The free-software counterpart of the GoldSource game engine.

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Xash3D is a Half-Life-compatible engine, so all of the improvements and enhancements listed are relative to the GoldSource (GoldSrc) engine's features.

This list is for Xash3D 0.95. It will be updated as new features are added.

**Primary Limits Limits for BSP Models** 

Other Limits

Server Shows Attachment Angles

**Correct Server-Side Lighting Information** 

Saving Cameras Using trigger\_camera

**Better Decal Saving** 

**Entity Patch Technology Support** 

Support for More Map Types

Support for On-the-Fly Precaching

Secure Transmission of User Messages to the Client

Safe Level Changing

**Bundled Titles** 

**Recursive Search for Visible Entities** 

More Stable MOVETYPE PUSH

New Type of Physics Relationship: MOVETYPE\_COMPOUND

**Stopping Time** 

File System Transparency

Autocompletion in the Console

**Detached from the Base Directory** 

Fully-Fledged Dedicated Server Console

Colour Console Messages

**Auto-Levelshots System** 

**Background Map Support** 

**Sprite Interpolation** 

**Lightstyle Interpolation** 

Support for Quake-Style Luma Textures

Better Sprite and Model Lighting

Playlist for Background Audio Tracks

Support for Save Shots and Demo Shots

Player Model in the Menu

**Dynamic Skybox Substitution** 

**Twitching Monsters Fixed** 

More Efficient Culling

**Viewing Loaded Textures** 

**Automatic Sorting of Translucent Surfaces** 

**Support for Detail Textures** 

Full Support for Russian

**Streamlined Overview Creation** 

**Mirror Surfaces** 

**Rotating Skyboxes** 

**Transparent World Water** 

High-Resolution Textures

PhysicsInterface and RenderInterface

Xash3D raises GoldSource's primary limits so that they are less restrictive, and makes them more customizable. See **gameinfo.txt** for an example:

Limit	Xash3D	GoldSource
MAX_EDICTS	600–4096	900
MAX_TEMPENTS	300-2048	500
MAX_PARTICLES	1024-8192	4096
MAX_BEAMS	64–512	64

Manually setting lower limits helps you save memory in those mods where, for example, you don't need many edicts. In addition, the **MAX\_EDICTS** parameter comes from the server if the game is local, and the client is automatically adjusted to the new environment.

Limit	Xash3D	GoldSource
MAX_MAP_MODELS	1024	256
MAX_MAP_LEAFS	32767	8192

Other limits for BSP models are configured by the compiler and do not depend on the engine.

The following limits are locked at fixed values in the engine and can't be changed in the client:

Limit	Xash3D	GoldSource
MAX_VISIBLE_PACKET (entities)	512	256
MAX_MODELS (unique models including sprites and bmodels)	2048	N/A
MAX_SOUNDS	2048	N/A
MAX_SENTENCES	2048	1534
MAX_USER_MESSAGES	191	128 (WON GoldSource)
MAX_TEXTURES	4096 (of which 2048 can be used by VGUI)	N/A
MAX_MESSAGES (number of messages in <b>titles.txt</b> )	2048	1024
Maximum size of indexed texture	1024x1024	512x512
Maximum size of TrueColor texture	4096x4096	N/A

It's a known fact that the **GET\_ATTACHMENT** engine function doesn't return attachment angles. This feature is simply absent from the original engine and model compiler.

Xash3D can partially correct this by returning the angle between the forward vector (running from the bone to the attachment) and the attachment vector (shown in any version of the Half-Life Model Viewer when the **Show** attachment option is selected). This feature may be useful for implementing things like a headcrab jumping off a dead zombie or realistic positioning of the laser sight on a viewmodel.

To enable this, set the **sv\_allow\_studio\_attachment\_angles** console cvar to **1**. The value of this variable is saved in **config.cfg**, but does not affect clients.

Xash3D is better at returning lighting-related values, because it takes both the light styles and their current values into account. In future versions, it is also planned to provide brightness information about entities lit by flashlights and other players (for example, in multiplayer). Player lighting data is taken directly from the renderer and considers all light types, including entity light and dynamic light.

It is a known Half-Life issue that the camera orientation is not restored when loading a savegame. This can interfere with scripted scenes and give mod makers trouble. Xash3D fixes this problem. Now any camera in any mod is restored on game load.

In Half-Life, decals are consistently saved only on world brushes and randomly on entities such as doors or elevators. Xash3D saves decals on all brushes and entities. Decals are also transferred between levels (an implementation of this exists in Half-Life but does not work).

This technology loads the entities for a map from an external script with the extension **.ent**. Such a script can be created by **ripent.exe** or by interacting with the engine. For example, using the console command **entpatch** <**map\_name**> when a map loads will automatically create an entity patch for this map.

Xash3D supports the following types of BSP map:

- Quake 1
- Half-Life
- Half-Life Blue Shift
- BSP 31 (custom Xash3D-specific format with extended limits and high-resolution lightmaps)

In addition, there is Quake-style support for external bmodels, such as medkit and ammo models.

**Note:** Maps from Quake 1 should be used in the Deathmatch Classic mod to prevent player models getting stuck due to hull size differences between Half-Life and Quake.

