReflectionSpecular, PEXETMReflectionSpecular

PEXETRenderingColorModel

PEXRenderingColorModelImpDep, implementation-dependent string
PEXRenderingColorModelRGB, PEXETMRenderingColorModelRGB
PEXRenderingColorModelCIE, PEXETMRenderingColorModelCIE
PEXRenderingColorModelHSV, PEXETMRenderingColorModelHSV
PEXRenderingColorModelHLS, PEXETMRenderingColorModelHLS

PEXETSurfaceApproxMethod

PEXApproxImpDep, implementation-dependent string
PEXApproxConstantBetweenKnots, PEXETMApproxConstantBetweenKnots
PEXApproxWCChordalSize, PEXETMApproxWCChordalSize
PEXApproxNPCChordalSize, PEXETMApproxNPCChordalSize
PEXApproxDCChordalSize, PEXETMApproxDCChordalSize
PEXSurfaceApproxWCPlanarDev, PEXETMSurfaceApproxWCPlanarDev
PEXSurfaceApproxNPCPlanarDev, PEXETMSurfaceApproxNPCPlanarDev
PEXSurfaceApproxDCPlanarDev, PEXETMSurfaceApproxDCPlanarDev
PEXApproxWCRelative, PEXETMApproxWCRelative
PEXApproxNPCRelative, PEXETMApproxNPCRelative
PEXApproxDCRelative, PEXETMApproxDCRelative

PEXETSurfaceEdgeType

PEXSurfaceEdgeSolid, PEXETMSurfaceEdgeSolid
PEXSurfaceEdgeDashed, PEXETMSurfaceEdgeDashed
PEXSurfaceEdgeDotted, PEXETMSurfaceEdgeDotted
PEXSurfaceEdgeDashDot, PEXETMSurfaceEdgeDashDot

PEXETSurfaceInterpMethod

PEXSurfaceInterpNone, PEXETMSurfaceInterpNone
PEXSurfaceInterpColor, PEXETMSurfaceInterpColor
PEXSurfaceInterpDotProduct, PEXETMSurfaceInterpDotProduct
PEXSurfaceInterpNormal, PEXETMSurfaceInterpNormal

PEXETTrimCurveApproxMethod

PEXApproxImpDep, implementation-dependent string
PEXApproxConstantBetweenKnots, PEXETMApproxConstantBetweenKnots

DATA STRUCTURES

```
typedef struct {
    PEXEnumTypeIndex    index;
    char                *descriptor;   /* null terminated string */
} PEXEnumTypeDesc;
```

ERRORS

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported.

BadValue
A specified enumerated type is invalid.

SEE ALSO

PEXFreeEnumInfo(3)

NAME

PEXGetExtensionInfo - Get Extension Information

SYNTAX

PEXExtensionInfo *PEXGetExtensionInfo(Display **display*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

RETURNS

A pointer to the extension information; a null pointer if unsuccessful.

DESCRIPTION

PEXGetExtensionInfo allows an application program to inquire the extension information from a PEX server extension.

The major version number, minor version number, release number, vendor name, and subset information are returned. If the subset value is **PEXCompleteImplementation,** the extension is a full PEX implementation. If the subset value is **PEXImmediateMode,** the extension supports only the *immediate rendering* subset of PEX. If the subset value is **PEXStructureMode,** the extension supports only the *structure rendering* subset of PEX. If the subset value is (**PEXImmediateMode** and **PEXStructureMode**), the extension supports both the *immediate rendering* and the *structure rendering* subsets of PEX. If the subset value is **PEXWorkstationOnly,** the extension supports only the *PHIGS workstation* subset of PEX.

The memory returned by this function is private to PEXlib and must not be modified or freed by the application.

DATA STRUCTURES

```
typedef struct {
        unsigned short      major_version;
        unsigned short      minor_version;
        unsigned long       release;
        unsigned long       subset_info;
        char                *vendor_name;
        int                 major_opcode;
        int                 first_event;
        int                 first_error;
} PEXExtensionInfo;
```

ERRORS

None

NAME

PEXGetImpDepConstants - Get Implementation Dependent Constants

SYNTAX

Status PEXGetImpDepConstants(Display **display*, Drawable *drawable*, unsigned long *count*, unsigned short **names*, PEXImpDepConstant ***constants_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
count	The number of implementation-dependent constants.
names	An array of names of implementation-dependent constants to be returned. (See the Description for valid values.)
constants_return	Returns an array of implementation-dependent constants.

RETURNS

Zero if unsuccessful; non-zero otherwise.

DESCRIPTION

PEXGetImpDepConstants allows an application program to query one or more implementation-dependent constants.

A single integer or floating-point value is returned for each value requested. These values are returned in order, with one return value in constants for each item in *names*. The implementation-dependent constants returned are based on the values used for a drawable having the same root and depth as the drawable specified. PEXlib allocates memory for the returned constants. **XFree** should be called to deallocate the memory.

The following implementation-dependent constants are standard:

PEXIDBestColorApprox (integer) — Either **PEXColorApproxPowersOf2** or **PEXColorApproxAnyValues,** depending on whether there is a significant performance gain if the number of reds / greens / blues in the color approximation table entry is a power of two, so pixels can be composed using shifts and adds.

PEXIDDitheringSupported (integer) — Either **True** if the dithering hint in color approximation lookup tables is used to control dithering, or **False,** if the dithering hint in color approximation lookup tables is not used.

PEXIDDoubleBufferingSupported (integer) — Either **True** if the server supports double-buffering for workstation resources, or **False,** if the server does not supports double-buffering for workstation resources.

PEXIDMaxEdgeWidth (integer) — Width (in pixels) of widest edge that can be drawn.

PEXIDMaxHitsEventSupported (integer) — **True** if the server supports the **PEXMaxHitsReached** event, or **False,** if the server does not support the event.

PEXIDMaxLineWidth (integer) — Width (in pixels) of widest line or curve that can be drawn.

PEXIDMaxMarkerSize (integer) — Largest dimension (either height or width, in pixels) of largest marker that can be drawn. This maximum is exclusive of the marker type **PEXMarkerDot** which is always drawn as the smallest displayable point.

PEXIDMaxModelClipPlanes (integer) — Maximum number of modeling clipping planes may be defined.

PEXIDMaxNameSetNames (integer) — Maximum number of *names* allowed in a name set.

PEXIDMaxNonAmbientLights (integer) — Maximum number of non-ambient light sources that can be enabled at one time.

PEXIDMaxNURBOrder (integer) — Maximum non-uniform rational B-spline order supported.

PEXIDMaxTrimCurveOrder (integer) — Maximum order for trim curves.

PEXIDMinEdgeWidth (integer) — Width (in pixels) of thinnest edge that can be drawn.

PEXIDMinLineWidth (integer) — Width (in pixels) of thinnest line or curve that can be drawn.

PEXIDMinMarkerSize (integer) — Largest dimension (either height or width, in pixels) of smallest marker that can be drawn. This minimum is exclusive of the marker type **PEXMarkerDot** which is always drawn as the smallest displayable point.

PEXIDNominalEdgeWidth (integer) — Width (in pixels) of *standard* edge.

PEXIDNominalLineWidth (integer) — Width (in pixels) of *standard* line or curve.

PEXIDNominalMarkerSize (integer) — Largest dimension (either height or width, in pixels) of *standard* marker.

PEXIDNumSupportedEdgeWidths (integer) — Number of supported edge widths. A value of 0 indicates that all edge widths, including fractional widths, between the minimum and maximum edge width are supported.

PEXIDNumSupportedLineWidths (integer) — Number of supported line or curve widths. A value of 0 indicates that all line widths, including fractional widths, between the minimum and maximum line width are supported.

PEXIDNumSupportedMarkerSizes (integer) — Number of supported marker sizes. A value of 0 indicates that all marker sizes, including fractional values, between the minimum and maximum marker size are supported.

PEXIDTransparencySupported (integer) — Either **True** if the transmission coefficient is utilized in the reflectance calculations, or **False,** if the transmission coefficient is not utilized.

PEXIDChromaticityRedU (flt_point) — CIEYUV u chromaticity coefficient for the red channel of the (properly adjusted) display device.

PEXIDChromaticityRedV (flt_point) — CIEYUV v chromaticity coefficient for the red channel of the (properly adjusted) display device.

PEXIDLuminanceRed (flt_point) — CIEYUV luminance value for the red channel of the (properly adjusted) display device.

PEXIDChromaticityGreenU (flt_point) — CIEYUV u chromaticity coefficient for the green channel of the (properly adjusted) display device.

PEXIDChromaticityGreenV (flt_point) — CIEYUV v chromaticity coefficient for the green channel of the (properly adjusted) display device.

PEXIDLuminanceGreen (flt_point) — CIEYUV luminance value for the green channel of the (properly adjusted) display device.

PEXIDChromaticityBlueU (flt_point) — CIEYUV u chromaticity coefficient for the blue channel of the (properly adjusted) display device.

PEXIDChromaticityBlueV (flt_point) — CIEYUV v chromaticity coefficient for the blue channel of the (properly adjusted) display device.

PEXIDLuminanceBlue (flt_point) — CIEYUV luminance value for the blue channel of the (properly adjusted) display device.

PEXIDChromaticityWhiteU (flt_point) — CIEYUV u chromaticity coefficient for the reference white of the (properly adjusted) display device.

PEXIDChromaticityWhiteV (flt_point) — CIEYUV v chromaticity coefficient for the reference white of the (properly adjusted) display device.

PEXIDLuminanceWhite (flt_point) — CIEYUV luminance value for the reference white of the (properly adjusted) display device.

DATA STRUCTURES

```
typedef union {
        unsigned long           integer;
        float                   flt_point;
} PEXImpDepConstant;
```

ERRORS

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported.

BadValue
A specified implementation-dependent constant name is invalid.

NAME

PEXGetNameSet - Get Name Set

SYNTAX

Status PEXGetNameSet(Display **display*, PEXNameSet *nameset*, unsigned long **count_return*, PEXName ***names_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
nameset	The resource identifier of the name set to be queried.
count_return	Returns the number of names.
names_return	Returns an array of names.

RETURNS

Zero if unsuccessful; non-zero otherwise.

DESCRIPTION

This function returns the names in the specified name set.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID                PEXNameSet;
typedef  unsigned long      PEXName;
```

ERRORS

BadPEXNameSet
The specified name set resource identifier is invalid.

SEE ALSO

PEXCreateNameSet(3)
PEXChangeNameSet(3)

NAME

PEXGetOCAddr - Get Address For Encoded Output Commands

SYNTAX

char *PEXGetOCAddr(Display **display*, int *length*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

length The number of bytes of data to be written by the application.

RETURNS

A pointer to memory where the application can write output command data; a null pointer if unsuccessful.

DESCRIPTION

This function returns a memory address to the specified number of bytes in the transport buffer where the application can write data.

The pointer returned is valid only until the next **PEXGetOCAddr** or **PEXCopyBytesToOC**(3) is called.

An attempt to request more bytes than remaining in the transport buffer, or more bytes than returned by **PEXGetOCAddrMaxSize**(3)**,** will result in an unsuccessful return value.

PEXStartOCs(3) must be called prior to this.

DO NOT attempt to deallocate or free memory at the address returned by this function.

ERRORS

None

SEE ALSO

PEXStartOCs(3)
PEXFinishOCs(3)
PEXCopyBytesToOC(3)
PEXGetOCAddrMaxSize(3)

NAME PEXGetOCAddrMaxSize - Macro to Obtain the Maximum Size for **PEXGetOCAddr**

SYNTAX PEXGetOCAddrMaxSize(*display*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

DESCRIPTION This macro evaluates to the maximum size for the *length* parameter of **PEXGetOCAddr**(3)**.**

ERRORS None

SEE ALSO **PEXGetOCAddr**(3)

NAME

PEXGetPickDevice - Get Pick Device Attributes

SYNTAX

PEXPDAttributes *PEXGetPickDevice(Display **display*, PEXWorkstation *workstation*, int *pick_device_type*, unsigned long *value_mask*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

pick_device_type The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).

value_mask A mask indicating which attributes to return.

RETURNS

A pointer to the pick device attribute values; a null pointer if unsuccessful.

DESCRIPTION

This function returns the attribute values of a pick descriptor for the PHIGS workstation resource specified. The descriptor returned will be the currently-defined descriptor for the pick device of the type specified. Supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3)**.** The value mask indicates which attributes are to be returned. The value mask is constructed by OR'ing together the following constants:

PEXPDEchoSwitch
PEXPDEchoVolume
PEXPDPickDataRec
PEXPDPickExcl
PEXPDPickIncl
PEXPDPickPath
PEXPDPickPathOrder
PEXPDPickStatus
PEXPDPromptEchoType

PEXlib allocates memory for the return value. **PEXFreePDAttributes**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        unsigned short          status;
        PEXPickPath             path;
        int                     path_order;
        PEXNameSet              inclusion;
        PEXNameSet              exclusion;
        PEXPickRecord           pick_record;
        PEXEnumTypeIndex        prompt_echo_type;
        PEXViewport             echo_volume;
        int                     echo_switch;
```

```
} PEXPDAttributes;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXPickElementRef       *elements;
} PEXPickPath;

typedef struct {
        PEXStructure            sid;
        unsigned long           offset;
        unsigned long           pick_id;
} PEXPickElementRef;

typedef  XID    PEXStructure;

typedef  XID    PEXNameSet;

typedef union {
        PEXPDNPCHitVolume       volume;
        PEXPDDCHitBox           box;
        PEXPickDataRecord       data;
} PEXPickRecord;

typedef  PEXNPCSubVolume    PEXPDNPCHitVolume;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;

typedef struct {
        float   x;
        float   y;
        float   z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D    position;
        float               distance;
} PEXPDDCHitBox;

typedef struct {
        short   x;
        short   y;
} PEXDeviceCoord2D;
```

```
typedef struct {
        unsigned short          length;         /* number of bytes in record */
        char                    *record;
} PEXPickDataRecord;

typedef  short   PEXEnumTypeIndex;

typedef struct {
        PEXDeviceCoord          min;
        PEXDeviceCoord          max;
        PEXSwitch               use_drawable;
        unsigned char           reserved[3];
} PEXViewport;

typedef struct {
        short   x;
        short   y;
        float   z;
} PEXDeviceCoord;

typedef  unsigned char  PEXSwitch;
```

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
The specified pick device type is invalid, or an invalid bit set in the value mask.

SEE ALSO

PEXChangePickDevice(3)
PEXGetEnumTypeInfo(3)

NAME

PEXGetPickMeasure - Get Pick Measure Attributes

SYNTAX

PEXPMAttributes *PEXGetPickMeasure(Display **display*, PEXPickMeasure *pick_measure*, unsigned long *value_mask*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

pick_measure The resource identifier of the pick measure.

value_mask A mask indicating which attributes to return.

RETURNS

A pointer to the pick measure attribute values; a null pointer if unsuccessful.

DESCRIPTION

This function returns the specified pick measure attribute values. The value mask indicates which attributes are to be returned. The value mask is constructed by OR'ing together the following constants:

PEXPMStatus
PEXPMPath

PEXlib allocates memory for the return value. **PEXFreePMAttributes**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXPickMeasure;

typedef struct {
        unsigned short          status;
        PEXPickPath             pick_path;
} PEXPMAttributes;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXPickElementRef       *elements;
} PEXPickPath;

typedef struct {
        PEXStructure            sid;
        unsigned long           offset;
        unsigned long           pick_id;
} PEXPickElementRef;

typedef XID     PEXStructure;
```

ERRORS

BadPEXPickMeasure
The specified *pick_measure* resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO **PEXCreatePickMeasure**(3)

NAME

PEXGetPipelineContext - Get Pipeline Context Attributes

SYNTAX

PEXPCAttributes *PEXGetPipelineContext(Display **display*, PEXPipelineContext *context*, unsigned long **value_mask*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
context	The resource identifier of the pipeline context.
value_mask	A pointer to an array of three unsigned long.

RETURNS

A pointer to pipeline context values; a null pointer if unsuccessful.

DESCRIPTION

This function returns the requested attribute values of the pipeline context. The value mask indicates which attribute values are requested. **PEXSetPCAttributeMask** and **PEXSetPCAttributeMaskAll** can be called to setup the value mask. PEXlib allocates the memory for the return value. **PEXFreePCAttributes**(3) should be called to deallocate the memory.

DATA STRUCTURES

typedef XID PEXPipelineContext;

See also **PEXlib.h.**

ERRORS

BadPEXPipelineContext
The specified pipeline context resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO

PEXCreatePipelineContext(3)
PEXChangePipelineContext(3)

NAME

PEXGetPredefinedEntries - Get Lookup Table Predefined Indices

SYNTAX

Status PEXGetPredefinedEntries(Display **display*, Drawable *drawable*, int *table_type*, unsigned int *start*, unsigned int *count*, PEXPointer **entries_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
table_type	The type of lookup table (see the Description).
start	The index of the first predefined entry to be returned.
count	The number of predefined entries requested.
entries_return	Returns an array of predefined table entries.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns the predefined entries for the specified lookup table. The type must be one of the following:

PEXLUTColor
PEXLUTColorApprox
PEXLUTDepthCue
PEXLUTEdgeBundle
PEXLUTInteriorBundle
PEXLUTLight
PEXLUTLineBundle
PEXLUTMarkerBundle
PEXLUTPattern
PEXLUTTextBundle
PEXLUTTextFont
PEXLUTView

Predefined entries are those automatically filled with valid data when a lookup table is created. The query is conducted based on the assumption that the lookup table would be used on drawables with the same root and depth as the specified drawable. The function returns at most the specified number of entries, starting with the specified entry index. The number of entries requested can not be larger than the number of predefined entries. Call **PEXGetTableInfo**(3) to determine the number of predefined entries.

Entries in the returned list depend on the type specified. See **PEXSetTableEntries**(3) for the structure types.

PEXlib allocates the memory for the returned table entries. **PEXFreeTableEntries**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
#if NeedFunctionPrototypes
typedef void    *PEXPointer;
#else
typedef char    *PEXPointer;
#endif
```

ERRORS

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported.

BadValue
The specified table type is invalid or unsupported, start is less than the minimum predefined entry, the sum of start and count is greater than the maximum predefined entry, or index 0 is not valid for the specified table type.

BadPEXLookupTable
The specified table type is unsupported.

SEE ALSO

PEXCreateLookupTable(3)
PEXGetTableInfo(3)
PEXGetDefinedIndices(3)
PEXGetTableEntry(3)
PEXGetTableEntries(3)
PEXSetTableEntries(3)

NAME PEXGetProtocolFloatFormat - Return Float Format used on Specified Display Connection

SYNTAX int PEXGetProtocolFloatFormat(Display **display*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

RETURNS Protocol floating point format (see **PEXGetEnumTypeInfo**(3)); zero if unsuccessful.

DESCRIPTION This function returns the protocol floating point format being used by PEXlib on the specified display connection.

ERRORS None

NAME

PEXGetRendererAttributes - Get Renderer Attribute Values

SYNTAX

PEXRendererAttributes *PEXGetRendererAttributes(Display **display*, PEXRenderer *renderer*, unsigned long *value_mask*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of the renderer to be queried.
value_mask	A mask indicating attributes to be returned from the renderer.

RETURNS

A pointer to the renderer attribute values; a null pointer if unsuccessful.

DESCRIPTION

This function returns attribute values from the specified *renderer* resource. The value mask indicates the attribute values to be returned. The value mask is constructed by OR'ing together the following constants:

PEXRABackgroundColor	**PEXRAInvisibilityIncl**
PEXRAClearImage	**PEXRALightTable**
PEXRAClearZ	**PEXRALineBundle**
PEXRAClipList	**PEXRAMarkerBundle**
PEXRAColorApproxTable	**PEXRANPCSubVolume**
PEXRAColorTable	**PEXRAPatternTable**
PEXRACurrentPath	**PEXRAPickExcl**
PEXRADepthCueTable	**PEXRAPickIncl**
PEXRAEchoMode	**PEXRAPickStartPath**
PEXRAEdgeBundle	**PEXRAPipelineContext**
PEXRAHLHSRMode	**PEXRARendererState**
PEXRAHighlightExcl	**PEXRATextBundle**
PEXRAHighlightIncl	**PEXRATextFontTable**
PEXRAInteriorBundle	**PEXRAViewTable**
PEXRAInvisibilityExcl	**PEXRAViewport**

PEXlib allocates the memory for the returned *renderer* attribute values. **PEXFreeRendererAttributes**(3) should be called to deallocate the memory.

DATA STRUCTURES

typedef XID PEXRenderer;

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified *renderer* resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO

PEXCreateRenderer(3)
PEXChangeRenderer(3)
PEXGetRendererDynamics(3)
PEXFreeRendererAttributes(3)

NAME

PEXGetRendererDynamics - Get Renderer Attribute Modification Dynamics

SYNTAX

Status PEXGetRendererDynamics(Display **display*, PEXRenderer *renderer*, unsigned long **tables_return*, unsigned long **name_sets_return*, unsigned long **attributes_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

renderer The resource identifier of the renderer.

tables_return Returns a mask describing dynamics of lookup tables associated with the renderer.

name_sets_return Returns a mask describing dynamics of name sets associated with the renderer.

attributes_return Returns a mask describing dynamics of other attributes associated with the renderer.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns the modification dynamics for all of the attributes of the specified *renderer resource*. Each bit, in the returned bitmasks, indicates the dynamics for a particular renderer attribute. For each bit, a value of **PEXDynamic** indicates that the specified attribute may be modified at any time, and the change will take place immediately. A value of **PEXNotDynamic** indicates that the specified attribute may not be modified dynamically. In this case, the change is "pending" and will take effect at the next explicit or implicit **PEXBeginRendering**(3)**.**

The pipeline context, pick start path, background color, clear image and clear z renderer attributes all take effect only at the time of "begin rendering or picking", and so do not have dynamics associated with them.

The bits in the tables bitmask are accessed with the following constants:

PEXRDTColorApproxContents
PEXRDTColorApproxTable
PEXRDTColorTable
PEXRDTColorTableContents
PEXRDTDepthCueTable
PEXRDTDepthCueTableContents
PEXRDTEdgeBundle
PEXRDTEdgeBundleContents
PEXRDTInteriorBundle
PEXRDTInteriorBundleContents
PEXRDTLightTable
PEXRDTLightTableContents
PEXRDTLineBundle

PEXRDTLineBundleContents
PEXRDTMarkerBundle
PEXRDTMarkerBundleContents
PEXRDTPatternTable
PEXRDTPatternTableContents
PEXRDTTextBundle
PEXRDTTextBundleContents
PEXRDTTextFontTable
PEXRDTTextFontTableContents
PEXRDTViewTable
PEXRDTViewTableContents

The bits in the name sets bitmask are accessed with the following constants:

PEXRDNHighlightNameSet
PEXRDNHighlightNameSetContents
PEXRDNInvisibilityNameSet
PEXRDNInvisibilityNameSetContents
PEXRDNPickNameSet
PEXRDNPickNameSetContents

The bits in the attributes bitmask are accessed with the following constants:

PEXRDAClipList
PEXRDAEchoMode
PEXRDAHLHSRMode
PEXRDANPCSubVolume
PEXRDAViewport

ERRORS

BadPEXRenderer
The specified *renderer* resource identifier is invalid.

SEE ALSO

PEXCreateRenderer(3)
PEXChangeRenderer(3)
PEXBeginRendering(3)

NAME

PEXGetSearchContext - Get Search Context Attributes

SYNTAX

PEXSCAttributes *PEXGetSearchContext(Display **display*, PEXSearchContext *context*, unsigned long *value_mask*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
context	The resource identifier of the search context to be queried.
value_mask	A mask indicating which attributes to return.

RETURNS

A pointer to the requested attribute values; a null pointer if unsuccessful.

