

MAKE YOUR VISION **REAL**



► Features Document

Next Generation Real-Time Renderer

Our renderer provides seamless support for both indoor and outdoor environments on DirectX9 and 10, as well as support for next generation consoles such as the Xbox360 and PS3 (under development).

Real Time Lighting and Dynamic Soft Shadows

CryENGINE 2 features natural looking light sources, and creates soft shadows that dynamically respond to natural movements. It includes high-resolution, perspective correct and volumetric smooth-shadow implementations.



Volumetric, Layer and View Distance Fogging

Create clouds or fog banks which can hug the ground and realistically reduce both visibility and contrast, and properly interact with both dynamic lights and shadows, add depth and dimension to a landscape by reducing scene contrast and clarity for distant landmarks.

Terrain 2.5D Ambient Occlusion Maps

On a per pixel level, approximates the amount of ambient (fill) light reaching an object (static or dynamic) depending on the amount of ambient occlusion created by the surrounding foliage and structures.



Normal Maps and Parallax Occlusion Maps

Normal maps are used to project the contour details of a highly detailed object onto a low polygon model by using a high frequency compressed (3DC/BC5) texture in place of the polygon's surface normal in lighting calculations. CryEngine2 also supports parallax occlusion mapping to give a greater sense of depth to a surface texture applied to a polygon, such as could be used to realistically emphasize the relief surface structure of a brick wall, for example.



Real Time Ambient Maps

Pre-calculate the amount of ambient (fill) light which will be applied to indoor surfaces, to improve the quality of lighting when applying real-time per-pixel lighting and shadows. This means the current light position and color can be dynamically added to the fill light intensity applied to illuminate surfaces in interior spaces.

Subsurface Scattering

Simulates the diffusion and diffraction of light transmitted through translucent objects, like ice and jade; it can also be used to create natural looking skin or vegetation.



Eye Adaptation & High Dynamic Range (HDR) Lighting

Eye Adaptation is used to simulate the human eye's adaptation to sudden or extreme changes in lighting conditions, like dark indoor environments suddenly transitioning to bright sunny outdoor environments, while HDR allows scenes with extreme brightness and contrast ranges to be more realistically rendered.

Light Beams & Shafts

These are used to create visually stunning light beams and shadows when light intersects with solid or highly detailed geometry, and can generate "godray" effects under water.

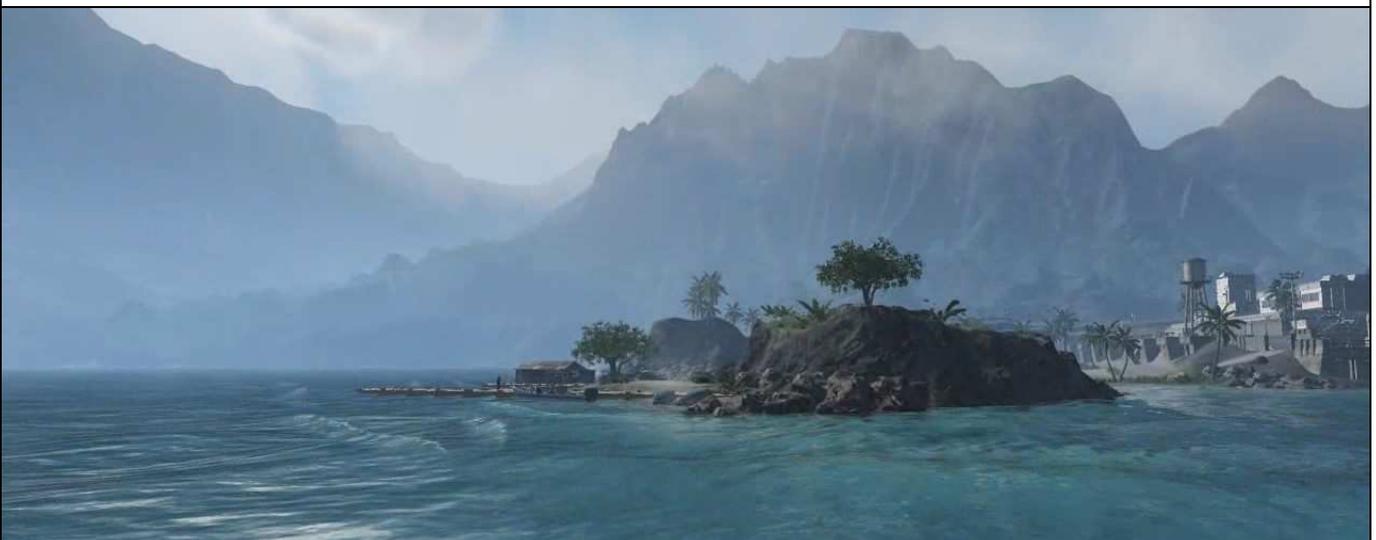


Advanced Shader Technology

A script system used to combine textures and math in different ways to create unique effects such as cloaked, wet, muddy, and/or frozen surfaces which can be layered together and combined with more basic shaders such as metallic and glassy and other visual effects. Supports real time per-pixel lighting, bumpy reflections, refractions, volumetric glow effects, animated textures, transparent computer displays, windows, bullet holes, and shiny surfaces. Included are many unique new shaders which take advantage of the efficiencies of the unified shader architecture of DirectX 10.

