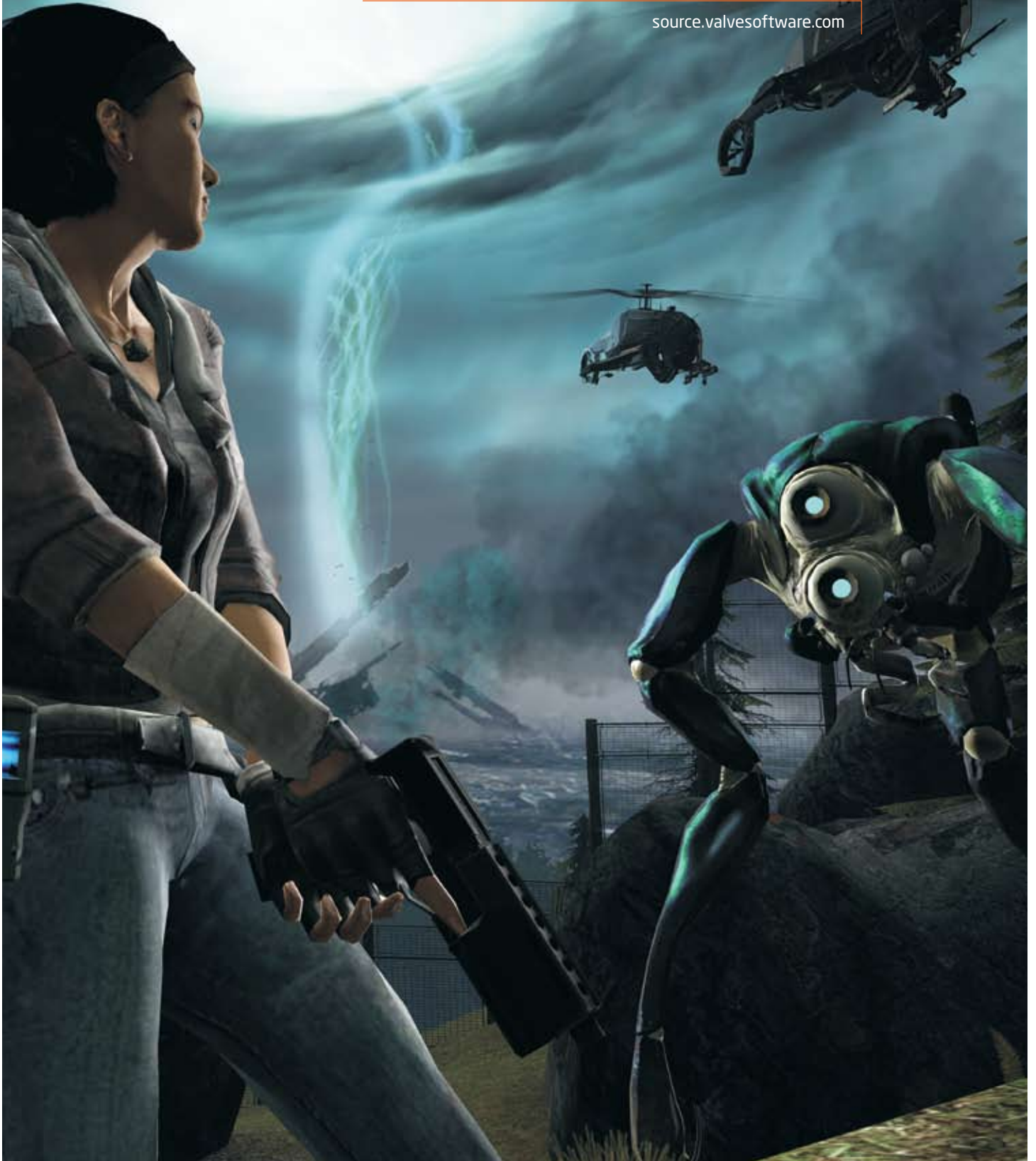




# source

[source.valvesoftware.com](http://source.valvesoftware.com)



**source** ®

## State-of-the-Art Games Start Here.

Valve's Source engine is widely recognized as the most flexible, comprehensive, and powerful game development environment available.

Source combines leading-edge character animation, advanced AI, real-world physics, shader-based rendering, and a highly extensible development environment to produce some of the most popular computer and console games. These games deliver the most intense, visually-stunning gameplay experiences on modern hardware, while scaling smoothly on older systems, enabling developers to reach a diverse range of gamers.

Thanks to Source's comprehensive, road-tested collection of tools—the same used to create *Team Fortress 2*, *Portal* and the *Half-Life 2* series—your team's time and effort can be spent building creative gameplay and unique content rather than fundamental systems such as rendering technology or network code or collision detection.



Source technology powers some of the most critically-acclaimed PC and console games.

## Keep up-to-date with the latest tools and technologies

At its core, Source is designed with a modular, component-based architecture that enables the seamless integration of new features and technologies. Since its 2004 debut to third-party developers, Source licensees have benefited from the very latest tools for level design, modeling and character animation, online play and communications, console development, and more—all available at no extra cost or additional licensing fees.

