A Glossary of XGL Terms

Accumulation Buffer

A buffer containing an array of pixels where the contents of the accumulation process is stored. The accumulation process takes a series of images and combines them. The most common reason for doing multiple rendering and accumulation is to reduce the aliasing effect. An accumulation buffer can also be used to render motion blur, depth of field, or soft shadows.

ASAP

As Soon As Possible. One of two deferral modes that control whether or not the data sent to the device is buffered. If the mode is ASAP, then data will be sent to the device immediately.

ASTI

At **S**ome **TI**me. One of two deferral modes that control whether or not the data sent to the device is buffered. If the mode is ASTI, then data will be sent to the device when the buffer is full; the application does not know when this will happen. It must use `xgl_context_post` to explicitly empty the buffer. The size of the buffer is device-dependent.

Ambient Light

A light source, containing only color, that adds non-directional lighting to a scene. Ambient light adds a uniform illumination to all surfaces, regardless of their orientations.

Attribute

State information associated with an XGL object.

Backing Store

A *backing store* maintains the window contents when a window is unmapped or covered by other windows so that the window is automatically refreshed with the current contents when it becomes visible again.

B-Spline Curve

The type of curve used by XGL for its curve rendering. B-spline curves can represent simple geometric shapes and complex free-form curves.

Class

An abstract data type that defines a virtual graphics resource within XGL. Each class is composed of a set of *operators* (functions) and *attributes* (state information) that specifies its functionality. Applications create instances of classes, where an instance of a class is called an *object*.

CMAP

An acronym for Color Map object.

Color Map Object

Object used to add color to an XGL application and to allow color value conversions from one color type to another.

Color Model

A method of representing the color space of a graphics system. In XGL, colors can be described in one of three color models: RGB, grayscale, or indexed color.

Color Table

An array of RGB color values used to map color indices (indexed color values) to RGB colors.

Concatenation

A method of joining two Transform objects together to produce a single resultant Transform object. Transforms can either be *preconcatenated* or *postconcatenate*d, depending on the order in which they are appended or prepended to the original transform.

Context Object

An XGL object that is an abstraction of a renderer. It contains graphics rendering state information, graphics primitives, and non-primitive operators used for several utility operations (such as copying pixels or clearing a Device).

Context Operator

One or more functions that affect the state of a Context object.

DC

The *Device Coordinate* System. See *Device Coordinates*.

Depth Cueing

An effect that modulates colors of primitives according to depth, enabling the viewer to distinguish whether a primitive is close or far away.

Device Coordinates

A device-dependent coordinate system in which position is usually specified by *x*,*y* pixel location and, for 3D applications, *z* is specified as a depth in a Z-buffer. The point (0,0,0) is the upper left corner, where the axes are oriented right for positive *x*, down for positive *y*, and away for positive *z*.

Device Object

An object that is an abstraction of a graphics display device. The Device object has two subclasses: *Raster*, which represents a two-dimensional rectangular array of discrete image samples (pixels), and *Non-Raster*, which represents any picture representation, such as CGM, that doesn't rely on discrete pixels to display the image.

DGA

Direct Graphics Access. DGA arbitrates access to the display between XGL and the X11 server. This allows XGL to talk directly to the frame buffer, which results in maximum performance.

Directional Light

A light source that is assumed to be at a nearly infinite distance from the scene so that it emits parallel light rays from a specified direction (similar to light from the sun).

Dithering

Dithering mixes two or more colored pixels to approximate a given color on the screen. This means placing pixels of different colors next to each other so that from a distance, the colors blend together to make a different color. In color dithering, the dither cell is filled with one or more colors defined in the current Color Map. When viewed together, the colors approximate the desired color.

Gcache Object

An object that is used to store an XGL primitive. A GCache can also reduce the complexity of application geometry by allowing the XGL library to process the geometry into simpler forms.

GKS

A specification for a standard 2D graphics library.

Graphics Primitive

A basic graphic element used to draw something on the device (for example, polyline, polygon, text, marker, and so on).

Handle

An opaque pointer to an XGL object provided to the application when an object is created. The application uses it to modify, inquire, or interact with the object.

HLHSR

Hidden **L**ine **H**idden **S**urface **R**emoval. A 3D Context has a rendering pipeline that consists of a lighting and shading stage, a depth cueing stage, and an HLHSR stage. (The HLHSR state may not be the last stage in the pipeline.) The HLHSR stage causes objects that are in front of objects in the 3D scene to obscure objects behind them.

Immediate Mode

A rendering mode in which all drawing functions are sent to the device immediately or sent to a device buffer immediately. There is *no* intermediate storage of drawing commands as there is in a display list.

Indexed Color

Color model in which colors are specified as indices into an array of color values. The array, usually called a color table, can contain color values from any color space (for example, RGB).

Infinite Light

A light source that is infinitely far from the surface that is being illuminated. Infinite light sources produce parallel light rays that are characterized by a direction only.

Instantiation

Allocation of resources that occurs when a variable of an object type (*Xgl_object*) is declared.

Intensity

The brightness of a color value.

Light Object

Object that defines a particular light source that can be used within a 3D Context. Four different types of lights are available: ambient, directional, positional, and spot.