Also, DMC has a full set of entities required for deathmatch on these maps.

Xash3D can precache resources on the fly during the game. This helps avoid the annoying **PF\_PRECACHE\_ERROR**. Xash3D also doesn't crash if it can't find a model or sound.

Xash3D does not crash if a user message is longer than the limit set during registration or if the limit is not set. Such a message is simply not sent, and is redirected to the console. In addition, **SVC\_TEMPENTITY** is a completely safe message just like user messages.

Before loading a new map, Xash3D analyses its status without unloading the current map and decides whether the level can be changed normally. If there are any errors in the next map, a message will be logged to the console, and the map will not be loaded. The error is accompanied with a recommendation on how to fix the error. This will undoubtedly make life easier for mappers, because errors at level change are usually the most obscure and the hardest to fix. In some cases, Xash3D can automatically disable the safe level change behaviour and activate the default Quake-style level change system. An error message in the console will reflect this.

When you feed the **oem\_end\_credit** keyword into the **pfnEndSection** engine function, titles are displayed on screen. When the titles finish, the game is ended. The code for the titles is stored in **menu.dll** and can be changed by the user.

Xash3D supports server-side searching for entities added to the "visible" list for the client. An implementation example of such a search can be found in the SDK, in the functions **SetupVisibility** and **AddToFullPack** (**client.cpp**).

In Xash3D, objects on moving platforms behave in a more stable fashion and do not swerve at sharp bends.

This lets you "glue" one entity to another at a particular angle, which is retained if the parent object moves. Example from the SDK: a crossbow bolt that sticks correctly to **func\_pushable**, **func\_rotating**, **func\_tracktrain** and other brush models.

The engine is capable of stopping time when **playersonly** is entered at the console (a counterpart of this command exists in the Unreal Engine). This command freezes time both on the server and the client, but does not affect the player. This can be useful for taking screenshots, verifying the behaviour of physics, and other debugging purposes.

Xash3D ignores the string "wad" in maps and does not crash if one or more WADs are not found. In GoldSrc, the situation was complicated by the engine not verifying that the map actually used anything from the WAD it said it needed. This means that Half-Life would occasionally demand a WAD for some map for no good reason.

You can now also load textures from WAD files using the pfnLoadFileForMe function on the server and the **COM\_LoadFile** function on the client. Just specify the name of the texture in the WAD file, and the engine will know how to find it. You can also supply the WAD you need in the path if the texture must come from this particular file. For example, **gfx.wad/conback**.

Xash3D has a powerful console command autocompletion system. You can list commands and even brief descriptions for each of them as you search. For convenience, you can enter **makehelp** at the console, and the engine will automatically generate the **help.txt** file with a list of all console commands and variables, and their descriptions. Autocompletion also works for map names, video files, background tracks, configuration script files, save names, weapon names (for the **give** command), sound testing (for the **play** command), and game (mod) directory changing.

Most Quake-derivative engines are known to be rigidly bound to a parent directory that has a specific name. This doesn't matter much for modding, but it is a huge liability for total conversion makers, who would like to change the parent directory. Xash3D is not bound to any particular directory. The parent directory is determined by a launcher executable, where it is specified. This enables you to create your own game that doesn't depend on Half-Life in any way.

The dedicated server console fully supports autocompletion and command history for the current session.

Xash3D supports console message colouring, which was first introduced in Quake 3. This system understands colour tags made up of ^ and a digit from 0 to 7, where the digit denotes a predefined colour.

Number	Colour	
0	black	
1	red	
2	green	
3	yellow	
4	blue	
5	cyan	
6	purple	
7	white	

This colour table is fully compatible with Quake 3 and works the same way: the line is coloured up to the end or up to the control tag ^7, which resets the colour. The system also works in the menu and can be used for colouring player nicknames.

**Note:** To enable colouring in **vgui**, set the **vgui\_colorstrings** console variable to **1**.

The engine supports creation personal levelshots for each level. To enable it, enter the following at the console: "allow\_levelshots" "1". The screenshots will be created automatically, but you can substitute your own at any time.

Background maps are maps displayed as a backdrop for the menu. A similar system can be found in Half-Life 2. Xash3D provides a simpler system: the choice of map doesn't depend on the completed episodes (because there is no episode tracking in Half-Life), but occurs randomly based on a list you provide.

The file listing the background maps must be named **chapterbackgrounds.txt** and be located in the **scripts** directory (if the directory doesn't exist, create it). Each new map name must be on its own line. Example:

c1a1a

c2a1

c4a3

c2a5

c0a0

Any map can be used as a background, but using maps where the player rides a monorail train is not advised, because the result may look unappealing.

Enabled by default. This provides smoother animation for sprites that have their rendermode set to **texture** and **additive**. To enable or disable interpolation, use the r\_sprite\_lerping console variable.

**Note:** For correct interpolation, make sure the server framerate is exactly 10 FPS (regardless of the sprite's own FPS in **pev** | **framerate**). This parameter is dictated by the frame changer function's think time, which is 0.1s and remains unchanged in most mods.