DESCRIPTION

This function returns the requested attribute values of the specified search *context* resource. The value mask indicates which attributes are to be returned. The value mask is constructed by OR'ing together the following constants:

PEXSCCeiling
PEXSCDistance
PEXSCInvertedList
PEXSCModelClipFlag
PEXSCNormalList
PEXSCPosition
PEXSCStartPath

PEXlib allocates memory for the returned search *context* attribute values. **PEXFreeSCAttributes**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID     PEXSearchContext;

typedef struct {
        PEXCoord                position;
        float                   distance;
        unsigned short          ceiling;
        Bool                    model_clip_flag;
        PEXStructurePath        start_path;
        PEXListOfNameSetPair    normal;
        PEXListOfNameSetPair    inverted;
} PEXSCAttributes;

typedef struct {
        float    x;
        float    y;
        float    z;
} PEXCoord;
```

```
typedef struct {
        unsigned long           count;          /* number of elements */
        PEXElementRef           *elements;
} PEXStructurePath;

typedef struct {
        PEXStructure            structure;
        unsigned long           offset;
} PEXElementRef;

typedef  XID     PEXStructure;

typedef struct {
        unsigned short          count;          /* number of pairs */
        PEXNameSetPair          *pairs;
} PEXListOfNameSetPair;

typedef struct {
        PEXNameSet    inclusion;
        PEXNameSet    exclusion;
} PEXNameSetPair;

typedef  XID     PEXNameSet;
```

ERRORS

BadPEXSearchContext
The specified search *context* resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO

PEXCreateSearchContext(3)
PEXChangeSearchContext(3)
PEXFreeSCAttributes(3)

NAME PEXGetSizeOCs - Return the Protocol Formatted Size of Output Commands

SYNTAX int PEXGetSizeOCs(int *float_format*, int *oc_count*, PEXOCData **oc_data*)

PARAMETERS

float_format	The floating point format to use in computing the formatted size.
oc_count	The number of output commands.
oc_data	An array of output command data.

RETURNS The size, in bytes, of the formatted output commands; zero if unsuccessful.

DESCRIPTION This function returns information about the size of the protocol for the output commands. An unsuccessful return value is possible if the specified floating point format is invalid or unsupported by PEXlib.

DATA STRUCTURES See **PEXlib.h** for the definition of **PEXOCData.**

ERRORS None

NAME

PEXGetStructureInfo - Get Structure Information

SYNTAX

Status PEXGetStructureInfo(Display **display*, PEXStructure *structure*, int *float_format*, unsigned long *value_mask*, PEXStructureInfo **info_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
float_format	The floating point format to use when computing element sizes (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
value_mask	A mask indicating which values to return.
info_return	Returns information about the *structure* resource.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns information about the specified *structure* resource. The value mask is constructed by OR'ing together the following constants:

PEXEditMode
PEXElementPtr
PEXHasRefs
PEXLengthStructure
PEXNumElements

The length of the structure is given in the number of 4-byte units, and is based upon the specified floating point format.

DATA STRUCTURES

```
typedef  XID     PEXStructure;

typedef struct {
        unsigned long   element_count;
        unsigned long   size;
        Bool            has_refs;
        unsigned short  edit_mode;
        unsigned long   element_pointer;
} PEXStructureInfo;
```

ERRORS

BadPEXFloatingPointFormat
The specified floating point format is invalid or unsupported.

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO **PEXCreateStructure**(3)

NAME

PEXGetStructuresInNetwork - Get Structures in Network

SYNTAX

PEXStructure *PEXGetStructuresInNetwork(Display **display*, PEXStructure *structure*, int *which*, unsigned long **count_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the root structure in the structure network.
which	A value indicating which structure resource identifiers to return (**PEXAll** or **PEXOrphans**).
count_return	Returns the number of structure resource identifiers returned.

RETURNS

An array of structure resource identifiers; a null pointer if unsuccessful.

DESCRIPTION

This function returns a list of unique structure resource identifiers that are referenced in the structure network rooted at the specified *structure*. **PEXAll** indicates that identifiers of all structure resources referenced in the structure network are returned. **PEXOrphans** indicates that identifiers returned are those not referenced by any structures outside of those in the specified *structure* network.

The specified *structure* identifier will always be returned in the list, unless it is an invalid structure identifier, in which case the returned list will be empty.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for which parameter is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXGetAncestors(3)
PEXGetDescendants(3)

NAME

PEXGetTableEntries - Get Lookup Table Entries

SYNTAX

Status PEXGetTableEntries(Display **display*, PEXLookupTable *table*, unsigned int *start*, unsigned int *count*, int *value_type*, int **table_type_return*, PEXPointer **entries_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
table	The resource identifier of the lookup table from which the table entries are to be obtained.
start	The index of the first lookup table entry to be returned.
count	The number of entries requested.
value_type	The type of values to return (**PEXSetValue** or **PEXRealizedValue**).
table_type_return	Returns the type of table.
entries_return	Returns an array of table entries.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns the values associated with a range of contiguous table indices, starting at the specified entry index. If a table entry in the requested range is not defined, the default entry for a table of this type is returned.

The type of entries in the returned list depend on the returned table type. See **PEXSetTableEntries**(3) for the structure types.

If the requested value type is **PEXSetValue,** the values returned will be those originally set in the table entry. If the requested value type is **PEXRealizedValue,** the values returned will be those actually used during rendering (i.e. the values used if the specified entry value can not be exactly matched).

PEXlib allocates the memory for the returned entries. **PEXFreeTableEntries**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXLookupTable;

#if NeedFunctionPrototypes
typedef void    *PEXPointer;
#else
typedef char    *PEXPointer;
#endif
```

ERRORS

BadPEXLookupTable
The specified lookup table resource identifier is invalid, or the table type is unsupported.

BadValue
The sum of start and count is too large, or index 0 is invalid for the specified table type.

SEE ALSO

PEXCreateLookupTable(3)
PEXGetTableInfo(3)
PEXGetPredefinedEntries(3)
PEXGetDefinedIndices(3)
PEXGetTableEntry(3)
PEXSetTableEntries(3)

NAME

PEXGetTableEntry - Get Lookup Table Entry

SYNTAX

PEXPointer PEXGetTableEntry(Display **display*, PEXLookupTable *table*, unsigned int *index*, int *value_type*, int **status_return*, int **table_type_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

table The resource identifier of the lookup table.

index The index of the entry to be returned from the lookup table.

value_type The type of values to return (**PEXSetValue** or **PEXRealizedValue**).

status_return Returns the entry status, either **PEXDefinedEntry** if the specified lookup table entry is defined or **PEXDefaultEntry** if it is undefined.

table_type_return
Returns the type of table.

RETURNS

A pointer to the lookup table entry; a null pointer if unsuccessful.

DESCRIPTION

This function returns a single entry from the specified lookup table. If the specified lookup table entry is defined, the defined entry is returned. If the specified lookup table entry is not defined, the default entry for that type of table is returned.

The type of structure returned depends on the specified type. See **PEXSetTableEntries**(3) for the structure types.

If the requested value type is **PEXSetValue,** the values returned will be those originally set in the table entry. If the requested value type is **PEXRealizedValue,** the values returned will be those actually used during rendering (i.e. the values used if the specified entry value can not be exactly matched).

PEXlib allocates memory for the returned entry. **PEXFreeTableEntries**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID     PEXLookupTable;

#if NeedFunctionPrototypes
typedef void     *PEXPointer;
#else
typedef char     *PEXPointer;
#endif
```

ERRORS

BadPEXLookupTable
The specified lookup table resource identifier is invalid, or the table type is unsupported.

BadValue
Index 0 is invalid for the specified table type.

SEE ALSO

PEXCreateLookupTable(3)
PEXGetTableInfo(3)
PEXGetPredefinedEntries(3)
PEXGetDefinedIndices(3)
PEXGetTableEntries(3)
PEXSetTableEntries(3)

NAME

PEXGetTableInfo - Get Lookup Table Information

SYNTAX

Status PEXGetTableInfo(Display **display*, Drawable *drawable*, int *table_type*, PEXTableInfo **info_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
table_type	The type of lookup table (see the Description).
info_return	Returns the lookup table information.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns information about the specified type of lookup table. The type of lookup table must be one of the following:

PEXLUTColor
PEXLUTColorApprox
PEXLUTDepthCue
PEXLUTEdgeBundle
PEXLUTInteriorBundle
PEXLUTLight
PEXLUTLineBundle
PEXLUTMarkerBundle
PEXLUTPattern
PEXLUTTextBundle
PEXLUTTextFont
PEXLUTView

The returned information is based on the assumption that the lookup table would be used on drawables with the same root and depth as the specified drawable. The returned information includes the number of predefined table entries, the number of definable table entries, and the indices of the predefined minimum and maximum entries. Predefined entries are contiguous. The number of definable table entries includes the number of predefined entries since predefined table entries can be redefined by the application. All entries between the predefined minimum and maximum values are guaranteed to be defined initially (i.e. predefined entries have contiguous indices).

DATA STRUCTURES

```
typedef struct {
        unsigned short      definable_entries;
        unsigned short      predefined_count;
        unsigned short      predefined_min;
        unsigned short      predefined_max;
} PEXTableInfo;
```

ERRORS

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported.

BadPEXLookupTable
The specified table type is unsupported.

BadValue
The specified table type is invalid.

SEE ALSO

PEXCreateLookupTable(3)

NAME

PEXGetWorkstationAttributes - Get Workstation Attribute Values

SYNTAX

PEXWorkstationAttributes *PEXGetWorkstationAttributes(Display **display*, PEXWorkstation *workstation*, unsigned long **value_mask*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
value_mask	A mask indicating which workstation attribute values to return.

RETURNS

A pointer to the workstation attribute values; a null pointer if unsuccessful.

DESCRIPTION

This function returns the specified workstation's attributes. The value mask indicates which attributes are to be returned. **PEXSetPWAttributeMask**(3) or **PEXSetPWAttributeMaskAll**(3) should be used to setup the value mask.

PEXlib allocates memory for the returned workstation attribute values. **PEXFreeWorkstationAttributes**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        short                   drawable_update;
        int                     visual_state;
        int                     drawable_surface;
        int                     view_update;
        PEXListOfView           defined_views;
        int                     wks_update;
        PEXNPCSubVolume         req_npc_subvolume;
        PEXNPCSubVolume         cur_npc_subvolume;
        PEXViewport             req_workstation_viewport;
        PEXViewport             cur_workstation_viewport;
        int                     hlhsr_update;
        PEXEnumTypeIndex        req_hlhsr_mode;
        PEXEnumTypeIndex        cur_hlhsr_mode;
        Drawable                drawable;
        PEXLookupTable          marker_bundle;
        PEXLookupTable          text_bundle;
        PEXLookupTable          line_bundle;
        PEXLookupTable          interior_bundle;
        PEXLookupTable          edge_bundle;
        PEXLookupTable          color_table;
        PEXLookupTable          depth_cue_table;
        PEXLookupTable          light_table;
        PEXLookupTable          color_approx_table;
```

```
        PEXLookupTable              pattern_table;
        PEXLookupTable              text_font_table;
        PEXNameSet                  highlight_incl;
        PEXNameSet                  highlight_excl;
        PEXNameSet                  invisibility_incl;
        PEXNameSet                  invisibility_excl;
        PEXListOfPostedStructure    posted_structures;
        unsigned long               count_priorities;
        int                         buffer_update;
        int                         req_buffer_mode;
        int                         cur_buffer_mode;
} PEXWorkstationAttributes;

typedef struct {
        unsigned short          count;          /* number of views */
        PEXTableIndex           *views;
} PEXListOfView;

typedef  unsigned short PEXTableIndex;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
XNPCSubVolume;

typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord          min;
        PEXDeviceCoord          max;
        PEXSwitch               use_drawable;
        unsigned char           reserved[3];
} PEXViewport;

typedef struct {
        short     x;
        short     y;
        float     z;
} PEXDeviceCoord;

typedef  unsigned char  PEXSwitch;
```

```
typedef short   PEXEnumTypeIndex;
typedef XID     PEXLookupTable;
typedef XID     PEXNameSet;

typedef struct {
        unsigned long           count;          /* number of posted structures */
        PEXPostedStructure      *structures;
} PEXListOfPostedStructure;

typedef struct {
        PEXStructure    sid;
        float           priority;
} PEXPostedStructure;

typedef XID     PEXStructure;
```

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
An invalid bit is set in the value mask.

SEE ALSO

PEXGetWorkstationDynamics(3)
PEXSetPWAttributeMask(3)
PEXSetPWAttributeMaskAll(3)

NAME

PEXGetWorkstationDynamics - Get Workstation Attribute Modification Dynamics

SYNTAX

Status PEXGetWorkstationDynamics(Display **display*, Drawable *drawable*, PEXWorkstationDynamics **dynamics_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

drawable The resource identifier of a drawable.

dynamics_return Returns the dynamics of the specified workstation.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns the dynamics of the specified PHIGS workstation resource. Each entry in the returned list has one of the following values: **PEXIMM, PEXCBS** or **PEXIRG. PEXIMM** means that modification of the corresponding attribute will result in the correct image displayed immediately without regeneration. **PEXCBS** means that modification of the corresponding attribute will result in a simulation displayed immediately if the display update mode is **PEXSimulateSome. PEXIRG** means that a regeneration is required for the change to be visible.

DATA STRUCTURES

```
typedef struct {
        unsigned char       view_rep;
        unsigned char       marker_bundle;
        unsigned char       text_bundle;
        unsigned char       line_bundle;
        unsigned char       interior_bundle;
        unsigned char       edge_bundle;
        unsigned char       color_table;
        unsigned char       pattern_table;
        unsigned char       wks_transform;
        unsigned char       highlight_filter;
        unsigned char       invisibility_filter;
        unsigned char       hlhsr_mode;
        unsigned char       structure_modify;
        unsigned char       post_structure;
        unsigned char       unpost_structure;
        unsigned char       delete_structure;
        unsigned char       reference_modify;
        unsigned char       buffer_modify;
        unsigned char       light_table;
        unsigned char       depth_cue_table;
        unsigned char       color_approx_table;
} PEXWorkstationDynamics;
```

ERRORS

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported.

SEE ALSO

PEXGetWorkstationAttributes(3)

NAME

PEXGetWorkstationPostings - Get Workstation Postings

SYNTAX

Status PEXGetWorkstationPostings(Display **display*, PEXStructure *structure*, unsigned long **count_return*, PEXWorkstation ***postings_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
count_return	Returns the number of workstation identifiers.
postings_return	Returns an array of workstation resource identifiers.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns a list of workstation resources to which the specified *structure* has been posted.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

typedef XID PEXStructure;
typedef XID PEXWorkstation;

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXPostStructure(3)
PEXUnpostStructure(3)
PEXUnpostAllStructures(3)

NAME

PEXGetWorkstationViewRep - Get Workstation View Representation

SYNTAX

Status PEXGetWorkstationViewRep(Display **display*, PEXWorkstation *workstation*, unsigned int *index*, int **update_return*, PEXViewRep **req_view_return*, PEXViewRep **cur_view_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
index	The view table index.
update_return	Returns the update status of the view table index.
req_view_return	Returns the requested value of the view table index.
cur_view_return	Returns the current value of the view table index.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

The function returns the update state, and the requested and current values for the specified view index of the specified workstation. The update will be **PEXPending** if a view change has been requested but not established; otherwise it will be **PEXNotPending .** If the specified view index is not defined, an error will be generated and the contents of the reply parameters will be undefined.

DATA STRUCTURES

```
typedef  XID     PEXWorkstation;

typedef struct {
        PEXTableIndex           index;
        unsigned short          reserved;
        PEXViewEntry            view;
} PEXViewRep;

typedef  unsigned short PEXTableIndex;

typedef struct {
        unsigned short          clip_flags;
        unsigned short          reserved;
        PEXNPCSubVolume         clip_limits;
        PEXMatrix               orientation;
        PEXMatrix               mapping;
} PEXViewEntry;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;
```

```
typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef  float    PEXMatrix[4][4];
```

ERRORS

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

BadValue
The specified view table entry is not defined.

SEE ALSO

PEXSetWorkstationViewRep(3)

NAME PEXIdentityMatrix - utility function

SYNTAX void PEXIdentityMatrix(PEXMatrix *transform_return*)

PARAMETERS

transform_return
The returned identity matrix.

DESCRIPTION This function returns an identity matrix.

ERRORS None

NAME

PEXIdentityMatrix2D - utility function

SYNTAX

void PEXIdentityMatrix2D(PEXMatrix3x3 *transform_return*)

PARAMETERS

transform_return
The returned identity matrix.

DESCRIPTION

This function returns a 2D identity matrix.

ERRORS

None

NAME

PEXInitialize - Initialize PEXlib display connection

SYNTAX

int PEXInitialize(Display **display*, PEXExtensionInfo ***info_return*, int *length*, char **error_string*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
info_return	Returns a pointer to the extension information; if available (see the Description).
length	The length, in bytes, of the memory allocated for the error string.
error_string	A pointer to memory allocated for the error string.

RETURNS

Zero if successful; otherwise, one of the following return values:

PEXBadExtension
PEXBadProtocolVersion
PEXBadFloatConversion
PEXBadLocalAlloc

DESCRIPTION

PEXInitialize initializes PEXlib for the specified display.

PEXInitialize can be called multiple times; subsequent calls will result in the same return value as the first call.

Standard **PEXInitialize** failure return values are:

PEXBadExtension - the PEX server extension does not exist,

PEXBadProtocolVersion - the PEX server extension does not support a compatible protocol version,

PEXBadFloatConversion - the PEX server extension does not support a protocol floating point format compatible with PEXlib's native format or a format to which PEXlib supports conversion, or

PEXBadLocalAlloc - PEXlib client-side allocation failed.

If **PEXInitialize** is successful (return value is zero), or if the return value is **PEXBadProtocolVersion,** a pointer to the extension information is returned in *info_return.* Otherwise, a NULL pointer is returned in *info_return. The* extension information is private to PEXlib and must not be modified or freed by the application.

The error string parameter specifies an address to memory allocated by the application. The constant **PEXErrorStringLength** is defined as a guideline for the size to allocate for the error string. If no failure occurred, the memory addressed by the error string parameter will be unchanged. If a failure does occur, an error string giving further information about the failure will be copied into this memory (up to the maximum specified by the length parameter).

The actual string returned is implementation dependent, and is provided primarily for convenience in printing an error message for the application's end-user.

DATA STRUCTURES

```
typedef struct {
        unsigned short          major_version;
        unsigned short          minor_version;
        unsigned long           release;
        unsigned long           subset_info;
        char                    *vendor_name;
        int                     major_opcode;
        int                     first_event;
        int                     first_error;
} PEXExtensionInfo;
```

ERRORS

None

SEE ALSO

PEXGetExtensionInfo(3)
PEXGetEnumTypeInfo(3)
PEXGetImpDepConstants(3)
PEXMatchRenderingTargets(3)

NAME PEXInvertMatrix - utility function

SYNTAX int PEXInvertMatrix(PEXMatrix *transform*, PEXMatrix *transform_return*)

PARAMETERS

transform The transformation matrix to invert.

transform_return The inverse transformation.

RETURNS Zero if successful; non-zero if unsuccessful.

DESCRIPTION

This function computes the inverse of a transformation matrix.

An unsuccessful status is returned if the matrix is non-invertible.

The two arguments may be the same variable, in which case the inversion is performed in-place, overwriting the original transform.

ERRORS None

SEE ALSO **PEXInvertMatrix2D**(3)

NAME

PEXInvertMatrix2D - utility function

SYNTAX

int PEXInvertMatrix2D(PEXMatrix3x3 *transform*, PEXMatrix3x3 *transform_return*)

PARAMETERS

transform The transformation matrix to invert.

transform_return
The inverse transformation.

RETURNS

Zero if successful; non-zero if unsuccessful.

DESCRIPTION

This function computes the inverse of a 2D transformation matrix.

An unsuccessful status is returned if the matrix is non-invertible.

The two arguments may be the same variable, in which case the inversion is performed in-place, overwriting the original transform.

ERRORS

None

SEE ALSO

PEXInvertMatrix(3)

NAME

PEXLabel - Structure Label

SYNTAX

void PEXLabel(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, long *label*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
label	A value to be used as a label.

RETURNS

None

DESCRIPTION

This function creates a label output command which has no visible effect. Its primary function comes when it is stored in a structure, as labels can be used in various element pointer positioning operations. Labels within a particular structure need not be unique.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXDeleteToLabel(3)
PEXDeleteBetweenLabels(3)
PEXSetElementPtrAtLabel(3)

NAME

PEXListFonts - List PEX Fonts

SYNTAX

char **PEXListFonts(Display *_display_, char *_pattern_, unsigned int _max_names_, unsigned long *_count_return_)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
pattern	A null-terminated string pattern.
max_names	The maximum number of names to be returned.
count_return	Returns the actual number of font names.

RETURNS

An array of font names (null-terminated strings); a null pointer if unsuccessful or if no PEX fonts supported.

DESCRIPTION

This function is like X11 **XListFonts** except only information about fonts that can support the full range of PEX text attributes is returned (i.e. only those fonts that are "PEX usable"). This list may or may not contain some of the same fonts returned by the X11 **XListFonts** function. This function returns a list of entries, each of which contains the name of a font matching the pattern. The pattern is a string that uses the ISO Latin-1 encoding and case is not significant in matching names. The '?' character (octal value 077) matches any single character, and the character '*' (octal value 052) matches any number of characters. The returned names are null-terminated, in lower-case and are also ISO Latin-1 encoded strings.

PEXlib allocates memory for the returned list of font names. **PEXFreeFontNames**(3) should be called to deallocate the memory.

ERRORS

None

SEE ALSO

PEXListFontsWithInfo(3)
PEXFreeFontNames(3)

NAME

PEXListFontsWithInfo - List PEX Fonts With Information

SYNTAX

char **PEXListFontsWithInfo(Display *_display_, char *_pattern_, unsigned int _max_names_, unsigned long *_count_return_, PEXFontInfo **_info_return_)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
pattern	A null-terminated string pattern.
max_names	The maximum number of names to be returned.
count_return	Returns the actual number of font names.
font_info	Returns an array of font info structures (one for each name).

RETURNS

An array of font names (null-terminated strings); a null pointer if unsuccessful or if no PEX fonts supported.

DESCRIPTION

This function is like X11 **XListFontsWithInfo** except that only information about fonts that can support the full range of PEX text attributes is returned (i.e. those fonts that are "PEX usable"). This list may or may not contain some of the same fonts returned the X11 **XListFontsWithInfo** function. This function returns a list of entries, each of which contains information about a font matching the pattern. The pattern is a string that uses the ISO Latin-1 encoding and case is not significant in matching names. The '?' character (octal value 077) matches any single character, and the character '*' (octal value 052) matches any number of characters. The returned names are null-terminated, in lower case and are also ISO Latin-1 encoded strings.

The information returned for each font is identical to what **PEXQueryFont**(3) would return.

PEXlib allocates memory for the returned list of font names and font info. **PEXFreeFontNames**(3) should be called to deallocate the memory for the font names. **PEXFreeFontInfo**(3) should be called to deallocate the memory for the font information.

DATA STRUCTURES

```
typedef struct {
        unsigned long       first_glyph;
        unsigned long       last_glyph;
        unsigned long       default_glyph;
        Bool                all_exist;
        Bool                stroke;
        unsigned short      count;          /* number of properties */
        PEXFontProp         *props;
} PEXFontInfo;

typedef struct {
        Atom                name;
        unsigned long       value;
```

```
} PEXFontProp;
```

ERRORS None

SEE ALSO **PEXListFonts**(3)
PEXQueryFont(3)
PEXFreeFontNames(3)
PEXFreeFontInfo(3)

NAME

PEXLoadFont - Load PEX Font

SYNTAX

PEXFont PEXLoadFont(Display **display*, char **font_name*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

font_name The font name (null-terminated string).

RETURNS

The resource identifier of the loaded PEX font.

DESCRIPTION

This function loads the specified PEX font, if necessary. The font name should use the ISO Latin-1 encoding and case is not significant in matching names. PEX fonts are not associated with a particular screen, and can be used with any renderer or PHIGS workstation resource. An error will be generated if the specified font is not "PEX usable", that is, it is not capable of supporting the full range of PEX text attributes.

DATA STRUCTURES

typedef XID PEXFont;

ERRORS

BadAlloc
The server failed to allocate the resource.

BadPEXFont
The specified font name does not name a usable PEX font.

SEE ALSO

PEXUnloadFont(3)

NAME

PEXLookAtViewMatrix - utility function

SYNTAX

int PEXLookAtViewMatrix(PEXCoord **from*, PEXCoord **to*, PEXVector **up*, PEXMatrix *matrix_return*)

PARAMETERS

from	Viewing position, in world coordinates.
to	Look at position, in world coordinates.
up	Vector representing the *up* direction, in world coordinates.
matrix_return	Matrix in which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadVectors
The *from* and *to* arguments are equal, or the line between them is parallel with the up vector

PEXBadVector
Up is zero length.

DESCRIPTION

This function creates a view orientation transform that defines the viewing direction and orientation. It is a slightly more intuitive interface to **PEXViewOrientationMatrix**(3)**.**

The *from* position defines the viewpoint, and the *to* position specifies the point being viewed. These two parameters together define the view reference point (the VRC origin) and the view plane normal of **PEXViewOrientationMatrix**(3)**.** The view reference point is the *to* point; the view plane normal is the vector from *to* to *from*.