Source's updated animation system brings expressive characters to life with an unlimited palette of facial expressions that allow them to convey a message without having to say a word. These characters possess the industry's most advanced artificial intelligence, making them extremely capable allies and foes.

Characters populate beautifully rendered and physically simulated worlds that, thanks to Source's integrated and versatile physics system, immerse players in realistic and responsive environments. This allows developers to break from authoring the pre-scripted events featured in previous generations of games, and opens the door for the creation of completely new styles of play.

Source's multiplayer platform supports some of the world's most played online games—including *Counter-Strike* and *Team Fortress 2*—and one of the largest online gaming cultures in the world. Robust networking and multiplayer features include support up to 32-player LAN and Internet games, an integrated server browser, and voice and text messaging.

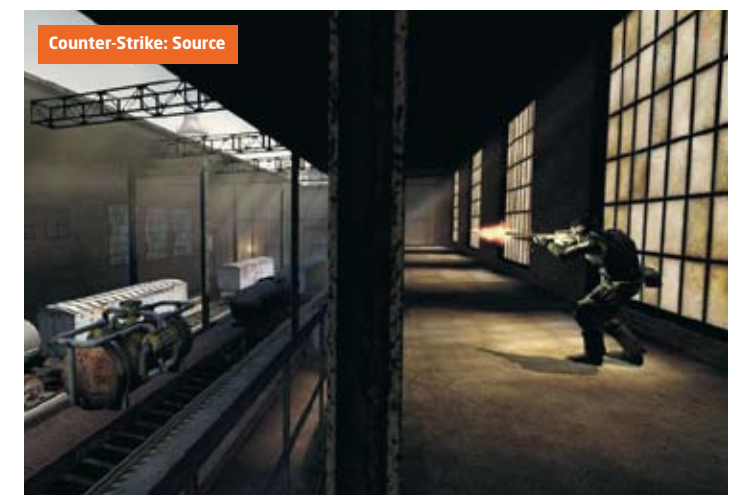
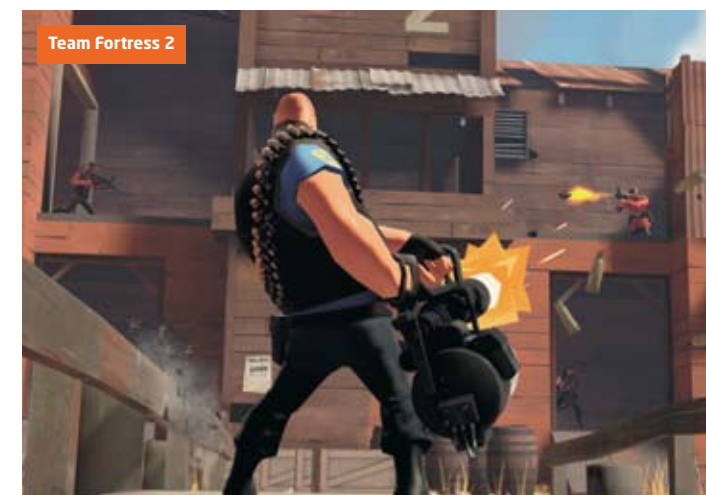
### Notable Source Updates

**October 2004.** The groundbreaking game platform that powers *Half-Life 2* and *Counter-Strike: Source* is made available to independent and professional game developers.

**June 2006.** High Dynamic Range Rendering (HDR) brings a new level of lighting realism to Source games, including the mod-turned-commercial release, *Day of Defeat: Source*.

**August 2006.** An enhanced facial animation system extends the range of character expression, as demonstrated by *Half-Life 2: Episode One's* Alyx Vance.

**November 2007.** A scalable multi-core system offloads CPU-intensive subsystems for PC and consoles—such as the materials system, particle simulations, and AI—across cores, setting the stage a new level of innovation on the Source platform.





# Rendering

Source features fast, reliable and flexible technology to render computationally intensive game environments. The highest-performing shader-based rendering available to game developers helps you quickly produce even the most complex scenes quickly and efficiently. Source's renderer utilizes advanced processor technologies such as multi-core and SIMD, as well as the latest GPU features via DirectX, to bring your vision to life in vibrant detail.

## FEATURES

### Advanced Shader Technology

**Support for HLSL shaders.** Author shaders for the Direct3D pipeline using up to shader model 3.0.

**Advanced Shader Library.** Use Valve's existing shader library or augment with your own algorithms. Existing techniques include all manner of sophisticated lighting effects from the non-photorealistic rendering (NPR) style of *Team Fortress 2* to the hyper-realistic look of the *Half-Life 2* episodes—all in one engine.

**LOD on Models and World.** Achieve maximum performance on all levels of hardware with automatic management of geometric Level of Detail (LOD).

**Alpha-to-Coverage.** Enables antialiasing of alpha-tested primitives such as foliage, fences, and grillwork.

**Infinite Resolution Masking.** Use distance-coded alpha masking for infinite resolution texture masking—useful for resolution-independent UI elements or any alpha-tested primitives.

