



***Fast* playback of HD video and audio content.**

For Windows and OSX

**1080p - MOV - H.264 - MP4 - DV - MJPEG
Animated GIF - MP3 - AAC and more.**

Version 1.9.2

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1. Introduction

“AVPro QuickTime” is a plugin for Unity that allows playback of supported QuickTime content in a fast and easy manner.

The plugin is aimed at the high-end user group that require video playback features beyond Unity’s built-in video support.

QuickTime is a trademark of Apple Inc., registered in the U.S. and other countries.

2. System Requirements

- Unity Pro 3.4 and above.
- Windows or Mac.
- QuickTime 7 or above must be installed on the machine.

When playing back high resolution videos a decent CPU and GPU must be available. Integrated chipsets may not handle HD content well, especially when using the DirectX rendering path. See the “Performance Notes” section below.

3. Features

a) Alpha / Transparent Video Support

The plugin supports video codecs that support an alpha channel, allowing playback of transparent videos - something that Unity’s native Ogg Theora codec doesn’t allow.

Codecs with alpha channel support include:

- 1) QuickTime native Animation
- 2) QuickTime native JPEG-2000
- 3) QuickTime native PNG
- 4) Resolume DXV <http://www.resolume.com/software/dxv.php>

b) Advanced File Loading & Streaming

The plugin supports loading files from:

1. Local file system
2. Memory
3. URL

Loading content dynamically from disk allows content to be replaced and updated without relying on having Unity installed. This is especially useful when creating an application that must be maintained/updated by a third party, or for live applications where content is being created while the application is running.

Another benefit of loading dynamically instead of importing into Unity is the time it takes to import assets. If you have a lot of video content, importing the assets can take a very long time. In this case, loading them dynamically provides a much better workflow.

Loading from memory allows you to hide your movie content from users. One way to do this is to use Unity's TextAsset loader. The data can then be loaded from a byte[] array.

Loading from URL allows videos to be streamed. When streaming videos it's important to have them encoded correctly using the "Internet Fast Start" option and a suitable bit-rate.

c) Video Codec Choice

Video codecs can be chosen to suit the content and playback requirements. For example:

- Lossless encoding can be used for videos that require **high fidelity**.
- The Animation codec can be used for videos with **tranparency**.
- Animated GIF can be used when **small file size** is desired for simple animations.
- DV / Motion JPEG or similar non-intra-frame codecs can be used when videos need to to **scrubbed through, played backwards or seeked quickly** (eg VJing).

d) Audio & Video Formats

Playback of most of the file formats that QuickTime supports. Including:

Video / Codecs	Image	Audio
QuickTime Movie (mov)	JPEG	MP3
MPEG4 (mp4)	PNG	AAC
Animated GIF (gif)	BMP	WAV (uncompressed)
H.264	JPEG 2000	AU
DV	TGA	MIDI
Microsoft AVI (limited)	TIFF	Apple Lossless
Motion JPEG	GIF	AIFF
3GP & 3G2		
Animation		

e) Fast Playback of Full HD 1080p Content

The plugin has been optimised to run as fast as possible to allow for smooth playback of HD

content. Various methods have been used to achieve optimal performance. These include:

- **Fast OpenGL Rendering Path**

Using direct GPU hardware updates, the plugin is able to render very quickly using little CPU power. This path is only available when Unity is running in OpenGL mode.

You can run your Unity editor in OpenGL mode by adding the “-force-opengl” switch to the shortcut. Builds can also be forced to run in OpenGL mode by using the “-force-opengl” switch on the generated executable files.

- **Fast DirectX Rendering Path**

The DirectX rendering path isn't as fast as the OpenGL path however we have made it as fast as possible using various techniques. Power-of-2 sized textures are used for texture updates as Unity updates these much quicker.

Note: using the DirectX path a 1280x720 video will use a 2048x1024 texture, as will a 1920x1080 video, so there is often not much difference between them in terms of system load.

- **Timely Video Updates**

Videos are only updated when a new video frame is ready instead of every frame.

- **Native Pixel Formats**

The plugin can use RGBA or the native YUV2 pixel format for GPU texture uploads. Using the YUV2 format we can decrease the video frame size by half. Conversion from native pixel formats to standard RGBA is done on the GPU via a shader.

f) Unity Integration

The “AVPro QuickTime” plugin provides an API for playing QuickTime content. Additionally some helpful Unity components have been created to allow drag and drop use of the plugin without any scripting. See the “Usage” section below.