Disabled by default. Has no effect on short sequences such as lights being turned on or off. Does a good job of smoothing the light animation in long slow sequences such as SlowStrobe or SlowPulse.

**Note:** This option can significantly decrease the overall framerate.

This type of texture can be found in the original Quake maps—they are the luminescent areas of the texture. This trick owes its existence to the specifics of Quake's palette, so the engine enables it only for those textures whose palette is identical to Quake or Quake 2. This palette is preserved well when textures are converted from WAD2 to WAD3; an example can be found in the "qstyle" map by Scrama.

Improvements to model lighting include per-bone lighting by static and dynamic light sources and consistently correct model lighting all through long sequences, where a model travels a fair distance from its actual location. Example: forklift.mdl.

Correct lighting has been implemented for all sprites for which the type was set to **alphtest** at compile time and rendermode was not set to additive in game. For example, blood spatters are tinted by the environment's lighting rather than glowing in the dark.

Lighting of both models and sprites is affected not only by the world, but also by the nearest brush model, if any.

**Note:** If the improved lighting produces poor results in a particular game, you can disable it by setting **r\_lighting\_extended** to **0**.

In Half-Life, the names of MP3 files, which replaced audio CD tracks, are hardcoded in the engine and cannot be changed. Xash3D automatically creates a playlist of these tracks, and you can add your own tracks or the blank keyword (if a track does not exist). The playlist is located in the media directory and named **audiocd.txt**.

These are thumbnail images of the game view at the time the game was saved on a demo recording started. You can view them in the menu, in the corresponding sections.	

Instead of the regular player image, the menu shows an actual 3D model and lets you preview your changes in real time.

You can change the skybox in game using the **sv\_skyname** command (for example, with **CVAR\_SET\_STRING**). This change is stored in savegames and restored on load. You can also use the skyname command to change the skybox only on the local client. In this case, the change cannot be saved.

Xash3D fixes the annoying twitching of monsters that are travelling in trains and on elevators. This fix works in all mods and is unrelated to some mods' similar efforts, such as the one in the latest versions of SoHL: Custom Build.

Xash3D uses a more efficient culling system, which helps improve the framerate and decrease **r\_speeds**. In addition to the **r\_lockpvs** command, you can use the **r\_lockcull** command to evaluate culling efficiency. Moreover, the engine can handle what is known as static brushes, where any model with normal rendermode and zero position and rotation values automatically becomes part of the world and is drawn along with world polygons. In highly detailed maps, this, coupled with the use of **func\_cull**, significantly boosts performance (for example, in the "Dm-knot" map by Scrama). However, this system considerably increases the chances of z-fighting in some old maps created with Worldcraft or Valve Hammer Editor, because those editors use integer coordinates for all objects in the map. If this occurs, it is recommended that you disable static brush support using the "**gl\_allow\_static**" "0" console command.

To view currently loaded textures, use the **r\_showtextures 1** console variable. This enables texture browser mode, where you can navigate the pages using the right and left arrow keys. To exit the texture browser, enter **r\_showtextures 0**.

This method makes sure that all translucent surfaces are drawn in the correct order from the point of view outward. Half-Life does not guarantee this.

You also have the option to sort textures in studio models by making the model draw opaque textures first and textures with the **additive** flag last. This behaviour is enabled by setting the **r\_studio\_sort\_textures** console variable to **1** (it is **0** by default).

For brushes, translucent surface sorting can be turned off by setting **gl\_nosort** to **1**.

Xash3D support standard detail textures from the Steam version of Half-Life. To turn detail textures on and off, use the **r\_detailtextures** command. Setting the value of **r\_detailtextures** to **2** activates the built-in detail list generator for each map. This facilitates subsequent editing, because normally all that is left to do is prune unneeded values.

Unlike GoldSrc, Xash3D has comprehensive support for the Russian language. This enables you not only to output screen messages in Russian, but also chat in Russian, give models and maps Russian names, write player nicknames in Russian and even provide Russian-language console commands and cvars.

**Note:** Russian language support requires a **fonts.wad** file that provides Russian characters. To prepare such a file, use the **makefont.exe** utility, which is included in the **xash\_extras.rar** archive, or download the file from the GoldSrc localisation Web site.

Xash3D creates overview files at the push of a button. With **dev\_overviev** set to **1**, configure the display options as necessary, and press the screenshot button. Xash3D will automatically create a screenshot, compress the input colorspace to 8 bits and write out the overview script. Of course, the legacy option to create overviews as in the original Half-Life has been preserved—for that, use **"dev\_overview" "2"**.

Xash3D supports mirror surfaces on all brush objects. This means you can stick a special texture to part of the geometry or a separate model to turn that area or model into a mirror. The texture must be named **reflect1** or **reflect** (the necessary texture is included in **decals.wad**). Mirrors can also be used on moving and rotating objects such as trains or doors. In addition, the mirror will respond to rendering parameters set by the mapper, enabling you to control transparency, as you can for the entire brush. Mirrors also support detail textures.

