



This page is dedicated to describing the commonly used terms when working with CRYENGINE V. As a use case, you may find yourself asking questions like "What is a Brush", "What is a **Component**", or "What is POM?", this page will highlight and provide descriptions for those types of questions and more. Once you have an understanding of what each term means, links are provided for more documentation and guidance on working with them.

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2.5D	Used to describe raycasting engines, such as Doom or Duke Nukem. The maps are generally drawn as 2D bitmaps with height properties but when rendered gives the appearance of being 3D.
3D	Refers to the ability to move in the X, Y and Z axis and also rotate around the X, Y, and Z axes.
Axis-aligned Bounding Box (AABB)	A form of a bounding box where the box is aligned to the axis therefore only two points in space are needed to define it. AABB's are much faster to use, and take up less memory, but are very limited in the sense that they can only be aligned to the axis.
Albedo	An albedo is a physical measure of a material's reflectivity, generally across the visible spectrum of light. An albedo texture simulates a surface albedo as opposed to explicitly defining a colour for it.
Alpha Blending	Assigning varying levels of translucency to graphical objects, allowing the creation of things such as glass, fog, and ghosts. This can be accomplished by using alpha channels.
Alpha Channel	The optional channel of image data in a texture file that can be used as a transparency map, height map, specular map, etc. The format of the alpha channel is usually 8 bits per pixel (256 colors), though certain file formats support different bit depths.
Alpha Testing	A method for creating transparency by checking the alpha value of a given pixel.
Animatic	An animated storyboard which is used to refine timing, cameras, composition, when a complex shot is needed and static images have trouble making intention clear. When needed, low-resolution animated 3d scenes are used, intermixed with the remaining 2D storyboard panels.
Anisotropic Filtering	A texture filtering method, specifically for non-square filtering, usually of textures shown in radical perspective. Generally speaking, anisotropic improves clarity of images with severely unequal aspect ratios.
Anti-aliasing (AA)	Removes the stair-stepping or jaggies which occur at the edges of polygons or between the texels on the polygons. The way this works is by interpolating the pixels at the edges to make the difference between two color areas less dramatic.
Artificial Intelligence (AI)	A set of computer instructions or algorithms designed to simulate the actions of an intelligent being to the extent necessary to meet the design requirements of a game.
ASCII	An acronym for the American Standard Code for Information Interchange, which is an encoding method for text, based on the English alphabet.
Aspect Ratio	A number that describes the shape of a rectangle texture, whether it's tall or wide. To calculate an aspect ratio, either divide the width by the height, or write it out as width:height.
Back Buffer	A secondary surface where the current frame's graphics are stored before they are transferred to the primary display surface.
Backface Culling	The process of removing the unseen polygons that face away from the camera in the game. These surfaces are usually not needed (except sometimes for shadow casting). Doing so can dramatically speed up the rendering of a polygonal scene.
Bezier Spline	This type of spline provides the ability to make a curved line using very few points. The two endpoints of the curve are called anchor points. The other points, which define the shape of the curve, are called handles, tangent points, or nodes.
Billboard	A term commonly used in games to describe a camera-facing plane. This is a polygon with a texture using transparency, that rotates on various axes to always face the player. Billboards are commonly used for particles, trees, grass, clouds, and UI elements.
Bit depth	This value defines the amount of color information an image holds. Typically 1-bit is two colors (black and white), 2-bit is four colors, 4-bit is sixteen, 8-bit is 256 colors, and 16-bit is 65536 colors.