Movies are uploaded on to standard Unity Texture2D objects.

g) Other

- Play multiple QuickTime videos simultaneously.
- Audio volume control.
- Frame by frame playback.
- Seeking.
- Playback rate control, including reverse.
- Playback from memory allows loading from a byte[] array.

- Streaming from URL

4. Installation

Import the unitypackage file into your Unity project.

**You may need to move the “Plugins” folder into the root of your project.
Make sure QuickTime is installed on your system.**

5. Usage

FullScreenMovie.cs

This component can be added to any Unity object and will playback QuickTime content fullscreen matching the source content aspect ratio.

ScreenMovie.cs

This component can be added to any Unity object and will playback QuickTime content to a region of the screen.

MeshMovieApply.cs

This component can be added to any Unity mesh object and allows QuickTime content to override textures on the mesh.

MoviePlayer.cs

This script can be used as a starting point for creating your own playback scripts. FullScreenMovie.cs inherits this script.

AVProQuickTime.cs

This script exposes the core functionality of the plugin. Using this script and the others as reference you will be able to craft your own QuickTime

6. Performance Notes

The following performance notes all relate to playback of the highest resolution (1080p) HD content.

Here we demonstrate that the plugin has high performance and show how different configurations affect the performance. One thing we can't really demonstrate here is playback smoothness. This is something that the developer will have to test for themselves, however we've found that our plugin plays back 1080p HD movies smoother than Unity's built-in movie playback system. In general though our plugin does use slightly more CPU power doing so.

Test Hardware:

- Sony Vaio Z-Series Laptop
- Windows 7 Professional 64-bit
- Intel Core i5 M520 @ 2.4Ghz

Machine A: Intel Graphics Media Accelerator HD

Machine B: NVIDIA GT 330M (1024MB), driver v188.80

TinTin Movie Trailer MOV H264 1920x816. Score is frames per second out of 60.

Config	Machine A	Machine B
DirectX RGBA	17	18
DirectX YUV2	40	46
OpenGL RGBA	8	52
OpenGL YUV2	17	60

Note: When using 1080p videos it's actually best if your input video has a maximum height of ≤ 1024 as this means the plugin can use a texture with a height of maximum 1024 instead of 2048 in the case of true 1080p.

7. FAQ (Frequently Asked Questions)

1. How do I fix the error: "DLLNotFoundException"?

You need to move/copy the "Plugins" folder from your "AVProQuickTime" folder into the root of your folder structure. This means the "Plugins" folder should be moved to your "Assets" folder. Unfortunately this is a limitation in the way Unitys Asset Store handles plugins.

2. My movie appears too bright or desaturated, how can I fix it?

Tick the "use BT709" checkbox, this will force the plugin to use a different colour conversion routine that is more suitable for your movie.

8. Version History

● Version 1.9.2 - Wednesday 3 May 2012

- Fixed texture update bug in OpenGL with Unity3.5.
- Added support for BT709 conversion.

● Version 1.9 - Friday 17 February 2012

- Plugin now also built for Mac.
- Playback from memory.
- Playback from URL (beta).
- Better performance switching between videos of the same resolution.

- Fixed a resource leak.
- **Version 1.8 - Wednesday 18 January 2012**
 - Fixed a memory leak.
- **Version 1.7 - Wednesday 11 January 2012**
 - Added playback rate control, including reverse.
- **Version 1.5 - Thursday 22 December 2011**
 - Improved stability.
 - Tidied up demos.
- **Version 1.4 - Tuesday 30 November 2011**
 - Added frame-by-frame playback.
 - Updated logo graphics.
 - Added FPS counter to benchmark demo.
- **Version 1.2 - Thursday 17 November 2011**
 - Accepted at Asset Store.
 - Fixed seeking bug.
 - Fixed OpenGL state bug.
 - Improved demo controls.
- **Version 1.0 - Wednesday 26 October 2011**
 - Initial release submitted to Asset Store.

9. Support

If you are in need of support or have any comments/suggestions regarding this product please contact us.

Website: <http://www.renderheads.com/contact/>

Email: contact@renderheads.com

If you are reporting a bug please include any relevant files so that we may remedy the problem as fast as possible.