### Dynamic Lighting and Shadows

**Radiosity Lighting.** World geometry is lit with radiosity lighting stored in light maps or per vertex to provide immersive environments. Light maps encode directional information so that lighting combines naturally with bump maps, resulting in more accurate lighting of local surface detail, including self-shadowing. Radiosity is computed using a distributed radiosity solver (vrad) which can be deployed across your local network for rapid iteration on world lighting.

**High Dynamic Range (HDR) Lighting.** All lighting data including light maps, environment maps and dynamic lights in the scene are computed in high dynamic range space for natural lighting. High dynamic range lighting is supported in the Source engine on all DirectX 9 level hardware, unlike most competing engines.

**Radiance Transfer/Indirect Lighting.** Dynamic objects and characters in the world pick up bounced light computed during offline radiosity computation. This lighting effect truly grounds characters and other dynamic objects in the game world.

**High Performance Dynamic Shadows.** Dynamic objects and characters in the world generate high performance shadows which are projected onto world geometry, providing critical lighting cues.

**Shadow Depth Mapping.** Shadow depth textures allow for realistic self-shadowing of objects in the world, providing a more realistic and immersive effect, at a greater cost than RTT shadows.

**Rim Lighting.** A separate rim lighting term can be used to highlight key characters, as in *Left 4 Dead*, or provide a stylized look, as in *Team Fortress 2*.

**Advanced Material Rendering.** Apply diffuse, specular, detail, emissive, iridescent and other special effects.

> A scalable, high-performance rendering system

### Effects

**Full Range of Special Effects.** Including particles, beams, volumetric smoke, sparks, blood and environmental effects like fog and rain.

**Particle Effects.** Source's advanced particle system can emit sprites or models for realistic fire, explosions, snow, and more. Multicore graphics optimizations improves particle rendering performance.

**Particle Editor.** Edit and create particle systems with fully interactive preview and the ability to see edited systems immediately in the game.

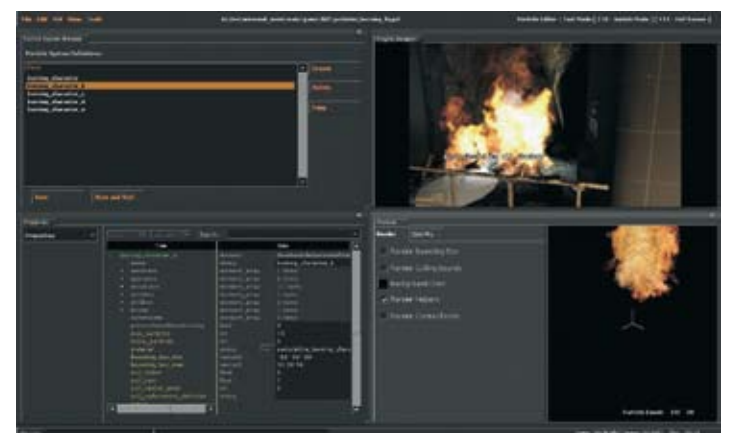
**Soft Particles.** Particle shaders use scene depth information to eliminate hard intersections seen in traditional particle rendering.

**Motion Blur.** Render full-screen camera motion blur in real-time.

**Water.** Generate realistic-looking reflective water surfaces with refraction and Fresnel effects.



Features like water refraction and High Dynamic Range lighting enhance visual fidelity and believability in Source-powered games.



Create and edit particle systems in the Particle Editor.



## Rendering (continued)

### Materials

**Material System.** Source defines sets of materials that specify what the object is made from and the texture used for that object. A material specifies how an object will fracture when broken, what it will sound like when struck or dragged across another surface, and what that object's mass and buoyancy are. This system is much more flexible than other texture-only based systems.

**Self-shadowed Bump Maps** create soft shadows and ambient occlusion with both dynamic and pre-calculated radiosity lighting. Source renders self-shadowed bump maps on both current and older-generation graphics hardware.

**Wrinkle Maps.** Particularly useful for facial and clothing wrinkles, additional texture maps are blended in to provide dynamic surface detail in areas of models which compress and stretch.

**Detail Textures.** Combine low frequency textures with high frequency detail to conserve video memory while maintaining apparent texture density.

**Versatile Multi-Texture Blending.** Define blend masks with variable sharp edges, combine textures using multiple different modes, and apply per-surface color correction.

**Dynamic Color Correction.** Interactively edit the color cast and contrast of your scene to match the desired art style.





# MODELING & ANIMATION

Compatibility with popular graphics and 3D modeling software lets you model realistic or highly-stylized characters, weapons, vehicles, and props within the Source environment. A robust set of tools help you efficiently rig, animate, and define physics interactions for a wide range of characters and objects.

