Glossary

This chapter provides a glossary of technical terms used in the DirectX Programmer's Reference documentation. Entries are grouped by letter in alphabetical order.

A

alpha channel

The opacity of an image defined by an alpha value per pixel interleaved with the color components (for example, ARGB), an alpha value per pixel stored in a separate alpha surface, or a constant alpha value for the entire surface.

alpha color component

The portion of a 32-bit color that determines its opacity. In this case, the alpha value per pixel is interleaved with the color components (for example, ARGB). Less commonly, this term can also refer to an image with an alpha value per pixel stored in a separate alpha surface.

alpha constant

A level of opacity (alpha value) applied to an entire surface.

alpha edge blend

A particular use of alpha blending (and alpha channel information) to reduce aliasing by blending edges based on pixel coverage information.

ambient

A light source that illuminates everything in a scene, regardless of the orientation, position, and surface characteristics of the objects in the scene. Because this illuminates a scene with equal strength everywhere, the position and orientation of the frame it is attached to are inconsequential. Multiple ambient light sources are combined within a scene.

anisotropic filtering

A mipmap filtering mode that compensates for anisotropy, which is the distortion visible in the texels of a 3D object whose surface is oriented at an angle with respect to the plane of the screen. The anisotropy is measured as the elongation (length divided by width) of a screen pixel that is inverse-mapped into texture space.

array object

A group of objects organized into an array. Array objects make it simpler to apply operations to the entire group. The COM interfaces that allow you to work with array objects contain the **GetElement** and **GetSize** methods. These methods retrieve a pointer to an element in the array and the size of the array, respectively.

attach

To connect multiple DirectDrawSurface objects into complex structures, like those needed to support 3-D page flipping with z-buffers. Attachment is not bidirectional, and a surface cannot be attached to itself. Emulated surfaces (in

system memory) cannot be attached to nonemulated surfaces. Unless one surface is a texture map, the two attached surfaces must be the same size.

attached
Physically connected to the system. A device may be installed but not currently attached.

attack
The period at the beginning of a force feedback effect when the magnitude is reaching its basic or sustain level.

audio stream
Sound data, mixed or unmixed. DirectSound mixes audio streams from each secondary sound buffer that is playing and writes the result to the primary sound buffer, which supplies the sound hardware with audio data.

B

back buffer
A nonvisible surface that bitmaps and other images can be drawn to while the primary surface displays the currently visible image.

back clipping plane
The far boundary of a viewing frustum beyond which objects are not rendered. *See also* front clipping plane.

blend factor
The description of how each color component is blended in texture blending.

blend mode
The algorithm used to determine how a texture is blended with the colors of the surface to which the texture is applied.

blit
A bit block transfer.

bounds checking
The process of checking that an on-screen image is displayed within the bounds of the screen.

C

camera
A Direct3DRMFrame object used by the viewport to define the viewing position and direction. The viewport renders only what is visible along the positive z-axis of the camera frame, with the up direction being in the direction of the positive y-axis.

clip list
A series of rectangles that describes the visible areas of the surface. The clip list cannot be set if a window handle is already associated with the DirectDrawClipper object.

clipper

A DirectDrawClipper object.

codec

Represents the phrase "compressor and decompressor."

collision detection

The process of determining if any pixels for two images share the same location on-screen. (See also, hit detection).

color key

A value indicating the color to be used for transparent or translucent effects. When using a hardware blitter, for example, all of the pixels of a rectangular area will be blitted except for the value that was set as the color key, thereby creating nonrectangular sprites on a surface.

color space

Any of several different methods of encoding and visualizing color. The two most common types of color space are RGB and YUV.

color-space conversion

A technique for converting a color in one color space to another color space. Typically, this conversion is from YUV colors from a video source to RGB for display.

color table

An array of n color values (normally RGB triples).

complex surface

The collective term for several DirectDrawSurface objects, all of which are attached to a root surface. The complex-surface structure can be destroyed only by destroying the root.

current play position

The location in a DirectSound buffer where a sound is being played.

current write position

The location in a DirectSound buffer where it is safe to change data in that buffer.