High Quality 3D Ocean Technology

Dynamically modifies the ocean surface based on wind and wave direction, generating shoreline soft-clipping breakers automatically where the ocean meets the shore, depending on the shoreline contour and ocean depth, while our caustic simulation creates realistic looking moving shadows and highlights in underwater environments.



Motion Blur & Depth of Field

Motion Blur is used to simulate the visual effect of using a slow shutter speed when tracking fast moving objects or making quick camera movements. Blur can be applied both to individual objects (object based motion blur), and/or to an entire scene (screen based motion blur), while Depth of Field can be used to focus the viewer's eye on a nearby object while subtly blurring objects in front or behind the point of focus.



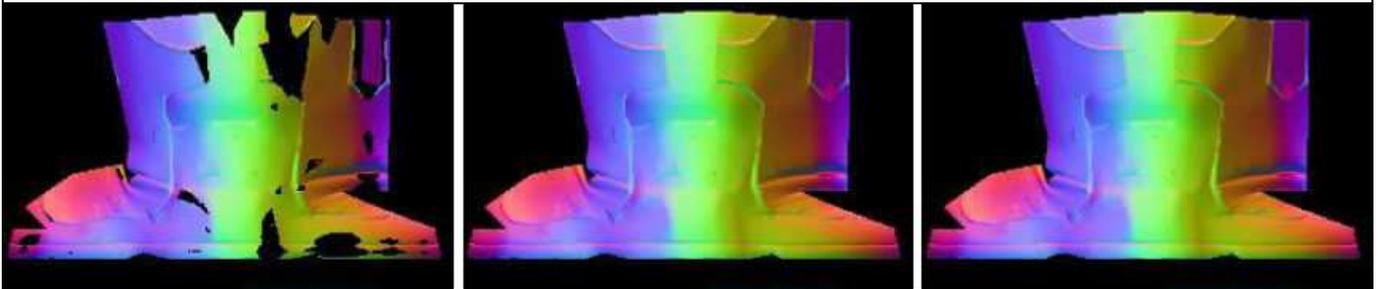
Terrain LOD Management Feature

This feature allows optimal usage of CPU and memory to display closer objects and terrain at a fine level of detail while enabling long view distances of over 8 kilometers.



Polybump™ 2

Polybump™ 2 can be used as either as a standalone utility, or fully integrated with other tools such as 3DS Max™. This tool creates a high quality surface description that allows quick extraction of surface features like normal maps (tangent-space or object-space), displacement maps, unoccluded area direction, accessibility and other properties. The extracted information can be used to render Low poly models with surface detail almost making them look like the high-poly models but it will render much faster. The data is stored in a intermediate file format so it can be exported in different ways without doing the computation again. Very high polygon counts (e.g. 10 million triangles) are processed quite quickly.



Integrated Multithreaded Physics Engine

Can be applied to almost everything in a level, including trees and vegetation, to realistically model reactions to forces like wind currents, explosions, gravity, friction and collisions with other objects, without the need of specialized coprocessing hardware. Also allows for character to ragdoll and ragdoll to character transitions.

Advanced Rope Physics

Bendable vegetation which responds to wind, rain or character movement, realistically interactive rope bridges, and physically driven creature tentacle animations are just some of the uses to which we've put our rope physics technology.



Interactive and Destructible Environments

Dynamically physicallize (using previously defined breaking or shattering characteristics) any arbitrary environmental object or shape, in order to destroy buildings, trees, or other objects, and then further interact with the resulting pieces.



Character Animation System

Our new character animation system considerably advances the state of the art in real-time human, model and vehicle animation. A fully integrated character editor allows animations to be previewed inside of CryENGINE Sandbox2, while our extremely powerful animation graph allows an animator to visually define the animation states of a character, and the allowable transitions between those states.

Character Individualisation System

The character pipeline uses a robust character attachment system which allows for attachment of skinned, animated, or physicallized attachments to the skeleton or polygonal faces of a character, to the extent you can even replace entire body parts such as heads, hands, or upper and lower body. A hardware based shape deformation system allows flexible variation of the character meshes. The system supports manually and even procedurally generated examples to ensure a small memory footprint. An additional variation system based on shaders is use for dirt, decals for clothes, and camouflage shaders for the skin.





Parametric Skeletal Animation

By blending example-motions based on user-defined parameters, we obtain responsive interactive control over a character with a focus on believability and the ability to adapt automatically and naturally to the changing circumstances of a game environment. This enables the character to travel at different speeds, follow paths where the direction changes smoothly or suddenly, move uphill or downhill, dynamically blend in varying amounts of hit reaction animation, and/or change the style of locomotion.