## FEATURES

### Advanced Character Meshes

Create believable characters with accurate human characteristics:

- > **Simulated musculature** projects character emotions, speech, and body language.
- > **Spherically-shaped eyes** realistically reflect light and focus on the player/object, rather than parallel views.
- > **Language independent speech.** Characters accurately and naturally lip-synch speech in any language.
- > **Improved human skin shading.** Skin rendering includes natural-looking Phong shading, including a view-dependent Fresnel effect tuned for realistic human skin.



**Artist Plug-ins.** Streamline artist workflow by integrating Source modeling functions with familiar programs favored by creative professionals:

- > Autodesk®, Maya®, 3ds Max®, and Gmax®
- > SOFTIMAGE® | XSI®
- > Blender, LightWave 3D®
- > Maxon CINEMA 4D
- > Milkshape 3D
- > FragMOTION

**Model and Materials Compiler.** Compile models and materials with the Studiomdl and Vtex tools.

**Model Viewer.** Preview models in wireframe, shaded, or textured view modes; set up hit boxes, play animations, and fine-tune physics constraints.



← Source Model Viewer.

← Choreograph realistic characters that convey a wide range of emotions.

### Advanced Animation Tools

**Skeletal Animation System.** Articulate models with fluid and complex motion using Valve's proprietary skeletal animation system.

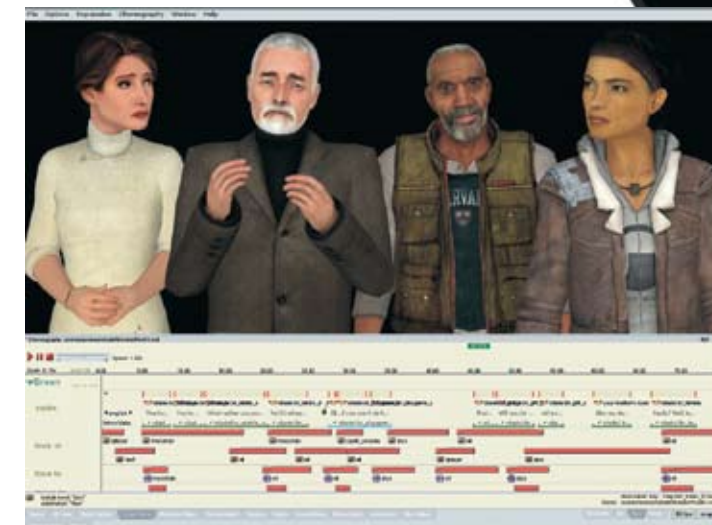
**Facial Animation System.** Valve's proprietary facial animation system seamlessly blends a wide range of facial expressions for natural, emotion-driven speech and movement. With more than 40 distinct facial "muscles," human characters convey the full array of human emotion and respond to the player with fluidity and intelligence.

**Advanced Procedural Animation Tools.** Tune ragdoll, animated bone followers, and custom procedural physics controllers.

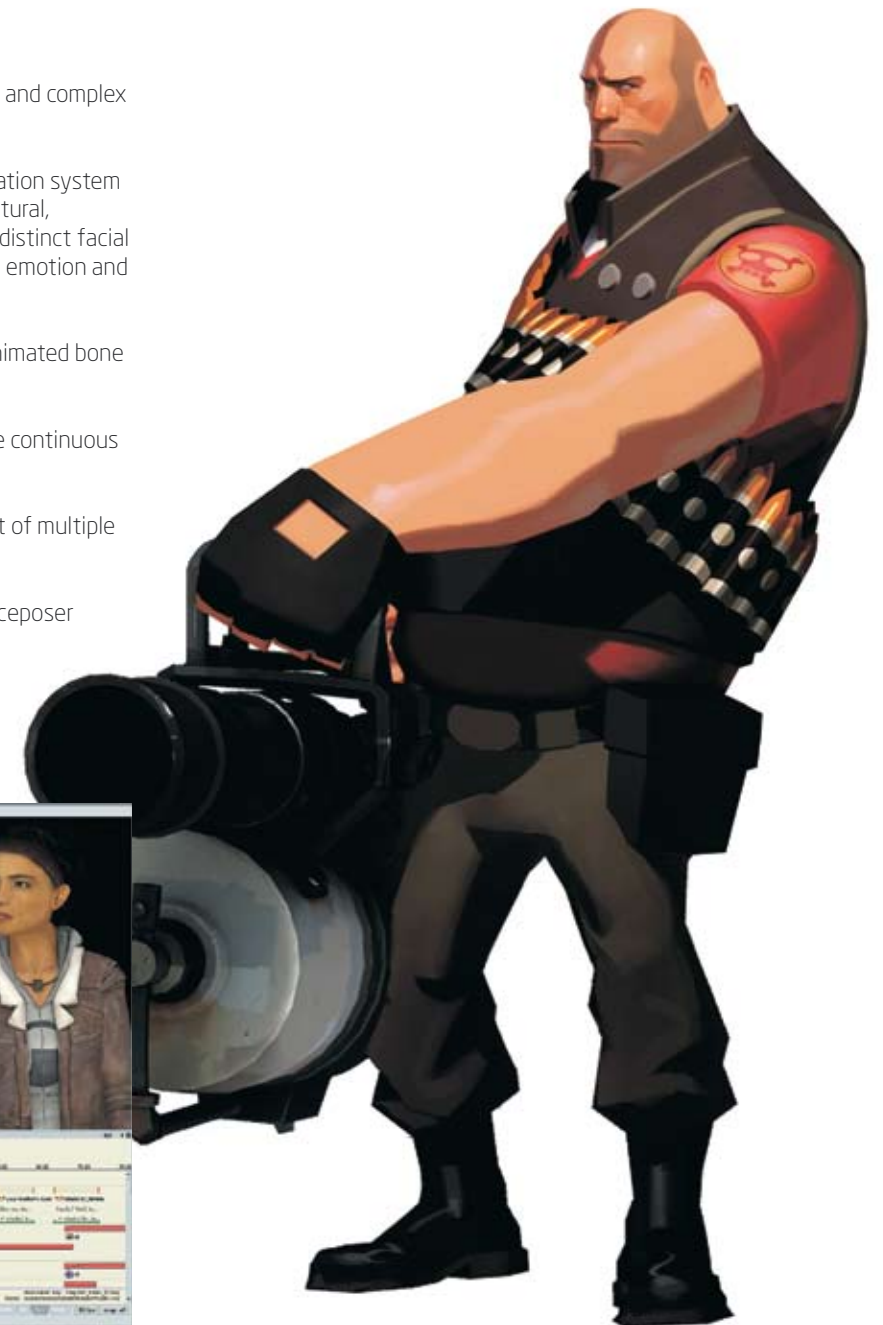
**Animation Blending.** Seamlessly blend gestures to create continuous movement or add depth to any character situation.