D

dark light

A light source that removes illumination from a scene, created by specifying negative values for the colors of the light.

dead zone

An area within the range of an axis where the axis is considered to be at the center.

decal

A texture that is rendered directly, as a visual. Decals are rendered into a viewport-aligned rectangle.

destination color key

The color that, in the case of blitting, will be replaced or, in the case of overlays, be covered up on the destination surface.

directional

A light source that is attached to a frame but appears to illuminate all objects with equal intensity, as if it were at an infinite distance from the objects. Directional light has orientation but no position, and it is commonly used to simulate distant light sources, such as the sun.

E

emissive property

The material property that determines whether a material emits light. The emissive property of a material is one of two properties that determines how the material reflects light. *See also* specular property.

emissive setting

See emissive property.

enable frame

The frame to which a light applies.

envelope

A set of values that defines the shape of a force feedback effect by modifying the magnitude at the beginning (attack) and end (fade).

even field

The second field comprising a video frame in an odd/even field set. Also known as field 2.

execute buffer

A fully self-contained, independent packet of information that describes a 3-D scene. An execute buffer contains a vertex list followed by an instruction stream. The instruction stream consists of operation codes, or opcodes, and the data that is operated on by those opcodes.

F

face

A single polygon in a mesh.

fade

The period between the central, or sustain, portion of a force feedback effect and its end.

field

Data for one-half of a single video frame within a video stream. Each field contains data for every other scan line. Fields are sent and received in odd field, even field order.

field polarity

Quality determining whether a field is an even field or an odd field. Odd fields are defined when the trailing edge of VREF does not occur during a scan line. Even fields are defined as when the trailing edge of VREF occurs during a scan line.

flip

The process of swapping the addresses associated with the back and front buffers. This effectively swaps the image in the back buffer to the front buffer, thereby displaying the image.

flipping chain

A series of surfaces, attached to each other, that can be flipped. *See also* flip.

flipping surface

Any piece of memory that can be flipped. *See also* flip.

frame

An invisible box that provides a frame of reference for objects in a scene. Objects can be placed in a scene by specifying their spatial relationship to a relevant reference frame. Visual objects take their positions and orientations from frames. Also, a single image from a movie or animation.

front buffer

The first buffer in a flipping chain. In many cases, this will be the visible primary surface. In other cases, such as a flipping chain of textures, the front buffer is the surface the 3-D engine will get the texture from, but it is not the primary surface and is not displayed. In the case of flipping overlay surfaces, the front buffer is displayed, but is only a surface overlaid on the primary surface. *See also* primary surface.

front clipping plane

The near boundary of a viewing frustum. Any object closer to the camera than the front clipping plane is not rendered. The height of the front clipping plane defines the field of view. *See also* back clipping plane.

G

genlocking

The process of synchronizing one video signal with another. Because they are synchronized, the genlocked signal can be mixed with the original signal, allowing dissolves, wipes, and other transition effects.

group

A number of players arranged together as a set in a DirectPlay session.

H

HAL

The hardware-abstraction layer. Consists of hardware and device driver mechanisms that insulate applications from device-specific implementation

details. If a capability requested by an application is not implemented by the current hardware, the capability will be emulated by the software.

hardware blitter

A hardware component, built into the display adapter, that performs efficient blit operations.

HEL

The hardware-emulation layer. Provides software-based emulation of features that are not present in hardware.

hit detection

See collision detection.

host

In DirectPlay, a virtual player whose ID is DPID_SYSMSG. System messages and messages sent to all players in a session are managed by the host.

HREF

Acronym for horizontal refresh. In a video stream, the HREF is active to signal that the display is to begin a new scan line. See also, VREF.

I

index palette

A DirectDrawPalette object whose entries are indices into another palette object.

L

latency

A delay in response; for example, the interval between the time that a sound buffer plays and the time that the speakers actually reproduce the sound. .

lobby client

Lobby management routines associated with the user's computer, including launching applications, updating the user interface, and communicating with the lobby server.

lobby server

Lobby management routines associated with a remote server. The lobby server coordinates all the information about the users connected to a specific application.

M

material

A property that determines how a surface reflects light. A material has two components: an emissive property (whether it emits light) and a specular property, whose brightness is determined by a power setting.

mesh
A set of faces, each of which is described by a simple polygon.

mipmap
A sequence of textures, each of which is a progressively lower-resolution, prefiltered representation of the same image. A higher-resolution image is used when a visible object is close to the viewer; as the object moves farther away (and gets smaller), lower-resolution images are used.

mixing
In DirectSound, the process of combining sound buffers that are playing and writing the result to the primary sound buffer, which supplies the sound hardware with audio data. There are no limitations to the number of buffers that can be mixed, except the practicalities of available processing time.

