B

Glossary

Introduction

This Glossary provides an alphabetical
listing of the special terms used in
describing 3D modeling and animating.

A

Alignment, relative   Setting two or more objects to some meaningful spatial relationship, such as centering them or distributing them evenly along a line.

Alignment, text   Text alignment affects text objects of more than one line. The lines of text may be aligned to their left edge, their center, or to their right edge.

Alpha Channel   The top byte of a 32-bit pixel that is used for data other than color. The channel may hold mask or transparency data.

Ambient Light   That light responsible for the overall, diffuse lighting of a 3D scene. Similar to daylight in the real world.

Anti-aliasing   Intermediate colors (or shades of gray) in the pixels between contrasting colored regions. Anti-aliasing improves the appearance of objects in renderings by removing jagged, "stair-step" edges.

Aspect Ratio   The ratio of the width of an image to its height (x:y). For example, the aspect ratio of an image 640 x 480 pixels is 4:3.

Atmospheric Effects   Atmospheric conditions or phenomena that affect the clarity or mood of a scene. Fog and smoke are good examples of atmospheric effects.

Attitude   See *Orientation*.

Axis   A hypothetical linear path. The X, Y, and Z axes (width, height, and depth, respectively) define the directions of the 3D universe. The axis along which an object is rotated is the axis of rotation. An object's axes are parallel to its bounding box.

B

Backdrop   A picture that is automatically composited behind a 3D scene. The matte paintings used in traditional movie making are a good example of backdrops.

Background, reflected   Reflected backgrounds are 2D images that show up on reflective surfaces (metal, glass, etc.). Reflected backgrounds increase the realism of such surfaces. Reflected backgrounds are also knows as environment maps.

Bézier Curve   A path defined by the position of four control points (at the ends of the tangents of the vertices). The length and angle of the tangents describe the deviation from a linear path that the curve follows between vertices.

Bit Depth   The number of bits used to define the shade or color of each pixel in an image. A 1-bit image is black and white. An 8-bit grayscale image provides 256 shades of gray (2 to the 8th power is 256). An 8-bit color image provides 256 colors. A 24-bit image provides over 16 million colors: 8 bits are used for red, 8 are for blue, and 8 for green.

Bitmap   A pixel-based image.

Boolean   An object created by combining two objects using mathematical operators (Booleans). The two objects may be subtracted one from another, merged or intersected to form the Boolean object.

Bounding Box   A hypothetical box drawn around an object or group of objects. A bounding box is the smallest rectangular box in which the object (or group of objects) fits completely. The bounding box is parallel to the axes of the object. The bounding box is shown (around the preview of selected objects and groups) in the **Perspective** window, and it is the bounding box—not the object itself—that "casts" the projections onto the working box grid.

C

Child   An object linked to another object (its parent) in the hierarchy. When the parent is moved, the child and all "grandchildren" go with it. The parent-child link is used to enable articulation of complex objects.

Colinear   Two or more objects that are in the same line.

Color, CMYK   The subtractive color model, used in printing. Colors are created by assembling different densities of cyan, magenta, yellow, and black pigments on a surface. When white light strikes the surface, only specific bandwidths are reflected—depending on the density of the specific pigments. The reflected bandwidths create the perceived color. The CMYK model is called the subtractive model because the pigments subtract (by absorption) the bandwidths of white light that do not contribute to the specified color.

Color Depth   See *Bit Depth*.

Color, RGB   The additive color model, used in computer monitors. Colors are created by adding varying degrees of red, green, and blue light. For information on the "varying degrees," refer to Bit Depth.

Complex Object   An object constructed of several simple objects that are linked or grouped. For example, a telephone—comprised of the grouped, simple objects: cord, handset, and cradle—would be considered a complex object.

Component, shader   An elementary building block of a shader tree.

Concentric   Having the same center.

Constrain   To restrict object movement to a particular plane, axis, or angle. The working box is the primary tool for constraining an object.

Control Points   The "knobs" at the ends of Bezier tangents used to adjust a Bezier curve.

Co-planar   Occurring in the same plane.

Cross Section   One of the planes on which two-dimensional shapes are drawn in the Free Form modeler to create a three-dimensional object. Objects have two or more cross sections.

D

Deformers   Properties that can be applied to any object (or group of objects) to deform its geometry. Asymmetric scaling, bend, twist and shatter operations are examples of deformers available in Ray Dream Studio 5.

Dithering   The process of approximating pixel colors when reducing the color depth of an image or mapping to a different palette. Dithering can improve transitions between colors when reducing a 24-bit image to 8-bit format.

Dolly, Pan and Track   The computer equivalents of the real world camera movement commands. With Dolly, the camera moves around in 3D space as if gliding on the surface of a sphere that has the object of interest as its center. Inversely, using Pan, the camera acts as the "center of the sphere" and rotates at a fixed position in space to track an object or view a scene, much like a movie camera can rotate on a tripod to follow a moving object. Finally, Track moves the camera in a plane perpendicular to the direction in which the camera is pointing.