Procedural Motion Warping

Procedural algorithms like CCD-IK, analytic IK, example-based IK or physical simulations are used to augment pre-authored animations. All procedural methods have in common that a computer procedurally follows the steps in an algorithm to generate artificial motions. To avoid the typical computer-generated look when combining artificial and captured animations, we use a warping technique that can preserve the style and the content of the base motion, despite the transformations needed to comply with the constraints.



High Quality Animation Compression

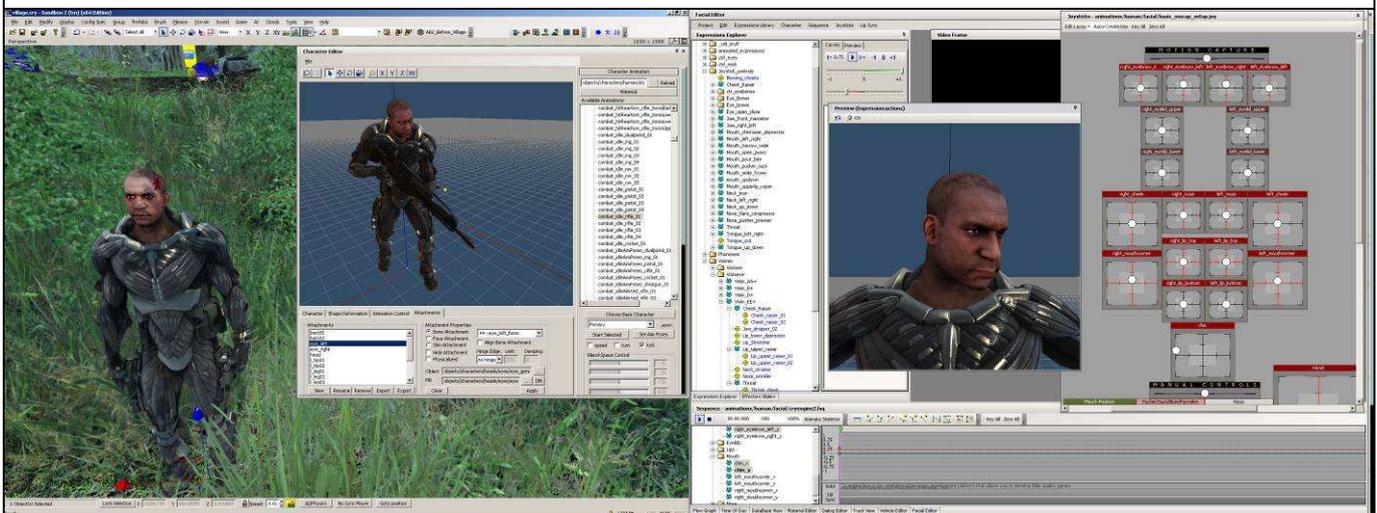
Using our adaptive key frame compression technology, we can adjust the compression level to match the fidelity needed for any given animation while saving at least 90% of the RAM that would otherwise be consumed, without significant loss of motion fidelity.

Integrated CryENGINE Sandbox2 Editor

Run time engine is fully integrated into the CryENGINE Sandbox2 editor to give designers "What you see is what you play" functionality.