The view up vector is a 3D vector defined in world coordinates relative to the *to* point. The projection of this vector onto the plane through the *to* point and perpendicular to the view plane normal defines the Y axis of VRC.

ERRORS

None

SEE ALSO

PEXPolarViewMatrix(3)
PEXViewOrientationMatrix(3)
PEXViewMappingMatrix(3)

NAME

PEXMapDCToWC - Map Device Coordinate Points to World Coordinate Points

SYNTAX

Status PEXMapDCToWC(Display **display*, PEXWorkstation *workstation*, unsigned long *dc_count*, PEXDeviceCoord **dc_points*, unsigned int **view_index_return*, unsigned long **wc_count_return*, PEXCoord ***wc_points_return*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

dc_count The number of device coordinate points.

dc_points An array of device coordinates.

view_index_return Returns the view index of the view containing most or all of the points.

wc_count_return Returns the number of world coordinate points.

wc_points_return Returns an array of world coordinate points.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function maps the device coordinate points to world coordinate points using the specified workstation. Each view in the workstation's current view table, which has an inverse, is checked to see if it contains all the specified device coordinate points. (If the view transform has no inverse, it is not considered.) The index of the view with the highest view transformation input priority that contains all of the points is returned. If no view contains all the points, the index of the view containing the most points is returned. The points are transformed to world coordinates by passing them through the inverse of the view transform associated with the view index. Points that are clipped (outside the viewport) will not be transformed and returned, so the number of points returned may be less than the number sent.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        short   x;
        short   y;
        float   z;
} PEXDeviceCoord;

typedef struct {
        float   x;
        float   y;
```

```
        float     z;
} PEXCoord;
```

ERRORS

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

SEE ALSO

PEXMapWCToDC(3)
PEXSetWorkstationViewPriority(3)

NAME

PEXMapWCToDC - Map World Coordinate Points to Device Coordinate Points

SYNTAX

Status PEXMapWCToDC(Display **display*, PEXWorkstation *workstation*, unsigned long *wc_count*, PEXCoord **wc_points*, unsigned int *view_index*, unsigned long **dc_count_return*, PEXDeviceCoord ***dc_points_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
wc_count	The number of world coordinate points.
wc_points	An array of world coordinate points.
view_index	The view index to use in transforming the world coordinate points.
dc_count_return	Returns the number of device coordinate points.
dc_points_return	Returns an array of device coordinate points.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function maps the world coordinate points to device coordinate points using the specified workstation and view index. The points are transformed to device coordinates by passing them through the view transform associated with the view index. Points that are clipped will not be returned, so the number of points returned may be less than the number sent.

PEXlib allocates memory for the return value. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        short   x;
        short   y;
        float   z;
} PEXDeviceCoord;

typedef struct {
        float   x;
        float   y;
        float   z;
} PEXCoord;
```

ERRORS

BadPEXWorkstation
The specified *workstation* resource identifier is invalid.

SEE ALSO

PEXMapDCToWC(3)
PEXSetWorkstationViewPriority(3)

NAME

PEXMapXCToNPC - utility function

SYNTAX

int PEXMapXCToNPC(int *point_count*, PEXDeviceCoord2D **points*, unsigned int *window_height*, double *z_dc*, PEXDeviceCoord **viewport*, PEXNPCSubVolume **npc_sub_volume*, int *view_count*, PEXViewEntry **views*, int **view_return*, int **count_return*, PEXCoord **points_return*)

PARAMETERS

point_count	The number of points to transform.
points	A pointer to an array of points to transform. The X and Y coordinates of these points are in drawable coordinates (XC). The Z coordinate is in device coordinates (DC).
window_height	The height of the drawable.
z_dc	The z DC coordinate to assign the drawable points when converting them to DC.
viewport	An array of two device coordinate points defining a viewport, typically that of a renderer resource. The first point in the array is the lower-left corner of the viewport; the second point is the upper-right.
npc_sub_volume	A pointer to an NPC subvolume, typically that of a renderer resource.
view_count	The number of views to search.
views	The view entries to search for inclusion of the transformed points.
view_return	Returns the view found to contain the most points.
count_return	Returns the number of points contained in the returned view, or the number of points transformed if no views are specified.
points_return	Returns a pointer to an array in which to store the transformed points.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadViewport
PEXBadSubVolume

DESCRIPTION

This function maps a list of drawable coordinates (XC) to NPC, and searches a specified list of view entries to determine the view containing the computed NPC points.

The XC points are first transformed to DC, using the specified window height and assigning them the specified z DC value. They are then transformed to NPC by the viewport-to-subvolume transform implied by the specified viewport and NPC subvolume. The specified list of views is then searched, in order from 0 to the number of views minus 1, and the index of the first view containing all the NPC points is returned. If no view contains all the points, then the lowest-index view containing the most points is returned. In this case, only the points within the view are returned in *points_ret*.

When determining the containing view, only the clipping limits of the view are considered, with no consideration given to the clipping flags or the viewing transforms.

If no views are specified, the XC points are simply transformed to NPC points and returned. The value of the returned view is undefined in this case.

The viewport-to-subvolume transformation maps to NPC the largest region of the specified viewport that has the same aspect ratio as the NPC subvolume and is anchored at the back lower-left of the viewport (the corner of the viewport with the minimum X, Y and Z coordinates). Points that lie outside this region of the viewport are not transformed.

When specifying NPC and DC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS None

SEE ALSO **PEXMapXCToNPC2D**(3)
PEXNPCToXCTransform(3)
PEXXCToNPCTransform(3)

NAME

PEXMapXCToNPC2D - utility function

SYNTAX

int PEXMapXCToNPC2D(int *point_count*, PEXDeviceCoord2D **points*, unsigned int *window_height*, PEXDeviceCoord2D **viewport*, PEXNPCSubVolume **npc_sub_volume*, int *view_count*, PEXViewEntry **views*, int **view_return*, int **count_return*, PEXCoord2D **points_return*)

PARAMETERS

point_count	The number of points to transform.
points	A pointer to an array of drawable-coordinate (XC) points to transform.
window_height	The height of the drawable.
viewport	An array of two device coordinate points defining a viewport, typically that of a renderer resource. The first point in the array is the lower-left corner of the viewport; the second point is the upper-right.
npc_sub_volume	A pointer to an NPC subvolume, typically that of a renderer resource.
view_count	The number of views to search.
views	The view entries to search for inclusion of the transformed points.
view_return	The view found to contain the most points.
count_return	Returns the number of points contained in the returned view, or the number of points transformed if no views are specified.
points_return	A pointer to an array in which to store the transformed points.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadViewport
PEXBadSubVolume

DESCRIPTION

This function maps a list of drawable coordinates (XC) to NPC, and searches a specified list of view entries to determine the view containing the computed NPC points.

The XC points are first transformed to 2D DC, using the specified window height, then transformed to 2D NPC by the viewport-to-subvolume transform implied by the specified viewport and NPC subvolume. The specified list of views is then searched, in order from 0 to the number of views minus 1, and the index of the first view containing all the NPC points is returned. If no view contains all the points, then the lowest-index view containing the most points is returned. In this case, only the points within the view are returned.

When determining the containing view, only the x-y clipping limits of the view are considered, with no consideration given to the front and back clipping limits, the clipping flags, or the viewing transforms.

If no views are specified, the XC points are simply transformed to NPC points and returned. The value of the returned view is undefined in this case.

The viewport-to-subvolume transformation maps to NPC the largest region of the specified viewport that has the same aspect ratio as the NPC subvolume and is anchored at the back lower-left of the viewport (the corner of the viewport with the minimum X, Y and Z coordinates). Points that lie outside this region of the viewport are not transformed.

When specifying NPC and DC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS

None

SEE ALSO

PEXMapXCToNPC(3)
PEXNPCToXCTransform2D(3)
PEXXCToNPCTransform2D(3)

NAME

PEXMarkers - 3D Markers Primitive

SYNTAX

void PEXMarkers(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *count*, PEXCoord **points*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
count	The number of points.
points	An array of points specifying marker locations.

RETURNS

None

DESCRIPTION

This function creates a markers output primitive.

A marker is a geometric primitive with a position as its only geometric attribute. The position is specified in modeling coordinates.

Rendering transforms the marker's position to a position in device coordinates. A marker has no geometric size, so geometric transformations do not affect the displayed size of the marker. The marker's color is affected only by depth-cueing and mapped to a device color. The clipping of markers whose position is inside the clipping volume but whose rendering is outside the clipping volume is implementation-dependent.

Depending on the setting of the marker ASF attributes, the marker color, marker type, and marker scale attributes are obtained either directly from the current marker attributes or from the marker bundle.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetMarkerType(3)
PEXSetMarkerScale(3)
PEXSetMarkerColorIndex(3)
PEXSetMarkerColor(3)
PEXSetMarkerBundleIndex(3)

NAME

PEXMarkers2D - 2D Markers Primitive

SYNTAX

void PEXMarkers2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *count*, PEXCoord2D **points*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
count	The number of points.
points	An array of points specifying marker locations.

RETURNS

None

DESCRIPTION

This function creates a 2D markers output primitive.

This function is like **PEXMarkers**(3)**,** except that the vertices consist of only x- and y-components. The z-component is assumed to be zero. This primitive is two-dimensional only in that the z-components are implied. Geometry transformations are still carried out in three dimensions.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetMarkerType(3)
PEXSetMarkerScale(3)
PEXSetMarkerColorIndex(3)
PEXSetMarkerColor(3)
PEXSetMarkerBundleIndex(3)

NAME

PEXMatchRenderingTargets - Return Information about Supported Rendering Targets

SYNTAX

Status PEXMatchRenderingTargets(Display **display*, Drawable *drawable*, int *depth*, int *type*, Visual **visual*, unsigned long *max_targets*, unsigned long **count_return*, PEXRenderingTarget ***targets_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The drawable indicates which screen the application is interested in.
depth	The depth of interest.
type	The drawable type of interest (**PEXAnyDrawable, PEXWindowDrawable, PEXPixmapDrawable, PEXBufferDrawable**).
visual	The visual of interest.
max_targets	The maximum number of targets to return.
count_return	Returns the actual number of targets in the return array.
targets_return	Returns an array of rendering target information.

RETURNS

Zero if unsuccessful, non-zero otherwise.

DESCRIPTION

This function returns information about which drawable types the server supports.

A drawable is specified only to indicate the screen for which the returned information should apply. None of the other drawable attributes are used.

The depth value is specified to indicate the depth for which the returned information should apply. If the application wants information on all supported depths, a value of zero should be specified.

The drawable type is specified to indicate the type of drawable for which the returned information should apply. The type field of the **PEXRenderingTarget** data structure will have these same values with the exception of **PEXAnyDrawable .**

The *visual* is specified to indicate the *visual* for which the returned information should apply. If the application wants information on all supported visuals, a null pointer should be specified.

PEXlib allocates memory for the returned target values. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef struct {
        int     depth;
        int     type;    /* PEXWindowDrawable, PEXPixmapDrawable, PEXBufferDrawable */
        Visual  *visual;
} PEXRenderingTarget;
```

ERRORS

BadDrawable
The specified drawable resource identifier is invalid.

BadValue
The specified visual is invalid.

NAME

PEXMatrixMult - utility function

SYNTAX

void PEXMatrixMult(PEXMatrix *matrix1*, PEXMatrix *matrix2*, PEXMatrix *matrix_return*)

PARAMETERS

matrix1	First matrix to be multiplied.
matrix2	Second matrix to be multiplied.
matrix_return	Matrix into which result is stored.

RETURNS

None

DESCRIPTION

Performs a matrix multiplication: matrix = matrix1 X matrix2

If the return matrix is the same as one of the input matrices, the function will overwrite the input values with the multiplied values.

ERRORS

None

SEE ALSO

PEXMatrixMult2D(3)

NAME

PEXMatrixMult2D - utility function

SYNTAX

void PEXMatrixMult2D(PEXMatrix3x3 *matrix1*, PEXMatrix3x3 *matrix2*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

matrix1	First matrix to be multiplied.
matrix2	Second matrix to be multiplied.
matrix_return	Matrix into which result is stored.

RETURNS

None

DESCRIPTION

Performs a 3X3 matrix multiplication: matrix = matrix1 X matrix2.

If the return matrix is the same as one of the input matrices, the function will overwrite the input values with the multiplied values.

ERRORS

None

SEE ALSO

PEXMatrixMult(3)

NAME

PEXNPCToXCTransform - utility function

SYNTAX

int PEXNPCToXCTransform(PEXNPCSubVolume **npc_sub_volume*, PEXDeviceCoord **viewport*, unsigned int *window_height*, PEXMatrix *transform_return*)

PARAMETERS

npc_sub_volume A pointer to an NPC subvolume, typically that of a renderer resource.

viewport An array of two device coordinate points defining a viewport, typically that of a renderer resource. The first point in the array is the lower-left corner of the viewport; the second point is the upper-right.

window_height The height of the drawable.

transform_return The returned transformation.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadViewport - (xmin >= xmax, or
PEXBadSubVolume - (xmin >= xmax, or

DESCRIPTION

This function computes the transformation matrix to map an NPC point to a drawable coordinate (XC), using the specified NPC subvolume, DC viewport, and drawable height. The returned transformation matrix first applies the subvolume-to-viewport transformation, then transforms the x and y coordinates of the resulting points to drawable coordinates, leaving the z coordinate in DC.

When specifying NPC and DC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS

None

SEE ALSO

PEXNPCToXCTransform2D(3)

NAME

PEXNPCToXCTransform2D - utility function

SYNTAX

int PEXNPCToXCTransform2D(PEXNPCSubVolume **npc_sub_volume*, PEXDeviceCoord2D **viewport*, unsigned int *window_height*, PEXMatrix3x3 *transform_return*)

PARAMETERS

npc_sub_volume A pointer to an NPC subvolume, typically that of a renderer resource.

viewport An array of two device coordinate points defining a viewport, typically that of a renderer resource. The first point in the array is the lower-left corner of the viewport; the second point is the upper-right.

window_height The height of the drawable.

transform_return The returned transformation.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadViewport - (xmin >= xmax, or
PEXBadSubVolume - (xmin >= xmax, or

DESCRIPTION

This function computes the 2D transformation matrix to map a 2D NPC point to a 2D drawable coordinate (XC), using the specified NPC subvolume, DC viewport, and drawable height. The returned transformation matrix first applies the subvolume-to-viewport transformation, then transform the resulting points to drawable coordinates.

When specifying NPC and DC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS

None

SEE ALSO

PEXNPCToXCTransform(3)

NAME

PEXNURBCurve - Non-Uniform Rational B-spline Curve Primitive

SYNTAX

void PEXNURBCurve(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *rationality*, int *order*, float **knots*, unsigned int *count*, PEXArrayOfCoord *points*, double *tmin*, double *tmax*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
rationality	The type of B-spline curve, whether rational or non-rational (**PEXRational** or **PEXNonRational**).
order	The order of the polynomial expression.
knots	An array of floats specifying the B-spline curve knots.
count	The number of control points that define the curve.
points	An array of control points defining the B-spline curve.
tmin	The minimum parameter value at which to evaluate the curve.
tmax	The maximum parameter value at which to evaluate the curve.

RETURNS

None

DESCRIPTION

This function creates a non-uniform B-spline curve output primitive.

The curve order is specified as a positive number. **PEXGetImpDepConstants**(3) can be called to determine the largest supported value for curve order. The spline shape is specified using a list of knots in the parametric coordinate space and a list of control points in modeling coordinates. The number of control points must be at least as large as the order. The number of knots is the sum of the curve order plus the number of control points. The sequence of knots must be non-decreasing,

i.e. t(0) <= t(1) <= ... <= t(k-1)

where k is the number of knots.

If the rationality is **PEXRational,** the control points must be specified in homogeneous (4D) modeling coordinates. PEXlib assumes that 4D modeling coordinates (x,y,z) have already been multiplied by the homogeneous coordinate (w). If the rationality is **PEXNonRational,** the control points must be specified in non-homogeneous (3D) modeling coordinates.

Evaluation of the spline is restricted to a specific region in the parametric coordinate space. The parametric limits, tmin and tmax, specify the region in the parametric coordinate space over which the spline is to be evaluated (tmin must be less than tmax). The parametric bounds must also satisfy the restriction tmin >= t(order), tmax <= t(k+1-order).

Depending on the ASF attributes, line color, line type, line width and curve approximation attributes are obtained either directly from the current line attributes or from the line bundle.

If the specified curve order is not supported, the output primitive is stored in a structure, but when rendered, the primitive is ignored and has no visual effect.

Also, the curve order must not be less than one.

DATA STRUCTURES

```
typedef union {
        PEXCoord2D    *point_2d;
        PEXCoord      *point;
        PEXCoord4D    *point_4d;
} PEXArrayOfCoord;    /* Pointer to array of points */
```

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetLineType(3)
PEXSetLineWidth(3)
PEXSetLineColorIndex(3)
PEXSetLineColor(3)
PEXSetLineBundleIndex(3)
PEXSetCurveApprox(3)
PEXGetImpDepConstants(3)

NAME

PEXNURBSurface - Non-Uniform Rational B-spline Surface Primitive

SYNTAX

void PEXNURBSurface(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *rationality*, int *uorder*, int *vorder*, float **uknots*, float **vknots*, unsigned int *col_count*, unsigned int *row_count*, PEXArrayOfCoord *points*, unsigned int *curve_count*, PEXListOfTrimCurve **trim_curves*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
rationality	The type of B-spline surface, whether rational or non-rational **PEXRational** or **PEXNonRational**).
uorder	The order of the polynomial expression in the u direction.
vorder	The order of the polynomial expression in the v direction.
uknots	An array of floats specifying the B-spline curve knots in the u direction.
vknots	An array of floats specifying the B-spline curve knots in the v direction.
col_count	The number of columns in the points array (number of points in the u direction).
row_count	The number of rows in the points array (number of points in the v direction).
points	An array of points defining the B-spline surface.
curve_count	The number of trimming curves.
trim_curves	A pointer to a list of trimming curves.

RETURNS

None

DESCRIPTION

This function creates a non-uniform B-spline surface output primitive.

The surface is generated as a function of the parametric variables u and v. The u and v order must be positive integers and indicate the order of the surface in each of the u and v parameter dimensions. **PEXGetImpDepConstants**(3) can be called to determine the largest supported value for surface u and v order. The spline shape is specified using two lists of knots in the parametric coordinate space, plus an array of control points specified in modeling coordinates. The u and v knot sequences must each form a non-decreasing sequence of numbers. The column count indicates the number of control points in the u direction and the row count indicates the number of control points in the v direction. The control points are stored in the array in row-major order (i.e., the column number varies fastest as vertices are stored in the array) and the rows increase in the direction of increasing v. The number of knots in the u direction is the sum of the order in the u direction and column count. The number of knots in the v direction is the sum of

the order in the v direction and row count. The number of control points in each direction must be at least as large as the corresponding order.

The minimum and maximum knot values define the range over which the B-spline surface is evaluated in the u or v parametric direction,.

If the rationality is **PEXRational,** the control point list must be specified in homogeneous (4D) modeling coordinates. If rationality is **PEXNonRational,** the control point list must be specified in non-homogeneous (3D) modeling coordinates.

In addition to the parametric bounds, a list of trimming loops may also be specified. Trimming loops serve to further restrict the region in parametric coordinate space over which the surface is evaluated. Each trimming loop is defined as a list of one or more B-spline trimming curves that are connected head-to-tail. Each trim curve is a completely specified NURB curve, i.e. it is rational or non-rational, has its own order, etc. The list must be explicitly closed so that the tail of the last curve joins the head of the first. Each trimming curve is parameterized independently. If there is floating point inaccuracy in closure or in head-to-tail connectivity between curves, closure or connectivity will be assumed. Trimming loops are defined in the parameter space of the surface and may not go outside the parameter space of the surface.

When no trimming loops are specified, the rectangular parameter limits of the surface are renderer as the edges of the surface based on the edge flag attribute.

Trimming loops define the region of the surface that is to be rendered based on the following two rules: (1) a point is in the portion of the surface to be rendered if any ray projected from it to infinity has an odd number of intersections with trimming loops, and (2) traveling in the direction of a trimming loop, the portion of the surface to be trimmed away should be on the right and the portion to be retained should be on the left. In other words, a loop defined in counter-clockwise order will cause the interior of the loop to be retained and the exterior to be trimmed away. A clockwise loop will cause the exterior of the loop to be retained and the interior to be trimmed away. If loops are nested, they must alternate in direction. In all cases, the outermost loop must be counter-clockwise. No trimming curve may intersect itself and no trimming loop may intersect itself or any other trimming loop. Trimming loops that do not obey these rules will result in implementation-dependent behavior.

Each trimming curve has a visibility flag that controls its visibility for the purposes of surface edge display. Depending on the surface edge attributes and the visibility flags associated with trimming curves, the curves in trimming loops may be drawn as surface edges.

All attributes affecting the representation of fill area sets also affect the representation of the non-unform B-spline surface primitive. In addition, the surface approximation is used to determine how to approximate the B-spline surface and the parametric surface characteristics are used to specify the appearance of the surface.

If either of the specified surface orders are not supported, the output primitive is stored in a structure, but when rendered, the primitive is ignored and has no visual effect.

Trimming curve specification must abide by the constraints of NURB curve (e.g. number of control points at least as large as the order, non-decreasing knot sequence, order plus number of controls points equals the number of knots). Also, the trim curve order must not be less than two.

DATA STRUCTURES