DXF   A standard 3D file format originally developed by Autodesk, makers of AutoCAD, for the purpose of exchanging CAD data between various 3D software applications. Widely used as a poor man's exchange file format, DXF only offers support for basic geometric information (no textures).

E

Extrusion   The method of creating a 3D object by moving a 2D cross section along a path (the sweep path). The Free Form modeler uses this method.

F

Face   The back (first cross section shape) or front (last shape) of an extruded object.

Formula   A mathematical expression that, with input, returns a meaningful set of values. Formulas may be used to create objects, define a tweener curve, or create a color pattern in a shader, gel, background or backdrop.

Free Form modeler   A modeler that uses cross sections, sweep paths and scaling envelopes to create 3D objects.

G

G-Buffer (Geometry Buffer)   A type of information carried on optional channels of a rendered image. The G-Buffer carries an aspect of three dimensionality with the 2D rendering. This can assist 2D filters and paint tools during retouching.

Global Mixer   A shader component that mixing all channels of its two component shaders.

Global Universe   The Global Universe is a Cartesian coordinate system with the origin of the X, Y, and Z axes (0, 0, 0) at the center of the universe. The Global Universe is fixed and is not affected by changes made to the working box.

Glow Channel   A shading channel that holds data describing an object's luminescence or "glow."

Grayscale   An image in which the pixels are defined with 8 bits, which provides 256 levels of gray.

Group   A set of collected objects. Grouping enables a set of objects to behave as one.

H

Hierarchy   The tree structure in the **Time Line** window that lists the objects in the scene and shows their logical relationships (links and groups). The hierarchy also includes listings for the animatable properties of each object.

Highlights   Regions on an object where light reflects directly into the viewpoint. Highlights appear as bright spots on smooth/shiny objects and are almost nonexistent on rough/dull objects.

Hot Point   A special, active point inside, on the surface of, or near an object or group. The hot point is used as the reference for rotation and for some positioning and alignment operations. In the **Perspective** window, the hot point appears as a small circle that is, by default, at the center of the object or group.

I-J-K

Icon   A pictorial representation of a tool, object, file, or other program item. An item is selected by clicking once, or sometimes double-clicking, on its icon.

Jaggies   The appearance of "stair-step," jagged edges in a pixmap image. Jaggies can be reduced with anti-aliasing.

Key Event   A moment in the animation where an object's characteristics change. Key events are marked on the time track for each animatable property.

L

Leading   Leading determines the vertical space between lines of text. The default leading value is 120% of the font's point size. Decreasing the percentage makes vertical spacing more compact, while increasing the percentage expands it.

Letter Spacing   Letter Spacing adjusts the horizontal spacing between characters in an entire word, line, or text block. A negative value decreases spacing, while a positive value increases it.

Links   A variety of child/parent relationships and constraints on relative motion to simulate traditional, real world mechanical links. Shafts, axis, and ball joints are examples of links.

M

Mask   The mask is a grayscale image, stored in channel 4 of a rendering, that describes where objects are versus where they are not. In a 2D image-editing program, the mask is used to generate a selection, which helps you composite your rendered scene with other background imagery.

Master Objects   A master object is the "mold" from which object instances are created. If a master object is modified, all of the objects derived from it are modified similarly.

Motion Path   A curve, visible in the **Perspective** Window, that shows where an object will move during the course of an animation.

N-O

Normal Vector   A ray perpendicular to an object's surface at a given point.

Object   Any 3D volume or other item that appears in the universe, including cameras and lights. When objects are grouped, their group is also described as an object.

Object/Group Coordinate System   Groups and individual objects have their own local coordinate systems. The origin of a group or object's coordinate system is at the center of its bounding box. The axes are parallel to the sides of the bounding box.

Operator   An operator is a shader shell that combines other shaders to form a sub-shader.

Orientation   The direction an object "faces" as defined by the compound effect of the object's pitch, yaw, and roll. Usually, the most important aspect of an object's orientation is its relation to other objects. An object's relation to the viewpoint can be changed by moving the current camera.

Oversampling   Rendering at a higher resolution, then bringing the resolution back down to minimize artifacts like aliasing.

P

Pan   See *Dolly, Pan, and Track*.

Penumbra   The region of partial shadow at the edge of the full shadow. In Ray Dream Studio, you can achieve nice penumbras with the Soft DRT Shadows option for lights.

Pipeline   An extrusion in which the cross section is always perpendicular to the sweep path.

Pitch   The aspect of an object's attitude that describes its angular deviation along its vertical (top-to-bottom) axis.

Pixel (picture element)   One dot in a 2D image. Computer images are created as an array of such dots, each having a specific color. See also *Resolution* and *Bit Depth*.

Pixmap   An image formed as an array of pixels.

Plane   A hypothetical, two-dimensional construct that may exist at any attitude in space. A plane can be envisioned as a flat sheet of invisible paper that stretches infinitely in two dimensions. In Ray Dream Studio, planes are used to constrain the direction of translation of an object. The working box shows the angle at which the constraint planes are set. By default, the planes of the working box are set parallel to the axes of the current local universe.

Point   As a unit of measure, a point is 1/72 of an inch. Point also refers to Bézier vertex and control points.