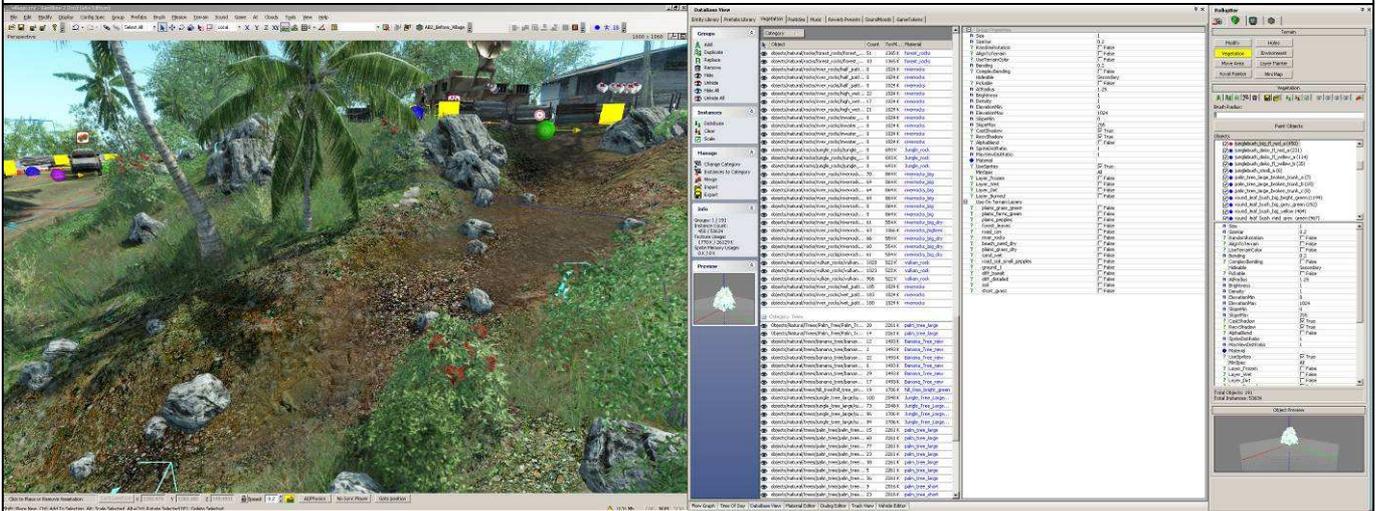
Embedded Facial Animation Editor

The powerful new Facial Animation editing tool uses audio waveform analysis technology to automatically extract phonemes and other key features of speech in order to animate facial features and provide convincing lip sync. The sophisticated and convenient multiple joystick-based user interface allows expressions to be defined and combined in many powerful ways, then animated quickly and intuitively. Expressions and animations can be created once, and then seamlessly applied to multiple models. In conjunction with this system, a video tracking tool can be used to capture movements from an actor's face using a standard video camera, and these movements transferred directly to the desired facial model in the editor, where the expressions and movements can be combined with the lip sync and/or further edited by an animator.



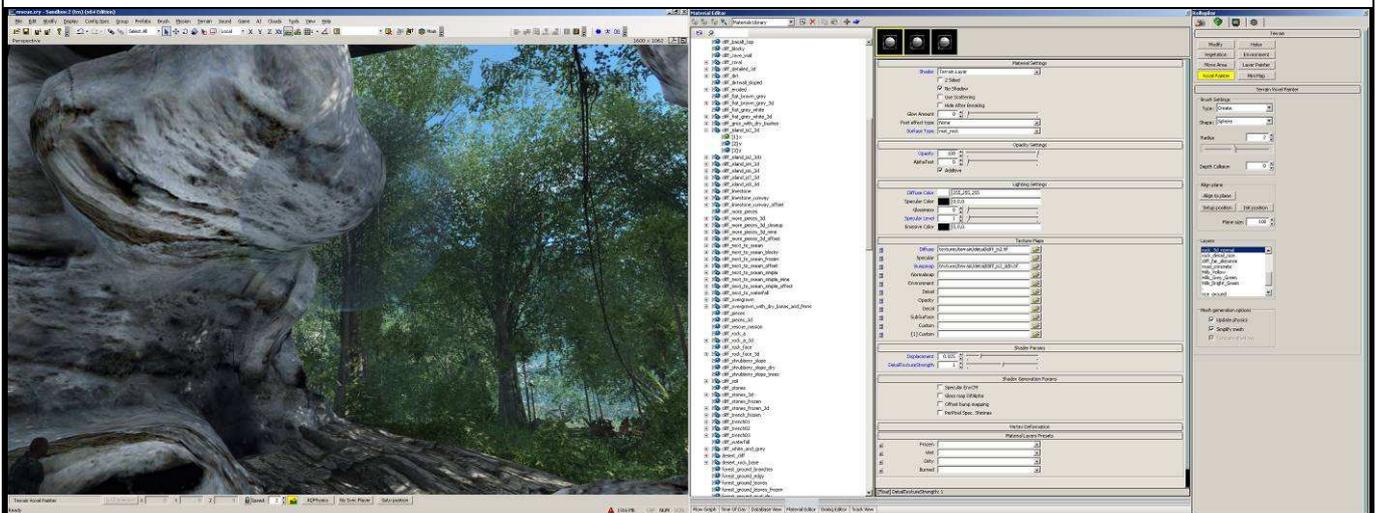
Integrated Vegetation and Terrain Cover Generation System

Allows procedurally placed vegetation to behave according to natural rules about the desirable and allowable ground slope, surface altitude, and allowable plant density to create believable natural environments at run time without requiring the level designer to custom place every blade of grass or tree. Vegetation can also absorb some color from the underlying terrain texture, to fit more naturally into the environment.



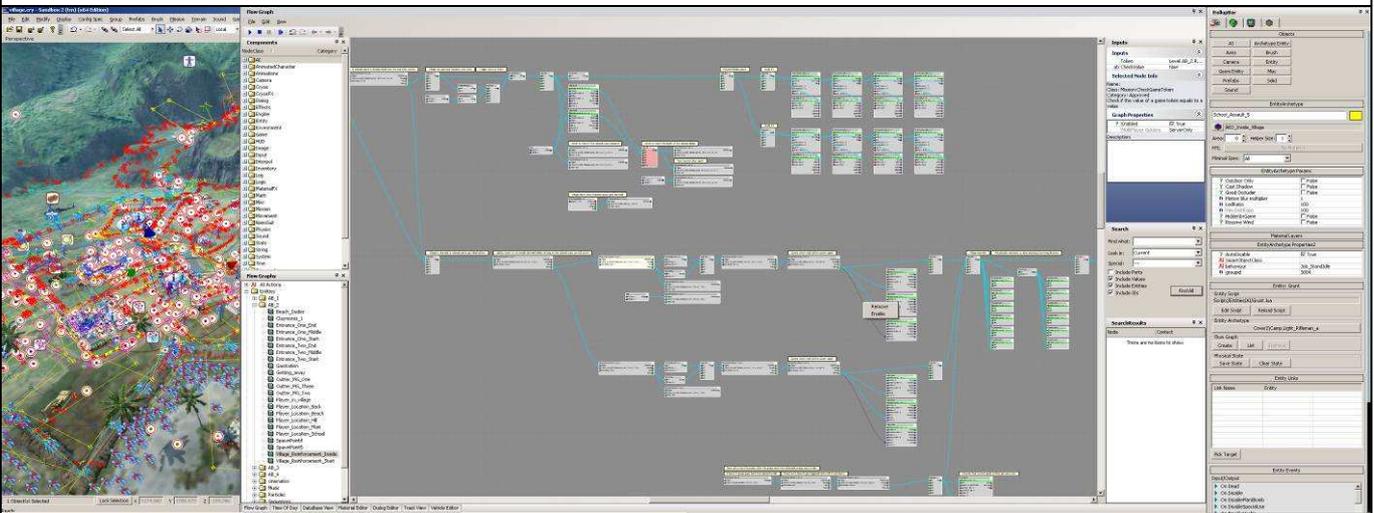
Advanced Terrain System with Integrated Voxel Objects Technology