The new skybox control system enables tilting the skybox in arbitrary directions and set its rotation on the three primary axes. For that, use the following console variables:

- sv\_skyspeed
- sv\_skyangle
- sv\_skydir\_x
- sv\_skydir\_y
- sv\_skydir\_z

All of those variables are stored in savegames and restored on load, which makes them easier to work with.

A known limitation of GoldSrc is that it doesn't let you make the world water transparent. Xash3D makes this possible by adding the new variable **sv\_wateralpha**, which adjusts water transparency. The value of this variable is stored in savegames.

**Note:** To fully support transparent world water, you need a special compiler that takes the transparency into account. Sample code for implementing this can be found in numerous compilers for Quake 1, where this feature has been enabled for quite some time.

Xash3D supports loading of high-resolution textures in TGA format for nearly all types of in-game models (except sprites).

The textures should be in the following locations:

- modfolder\materials\<map\_name>—for a specific map
- modfolder\materials\common—common to all maps
- **modfolder\materials\models\<** modelname>—for models (the texture name must match the model's internal texture name)
- modfolder\materials\decals—for decals

To enable high-resolution textures, go the Video Options section in the game menu.

The self-explanatorily named PhysicsInterface and RenderInterface provide ways to flexibly control physics and create custom renderers for mods. For examples of using the interfaces, refer to the Xash mod.

Xash3D is intended as a replacement for the GoldSource engine, so the original engine binaries are not needed for Xash3D to work. Generally, you need only the following:

- The folder containing the game or mod data. For Half-Life, this is the **valve** folder; for a mod or derivative game, the folder name is usually the developer name or a variation of the title: for example, **gearbox** for Opposing Force or **Hunger** for They Hunger.
- The xash\_build\*.rar file.
- The xash\_extras.rar file.

## Installation for Pre-Steam Games and Mods

- 1. Unpack the contents of the **xash\_build\*.rar** file to your Half-Life folder, overwriting any existing files.
- 2. Extract the **valve** folder from the **xash\_extras.rar** file to the same folder, overwriting any existing files.

Installing mods on top of this setup is no different from installing on top of the original Half-Life. You simply need to put the mod data folder alongside the **valve** folder.

## **Installation for Steam Games and Mods**

Xash3D does not work directly with Steam's \*.gcf game data archives. To make a Steam-distributed game work with Xash3D, you first need to extract the game data from the \*.gcf file using a third-party program, such as GCFScape (link opens a new window).

#### Half-Life

- 1. Create a folder for Half-Life.
- 2. Extract the **valve** folder from the **<steam\_installation\_folder>\steamapps\half-life.gcf** file to your Half-Life folder.
- 3. Unpack the contents of the **xash\_build\*.rar** file to this folder.
- 4. Extract the **valve** folder from the **xash\_extras.rar** file to the same folder, overwriting any existing files.

#### **Derivatives and Mods**

- 1. Make sure you have set up Xash3D to run Half-Life, as described above.
- 2. Locate the **\*.gcf** file for your game or mod in the <**steam\_installation\_folder**>\**steamapps** folder.
- 3. From this \*.gcf file, extract the folder with the game or mod data to your Half-Life folder. For example, for Blue Shift you need to extract the bshift folder from the half-life blue shift.gcf file.

## Launching the Game

To launch Half-Life, run the replacement **hl.exe** program.

To launch a Half-Life mod, do one of the following:

- Run **hl.exe**, and switch to the mod by selecting **Custom game** in the main menu.
- Create a shortcut to hl.exe, open the shortcut's properties and add the
   -game <mod\_folder> parameter to the command string in the Target text
   box; for example, "C:\games\half-life\hl.exe -game gearbox".
- Create a \*.bat file that runs hl.exe with the -game <mod\_folder> parameter; for example, "C:\games\half-life\hl.exe -game hunger".

The following games and mods have been successfully completed on the Xash3D engine. This list is constantly updated; for the most up-to-date version click <a href="here">here</a> (link will open in a new window).

Title	Comments
Accidental Assassin	
Adam	
Affliction	
Afraid of Monsters: Director's Cut	
Alternative Way: Part 1	
Arrange Mod: Rebirth	The mod is extremely heavily modified and incomplete.
Ashfield	Buggy, but the bugs are also present when the original Half-Life is used.
Assault on Roswell v2.0	
Azure Sheep	
Back to Xen	
Back to Xen 2	
Before	
Betrayal	
Big Lolly	
Big Scientists	
Black Death	
Black Guard (aka	

Black Security)	Demo 2 has been tested.
Black OPS (aka Black Operations)	
Black OPS Redux	Some advanced game options cannot be configured through the Xash3D game menu, but only through console commands; some visual effects can look different.
Blbej Den	
Blood and Bones	
Blood Bath	
Bloody Pizza: Vendetta	
Blue Shift	
BoomeNShtein3D: Episode 1	
Bootleg Squadrog	
Boreality: Part 1	There are visual glitches on the <b>mell04</b> map, but the same thing also happens under the original Half-Life.
Borked Hazard Mod (aka The Borked Hazard Course)	
Brave Brain	There are a couple of internal bugs in maps <b>b3a3a</b> and <b>b4a7</b> that can force you to use <b>noclip</b> , but they are not Xash3D-specific.
Breakdown	
Breakdown 2: Afterwards	
Buddhist Wars	
Bugstompers	
Case Closed	
Castle Disposed	