Point of View (also viewpoint)   The position and angle from which you view a scene. The point of view (POV) is always through a camera. You may add several cameras, positioned and angled differently, and switch the **Universe** window POV between them. When you render an image, you choose the POV from which the image should be taken.

Position, absolute   The X, Y, Z coordinates of an object's hot point in the Global Universe.

Position, relative   The placement of an object in relation to another object. For example, a book might be on top of a table.

Preview   The display of an object in the **Perspective** or **Modeling** window or the color chip of a shader in the Browser. Also refers to a rendering with a low resolution setting.

Primitive   An object created by definition, rather than modeling. A primitive object cannot be "dismantled" into components. The Sphere, Cube, Cylinder, Cone and Icosahedra are the basic primitives in Ray Dream Studio. The environmental primitives include Fountain, Fog, Cloud and Fire.

Production Frame   The computer equivalent of the viewfinder in a regular camera. The production frame can be thought off as describing the area of the 3D scene that will be rendered into an image.

Projection   The silhouette of an object's bounding box on one of the three visible planes of the grid. The hot point of the selected object or group also casts a projection. Projections are used for translation and rotation.

Properties   The collection of characteristics applied to (or available for) an object. Properties for the selected object appear in the **Properties** palette.

R

Ray Tracing   A procedure for generating a rendering. The ray tracer sends hypothetical rays of light from the sources in the scene and calculates the visual effects, for each pixel in the rendering, as the rays encounter and reflect from the objects in the scene.

Reference   A fixed point or plane used as the starting point for some operation. The hot point, the center of the bounding box, and the corners of the bounding box are common reference points.

Reflection   The phenomenon of light "bouncing off" objects.

Refraction   The phenomenon of light deflecting as it passes through a translucent object, like glass or fluid.

Render   The process of capturing a 2D image from a 3D scene.

Resolution   For an image, resolution is given as the number of pixels in each dimension. For devices, like a printer or the monitor screen, resolution is given in dots per inch (dpi) or dots per centimeter.

Roll   The aspect of an object's attitude that describes its angular deviation along its lateral (side-to-side) axis.

Root   The root describes the highest level of the hierarchy, the universe. When you are "Jumped Into" a group, the group box is the highest level of the hierarchy, and therefore, the local root.

S

Scaling, object   The percentage an object is resized. Each object instance may be scaled from the dimension of its master, which has a scaling of 1.

Scaling, text   Scaling changes the width of characters without affecting their height. A value below 100% results in characters that are narrower than usual, while a value above 100% results in characters wider than usual.

Shape   A 2D path that may be open (a line) or closed, such as an oval or a polygon. Shapes are used in cross sections when modeling. In shading, paint shapes are used to specify regions for shading.

Sweep Path   The curve or line along which shapes are extruded when modeling. Called the sweep or extrusion path, the path is defined by one line on the bottom plane and one line on the back plane in the **Modeling** window. The compound curvature of these two lines defines the path itself.

T

Texture Map   A 2D image used as a shader.

3D (three-dimensional)   An object or volume that exists in the dimensions of width, height and depth.

TIFF (Tagged Image File Format)   An image file format often used for transfer between applications or platforms. Ray Dream Studio 5 opens TIFF images in RGB format, but not in CMYK format.

Tiling   The technique of repeating a small image across a larger surface to cover it.

Track   See *Dolly, Pan, and Track*.

Translation   Any manipulation of the position or attitude of an object. Also, an extrusion in which the cross section remains at one angle, regardless of the curvature of the sweep path.

Translucence   The characteristic of an object that allows light to pass through it.

2D (two-dimensional)   An image, shape, path, or plane that exists in the dimensions of width and height only.

Tweener   A formula used to control the transition between two key events.

U-V

Universe   The 3D workspace, shown in the **Perspective** window. The Universe is where you place and position objects. It is the root of the hierarchy, and its coordinate system is absolute (doesn't move or rotate).

URL   Uniform Resource Locator is the "address" of an item on the internet.

UV   A 3D coordinate mapping system. UV coordinates are used in parametric mapping to align points on the shader with points on the object.

Vertex   A control point on a path. Paths begin, change angle, and end at vertices.

Viewpoint   See *Point of View*.

W

Wizards, modeling and scene   Visual step-by-step pictorials used to simplify a typically complex multi-stage process. The Modeling Wizard speeds the creation of 3D objects. The Scene Wizards facilitates setting up a scene with lighting and props. Wizards are great learn-by-example resources.

Word Spacing   Word Spacing adjusts the horizontal spacing between words. A negative value decreases spacing, while a positive value increases it.

Working Box   The three visible grid planes in the **Perspective** window. Called the working box because you'll move it as you work to constrain operations to certain planes.

Working Box System   The working box has its own coordinate system. The attitude of its axes and the position of its origin (at the center of the working box) change as you move and re-orient the working box.

Y-Z

Yaw   The aspect of an object's attitude that describes its angular deviation along its linear (front-to-back) axis.

Z-Buffer   A rendering technique that uses z (depth) information in sorting object facets.