Allows designers to place overhanging cliffs, caves or tunnels in their levels, and allows them to adjust the terrain detail on a per-sector basis to reduce overall polygon counts.



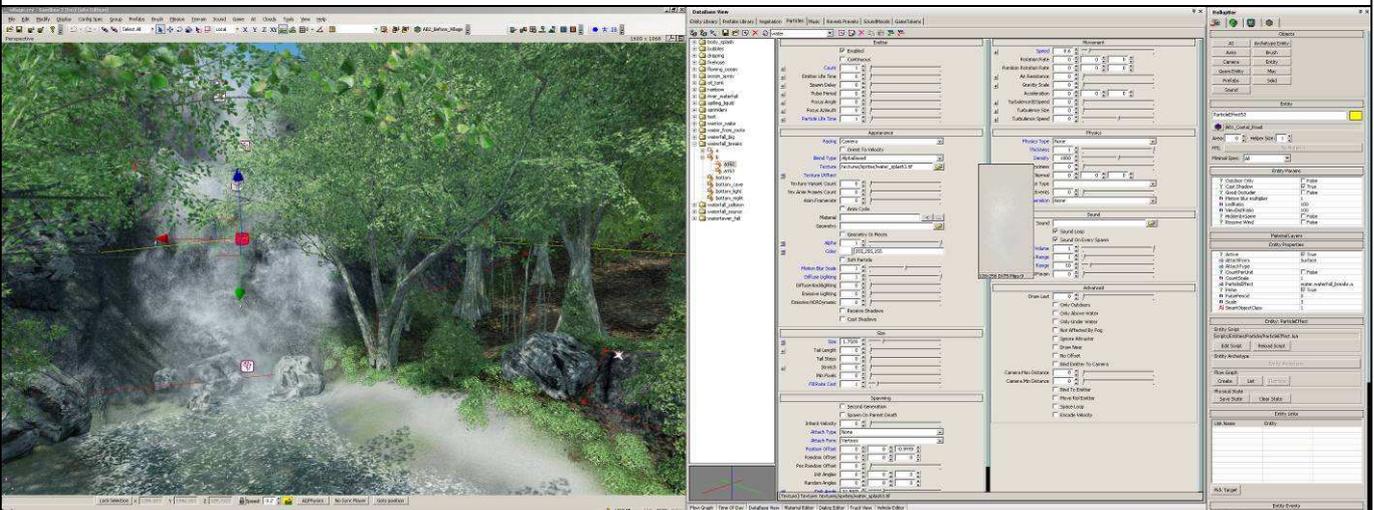
Flow Graph

A visual editing system which allows designers to set up events, triggers, and other game logic by connecting various logic boxes to each other with lines between their input and output gates, and defining their properties and state changes. This allows designers to build complex levels without needing to write C++ code or LUA scripts.