```
typedef union {
        PEXCoord2D    *point_2d;
        PEXCoord      *point;
        PEXCoord4D    *point_4d;
} PEXArrayOfCoord;    /* Pointer to array of points */

typedef struct {
        unsigned short          count;          /* number of curves */
        PEXTrimCurve            *curves;
} PEXListOfTrimCurve;

typedef struct {
        PEXSwitch               visibility;             /* True or False */
        unsigned char           reserved;
        unsigned short          order;
        PEXCoordType            rationality;            /* PEXRational or PEXNonRational */
        PEXEnumTypeIndex        approx_method;          /* see PEXGetEnumTypeInfo */
        float                   tolerance;
        float                   tmin, tmax;
        PEXListOfFloat          knots;
        unsigned short          count;                  /* number of control points */
        PEXArrayOfCoord         control_points;
} PEXTrimCurve;

typedef  unsigned char    PEXSwitch;
typedef  unsigned short   PEXCoordType;
typedef  short            PEXEnumTypeIndex;

typedef struct {
        unsigned short          count;          /* number of floats */
        float                   *floats;
} PEXListOfFloat;
```

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure

The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetSurfaceApprox(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)
PEXSetParaSurfCharacteristics(3)
PEXGetImpDepConstants(3)

NAME

PEXNoop - Noop Output Command

SYNTAX

void PEXNoop(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).

RETURNS

None

DESCRIPTION

This function creates a no-op output command which, when rendered, will do nothing except update the current path.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXNormalizeVectors - utility function

SYNTAX

int PEXNormalizeVectors(int *count*, PEXVector **vectors*, PEXVector **vectors_return*)

PARAMETERS

count	The number of vectors to normalize.
vectors	A pointer to the array of vectors to normalize.
vectors_return	A pointer to an array in which to store the normalized vectors.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadVector
One of the vectors has zero magnitude.

DESCRIPTION

This function normalizes each vector in the specified list of 3D vectors. An error is returned if any vector in the list has a magnitude of zero. All non-zero vectors in the list are still normalized, however.

If the return array is the same as the input array, the function will overwrite the input values with the normalized values.

ERRORS

None

SEE ALSO

PEXTransformVectors(3)
PEXNormalizeVectors2D(3)

NAME

PEXNormalizeVectors2D - utility function

SYNTAX

int PEXNormalizeVectors2D(int *count*, PEXVector2D **vectors*, PEXVector2D **vectors_return*)

PARAMETERS

count The number of vectors to normalize.

vectors A pointer to the array of vectors to normalize.

vectors_return A pointer to an array in which to store the normalized vectors.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadVector
One of the vectors has zero magnitude.

DESCRIPTION

This function normalizes each vector in the specified list of 2D vectors. An error is returned if any vector in the list has a magnitude of zero. All non-zero vectors in the list are still normalized, however.

If the return array is the same as the input array, the function will overwrite the input values with the normalized values.

ERRORS

None

SEE ALSO

PEXTransformVectors2D(3)
PEXNormalizeVectors(3)

NAME

PEXOrthoProjMatrix - utility function

SYNTAX

int PEXOrthoProjMatrix(double *height*, double *aspect*, double *near*, double *far*, PEXMatrix *matrix_return*)

PARAMETERS

height	The height of the orthographic viewing box.
aspect	The aspect ratio (width / height) of the orthographic viewing box.
near	The distance, in view reference coordinates, from the VRC origin to the front clipping plane.
far	The distance, in view reference coordinates, from the VRC origin to the back clipping plane.
matrix_return	Matrix in which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadLimits
The viewing box depth, width, or height is zero.

DESCRIPTION

This routine formats a view mapping matrix.

A projection matrix defines a visible region of the coordinate space. An orthographic projection defines the visible region as a box specified by its height, width (the height multiplied by the aspect), and its near and far boundaries.

The reference point for the projection is the origin of VRC; the near and far clipping planes are defined with respect to it. The height is defined in view reference coordinates. Clipping at the planes is controlled by the clipping flags in the selected view table entry.

ERRORS

None

SEE ALSO

PEXLookAtViewMatrix(3)
PEXViewOrientationMatrix(3)
PEXViewMappingMatrix(3)
PEXPerspProjMatrix(3)

NAME

PEXPerspProjMatrix - utility function

SYNTAX

int PEXPerspProjMatrix(double *fovy*, double *distance*, double *aspect*, double *near*, double *far*, PEXMatrix *matrix_return*)

PARAMETERS

fovy	Field of view (in radians) in the horizontal direction.
distance	The distance to the eye-point.
aspect	The aspect ratio (width / height) of the perspective viewing frustum.
near	The distance to the near clipping plane.
far	The distance to the far clipping plane.
matrix_return	Matrix in which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadLimits
near <= far, fovy = 0, aspect = 0, or distance <= near

DESCRIPTION

This routine formats a view mapping matrix.

A projection matrix defines the visible region of the coordinate space. A perspective projection defines the visible region as a truncated pyramid or frustum. The amount of perspective in the projection is specified by the field of view argument, *fovy*. The perspective increases as the angle increases to a value of pi radians.

The distance between the eye-point and the origin is specified by the *distance*. If the application program calls **PEXLookAtViewMatrix**(3) to calculate the view orientation matrix, the distance is typically the distance between the from and to points specified to that routine. If the application program calls **PEXPolarViewMatrix**(3) to calculate the view orientation matrix, the distance is typically the same distance specified to that routine.

The height of the frustum at the near clipping plane is determined by *fovy* and the distance to the near plane. The width of the frustum is determined from the *aspect* ratio.

The reference point for the projection is the origin of VRC; the *near* and *far* clipping planes are defined with respect to it. Clipping at the planes is controlled by the clip flags in the selected view table entry.

It is useful to think of **PEXPerspProjMatrix** as defining a camera. The object being viewed is defined near the origin. The lens is defined by *fovy;* a larger value of *fovy* defines a wide angle lens. For those who wish to keep the height at the near plane constant and automatically back up the camera to frame the subject, the relationship between the field of view, the eye distance, which is the distance between the eye-point and the near plane, and the height, which is the height at the near plane, is:

tan (fovy / 2) = ((height / 2) / eye_distance)

For example, if a unit cube is being viewed, a "look at" view with the to point at the center of the cube or a "polar" view with the viewed point at the center of the cube, places the cube at the origin. A matrix created by **PEXPerspProjMatrix** with aspect = 1, near = 0.5,

and far = -0.5 makes the entire cube visible, with the field of view and distance controlling the amount of perspective applied.

ERRORS

None

SEE ALSO

PEXLookAtViewMatrix(3)
PEXViewOrientationMatrix(3)
PEXViewMappingMatrix(3)
PEXOrthoProjMatrix(3)

NAME

PEXPickAll - Pick All Traversal

SYNTAX

PEXPickPath *PEXPickAll(Display **display*, Drawable *drawable*, PEXRenderer *renderer*, int *method*, int *max_hits*, int *pick_device_type*, PEXPickRecord **pick_record*, int **status_return*, int **more_return*, unsigned long **count_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
renderer	The resource identifier of the renderer.
method	The pick all method (**PEXPickAllAll** or **PEXPickAllVisible**).
max_hits	The maximum number of hits to be returned.
pick_device_type	The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).
pick_record	A pointer to the pick data record.
status_return	Returns the status of the pick operation.
more_return	Returns the status of remaining picks.
count_return	Returns the number of pick paths.

RETURNS

An array of pick paths; a null pointer if unsuccessful or no pick (see also *status_return).*

DESCRIPTION

This function traverses the structure network specified by the renderer's current pick start path. Hit testing begins after the last element specified in the renderer's current pick start path and continues until one of two conditions is met: the maximum number of hits is reached, or the last element of the first structure in the pick start path is processed. If the pick start path does not define a valid hierarchical path, a **BadPEXPath** error is sent and a null pick path is returned.

Standard pick all methods are **PEXPickAllAll** and **PEXPickAllVisible.** The supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3).

If one or more primitives were picked, a pick status of **PEXPick** is returned along with the pick paths. The hierarchical pick path is equivalent to the renderer's current path at the time the picked primitive was processed. If no primitives were picked, the returned pick status is **PEXNoPick,** and the returned pick path is a null pointer. If the renderer's drawable was destroyed or resized during the pick operation, the returned pick status is **PEXAbortedPick** and the returned pick path is a null pointer.

The paths of all hit primitives are recorded until reaching the maximum number of hits or until the server maximum number of recordable hits is reached. Once the maximum number of paths is recorded, subsequent primitives may be ignored and the results returned.

If all possible hits were recorded, then **PEXNoMoreHits** is returned and the renderer's pick start path will be empty. If the maximum number of hits was reached and additional hits were detected, then **PEXMoreHits** is returned and the renderer's pick start path will be set to the last recorded hit primitive. If, after reaching the maximum number of hits, subsequent output commands were ignored, then **PEXMayBeMoreHits** is returned and the renderer's pick start path will be set to the last element processed by the renderer before it started ignoring primitives.

If the specified drawable does not have the same root and depth as the drawable used to create the renderer, or, if the specified drawable is not one of the supported drawables returned by **PEXMatchRenderingTargets ,** a match error is generated. If the renderer state is set to **PEXRendering** or **PEXPicking** when this function is called, then the operation in progress is aborted, the **PEXPickAll** function is completed, and a **BadPEXRendererState** error returned.

PEXlib allocates memory for the return value. **PEXFreePickPaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef  XID     PEXRenderer;

typedef union {
        PEXPDNPCHitVolume  volume;
        PEXPDDCHitBox      box;
        PEXPickDataRecord  data;
} PEXPickRecord;

typedef  PEXNPCSubVolume    PEXPDNPCHitVolume;

typedef struct {
        PEXCoord       min;
        PEXCoord       max;
} PEXNPCSubVolume;

typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D     position;
        float                distance;
} PEXPDDCHitBox;

typedef struct {
        short     x;
        short     y;
```

```
} PEXDeviceCoord2D;

typedef struct {
        unsigned short          length;  /* number of bytes in record */
        char                    *record;
} PEXPickDataRecord;

typedef struct {
        unsigned long           count;   /* number of elements */
        PEXPickElementRef       *elements;
} PEXPickPath;

typedef struct {
        PEXStructure    sid;
        unsigned long   offset;
        unsigned long   pick_id;
} PEXPickElementRef;

typedef  XID     PEXStructure;
```

ERRORS

BadAlloc
The server failed to allocate resources necessary to complete request.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or the specified renderer resource was not created with a compatible drawable.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

BadPEXPath
The renderer pick start path is invalid.

BadValue
The pick record contains invalid data, or the pick device type is invalid.

SEE ALSO

PEXBeginPickAll(3)
PEXEndPickAll(3)
PEXFreePickPaths(3)

NAME

PEXPickOne - Pick One Traversal

SYNTAX

PEXPickPath *PEXPickOne(Display *display, Drawable *drawable*, PEXRenderer *renderer*, PEXStructure *structure*, int *method*, int *pick_device_type*, PEXPickRecord *pick_record*, int *status_return*, int *undetectable_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
renderer	The resource identifier of the renderer.
structure	The resource identifier for the root structure of the structure network.
method	The pick one method (**PEXPickLast, PEXPickClosestZ, PEXPickVisibleAny, PEXPickVisibleClosest**).
pick_device_type	The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).
pick_record	A pointer to the pick data record.
status_return	Returns the status of the pick operation.
undetectable_return	Returns **True** or **False** indicating whether another pick better satisfied the pick criteria with the exception that it did not pass the pick filter test.

RETURNS

A pointer to the pick path; a null pointer if unsuccessful or no pick (see also *status_return).*

DESCRIPTION

This function traverses the specified structure network.

Standard pick one methods are **PEXPickLast, PEXPickClosestZ, PEXPickVisibleAny** and **PEXPickVisibleClosest.** The supported pick device types are inquirable via **PEXGetEnumTypeInfo**(3)**.**

If a primitive was picked, the returned pick status is **PEXPick.** If no primitive was picked, the returned pick status is **PEXNoPick,** and the returned pick path is a null pointer. If the renderer's *drawable* was destroyed or resized during the pick operation, the returned pick status is **PEXAbortedPick** and the returned pick path is a null pointer.

If there was a primitive which more closely satisfied the pick criteria, but did not pass the pick filter test, then the undetectable pick return status will be **True.** Otherwise, it will be **False.**

If the specified drawable does not have the same root and depth as the drawable that was used to create the renderer, or, if the specified drawable is not one of the supported drawables returned by **PEXMatchRenderingTargets**(3)**,** a Match error will be generated. If the renderer state is set to **PEXRendering** or **PEXPicking** when this function is called, then the operation in progress is aborted, the **PEXPickOne** function is completed, and a

BadPEXRendererState error is sent.

PEXlib allocates memory for the return value. **PEXFreePickPaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXRenderer;

typedef union {
        PEXPDNPCHitVolume volume;
        PEXPDDCHitBox     box;
        PEXPickDataRecord data;
} PEXPickRecord;

typedef PEXNPCSubVolume    PEXPDNPCHitVolume;

typedef struct {
        PEXCoord      min;
        PEXCoord      max;
} PEXNPCSubVolume;

typedef struct {
        float    x;
        float    y;
        float    z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D    position;
        float               distance;
} PEXPDDCHitBox;

typedef struct {
        short    x;
        short    y;
} PEXDeviceCoord2D;

typedef struct {
        unsigned short          length;  /* number of bytes in record */
        char                    *record;
} PEXPickDataRecord;

typedef struct {
        unsigned long           count;   /* number of elements */
        PEXPickElementRef       *elements;
} PEXPickPath;
```

```
typedef struct {
        PEXStructure    sid;
        unsigned long   offset;
        unsigned long   pick_id;
} PEXPickElementRef;

typedef  XID     PEXStructure;
```

ERRORS

BadAlloc
The server failed to allocate resources necessary to complete request.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or the specified renderer resource was not created with a compatible drawable.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The pick record contains invalid data, or the pick device type is invalid.

SEE ALSO

PEXBeginPickOne(3)
PEXEndPickOne(3)

NAME

PEXPolarViewMatrix - utility function

SYNTAX

int PEXPolarViewMatrix(PEXCoord **from*, double *distance*, double *azimuth*, double *altitude*, double *twist*, PEXMatrix *matrix_return*)

PARAMETERS

from	The viewing position.
distance	The distance between the *from* position and the position being viewed.
azimuth	The angle in the x,z plane from the +z axis to the line of sight, in radians. Positive values are counter-clockwise when viewed from the positive y axis.
altitude	The angular inclination of the line of sight from the x,z plane. The *altitude* argument is the angle in radians. Positive values are towards the positive y axis.
twist	The up direction of the view, given as an angle, in radians, about the line of sight. Positive values of *twist* are in the counter-clockwise direction.
matrix_return	Matrix in which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadDistance

DESCRIPTION

This routine formats a polar view orientation matrix. This routine is similar to **PEXLookAtViewMatrix**(3)**,** except that the viewing parameters are specified in spherical coordinates. The *from* position defines one end of the view plane normal; the position indicated by *distance, azimuth,* and *altitude* define the base of the view plane normal, and the origin of VRC.

The view is defined with respect to the *from* position (the viewing position) and the distance between it and the position being viewed. The *azimuth* angle specifies the direction of the line of sight going toward the position being viewed. Positive values of *azimuth* are counter-clockwise when viewed from the positive y axis.

The *azimuth* and *altitude* angles apply to the coordinate system with *from* at the origin and the line of sight emanating from it. The *azimuth* specifies the angle between the line of sight and the +z axis, and the *altitude* defines the angle between it and the x,z plane.

When applied, the transformation places the viewing position at the origin, aligns the viewpoint with the +z axis, applies any *twist* to the coordinates, and then places the viewed point at the origin.

ERRORS

None

SEE ALSO

PEXLookAtViewMatrix(3)
PEXViewOrientationMatrix(3)
PEXViewMappingMatrix(3)

NAME

PEXPolyline - 3D Polyline Primitive

SYNTAX

void PEXPolyline(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *count*, PEXCoord **points*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
count	The number of points.
points	An array of points defining the polyline.

RETURNS

None

DESCRIPTION

This function creates a polyline output primitive.

The *points*, specified in modeling coordinates, are joined together by line segments. The first point is joined to the second, the second to the third, and so on. The last point is not joined to the first.

The polyline colors are affected only by depth-cueing and are mapped to device colors. Polylines are not displayed if they are outside the currently defined clipping volume. Polylines crossing the clipping volume are clipped and only the portions inside the clipping volume are displayed.

Depending on the ASF attributes, the line color, line type, line width, and polyline interpolation method attributes are obtained either directly from the current attributes or from the line bundle.

A polyline with fewer than two points is considered degenerate. It is stored in a structure, but when rendered, the primitive is ignored and has no visual effect.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetLineType(3)
PEXSetLineWidth(3)
PEXSetLineColorIndex(3)
PEXSetLineColor(3)
PEXSetLineBundleIndex(3)

NAME

PEXPolyline2D - 2D Polyline Primitive

SYNTAX

void PEXPolyline2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *count*, PEXCoord2D **points*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
count	The number of points.
points	An array of points defining the polyline.

RETURNS

None

DESCRIPTION

This function creates a 2D polyline output primitive.

This function is like **PEXPolyline**(3)**,** except that the points consist of only x- and y-components. The z-component is assumed to be zero. This primitive is two-dimensional only in that the z-components are implied. Geometry transformations are still carried out in three dimensions.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetLineType(3)
PEXSetLineWidth(3)
PEXSetLineColorIndex(3)
PEXSetLineColor(3)
PEXSetLineBundleIndex(3)

NAME

PEXPolylineSetWithData - 3D Set of Polylines Primitive

SYNTAX

void PEXPolylineSetWithData(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *vertex_attributes*, int *color_type*, unsigned int *count*, PEXListOfVertex **vertex_lists*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
vertex_attributes	A mask indicating the vertex attributes provided (**PEXGANone** or **PEXGAColor**).
color_type	The type of color data provided (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
count	The number of polylines.
vertex_lists	A pointer to a list of vertex arrays defining each polyline in the set.

RETURNS

None

DESCRIPTION

This function creates a polyline set output primitive.

This function is similar to **PEXPolyline**(3) except that it allows applications to specify a number of polylines as well as additional data. These polylines may contain a color value at each vertex. The vertex attributes indicate the content of the additional data. Color values passed must be of the specified color type.

If colors are passed for each vertex, they are used instead of the line color attribute. The polyline interpolation method, which depending on the ASF attribute is obtained directly from the current polyline interpolation attribute or from the line bundle, controls how the polylines are shaded.

All other aspects of this primitive are the same as **PEXPolyline**(3)**.**

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetLineType(3)
PEXSetLineWidth(3)
PEXSetLineColorIndex(3)
PEXSetLineColor(3)
PEXSetPolylineInterpMethod(3)
PEXSetLineBundleIndex(3)

NAME

PEXPostStructure - Post Structure to a Workstation

SYNTAX

void PEXPostStructure(Display **display*, PEXWorkstation *workstation*, PEXStructure *structure*, double *priority*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
structure	The resource identifier of the structure.
priority	The priority of the newly-posted structure.

RETURNS

None

DESCRIPTION

This function adds the specified *structure* to the list of posted structures in the specified *workstation*. The *priority* is used to indicate the priority of the new posted structure relative to the structures already posted. If multiple structures are posted for display to the same display space location, the higher priority structure will be displayed. If two structures have the same priority, the last posted structure is considered of higher priority.

DATA STRUCTURES

typedef XID PEXStructure;
typedef XID PEXWorkstation;

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadPEXWorkstation
The specified workstation resource identifier is invalid.

SEE ALSO

PEXUnpostStructure(3)
PEXUnpostAllStructures(3)

NAME

PEXQuadrilateralMesh - 3D Quadrilateral Mesh Primitive

SYNTAX

void PEXQuadrilateralMesh(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, PEXArrayOfFacetData *facet_data*, unsigned int *col_count*, unsigned int *row_count*, PEXArrayOfVertex *vertices*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape which describes all of the quadrilaterals (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
facet_attributes	A mask indicating the facet attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
vertex_attributes	A mask indicating the vertex attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
color_type	The type of color data provided (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
facet_data	An array of facet data.
col_count	The number of columns in the vertex array.
row_count	The number of rows in the vertex array.
vertices	A two-dimensional (row-major) array of vertices defining the quadrilateral mesh.

RETURNS

None

DESCRIPTION

This function creates a quadrilateral mesh output primitive.

The quadrilateral mesh surface is created from the vertices. The vertex array is accessed in row major order (i.e. the column number varies fastest as vertices are accessed). The (ith, jth), (i+1th, jth), (i+1th, j+1th), and (ith, j+1th) vertices are connected to create a single facet. Adjacent vertices are interconnected until the entire facet network is processed.

Normals for quadrilaterals, if not provided explicitly, are computed by taking the cross product of the diagonals. For a quadrilateral with the above vertices, the cross product would be formed as follows:

normal(i,j) = (point(i+1, j+1) - point(i, j)) X (point(i, j+1) - point(i+1, j))

Normals are assumed to be unit length vectors. If not unit length, the result is implementation-dependent.

There must be an entry in the facet data array for each facet, if facet data is indicated by the facet attributes.

All other aspects of this primitive are the same as **PEXFillAreaSetWithData**(3)**.**

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXQueryEncodedTextExtents - Query Encoded Text Extents

SYNTAX

PEXTextExtent *PEXQueryEncodedTextExtents(Display *_display_, XID _resource_id_, unsigned int _font_table_index_, int _path_, double _expansion_, double _spacing_, double _height_, int _halign_, int _valign_, unsigned long _count_, PEXListOfEncodedText *_encoded_text_)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of either a renderer, a workstation or a text font table.
font_table_index	The text font table index.
path	The text path (**PEXPathRight, PEXPathLeft, PEXPathUp, PEXPathDown**).
expansion	The text character expansion factor.
spacing	The text character spacing factor.
height	The text character height.
halign	The text horizontal text alignment (**PEXHAlignNormal, PEXHAlignLeft, PEXHAlignCenter, PEXHAlignRight**).
valign	The text vertical text alignment (**PEXVAlignNormal, PEXVAlignTop, PEXVAlignCap, PEXVAlignHalf, PEXVAlignBase, PEXVAlignBottom).**
count	The number of encoded text strings.
encoded_text	An array of encoded text strings.

RETURNS

An array of text extents; a null pointer if unsuccessful.

DESCRIPTION

This function is like **PEXQueryTextExtents**(3)**,** except that multiple encoded text strings are specified. Each text string in the encoded text list has a character set, a character set width, an encoding state, and a list of characters. (See **PEXEncodedTextData.)**

The character set is an index into the current font group. Font groups have individual fonts which are numbered starting at one; a value of three would select the third font in the font group currently being used. If a character set is not available in the current font group then the default font group is used. If a character set value is not available in the default font group then the result is implementation-dependent. The character set width indicates the width or size of characters in the strings. Valid values for character set width are **PEXCSByte, PEXCSShort** and **PEXCSLong.** The encoding state is provided for use by the application and is not interpreted by the PEX server.

All other aspects of this function are the same as **PEXQueryTextExtents**(3)**.**

DATA STRUCTURES

```
typedef struct {
        unsigned short          count;   /* number of encodings */
        PEXEncodedTextData      *encoded_text;
} PEXListOfEncodedText;

typedef struct {
        unsigned short          character_set;
        unsigned char           character_set_width;
        unsigned char           encoding_state;
        unsigned short          reserved;
        unsigned short          length;
        char                    *ch;
} PEXEncodedTextData;

typedef struct {
        PEXCoord2D    lower_left;
        PEXCoord2D    upper_right;
        PEXCoord2D    concat_point;
} PEXTextExtent;

typedef struct {
        float     x;
        float     y;
} PEXCoord2D;
```

ERRORS

BadMatch

The specified resource identifier identifies a table of type other than a text font table.

BadValue

A specified value for one or more text attributes is invalid, or the specified resource identifier does not identify a valid renderer, workstation or lookup table resource.

SEE ALSO

PEXQueryTextExtents(3)

NAME

PEXQueryFont - Query PEX Font Information

SYNTAX

PEXFontInfo *PEXQueryFont(Display **display*, PEXFont *font*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

font The resource identifier of the font.

RETURNS

A pointer to the font info structure; a null pointer if unsuccessful.

DESCRIPTION

This function returns information about the specified PEX font. The information returned is identical to what **PEXListFontsWithInfo**(3) would return.

PEXlib allocates memory for the returned list of font information. **PEXFreeFontInfo**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXFont;

typedef struct {
        unsigned long           first_glyph;
        unsigned long           last_glyph;
        unsigned long           default_glyph;
        Bool                    all_exist;
        Bool                    stroke;
        unsigned short          count;          /* number of properties */
        PEXFontProp             *props;
} PEXFontInfo;

typedef struct {
        Atom                    name;
        unsigned long           value;
} PEXFontProp;
```

ERRORS

BadPEXFont

The specified font resource identifier is invalid.

NAME

PEXQueryTextExtents - Query Text Extents

SYNTAX

PEXTextExtent *PEXQueryTextExtents(Display **display*, XID *resource_id*, unsigned int *font_table_index*, int *path*, double *expansion*, double *spacing*, double *height*, int *halign*, int *valign*, unsigned long *count*, PEXStringData **text*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of either a renderer, a workstation or a text font table.
font_table_index	The text font table index.
path	The text path (**PEXPathRight, PEXPathLeft, PEXPathUp, PEXPathDown**).
expansion	The text character expansion factor.
spacing	The text character spacing factor.
height	The text character height.
halign	The text horizontal text alignment (**PEXHAlignNormal, PEXHAlignLeft, PEXHAlignCenter, PEXHAlignRight**).
valign	The text vertical text alignment (**PEXVAlignNormal, PEXVAlignTop, PEXVAlignCap, PEXVAlignHalf, PEXVAlignBase, PEXVAlignBottom).**
count	The number of text strings.
text	An array of text strings.

RETURNS

An array of text extents; a null pointer if unsuccessful.

DESCRIPTION

This function returns the text extents, in the local 2D text coordinate system, of each specified text string. If the resource identifier is a renderer or PHIGS workstation, then the text font table associated with the renderer or workstation is used. If the resource identifier is a text font lookup table, it is used directly. The specified font group provides the index of the entry that is to be used to obtain the font group. The first character set in the font will be used.

Stroke precision is assumed. The text position is (0,0) in the local 2D text coordinate system. The extent of each string is computed independent of the other strings.

If a specified font has no defined default glyph, then undefined glyphs are taken to have all zero metrics.

The extent data is returned in memory allocated by PEXlib. **XFree** should be called to deallocate the memory.

DATA STRUCTURES

```
typedef struct {
        unsigned short          length;
        char                    *ch;
} PEXStringData;

typedef struct {
        PEXCoord2D              lower_left;
        PEXCoord2D              upper_right;
        PEXCoord2D              concat_point;
} PEXTextExtent;

typedef struct {
        float     x;
        float     y;
} PEXCoord2D;
```

ERRORS

BadMatch
The specified resource identifier identifies a table of type other than a text font table.

BadValue
A specified value for one or more text attributes is invalid, or the specified resource identifier does not identify a valid renderer, workstation or lookup table resource.

SEE ALSO

PEXQueryEncodedTextExtents(3)

NAME

PEXRedrawAllStructures - Redraw All Posted Structures

SYNTAX

void PEXRedrawAllStructures(Display **display*, PEXWorkstation *workstation*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

RETURNS

None

DESCRIPTION

This function redraws all of the posted structures for the workstation. First, if the workstation's display surface is **PEXNotEmpty,** its drawable is cleared to the color stored in entry zero of the color table. Then, if any of its view, workstation, HLHSR or buffer update attributes is set to **PEXPending,** the requested values are made current and the update attributes are set to **PEXNotPending.** After this, all the posted structures are traversed and rendered (in priority order). Finally, the workstation's visual state is set to **PEXCorrect.**

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

SEE ALSO

PEXUpdateWorkstation(3)
PEXExecuteDeferredActions(3)

NAME

PEXRedrawClipRegion - Redraw Posted Structures Clipped to Clip Region

SYNTAX

void PEXRedrawClipRegion(Display **display*, PEXWorkstation *workstation*, unsigned long *count*, PEXDeviceRect **clip_rectangles*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
count	The number of clip rectangles.
clip_rectangles	An array of device clip rectangles.