Mode X
A hybrid display mode derived from the standard VGA Mode 13. This mode allows the use of up to 256KB of display memory (rather than 64KB allowed by Mode 13) by using the VGA display adapter's EGA multiple video plane system.

model coordinates
Coordinates that are relative to a child frame. *See also* world coordinates.

N

normal vector
An imaginary ray extending perpendicularly from a surface that defines the face's orientation.

O

odd field
The first field comprising a video frame in an odd/even field set.

off-screen surface
A conceptually rectangular area in memory that is generally used to store bitmaps that will be blitted to a back buffer before being displayed. Commonly used to store sprites.

opcode
Operation code that defines how the vertices in an execute buffer should be interpreted or how the state of the system should be changed.

overdraw
The average number of times to which a screen pixel is written.

overlay surface
A conceptually rectangular area in memory whose stored image information will cover the image information of the primary surface to which it is applied. Overlays are assumed to be on top of all other screen components.

overlay z-order

Determines the order in which overlays clip each other, enabling a hardware sprite system to be implemented under DirectDraw.

P

page flipping
See flip.

palette
The set of colors used by an object or application. In DirectX, a DirectDrawPalette object.

palette index
An integer index into the palette table array that is used to select a particular color.

pan value
The relative volume, measured in hundredths of decibels, between the left and right audio channels.

parallel point
A light source that illuminates objects with parallel light, but the orientation of the light is taken from the position of the parallel point light source. For example, two meshes on either side of a parallel point light source are lit on the side that faces the position of the source.

penumbra
The outer, dimly lit section of a spotlight's cone of light. The penumbra surrounds the umbra and merges with the surrounding deep shadow. *See also* umbra, *and* spotlight.

perspective correction
The technique of applying a texture map to a polygon that is angled away from the camera, interpolating so that the texture is stretched onto the polygon appropriately for the apparent depth of the polygon. Direct3D supplies perspective correction automatically.

pick
To search for visuals in a scene given a 2-D coordinate in a viewport.

pitch
The distance, in bytes, between an address that represents the beginning of a bitmap line and the beginning of the next line. Do not confuse memory pitch and memory width, since not all display memory is laid out as one linear block. For example, with rectangular memory, the pitch of the display memory could include the width of the bitmap plus part of a cache. *See also* width, stride.

player
A single participant in a DirectPlay session. Each player is associated with a player ID that enables messages to be exchanged among players.

player ID
A unique number that is assigned to each participant in a DirectPlay session when the participant is created. The application can exchange messages among

players by using player IDs. The host is always assigned the DPID_SYSMSG player ID.

point

A light source that radiates equally in all directions from its origin.

power

In the specular property of a material, the value that determines the sharpness of specular highlights. A value of 5 gives a metallic appearance, and higher values give a more plastic appearance.

primary sound buffer

The buffer the user hears when a game is playing. The primary buffer is generally used to mix sound from secondary buffers, but it can be accessed directly for custom mixing or other specialized activities.

primary surface

The area in memory containing the image being displayed on the monitor. In DirectX, the primary surface is represented by the primary DirectDrawSurface object.

Q

quaternion

A fourth element added to the [x, y, z] values that define a vector. Quaternions define a 3-D axis and a rotation around that axis.

R

reference count

A control for a component object model (COM) object. When an object is created, its reference count is set to 1. Every time an interface is bound to the object, its reference count is incremented; when the interface connection is destroyed, the reference count is decremented. The object is destroyed when the reference count reaches 0. All interfaces to that object are then invalid.

root frame

A frame in Direct3D that has no parent frame; a frame at the top of a hierarchy of frames. The root frame contains the entire set of objects that make up a scene. *See also* scene.