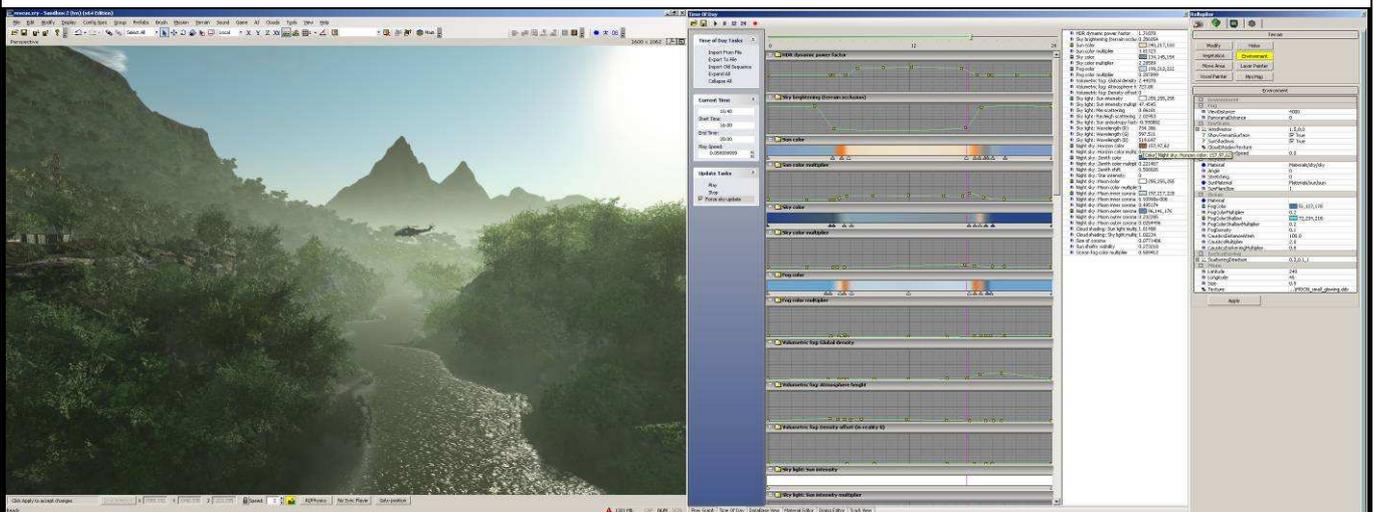
Advanced Soft Particle System and Integrated FX Editor

Simplifies the creation of extremely complex explosion, fire, smoke and other special effects using next generation soft particles, which in turn can be affected by collisions with any other objects, apply or receive forces such as wind or gravity, and can interact with lights and shadows.



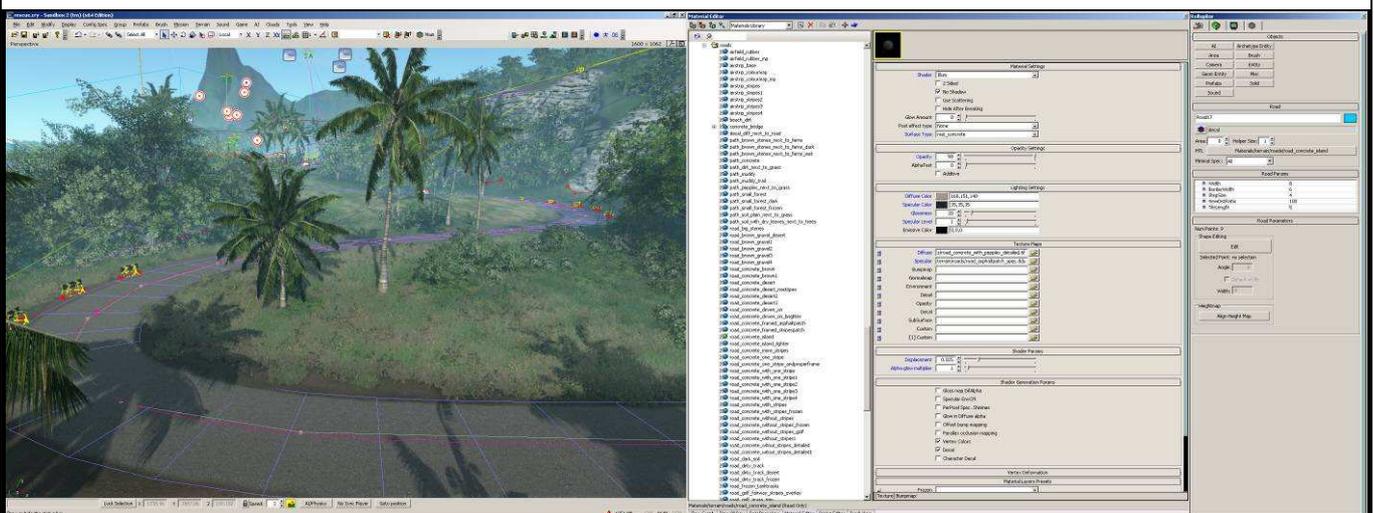
Dynamic Time of Day Settings

Change the time of day dynamically during a game mission to reflect lighting conditions and sun/moon positions over any predefined 24 hour cycle, from a blue and foggy morning sunrise to a fiery orange sunset to a clear cold moonlit night.



Road and River Tools

These integrated tools greatly simplify the process of locally smoothing and leveling terrain and applying a tiled texture for the creation of paths, roads, or rivers through rugged landscapes.