RETURNS

None

DESCRIPTION

This function performs actions similar to **PEXRedrawAllStructures**(3) except that the workstation state attributes are not modified or updated by this function and rendering will occur only in the region defined by the specified clip list. The color stored in entry zero of the color table is used to clear the region defined by the clip list. The clip list must consist of non-overlapping rectangles or the result will be undefined. If a z-buffering HLHSR algorithm is used, only the z-values corresponding to pixels in the clip region will be affected. All of the posted structures for the workstation are redrawn, but clipped to the clip list. Pending changes are not made current, nor is the visual state modified.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        short           xmin;
        short           ymin;
        short           xmax;
        short           ymax;
} PEXDeviceRect;
```

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

SEE ALSO

PEXRedrawAllStructures(3)
PEXExecuteDeferredActions(3)

NAME

PEXRemoveFromNameSet - Remove Names from Name Set

SYNTAX

void PEXRemoveFromNameSet(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned long *count*, PEXName **names*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
count	The number of names.
names	An array of names to be removed from the current name set.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which removes the specified list of *names* from the current name set. If any name is outside the supported range, that name is ignored.

DATA STRUCTURES

typedef unsigned long PEXName;

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateNameSet(3)
PEXAddToNameSet(3)
PEXGetImpDepConstants(3)

NAME

PEXRenderElements - Render Elements

SYNTAX

void PEXRenderElements(Display **display*, PEXRenderer *renderer*, PEXStructure *structure*, int *whence1*, long *offset1*, int *whence2*, long *offset2*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of a renderer resource.
structure	The resource identifier of a structure resource.
whence1	A value specifying, with *offset1*, the first limit of the element range (**PEXBeginning, PEXCurrent PEXEnd**).
offset1	An offset from *whence1* specifying the first limit of the element range.
whence2	A value specifying, with *offset2*, the second limit of the element range (**PEXBeginning, PEXCurrent PEXEnd**).
offset2	An offset from *whence2* specifying the second limit of the element range.

RETURNS

None

DESCRIPTION

This function processes all output commands in the specified element range of the specified *structure*. Output primitives in *structure* are rendered using the specified *renderer*. If the *renderer* is not rendering or picking, the request will be ignored. Structures referenced through execute structure output commands are also processed.

The first limit of the range is defined by *whence1* and *offset1* and the second limit of the range is defined by *whence2* and *offset2*. The whence values describe how to interpret the corresponding offset. **PEXBeginning** means the element position is the value of offset (i.e. the offset from the beginning of the structure). **PEXCurrent** means the element position is the value of the current element pointer position plus the value of offset (i.e. the offset from the current element pointer). **PEXEnd** means the element position is the value of the last element position in the structure plus the value of offset (i.e. the offset from the end of the structure). Offsets can be negative values. If after computing an element position, it is less than zero, the position will be set to zero. If after computing an element position, it is greater than the number of elements in the *structure*, it will be set to the last structure element in the *structure*.

DATA STRUCTURES

```
typedef XID    PEXRenderer;
typedef XID    PEXStructure;
```

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue

The specified value for *whence* was invalid.

SEE ALSO

PEXBeginRendering(3)
PEXCreateStructure(3)
PEXCreateRenderer(3)

NAME

PEXRenderNetwork - Render Network

SYNTAX

void PEXRenderNetwork(Display **display*, Drawable *drawable*, PEXRenderer *renderer*, PEXStructure *structure*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
drawable	The resource identifier of a drawable.
renderer	The resource identifier of a renderer resource.
structure	The resource identifier of a structure resource.

RETURNS

None

DESCRIPTION

This function processes all output commands stored in *structure* using the specified *renderer*. Output primitives in *structure* are rendered to the specified *drawable*. Structures referenced through execute structure output commands are also processed. This request effectively performs an implicit **PEXBeginRendering**(3) before the traversal of the specified structure network and an implicit **PEXEndRendering**(3)**,** with a flush value of **True,** after the traversal.

DATA STRUCTURES

typedef XID PEXRenderer;
typedef XID PEXStructure;

ERRORS

BadAlloc
The server failed to allocate resources necessary to complete request.

BadDrawable
The specified drawable resource identifier is invalid.

BadMatch
The specified drawable is unsupported, or the specified renderer resource was not created with a compatible drawable.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXRendererState
The specified renderer was in an invalid state.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXExecuteStructure(3)
PEXBeginRendering(3)
PEXEndRendering(3)
PEXCreateStructure(3)
PEXCreateRenderer(3)

NAME

PEXRestoreModelClipVolume - Restore Model Clip Volume

SYNTAX

void PEXRestoreModelClipVolume(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which restores the last-saved modeling clipping volume. If there is no last-saved clipping volume that can be restored, the modeling clipping volume is restored to its default state.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetModelClipFlag(3)
PEXSetModelClipVolume(3)

NAME

PEXRotate - utility function

SYNTAX

int PEXRotate(int *axis*, double *angle*, PEXMatrix *matrix_return*)

PARAMETERS

axis	One of **PEXXAxis, PEXYAxis, PEXZAxis.**
angle	Angle of the rotation in radians.
matrix_return	Matrix into which rotation matrix is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadAxis
Invalid axis value specified.

DESCRIPTION

This function creates a rotation matrix about the specified *axis.*
The resulting matrix rotates by the *angle* specified in radians about the origin.
The function returns unsuccessfully if *axis* is not one of the defined values.

ERRORS

None

SEE ALSO

PEXRotate2D(3)
PEXRotateGeneral(3)

NAME

PEXRotate2D - utility function

SYNTAX

void PEXRotate2D(double *angle*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

angle Angle of the rotation in radians.

matrix_return Matrix into which rotation matrix is stored.

RETURNS

None

DESCRIPTION

The resulting matrix rotates by the *angle* specified in radians about the origin.

ERRORS

None

SEE ALSO

PEXRotate(3)
PEXRotateGeneral(3)

NAME

PEXRotateGeneral - utility function

SYNTAX

int PEXRotateGeneral(PEXCoord **point1*, PEXCoord **point2*, double *angle*, PEXMatrix *matrix_return*)

PARAMETERS

point1	Endpoint of line segment defining rotation axis.
point2	Endpoint of line segment defining rotation axis.
angle	Angle of the rotation in radians.
matrix_return	Matrix into which rotation matrix is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadAxis
The endpoints are coincident.

DESCRIPTION

This routine formats a matrix for a right-handed rotation about an arbitrary axis. The rotation axis is defined by the line segment joining the two points. The *angle* is in radians and is measured counter-clockwise when looking from the first point to second point along the specified axis.

Returns unsuccessfully if the points are coincident.

ERRORS

None

SEE ALSO

PEXRotate(3)
PEXRotate2D(3)

NAME

PEXScale - utility function

SYNTAX

void PEXScale(PEXVector **scale_vector*, PEXMatrix *matrix_return*)

PARAMETERS

scale_vector Vector containing the X, Y and Z scale factors.

matrix_return Matrix into which rotation matrix is stored.

RETURNS

None

DESCRIPTION

Creates a scale matrix given the scale vector.

ERRORS

None

SEE ALSO

PEXScale2D(3)

NAME

PEXScale2D - utility function

SYNTAX

void PEXScale2D(PEXVector2D **scale_vector*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

scale_vector Vector containing the X and Y scale factors.

matrix_return Matrix into which rotation matrix is stored.

RETURNS

None

DESCRIPTION

Creates a 3X3 scale matrix given the scale vector.

ERRORS

None

SEE ALSO

PEXScale(3)

NAME

PEXSearchNetwork - Search Network

SYNTAX

Status PEXSearchNetwork(Display **display*, PEXSearchContext *context*, PEXStructurePath ***path_return*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
context	The resource identifier of the search context.
path_return	Returns a pointer to a structure network path identifying the first primitive found.

RETURNS

Zero if unsuccessful; non-zero otherwise.

DESCRIPTION

This function searches a structure network according to the specified search criteria. The path to the first primitive found that satisfies the search criteria is returned. If no primitive is found that satisfies the criteria, a null pointer is returned.

After the search has been completed, the start path attribute of the specified search context will be set to the path returned, if a primitive was found.

PEXlib allocates memory for the returned structure path. **PEXFreeStructurePaths**(3) should be called to deallocate the memory.

DATA STRUCTURES

```
typedef XID     PEXSearchContext;

typedef struct {
        unsigned long           count;          /* number of elements */
        PEXElementRef           *elements;
} PEXStructurePath;

typedef struct {
        PEXStructure            structure;
        unsigned long           offset;
} PEXElementRef;

typedef XID     PEXStructure;
```

ERRORS

BadPEXPath
The specified path is invalid.

BadPEXSearchContext
The specified search context resource identifier is invalid.

SEE ALSO

PEXCreateSearchContext(3)
PEXChangeSearchContext(3)
PEXFreeStructurePaths(3)

NAME

PEXSendOCs - Send Encoded Output Commands

SYNTAX

void PEXSendOCs(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *float_format*, unsigned long *oc_count*, unsigned int *length*, char **encoded_ocs*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
float_format	The floating point format of the encoded output commands (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
oc_count	The number of encoded output commands.
length	The length, in bytes, of the encoded output commands.
encoded_ocs	A pointer to the encoded output commands.

RETURNS

None

DESCRIPTION

This function sends encoded output commands to the specified PEX server display.

Sending output commands to a structure whose editing mode is **PEXStructureReplace** is not really useful. The behavior will be unpredictable unless a request type of **PEXOCStoreSingle** is used. And, if the request type is **PEXOCStoreSingle,** each output command will simply replace the previous one sent. Applications should ensure that the structure's editing mode is **PEXStructureInsert,** when sending multiple output commands. If it is intended to replace multiple elements, the application can delete those elements first, and then insert the new ones.

ERRORS

BadPEXFloatingPointFormat
The specified floating point format is invalid or unsupported.

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXDecodeOCs(3)
PEXEncodeOCs(3)

NAME

PEXSetATextAlignment - Set Annotation Text Alignment

SYNTAX

void PEXSetATextAlignment(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *halignment*, int *valignment*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
halignment	The horizontal annotation text alignment (**PEXHAlignNormal, PEXHAlignLeft, PEXHAlignCenter, PEXHAlignRight**).
valignment	The vertical annotation text alignment (**PEXVAlignNormal, PEXVAlignTop, PEXVAlignCap, PEXVAlignHalf, PEXVAlignBase, PEXVAlignBottom**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the horizontal and vertical annotation text alignment attributes.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetATextHeight - Set Annotation Text Height

SYNTAX

void PEXSetATextHeight(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *height*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
height	The annotation text character height.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the annotation text *height* attribute. If the specified *height* or the computed width is not supported, the height or width is mapped to the nearest supported annotation character height or width. These values depend on the font files that are in the font groups in the selected font table entry, which in turn depend on which X or PEX font files have been opened. If all scalable and rotatable stroke fonts are open, then a continuous range of character sizes are supported. The height is expressed in normalized projection coordinates.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetATextPath - Set Annotation Text Path

SYNTAX

void PEXSetATextPath(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *path*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
path	The text (drawing) path (**PEXPathRight, PEXPathLeft, PEXPathUp, PEXPathDown**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the annotation text *path* attribute.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetATextStyle - Set Annotation Text Style

SYNTAX

void PEXSetATextStyle(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *style*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
style	The annotation text style (**PEXATextNotConnected** or **PEXATextConnected**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the annotation text *style* attribute. If the specified *style* is not supported, **PEXATextNotConnected** is used. Supported values for annotation text *style* are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)

NAME

PEXSetATextUpVector - Set Annotation Text Up Vector

SYNTAX

void PEXSetATextUpVector(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXVector2D **vector*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
vector	The annotation text character up vector.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the annotation text up *vector* attribute. The *vector* is specified in the text local coordinate system defined by the direction vectors associated with the annotation text primitive. Only the direction of the *vector* is used, not the magnitude. However, if the annotation text up *vector* is degenerate (it has a length of zero), a value <0,1> is used.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetBFInteriorStyle - Set Back-Face Surface Interior Style

SYNTAX

void PEXSetBFInteriorStyle(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *style*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
style	The back-facing surface interior style (**PEXInteriorStyleHollow, PEXInteriorStyleSolid, PEXInteriorStylePattern, PEXInteriorStyleHatch, PEXInteriorStyleEmpty**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing surface interior *style* attribute. If the specified *style* is not supported, **PEXInteriorStyleHollow** is used. Supported values for back-facing surface interior *style* are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetBFInteriorStyleIndex - Set Back-Face Surface Interior Style Index

SYNTAX

void PEXSetBFInteriorStyleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The back-facing surface interior style index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing interior style *index* attribute. If the current back-facing interior style is **PEXInteriorStylePattern** or **PEXInteriorStyleHatch,** the specified *index* is used to further define the rendering style of back-facing surface primitives. For **PEXInteriorStylePattern,** if the specified pattern table *index* is not defined, table *index* one is used. For **PEXInteriorStyleHatch,** the *index* determines the hatch style. If the specified hatch style is not supported, style one is used. If style one is not supported, the result is implementation-dependent. Supported values for hatch style are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetBFReflectionAttributes - Set Back-Face Surface Reflection Attributes

SYNTAX

void PEXSetBFReflectionAttributes(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXReflectionAttributes **attributes*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
attributes	The back-facing surface reflection attributes.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing surface reflection *attributes*. Surface reflection *attributes* consist of the ambient, diffuse and specular coefficients, the specular concentration and color, and the transmission coefficient.

DATA STRUCTURES

```
typedef struct {
        float               ambient;
        float               diffuse;
        float               specular;
        float               specular_conc;
        float               transmission;
        PEXColorSpecifier   specular_color;
} PEXReflectionAttributes;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXGetImpDepConstants(3)

NAME

PEXSetBFReflectionModel - Set Back-Face Surface Reflection Model

SYNTAX

void PEXSetBFReflectionModel(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *model*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
model	The back-facing surface reflection model (**PEXReflectionNone, PEXReflectionAmbient, PEXReflectionDiffuse, PEXReflectionSpecular).**

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing surface reflection *model* attribute. If the specified reflection *model* is not supported, **PEXReflectionNone** is used. Supported values for back-facing surface reflection *model* are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetBFSurfaceColor - Set Back-Face Surface Color

SYNTAX

void PEXSetBFSurfaceColor(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	A pointer to the back-facing surface color.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing surface *color* attribute. The attribute is set to either an indexed color or a direct color value, depending on the color type. If the color type is **PEXColorTypeIndexed** and the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value, e.g. the color type is **PEXColorTypeIndexed,** and the color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetBFSurfaceColorIndex - Set Back-Face Surface Color Index

SYNTAX

void PEXSetBFSurfaceColorIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color table index for back-facing surfaces.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing surface color attribute to an indexed color with the value indicated by *index*. If the color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetBFSurfaceInterpMethod - Set Back-Face Surface Interpolation Method

SYNTAX

void PEXSetBFSurfaceInterpMethod(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *method*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
method	The back-facing surface interpolation method (**PEXSurfaceInterpNone, PEXSurfaceInterpColor, PEXSurfaceInterpDotProduct, PEXSurfaceInterpNormal**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the back-facing surface interpolation *method* attribute. If the specified interpolation *method* is not supported, **PEXSurfaceInterpNone** is used. Supported values for back-facing surface interpolation *method* are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetCharExpansion - Set Character Expansion Factor

SYNTAX

void PEXSetCharExpansion(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *expansion*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
expansion	The character expansion factor.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the character expansion factor attribute. Only the magnitude of the specified *expansion* is considered. The specified character expansion factor is compared to the minimum and maximum character expansion factors. These values depend on the font files that are in the font groups in the selected font table entry, which in turn depend on the font files opened. For example, if all scalable and rotatable stroke fonts are open, then a continuous number of expansions are supported. If the expansion is smaller than the minimum character expansion factor, the minimum value is used. If the expansion is larger than the maximum character expansion factor, the maximum value is used.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)

NAME

PEXSetCharHeight - Set Character Height

SYNTAX

void PEXSetCharHeight(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *height*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
height	The text character height.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the character height value attribute. If the specified *height* or the computed width is not supported, the height or width is mapped to the nearest supported character height or width. These values depend on the font files that are in the font groups in the selected font table entry, which in turn depend on which X or PEX fonts are open. For example, if the client opens all scalable and rotatable stroke fonts, a continuous number of character sizes are supported. The *height* is specified in the text local coordinate system.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetCharSpacing - Set Character Spacing

SYNTAX

void PEXSetCharSpacing(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *spacing*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
spacing	The text character spacing factor.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the character *spacing* attribute. The character *spacing* attribute is expressed as a fraction of the font's nominal character height.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)

NAME

PEXSetCharUpVector - Set Character Up Vector

SYNTAX

void PEXSetCharUpVector(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXVector2D **vector*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
vector	The text character up vector.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text up *vector* attribute. The *vector* is specified in the text local coordinate system defined by the direction vectors associated with the annotation text primitive. If the annotation text up *vector* is degenerate (it has a length of zero), a value <0,1> is used.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetColorApproxIndex - Set Color Approximation Index

SYNTAX

void PEXSetColorApproxIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color approximation table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the color approximation *index* attribute. If the specified *index* is not defined, index zero is used. If index zero is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color approximation index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateLookupTable(3)
PEXGetImpDepConstants(3)

NAME

PEXSetCurveApprox - Set Curve Approximation Method

SYNTAX

void PEXSetCurveApprox(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *method*, double *tolerance*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
method	The curve approximation method (**PEXApproxImpDep, PEXApproxConstantBetweenKnots, PEXApproxWCChordalSize, PEXApproxNPCChordalSize, PEXApproxDCChordalSize, PEXCurveApproxWCChordalDev, PEXCurveApproxNPCChordalDev, PEXCurveApproxDCChordalDev, PEXApproxWCRelative, PEXApproxNPCRelative, PEXApproxDCRelative**).
tolerance	The curve approximation tolerance (specific to each method).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the curve approximation attribute. If the specified *method* is not supported, an implementation-dependent method (method 1) is used. Supported values for curve approximation are inquirable via **PEXGetEnumTypeInfo**(3)**.** The *tolerance* value is provided to indicate the desired accuracy of the approximation, and is used in different ways for the different methods.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXGetEnumTypeInfo(3)

NAME

PEXSetDepthCueIndex - Set Depth Cue Index

SYNTAX

void PEXSetDepthCueIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The depth cue table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the depth-cue *index* attribute. If the specified *index* is not defined, index zero is used. If index zero is not defined, depth cueing is turned off.

ERRORS

BadPEXOutputCommand
The depth cue index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateLookupTable(3)

NAME

PEXSetEchoColor - PEX Escape to set Echo Color for Specified Renderer

SYNTAX

void PEXSetEchoColor(Display **display*, PEXRenderer *renderer*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
renderer	The resource identifier of a renderer.
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	The echo color.

RETURNS

None

DESCRIPTION

This function is a convenient way to access the **PEXEscapeSetEchoColor** escape to set the echo color for use by a renderer when echoing primitives.

A renderer's echo color can be changed at any time during rendering and is not inquirable through the renderer's modification dynamics (see **PEXGetRendererDynamics**(3)). Lighting and shading for echoed primitives is implementation-dependent. A renderer's echo color cannot be inquired and the default value is implementation-dependent. Support of this escape is inquirable via **PEXGetEnumTypeInfo**(3)**.**

DATA STRUCTURES

```
typedef  XID     PEXRenderer;

typedef union {
        PEXColorIndexed         indexed;
        PEXColorRGB             rgb;
        PEXColorHSV             hsv;
        PEXColorHLS             hls;
        PEXColorCIE             cie;
        PEXColorRGB8            rgb8;
        PEXColorRGB16           rgb16;
} PEXColor;

typedef struct {
        PEXTableIndex           index;
        unsigned short          reserved;
} PEXColorIndexed;

typedef struct {
        float           red;
        float           green;
        float           blue;
```

```
} PEXColorRGB;

typedef struct {
        float           hue;
        float           saturation;
        float           value;
} PEXColorHSV;

typedef struct {
        float           hue;
        float           lightness;
        float           saturation;
} PEXColorHLS;

typedef struct {
        float           x;
        float           y;
        float           z;
} PEXColorCIE;

typedef struct {
        unsigned char           red;
        unsigned char           green;
        unsigned char           blue;
        unsigned char           reserved;
} PEXColorRGB8;

typedef struct {
        unsigned short          red;
        unsigned short          green;
        unsigned short          blue;
        unsigned short          reserved;
} PEXColorRGB16;
```

ERRORS

BadPEXColorType
The specified color type is invalid or unsupported.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadValue
The **PEXEscapeSetEchoColor** escape is unsupported.

SEE ALSO

PEXEscape(3)

NAME

PEXSetEdgeBundleIndex - Set Edge Bundle Index

SYNTAX

void PEXSetEdgeBundleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The edge bundle table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the edge bundle *index* attribute. If an undefined *index* is specified, default bundle index one is used. If index one is not defined, the edge bundle attributes are set as follows: surface edges are turned off, the edge type is solid, the edge width is 1.0 and the color is indexed color one.

An edge bundle table index of 0 will produce a **BadPEXOutputCommand** error.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetEditingMode - Set Structure Editing Mode

SYNTAX

void PEXSetEditingMode(Display **display*, PEXStructure *structure*, int *mode*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
mode	The editing mode (**PEXStructureInsert** or **PEXStructureReplace**).

RETURNS

None

DESCRIPTION

This function sets the editing *mode* for the structure specified. The editing *mode* specifies how editing operations affect the structure. If the editing *mode* is **PEXStructureInsert,** subsequent requests to create structure elements cause elements to be inserted into the structure. The element pointer is then incremented by the number of elements inserted. If the editing *mode* is **PEXStructureReplace,** output requests that create structure elements cause structure elements to replace elements, starting at the location specified by the element pointer.

DATA STRUCTURES

```
typedef XID     PEXStructure;
```

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for mode is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXSetElementPtr - Set Structure Element Pointer

SYNTAX

void PEXSetElementPtr(Display **display*, PEXStructure *structure*, int *whence*, long *offset*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
whence	A value specifying with *offset*, the element pointer position (**PEXBeginning, PEXCurrent, PEXEnd**).
offset	The offset from *whence* which specifies the element pointer position.

RETURNS

None

DESCRIPTION

This function sets the element pointer for the structure specified to the position specified.

If either computed *offset* is less than zero, it is set to zero before obtaining the element information. If either computed *offset* is greater than the number of elements in the structure, it is set to the *offset* of the last structure element in the structure.

DATA STRUCTURES

typedef XID PEXStructure;

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadValue
The specified value for whence parameter is invalid.

SEE ALSO

PEXCreateStructure(3)

NAME

PEXSetElementPtrAtLabel - Set Structure Element Pointer at Label

SYNTAX

void PEXSetElementPtrAtLabel(Display **display*, PEXStructure *structure*, long *label*, long *offset*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
structure	The resource identifier of the structure.
label	The value of the label.
offset	The offset from the label.

RETURNS

None

DESCRIPTION

This function sets the element pointer for the specified *structure* at a position denoted by the *label*. A search is conducted for the next occurrence of the *label*, starting at the current element pointer position plus one and proceeding in the forward direction. If *label* is found, the element pointer for the *structure* is set to the location of the *label* plus the value of the specified *offset*. If *label* is not found, the structure's element pointer is left unchanged.

DATA STRUCTURES

typedef XID PEXStructure;

ERRORS

BadPEXLabel
The specified label does not exist.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateStructure(3)
PEXLabel(3)

NAME

PEXSetFacetCullingMode - Set Facet Culling Mode

SYNTAX

void PEXSetFacetCullingMode(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *mode*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
mode	The facet culling mode (**PEXNone, PEXBackFaces, PEXFrontFaces**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the facet culling *mode* attribute.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetFacetDistinguishFlag - Set Facet Distinguish Flag

SYNTAX

void PEXSetFacetDistinguishFlag(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *flag*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
flag	The facet distinguish flag (**True** or **False**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the facet distinguish *flag* attribute. Values for the facet distinguish *flag* are **True** (use back-face attributes to renderer surfaces) or **False** (use front-face attributes to renderer surfaces).