Cat-Life Demo	
Chaos Theory	
Chemical Existence	You can get stuck inside a moving truck in the middle of the mod on level change. As a workaround, use the noclip command.
Christmas-Life	
Chronicles. Episode 1: Traumatic Experience v1.3	You should play only version 1.3, because older versions of the mod work properly only with WON Half-Life v1.0.1.6 or earlier.
Classic Games Mod	
Cleaner's Adventures	
Construction	
Conundrum	
Conundrum 2	
Cthulhu: An Unspeakable Modification for Half- Life	
CWC Board Mappack Initiative	Buggy, but the bugs are also present when the original Half-Life is used.
DALEK unbidden	
Dark Territory	Do not use any NPCs, especially Barney, to make them follow you, after you've all landed together in the first Tau jungle map. Otherwise the game can get stuck playing the scripted sequence, and you won't be able to advance.
DaRkFoRcE	Preview demo version of the Escape from the Darkness mod.
DAV Sub	
DAV Train	

Dead Sector	
Death Is Dead	There is a fog-related bug in the first map, but that is an internal programming issue.
DejaVu	
Deliverance	
Destination Black Mesa	There is a small problem that can randomly crop up at the end: Gordon Freeman can be positioned incorrectly in a scripted scene, so you can't properly see the last map of the mod with the credits. Type the <b>restart</b> command in the console if you get this issue; it's probably an internal glitch of the mod.
Doomed-life	
Dopusk31	Set the original <b>hl.dll</b> from the <b>valve</b> folder as main game dll in <b>gameinfo.txt</b> to play this mod; also turn off the flashlight before levelchanges, otherwise the game will crash.
Dwell	
E. T. C. (aka Earthquake Testing Facility)	
E. T. C. II	
E. T. F.	
E7: Black Star	
Edge of Darkness	
Emergency	
En Route 66	To start the mod, set the <b>-num edicts 4096</b> parameter in the properties of the shortcut to <b>hl.exe</b> .
Episode Power Plant and China	
Episode Secret Weapon	

ESCAPE	
ESCAPE 2	
Escape from the Darkness	
Fate Reversal	
Fathom 2.4	
Fight for Life	
Firefighter Demo	
Focalpoint	
Force of Evil	
Friendship: Town of half-life.ru mappers v2.0	
Gateway	
Gateway 2	
Ground Zero 2: Fallout by Derek 'Hellfire' McBurney	
Ground Zero by Derek 'Hellfire' McBurney	
Ground Zero by Necromancer	
Gunman Chronicles	Standalone game by Rewolf.
Gut Reaction	
Half-Life	
Half-Life Baby v1.4	This is an unfinished but playable mod. After installation, open the <b>liblist.gam</b> or <b>gameinfo.txt</b> file in the mod's folder and change the line <b>gamedll</b> "\hlbaby\dlls\hl.dll"; otherwise you won't be able to start the game.

Half-Life: Decay	The game crashes randomly when monsters try to attack your second character, so it's almost impossible to complete some episodes without using cheats.
Half-Life: Gold Singleplayer	HD textures for the maps in this mod cannot be used under Xash3D the way they can be used under the Steam version of Half-Life. However, remember that Xash3D has its own easier and more productive system for using HD textures in any mod.
Half-Life: OPS	The <b>escape</b> map has an internal bug: you should not use any kind of HD replacement for the default scientist model or you will get stuck.
Half-Life: REDUX	HD textures for the maps in this mod cannot be used under Xash3D the way they can be used under the Steam version of Half-Life. In addition, some advanced game options cannot be configured from epy Xash3D game menu, but only by using console commands.
Half-Quake	
Half-Quake 2: Amen	
Half-Quake 3: Sunrise	
Half Secret	
Hammertime Demo	
Hardman - In the City	The updated version of the mod has been tested.
Haywire	
Hazardous-Course 2	
Hazardous Materials: Episode 2	
Heart of Evil: Napalm Edition	
Heavily Armed	This mod can only be played using cheats, but that is by design, because the mod was created just for fun.
Help Wanted	

Hidden Evil v1.01	
HLFX Single Demo	
HLFX v0.5 (demo maps)	
HLFX: Lost in Black Mesa	
hlife_hotdog_compo26	
Hour-Glass	
Icon of Hell: Episode 1	This mod should only be played with Xash3D; it's not fully compatible with the original Half-Life.
Index Two: Episode One	There are a couple of internal mapping errors in the <b>outl08</b> map, so you'll be forced to use <b>noclip</b> to reach a ladder on a house, and then there will be an "inverted" changelevel to the <b>outl09</b> map.
Induction	
Infestation	
Infiltracja	
Infinite Rift	
Intolerable Threat	
INVASION	After the first run of the mod, open <b>gameinfo.txt</b> and set <b>max_tempents</b> to <b>1024</b> to avoid crashes.
Invasion 105	
Irreality	
Ispitatel	
Ispitatel II	
Ispitatel IV: Classic	
Issues	
Kill All Greenpeace	
	There is one bug in this mod: in the map with the