Sound and Music

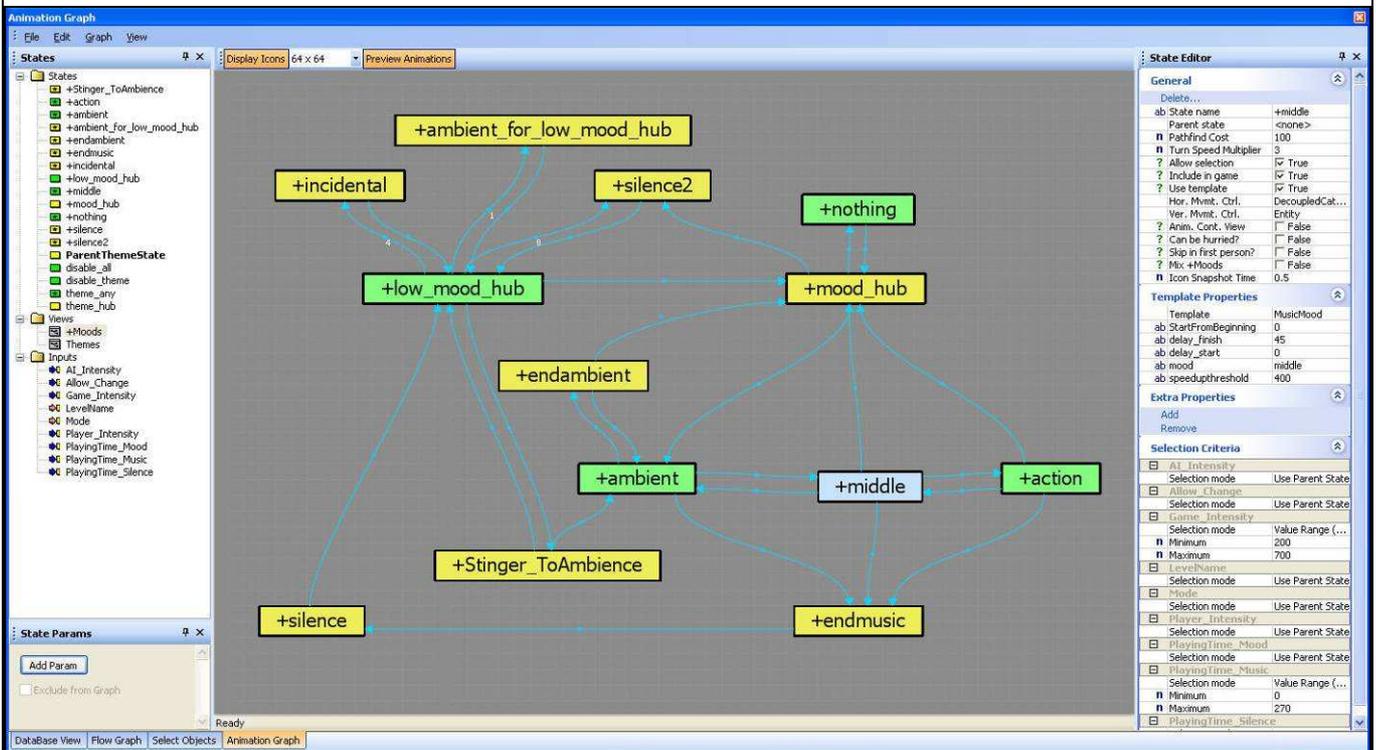
The sound system in CryEngine2 introduces many new features and improvements with its data-driven concept. Each sound carries its own specification with it, so sound designers are in full control of the final quality of the sound, and sounds are used consistently throughout the game.

Data-driven Sound System

Complex sounds can be easily created and delivered with studio quality while supporting any available surround sound speaker configuration. Multi-platform compatibility is guaranteed by FMOD's included sound library.

Interactive Dynamic Music System

Improved playback of music tracks by specially defined logic that reacts to any desired game event in order to give the player a movie-like sound track experience.



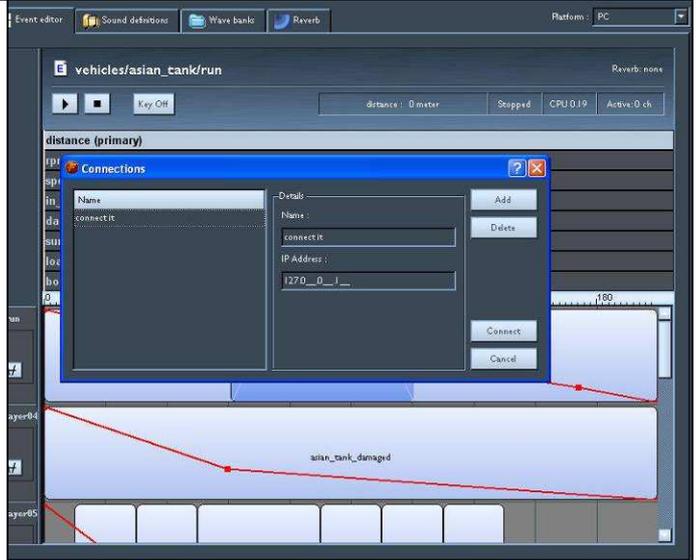


Dynamic World Sounds

Any physical contact can spawn a unique sound controlled by various parameters such as material type, object type, mass, and speed. This technique provides non-repetitive and responsive audio feedback to movement in an interactive game world.