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetGlobalTransfom - Set Global Transformation 3D

SYNTAX

void PEXSetGlobalTransform(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXMatrix *transform*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
transform	The new global transformation matrix.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which replaces the current global transformation matrix with the specified matrix. The matrix is stored in row-major order.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetGlobalTransform2D(3)

NAME

PEXSetGlobalTransform2D - Set Global Transformation 2D

SYNTAX

void PEXSetGlobalTransform2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXMatrix3x3 *transform*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
transform	The new global transformation matrix.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which replaces the current global transformation matrix with the specified matrix. This output command is similar to **PEXSetGlobalTransform**(3) except that the global transformation matrix is specified as a 3×3 matrix. Before replacement of the global transformation matrix, the 3×3 matrix represented by

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & j \end{bmatrix}$$

is expanded to a 4×4 matrix as follows:

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & j \end{bmatrix} \rightarrow \begin{bmatrix} a & b & 0 & c \\ d & e & 0 & f \\ 0 & 0 & 1 & 0 \\ g & h & 0 & j \end{bmatrix}$$

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetGlobalTransform(3)

NAME

PEXSetHLHSRID - Set Hidden-Line Hidden-Surface Removal Identifier

SYNTAX

void PEXSetHLHSRID(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned long *hlhsr_id*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
hlhsr_id	The HLHSR identifier (**PEXHLHSRIDDisable** or **PEXHLHSRIDEnable).**

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the HLHSR identifier attribute. This output command is a no-op for all standard HLHSR modes except **PEXHLHSRZBufferID.** If the renderer's HLHSR mode is set to **PEXHLHSRZBufferID,** then a HLHSR identifier of **PEXHLHSRIDDisable** will disable z-buffering and a HLHSR identifier of **PEXHLHSRIDEnable** will enable z-buffering. For non-standard HLHSR modes, the effect of this output command is implementation-dependent.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetIndividualASF - Set Individual Aspect Source Flags

SYNTAX

void PEXSetIndividualASF(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned long *attribute*, int *asf*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
attribute	The ASF attribute name (see the Description).
asf	The attribute source flag value (**PEXIndividual** or **PEXBundled**).

RETURNS

None

DESCRIPTION

This function creates an output primitive *attribute* which sets the aspect source flag for a single, individual *attribute.* For the individual ASF attribute name, valid values are:

PEXASFBFInteriorStyle	**PEXASFBFInteriorStyleIndex**
PEXASFBFReflectionAttr	**PEXASFBFReflectionModel**
PEXASFBFSurfaceColor	**PEXASFBFSurfaceInterp**
PEXASFCharExpansion	**PEXASFCharSpacing**
PEXASFCurveApprox	**PEXASFInteriorStyle**
PEXASFInteriorStyleIndex	**PEXASFLineColor**
PEXASFLineType	**PEXASFLineWidth**
PEXASFMarkerColor	**PEXASFMarkerScale**
PEXASFMarkerType	**PEXASFPolylineInterp**
PEXASFReflectionAttr	**PEXASFReflectionModel**
PEXASFSurfaceApprox	**PEXASFSurfaceColor**
PEXASFSurfaceEdgeColor	**PEXASFSurfaceEdgeType**
PEXASFSurfaceEdgeWidth	**PEXASFSurfaceEdges**
PEXASFSurfaceInterp	**PEXASFTextColor**
PEXASFTextFontIndex	**PEXASFTextPrec**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetInteriorBundleIndex - Set Interior Bundle Index

SYNTAX

void PEXSetInteriorBundleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The interior bundle table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the interior bundle index attribute. If the specified *index* is not defined, the default index one is used. If index one is not defined, the following bundle values are used: interior style is **PEXInteriorStyleHollow;** interior style index is one; surface color is indexed color one; reflection attributes are ambient, diffuse and specular coefficient of 1.0, specular concentration and transmission coefficient of 0.0 and specular color of indexed color one; reflection model is **PEXReflectionNone;** surface interpolation is **PEXSurfaceInterpNone;** and surface approximation is method 1 (**PEXApproxImpDep**) with u and v tolerances of 1.0. The back-facing attributes are set to identical values as the front-facing attributes.

An interior bundle table index of 0 will produce a **BadPEXOutputCommand** error.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetInteriorStyle - Set Surface Interior Style

SYNTAX

void PEXSetInteriorStyle(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *style*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
style	The interior style (**PEXInteriorStyleHollow, PEXInteriorStyleSolid, PEXInteriorStylePattern, PEXInteriorStyleHatch, PEXInteriorStyleEmpty**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface interior *style* attribute. If the specified *style* is not supported, **PEXInteriorStyleHollow** is used. Supported values for surface interior *style* are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetInteriorStyleIndex - Set Surface Interior Style Index

SYNTAX

void PEXSetInteriorStyleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The interior style index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the interior style *index* attribute. If the current interior style is **PEXInteriorStylePattern** or **PEXInteriorStyleHatch,** the specified *index* is used to further define the rendering style of front-facing surface primitives. For **PEXInteriorStylePattern,** if the specified pattern table index is not defined, table index one is used. For **PEXInteriorStyleHatch,** the index determines the hatch style. If the specified hatch style is not supported, style one is used. If style one is not supported, the result is implementation-dependent. Supported values for hatch style are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)
PEXGetEnumTypeInfo(3)

NAME

PEXSetLightSourceState - Set Light Source State

SYNTAX

void PEXSetLightSourceState(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *enable_count*, PEXTableIndex **enable*, unsigned int *disable_count*, PEXTableIndex **disable*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
enable_count	The number of lights to enable.
enable	An array of lights to enable.
disable_count	The number of lights to disable.
disable	An array of lights to disable.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the light source state attribute. Each element in the *enable* list activates the light represented by the corresponding light table entry and each element in the *disable* list deactivates the light represented by the corresponding light table entry.

A light listed in both the *enable* list and the *disable* list, or a light index of 0 will produce a **BadPEXOutputCommand** error. Otherwise, if any light in the *enable* or *disable* list references an undefined light table entry, the light is ignored.

DATA STRUCTURES

typedef unsigned short PEXTableIndex;

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateLookupTable(3)

NAME

PEXSetLineBundleIndex - Set Line Bundle Index

SYNTAX

void PEXSetLineBundleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The line bundle table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the line bundle *index* attribute. If an undefined line bundle *index* is specified, the default bundle index one is used. If index one is not defined, the following values are used: line type is **PEXLineTypeSolid;** polyline interpolation is **PEXPolylineInterpNone;** curve approximation is method 1 (**PEXApproxImpDep**) with a tolerance of 1.0; line width is 1.0 and line color is index color one.

A line bundle table index of 0 will produce a **BadPEXOutputCommand** error.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetLineColor - Set Line Color

SYNTAX

void PEXSetLineColor(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	A pointer to the line color.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the line *color* attribute. The attribute is set to either an indexed color or a direct color value, depending on the color type. If the color type is **PEXColorTypeIndexed** and the specified *color* index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value, e.g. the color type is **PEXColorTypeIndexed,** and the color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetLineColorIndex - Set Line Color Index

SYNTAX

void PEXSetLineColorIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color table index for lines.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the line color attribute to an indexed color with the value indicated by *index*. If the color *index* is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetLineType - Set Line Type

SYNTAX

void PEXSetLineType(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *line_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
line_type	The line type (**PEXLineTypeSolid, PEXLineTypeDashed, PEXLineTypeDotted, PEXLineTypeDashDot**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the line type attribute. If the specified line type is not supported, **PEXLineTypeSolid** is used. Supported values for line type are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetLineWidth - Set Line Width

SYNTAX

void PEXSetLineWidth(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *width*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
width	The line width scale factor.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the line *width* attribute. The specified *width* is used as a scale factor. This scale factor is used to increase or decrease the width (in pixels) from the nominal line width for the display device. The result is mapped to the nearest supported line width.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetImpDepConstants(3)
PEXSetIndividualASF(3)

NAME

PEXSetLocalTransform - Set Local Transformation 3D

SYNTAX

void PEXSetLocalTransform(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *composition*, PEXMatrix *transform*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
composition	The composition rule for combining the new matrix with the current local transform (**PEXPreConcatenate, PEXPostConcatenate, PEXReplace**).
transform	The new local transformation matrix.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which modifies the local transformation matrix. If the *composition* type is **PEXPreConcatenate,** the specified matrix is pre-concatenated to the current local transformation matrix ($L' = L \times T$). If the *composition* type is **PEXPostConcatenate,** the specified matrix is post-concatenated to the current local transformation matrix ($L' = T \times L$). If the *composition* type is **PEXReplace,** the specified matrix replaces the current local transformation matrix ($L' = T$).

The composite matrix is then recomputed using the current global transformation and the new local transformation matrix ($C = G \times L'$).

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetLocalTransform2D(3)

NAME

PEXSetLocalTransform2D - Set Local Transformation 2D

SYNTAX

void PEXSetLocalTransform2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *composition*, PEXMatrix3x3 *transform*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
composition	The composition rule for combining the new matrix with the current local transform (**PEXPreConcatenate, PEXPostConcatenate, PEXReplace**).
transform	The new local transformation matrix.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which modifies the local transformation matrix. This output command is similar to **PEXSetLocalTransform**(3) except that the local transformation matrix is specified as a 3×3 matrix. Before modification of the local transformation matrix, the 3×3 matrix represented by

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & j \end{bmatrix}$$

is expanded to a 4×4 matrix as follows:

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & j \end{bmatrix} \rightarrow \begin{bmatrix} a & b & 0 & c \\ d & e & 0 & f \\ 0 & 0 & 1 & 0 \\ g & h & 0 & j \end{bmatrix}$$

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO **PEXSetLocalTransform**(3)

NAME

PEXSetMarkerBundleIndex - Set Marker Bundle Index

SYNTAX

void PEXSetMarkerBundleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The marker bundle table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the marker bundle *index* attribute. If an undefined *index* is specified, the default bundle index one is used. If index one is undefined, the default values are used: marker type is **PEXMarkerAsterisk;** marker scale is 1.0 and marker color is indexed color one.

A marker bundle table index of 0 will produce a **BadPEXOutputCommand** error.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetMarkerColor - Set Marker Color

SYNTAX

void PEXSetMarkerColor(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	A pointer to the marker color.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the marker *color* attribute. The attribute is set to either an indexed color or a direct color value, depending on the color type. If the color type is **PEXColorTypeIndexed** and the specified *color* index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value, e.g. the color type is **PEXColorTypeIndexed,** and the color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetMarkerColorIndex - Set Marker Color Index

SYNTAX

void PEXSetMarkerColorIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color table index for markers.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the marker color attribute to an indexed color with the value indicated by *index*. If the color *index* is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetMarkerScale - Set Marker Scale

SYNTAX

void PEXSetMarkerScale(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *scale*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
scale	The marker scale factor.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the marker *scale* attribute. Scale is multiplied by the nominal marker size for the display device to produce a marker size mapped to the nearest supported marker size.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetImpDepConstants(3)
PEXSetIndividualASF(3)

NAME

PEXSetMarkerType - Set Marker Type

SYNTAX

void PEXSetMarkerType(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *marker_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
marker_type	The marker type (**PEXMarkerDot, PEXMarkerCross, PEXMarkerAsterisk, PEXMarkerCircle, PEXMarkerX**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the marker type attribute. If the specified marker type is not supported, **PEXMarkerAsterisk** is used. Supported values for marker type are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetModelClipFlag - Set Model Clipping Flag

SYNTAX

void PEXSetModelClipFlag(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *flag*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
flag	The model clipping flag (**PEXClip** or **PEXNoClip**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the model clip attribute. Values for the model clip flag are **PEXClip** (enable modeling clipping) and **PEXNoClip** (disable modeling clipping).

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetModelClipVolume(3)
PEXSetModelClipVolume2D(3)
PEXRestoreModelClipVolume(3)

NAME

PEXSetModelClipVolume - Set Model Clip Volume 3D

SYNTAX

void PEXSetModelClipVolume(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *op*, unsigned int *count*, PEXHalfSpace **half_spaces*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
op	The model clipping volume operator (**PEXModelClipReplace** or **PEXModelClipIntersection**).
count	The number of halfspaces.
half_spaces	An array of points and normal vectors defining the model clipping volume.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the model clip volume attribute. The operator will be used to combine the specified list of half-spaces with the current model clipping volume to form a new model clipping volume. Values for the operator are **PEXModelClipReplace** (replace current volume) and **PEXModelClipIntersection** (intersect specified volume with current volume). Each half-space is defined by a point and a normal in model coordinates. The normal points in the direction of the half-space, and the point is considered to be on the plane. See **PEXGetImpDepConstants**(3) for the maximum allowable number of model clip planes.

Each half-space is transformed by the current composite modeling transformation and combined with the current model clipping volume. The resulting model clipping volume is not affected by subsequent changes to the composite modeling transformation.

DATA STRUCTURES

```
typedef struct {
        PEXCoord        point;
        PEXVector       vector;
} PEXHalfSpace;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetModelClipFlag(3)
PEXSetModelClipVolume2D(3)
PEXRestoreModelClipVolume(3)
PEXGetImpDepConstants(3)

NAME

PEXSetModelClipVolume2D - Set Model Clip Volume 2D

SYNTAX

void PEXSetModelClipVolume2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *op*, unsigned int *count*, PEXHalfSpace2D **half_spaces*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
op	The model clipping volume operator (**PEXModelClipReplace** or **PEXModelClipIntersection**).
count	The number of halfspaces.
half_spaces	An array of points and normal vectors defining the model clipping volume.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the model clip volume attribute. This output command is similar to **PEXSetModelClipVolume**(3) except that the half-spaces are specified in 2D coordinates where the z-component of each point and normal vector assumed to be zero.

DATA STRUCTURES

```
typedef struct {
        PEXCoord2D    point;
        PEXVector2D   vector;
} PEXHalfSpace2D;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetModelClipFlag(3)
PEXSetModelClipVolume(3)
PEXRestoreModelClipVolume(3)
PEXGetImpDepConstants(3)

NAME

PEXSetOfFillAreaSets - 3D Set of Fill Area Sets Primitive

SYNTAX

void PEXSetOfFillAreaSets(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *shape_hint*, unsigned int *facet_attributes*, unsigned int *vertex_attributes*, unsigned int *edge_attributes*, int *contour_hint*, int *contours_all_one*, int *color_type*, unsigned int *set_count*, PEXArrayOfFacetData *facet_data*, unsigned int *vertex_count*, PEXArrayOfVertex *vertices*, unsigned int *index_count*, PEXSwitch **edge_flags*, PEXConnectivityData **connectivity*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
shape_hint	The shape which describes all of the contours (**PEXShapeComplex, PEXShapeNonConvex, PEXShapeConvex, PEXShapeUnknown**).
facet_attributes	A mask indicating the facet attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
vertex_attributes	A mask indicating the vertex attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
edge_attributes	A mask indicating the edge attributes provided (**PEXGANone** or **PEXGAEdges**).
contour_hint	A flag indicating whether contours are disjoint or overlapping (**PEXContourDisjoint, PEXContourNested, PEXContourIntersecting, PEXContourUnknown**).
contours_all_one	**True** if each fill area set contains only one contour; **False** otherwise.
color_type	The type of color data provided (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
set_count	The number of fill area sets.
facet_data	An array of facet data.
vertex_count	The number of vertices.
vertices	An array of vertices.
index_count	The number of vertex connectivity indices (also number of edge flags, if edges are specified).
edge_flags	An array of edge flags.
connectivity	A pointer to the list of contour connectivity data.

RETURNS None

DESCRIPTION This function creates a set of fill area sets output primitive.

A fill area may cross over itself to create a complex shape. The odd-even rule is used for determining the area that lies in the interior of the fill area. The shape hint is provided to enable performance improvements for certain shapes. Fill areas that are of higher complexity than indicated by the shape hint are rendered in an implementation-dependent manner. Consequently, applications should pass **PEXShapeUnknown** as the shape unless they are certain the fill area's shape is one of the other three. Note that a fill area set with more than one contour is always allowed to have contours that intersect. If is quite possible that the only times rendering optimization can occur are when the number of contours in a fill area set is equal to one or if the contours all one flag is **True,** and the shape hint is **PEXShapeConvex.**

The contour hint provides further information about the relationships between contours in the fill area set. If the contour hint is **PEXContourDisjoint** all contours will be spatially disjoint. No overlapping or intersection occurs between any contours in the fill area set. If the contour hint is **PEXContourNested** contours will either be disjoint or wholly contained within another contour. No contour will have edges that intersect or are coincident with edges of any other contour. If the contour hint is **PEXContourIntersecting** separated contours may have edges that are coincident or overlap. If the contour hint is **PEXContourUnknown** nothing is known about the interrelationships between contours. Fill area sets with contours that have higher complexity interrelationships than that indicated by the contour hint are rendered in an implementation-dependent manner.

The facet attributes indicate the content of the facet data. This data may be a color, a normal, or a color followed by a normal. Use the constants **PEXGANone, PEXGAColor** and **PEXGANormal** to construct a mask indicating the data provided. If specified, the facet color takes precedence over the surface color. If specified, the facet normal is used to determine whether the fill area is back-facing.

The vertex attributes indicate the content of each fill area vertex. In addition to the coordinate (x,y,z), applications may specify a color, a normal, or a color followed by a normal for each vertex. Use the constants **PEXGANone, PEXGAColor** and **PEXGANormal** to construct a mask indicating the data provided. If specified, vertex colors will override facet color or the current surface color. If specified, vertex normals are taken to be normals at the vertices of the fill area.

The reflection model and the surface interpolation will affect how the additional data is used in rendering the surface.

Color values passed must be of the specified color type. Normals are assumed to be unit length vectors. The effect if the normal is not unit length is implementation-dependent.

The edge attributes indicate the content of the edge flags. Use **PEXGAEdges** to indicate edge flags are provided or **PEXGANone** if no edge flags are provided. The edge flags, if present, are set to **PEXOn** or **PEXOff** and are used to indicate which edges should be rendered. The edge control for vertex i indicates whether or not to render the edge between vertex i and vertex i+1. Surface edges are always rendered with the surface edge color

and are not affected by the facet or vertex colors.

The *connectivity* of the primitive is defined by the *connectivity* list. The *connectivity* list is a pointer to an array of **PEXConnectivityData** structures. Each entry in the array gives the contours for one fill area set in the set of fill area sets, and, in turn, contains a pointer to an array of **PEXListOfUShort** structures. Each of these latter structures gives the index of the vertices of one contour in that fill area set. The indices select a vertex in the array of vertices. Vertices are numbered with indices starting from zero (i.e. the first vertex is referenced as vertex 0). As a special case, if the contours all one flag is **True** then the contour count field in each fill area set is guaranteed to be one.

All attributes affecting the representation of fill area sets also affect the representation of this primitive.

DATA STRUCTURES

```
typedef struct {
        unsigned short          count;          /* number of lists */
        PEXListOfUShort         *lists;
} PEXConnectivityData;

typedef struct {
        unsigned short          count;          /* number of shorts */
        unsigned short          *shorts;
} PEXListOfUShort;

typedef  unsigned char  PEXSwitch;
```

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)

PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXSetPCAttributeMask - Macro to Setup Pipeline Context Attributes Value Mask

SYNTAX

PEXSetPCAttributeMask(*mask*, *attr*)

PARAMETERS

mask The address of the value mask - an array of three unsigned long.

attr A single pipeline context attribute bitmask constant.

DESCRIPTION

This is a utility macro to aid in setting up the bitmask for the pipeline context attributes. The following attribute bitmask constants must be used:

PEXPCASFValues	**PEXPCLocalTransform**
PEXPCTextAlignment	**PEXPCMarkerBundleIndex**
PEXPCATextHeight	**PEXPCMarkerColor**
PEXPCTextPath	**PEXPCMarkerScale**
PEXPCATextStyle	**PEXPCMarkerType**
PEXPCATextUpVector	**PEXPCModelClip**
PEXPCBFInteriorStyle	**PEXPCModelClipVolume**
PEXPCBFInteriorStyleIndex	**PEXPCNameSet**
PEXPCBFReflectionAttr	**PEXPCParaSurfCharacteristics**
PEXPCBFReflectionModel	**PEXPCPatternRefPoint**
PEXPCBFSurfaceColor	**PEXPCPatternRefVec1**
PEXPCBFSurfaceInterp	**PEXPCPatternRefVec2**
PEXPCCharExpansion	**PEXPCPatternSize**
PEXPCCharHeight	**PEXPCPickID**
PEXPCCharSpacing	**PEXPCPolylineInterp**
PEXPCCharUpVector	**PEXPCReflectionAttr**
PEXPCColorApproxIndex	**PEXPCReflectionModel**
PEXPCCullingMode	**PEXPCRenderingColorModel**
PEXPCCurveApprox	**PEXPCSurfaceApprox**
PEXPCDepthCueIndex	**PEXPCSurfaceColor**
PEXPCDistinguishFlag	**PEXPCSurfaceEdgeColor**
PEXPCEdgeBundleIndex	**PEXPCSurfaceEdgeFlag**
PEXPCGlobalTransform	**PEXPCSurfaceEdgeType**
PEXPCHLHSRIdentifier	**PEXPCSurfaceEdgeWidth**
PEXPCInteriorBundleIndex	**PEXPCSurfaceInterp**
PEXPCInteriorStyle	**PEXPCTextAlignment**
PEXPCInteriorStyleIndex	**PEXPCTextBundleIndex**
PEXPCLightState	**PEXPCTextColor**
PEXPCLineBundleIndex	**PEXPCTextFont**
PEXPCLineColor	**PEXPCTextPath**
PEXPCLineType	**PEXPCTextPrecision**
PEXPCLineWidth	**PEXPCViewIndex**

Note that this macro does multiple evaluations of the value for attr.

ERRORS None

SEE ALSO
PEXCreatePipelineContext(3)
PEXChangePipelineContext(3)
PEXCopyPipelineContext(3)
PEXGetPipelineContext(3)

NAME PEXSetPCAttributeMaskAll - Macro to Set All Pipeline Context Attributes in Value Mask

SYNTAX PEXSetPCAttributeMaskAll(*mask*)

PARAMETERS *mask* The address of the value mask - an array of three unsigned long.

DESCRIPTION This is a utility macro to aid in setting up the bitmask for the pipeline context attributes. This macro will set all valid bits in the mask.

ERRORS None

SEE ALSO **PEXCreatePipelineContext**(3)
PEXChangePipelineContext(3)
PEXCopyPipelineContext(3)
PEXGetPipelineContext(3)

NAME

PEXSetPWAttributeMask - Macro to Setup Workstation Attributes Value Mask

SYNTAX

PEXSetPWAttributeMask(*mask*, *attr*)

PARAMETERS

mask The address of the value mask - an array of two unsigned long.

attr A single workstation attribute bitmask constant.

DESCRIPTION

This is a utility macro to aid in setting up the bitmask for the workstation attributes. The following constants must be used:

PEXPWBufferUpdate	**PEXPWInvisibilityExcl**
PEXPWColorApproxTable	**PEXPWInvisibilityIncl**
PEXPWColorTable	**PEXPWLightTable**
PEXPWCurBufferMode	**PEXPWLineBundle**
PEXPWCurHLHSRMode	**PEXPWMarkerBundle**
PEXPWCurNPCSubVolume	**PEXPWNumPriorities**
PEXPWCurViewport	**PEXPWPatternTable**
PEXPWDefinedViews	**PEXPWPostedStructures**
PEXPWDepthCueTable	**PEXPWReqBufferMode**
PEXPWDisplaySurface	**PEXPWReqHLHSRMode**
PEXPWDisplayUpdate	**PEXPWReqNPCSubVolume**
PEXPWDrawable	**PEXPWReqViewport**
PEXPWEdgeBundle	**PEXPWTextBundle**
PEXPWHLHSRUpdate	**PEXPWTextFontTable**
PEXPWHighlightExcl	**PEXPWViewUpdate**
PEXPWHighlightIncl	**PEXPWVisualState**
PEXPWInteriorBundle	**PEXPWWorkstationUpdate**

Note that this macro does multiple evaluations of the value for attr.

ERRORS

None

SEE ALSO

PEXGetWorkstationAttributes(3)

NAME PEXSetPWAttributeMaskAll - Macro to Set All Workstation Attributes in Value Mask

SYNTAX PEXSetPWAttributeMaskAll(*mask*)

PARAMETERS *mask* The address of the value mask - an array of two unsigned long.

DESCRIPTION This is a utility macro to aid in setting up the bitmask for the workstation attributes. This macro will set all valid bits in the mask.