**Layered Animation Blending.** Synthesize animations out of multiple pieces.

**Faceposer.** Easily craft speech and emotions using the Faceposer facial expression tool.



Faceposer.



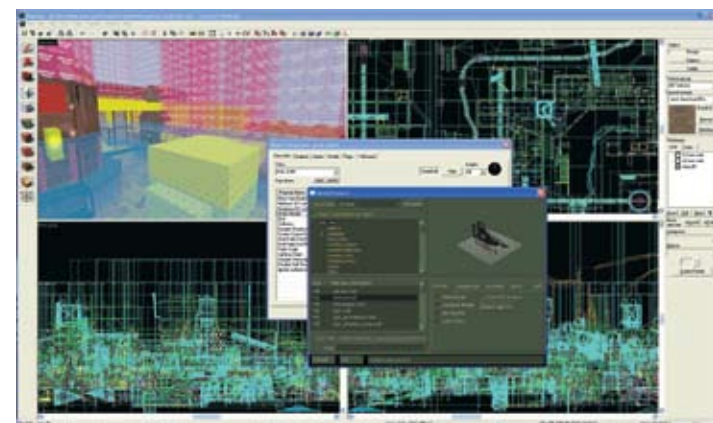
## ENVIRONMENTS

Valve Hammer Editor, the Source map creation tool, is an intuitive WYSIWYG design environment for constructing level architecture (geometry, texturing, lighting); placing and scripting models, entities, and NPCs; and compiling and running game levels. Included is the VMPI tool, which greatly reduces map build time by distributing compilation across multiple PCs.

### FEATURES

**Displacement Surfaces.** Freely create and sculpt natural hills, valleys, trenches, slopes, and tunnels using displacement geometry brush surfaces. Transform and clip displacement surfaces using brush and vertex tools.

**Brush Entities.** Define how objects interact with world architecture using a comprehensive inventory of brushes, including occluders, doors, triggers, area portals, soundscapes, and more.



Build and preview new worlds with the Valve Hammer Editor. The integrated Model Browser helps you quickly find, preview, and place models.

**Skyboxes.** Cube and environment mapping (skyboxing) extends the horizon and adds parallax on distant objects.

**Lighting Preview.** Easily view the effects of manipulating light sources within a level.



Dynamically render organics, such as grass and trees, using alpha-to-coverage for realistic foliage and landscape rendering.

## PHYSICS

Source's highly scalable, network-enabled physics system is both processor and bandwidth efficient. Construct responsive, transformable worlds where AI characters interact with physically simulated objects, and sound and graphics follow from physics. Source's physics features can be controlled by level design.

### FEATURES

**Machinery.** Construct detailed machinery with functioning mechanisms, gears, belts, and pulleys.

**Vehicles.** Non-player characters and, in a multiplayer game, other players can come along for a ride in cars that feature realistic suspensions with springs on each wheel and wheels that slip and skid depending on the surface material. Individually tunable parameters include horsepower, gearing, max speed, shift speed, tire material, tire friction, spring tension/dampening, and more. Leaning during acceleration, deceleration, and turning enhances the realism of the driving experience.

**Deformable Objects.** Physics-based animation simulates flexible hair and clothing and blends ragdoll physics with predefined animations.