Krypton	rocket pad, the rocket can get stuck when you try to launch it. However, this bug happens with the original Half-Life engine too.
Land of Legends: Heroes of Loria	This is a cooperative mod, and it was tested in solo play mode.
Lands of Lore v2	
Last-life	
Life's End	
Lunch Lady Invasion: Episode 1	
LV-426: Episode 1	
MadCrabs	There are a couple of possible scripting problems, but they seem to be the mod's internal issues, so if you get stuck somewhere just try replaying from the last autosave.
Malevolence v1.4	
Mario Keys	
McBeth	
Medieval World	
Mission Failed	
Mission to Kill	
Mission to Kill 2	
Mistake	
Mistake-1 (aka Pre- Mistake)	
Moonwalker	
Need for Energy (aka SP-Energy)	
Night at the Office	
No-Life	

No Exit	
Nuclear Winter	
Operacja Gargantua	
Operacja Mirra	
Operation Black Thunder	
Operations 1942 v2.0	
Opposing Force	
Orion	
Outrun	
Overhaul Pack	HD replacement pack for Half-Life and its mods.
PARANOIA v1.2	
Peaces Like Us	
Phobos IV	
Plague	
Point of View	
Poke646	
Poke646: Vendetta	
Portrait of Freeman v1.1	
Prince of Persia 3D Demo	
Prison v2.1	
Prisoner Escaped	
Prisoner Escaped 2	There is a level design flaw in the second teleporter in the map with GMan. Try stepping into the center of the portal to prevent unsuccessful teleportation.
Prisoner of War	
Prize	

Project AMOD	Buggy, but the bugs are also present when the original Half-Life is used.
Project Focus North v1.6 Demo	
Project Quantum Leap	
Projekt Einstein	
Prototype 98	
Radiation Alert: Episode 1 v1.1	
Rebellion	You must set the original <b>hl.dll</b> from the <b>valve</b> folder as the game dll in order to play this mod—unfortunately, the new weapon system in the mod is fully functional only under WON Half-Life v1.0.1.6 or earlier.
Red Alert X-pantion Demo: Developers Edition (aka HLRA Techdemo)	The mod is playable until the last map, which is unfinished.
Red Mesa	
Red Mesa 2	
Red Star: Episode 1	
Redemption (aka Absolute Redemption)	
Reissues	
Rescue 9-1-Freeman	
Residual Life v1.0 Final	
Residual Point	
Resublimation	
Retribution	

Reviviscence	
Riot in Progress	
Robotech: Invasion Beta	There is a couple of glitches with the HUD and flashlight after reloading a saved game, but these problems are the mod's internal bugs.
Route City	
Rumble	
S.W.A.T.	
Santa's Revenge	There is a problem with the final scripted sequence, so the mod cannot be finished properly.
Santa's Revenge 2: Xmas Meltdown	
Scientist Slaughterhouse	
SelfKill	
Shift-Two	
Sky Mesa	
Smart Decoy	
Snark Planet Demo	
Soldier	
Solo Operations	
Somewhere in Time	
Space Prisoner	After you have installed the mod, open the <b>liblist.gam</b> or <b>gameinfo.txt</b> file in the mod's folder and change the line <b>gamedll</b> "\prison\dlls\spirit.dll" to <b>gamedll</b> "dlls\spirit.dll", otherwise you won't be able to start the game. There is also a scripting error in the third map of the mod, so you'll be forced to use <b>noclip</b> to cross the buggy area and enter the elevator.
Spirit of Half-Life v1.0, v1.3, v1.7, v1.9	

(demo maps)	
Split-Second	
Static Friction BETA Demo 1.2	This mod constantly crashes or freezes at the start of any map; you can play this mod with Xash3D without major problems only if you first remove the <b>client.dll</b> file from the <b>cl_dlls</b> folder of the mod, but some of the mod's FX and GUI features will not work.
Survive in Catacombs	
Survive in Catacombs II	
Sweet Half-Life	You may have some trouble completing the game after you have met aliens; a few scripts will not work properly, and one of the bosses can't be killed.
Swiss Cheese Halloween 2002	
Tactical Espionage Action v1.1	This mod is fully playable from the beginning till the end, but there is a problem with the new interface, which can't work properly under Xash3D due to some hard-coded features.
Terror Side	To avoid level change issues, open the console while playing or the <b>config.cfg</b> file in the mod's folder, and set the <b>sv_validate_changelevel</b> parameter to <b>0</b> .
Test Your Skill	
The-Tower	
The Alpha Unit v1.1	To avoid level change issues, open the console while playing or the <b>config.cfg</b> file in the mod's folder, and set the <b>sv_validate_changelevel</b> parameter to <b>0</b> .
The Aztecs' Bane	
The Bounty Hunter Demo	
The Challenger Deep	