ERRORS None

SEE ALSO **PEXGetWorkstationAttributes**(3)

NAME

PEXSetParaSurfCharacteristics - Set Parametric Surface Characteristics

SYNTAX

void PEXSetParaSurfCharacteristics(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *psc_type*, PEXPSCData **characteristics*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
psc_type	The parametric surface characteristic type (**PEXPSCNone, PEXPSCImpDep, PEXPSCIsoCurves, PEXPSCMCLevelCurves, PEXPSCWCLevelCurves**).
characteristics	A pointer to data defining the parametric surface characteristics.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the parametric surface *characteristics*. If the specified parametric surface *characteristics* type is not supported, **PEXPSCNone** is used. Supported values for parameteric surface characteristic types are inquirable via **PEXGetEnumTypeInfo**(3)**.**

DATA STRUCTURES

```
typedef union {
        PEXPSCIsoparametricCurves       iso_curves;
        PEXPSCLevelCurves               level_curves;
        PEXPSCImpDepData                imp_dep;
} PEXPSCData;

typedef struct {
        unsigned short          placement_type;
        unsigned short          reserved;
        unsigned short          u_count;
        unsigned short          v_count;
} PEXPSCIsoparametricCurves;

typedef struct {
        PEXCoord                origin;
        PEXVector               direction;
        unsigned short          count;          /* number of parameters */
        unsigned short          reserved;
        float                   *parameters;
} PEXPSCLevelCurves;

typedef struct {
```

```
        unsigned short      length;
        char                *data;
} PEXPSCImpDepData;
```

See also **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetPatternAttributes - Set Pattern Interior Style Attributes

SYNTAX

void PEXSetPatternAttributes(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **ref_point*, PEXVector **vector1*, PEXVector **vector2*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
ref_point	The pattern reference point.
vector1	The first pattern reference vector.
vector2	The second pattern reference vector.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the pattern reference point and both pattern reference vectors attributes, in modeling coordinates. If the surface interior style is **PEXInteriorStylePattern,** the pattern reference point and the pattern reference vectors are used to to position and scale the pattern on the surface. If either of the pattern reference vectors are zero length or if the vectors are parallel, the output command is ignored.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetPatternAttributes2D - Set Pattern Interior Style Reference Point

SYNTAX

void PEXSetPatternAttributes2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord2D **ref_point*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
ref_point	The pattern reference point.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the pattern reference point and both pattern reference vector attributes, in 2D modeling coordinates. The pattern reference point is set to <x,y,0> and the two pattern reference vectors are set to <1,0,0> and <0,1,0>. If the surface interior style is **PEXInteriorStylePattern,** the pattern reference point and the reference vectors are used to position and scale the pattern on the surface.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetPatternSize - Set Pattern Interior Style Size

SYNTAX

void PEXSetPatternSize(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *width*, double *height*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
width	The pattern width.
height	The pattern height.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the pattern size attribute. Only the magnitude of the specified width and height is used. The value (width,0) is used as the pattern width vector, and the value (0,height) specifies the pattern height vector. If the interior style is **PEXInteriorStylePattern,** these values plus the pattern reference point and the pattern reference vector are used to position, scale, and rotate the pattern on the surface.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetPickID - Set Pick Identifier

SYNTAX

void PEXSetPickID(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned long *pick_id*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
pick_id	The pick identifier.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the current pick identifier attribute.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetPolylineInterpMethod - Set Polyline Interpolation Method

SYNTAX

void PEXSetPolylineInterpMethod(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *method*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
method	The polyline interpolation method (**PEXPolylineInterpNone** or **PEXPolylineInterpColor**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the polyline interpolation method attribute. If the specified interpolation method is not supported, **PEXPolylineInterpNone** is used. Supported values for polyline interpolation method are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetReflectionAttributes - Set Surface Reflection Attributes

SYNTAX

void PEXSetReflectionAttributes(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXReflectionAttributes **attributes*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
attributes	The surface reflection attributes.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface reflection *attributes*. Surface reflection *attributes* consist of the ambient, diffuse and specular coefficients, the specular concentration and color, and the transmission coefficient.

DATA STRUCTURES

```
typedef struct {
        float               ambient;
        float               diffuse;
        float               specular;
        float               specular_conc;
        float               transmission;
        PEXColorSpecifier   specular_color;
} PEXReflectionAttributes;
```

See also **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXGetImpDepConstants(3)

NAME

PEXSetReflectionModel - Set Surface Reflection Model

SYNTAX

void PEXSetReflectionModel(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *model*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
model	The surface reflection model (**PEXReflectionNone, PEXReflectionAmbient, PEXReflectionDiffuse, PEXReflectionSpecular).**

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface reflection model attribute. If the specified reflection model is not supported, **PEXReflectionNone** is used. Supported values for surface reflection model are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetRenderingColorModel - Set Rendering Color Model

SYNTAX

void PEXSetRenderingColorModel(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *model*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
model	The surface reflection model (**PEXRenderingColorModelImpDep, PEXRenderingColorModelRGB, PEXRenderingColorModelCIE, PEXRenderingColorModelHSV, PEXRenderingColorModelHLS**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the rendering color model attribute. If the specified color model is not supported, an implementation-dependent model (model 0) is used. Supported values for rendering color model are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)

NAME

PEXSetSurfaceApprox - Set Surface Approximation Method

SYNTAX

void PEXSetSurfaceApprox(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *method*, double *utolerance*, double *vtolerance*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
method	The surface approximation method (**PEXApproxImpDep, PEXApproxConstantBetweenKnots, PEXApproxWCChordalSize, PEXApproxNPCChordalSize, PEXApproxDCChordalSize, PEXSurfaceApproxWCPlanarDev, PEXSurfaceApproxNPCPlanarDev, PEXSurfaceApproxDCPlanarDev, PEXApproxWCRelative, PEXApproxNPCRelative, PEXApproxDCRelative**).
utolerance	The surface approximation tolerance in the u direction.
vtolerance	The surface approximation tolerance in the v direction.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface approximation *method* attribute. If the specified *method* is not supported, **PEXApproxImpDep** is used. Supported values for surface approximation are inquirable via **PEXGetEnumTypeInfo**(3)**.** The u and v tolerance values are provided to indicate the desired accuracy of the approximation, and are used in different ways for the different methods.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXGetEnumTypeInfo(3)

NAME

PEXSetSurfaceColor - Set Surface Color

SYNTAX

void PEXSetSurfaceColor(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	A pointer to the surface color.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface *color* attribute. The attribute is set to either an indexed color or a direct color value, depending on the color type. If the *color* type is **PEXColorTypeIndexed** and the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value, e.g. the color type is **PEXColorTypeIndexed,** and the color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetSurfaceColorIndex - Set Surface Color Index

SYNTAX

void PEXSetSurfaceColorIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color table index surfaces.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface color attribute to an indexed color with the value indicated by *index*. If the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetSurfaceEdgeColor - Set Surface Edge Color

SYNTAX

void PEXSetSurfaceEdgeColor(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	A pointer to the surface edge color.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface edge *color* attribute. The attribute is set to either an indexed color or a direct color value, depending on the color type. If the color type is **PEXColorTypeIndexed** and the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value, e.g. the color type is **PEXColorTypeIndexed,** and the color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetSurfaceEdgeColorIndex - Set Surface Edge Color Index

SYNTAX

void PEXSetSurfaceEdgeColorIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color table index for surface edges.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface edge color attribute to an indexed color with the value indicated by *index*. If the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetSurfaceEdgeFlag - Set Surface Edge Flag

SYNTAX

void PEXSetSurfaceEdgeFlag(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *flag*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
flag	A flag indicating whether surface edge drawing is enabled or disabled (**PEXOn** or **PEXOff**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface edge *flag* attribute. Values for the surface edge *flag* are **PEXOn** (enable surface edges) and **PEXOff** (disable surface edges).

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)

NAME

PEXSetSurfaceEdgeType - Set Surface Edge Type

SYNTAX

void PEXSetSurfaceEdgeType(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *edge_type*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
edge_type	The surface edge type (**PEXSurfaceEdgeSolid, PEXSurfaceEdgeDashed, PEXSurfaceEdgeDotted, PEXSurfaceEdgeDashDot**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface edge type attribute. If the specified edge type is not supported, **PEXSurfaceEdgeSolid** is used. Supported values for surface edge type are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetSurfaceEdgeWidth - Set Surface Edge Width

SYNTAX

void PEXSetSurfaceEdgeWidth(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, double *width*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
width	The surface edge width scale factor.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface edge *width* attribute. The specified *width* is used as a scale factor. This scale factor is used to increase or decrease the width (in pixels) from the nominal edge width for the display device. The result is mapped to the nearest supported line width.

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetImpDepConstants(3)
PEXSetIndividualASF(3)

NAME

PEXSetSurfaceInterpMethod - Set Surface Interpolation Method

SYNTAX

void PEXSetSurfaceInterpMethod(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *method*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
method	The surface interpolation method (**PEXSurfaceInterpNone, PEXSurfaceInterpColor, PEXSurfaceInterpDotProduct, PEXSurfaceInterpNormal**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the surface interpolation method attribute. If the specified interpolation method is not supported, **PEXSurfaceInterpNone** is used. Supported values for surface interpolation are inquirable via **PEXGetEnumTypeInfo**(3)**.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXGetEnumTypeInfo(3)
PEXSetIndividualASF(3)

NAME

PEXSetTableEntries - Set Lookup Table Entries

SYNTAX

void PEXSetTableEntries(Display **display*, PEXLookupTable *table*, unsigned int *start*, unsigned int *count*, int *table_type*, PEXPointer *entries*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
table	The resource identifier of the lookup table.
start	The index of the first table entry to be set.
count	The number of table entries to be set.
type	The type of lookup table entries to be set (see the Description).
entries	An array of table entries.

RETURNS

None

DESCRIPTION

This function sets lookup table entries in the specified lookup table, starting at the specified entry index.

The entries must point to an array of structures having one of the following types:

PEXTextFontEntry if type is **PEXLUTTextFont**
PEXViewEntry if type is **PEXLUTView**
PEXColorApproxEntry if type is **PEXLUTColorApprox**
PEXLineBundleEntry if type is **PEXLUTLineBundle**
PEXMarkerBundleEntry if type is **PEXLUTMarkerBundle**
PEXTextBundleEntry if type is **PEXLUTTextBundle**
PEXInteriorBundleEntry if type is **PEXLUTInteriorBundle**
PEXEdgeBundleEntry if type is **PEXLUTEdgeBundle**
PEXLightEntry if type is **PEXLUTLight**
PEXDepthCueEntry if type is **PEXLUTDepthCue**
PEXColorEntry if type is **PEXLUTColor**
PEXPatternEntry if type is **PEXLUTPattern**

DATA STRUCTURES

```
typedef XID     PEXLookupTable;

#if NeedFunctionPrototypes
typedef void    *PEXPointer;
#else
typedef char    *PEXPointer;
#endif
```

ERRORS

BadAlloc
The server failed to allocate the resource.

BadPEXColorType
The specified color type is invalid or unsupported.

BadPEXLookupTable
The specified lookup table resource identifier is invalid, or the table type is unsupported.

BadValue
The sum of *start* plus *count* is too large, a table entry field contains an invalid value, or index 0 is invalid for the specified table type.

SEE ALSO

PEXCreateLookupTable(3)
PEXGetTableInfo(3)
PEXGetPredefinedEntries(3)
PEXGetDefinedIndices(3)
PEXGetTableEntry(3)
PEXGetTableEntries(3)

NAME

PEXSetTextAlignment - Set Text Alignment

SYNTAX

void PEXSetTextAlignment(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *halignment*, int *valignment*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
halignment	The horizontal text alignment (**PEXHAlignNormal, PEXHAlignLeft, PEXHAlignCenter, PEXHAlignRight**).
valignment	The vertical text alignment (**PEXVAlignNormal, PEXVAlignTop, PEXVAlignCap, PEXVAlignHalf, PEXVAlignBase, PEXVAlignBottom**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the horizontal and vertical text alignment attributes.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetTextBundleIndex - Set Text Bundle Index

SYNTAX

void PEXSetTextBundleIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The text bundle table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text bundle *index* attribute. If an undefined *index* is specified, the default bundle index one is used. If index one is undefined, the defaults are used: text font index is one; text precision is **PEXStringPrecision;** character expansion is 1.0; character spacing is 0.0 and text color is indexed color one.

A text bundle table *index* of 0 will produce a **BadPEXOutputCommand** error.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetTextColor - Set Text Color

SYNTAX

void PEXSetTextColor(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *color_type*, PEXColor **color*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
color_type	The type of color (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
color	A pointer to the text color.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text *color* attribute. The attribute is set to either an indexed color or a direct color value, depending on the color type. If the color type is **PEXColorTypeIndexed** and the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value, e.g. the color type is **PEXColorTypeIndexed,** and the color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetTextColorIndex - Set Text Color Index

SYNTAX

void PEXSetTextColorIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The color table index for text.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text color attribute to an indexed color with the value indicated by *index*. If the specified color index is not defined, color index one is used. If color index one is not defined, the result is implementation-dependent.

ERRORS

BadPEXOutputCommand
The color index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetTextFontIndex - Set Text Font Index

SYNTAX

void PEXSetTextFontIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The text font table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text font *index* attribute. Index specifies the entry in the current text font lookup table used to render text primitives. If *index* is undefined, the default index one is used. If index one is undefined, the result is implementation-dependent.

A text font table index less than 1 will produce a **BadPEXOutputCommand** error.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)
PEXCreateLookupTable(3)

NAME

PEXSetTextPath - Set Text Path

SYNTAX

void PEXSetTextPath(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *path*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
path	The text (drawing) path (**PEXPathRight, PEXPathLeft, PEXPathUp, PEXPathDown**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text *path* attribute.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

NAME

PEXSetTextPrecision - Set Text Precision

SYNTAX

PEXSetTextPrecision(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *precision*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
precision	The text precision (**PEXStringPrecision, PEXCharPrecision, PEXStrokePrecision**).

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the text *precision* attribute.

When text or annotation text is interpreted, the fragments in the text string are rendered in the same text *precision*. If the font group selected by the current text font index consists of both X and PEX fonts, and if some of the string fragments in the string are rendered in X fonts, the text *precision* of the entire string must be dropped to at least **PEXCharPrecision.**

If a character set value is not available in the current font group, then the entire string is rendered using the default font group. If a character set value is not available in the default font group, then that portion of the string is rendered in an implementation-dependent manner.

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetIndividualASF(3)

NAME

PEXSetViewIndex - Set View Index

SYNTAX

void PEXSetViewIndex(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *index*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
index	The view table index.

RETURNS

None

DESCRIPTION

This function creates an output primitive attribute which sets the view *index* attribute. If the specified view *index* is not defined, the default index zero is used. If view index zero is undefined, the default values are used: all clip flags are on; the clip limits are set to <0,0,0> , <1,1,1>; orientation and mapping are the identity matrices.

ERRORS

BadPEXOutputCommand
The view index value exceeds 65534.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXCreateLookupTable(3)

NAME

PEXSetWorkstationBufferMode - Set Workstation Buffer Mode

SYNTAX

void PEXSetWorkstationBufferMode(Display **display*, PEXWorkstation *workstation*, int *buffer_mode*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
buffer_mode	The workstation buffering mode (**PEXSingleBuffer** or **PEXDoubleBuffer**).

RETURNS

None

DESCRIPTION

This function sets the requested buffer mode of the specified *workstation*. If the workstation's display surface attribute is **PEXEmpty,** or if the dynamic modification for buffer mode is **PEXIMM,** the current buffer mode is set to the specified buffer mode and the buffer update is set to **PEXNotPending;** otherwise, the buffer update is set to **PEXPending** and the current buffer mode is not changed.

Buffer mode may be one of the following values: **PEXSingleBuffer** or **PEXDoubleBuffer.** An error will be generated if the buffer mode is **PEXDoubleBuffer** and the server cannot allocated the second image buffer.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;
```

ERRORS

BadAlloc
The server failed to allocate resources needed for double-buffering.

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
The specified buffer mode is invalid.

SEE ALSO

PEXSetWorkstationDisplayUpdateMode(3)
PEXGetImpDepConstants(3)

NAME

PEXSetWorkstationDisplayUpdateMode - Set Workstation Display Update Mode

SYNTAX

void PEXSetWorkstationDisplayUpdateMode(Display **display*, PEXWorkstation *workstation*, int *update_mode*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
update_mode	The workstation display update mode (**PEXVisualizeEach, PEXVisualizeEasy, PEXVisualizeNone, PEXSimulateSome, PEXVisualizeWhenever**).

RETURNS

None

DESCRIPTION

This function sets the display update attribute of the specified *workstation*. This attribute defines how changes to the display surface will be visualized. The supported values for display update mode are inquirable via **PEXGetEnumTypeInfo**(3)**.**

If double-buffering is enabled, the display update mode affects which buffer is rendered into during traversal. If the display update mode is **PEXVisualizeEach, PEXVisualizeWhenever** or **PEXVisualizeNone,** output primitives are rendered into the back (undisplayed) buffer while the structure network is being traversed. When the traversal is complete, the front and back buffers are swapped, so the rendered image is displayed. If the display update mode is **PEXVisualizeEasy** or **PEXSimulateSome,** output primitives are always rendered into the front (displayed) buffer.

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
The specified display update mode is invalid.

SEE ALSO

PEXSetWorkstationBufferMode(3)
PEXGetEnumTypeInfo(3)

NAME

PEXSetWorkstationHLHSRMode - Set Workstation HLHSR Mode

SYNTAX

void PEXSetWorkstationHLHSRMode(Display **display*, PEXWorkstation *workstation*, int *hlhsr_mode*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
hlhsr_mode	The workstation HLHSR mode (**PEXHLHSROff, PEXHLHSRZBuffer, PEXHLHSRPainters, PEXHLHSRScanline, PEXHLHSRHidden-LineOnly, PEXHLHSRZBufferID**).

RETURNS

None

DESCRIPTION

This function sets the requested HLHSR mode of the specified *workstation.* If the workstation's display surface attribute is **PEXEmpty,** or if the dynamic modification for HLHSR mode is **PEXIMM,** the current HLHSR mode is set to the specified HLHSR mode and the HLHSR update is set to **PEXNotPending;** otherwise, the HLHSR update is set to **PEXPending** and the current HLHSR mode is not changed.

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadAlloc
The server failed to allocate resources needed for HLHSR.

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
The specified HLHSR mode is invalid.

NAME

PEXSetWorkstationViewPriority - Set Workstation View Priority

SYNTAX

void PEXSetWorkstationViewPriority(Display **display*, PEXWorkstation *workstation*, unsigned int *index1*, unsigned int *index2*, int *priority*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
index1	The first view table entry index.
index2	The second view table entry index.
priority	A relative priority of index 1 with respect to index 2 (**PEXHigher** or **PEXLower**).

RETURNS

None

DESCRIPTION

This function sets the relative priorities of entries in the workstation's current view table. The *priority* of the first view table entry with respect to the second view table entry is set to the next higher or lower priority as indicated by the specified *priority*. These priorities are used to determine the order in which view table entries are tested when selecting the inverse viewing transformation to use for transforming from device coordinates to world coordinates.

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
The specified value for priority is invalid, or the specified table entry is not defined.

NAME

PEXSetWorkstationViewRep - Set Workstation View Representation

SYNTAX

void PEXSetWorkstationViewRep(Display **display*, PEXWorkstation *workstation*, unsigned int *view_index*, PEXViewEntry **values*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
view_index	The view index.
values	A pointer to the view representation values.

RETURNS

None

DESCRIPTION

This function sets the specified view table entry of the requested view table in the specified *workstation*. If the dynamic modification for the view table is **PEXIMM,** the current view table entry is set to the specified view representation and the view update is set to **PEXNotPending;** otherwise, the view update is set to **PEXPending** and the current view table is not changed.

DATA STRUCTURES

```
typedef  XID     PEXWorkstation;

typedef struct {
        unsigned short              clip_flags;
        unsigned short              reserved;
        PEXNPCSubVolume             clip_limits;
        PEXMatrix                   orientation;
        PEXMatrix                   mapping;
} PEXViewEntry;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;

typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef  float     PEXMatrix[4][4];
```

ERRORS

BadAlloc
The view table is full.

BadPEXWorkstation
The specified workstation resource identifier is invalid.

NAME

PEXSetWorkstationViewport - Set Workstation Viewport

SYNTAX

void PEXSetWorkstationViewport(Display **display*, PEXWorkstation *workstation*, PEXViewport **viewport*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
viewport	The workstation viewport.

RETURNS

None

DESCRIPTION

This function sets the requested workstation *viewport of the specified workstation*. If the dynamic modification for workstation viewport is **PEXIMM,** the current workstation viewport is set to the specified viewport and the workstation update is set to **PEXNotPending;** otherwise, the workstation update is set to **PEXPending** and the current workstation viewport is not changed.

DATA STRUCTURES

```
typedef  XID     PEXWorkstation;

typedef struct {
        PEXDeviceCoord          min;
        PEXDeviceCoord          max;
        PEXSwitch               use_drawable;
        unsigned char           reserved[3];
} PEXViewport;

typedef struct {
        short    x;
        short    y;
        float    z;
} PEXDeviceCoord;

typedef  unsigned char   PEXSwitch;
```

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

BadValue
The specified value for use_drawable is invalid.

NAME

PEXSetWorkstationWindow - Set Workstation Window

SYNTAX

void PEXSetWorkstationWindow(Display **display*, PEXWorkstation *workstation*, PEXNPCSubVolume **workstation_window*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

workstation_window The workstation window.

RETURNS

None

DESCRIPTION

This function set the requested NPC subvolume of the specified *workstation*. If the dynamic modification for the workstation window is **PEXIMM,** the current workstation window is set to the specified NPC subvolume and the workstation update is set to **PEXNotPending;** otherwise, the workstation update is set to **PEXPending** and the current workstation window is not changed.

DATA STRUCTURES