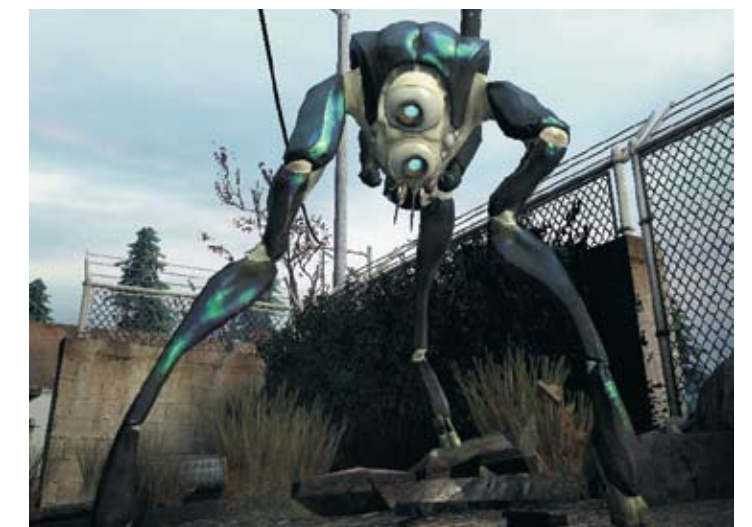


Vehicles, from cars to hovercrafts, are custom-tunable for a realistic driving experience.

**Ropes and Cables** can be dynamically shaken or broken by level events.

**Constraint System Manager.** Realistically define bone movement within a physical system using a series of constraints that enable a nearly limitless range of complex movements.

**Inverse Kinematics** ensures that characters' limbs correctly react to environments, such as moving around obstructions and adjusting for uneven terrain.



Characters' limbs correctly adjust for uneven surfaces.



## GAME MECHANICS

Innovative and seamless interaction between player and non-player characters is a hallmark of Source-powered games. A sophisticated AI system allows NPCs to follow players, join in the fight, or engage the player in epic non-scripted battles. AI characters can run, fly, jump, crouch, climb stairs, and burrow underground.

### FEATURES

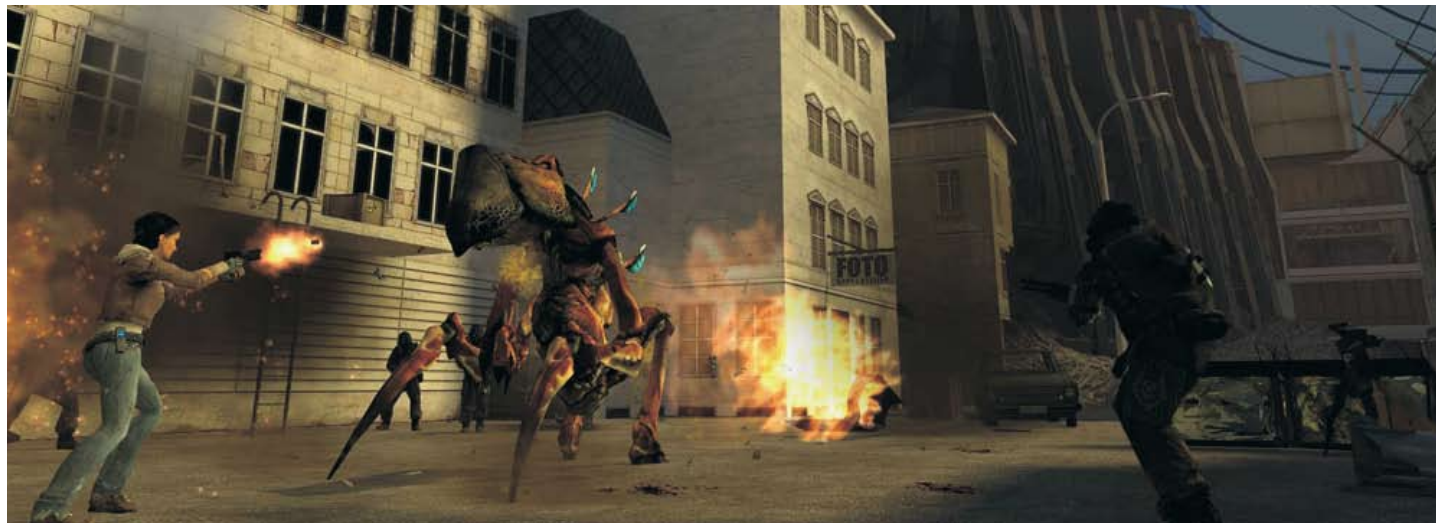
The sophisticated **Pathfinding and Navigation System** features a local avoidance system to help NPCs navigate around obstacles; a path cost system for fine tuning pathfinding choices; and dynamic and level designer-controlled path connections. The system recognizes the size of creatures—knowing where they can and cannot travel—and automatically accounts for all known methods of movement.

The **AI Sensory System** emulates human senses—vision, hearing, and even scent—to track and identify objects. The tunable system can be used for nearly limitless in-game mechanics and player challenges.

**AI Relationships.** Set a relationship between characters—an NPC, an NPC class, or player(s)—to influence behavior and action based on a variety of entities, such as hate, like, or fear.