Bitmap	An image file, such as JPG, TIF, PSD, and BMP.
Binary Space Partition (BSP)	A BSP tree subdivides 3D space with 2D planes to help speed up sorting. In game development, BSP usually means using solid modeling techniques to carve the basic surfaces of a game level.
Bloom	A post-processing effect which simulates bright light sources overwhelming a camera or the eye, creating a halo around the brightest parts of a scene.
BMP	A Bitmap file type used in game development, for storing source files. This is an intermediary format for use outside of a game engine. Usually then imported and converted into a different in-game format.
Bounding Box	A simplified approximation of the volume of a model, most commonly used for collision detection. It is common place to find referenced in code axis-aligned bounding box (AABB) and oriented bounding box (OBB).
Bump Map	A process of rendering polygons that gives them an illusion of depth.
Camera	typically the camera in a game is the player's view into the game scene. Cameras can also be used for other views in the game level, for example a virtual security cam can use "render to texture" to show the player alternate views of a game level.
Cartesian Coordinate	The standard coordinate system. With three dimensions, there are three scalars, x, y, and z used to represent a point at a given distance from a reference point, the origin.
Cel Shading	A technique which causes rendered objects to look as though they are hand-drawn, cartoon images.
Channel	Commonly used to describe a color component that makes up an image. A 24-bit image can have red, green, and blue channels. 32-bit images have room for a fourth channel, commonly known as an alpha channel.
Child	Any node in a hierarchy that is attached to another node.
Clipping Plane	This plane throws away polygons on the other side of it. This can dramatically speed up the rendering of a polygonal scene, since unneeded polygons can take up valuable processing power.
Collision Detection	The systematic check to see if any intersections are occurring between significant polygons. A common method to optimize collision detection is to use a bounding box to simplify collision shapes.
Compile	Programmers have to convert source code, written in a high-level language such as C++, into object code (aka Assembly), so that a microprocessor can run the application.
Concave	Defined where any two points can be connected by a line that goes outside the shape. When visualized the shape takes the formation of the letter C.
Convex	Defined where any two points can be connected by a line that goes outside the shape. This is a shape without indentations and is the opposite of a concave surface.
Corona	Artifacts that appear around a bright light source. Often in circular or star like shapes.
Cross-Product	Commonly utilized to compute something known as a surface normal. As by the cross product formula, a normal is simply a vector that is perpendicular to some plane. In graphics, this plane is usually a polygon of some type.
Cube Mapping	an alternative to sphere mapping used in environment mapping, cube mapping gets a 'screenshot' looking in 6 different directions and arranges them in a rolled out cube. When applied, the object appears to reflect the environment around it.
Depth Cueing	Scene effect to make objects that are farther away from the camera are rendered with a lighter color so that they are given the illusion of distance.
Dithering	Process of creating an illusion of more colors than are really available in the current color depth by creatively arranging individual pixel patterns.
Draw Call	These calls are based on how many objects are drawn to the screen. A good way to think about this is 1 material = 1 draw call, and an object with 4 materials = 4 draw calls. This can grow exponentially when incorporating the lighting and shadows in a scene.
Draw Order	the way to define what polygons are drawn in a game engine. Back-to-front draw order means the furthest polygons are drawn first, and the rest are drawn on on top of another, with the last to draw being the one that appears to be in front. This can also be referred to as "sort priority" regarding transparent polygons as well.
Dynamic Lighting	The definition of dynamic lighting is a light source that is updated every frame, as you'd want for moving lights and for characters that move amongst various light sources. The opposite of dynamic lighting is "baked" lighting through lightmapping.
Engine	

A game engine is what converts all the game assets into the display on your computer screen. Game engines often come with a level editor and other tools which help artists create content that work well in the engine.

Environment Probe

An effect where an object reflects its surroundings, much like chrome.

Expression

An expression is a formula used to create procedural animation, often using mathematical elements like sine and cosine. Expressions can automate and greatly speed up repetitive animation tasks.

Face

Face is another name for a Polygon. This term can be used specifically for a single triangle or more generally for a multi-triangle polygon.

Facial Action Coding System (FACS)

A system to taxonomize human facial movements by their appearance on the face. Movements of individual facial muscles are encoded by FACS from slight different instant changes in facial appearance. It is a common standard to systematically categorize the physical expression of emotions, and it has proven useful to psychologists and to animators alike.