```
typedef XID     PEXWorkstation;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;

typedef struct {
        float   x;
        float   y;
        float   z;
} PEXCoord;
```

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

NAME

PEXStartOCs - Start Encoded Output Commands

SYNTAX

Status PEXStartOCs(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, int *float_format*, int *oc_count*, int *word_count*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
float_format	The floating point format of the output command data (**PEXIEEE_754_32, PEXDEC_F_Floating, PEXIEEE_754_64, PEXDEC_D_Floating**).
oc_count	The number of output commands to be sent.
word_count	The number of four-byte words of data for the total size of the output commands.

RETURNS

Zero is unsuccessful, non-zero otherwise.

DESCRIPTION

This function locks the display. Only **PEXCopyBytesToOC** or **PEXGetOCAddr** may be called between pairs of **PEXStartOCs** and **PEXFinishOCs.** Do not call anything else that may lock the display as this will result in deadlock.

The first output command is guaranteed to start on a four-byte boundary. Output command data may be copied into the transport buffer by calling **PEXCopyBytesToOC.** Output command data may be written directly by the application by calling **PEXGetOCAddr** to get a pointer to memory in the transport buffer.

PEXFinishOCs must be called after all the data has been specified.

The application is responsible for writing valid protocol and the correct numberof words requested.

If the requested number of words is too large for the display connection (each server has a maximum request size), the function will return unsuccessfully. If this occurs, and the number of output commands was greater than one, the application should try specifying the data for a single output command at a time. If the size of a single output command is too large for the display connection, the function will return unsuccessfully.

ERRORS

BadPEXFloatingPointFormat
The specified floating point format is invalid or unsupported.

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXFinishOCs(3)
PEXCopyBytesToOC(3)
PEXGetOCAddr(3)

NAME

PEXText - 3D Text Primitive

SYNTAX

void PEXText(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord **origin*, PEXVector **vector1*, PEXVector **vector2*, int *length*, char **string*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
vector1	A vector defining the positive x-direction of the text local coordinate system.
vector2	A vector defining the positive y-direction of the text local coordinate system.
length	The number of bytes in the text string.
string	A pointer to the text string.

RETURNS

None

DESCRIPTION

This function creates a text output primitive.

The first character set in the text font will be used.

The text string is located on a plane defined by its position and direction vectors. The *origin* defines the position, in model coordinates, at which to render the text *string.* The two direction vectors define the positive x- and y-directions of the text local coordinate system. If the two vectors are parallel or if one of the vectors has zero length, the vector values <1,0,0> and <0,1,0> are used.

During rendering, the string's position is transformed to a position in device coordinates. The string's color is only affected by depth-cueing and is mapped to a device color. The text *string* is clipped depending on the current text precision attribute. If the text precision is **PEXStringPrecision,** clipping is done in an implementation-dependent fashion. If the text precision is **PEXCharPrecision,** clipping is done on at least a character-by-character basis. If the text precision is **PEXStrokePrecision,** clipping is performed at the clipping boundaries for each character.

Depending on the text ASF values, the text color, text precision, character expansion, character spacing, and text font attributes are obtained either directly from the current text attribute values or from the entry in the text bundle specified by the current text bundle index attribute. The current character height, text path, text alignment attributes and character up vector are also used to render the text *string.* The directions specified by the character up vector and text path are relative to the text local coordinate system.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetCharHeight(3)
PEXSetCharUpVector(3)
PEXSetTextPath(3)
PEXSetTextAlignment(3)
PEXSetTextBundleIndex(3)

NAME

PEXText2D - 2D Text Primitive

SYNTAX

void PEXText2D(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, PEXCoord2D **origin*, int *length*, char **string*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
origin	The origin of the text string.
length	The number of bytes in the text string.
string	A pointer to the text string.

RETURNS

None

DESCRIPTION

This function creates a 2D text output primitive.

This function is like **PEXText**(3)**,** except that the *origin* position consists of only x- and y-components. The z-component is assumed to be zero. This primitive is two-dimensional only in that the z-component is implied. Geometry transformations are still carried out in three dimensions.

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetTextFontIndex(3)
PEXSetTextPrecision(3)
PEXSetCharExpansion(3)
PEXSetCharSpacing(3)
PEXSetTextColorIndex(3)
PEXSetTextColor(3)
PEXSetCharHeight(3)
PEXSetCharUpVector(3)
PEXSetTextPath(3)
PEXSetTextAlignment(3)
PEXSetTextBundleIndex(3)

NAME

PEXTransformPoints - utility function

SYNTAX

int PEXTransformPoints(PEXMatrix *transform*, int *count*, PEXCoord **points*, PEXCoord **points_return*)

PARAMETERS

transform	The transformation matrix to apply to the points.
count	The number of points to transform.
points	A pointer to an array of 3D points to transform.
points_return	A pointer to an array in which to store the transformed points.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadHomoCoord
One or more of the transformed points has a homogeneous coordinate of 0.

DESCRIPTION

This function applies the specified homogeneous transformation matrix to the list of *points*. In applying the transformation, the *points* are first converted to homogeneous points by assigning them a homogeneous coordinate of 1. The transformation is then applied:

P' = TxP

Where P is the point, treated as a column vector, and T is the transformation matrix. The points are then mapped to 3D by dividing their first three coordinates by the computed homogeneous coordinate.

If the function returns unsuccessfully, all points other than those with a homogeneous coordinate of 0 will be transformed and returned.

If the return array is the same as the input array, the function will overwrite the input values with the transformed values.

ERRORS

None

SEE ALSO

PEXTransformPoints2D(3)
PEXTransformPoints4D(3)
PEXTransformPoints2DH(3)

NAME

PEXTransformPoints2D - utility function

SYNTAX

int PEXTransformPoints2D(PEXMatrix3x3 *transform*, int *count*, PEXCoord2D **points*, PEXCoord2D **points_return*)

PARAMETERS

transform	The transformation matrix to apply to the points.
count	The number of points to transform.
points	A pointer to an array of 2D points to transform.
points_return	A pointer to an array in which to store the transformed points.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadHomoCoord
One or more of the transformed points has a homogeneous coordinate of 0.

DESCRIPTION

This function applies the specified homogeneous transformation matrix to the list of *points*. In applying the transformation, the *points* are first converted to homogeneous points by assigning them a homogeneous coordinate of 1. The transformation is then applied:

P' = TxP

Where P is the point, treated as a column vector, and T is the transformation matrix. The *points* are then mapped to 2D by dividing their first three coordinates by the computed homogeneous coordinate.

If the function returns unsuccessfully, all *points* other than those with a homogeneous coordinate of 0 will be transformed and returned.

If the return array is the same as the input array, the function will overwrite the input values with the transformed values.

ERRORS

None

SEE ALSO

PEXTransformPoints(3)
PEXTransformPoints4D(3)
PEXTransformPoints2DH(3)

NAME

PEXTransformPoints2DH - utility function

SYNTAX

void PEXTransformPoints2DH(PEXMatrix3x3 *transform*, int *count*, PEXCoord **points*, PEXCoord **points_return*)

PARAMETERS

transform	The transformation matrix to apply to the points.
count	The number of points to transform.
points	A pointer to an array of 2D homogeneous points to transform.
points_return	A pointer to an array in which to store the transformed points.

RETURNS

None

DESCRIPTION

This function applies the specified homogeneous transformation matrix to the list of 2D homogeneous *points* (P = x, y, w). The transformation is applied:

P' = TxP

Where P is the point, treated as a column vector, and T is the transformation matrix. The function returns P' = (x', y', w').

If the return array is the same as the input array, the function will overwrite the input values with the transformed values.

ERRORS

None

SEE ALSO

PEXTransformPoints(3)
PEXTransformPoints2D(3)
PEXTransformPoints4D(3)

NAME

PEXTransformPoints4D - utility function

SYNTAX

void PEXTransformPoints4D(PEXMatrix *transform*, int *count*, PEXCoord4D **points*, PEXCoord4D **points_return*)

PARAMETERS

transform	The transformation matrix to apply to the points.
count	The number of points to transform.
points	A pointer to an array of 4D points to transform.
points_return	A pointer to an array in which to store the transformed points.

RETURNS

None

DESCRIPTION

This function applies the specified homogeneous transformation matrix to the list of 3D homogeneous *points* (P = x, y, z, w). The transformation is applied:

P' = TxP

Where P is the point, treated as a column vector, and T is the transformation matrix. The function returns P' = (x', y', z', w').

If the return array is the same as the input array, the function will overwrite the input values with the transformed values.

ERRORS

None

SEE ALSO

PEXTransformPoints(3)
PEXTransformPoints2D(3)
PEXTransformPoints2DH(3)

NAME

PEXTransformVectors - utility function

SYNTAX

void PEXTransformVectors(PEXMatrix *transform*, int *count*, PEXVector **vectors*, PEXVector **vectors_return*)

PARAMETERS

transform	The transformation matrix to apply to the vectors.
count	The number of vectors to transform.
vectors	A pointer to the array of 3D vectors to transform.
vectors_return	A pointer to an array in which to store the transformed vectors.

RETURNS

None

DESCRIPTION

This function applies the upper 3x3 submatrix of the specified transformation matrix to the list of 3D *vectors*. The transformation is applied:

V' = T'xV

Where V is the vector, treated as a column vector, and T' is the upper 3x3 sub-matrix of *transform*.

If the return array is the same as the input array, the function will overwrite the input values with the transformed values.

ERRORS

None

SEE ALSO

PEXTransformVectors2D(3)
PEXNormalizeVectors(3)

NAME

PEXTransformVectors2D - utility function

SYNTAX

void PEXTransformVectors2D(PEXMatrix3x3 *transform*, int *count*, PEXVector2D **vectors*, PEXVector2D **vectors_return*)

PARAMETERS

transform	The transformation matrix to apply to the vectors.
count	The number of vectors to transform.
vectors	A pointer to the array of 2D vectors to transform.
vectors_return	A pointer to an array in which to store the transformed vectors.

RETURNS

None

DESCRIPTION

This function applies the upper 2x2 submatrix of the specified transformation matrix to the list of 2D *vectors*. The transformation is applied:

V' = T'xV

Where V is the vector, treated as a column vector, and T' is the upper 2x2 sub-matrix of *transform*.

If the return array is the same as the input array, the function will overwrite the input values with the transformed values.

ERRORS

None

SEE ALSO

PEXTransformVectors(3)
PEXNormalizeVectors2D(3)

NAME PEXTranslate - utility function

SYNTAX void PEXTranslate(PEXVector **trans_vector*, PEXMatrix *matrix_return*)

PARAMETERS

trans_vector	Vector containing the X, Y and Z translation factors.
matrix_return	Matrix into which rotation matrix is stored.

RETURNS None

DESCRIPTION Creates a translation matrix that translates objects by the given translation vector.

ERRORS None

SEE ALSO **PEXTranslate2D**(3)

NAME

PEXTranslate2D - utility function

SYNTAX

void PEXTranslate2D(PEXVector2D **trans_vector*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

trans_vector Vector containing the X, Y and Z translation factors.

matrix_return Matrix into which rotation matrix is stored.

RETURNS

None

DESCRIPTION

Creates a 3X3 translation matrix that translates objects by the given translation vector.

ERRORS

None

SEE ALSO

PEXTranslate(3)

NAME

PEXTriangleStrip - 3D Triangle Strip Primitive

SYNTAX

void PEXTriangleStrip(Display **display*, XID *resource_id*, PEXOCRequestType *req_type*, unsigned int *facet_attributes*, unsigned int *vertex_attributes*, int *color_type*, PEXArrayOfFacetData *facet_data*, unsigned int *count*, PEXArrayOfVertex *vertices*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
resource_id	The resource identifier of the renderer or structure.
req_type	The request type for the output command (**PEXOCRender, PEXOCStore, PEXOCRenderSingle** or **PEXOCStoreSingle**).
facet_attributes	A mask indicating the facet attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
vertex_attributes	A mask indicating the vertex attributes provided (**PEXGANone, PEXGAColor, PEXGANormal**).
color_type	The type of color data provided (**PEXColorTypeIndexed, PEXColorTypeRGB, PEXColorTypeCIE, PEXColorTypeHSV, PEXColorTypeHLS, PEXColorTypeRGB8, PEXColorTypeRGB16**).
facet_data	An array of facet data.
count	The number of vertices.
vertices	An array of vertices defining the triangle strip.

RETURNS

None

DESCRIPTION

This function creates a triangle strip output primitive.

The triangle strip is created from the array of *vertices*. There are two less facets in the strip than the number of *vertices*. The first triangle in the strip is formed from the first three *vertices* in the list, the second triangle is formed by the second through the fourth *vertices* in the list, etc., up to the last triangle, which is formed by the last three *vertices* in the list. There must be an entry in the facet data array for each facet, if facet data is indicated by the facet attributes.

Normals are assumed to be unit length vectors. If not unit length, the result is implementation-dependent.

A triangle strip with fewer than three *vertices* is considered degenerate. It is stored in a structure, but when rendered, the primitive is ignored and has no visual effect.

All other aspects of this primitive are the same as **PEXFillAreaWithData**(3)**.**

DATA STRUCTURES

See **PEXlib.h.**

ERRORS

BadPEXOutputCommand
The output command contains an invalid value.

BadPEXRenderer
The specified renderer resource identifier is invalid.

BadPEXStructure
The specified structure resource identifier is invalid.

SEE ALSO

PEXSetInteriorStyle(3)
PEXSetInteriorStyleIndex(3)
PEXSetSurfaceColorIndex(3)
PEXSetSurfaceColor(3)
PEXSetReflectionAttributes(3)
PEXSetReflectionModel(3)
PEXSetSurfaceInterpMethod(3)
PEXSetBFInteriorStyle(3)
PEXSetBFInteriorStyleIndex(3)
PEXSetBFSurfaceColorIndex(3)
PEXSetBFSurfaceColor(3)
PEXSetBFReflectionAttributes(3)
PEXSetBFReflectionModel(3)
PEXSetBFSurfaceInterpMethod(3)
PEXSetFacetCullingMode(3)
PEXSetFacetDistinguishFlag(3)
PEXSetPatternSize(3)
PEXSetPatternAttributes(3)
PEXSetPatternAttributes2D(3)
PEXSetInteriorBundleIndex(3)
PEXSetSurfaceEdgeFlag(3)
PEXSetSurfaceEdgeType(3)
PEXSetSurfaceEdgeWidth(3)
PEXSetSurfaceEdgeColor(3)
PEXSetSurfaceEdgeColorIndex(3)
PEXSetEdgeBundleIndex(3)

NAME

PEXUnloadFont - Unload PEX Font

SYNTAX

void PEXUnloadFont(Display **display*, PEXFont *font*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
font	The resource identifier of the PEX font.

RETURNS

None

DESCRIPTION

This function deletes the association between the resource identifier and the PEX *font*. The PEX *font* itself will be freed when no other resource references it.

DATA STRUCTURES

typedef XID PEXFont;

ERRORS

BadPEXFont
The specified font resource identifier is invalid.

SEE ALSO

PEXLoadFont(3)

NAME

PEXUnpostAllStructures - Unpost All Structures from Workstation

SYNTAX

void PEXUnpostAllStructures(Display **display*, PEXWorkstation *workstation*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

RETURNS

None

DESCRIPTION

This function removes all structures from the specified workstation's posted structure list.

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

SEE ALSO

PEXUnpostStructure(3)

NAME

PEXUnpostStructure - Unpost Structure from Workstation

SYNTAX

void PEXUnpostStructure(Display **display*, PEXWorkstation *workstation*, PEXStructure *structure*)

PARAMETERS

display	A pointer to a display structure returned by a successful **XOpenDisplay** call.
workstation	The resource identifier of the workstation.
structure	The resource identifier of the structure.

RETURNS

None

DESCRIPTION

This function removes the specified *structure* from the workstation's posted *structure* list. If the *structure* is not found in the list, an error is generated.

DATA STRUCTURES

typedef XID PEXWorkstation;
typedef XID PEXStructure;

ERRORS

BadPEXStructure
The specified structure resource identifier is invalid.

BadPEXWorkstation
The specified workstation resource identifier is invalid.

SEE ALSO

PEXUnpostAllStructures(3)

NAME

PEXUpdatePickMeasure - Update Pick Measure

SYNTAX

void PEXUpdatePickMeasure(Display **display*, PEXPickMeasure *pick_measure*, int *pick_device_type*, PEXPickRecord **pick_record*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

pick_measure The resource identifier of the pick measure.

pick_device_type The pick device type (**PEXPickDeviceDCHitBox** or **PEXPickDeviceNPCHitVolume**).

pick_record A pointer to the pick data record.

RETURNS

None

DESCRIPTION

This function updates the specified pick measure resource. If the update causes a primitive to be picked, the pick measure's pick status will be set to **PEXPick** and the pick path attribute will be set to the path of the picked primitive. If no primitive was picked, the pick status will be set to **PEXNoPick.**

The pick path can be used for echoing when the pick measure is created. However, it is not used as a start path from which to start picking.

The input record is a pointer to data used to update the pick measure and depends on the pick device type specified when the pick measure was created. If the pick device type is **PEXPickDeviceDCHitBox,** the input record should point to a data structure of type **PEXPDDCHitBox.** If the pick device type is **PEXPickDeviceNPCHitVolume,** the input record should point to a data structure of type **PEXPDNPCHitVolume.**

DATA STRUCTURES

```
typedef XID     PEXPickMeasure;

typedef union {
        PEXPDNPCHitVolume       volume;
        PEXPDDCHitBox           box;
        PEXPickDataRecord       data;
} PEXPickRecord;

typedef PEXNPCSubVolume    PEXPDNPCHitVolume;

typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;
```

```
typedef struct {
        float     x;
        float     y;
        float     z;
} PEXCoord;

typedef struct {
        PEXDeviceCoord2D     position;
        float                distance;
} PEXPDDCHitBox;

typedef struct {
        short     x;
        short     y;
} PEXDeviceCoord2D;

typedef struct {
        unsigned short       length;        /* number of bytes in record */
        char                 *record;
} PEXPickDataRecord;
```

ERRORS

BadPEXPath
The specified path is invalid.

BadPEXPickMeasure
The specified pick measure resource identifier is invalid.

SEE ALSO

PEXFreePickMeasure(3)

NAME

PEXUpdateWorkstation - Update Workstation

SYNTAX

void PEXUpdateWorkstation(Display **display*, PEXWorkstation *workstation*)

PARAMETERS

display A pointer to a display structure returned by a successful **XOpenDisplay** call.

workstation The resource identifier of the workstation.

RETURNS

None

DESCRIPTION

This function will perform actions identical to **PEXRedrawAllStructures**(3) on the specified *workstation* if the workstation's visual state is currently set to **PEXDeferred** or **PEXSimulated.**

DATA STRUCTURES

typedef XID PEXWorkstation;

ERRORS

BadPEXWorkstation
The specified workstation resource identifier is invalid.

SEE ALSO

PEXRedrawAllStructures(3)

NAME

PEXViewMappingMatrix - utility function

SYNTAX

int PEXViewMappingMatrix(PEXCoord2D **frame*, PEXNPCSubVolume **viewport*, int *perspective*, PEXCoord **prp*, double *view_plane*, double *back_plane*, double *front_plane*, PEXMatrix *matrix_return*)

PARAMETERS

frame	Array of 2 2D VRC locations which mark a rectangle in the view plane.
viewport	NPC viewport into which the frame gets mapped.
perspective	Flag to indicate whether a perspective view is desired, a value of **True.** Requests that perspective be applied.
prp	Projection reference point.
view_plane	VRC position of view plane w.r.t. the VRP.
back_plane	VRC position of the back plane w.r.t. the VRP.
front_plane	VRC position of the front plane w.r.t. the VRP.
matrix_return	Matrix into which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadLimits
PEXBadViewport
PEXBadPlanes
PEXBadPRP

DESCRIPTION

This function creates a view mapping matrix that transforms a volume specified in view reference coordinates (VRC) to a volume in normalized projection coordinates (NPC). This matrix is used in conjunction with a view orientation matrix as the viewing matrices for a designated view.

The axes of VRC form a right-handed coordinate system. The z axis is along the VPN (view plane normal, see The Y axis is fixed by VUP, and the X axis is determined so that the three axes form a right-handed coordinate system.

The front plane, back plane, and view plane all define planes in VRC parallel to the VRC x-y plane. The location of *front_plane* and *back_plane* along the z axis of VRC defines the front and back of the volume of VRC that will be mapped to the specified NPC viewport. The view plane locates the view frame or "window" on the VRC z axis. The two points in frame determine the size of the view window by specifying lower left (frame[0]) and upper right (frame[1]) x and y VRC points of the window on the view plane. These values taken together establish the volume of VRC space that is mapped into the NPC viewport.

The type of projection may be parallel or perspective. The projection reference point (PRP) orients the projectors defining the surfaces of the view volume. If perspective indicator is **False,** then the projection type is parallel and the projectors are all parallel to the vector joining the projection reference point and the center of the view window (located on the view plane). If perspective is **True,** then the projectors all converge at the

projection reference point. Thus, the view volume is a parallelpiped for parallel views, and a truncated pyramid for perspective views.

When specifying NPC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

DATA STRUCTURES

```
typedef struct {
        PEXCoord        min;
        PEXCoord        max;
} PEXNPCSubVolume;
```

See **PEXlib.h.**

ERRORS

None

SEE ALSO

PEXViewMappingMatrix2D(3)
PEXViewOrientationMatrix(3)
PEXViewOrientationMatrix2D(3)

NAME

PEXViewMappingMatrix2D - utility function

SYNTAX

int PEXViewMappingMatrix2D(PEXCoord2D **frame*, PEXCoord2D **viewport*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

frame	Array of 2 2D VRC locations which mark a rectangle to be mapped into the NPC subvolume.
viewport	Array of 2 2D NPC coordinates with z = 0 specifying lower left and upper right of the *viewport*.
matrix_return	Matrix in which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadLimits
PEXBadViewport

DESCRIPTION

This function is a 2D shorthand version of **PEXViewMappingMatrix**(3) with the following parameters assumed:

front plane distance = 1
back plane distance = 0
view plane distance = 0
viewport z range = [0,1]
projection type = parallel
x-y coordinates of projection reference point = center of view window,
z coordinate = 1.0.

When specifying NPC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS

None

SEE ALSO

PEXViewMappingMatrix(3)
PEXViewOrientationMatrix(3)
PEXViewOrientationMatrix2D(3)

NAME

PEXViewOrientationMatrix - utility function

SYNTAX

int PEXViewOrientationMatrix(PEXCoord **vrp*, PEXVector **vpn*, PEXVector **vup*, PEXMatrix *matrix_return*)

PARAMETERS

vrp	View reference point.
vpn	View plane normal.
vup	View up vector.
matrix_return	Matrix into which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadVector
Either *vpn* or *vup* is zero length.

PEXBadVectors
vup is parallel to *vpn*.

DESCRIPTION

This function creates a view orientation matrix that transforms world coordinates (WC) to view reference coordinates (VRC). This matrix is used in conjunction with a view mapping matrix as the viewing matrices for a designated view.

The view reference point (VRP) defines the point in world coordinate space that is to be used as the origin of the view reference coordinate system.

The view plane normal (VPN) is a 3D vector defined in world coordinates relative to the view reference point. This gives the direction of the positive Z axis of VRC.

The view up vector (VUP) is a 3D vector defined in world coordinates relative to the view reference point. The projection of this vector onto the plane through the view reference point and perpendicular to the view plane normal defines the Y axis of VRC.

The X axis of VRC is defined such that the VRC system forms a right-handed coordinate system.

ERRORS

None

SEE ALSO

PEXViewOrientationMatrix2D(3)
PEXViewMappingMatrix(3)
PEXViewMappingMatrix2D(3)

NAME

PEXViewOrientationMatrix2D - utility function

SYNTAX

int PEXViewOrientationMatrix2D(PEXCoord2D **vrp*, PEXVector2D **vup*, PEXMatrix3x3 *matrix_return*)

PARAMETERS

vrp	View reference point.
vup	View up vector.
matrix_return	Matrix into which result is stored.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadVector
vup is zero length.

DESCRIPTION

This function creates a view orientation matrix that transforms world coordinates (WC) to view reference coordinates (VRC). This matrix is used in conjunction with a view mapping matrix as the viewing matrices for a designated view.

The view reference point (VRP) defines the point in world coordinate space that is to be used as the origin of the view reference coordinate system. The point is in the WC z=0 plane.

The view plane normal (VPN) is in the direction of the positive Z axis of WC.

The view up vector (VUP) is a 2D vector in the WC z=0 plane. It determines the positive Y axis of VRC. It's defined in world coordinates relative to the view reference point.

The X axis of VRC is defined such that the VRC system forms a right-handed coordinate system.

ERRORS

None

SEE ALSO

PEXViewOrientationMatrix(3)
PEXViewMappingMatrix(3)
PEXViewMappingMatrix2D(3)

NAME

PEXXCToNPCTransform - utility function

SYNTAX

int PEXXCToNPCTransform(PEXNPCSubVolume **npc_sub_volume*, PEXDeviceCoord **viewport*, unsigned int *window_height*, PEXMatrix *transform_return*)

PARAMETERS

npc_sub_volume A pointer to an NPC subvolume, typically that of a renderer resource.

viewport An array of two device coordinate points defining a viewport, typically that of a renderer resource. The first point in the array is the lower-left corner of the viewport; the second point is the upper-right.

window_height The height of the drawable.

transform_return The returned transformation.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadViewport
(xmin >= xmax, or ymin >= ymax, or zmin > zmax)

PEXBadSubVolume
(xmin >= xmax, or ymin >= ymax, or zmin > zmax)

DESCRIPTION

This function computes a transformation matrix to map a drawable point (XC) to NPC coordinates, using the specified NPC subvolume, DC viewport, and drawable height. The returned transformation matrix first transforms the x and y coordinates of points to device coordinates (DC), leaving the z coordinate unmodified. It then applies the viewport-to-subvolume transformation to all coordinates of the resulting points, producing 3D NPC points.

When specifying NPC and DC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS

None

SEE ALSO

PEXXCToNPCTransform2D(3)

NAME

PEXXCToNPCTransform2D - utility function

SYNTAX

int PEXXCToNPCTransform2D(PEXNPCSubVolume **npc_sub_volume*, PEXDeviceCoord2D **viewport*, unsigned int *window_height*, PEXMatrix3x3 *transform_return*)

PARAMETERS

npc_sub_volume A pointer to an NPC subvolume, typically that of a renderer resource.

viewport An array of two device coordinate points defining a viewport, typically that of a renderer resource. The first point in the array is the lower-left corner of the viewport; the second point is the upper-right.

window_height The height of the drawable.

transform_return The returned transformation.

RETURNS

Zero if successful; otherwise, one of the following:

PEXBadViewport
(xmin >= xmax, or ymin >= ymax, or zmin > zmax)

PEXBadSubVolume
(xmin >= xmax, or ymin >= ymax, or zmin > zmax)

DESCRIPTION

This function computes the 2D transformation matrix to map a drawable point (XC) to NPC coordinates, using the specified NPC subvolume, DC viewport, and drawable height. The returned transformation matrix first transforms the x and y coordinates of drawable points to device coordinates (DC), then applies the 2D components of the viewport-to-subvolume transformation, producing 2D NPC points.

When specifying NPC and DC, the X, Y and Z limits must be as follows:

xmin < xmax , ymin < ymax , zmin <= zmax

ERRORS

None

SEE ALSO

PEXXCToNPCTransform(3)

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