S

saturation

Adjustment to the extreme value of a range when the actual value approaches the extreme. If the maximum value in a range is 1,000 and the maximum saturation point is set to 900, then any value greater than 899 is adjusted to 1,000.

scene

The entire set of objects that make up a virtual environment, including visible objects, sounds, lights, and frames. In Direct3D, the entire set of objects is contained by a root frame.

secondary sound buffer

A section of audio memory that stores individual sounds that are played throughout an application. The sound can be played as a single event or as a looping sound that plays repeatedly. Secondary buffers can also play sounds that are larger than available sound-buffer memory; the buffer serves as a queue that stores the portions of the sound about to be played.

service provider

A dynamic-link library used by DirectPlay to communicate over a network. The service provider contains all the network-specific code required to send and receive messages. Online services and network operators can supply service providers to use specialized hardware, protocols, communications media, and network resources.

session

In DirectPlay, an instance of several applications on remote machines communicating with each other.

sound buffer

A segment of memory that stores DirectSound audio data. Sound buffers can be primary or secondary, static or streaming.

source color key

A color that, in the case of blitting, will not be copied, or, in the case of overlays, not be visible on the destination.

specular property

The material property that determines how a point of light on a shiny object corresponds to the reflected light source. The specular property of a material is one of two properties that determines how a material reflects light. *See also* emissive property.

spotlight

A light source that emits a cone of light. Only objects within the cone are illuminated. The cone produces light of two degrees of intensity, with a central brightly lit section (the umbra) that acts as a point source, and a surrounding dimly lit section (the penumbra) that merges with the surrounding deep shadow.

static sound buffer

A section of memory that contains a complete sound. These buffers are convenient because the entire sound can be written once to the buffer.

sticky focus

In DirectSound, the capability to play sound buffers when the owning application does not have the input focus. For example, a DirectSound application could continue to play a sound buffer while the user was working in another application.

streaming sound buffer

A small sound buffer that can play lengthy sounds because the application dynamically loads audio data into the buffer as it plays. For example, an

application could use a buffer that can hold 3 seconds of audio data to play a 2-minute sound. A streaming buffer requires much less memory than a static buffer.

stretching

Blitting an image into a destination with different dimensions. This operation is supported directly by some hardware.

stride

Synonymous with pitch. *See also* width.

surface

Memory that represents visual images. This is often display memory, but it can be system memory. *See also* complex surface, off-screen surface, overlay surface, *and* primary surface.

sustain

The period when the basic magnitude of a force feedback effect is attained, after the attack and before the fade.

T

tearing

A visual artifact produced when the screen refresh rate is out of sync with an application's frame rate. The top portion of one frame is displayed at the same time as the bottom portion of another frame, with a discernible tear between the two partial images.

texel

A single element in a texture. When a texture has been applied to an object, the texels rarely correspond to pixels on the screen. Applications can use texture filtering to control how texels are interpolated to pixels.

texture

A rectangular array of pixels that is applied to a visual object in Direct3D.

texture blending

The technique of combining the colors of a texture with the colors of the surface to which the texture is applied.

texture coordinates

The coordinates that determine which texel in each texture is assigned to each vertex in an object.

texture mapping

The application of a texture to an object. Because a texture is a flat image and the object is often not, the texture must be mapped to the surface of the object, using texture coordinates and wrapping flags. *See also* texture coordinates *and* wrap.

U

umbra

The central brightly lit section of a spotlight's cone of light. The umbra can act as a point source. *See also* penumbra, *and* spotlight.

V

VBI
Abbreviation for Vertical Blanking Interval.

vertex
A point in 3-D space.

video frame
A single image in a video stream, comprised of one odd field and one even field. *See also,* field.

viewing frustum
A 3-D volume in a scene positioned relative to the viewport's camera. Objects within the frustum are visible. For perspective viewing, the viewing frustum is the volume of an imaginary pyramid that is between the front clipping plane and the back clipping plane. For orthographic viewing, the viewing frustum is cuboid.

viewport
A rectangle that defines how a 3-D scene is rendered into a 2-D window. A viewport also defines an area on a device into which objects will be rendered.

VREF
Acronym for vertical refresh. In a video stream, the VREF is active to signal that the display is to begin a new screen. *See also,* HREF.

W

width
The distance between two addresses in memory that represent the beginning of a line and the end of the line of a stored bitmap. This distance represents only the width of the bitmap in memory; it does not include any extra memory required to reach the beginning of the next line of the bitmap, such as a cache in rectangular memory.

world coordinates
Coordinates that are relative to the root frame. *See also* model coordinates.

wrap
The procedure used to calculate texture coordinates for a face or mesh. The basic wrapping types are flat, cylindrical, spherical, and chrome.

Z

z-buffer

A buffer that stores a depth value for each pixel in a scene. Pixels with a small z-value overwrite pixels with a large z-value.