Field of View (FOV)

The FOV is usually defined by its width in degrees. A typical FOV in games is around 60 degrees, although players enjoy being able to change the FOV themselves.

Flat Shading

Assigning only one color shade per face.

Fog

Fog makes objects become more and more the same color as they recede into the distance. This is similar to real fog, except that game fog is a perfect gradient, whereas real fog usually has some wispy qualities to it. Heavy fogging in a game is used to disguise the far clipping plane.

Forward Kinematics (FK)

A method of manipulating objects in a hierarchy where the animator positions objects and the program calculates the positions and orientations of the objects below it in the hierarchy.

Frames Per Second (FPS)

A measure of animation display rate. Not to be confused with the genre First Person Shooter.

Frame Buffer

What a video card uses to store the images it renders, while it is rendering them. When it is done rendering, it sends the completed frame to your monitor and starts building the next frame.

Frame Rate

Measures how fast the game is being rendered. Generally if the frame rate is lower than 30 frames per second, then the game will seem "choppy" and unresponsive.

Frustum

A term from traditional photography, the shape that the camera creates when projected into the scene. This pyramidal shape defines the limits of what the viewer can see, so it is used to calculate clipping, collisions, Fog, etc.

Geometry

Geometry is commonly used to define all polygonal objects in a game. Also called a mesh.

GIF

Graphics Interchange Format. A format for saving graphics that usually uses a 8-bit (256 color) indexed bitmap.

Gimbal Lock

A problem encountered when one tries to rotate using the 3 axes where one ends up rotating in the wrong direction after several rotations.

Gouraud Shading

Also known as intensity interpolation. A shading model where the light intensity is calculated at each of the vertices, and is interpolated across the polygon.

GUI

Graphical User Interface.

HDR

Real world lighting contains a high range of luminance values. HDR, or High Dynamic Range lighting, is essentially a technique that exceeds the normal computer graphics color range of 0 to 255, allowing for more realistic lighting models.

Height Map

A method often used to create 3D landscapes, height maps contain a grid of points that are given height values and the landscape is rendered by building polygons out of them.

Hierarchy

Existing where each node can trace its lineage up through this upside-down tree, back through parents to the root. If you choose any parent, then you can call its collection of children a branch of the tree.

HUD

Heads-Up-Display. This means status information which is always visible like health or ammo information.

Indexed Color

When color information is stored in a look up table that contains the colors red, green and blue information.

Interpolation

The process of determining from two or more values what the "in-between" values should be. Interpolation is used with animation and with textures, particularly texture filtering.

Inverse Kinematics (IK)

The process of creating realistic positioning of a complex object, such as an arm, based on the positioning of a lower-level node in the skeletal hierarchy, such as the twisting of a hand. This process works in the reverse of forward kinematics.