**Battle AI.** Squads of AI characters can operate together and share knowledge about enemies. AI squad members track the status of each other—while one squad member is laying cover fire, another may recognize the opportunity to move or reload a nearly-empty gun cartridge.

**I/O System.** The flexible I/O system allows level designers to control AI without touching code.



Squads of AI characters operate together in epic non-scripted battles.

## PROGRAMMING

Authored entirely in C++, the Source engine is architected with extensibility, flexibility, and performance in mind. Licensees of Source technology have access to all of the source code that Valve uses to build the Source engine as well as our award-winning games. This allows your development staff to spend its time realizing your game design rather than starting from the scratch.

### FEATURES

**Multi-platform.** Target the PC and Xbox 360™ platforms from the same codebase using Microsoft® Visual Studio® 2005.

**Multi-core.** Source engine games utilize multi-core processors in both the PC and Xbox 360 to deliver high-performance gaming experiences.

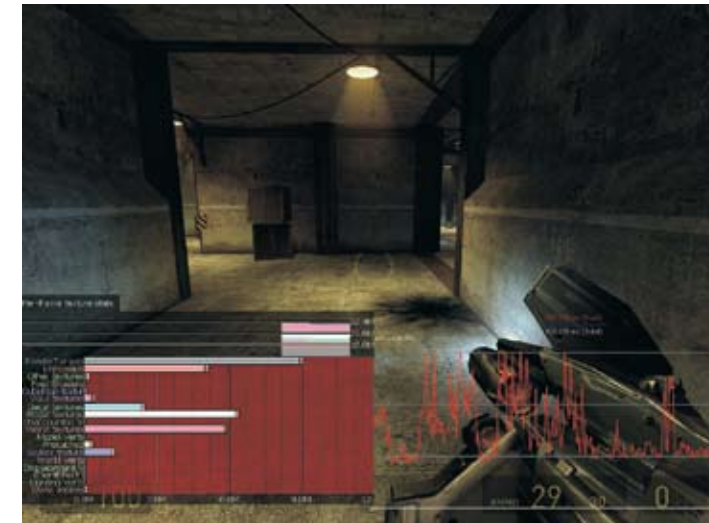
**Code Reuse.** Easily and quickly create new game rules, AI behaviors, game objects, and more using Valve's tested codebase as a starting point.

**Complete Control.** Make the modifications you need for your game to any part of the codebase – Source licensees have access to it all.

**Efficiency.** Take advantage of the memory and performance optimizations that Valve has developed for its own products.

**Profiling.** Utilize Valve's existing tools for monitoring video, network, and game entity performance.

**Presentation.** Valve's platform-independent custom GUI framework mimics most of the windows controls but is rendered using the Source engine for consistent in game and out of game UI.



Utilize Valve's existing tools for monitoring video, network, and game entity performance.



# AUDIO

Source includes a powerful suite of digital audio technologies to create vibrant, dynamic soundscapes within the game world. Seamlessly blend sound effects, dialogue, and music with visual elements for an intensely immersive and realistic playing experience.

## FEATURES

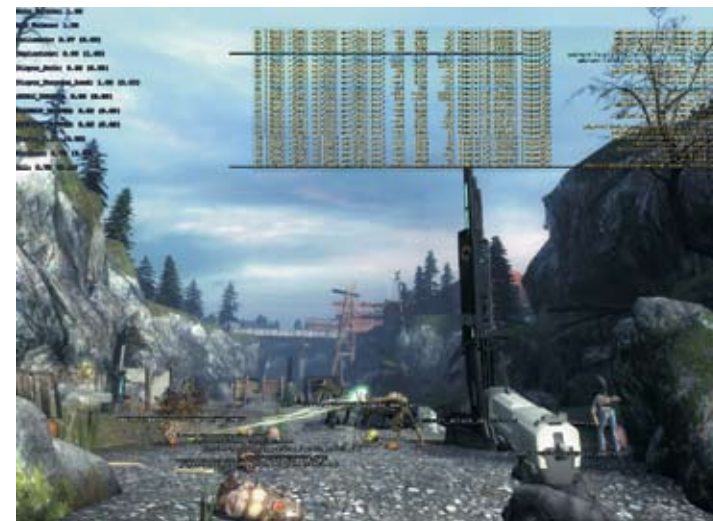
**Threaded Sound Engine.** Sound mixing processing can run on separate cores on multicore systems.

**Memory Management.** Sounds can be asynchronously loaded, streamed, cached into a fixed pool or preloaded.

**Surround Sound.** Support for stereo, headphone, 4 channel and 5.1 surround mixes.

**3D Spatialization.** Apply occlusion and obstruction effects, distance, and environmental reverberation using custom 3D spatialization algorithms.

**DSP.** A wide range of stackable preset DSP filters includes reverb, chorus, ADSR envelope, low-frequency oscillation (LFO), and low-pass, high-pass, and band-pass filters. Custom or preset DSP effects can be triggered in-game based on environmental geometry.