The Conspiracy in Shadow 2 v1.2	
The Cupboard of Doom	
The Escape	There are a couple of strange glitches in the <b>evasion7</b> map, but they don't interfere with gameplay. Don't forget to download and install all of the fixes available for the mod.
The Evasion	
The Evil Thing	
The Evil World	
The Gate	
The Haunted Lab	
The Long Night	
The Lost Hell	
The Puppy Years	
The Real	
The Trap	Map by Keks.
The Trap v1.51	Mod by Reaktor.
The Unknown Menace	
The Way Is Clear	
The Way Is Clear 2	
The Xeno Project	
The Xeno Project 2	
They Hunger: Trilogy	You may get performance drops due to excessive use of mirrored surfaces in some maps of this mod. To avoid this, consider opening the <b>opengl.cfg</b> file, which Xash3D will create when you first start the mod, and adding the line <b>setgl gl_allow_mirrors</b> "0".
	When you start a new game, try quickly switching

Time Shadows Beta 0.1	Xash3D to windowed mode and back again using <b>Alt+Enter</b> to fix the mod's broken renderer. The <b>r_fullbright 1</b> cheat can help you with the darkness; you can also try removing the mod's <b>client.dll</b> file from the <b>cl_dlls</b> folder, but this will disable some features of the mod.
Timefall	
Timeline	
Timeline II: Iced Earth	
Timeline III: Heart of Darkness	
Times of Troubles	
Todesangst	
Todesangst 2: Der Echte Feind	
Total Evasion	
Trespasser	
Typical Disaster	
Typical Disaster: The Lost Levels	
U-Life	
Ultimate Attack	
Unholy	
Unknown Faction	
Unnamed	
Uplink	
USS Darkstar	You may get performance drops due to excessive use of mirrored surfaces in some maps of this mod. To avoid this, consider opening the <b>opengl.cfg</b> file, which Xash3D will create when you first start the

	mod, and adding the line <b>setgl gl_allow_mirrors</b> " <b>0</b> ".
Vengeance	
Virtual Reality: The Real World	
Visitors	You can get stuck in a moving train in the beginning of the mod on level change; enter the <b>restart</b> command in the console to reload the map correctly.
Wake up and stay alive	
Wanted: The Half-Life Western Pack v1.6	
WAR: The Killer Beta 0.1	
World War III Missions (Part 1, 2, 3)	
X-Half-Life: Deathmatch v3.0.3.5	The mod's version is important; this version of the mod has only minor problems with Xash3D if you are playing the singleplayer part of the game.
X-Half-Life: Deathmatch v3.0.3.6	The mod's version is important; many Half-life singleplayer maps can't be started in this version of the mod under Xash3D, and there are also some other gameplay bugs.
X-treme Violence	
X.E.T. Demo	
Xen-Warrior v1.5 and 1.6	
You Are in Army Now	
Zombie Edition v1.1	

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## **For Players**

#### The console won't open

Make sure the **gameinfo.txt** file in the **valve** folder or your mod's folder does not have the following setting:
"secure" "1"

If this line is present, delete it. To enable the console, start Xash3D with the **-dev** or **-console** parameter.

#### Textures fade to black at a small distance

Try changing the value of the **gl\_texture\_lodbias** console variable. The default value is **0.0**. Setting a negative value helps on some ATI video cards.

Also consider disabling the texture LOD bias feature altogether; for that, locate the following line in the **opengl.cfg** file in the **valve** folder (for Half-Life) or your mod's data folder:
setgl gl\_ext\_texture\_lodbias "1"
and change it like this:
setgl gl ext texture lodbias "0"

#### Some models appear solid black, although they should be lit and textured

This may be due to the way invisible brushes are used around the models as obstacles for the player while Xash3D's extended lighting is enabled. With GoldSource's lighting method, this mapping technique does not cause such side effects. You can avoid the problem by disabling extended lighting; for that, set the **r\_extended\_lighting** console variable to **0**. This will make Xash3D approximate the lighting methods used in GoldSource, but will also disable some newer effects.

### When I press fire, there's a delay before the actual shot

This is one of the symptoms of Xash3D's incomplete implementation of client-side weapon prediction. This problem and a few related ones are well known but have so far defied correction. You can disable weapon prediction by setting the following console variables (set both of them):

cl\_lw "0"

cl\_predict "0"

# For Developers

## I can't build the engine in MSVC 6.0 due to a compilation error

You need Service Pack 5 for MSVC 6.0. I don't know why this error occurs, but I believe it's a bug in Visual Studio. If you are a skilled programmer, try modifying the code to fix this. If you succeed, I will include your changes in the code.

### **Contents**

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#### What is Xash3D?

Xash3D is a game engine that is compatible with Valve LLC's GoldSource, which powers Half-Life, Counter-Strike and a lot of other games.

#### Compatible to what extent?

The engines are 85 percent mutually compatible. This means that most mods and games based on GoldSource should work correctly on Xash3D without any adjustments, out of the box. This doesn't apply to games designed for the Steam version of GoldSource, because they rely on undocumented engine features, and this makes it considerably more difficult to adapt them. However, I hope that by the time the final version is out, this will be resolved.