JPEG	A bitmap file type used in game development. This format is often used for web games, because it can be highly compressed for faster download. After the download it is usually converted into a different in-game format to use in the game.
Lerp	An abbreviation for Linear Interpolation.
Light Mapping	Traditionally, light maps store the color and brightness of pre-baked lighting. The Diffuse map is applied to the mesh with no lighting, and the light map is then multiplied against it, darkening the diffuse where the light map has shadows.
Mapping	This can either mean texturing or it can mean creating texture coordinates.
Material	A set of parameters that determine the textures, color, shininess, smoothness, etc. for a surface. A material is the user interface for a shader; the shader controls how the surface is rendered, while the material merely stores the user-adjusted settings for the shader.
Material IDs	Used to split a model's surface into multiple Materials. Normally a model can only use a single material. However a number can be assigned to sets of polygons which each correspond to a particular material.
Memory	The amount of quickly-retrievable space for storing the assets currently being used by the game. Games use a number of different types of memory, but game artists are mostly concerned with RAM. The biggest question for the artist is how much RAM is available for textures.
Mesh	Another word for geometry, or polygon.
Mip Mapping	To render a texture more smoothly in a game, it is resized multiple times to make "mips," which are smaller versions of the texture. These smaller versions are swapped or blended with the original texture as the texture recedes in the scene.
Morph	An animated 2D or 3D effect that makes one texture or geometry smoothly transform into another. When used with models, all the shapes must have exactly the same vertex count, and vertex order. The individual mesh shapes are called blend shapes, or morph targets.
N-gon	This means a polygon with "n" number of sides. It can be used interchangeably with polygon. The letter N stands for any whole number. A 3-sided n-gon is a triangle, a 4 sided n-gon is called a quad.
Node	Each single object in a hierarchy is called a node. Without nodes there can be no hierarchy-- there's nothing to link together. Also sometimes called a bead.
NURBS	Short for Non-Uniform Rational B-Spline, a mathematical representation of a 3-dimensional object. Most applications support NURBS, which can be used to represent analytic shapes, such as cones, as well as free-form shapes, such as car bodies.
Overdraw	Defined as a screen pixel being drawn more than once. Overdraw is usually caused by multiple triangles being drawn over each other, for example with particle effects or tree foliage.
Parent	A parent is any Node in a Hierarchy that has another node linked to it. Usually when a parent is adjusted, all its children nodes get the same transform.
Physically-based Rendering (PBR)	An approach for materials and rendering that creates more accurate and predictable results than previous game rendering techniques, and works very well with dynamic lighting conditions (like time-of-day).
Phoneme	Any of the perceptually distinct units of sound in a specified language that distinguish one word from another, for example p, b, d, and t in the English words pad, pat, bad, and bat.
Phong	A method of lighting a 3D world, the Phong lighting model applies three different types of lighting to the vertex of every polygon. Phong lighting works by performing operations based on the normal of the polygon, the "normal" being an imaginary line drawn orthogonal (straight up from) the face of the polygon.
Pitch	This term comes from aviation. Most game engines count from +90 to -90 degrees, starting out pointed straight up, turning downwards and ending pointed straight down. Straight forward is 0 degrees.
Pixel	Short for picture element. There are two common meanings: the pixels that Textures or Bitmaps are made of, and the pixels that are rendered onto your computer screen by the game engine.
Photoshop Document (PSD)	A bitmap file type used in game development. It is the main image format for Photoshop.
PNG	Developed as a patent-free alternative to GIF, Portable Network Graphics (PNG) format is used for lossless compression and for display of images on the web. Unlike GIF, PNG supports 24bit images and produces background transparency without jagged edges.

Polygon	Most game engines use polygons to make the surfaces of their objects. A polygon can be made up of 1 or more triangles, like a quad is made of two triangles, a pentagon is made of three triangles, etc. Some engines support multiple polygon types, but triangles are the most common.
Power of Two	This means the numbers 2, 4, 8, 16, 32, 64, 128, 256, 512, etc. Usually this is used to describe the Texture sizes that a game engine requires in order to make good use of video Memory. An example pow2 texture size would be 32x64.
Project	To project something means to blanket the object with a detail that is either permanent or temporary. Projecting light textures in the engine provide enhanced floor detail while projecting a texture onto an object is considered to be baking the projected information to the new topology/geometry.
Quad	In systems that support multi-sided faces, polygons and faces are equivalent. However, most rendering hardware supports only 3- or 4-sided faces, so polygons are represented as multiple faces. When referenced as a quad it means this is a 4-sided face.
Random Access Memory (RAM)	A form of computer storage which stores frequently used program instructions to increase the general speed of a system. A random-access memory device allows data items to be read or written in almost the same amount of time irrespective of the physical location of data inside the memory.
Rasterize	The task of taking an image described in a vector format (shapes) and converting it into a raster image (pixels or dots) for storage in a bitmap file format. It refers to both rasterisation of models and 2D rendering primitives.
Ray Cast	The use of ray-surface intersection tests to solve a variety of problems in computer graphics and computational geometry. Typically a mouse cursor or crosshair will ray cast from a camera and provide the Entity ID needed to transform the object in 3D space.
Ray Tracing	A technique for generating an image by tracing the path of light through pixels in an image plane and simulating the effects of its encounters with virtual objects. The technique is capable of producing a very high degree of visual realism, usually higher than that of typical scanline rendering methods, but at a greater cost.
Real-time	A sub-field of computer graphics focused on producing and analyzing images in real-time. The term is most often used in reference to interactive 3D computer graphics, typically using a GPU, with video games the most noticeable users. The term can also refer to anything from rendering an application's GUI to real-time image processing and image analysis.
Render to Texture	
Re-topology	Sometimes over the course of modelling you will want to wrap a new topology around an object to either sculpt finer detail or bake a very precise normal map for photoreal results. This is simply tracing the pattern over the new object and transferring the details through baking.
Rigging	Refers to the act of weighting a polygon mesh to a skeleton for the purposes of animation. The "mesh" is the skin, and it is stuck to the "bones" of the animation rig, which form a skeleton that can then be manipulated by an animator to pose and animate the model.
RGB	An additive color model in which red, green, and blue light are added together in various ways to reproduce a broad array of colors. The name of the model comes from the initials of the three additive primary colors, red, green and blue.
Roll	The roll axis (or longitudinal axis) has its origin at the center of gravity and is directed forward, parallel to the fuselage reference line.
Rotational Axis	The rotational axis of an object still adheres to Cartesian Coordinates (X,Y,Z) and has the terms of Yaw, Pitch, and Roll to define the look and feel of say an plane in a scene.
Sculpting	The use of software that offers tools to push, pull, smooth, grab, pinch or otherwise manipulate a digital object as if it were made of a real-life substance such as clay.
Shading	At the base of all materials are source files called Shaders that drive specific qualities at runtime while stripping out extra features that could cost performance. Various shaders that ship with CRYENGINE include Illum, Glass, Eye, and Skin.
Skinning	The term skinning usually refers to assigning bone weights to the vertices of the model.
Smoothing Groups	A group of polygons in a mesh which should appear to form a smooth surface. Polygons in a mesh that should appear to be smoothly connected, smoothing groups allow 3D modeling software to estimate the surface normal at any point on the mesh, by averaging the surface normals or vertex normals in the mesh data that describes the mesh.
Sorting	Sorting is the term used to prioritize objects on a screen. This can be found in say glass that needs to have a priority to stack correctly when viewing it. To the sorting of layers on your UI Element when creating Scaleform assets that need to exist in the same place at the same time.
Splat Maps	Splat maps are a term for a projected texture over the terrain generation to provide even greater variation for the end result.

Spline	Frequently refers to a piecewise polynomial (parametric curve). Splines are popular curves in these subfields because of the simplicity of their construction, their ease and accuracy of evaluation, and their capacity to approximate complex shapes through curve fitting and interactive curve design.
Sprite	A two-dimensional bitmap that is integrated into a larger scene. Usually constrained to be oriented to always look at the camera and is a favorite of showing large forests and trees through a single plane.
Storyboard	A graphic organizer in the form of illustrations and images displayed in sequence for the purpose of pre-visualizing a motion picture, animation, motion graphics or an interactive media sequence.
Scalable Vector Graphics (SVG)	An XML-based vector image format for two-dimensional graphics with support for interactivity and animation.
Texel	A texel is each pixel of a texture during the time the texture is being processed by the game engine After the engine performs calculations to project the texture onto polygons, the texture pixels are transformed into texels. Then the engine renders the scene, and at that point it transforms those texels into screen pixels.
Texture Atlas	An atlas describes the method of packing many separate textures together into a single texture. Other common names for this are "decal sheet", "packed texture."
Texture Baking	Baking is the process of transferring details from one model to another. The baking starts a certain distance out from the model (usually a low-resolution model for game use), and casts rays inwards towards another model (usually a high-resolution sculpt).
Texture Compression	Compression is a technique to use larger or more textures in the same amount of memory and graphics bus bandwidth.
Texture Coordinates	Coordinates, also called UVs, are pairs of numbers stored in the vertices of a mesh. These numbers are often used to stretch a 2D texture onto a 3D mesh, but they can be used for other things like coloring the mesh, controlling the flow across the surface, etc.
Texture Filtering	Filtering is used whenever a texture is altered by the game engine to eliminate jagged edges and shimmering pixels.
Texture Types	There are various types of textures that are associated with any given material. Some of the most common are listed here and are all combined to create a believable material in the end through a technique known as compositing: <ul style="list-style-type: none"> • Albedo - the base color information of your object which has the light and shadow information stripped from the captured image. • Specular - This map controls the reflectivity of a surface and can be driven by a texture map or specific scientific values (example: 60,60,60 Skin) • Normal/Gloss - A specific map that modifies vertex normals in a finer detail and the gloss map defines how wide or narrow the specular highlights appear.
TGA	A format that is known as TARGA or the Truevision format which allows for you to save out color channel and alpha information. This is a standard texture format in most game engines.
TIF	TIF is a file format that is used through the CryTIF image exporter inside of Photoshop. The term stands for Tagged Image File Format and due to this ability to tag or store metadata you can define the resolution and Mipmapping or presets when saving out the file.
Tiling	The process of repeating the UVs or material of an object in order to get the highest repetition possible without giving away that the material is indeed repeating.
Transforms	These values are the Position, Rotation, and Scale of an object and should be known not only when using objects in an Editor but also when exporting objects from other 3D Editors. Holding on to these offsets over the course of your development will break your end product.
Transparency	The transparency of an object can be seen in multiple types of surfaces ranging from the typical glass to the transparency/translucency of a vegetation object within the scene. Sorting is key to this feature and further results can be refined using Depth Peeling or Order Independent Transparency.
Triangle	In relation to the point and the line with 2 points you have the most primitive form of a face in the triangle or "tri" for short. This type of face is universally the face that all game engines run on since it provides the proper deformation and material surface resolution to produce realistic results.
Vertex	The most simple form of all geometry is the vertex and it is the foundation for all types of geometry (line, tri, quad, and ngon). These vertices correlate to the model shape, the UVs for materials, and even skinning influence when conducting advanced rigging.
Viseme	A generic facial image that can be used to describe a particular sound. A viseme is the visual equivalent of a phoneme or unit of sound in spoken language. Visemes and phonemes do not share a one-to-one correspondence. Often several phonemes correspond to a single viseme, as several phonemes look the same on the face when produced.
Voxel	

A value on a regular grid in 3D space. As with pixels in a bitmap, voxels themselves do not typically have their position explicitly encoded along with their values. Instead, rendering systems infer the position of a voxel based upon its position relative to other voxels.

Yaw

Has its origin at the center of gravity and is directed towards the bottom of the aircraft, perpendicular to the wings and to the fuselage reference line. Motion about this axis is called **yaw**. A positive yawing motion moves the nose of the aircraft to the right. The rudder is the primary control of yaw.

Z-buffer

Known as depth buffering, is the management of image depth coordinates in 3D graphics, usually done in hardware, sometimes in software. It is one solution to the visibility problem, which is the problem of deciding which elements of a rendered scene are visible, and which are hidden. The painter's algorithm is another common solution which, though less efficient, can also handle non-opaque scene elements.

Z-fighting

A phenomenon in 3D rendering that occurs when two or more primitives have similar or identical values in the z-buffer. It is particularly prevalent with coplanar polygons, where two faces occupy essentially the same space, with neither in front.