Line Pattern Object

An object that defines line style patterns, used when rendering vectors, curves, and edges.

Marker Object

An object that defines markers.

Marker Primitive

An image that is drawn at a particular point in space.

MC

The *Modeling Coordinate* System. See Modeling Coordinates.

Memory Raster

A Raster object that designates a rectangular area of non-screen memory.

Model Transform

The composite of the Local Model Transform with the Global Model Transform. It is used in mapping geometric *primitives* defined in *Modeling Coordinate (MC)* space to *World Coordinate (WC)* space.

Modeling Coordinates

The coordinate space where a geometric model is defined. Each Modeling Coordinate System is transformed into the application's common World Coordinate space by the Model Transform.

NOP

A shorthand expression, meaning "NO-OP," or non-operator. Depending on a certain state of a machine or software, previously specified instructions are disabled.

NURBS

Non-Uniform Rational B-Spline curve.

Object

An instance of an XGL class that is created by calling an XGL creation operator specific to a particular class. An object is an abstraction of a graphics resource. The object contains various operators and attributes that can be used to manipulate XGL's graphics resources and graphics state.

Operator

Function that controls the behavior of an object.

PHIGS

The Programmer's Hierarchical Interactive Graphics Standard, a specification for a standard 3D graphics library.

PHIGS PLUS

A proposed extension to the PHIGS standard, which includes lighting and shading functionality.

Pick Aperture

The area (2D) or volume (3D) used to test primitives for picking.

Pick ID

The value used to identify a primitive that has been picked.

Picking

The selection of a particular graphics primitive by checking whether it falls within a predefined pick aperture.

Pipeline

A kind of graphics mapping. For example, in XGL, the series of mappings from one coordinate space to another is known as the *transformation pipeline*.

Positional Light

A single light source, specified by a color and a location, which radiates light rays uniformly in all directions (like a bare incandescent light bulb).

Primitive

See *Graphics Primitive.*

Raster

A two-dimensional rectangular area on which images are drawn, used as the output device for all XGL operations.

Rendering

The process of converting geometric data and its attributes into an image on the display.

Rendering Attribute

A description property belonging to graphics primitives (for example, color, width, pattern definition, and so on).

RGB

Color model in which colors are specified as intensities (between 0.0 and 1.0) of the three CRT monitor primary colors, red, green, and blue.

ROP

A raster operation. A Raster OPeration is a function of three variables: a source pixel, a destination pixel, and a per-plane pixel mask. Graphics primitives are rendered using the ROP to combine source and destination.

Rotation

The pivoting of a graphics image about a coordinate axis that is accomplished with a Transform object.

Scaling

The reduction or enlargement of a graphics image that is accomplished with a Transform object.

Spot Light

A light source specified by color, location, and direction, which radiates light rays from a single point with a maximum intensity along the specified direction.

Stroke Font Object

An object that defines the stroke font used by the Context object.

System State Object

An object that maintains state information about all operations occurring during a single XGL session.

Text Local Coordinates

Stroke text is defined in the Text Local Coordinate (TLC) system. A unit vector in TLC is the same length as a unit vector in Model Coordinates. The parameters of the stroke text operators define the orientation of TLC with respect to Modeling Coordinates.

TLC

See *Text Local Coordinates*.

Transform Object

An XGL object that specifies geometric transformations on output primitives The default for all transforms is the identity transform, which uses the identity matrix.

Transformation Matrix

A matrix that specifies a linear mapping of one coordinate space to another coordinate space.

Transformation Pipeline

The series of transformations used in mapping geometric data and their attributes from Model Coordinate (MC) space to Device Coordinate (DC) space.

Translation

Movement of a graphics image relative to the origin of the coordinate system. Accomplished with a Transform object.

VDC

The *Virtual Device Coordinate* system. See *Virtual Device Coordinates.*

VDC Transform

The final transform in the transformation pipeline that provides the mapping between Virtual Device Coordinates (VDC) and Device Coordinates (DC).

VDC Transformation Matrix

The transformation matrix used to map the clip-space window onto a rectangular region of the Raster known as the *Raster viewport.*

View Model

A model that specifies the geometric aspects of image formation, determining the orientation of images and the spatial relationships between objects.

View Transform

The transform used in mapping graphic objects defined in World Coordinate (WC) space to Normalized Device Coordinate (NDC) space where viewing operations take place.

View Transformation Matrix

The transformation matrix used in mapping graphic objects from WC to NDC. The view transformation matrix can be specified directly or derived from the matrix product of the view orientation matrix and the view mapping matrix.

Virtual Device Coordinates

A device-independent coordinate system used to isolate the specification of view boundaries from device coordinates.

WC

The *World Coordinate System*. See *World Coordinates*.

Window Raster

A *Raster object* that designates a rectangular area on the screen of the display device.

World Coordinates

The application's common coordinate system. If a Model Transform exists, then it transforms the Model Coordinate data to World Coordinates. If one does not exist, the application's data will be initially defined in World Coordinate space. Individual objects in the image to be rendered are represented in World Coordinates in proper perspective (3D only) with respect to each other.