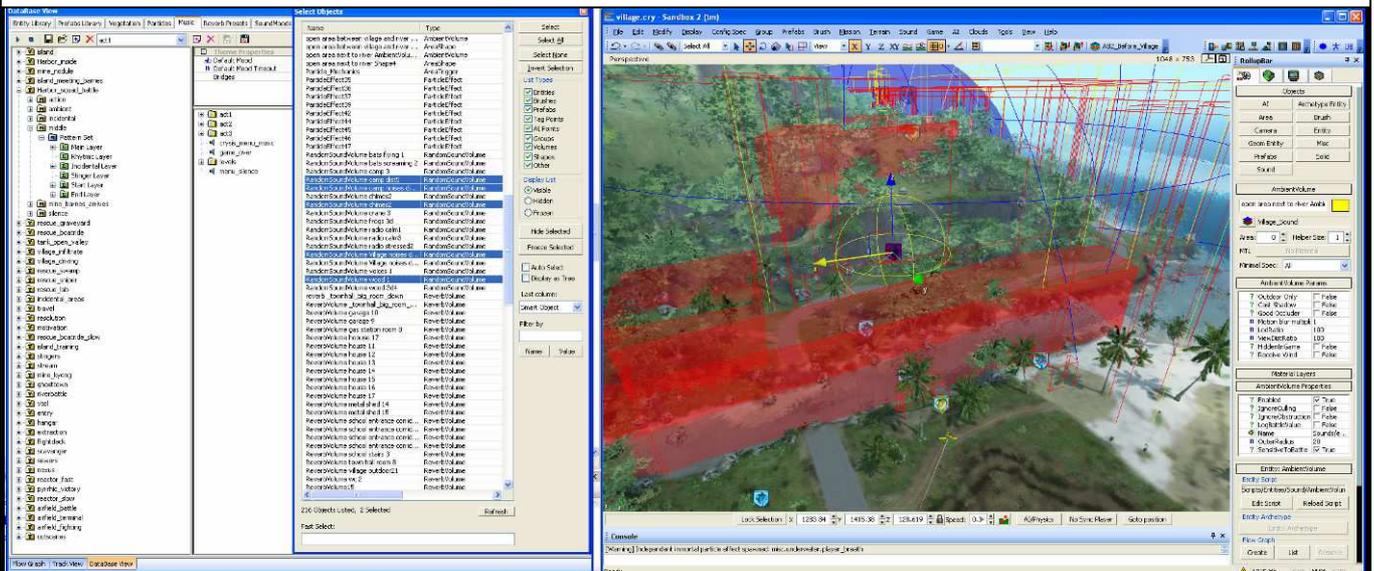
In Game Mixing

Integrated editor functionality and advanced sound specification tools provide efficient mixing by connecting to a running game instance on various target platforms. This constantly guarantees a well mixed game in every development stage by allowing review of the results in either the game itself, or in other editor modes, such as sounds triggered by animations from within the character editor, for example.



Environmental Audio

This feature allows a sound designer to achieve a dense sound impression by accurately reproducing sounds from nature, with seamless blending between different environments, for example the effect of moving from an interior to an exterior location.



Advanced AI System

CryENGINE 2 has a flexible and easily customizable AI system which handles both character and vehicle behaviors, it fully supports the complex requirements of the character locomotion system to animate bipedal characters in a believable fashion, and is fully integrated into the CryENGINE Sandbox2 editor.

LUA Script Driven AI System

Allows complex AI behaviors to be created without requiring new C++ code, including extending state machine behaviors from LUA scripts.



Dynamic Path Finding

Advanced 2D and 3D algorithms allow the AI navigation paths to be modified in real time in response to events which create new or destroy existing paths, a critical feature for creating believable AI in a highly interactive and destructible environment.



Smart Objects

Provides an easy way for level designers to connect specialized animations to particular objects in the level, so that the character animations and objects are properly aligned at the start and end of the animations, and the correct animation sequence plays.



Performance Analysis

Powerful instrumentation features allows the developer to analyze engine performance in real time, create detailed memory usage reports, and run automated walk-throughs of each level to get consistent test results from build to build.



Offline Rendering

Creating streaming videos or still images from within the game is made easier by the inclusion of specific console commands which can output a scene at any arbitrary screen resolution and/or aspect ratio, including generating autostitched panoramic views for use on 360 degree projection video displays.



Modular C++ Design

Entirely written in modular C++, fully documented and commented, and divided into logical separate DLL's, you can use what you need as-is, and modify or replace only the components in our engine that you particularly require to customize for your individual project requirements.

Multithreading Support

To get the most out of modern multicore processor architectures, CPU intensive subsystems of CryENGINE 2 such as physics, networking and sound, have been re-written to support multi-threading.

Resource Compiler

Assets are compiled from their original formats to an optimized platform dependent one by the resource compiler at project build time. This allows making global changes (e.g. mipmap computation, mesh stripification) to the output data depending on presets and target platforms without affecting the final level loading times, or requiring developers to keep multiple versions of assets on hand for different platforms.

Streaming System

Assets can be loaded on demand at run time to allow for larger levels and increased complexity, while reducing the amount of available system RAM required.

Network Client and Server System

CryENGINE 2 has a totally new, multi-threaded networking system which manages all connections for multiplayer mode. It features a highly reliable, low-latency, low bandwidth system based on client/server architecture using advanced range encoding based compression algorithms.