# What's the point in using Xash3D if you can play the same games on GoldSource?

#### There are a few reasons:

- 1. Recent changes that Valve made to the GoldSource engine have been known to break compatibility with some mods. Xash3D, however, makes a point of maintaining compatibility.
- 2. Xash3D addresses lots of issues found in the original GoldSource, where they might not be fixed.
- 3. Xash3D is optimised better, which results in a higher framerate—think netbooks.
- 4. The engine is not tethered to Steam, which is often more trouble than it's worth.
- 5. The engine is moving ahead, and you are in a position to ask for a new feature and, in all likelihood, get it in a future version. This is clearly not the case with GoldSource.
- 6. The engine's sources are open and licensed under LGPL, so that you can study the insides of your favourite game and even modify it to suit your needs.

# Seeing as the GoldSource source code is not freely available, how did Xash3D come about? Did you steal the sources from Valve?

Originally, compatibility with GoldSource wasn't planned. The intention was to use a similar model format and make the rest stand apart entirely. It was going to be yet another generic multi-purpose engine. However, three years' worth of development predictably showed the futility of this approach, because making an engine without a game for it to underpin may be a fascinating endeavour, but completely useless. There was no way to even test the gameplay for ten minutes (because no gameplay existed), so the code was gradually accumulating bugs, which could not possibly be found in the few test maps that were available. Meanwhile, many users who were noticing certain similarities to the GoldSource engine (primarily the model format) asked me to rewrite the code in such a way as to make it fully compatible with Half-Life and mods for it. So in late April and early May 2010 development of the engine took an entirely different course, with the aim of full GoldSource compatibility. The source code for GoldSource

was not freely available, and this didn't help matters. Therefore, the recreation process relied on well-known facts about the origins of GoldSource, which is a combination of Quake, QuakeWorld and Quake II; the sources of all these engines have long been open and publicly available. The game code in the Half-Life SDK helped tie up some loose ends, and so did the sources of Half-Life 2 Beta. Finally, whenever all of this information was insufficient, the missing knowledge was gained through black-box testing of the original GoldSource. In short, the way to do it is to feed a certain batch of data into the engine, receive the processed result and analyse the input and output values to make assumptions about the operation logic. The validation of this approach came when some games started to look and work identically in GoldSource and Xash3D.

**Note:** Since version 0.75, the author of the engine has sometimes been unable to tell if he's running GoldSource or Xash3D:-)

#### The engine sources used to be closed. What brought you to publish them?

To a certain extent, I was influenced by one of the members of our forum, who kept gushing about how opening the engine would ensure its glorious future. Personally, I tend to take such statements with a grain of salt, but I still decided to open the engine sources, because it does have a lot of interesting solutions that might prove helpful, for example, for the Quake community or for porting Xash3D to other platforms.

#### What's the latest version of the engine at the moment?

Currently the latest version is 0.95. The engine will hit its final version when the full range of Half-Life's features has been implemented.

#### This is a interesting project; can I make a game based on your engine?

Xash3D has inherited its parent engine's lack of dependence on a preset game directory. Therefore, nothing prevents the creation of entirely separate games.

The author of the engine has no objections to this and is ready to provide basic counselling regarding the engine's technical details and features.

#### What if I want to sell my game based on your engine?

This is a pretty tricky question. Xash3D is licensed under LGPL, so I am not entitled to any fees. However, the engine depends on the **vgui.dll** library, which ships with Half-Life 1.1.0.8 and is property of Valve LLC. If you create a commercial product, you must remove this part of the code from the engine and game libraries. That said, matters of this kind should be discussed with your company's legal staff.

#### This is an interesting project; how can I help?

For example, you can maintain the documentation, set up a Web site about the engine, translate the documentation into English, beta-test the engine. Alternatively, you can make a donation—the wallet number is 410011011597633 in the Yandex.Money system.

There is also the WebMoney wallet R921161786039

#### Will Xash3D support GCF archives?

This is very unlikely. The truth is that I have never seen amateur mods packed as GCF, and on the other hand, Half-Life has moved away from the GCF format. In addition, Steam uses a sophisticated directory and archive hierarchy, and this can cause confusion.

What tools do you use to work on the engine?

Microsoft Visual Studio Enterprise Edition 6.0 + Service Pack 5 + Processor Pack. For source code editing, Asm\_Ed.

#### Why the name Xash? What's the meaning of this word?

When I was considering a name for the future engine, I wanted to come up with a short word that defies translation, similar to "SONY". I chose "Xash" over several candidates. It was only later that the name turned out to conjure up Georgian cuisine and Star Wars, but originally, I had no idea.

#### Thanks go to:

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- XaeroX for hosting, technical advice and moral support
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- adamix for menu scrollbar code
- HAWK, ERIK-13 for the first translation of features.txt into English
- **n00b** for the implementation of detail textures
- nemyax for the updated documentation

#### Beta testers:

- Qwertyus
- The FiEctro
- Crazy Russian
- HAWK
- qpAHToMAS
- LokiMB
- Msteam
- (\_-=ZhekA=-\_)

#### Xash3D uses some parts of:

- Quake by id Software
- Quake 2 by id Software
- Quake 3 by id Software
- Half-Life by Valve Software
- Darkplaces by the Darkplaces team
- Quake 2 Evolved by Team Blur
- AVIKit by randomnine