Optimize soundscapes using in-game audio diagnostic tools.

**Compressed Audio Formats.** Source supports ADPCM, MP3\*, and XMA.

**Advanced Pre-processing Effects.** Sound designers can author custom doppler shift, distance cueing and other multichannel effects.

**16-bit 44KHz, stereo wave data** with all features.

**Real-time Wave File Stitching.** A simple scripting system lets audio designers build aggregate effects out of wave sequences.

**Overall Mix Control.** Audio designers can build several overall mixes using scripts and the game can dynamically switch between those mixes to get different fader settings for action vs. dialog scenes.

**Scripting System for Environmental Sounds.** Audio designer can script custom ambient loops, random events, and DSP effects that are triggered based on the player's position in space. This can also be modified by game logic for dynamic effects.

**Material-based Effects.** Audio designers can define scripts to set up material specific impact, friction, and footstep effects as well as reflection parameters for automatic room DSP.

\* requires Miles Sound System license

# NETWORKING

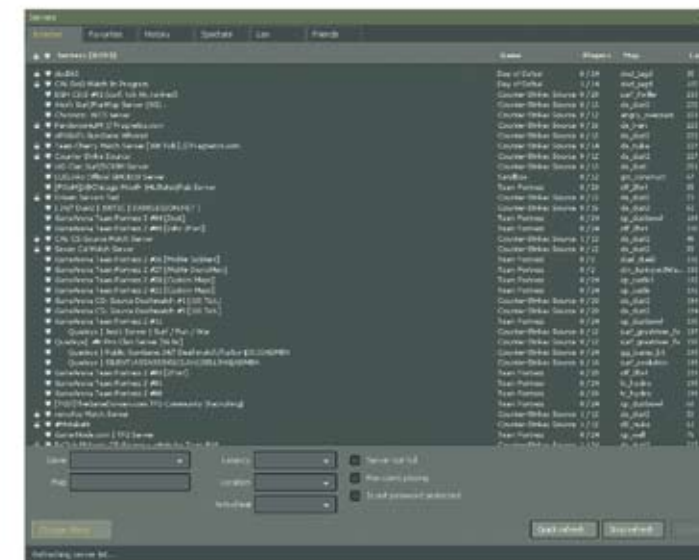
Source's multiplayer network code is time and gamer tested by millions of players around the world, with an average of more than 9 billion multiplayer minutes played per month.

## FEATURES

**Prediction Analysis and Server-Side Lag Compensation** for reducing the visible effects of latency in the connection between clients and the game server.

**Server Browser.** Displays all active game servers and allows a player to choose which one to participate on. Players can filter and sort server lists in order to speed up the display and selection of a server.

**Friends Instant Messenger.** Allows players to message each other both in and out of the game, as well as join friends in existing games. No more confusion about what server friends are on or how to chat -- the Friends Instant Messenger keeps everyone connected.



Server Browser



Friends Instant Messenger

## CONSOLE SUPPORT

Source offers an ideal development environment for next-generation console platforms, including the Xbox 360.

### FEATURES

**Asset Conversion.** Custom tools to convert PC assets (maps, models, materials) to 360-compliant formats.

**Xbox 360™ Specific Loaders.** Proprietary tool compiles game data into a custom format for fast loading and minimal access times.

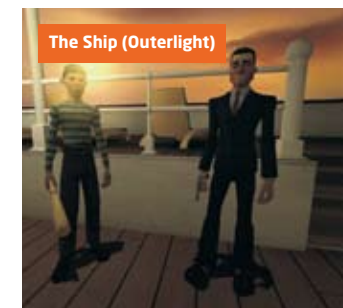
**Cross-platform Play.** Network design allows multiplayer between PC and 360 platforms and also simplifies development and testing in a cross-platform environment.

**Integrated Xbox LIVE™ Code.** Interfaces for Rich Presence, match-making, and stats reporting.

## SOURCE SDK: BUILDING COMMUNITIES

As a team largely comprised of former mod developers, Valve is dedicated to providing the best tools and resources for the modding community. The Source engine and SDK give you all the tools you need to produce brilliant game creations—in fact, more Source-powered mods have been successfully distributed as full-fledged commercial products than with any other engine.

The Source SDK is available free of charge via Steam with purchase of a Source-based game, such as *Half-Life 2* or *Team Fortress 2*. Learn more about building Source-powered mods at <http://developer.valvesoftware.com/wiki/Category:Modding>.





## LICENSING SOURCE

As a Source licensee, you're given full access to a range of contacts and resources, including special conferences, intensive Q&A sessions with Valve developers, a private licensees' wiki, and e-mail list membership.

### PRICING

Valve technology offers the most advanced features, tools, and support at extremely competitive prices. Discussed under NDA.

### CONTACT

sourceengine@valvesoftware.com

### FOR MORE INFORMATION

Valve Technologies

<http://www.valvesoftware.com/business>

Valve Developer's Community

<http://developer.valvesoftware.com>

Valve Publications

<http://www.valvesoftware.com/publications.html>

## Notes:

