

GStreamer in game engines

Exploring what’s there and what’s missing

Dominique Leroux · October 10th, 2026
Independent developer · GStreamer contributor



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Unity



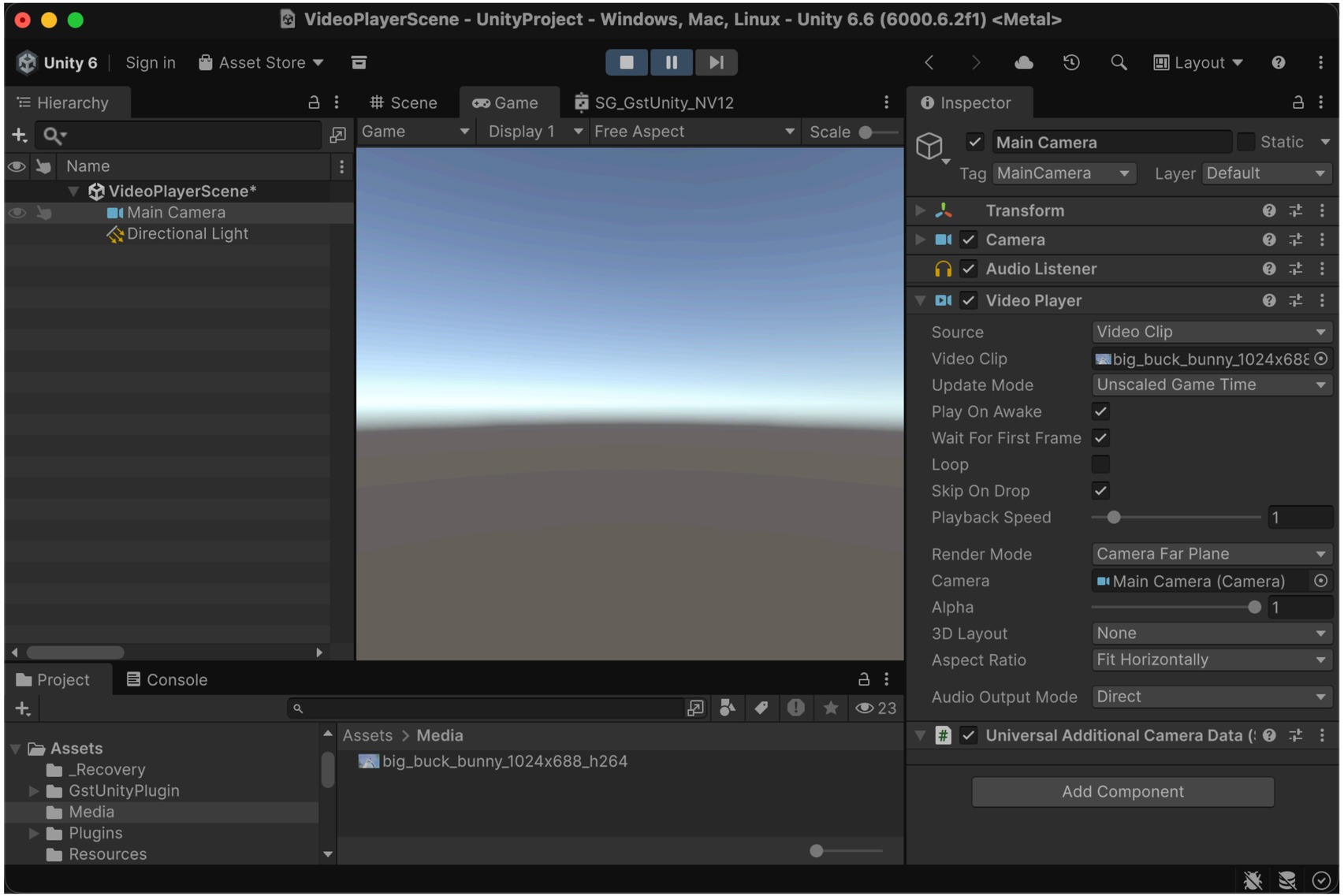
Godot



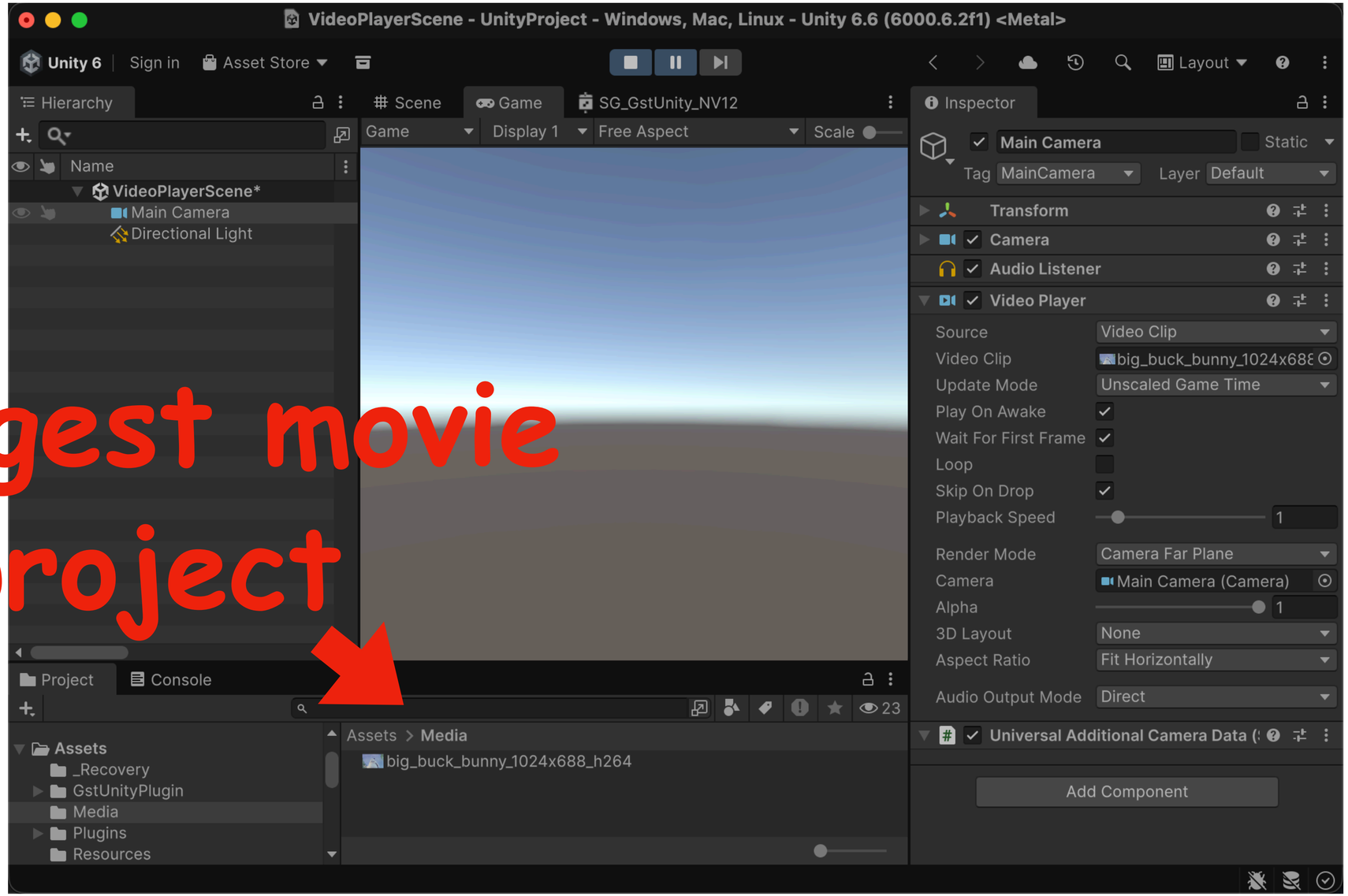
Unreal

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Game authoring (short version)



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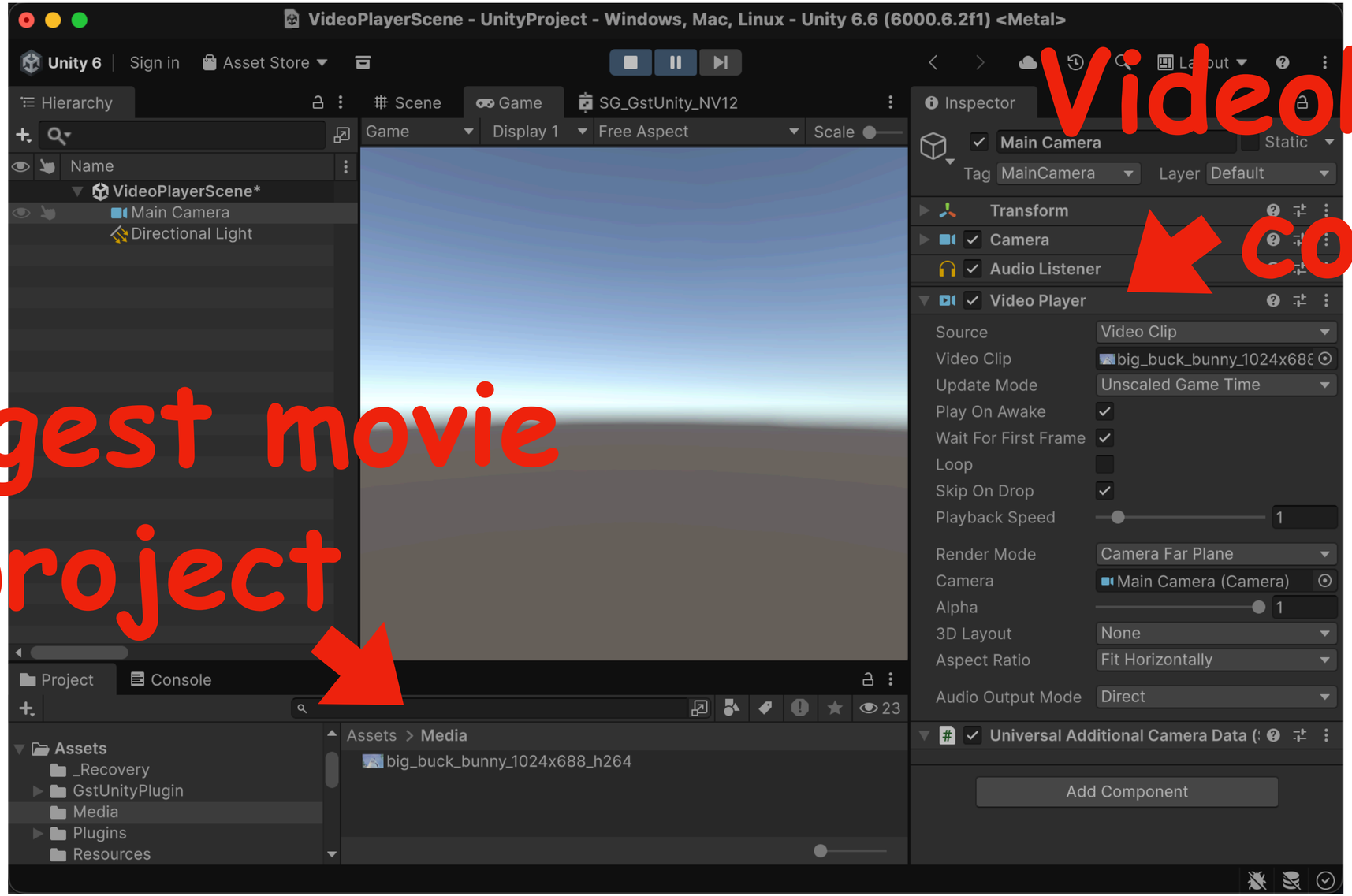


1. Ingest movie into project

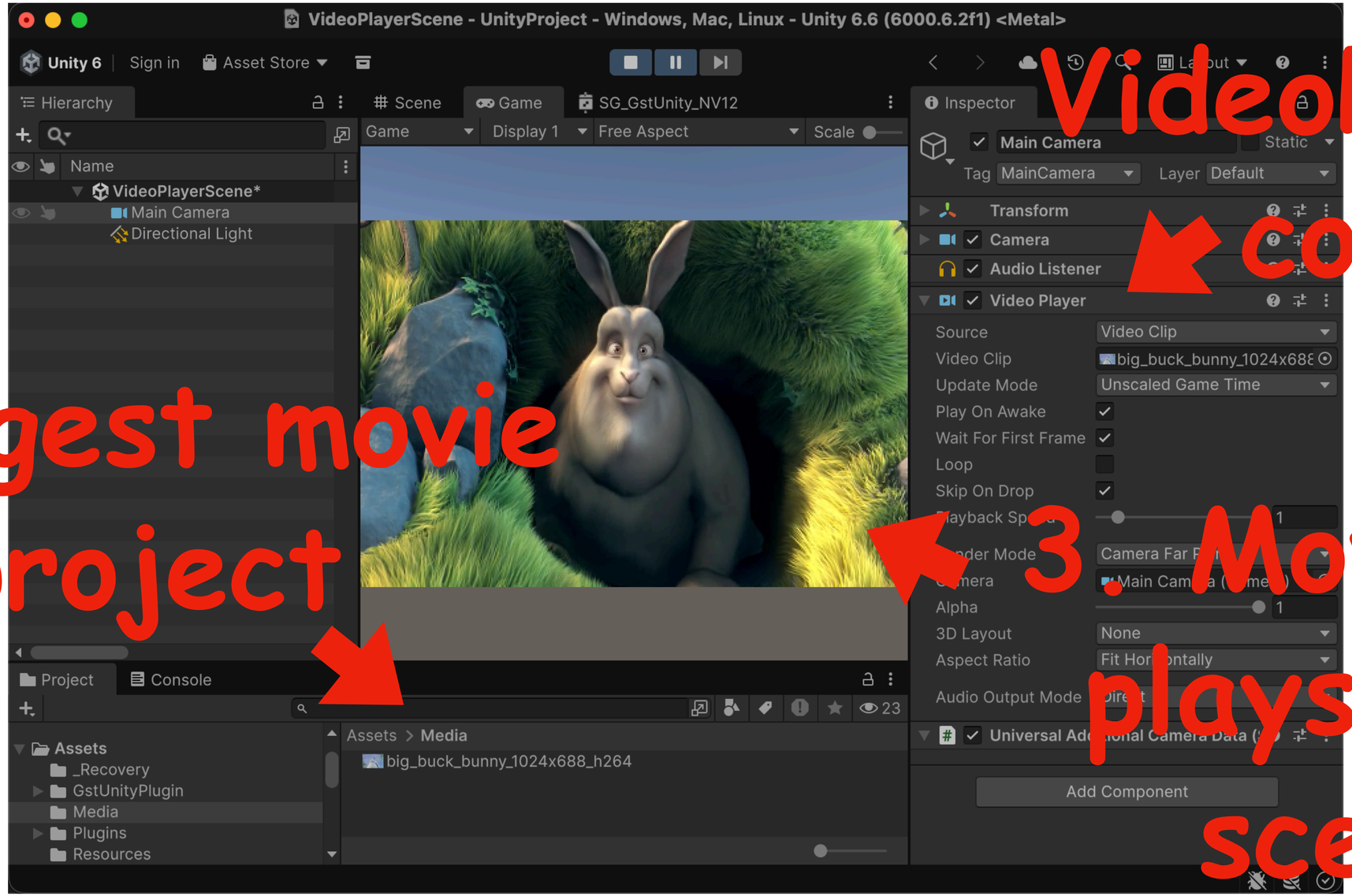
Game authoring (short version)

2. Adjust VideoPlayer controls

1. Ingest movie into project



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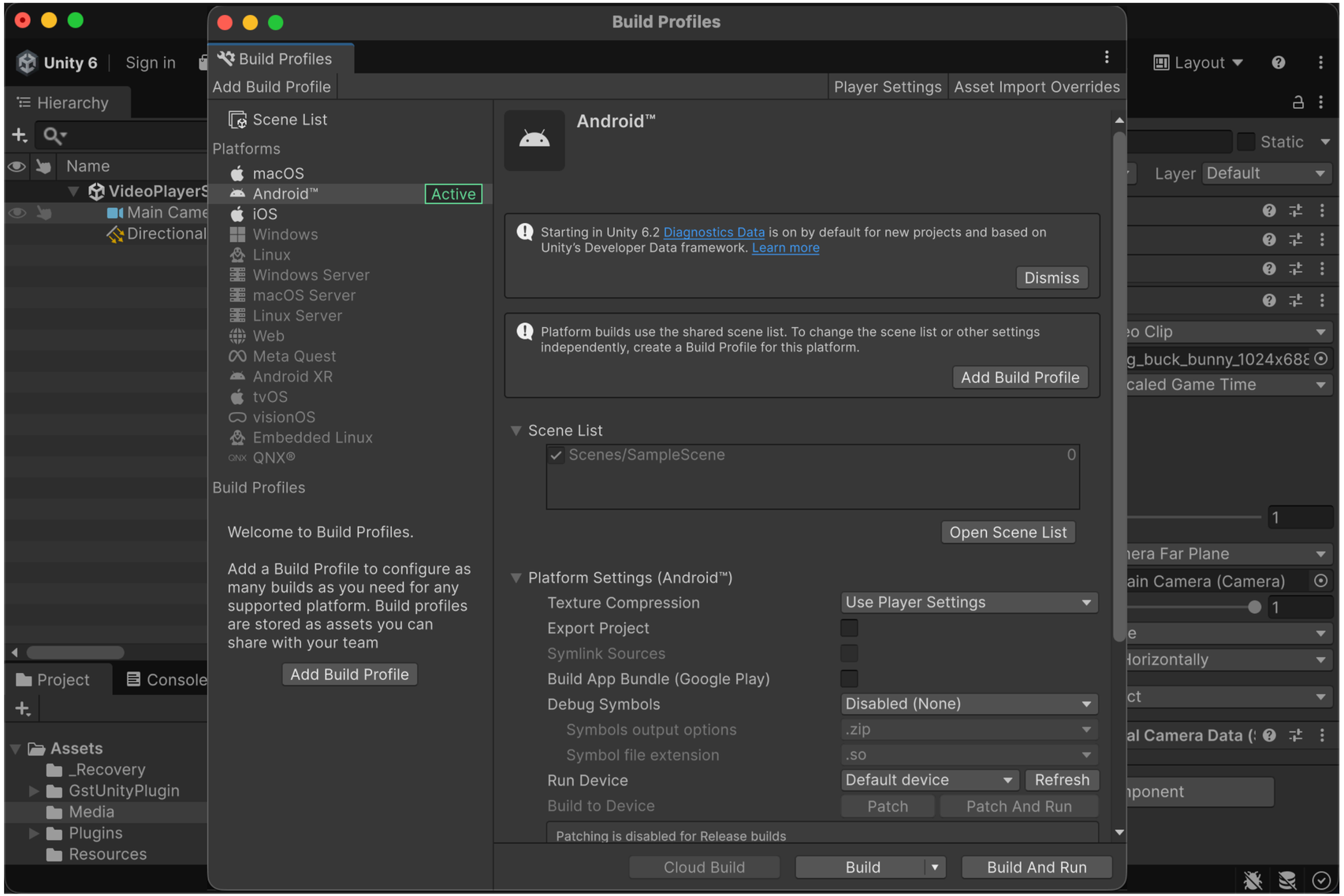


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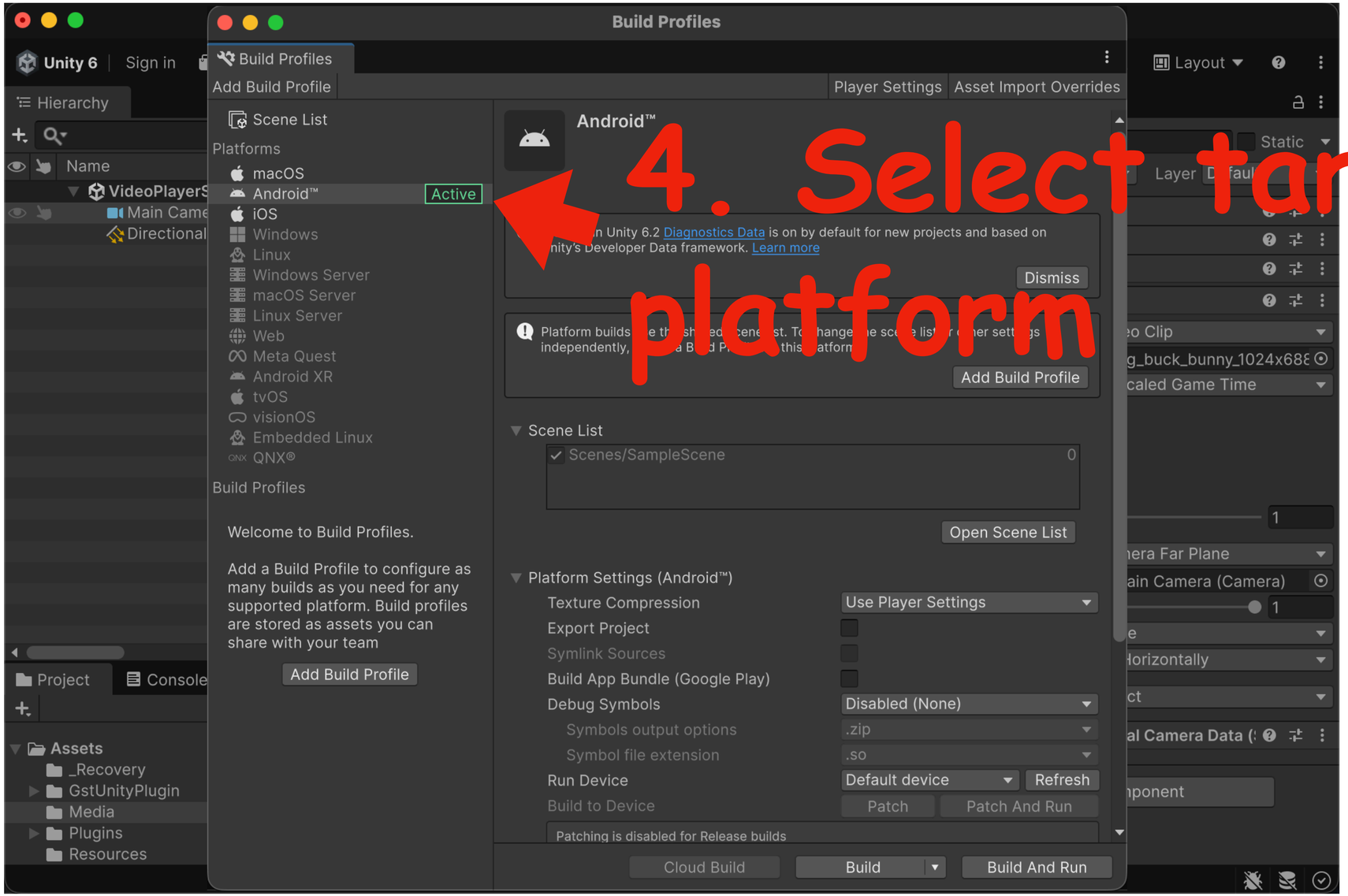
2. Adjust VideoPlayer controls

3. Movie plays in scene

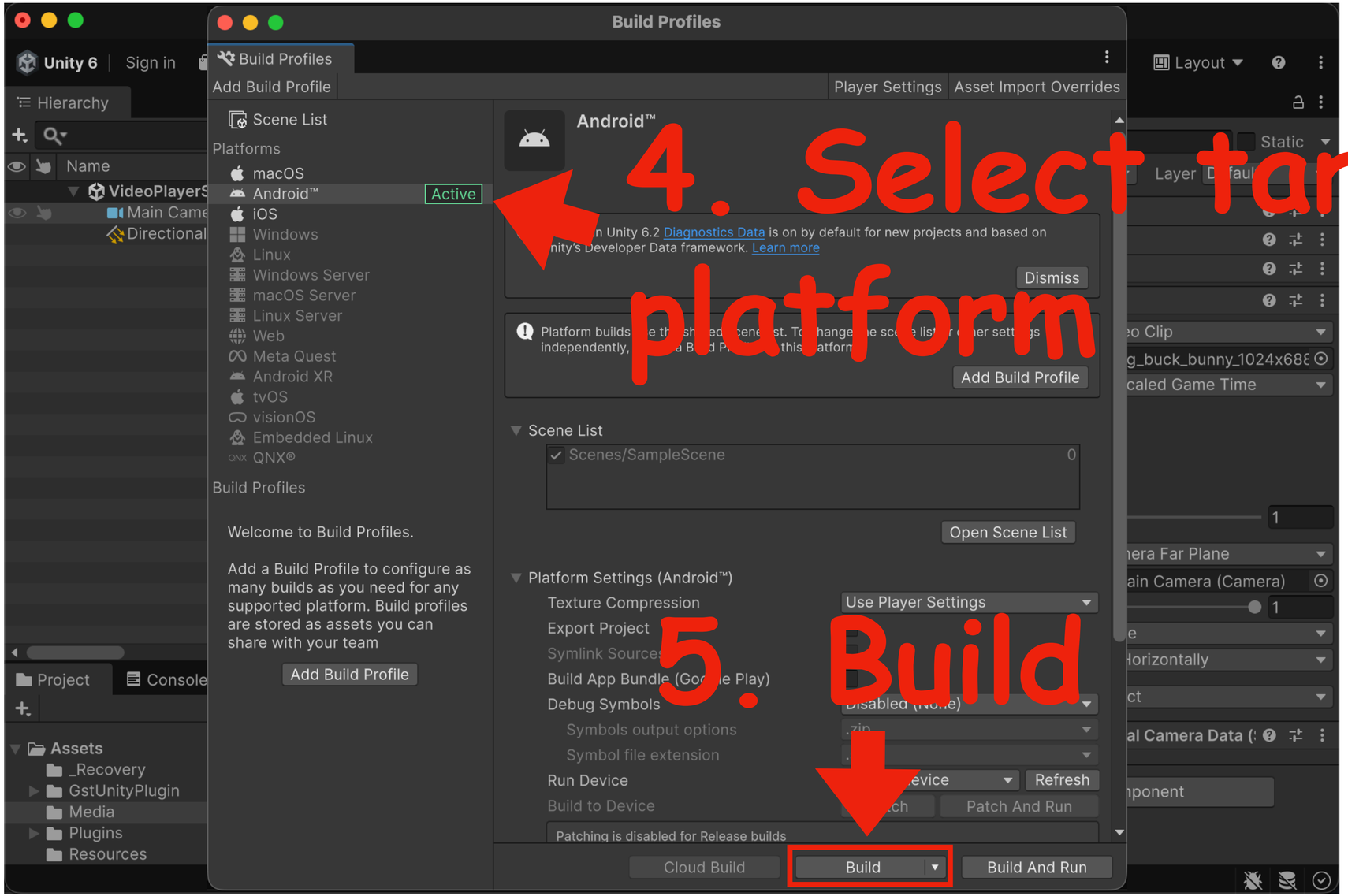
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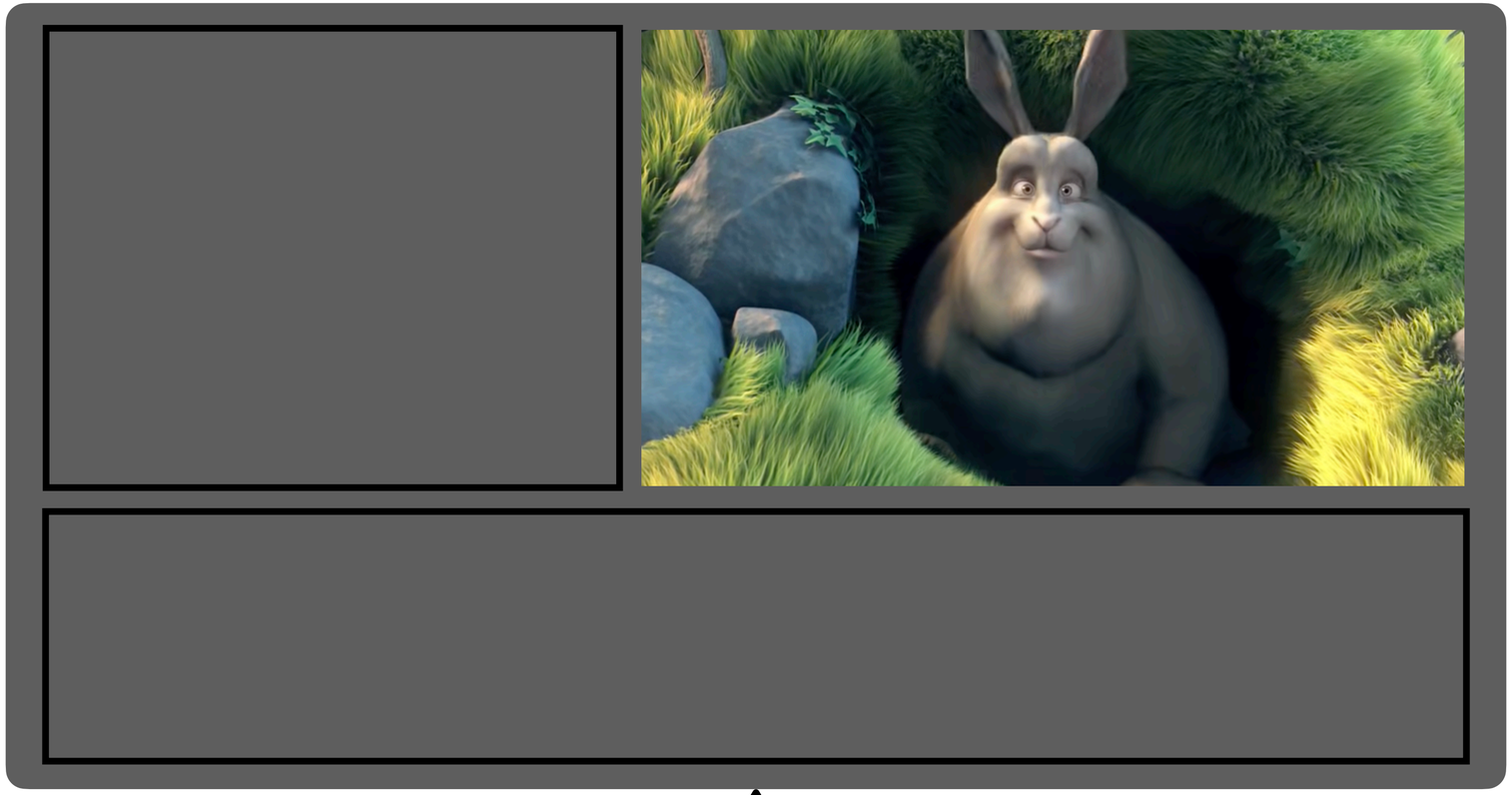
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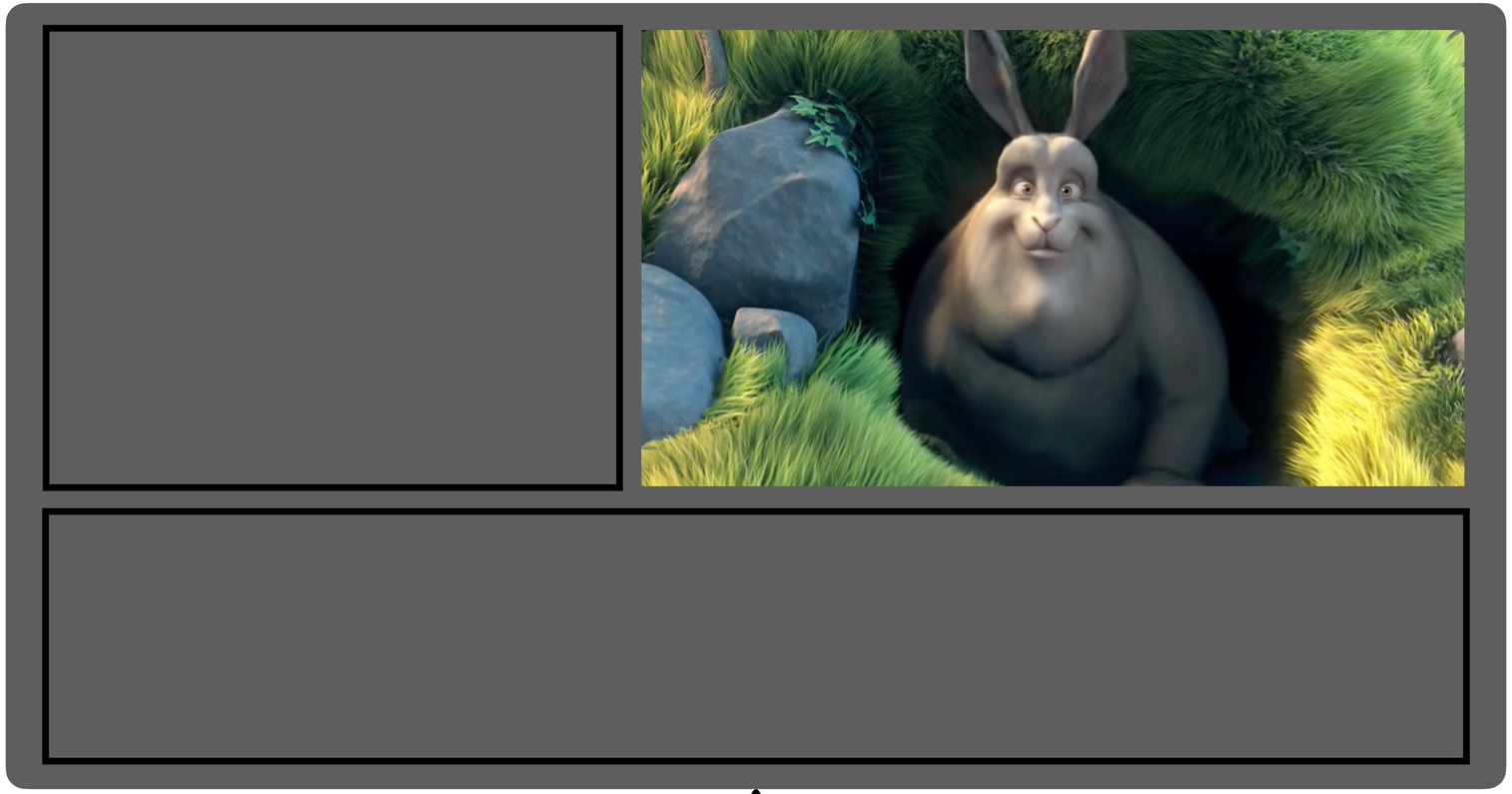
Game authoring (short version)



Game engine video player under the hood



VideoPlayer

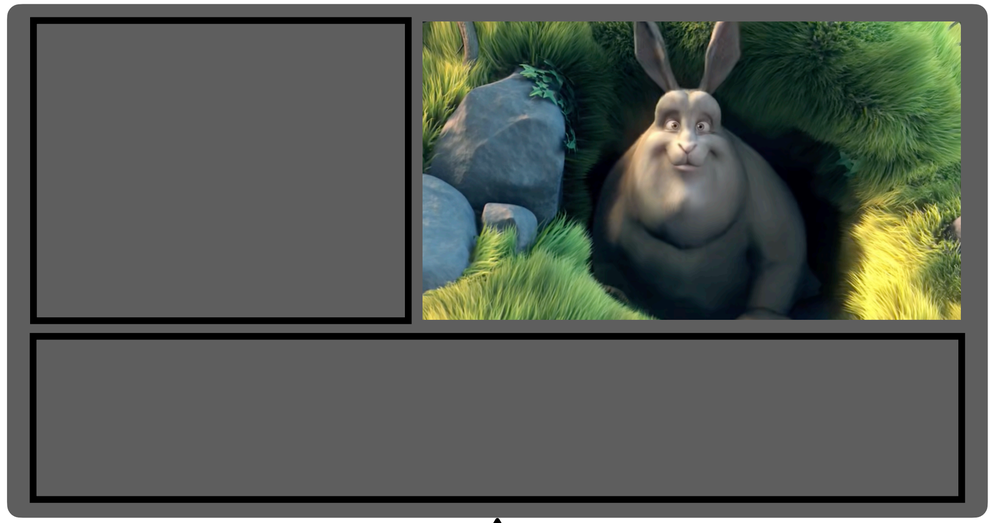


VideoPlayer

Windows

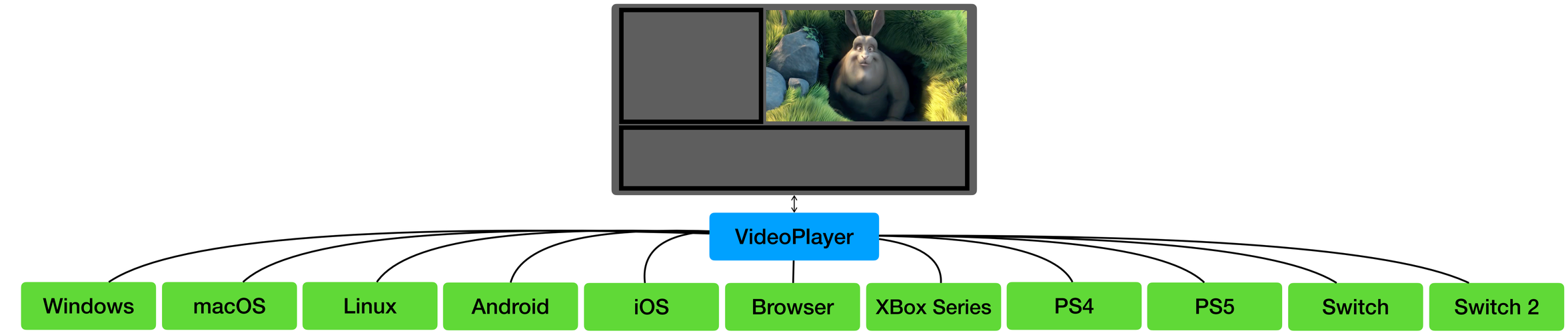
macOS

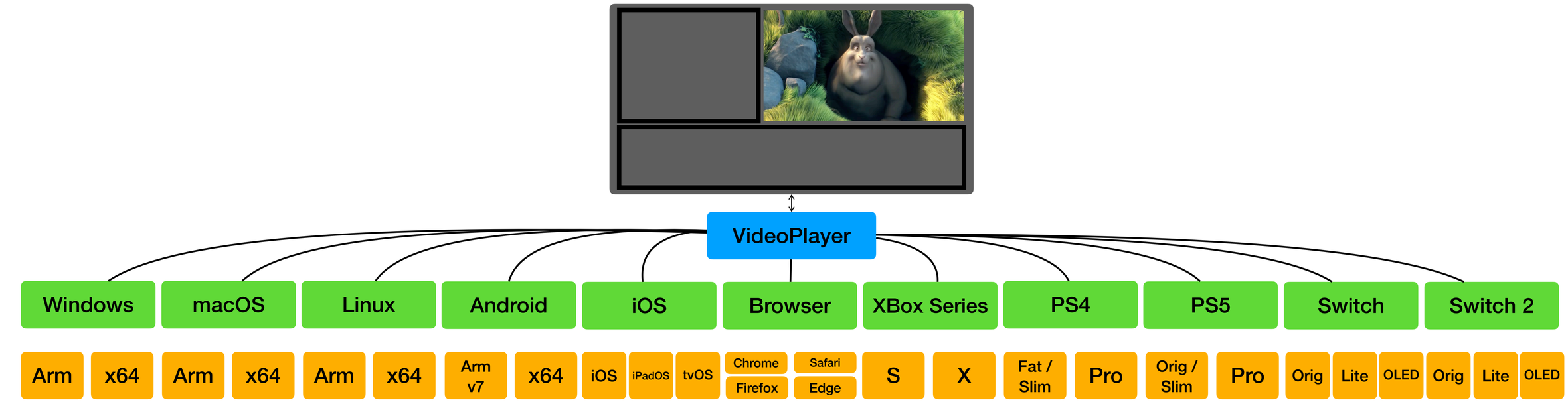
Linux



VideoPlayer

Windows | macOS | Linux | Android | iOS | Browser


VideoPlayer
Windows
macOS
Linux
Android
iOS
Browser
XBox Series
PS4
PS5
Switch
Switch 2


VideoPlayer
Windows
macOS
Linux
Android
iOS
Browser
XBox Series
PS4
PS5
Switch
Switch 2
Arm
x64
Arm
x64
Arm
x64
Arm v7
x64
iOS
iPadOS
tvOS
Chrome
Firefox
Safari
Edge
S
X
Fat / Slim
Pro
Orig / Slim
Pro
Orig
Lite
OLED
Orig
Lite
OLED



VideoPlayer

Windows	macOS	Linux	Android	iOS	Browser	XBox Series	PS4	PS5	Switch	Switch 2
Arm, x64	Arm, x64	Arm, x64	Arm v7, x64	iOS, iPadOS, tvOS	Chrome, Firefox, Safari, Edge	S, X	Fat / Slim, Pro	Orig / Slim, Pro	Orig, Lite, OLED	Orig, Lite, OLED
10 - 11	11 - 27	Ubuntu 22.04 - 24.04	8 - 17	16 - 27	113+, 51+, 17+, 113+	?	?	?	?	?



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VideoPlayer

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Device Model



VideoPlayer

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Device Model

Driver Version



VideoPlayer

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Device Model

Driver Version

Media Container



VideoPlayer

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Device Model

Driver Version

Media Container

Codec



VideoPlayer

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Device Model

Driver Version

Media Container

Codec

Pixel Format



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What’s in a name?🎮

A game engine by any other name wouldn’t be as fun

- Make games… anything else?

What’s in a name? 🎮🎥

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- Facilities management
- Standalone productivity & creative tools
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- Architectural Visualization
- Broadcast & Live Events
- Automotive Configurators
- Automotive Cockpit HMI
- Simulations & Robotics Training
- Industrial Digital Twins
- Architecture/Engineering/Construction
- Facilities Management
- Station, Productivity & Creative Tools
- Interactive Art & Kiosks

50% Non-Game Projects

https://www.devclass.com/development/2024/08/23/survey-finds-game-engines-used-equally-by-non-game-projects-rise-of-interest-in-open-source-godot/1627225

A huge (extensible) toolbox

… multimedia is just one area



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- **Animation**: Characters, solvers, state machines



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- **Animation**: Characters, solvers, state machines
- **Physics**: Rigid body dynamics, collision detection, fluid/cloth simulation

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A huge (extensible) toolbox

… multimedia: more present than you think



- **Movies**: ***Way more than cut scenes!***
- Animated **screen** shown in game play: TV, projector, computer



Screen capture form the official Control gameplay trailer

A huge (extensible) toolbox

… multimedia: more present than you think



- **Movies**: ***Way more than cut scenes!***
- Animated **screen** shown in game play: TV, projector, computer
- Environmental **lighting**



Screen capture form the official Control gameplay trailer

A huge (extensible) toolbox

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- Animated **textures**: water, fire, weather, sky
- Menu **backgrounds**, loading screen
- **Tutorials**, mission objectives, briefing



Screen capture form the official Control gameplay trailer

Let’s pick one target

VP9, HW-accelerated, alpha, Apple+Android first, Godot/Unity/Unreal

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- **VP9** is royalty-free, HW accelerated on **all** gaming platforms



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VP9, HW-accelerated, alpha, Apple+Android first, Godot/Unity/Unreal

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- **HW-acceleration** for *lower power usage*



Let’s pick one target

VP9, HW-accelerated, alpha, Apple+Android first, Godot/Unity/Unreal

- **VP9** is royalty-free, HW accelerated on **all** gaming platforms
- **HW-acceleration** for *lower power usage*
- **Alpha** for live compositing



Let’s pick one target

VP9, HW-accelerated, alpha, Apple+Android first, Godot/Unity/Unreal

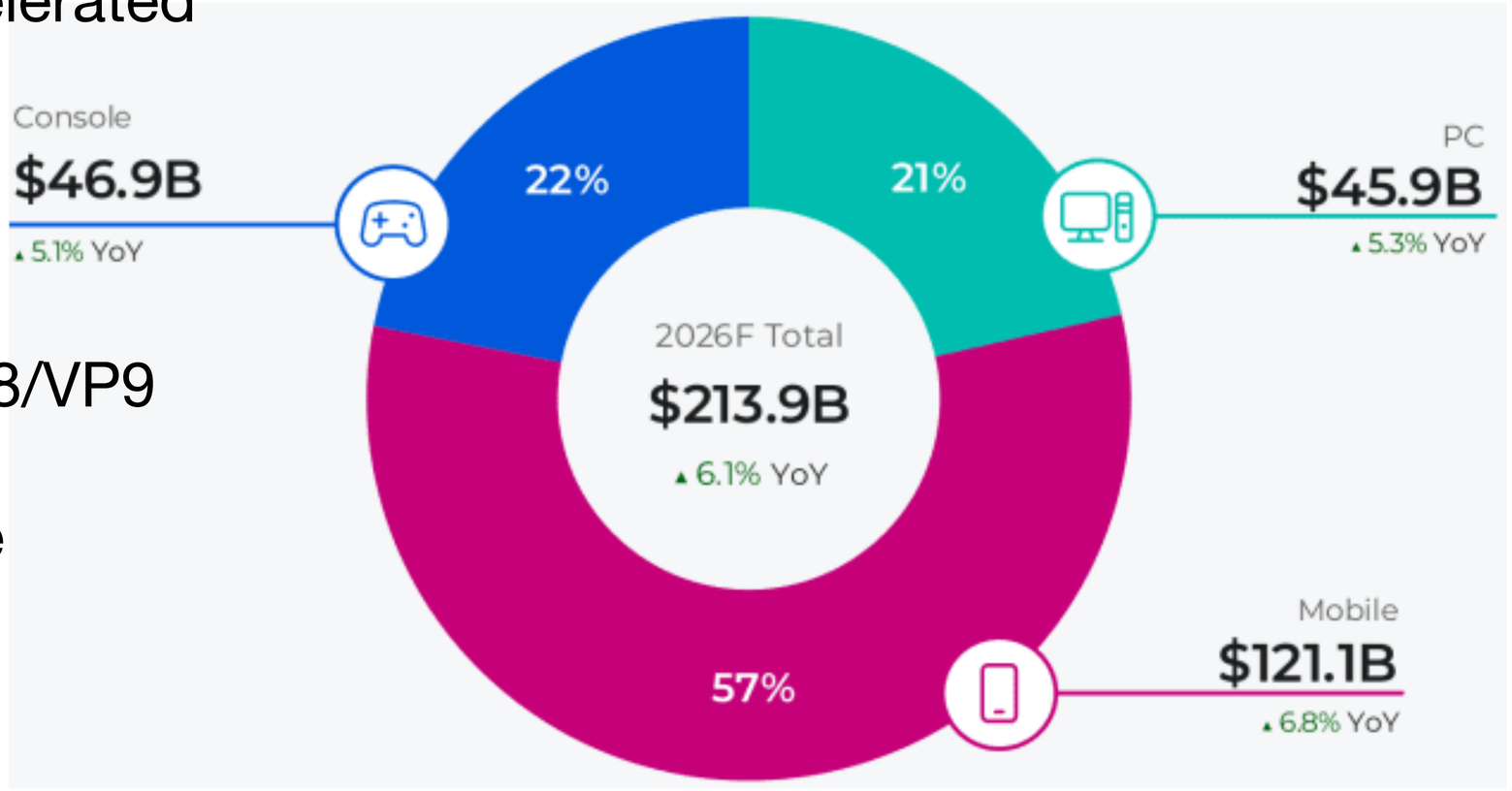
- **VP9** is royalty-free, HW accelerated on **all** gaming platforms
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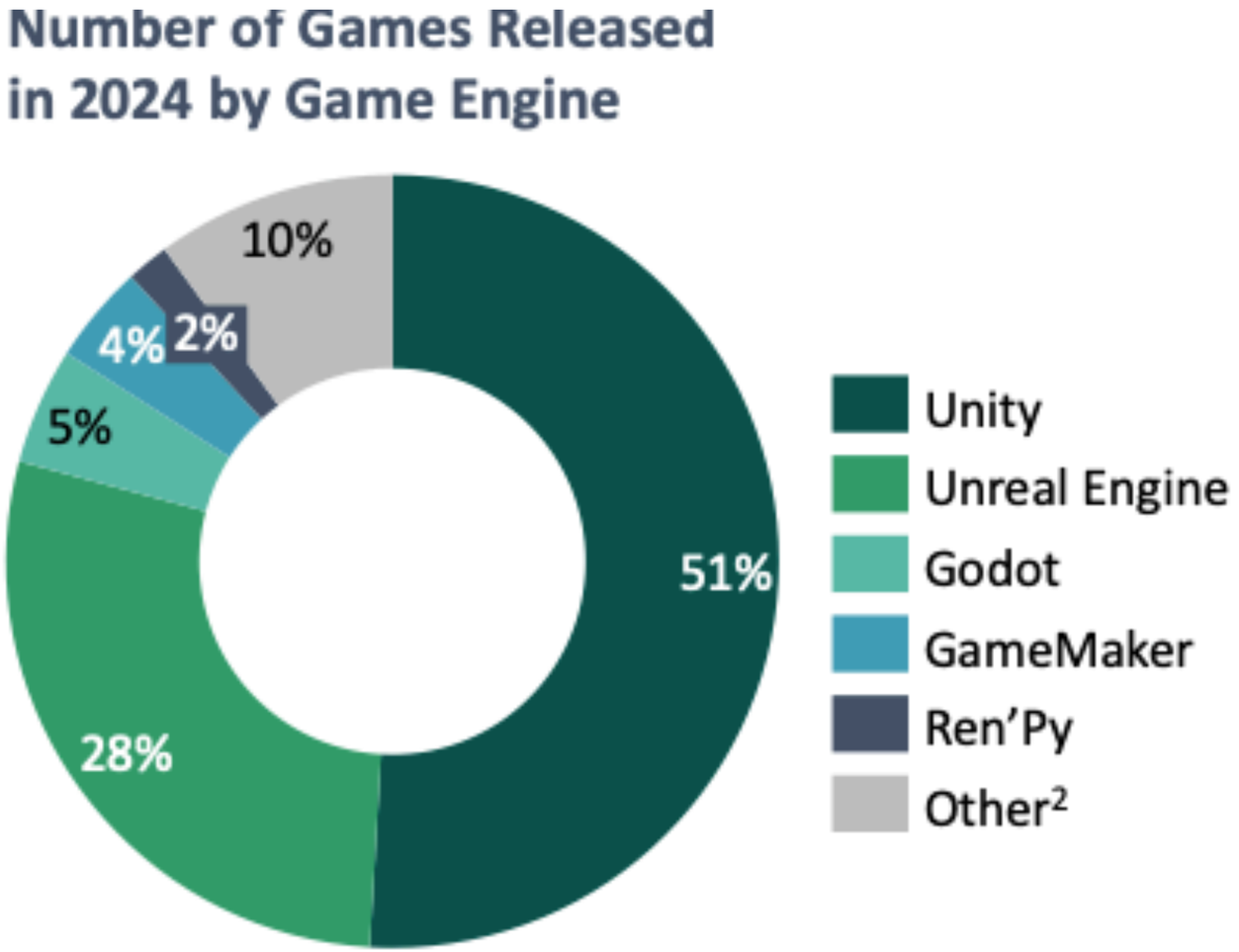


https://newzoo.com/articles/executive-summary-ggmr-2026-free-edition

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VP9, HW-accelerated, alpha, Apple+Android first, Godot/Unity/Unreal

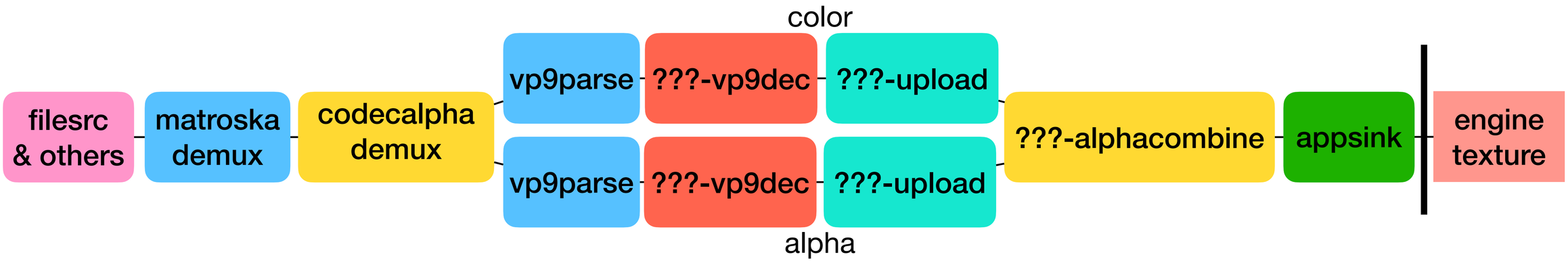
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- **Apple+Android first**: mobile gaming dominates
- Godot (**5%**), Unreal (**28%**) and Unity (**51%**) are the **big 3 engines**



https://app.sensortower.com/vgi/assets/reports/The_Big_Game_Engines_Report_of_2025.pdf

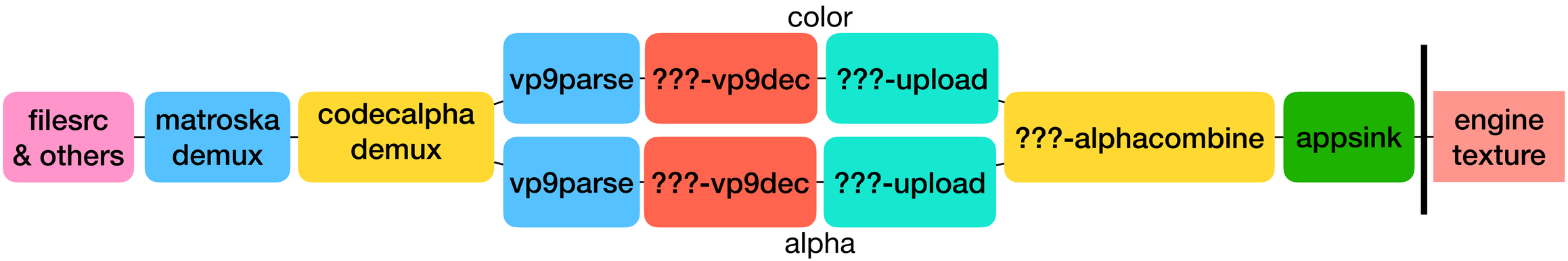
Let’s pick one target (continued)

Pipeline simplified for presentation: video only, no queues, etc



Let’s pick one target (continued)

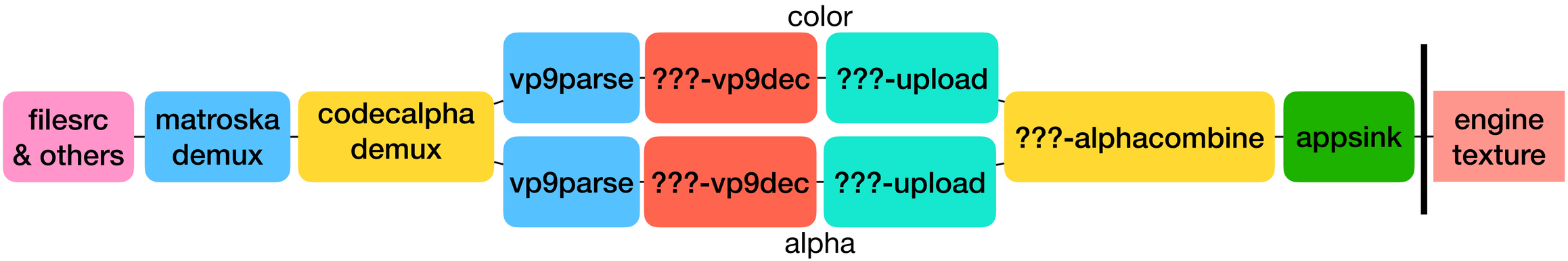
Pipeline simplified for presentation: video only, no queues, etc



- Small executable size, especially on mobile

Let’s pick one target (continued)

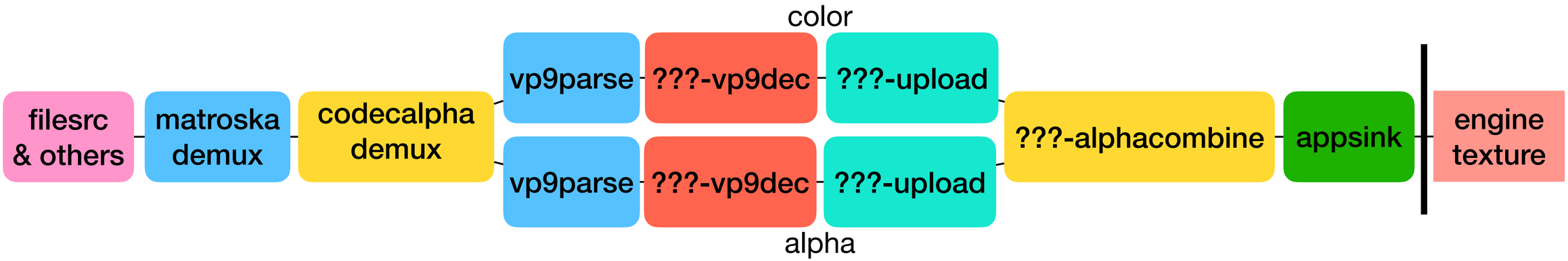
Pipeline simplified for presentation: video only, no queues, etc



- Small executable size, especially on mobile
- Controlled resource usage: threads, memory, storage

Let’s pick one target (continued)

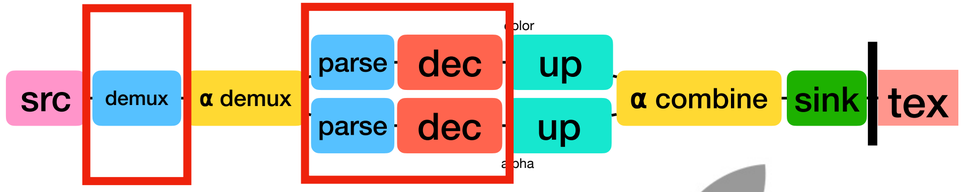
Pipeline simplified for presentation: video only, no queues, etc



- Small executable size, especially on mobile
- Controlled resource usage: threads, memory, storage
- Dynamic linking

VP9 in vtdec

HW-accelerated VP9 for Apple platforms





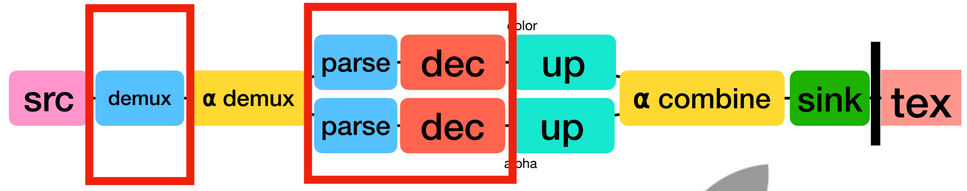
VP9 in vtdec

HW-accelerated VP9 for Apple platforms

GStreamer / gstreamer / Merge requests / !10175

vtdec: Add vp9 support

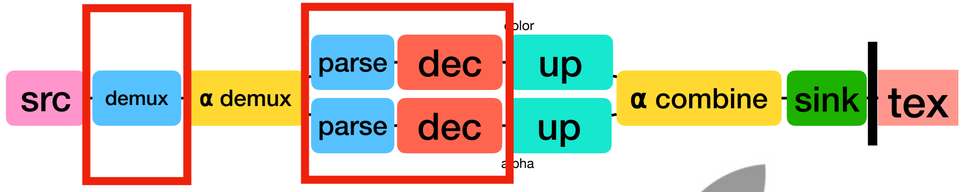
Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:vtdec-vp9-support` into `main` 10 months ago





VP9 in vtdec

HW-accelerated VP9 for Apple platforms



GStreamer / gstreamer / Merge requests / !10175

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GStreamer / gstreamer / Merge requests / !10704

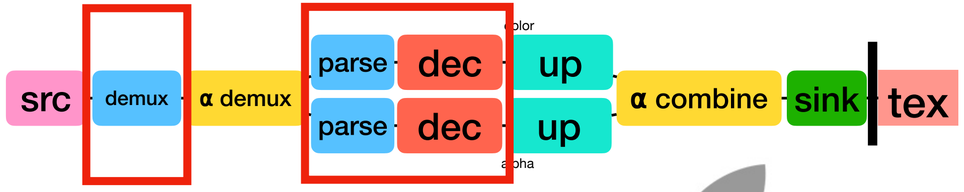
av1parse: now adds av1c in caps codec_data

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:av1parse-add-av1c-codec-data` into `main` 7 months ago



VP9 in vtdec

HW-accelerated VP9 for Apple platforms



GStreamer / gstreamer / Merge requests / !10175

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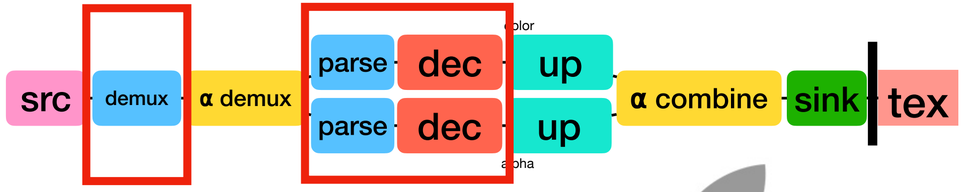
GStreamer / gstreamer / Merge requests / !10538

pbutils, qtmux, qtdemux, vtdec, vp9parse: vp9 improvements to unify vpcC creation and level handling

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:isomp4-vtdec-vpcc-unification` into `main` 8 months ago

VP9 in vtdec

HW-accelerated VP9 for Apple platforms





GStreamer / gstreamer / Merge requests / !10175

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GStreamer / gstreamer / Merge requests / !10538

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GStreamer / gstreamer / Merge requests / !10875

matroska: Now read&write vp9 CodecPrivate to assist initial decoder config

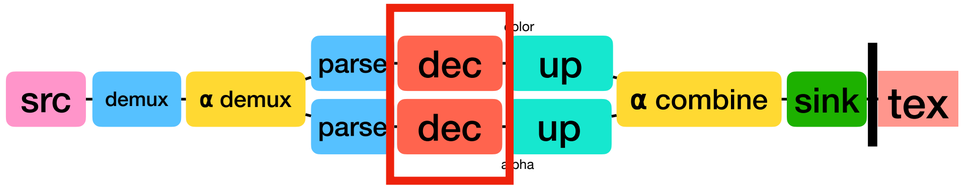
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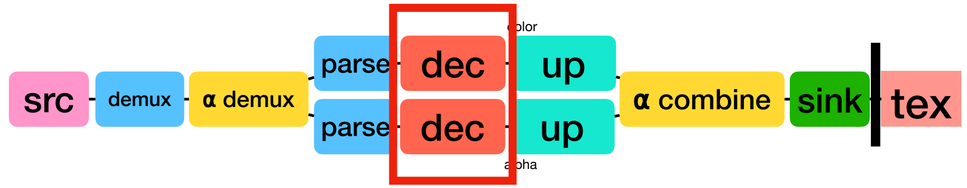
And now, plugins!

Wait… Build size matters!

We want vtdec alone, not the whole applemedia family!



Wait… Build size matters!

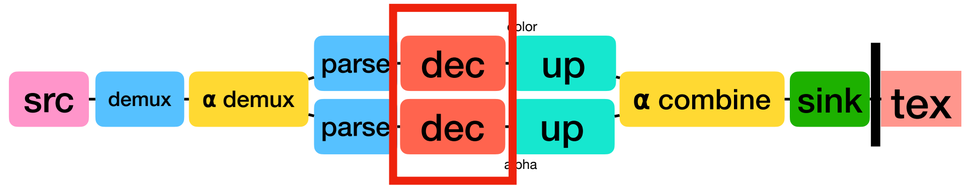


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```
Plugin Details:
  Name                     applemedia
  Description              Elements for capture and codec access on Apple macOS and iOS

  avfassetsrc: Source and decoder for AVFoundation assets
  avfdeviceprovider: AVF Device Provider
  avfvideosrc: Video Source (AVFoundation)
  avsamplebufferlayersink: AV Sample video sink
  vtdec: Apple VideoToolbox decoder
  vtdec_hw: Apple VideoToolbox decoder (hardware only)
  vtenc_h264: H.264 encoder
  vtenc_h264_hw: H.264 (HW only) encoder
  vtenc_h265: H.265/HEVC encoder
  vtenc_h265_hw: H.265/HEVC (HW only) encoder
  vtenc_h265a: H.265/HEVC with alpha encoder
  vtenc_h265a_hw: H.265/HEVC with alpha (HW only) encoder
  vtenc_prores: Apple ProRes encoder
```

Wait… Build size matters!



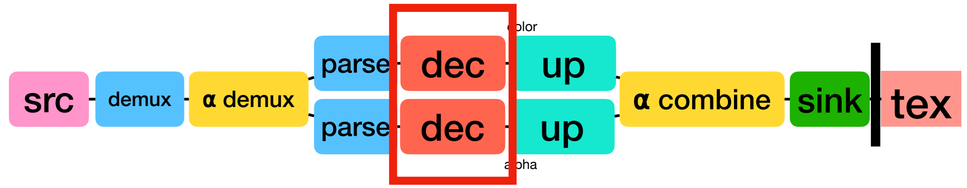
We want vtdec alone, not the whole applemedia family!

GStreamer / gstreamer / Merge requests / !10780

applemedia: elements can now be individually registered with gst-full

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:applemedia-per-element-registration` into `main` 7 months ago

Wait… Build size matters!



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GStreamer / gstreamer / Merge requests / **!10780**

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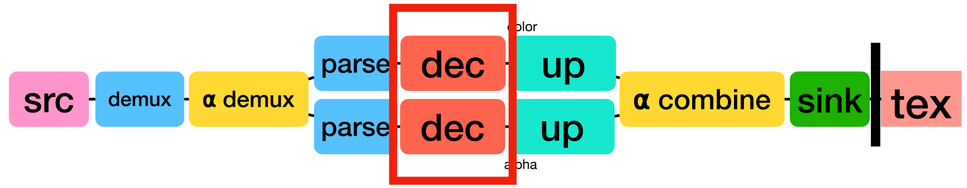
GStreamer / gstreamer / Merge requests / **!11631**

applemedia: vtdec now has per-codec elements

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:vtdec-codec-subclasses` into `main` 4 months ago

Wait… Build size matters!

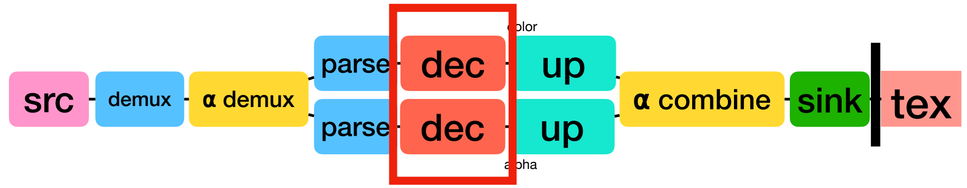
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  vtenc_h265a: H.265/HEVC with alpha encoder
  vtenc_h265a_hw: H.265/HEVC with alpha (HW only) encoder
  vtenc_prores: Apple ProRes encoder
  vth264dec: Apple VideoToolbox H.264 decoder
  vth264dec_hw: Apple VideoToolbox H.264 decoder (hardware only)
  vth265dec: Apple VideoToolbox H.265 decoder
  vth265dec_hw: Apple VideoToolbox H.265 decoder (hardware only)
  vtjpegdec: Apple VideoToolbox JPEG decoder
  vtjpegdec_hw: Apple VideoToolbox JPEG decoder (hardware only)
  vtmpeg2dec: Apple VideoToolbox MPEG-2 decoder
  vtmpeg2dec_hw: Apple VideoToolbox MPEG-2 decoder (hardware only)
  vtproresdec: Apple VideoToolbox ProRes decoder
  vtproresdec_hw: Apple VideoToolbox ProRes decoder (hardware only)
  vtvp9dec: Apple VideoToolbox VP9 decoder
  vtvp9dec_hw: Apple VideoToolbox VP9 decoder (hardware only)
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And now, plugins!
(really)

Extensibility overview

Plugins are right after, I swear!

	Godot	Unreal	Unity
Builtin	 Ogg Theora Vorbis	System-Level  Electra™ Bink™	System-Level  libvpx
Source access	✔	✔ -	Enterprise license
Scripting + Native API	✔	✔	✔
Dedicated media API	✔	✔ +	✖

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GODOT DOCS

Search docs

- VideoStream
- **VideoStreamPlayback**
  - Description
  - Methods
  - Method Descriptions
- VideoStreamTheora
- ViewportTexture
- VisualShader
- VisualShaderNode
- VisualShaderNodeBillboard
- VisualShaderNodeBoolean Constant
- VisualShaderNodeBoolean Parameter
- VisualShaderNodeClamp
- VisualShaderNodeColor Constant
- VisualShaderNodeColorFunc
- VisualShaderNodeColorOp
- VisualShaderNodeColor Parameter
- VisualShaderNodeComment
- VisualShaderNodeCompare
- VisualShaderNodeConstant
- VisualShaderNodeCubemap
- VisualShaderNodeCubemap Parameter
- VisualShaderNodeCurveTexture
- VisualShaderNodeCurve XYZTexture
- VisualShaderNodeCustom
- VisualShaderNodeDerivative Func
- VisualShaderNodeDeterminant
- VisualShaderNodeDistanceFade
- VisualShaderNodeDotProduct

Read the Docs v: stable

Godot Engine 4.7 documentation in English

/ All classes / VideoStreamPlayback

VideoStreamPlayback

Inherits: Resource < RefCounted < Object

Internal class used by VideoStream to manage playback state when played from a VideoStreamPlayer.

Description

This class is intended to be overridden by video decoder extensions with custom implementations of VideoStream.

Methods

int	_get_channels() virtual const
float	_get_length() virtual const
int	_get_mix_rate() virtual const
float	_get_playback_position() virtual const
Texture2D	_get_texture() virtual const
bool	_is_paused() virtual const
bool	_is_playing() virtual const
void	_play() virtual
void	_seek(time: float) virtual
void	_set_audio_track(idx: int) virtual
void	_set_paused(paused: bool) virtual
void	_stop() virtual
void	_update(delta: float) virtual required
int	mix_audio(num_frames: int, buffer: PackedFloat32Array = PackedFloat32Array(), offset: int = 0)

Method Descriptions

`int _get_channels() virtual const`

Returns the number of audio channels.

`float _get_length() virtual const`

Returns the video duration in seconds, if known, or 0 if unknown.

`int _get_mix_rate() virtual const`

Extensibility overview

Plugins are right after, I swear!

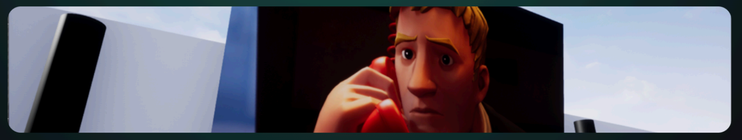
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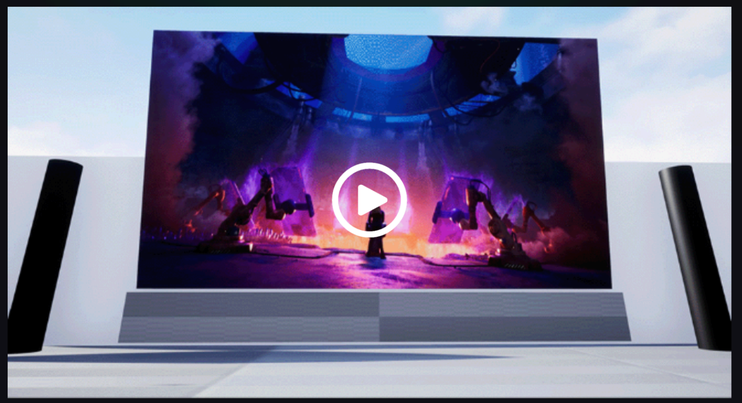
Developer / ••• / Media Framework

Media Framework

Working with Media Playback functionality in Unreal Engine.



On this page



While there is currently a **Startup Movie Player** system in UE, it can only be used for playing startup movies while the Engine loads up. It cannot be used to play movies in-game, say for instance as part of a UI element or perhaps on a Static Mesh in your level like a movie playing on a TV. This is where the **Media Framework** comes in, as not only will it allow you to do both of the examples presented above, it will also provide much more general media playback capabilities (outlined below) and is also scheduled to replace the deprecated Startup Movie Player framework in a future engine release.

The Media Framework in Unreal Engine is:

- Both Engine & Slate Agnostic
- Able to support Localized Audio & Video Tracks
- Accessible in the Content Browser, Material Editor, & Sound System
- Available for use with Blueprint & the UMG UI Designer
- Able to support Streaming Media
- Able to Fast Forward, Reverse, Play, Pause, & Scrub Media
- Able to support Pluggable Players

Extensibility overview

Plugins are right after, I swear!

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Unity Manual
- Unity 6.6 User Manual
- What's new in Unity
- Get started
- Upgrade Unity
- Unity Building Blocks
- Unity Editor interface
- Packages and package management
- Assets and media
- 2D game development
- Unity's AI
- XR
- Multiplayer
- Platform development
- GameObjects
- Scenes
- Cameras
- World building
- Physics
- Input
- UI systems
- Accessibility
- Animation
- Audio
- Video and cutscenes
- Lighting
- Materials and shaders
- Visual effects
- Render pipelines
- Post-processing
- Programming in Unity
  - Get started with programming in Unity
  - Environment and tools
  - Fundamental Unity types
  - Managing update and execution order
  - Managing time and frame rate

Native plug-ins

Unity supports native **plug-ins**, which are libraries of unmanaged code written in languages such as C, C++, and Objective-C. Plug-ins let the managed code you write in C# to call functions from these libraries. This feature allows you to integrate middleware libraries and to reuse existing C/C++ code. You can use both precompiled libraries and source code files as plug-ins. When you use source code, Unity compiles and links the plug-in code statically.

Topic	Description
Overview of native plug-ins in Unity	How to import and use native plug-ins.
Call functions	How to call unmanaged functions in a native plug-in from managed C# code and how to callback from unmanaged code to managed code.
Pass data	How to exchange data between managed and unmanaged code.

Note: Unity also exposes a set of native APIs that allow you to create and use plug-ins that interact directly with Unity Engine systems such as rendering, profiling, and logging. When you use these APIs, your native plug-in can interoperate with the Unity runtime directly without going through managed application code. Unity discovers and loads plug-ins that use this API automatically. For more information, refer to Native plug-in APIs. For an example of a native plug-in that uses these APIs, refer to Native Rendering Plugin.

For platform-specific information on native plug-ins, refer to the relevant section under Platform development.

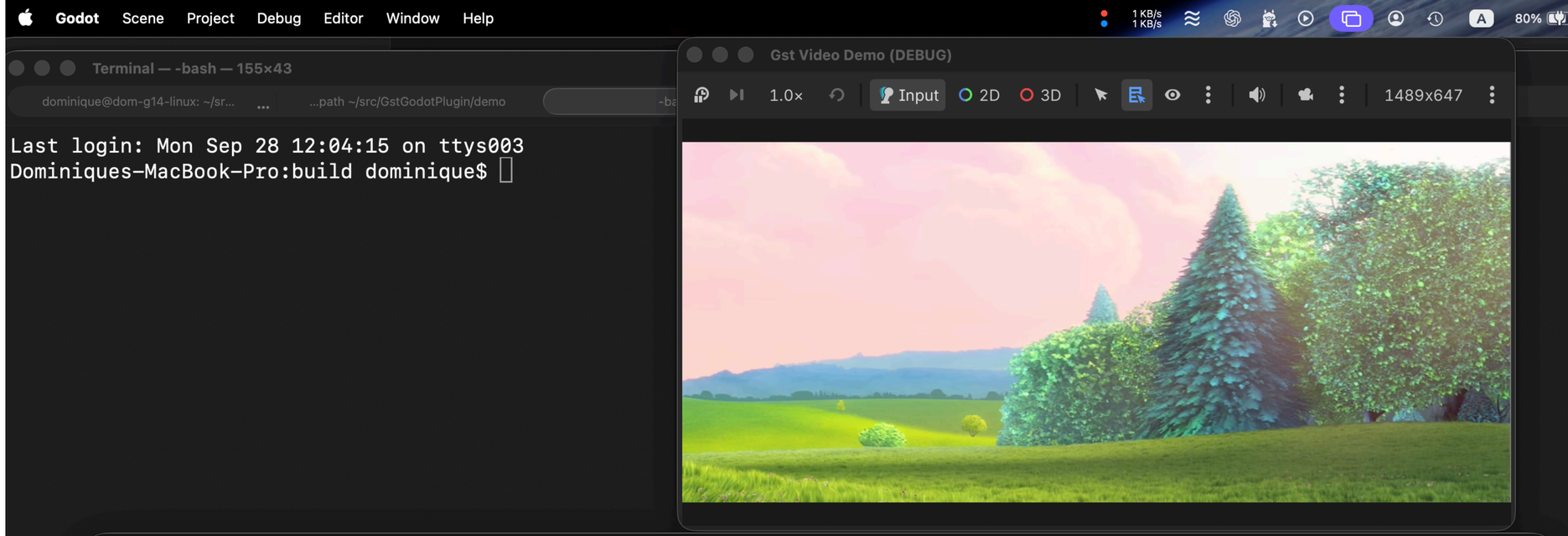
Additional resources

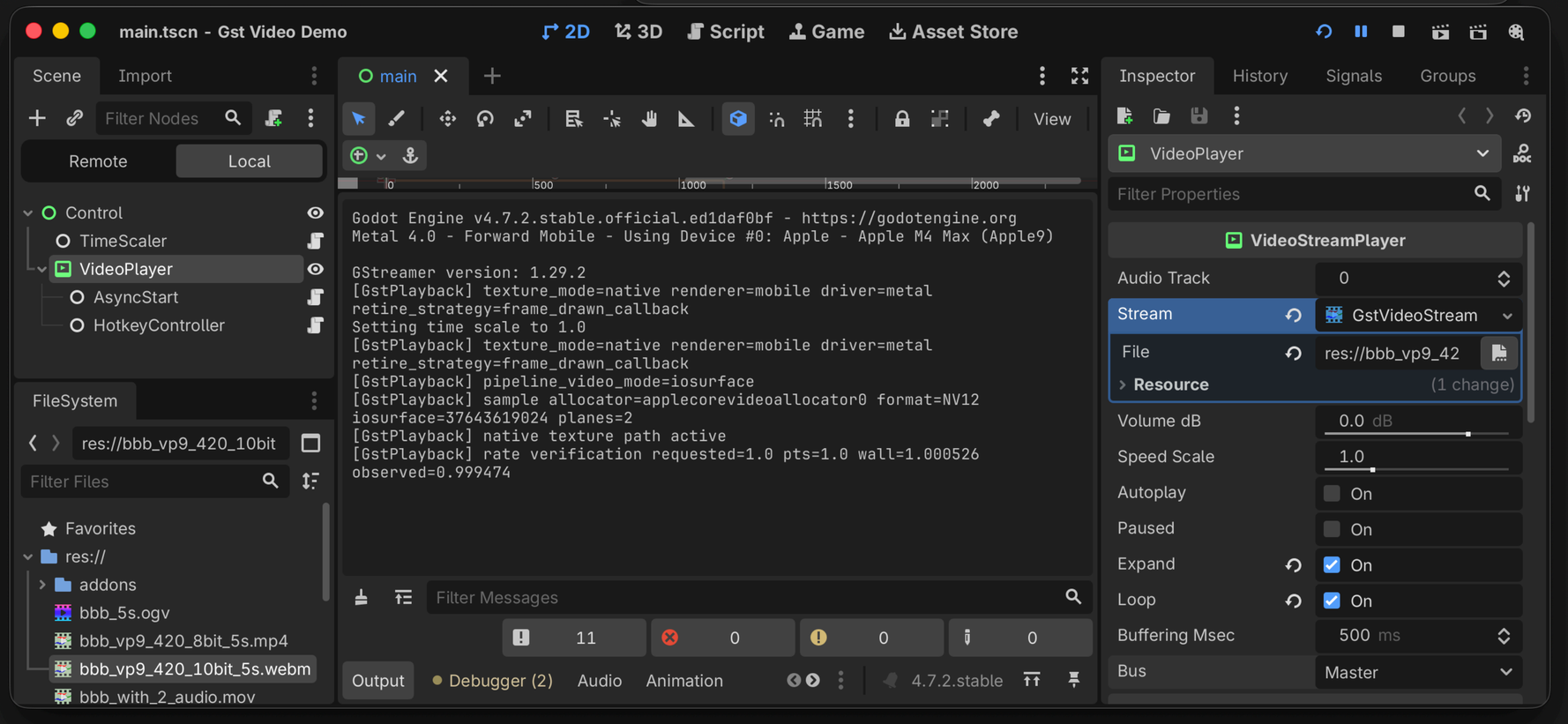
- Low-level native plug-in interface
- Platform development
- DllImportAttribute
- Mono Interop with native libraries
- Consuming Unmanaged DLL Functions
- Marshalling Data with Platform Invoke

Plugins

Godot





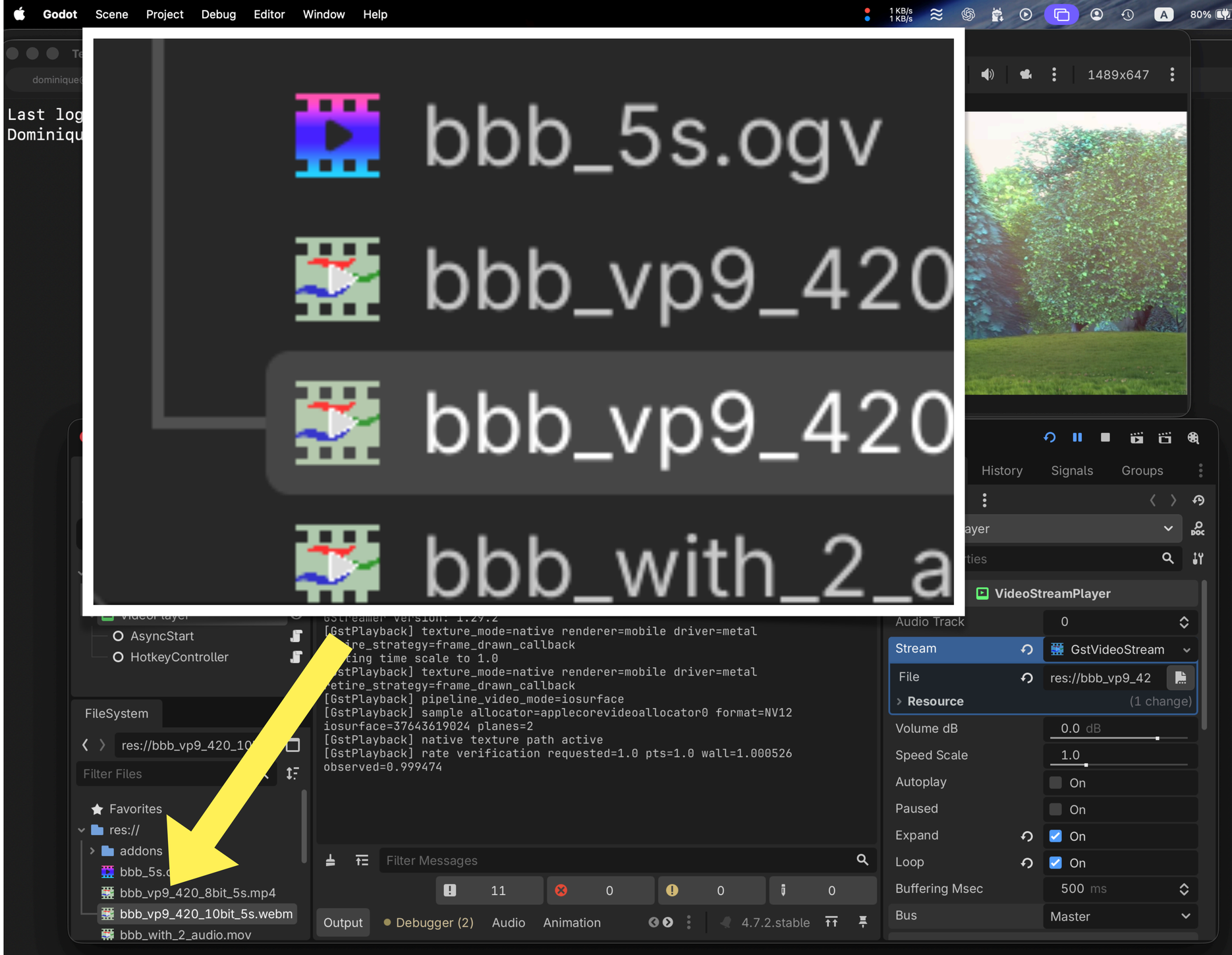


Plugins

Godot

- Importer + icon

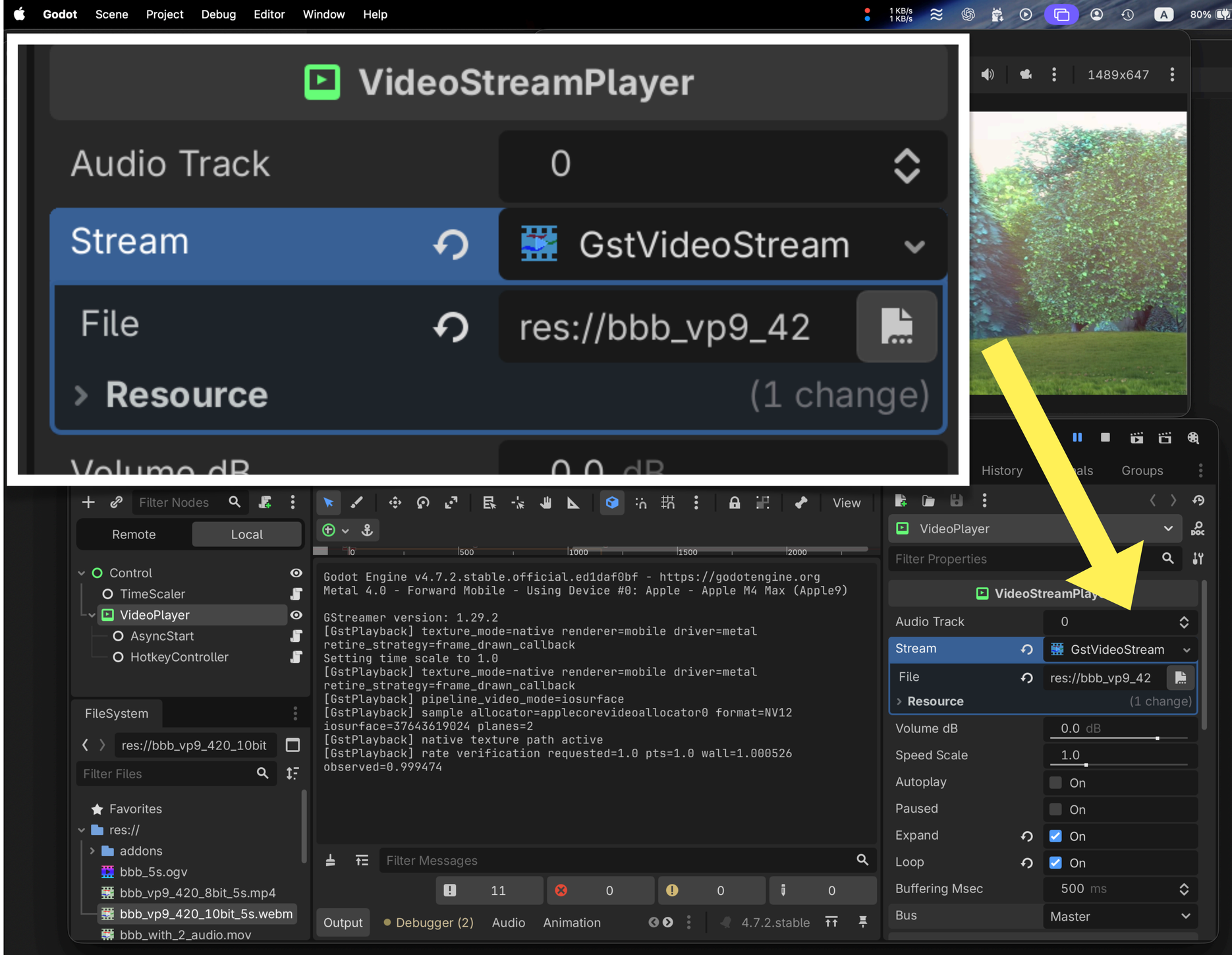




Plugins

Godot

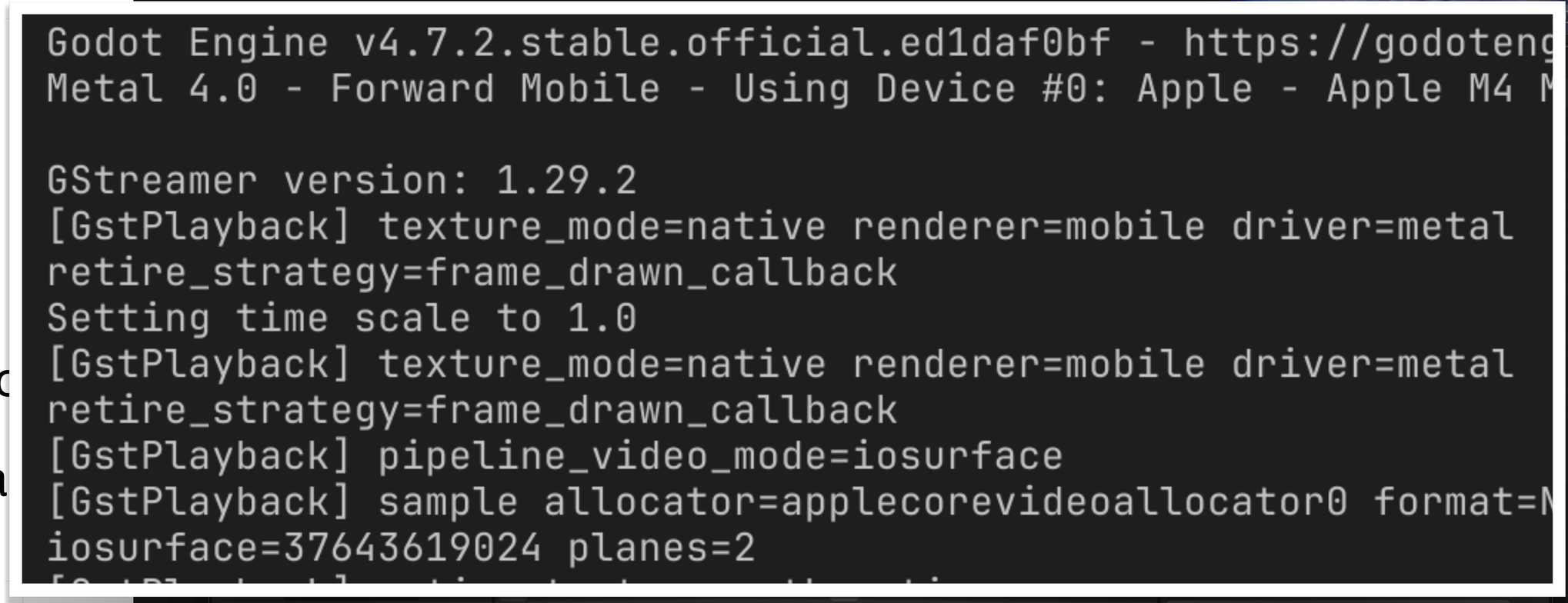
- Importer + icon
- Pipeline wrapper

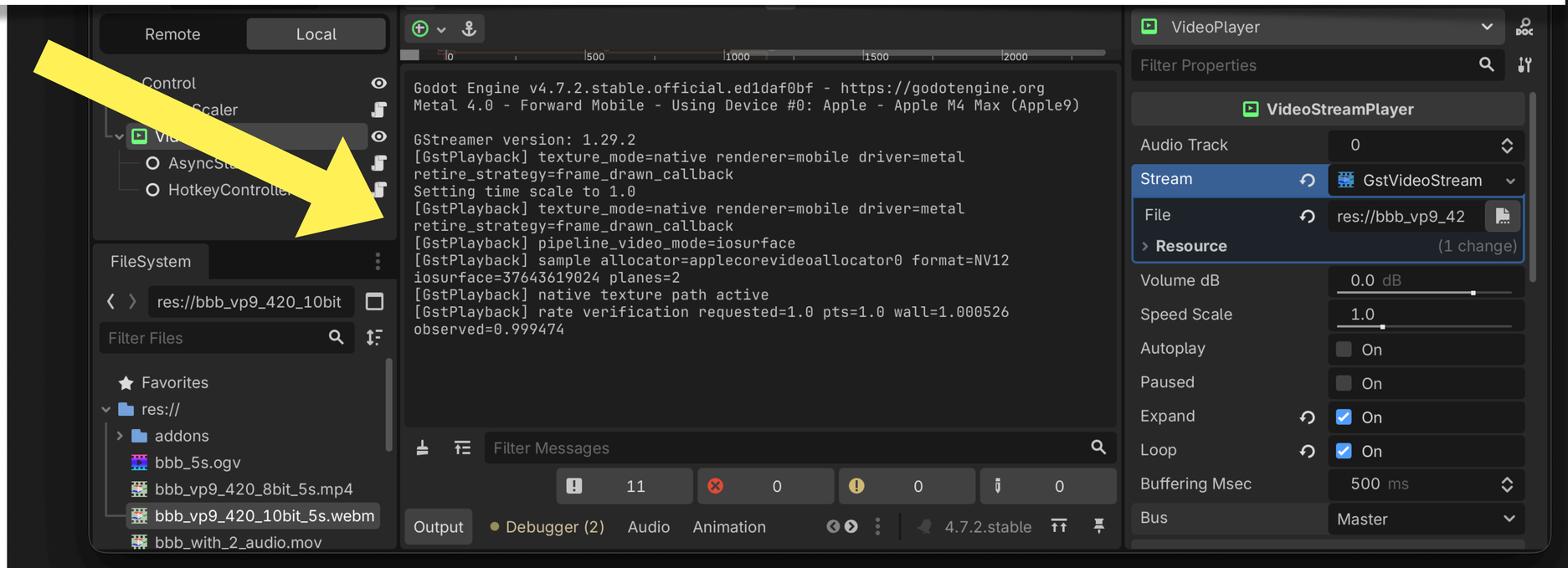


Plugins

Godot

- Importer + ic
- Pipeline wra
- Log



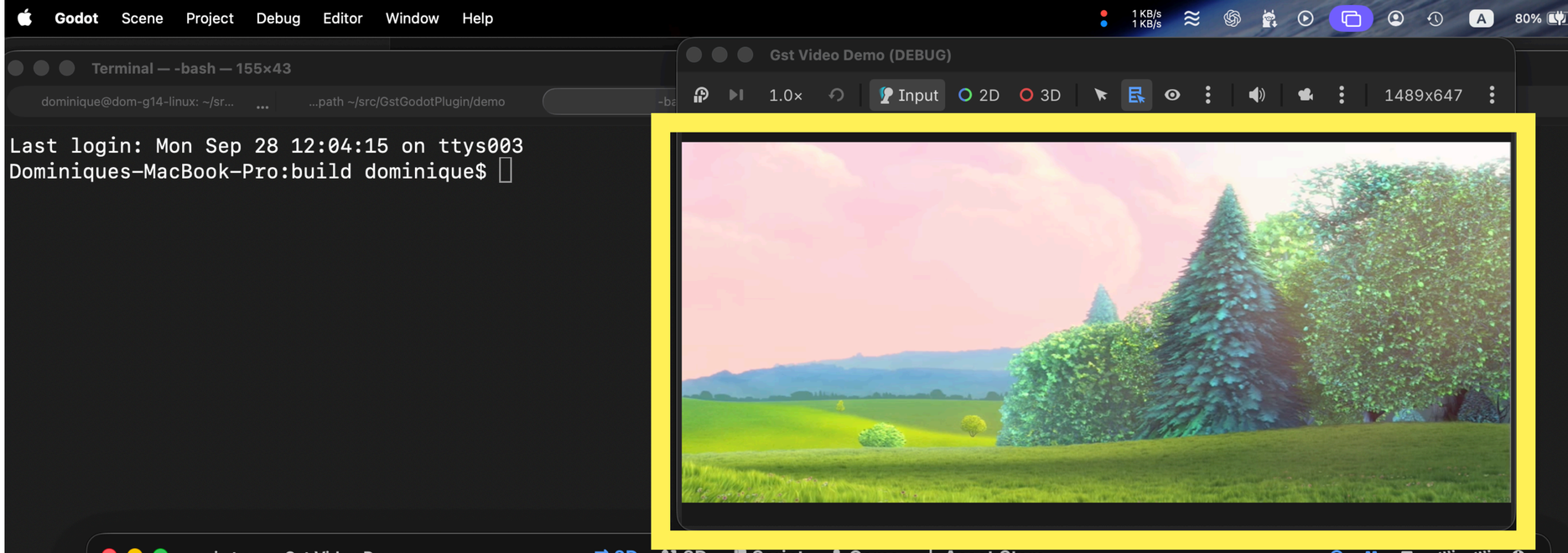


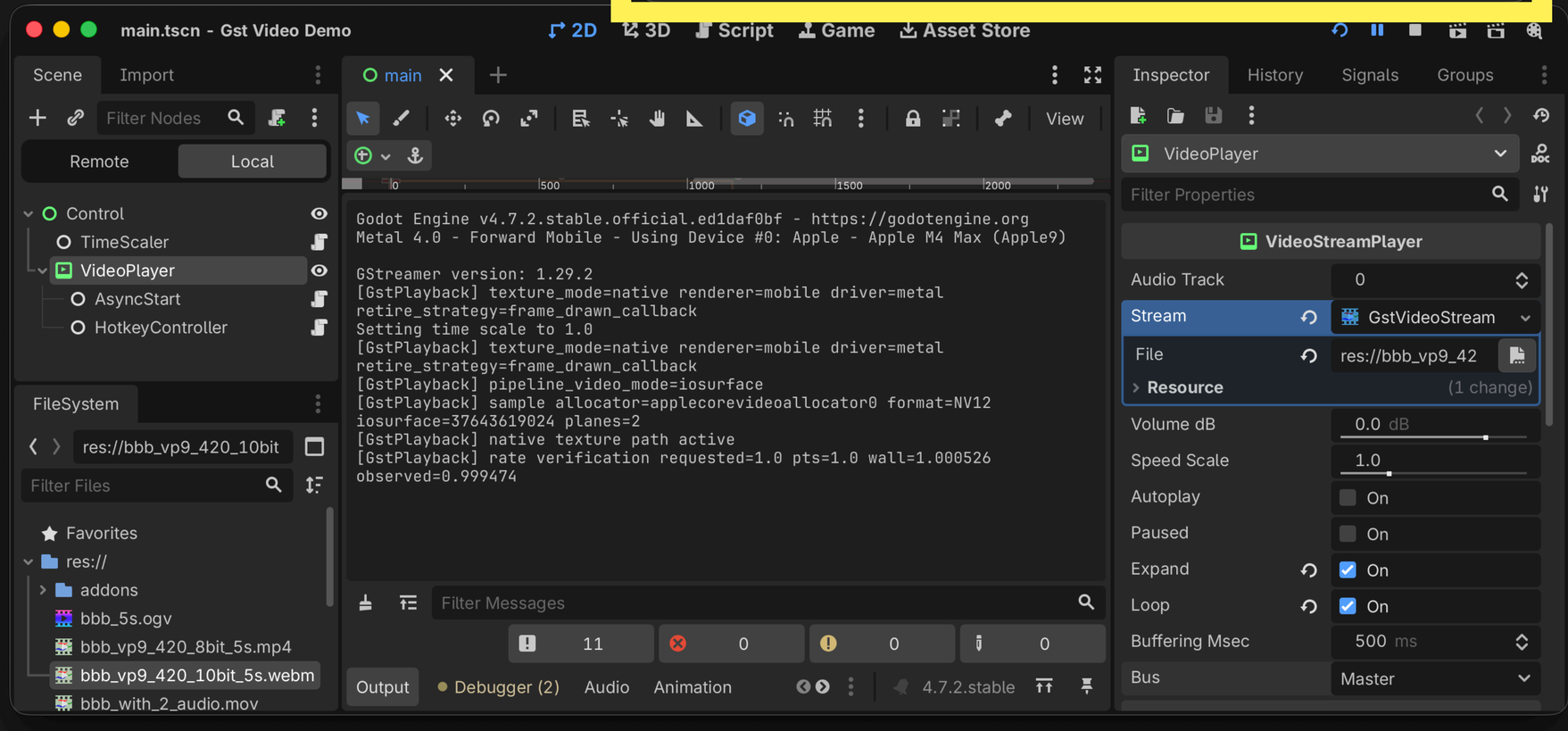
Plugins

Godot

- Importer + icon
- Pipeline wrapper
- Log
- Video in texture





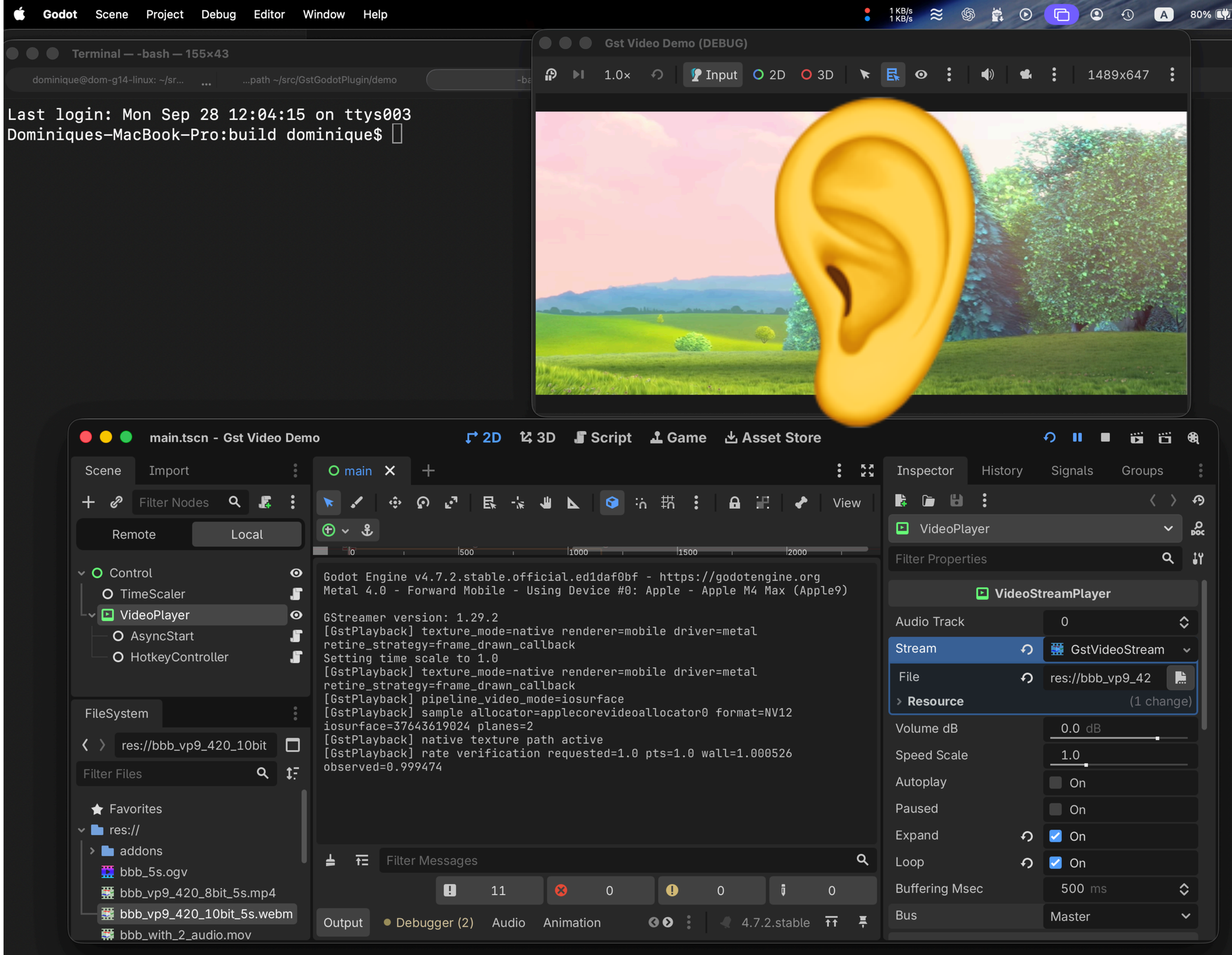


Plugins

Godot

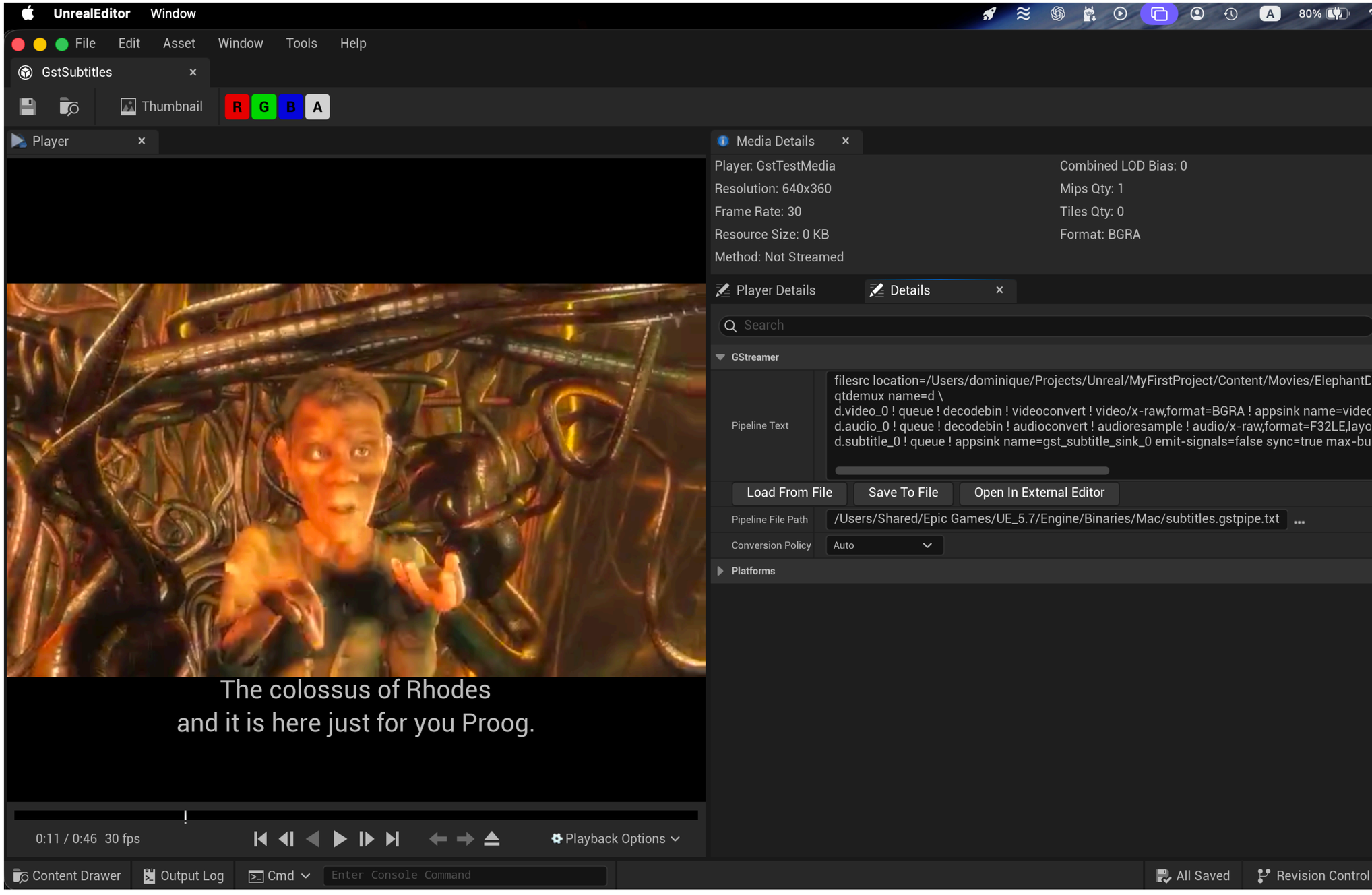
- Importer + icon
- Pipeline wrapper
- Log
- Video in texture
- Audio (trust me)





Plugins

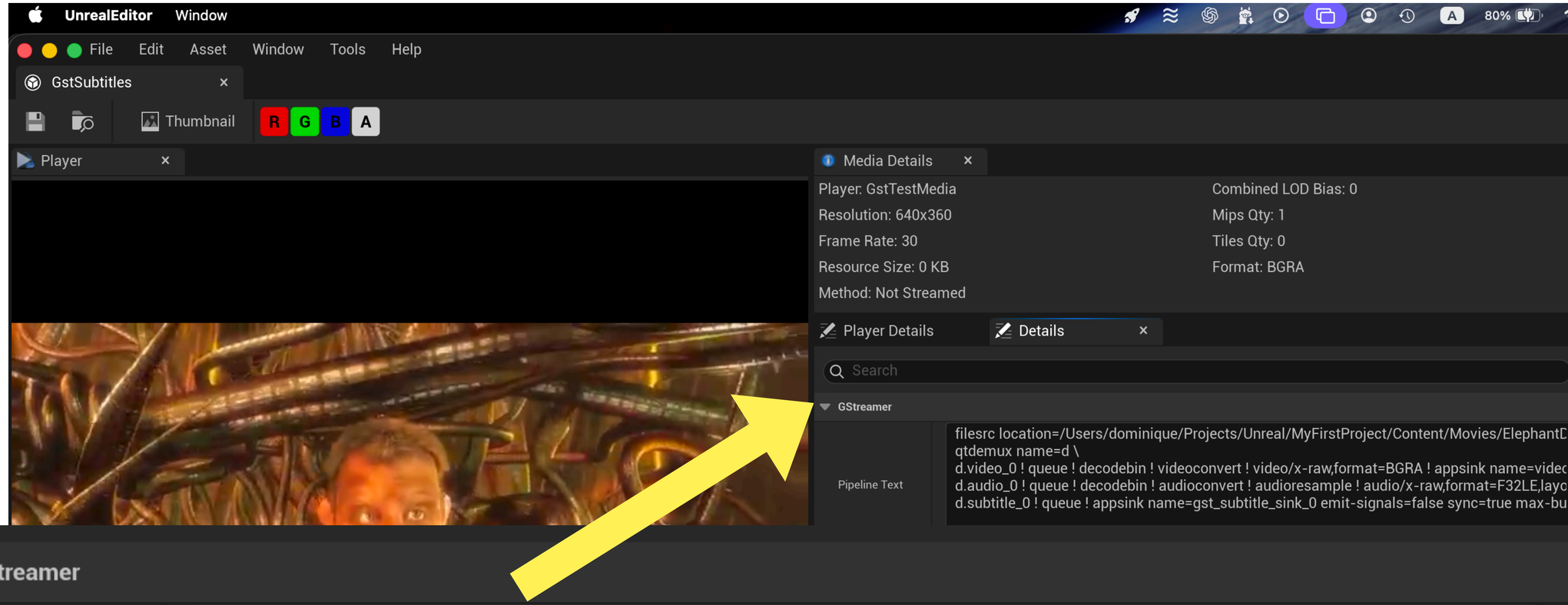
Unreal

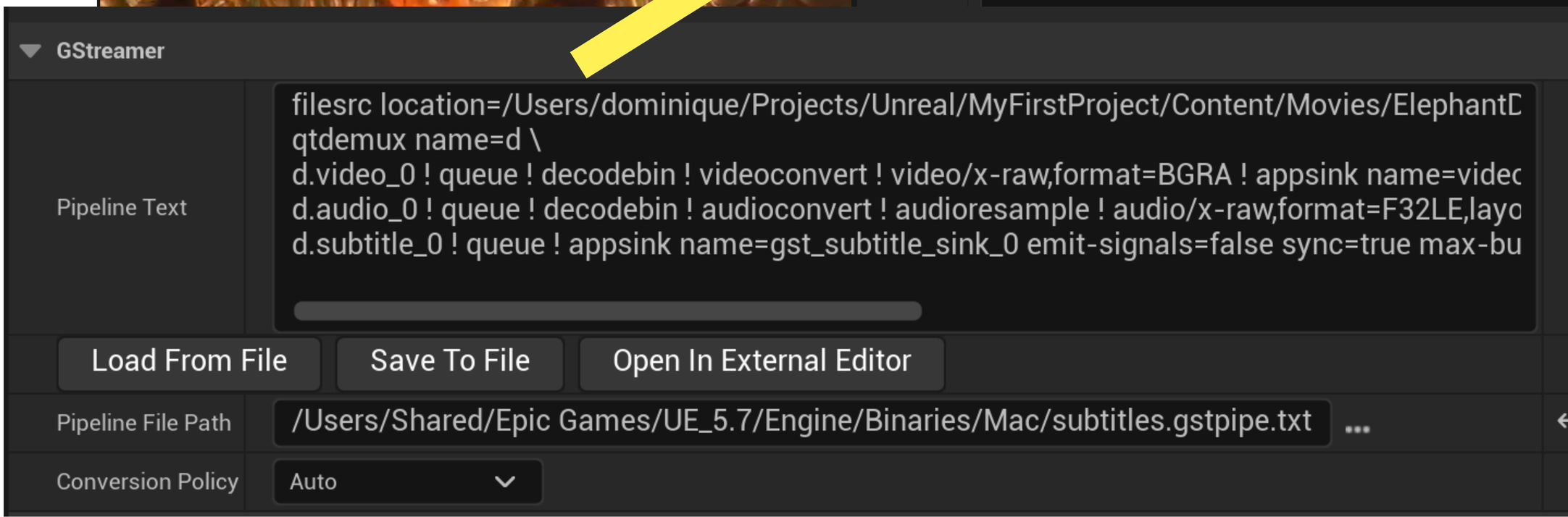


Plugins

Unreal

- Pipeline editor

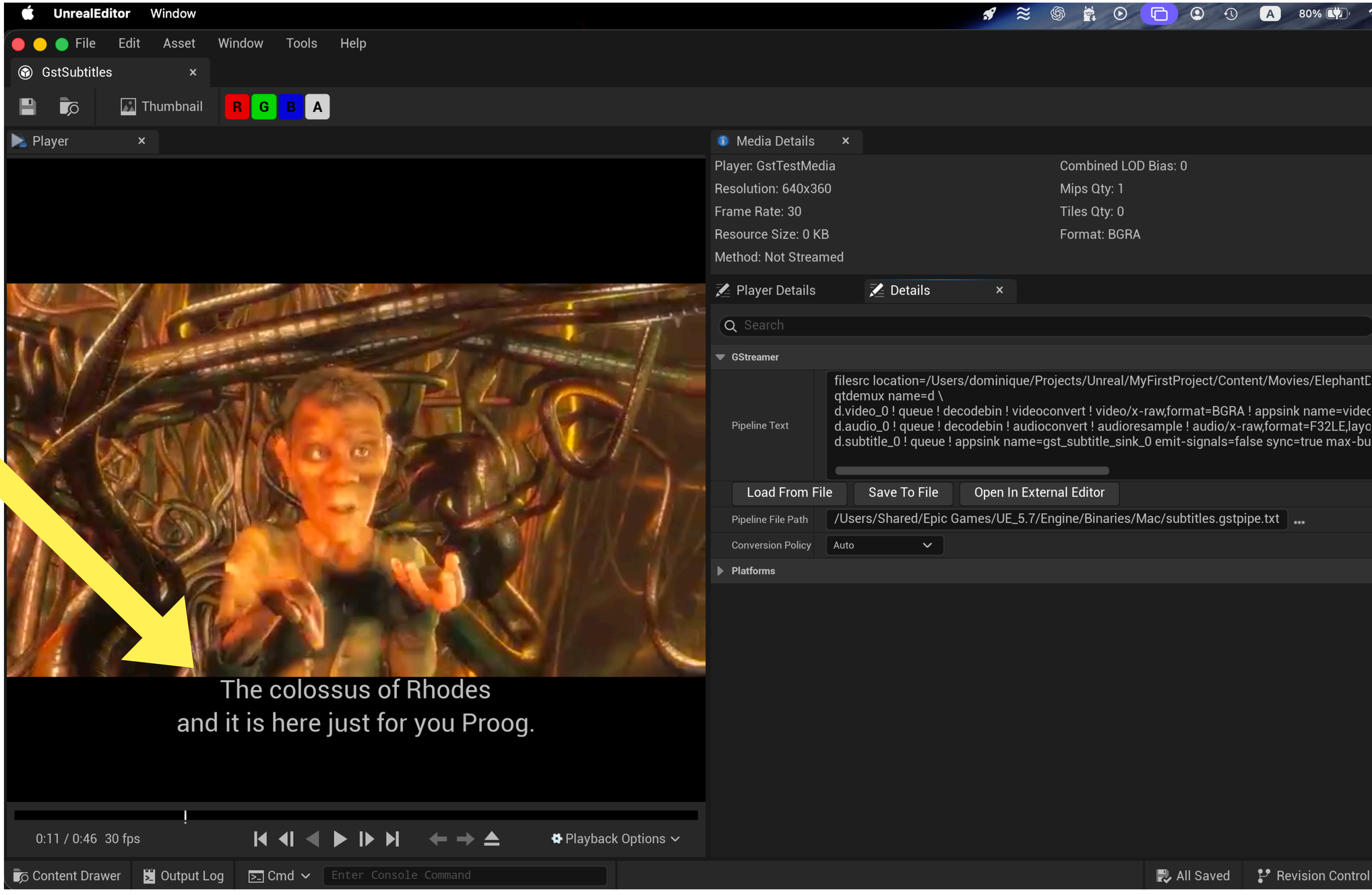




Plugins

Unreal

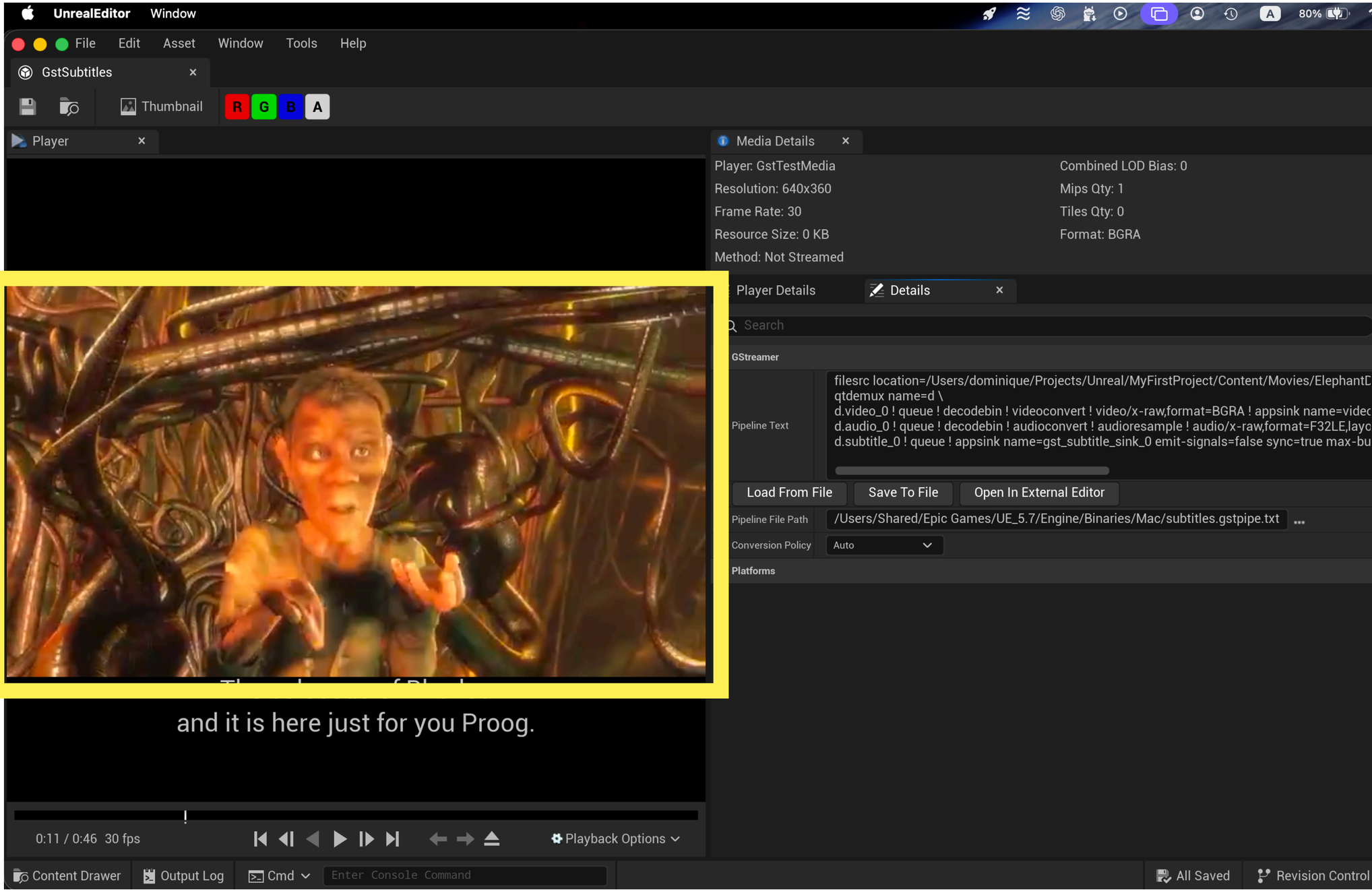
- Pipeline editor
- Subtitles!



Plugins

Unreal

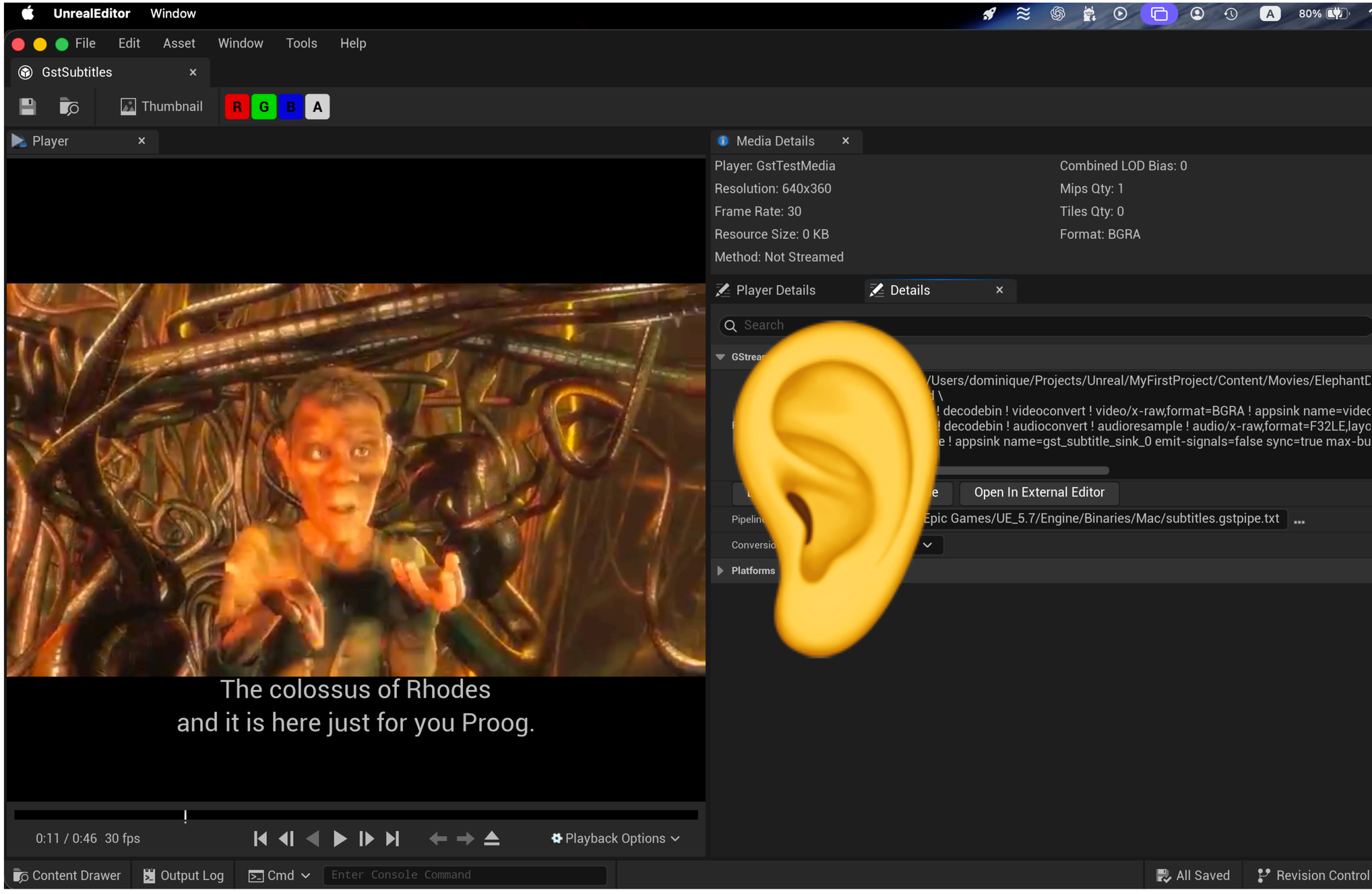
- Pipeline editor
- Subtitles!
- Video



Plugins

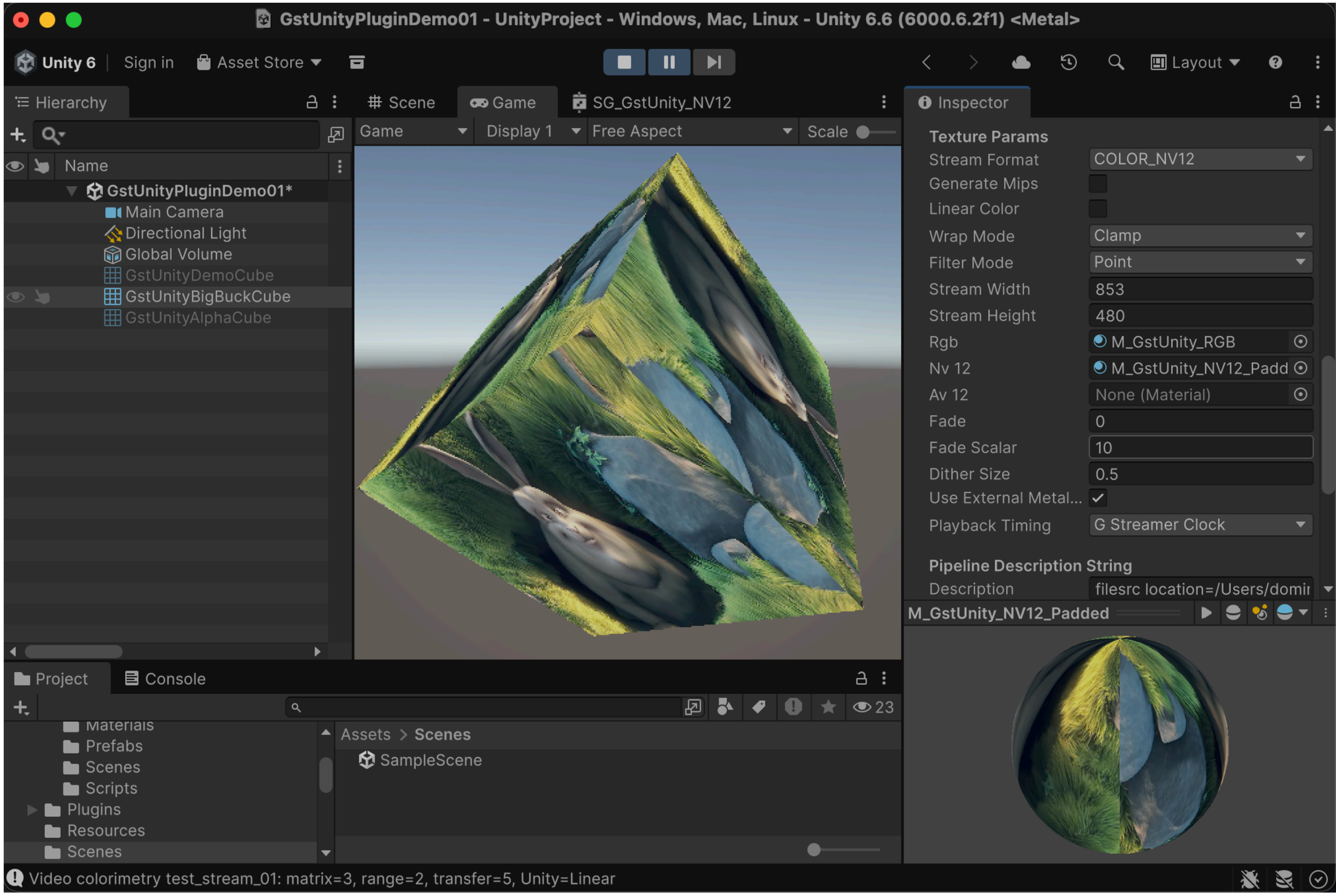
Unreal

- Pipeline editor
- Subtitles!
- Video
- Audio



Plugins

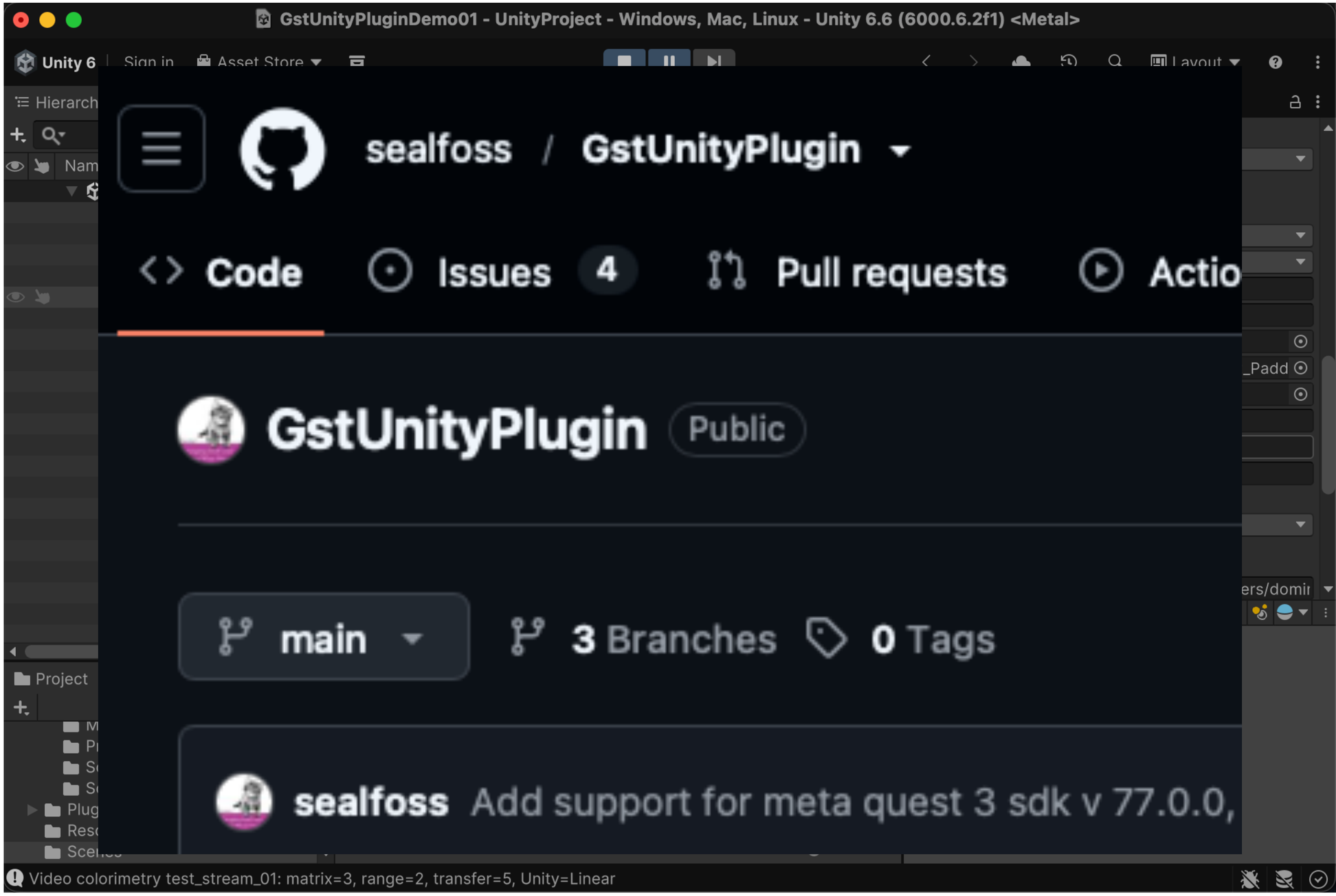
Unity



Plugins

Unity

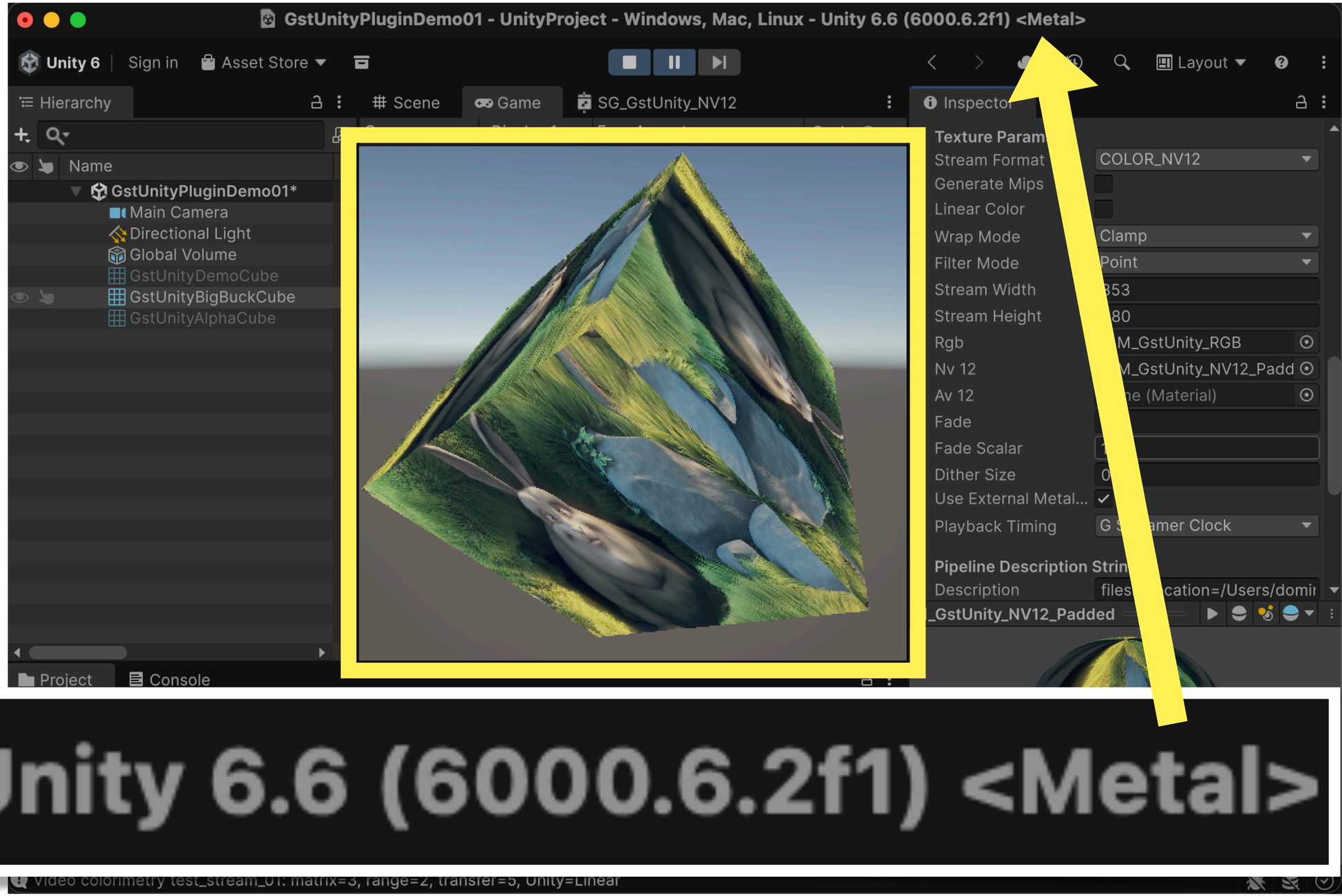
- Credit!



Plugins

Unity

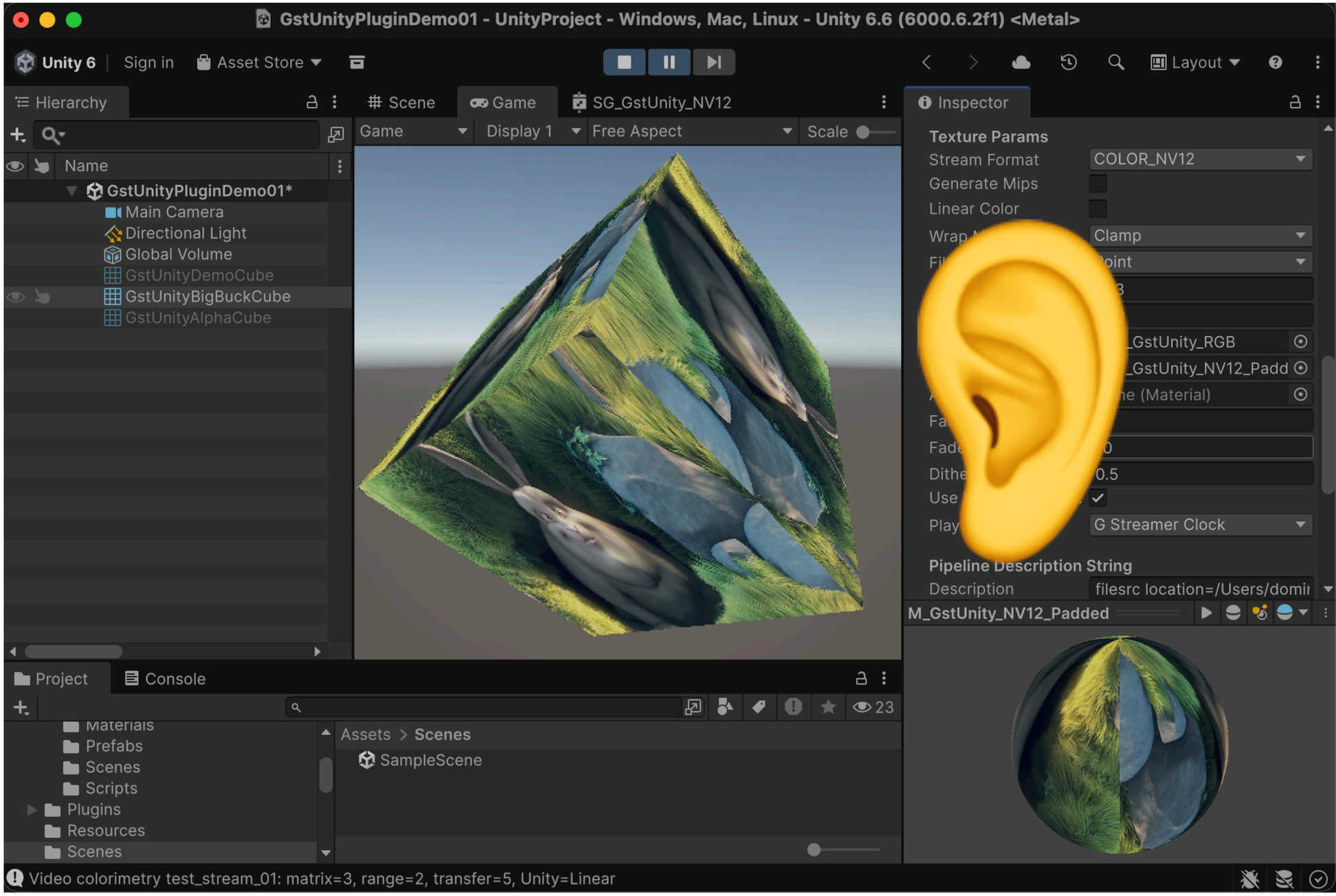
- Credit!
- Apple (Metal!)



Plugins

Unity

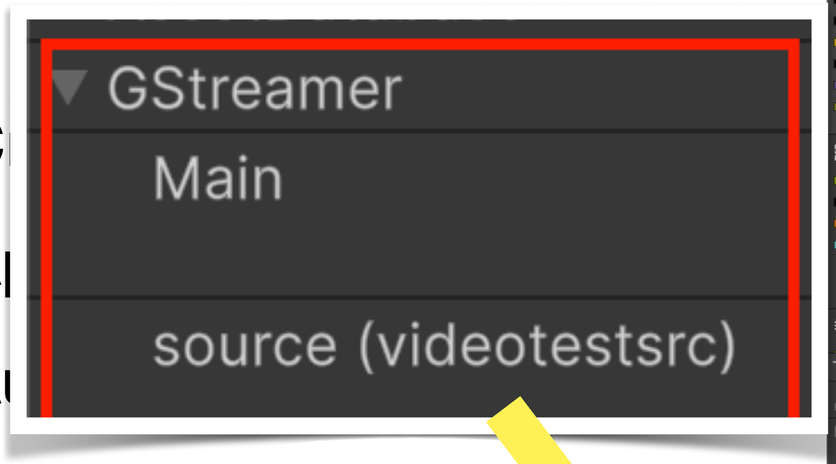
- Credit!
- Apple (Metal!)
- Audio

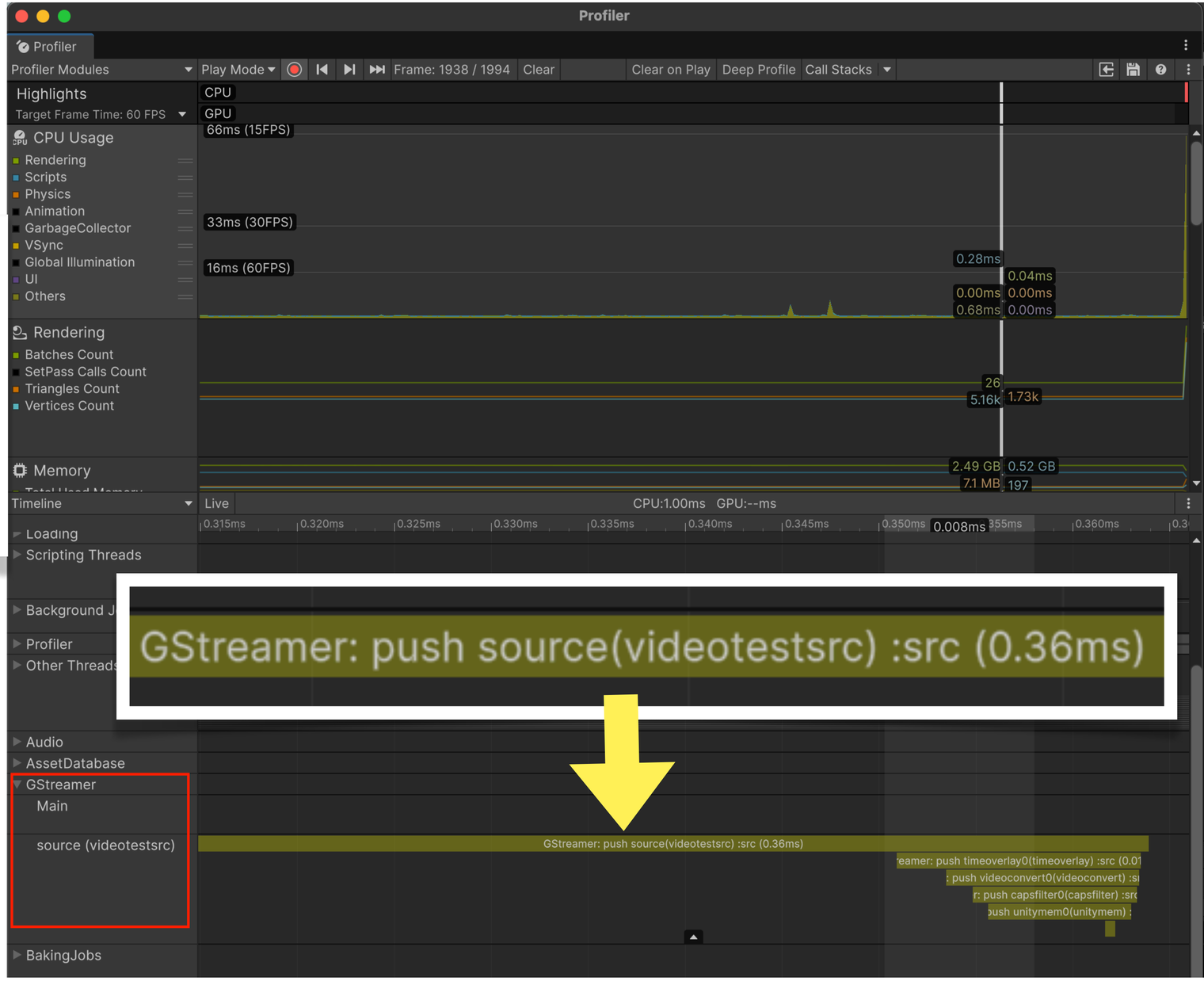


Plugins

Unity

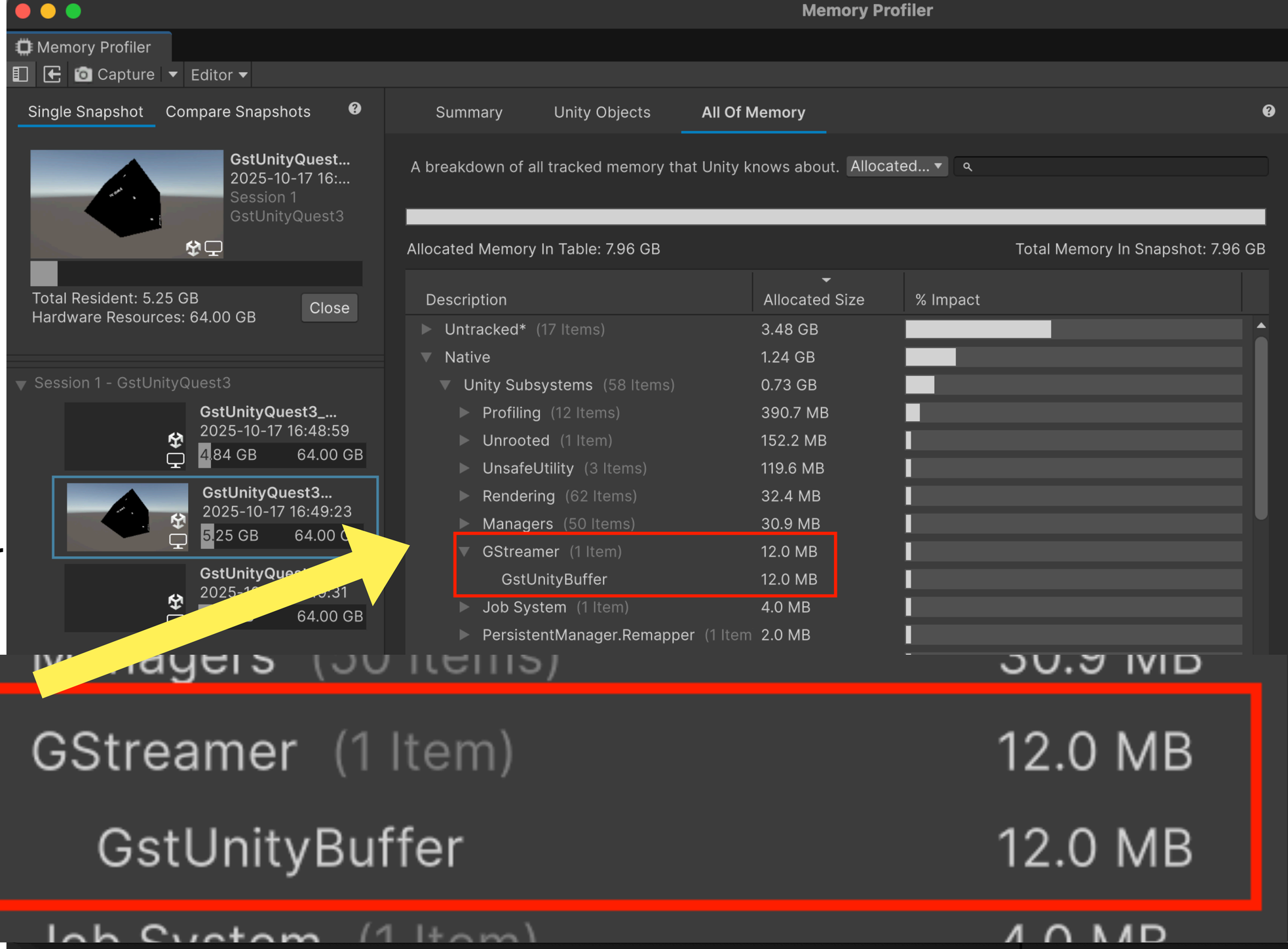
- C
- A
- A
- Thread profiler

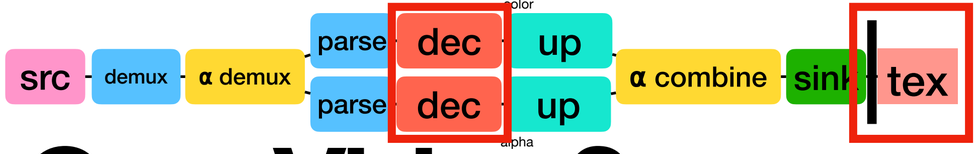




Plugins
Unity

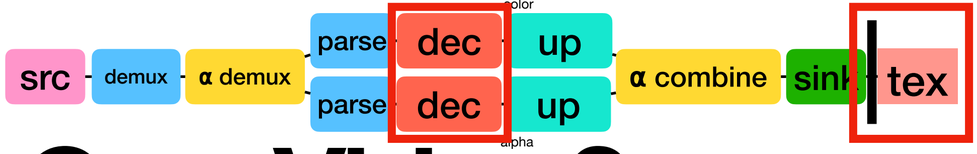
- Credit!
- Apple (Metal!)
- Audio
- Thread profiler
- Memory profiler





Apple GPU buffers: Metal or CoreVideo?

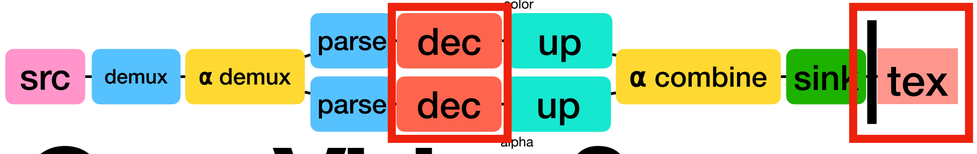
None! Introducing memory:IOSurface



Apple GPU buffers: Metal or CoreVideo?

None! Introducing memory:IOSurface

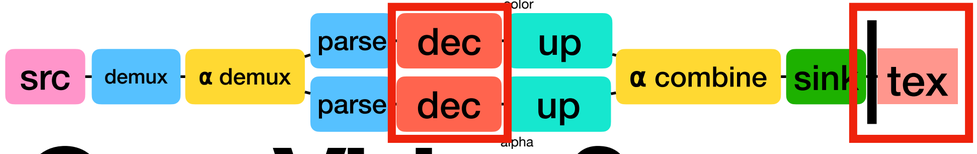
- Godot and Unity want Metal (**`MTLTexture`**)



Apple GPU buffers: Metal or CoreVideo?

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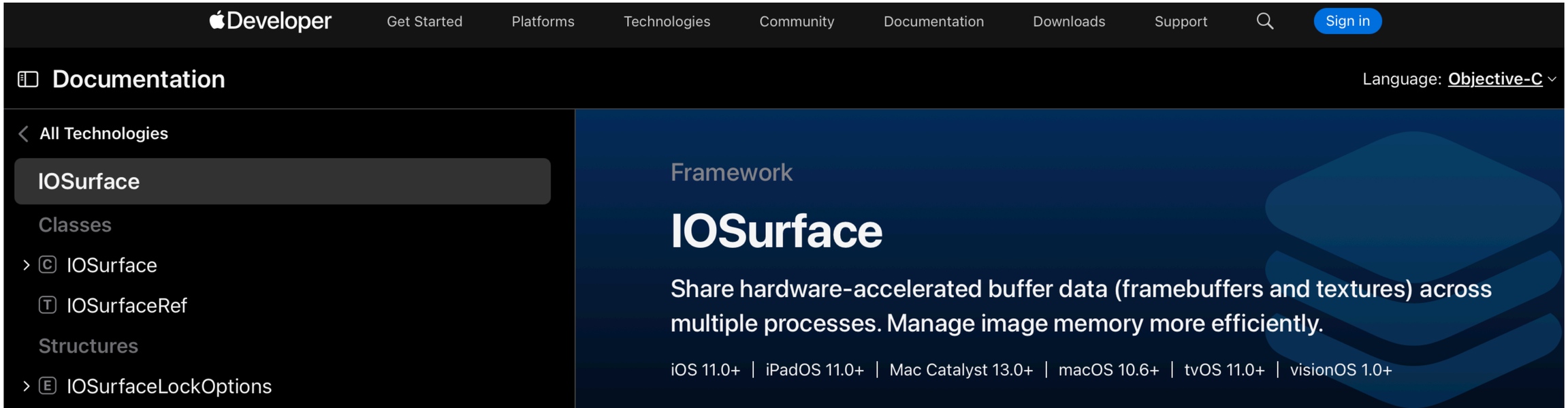
- Godot and Unity want Metal (**`MTLTexture`**)
- But Unreal wants CoreVideo (**`CVPixelBufferRef`**)

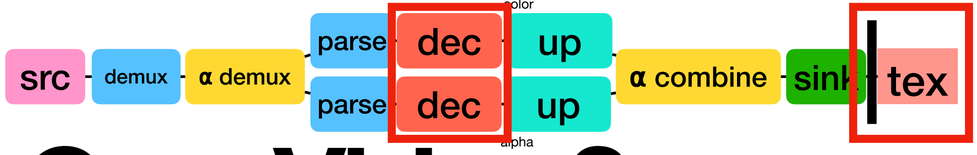


Apple GPU buffers: Metal or CoreVideo?

None! Introducing memory:IOSurface

- Godot and Unity want Metal (**`MTLTexture`**)
- But Unreal wants CoreVideo (**`CVPixelBufferRef`**)
- **`IOSurface`**, the DMA buffer of Apple, can be wrapped by MTL and CV





Apple GPU buffers: Metal or CoreVideo?

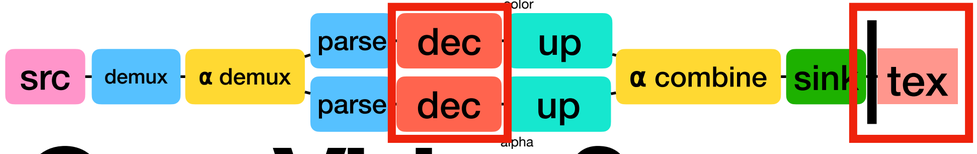
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GStreamer / gstreamer / Merge requests / **!11560**

gst-libs: iosurface: applemedia: Introducing memory:IOSurface

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:memory-iosurface` into `main` 4 months ago

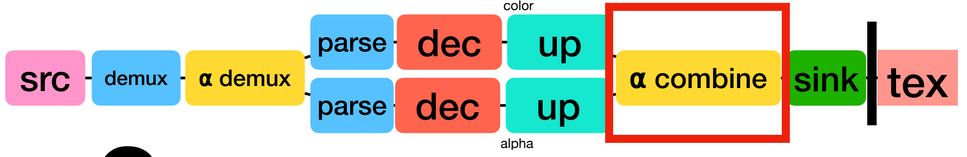


Apple GPU buffers: Metal or CoreVideo?

None! Introducing memory:IOSurface

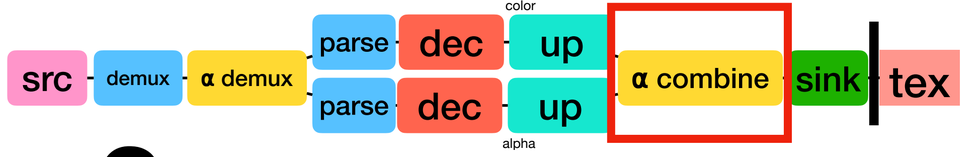
- Godot and Unity want Metal (**`MTLTexture`**)
- But Unreal wants CoreVideo (**`CVPixelBufferRef`**)
- **`IOSurface`**, the DMA buffer of Apple, can be wrapped by MTL and CV

```
Factory Details:
  Long-name                Apple VideoToolbox decoder
  Klass                    Codec/Decoder/Video/Hardware
  SRC template: 'src'
    Capabilities:
      video/x-raw(memory:IOSurface)
                 format: { (string)NV12, (string)AYUV64, (string)ARGB64
                  width: [ 1, 2147483647 ] (GstIntRange)
                 height: [ 1, 2147483647 ] (GstIntRange)
              framerate: [ 0/1, 2147483647/1 ] (GstFractionRange)
```



Alpha with memory:IOSurface?

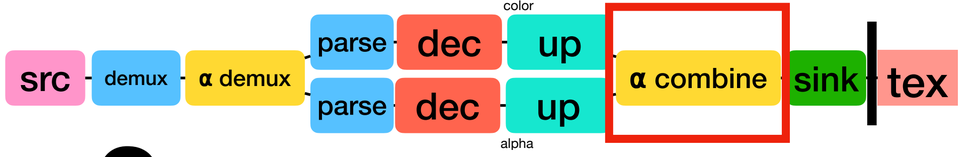
alphacombine (with a twist) to the rescue



Alpha with memory:IOSurface?

alphacombine (with a twist) to the rescue

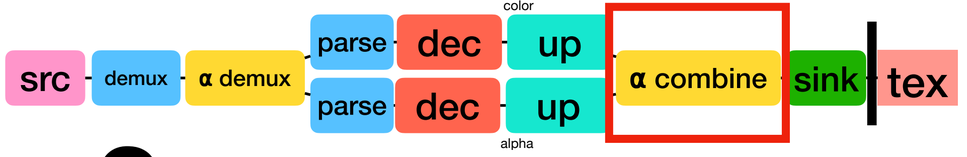
- Need to combine NV12 (color) + NV12 (alpha) with memory:IOSurface



Alpha with memory:IOSurface?

alphacombine (with a twist) to the rescue

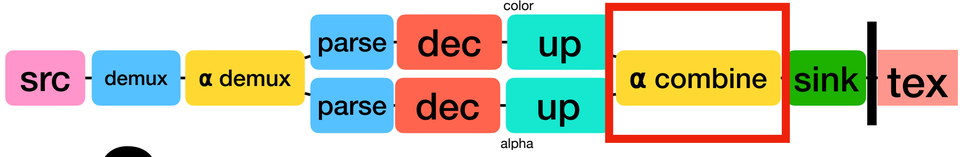
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- But **`IOSurface`** is not meant for processing (Metal is)



Alpha with memory:IOSurface?

alphacombine (with a twist) to the rescue

- Need to combine NV12 (color) + NV12 (alpha) with memory:IOSurface
- But **`IOSurface`** is not meant for processing (Metal is)
- Stitch 2 memory:IOSurface NV12 GstMemory with (improved) **`alphacombine`**

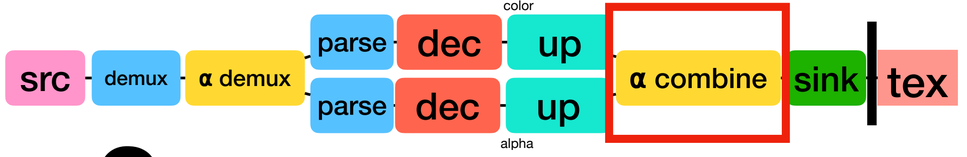


Alpha with memory:IOSurface?

alphacombine (with a twist) to the rescue

- Need to combine NV12 (color) + NV12 (alpha) with memory:IOSurface
- But **`IOSurface`** is not meant for processing (Metal is)
- Stitch 2 memory:IOSurface NV12 GstMemory with (improved) **`alphacombine`**

```
Factory Details:
  Rank                     none (0)
  Long-name                Alpha Combiner
  Klass                    Codec/Demuxer
  Description              Use luma from an opaque stream as alpha plane on another
  SRC template: 'src'
    Capabilities:
      video/x-raw
                 format: { (string)A420, (string)A420_10LE, (string)AV12 } (GstValueList)
```



Alpha with memory:IOSurface?

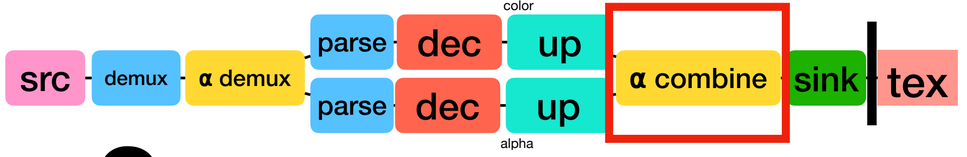
alphacombine (with a twist) to the rescue

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- But **`IOSurface`** is not meant for processing (Metal is)
- Stitch 2 memory:IOSurface NV12 GstMemory with (improved) **`alphacombine`**

GStreamer / gstreamer / Merge requests / !11399

alphacombine: support GLMemory, VulkanMemory and all applicable planar formats

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:alphacombine-any-memory` into `main` 5 months ago

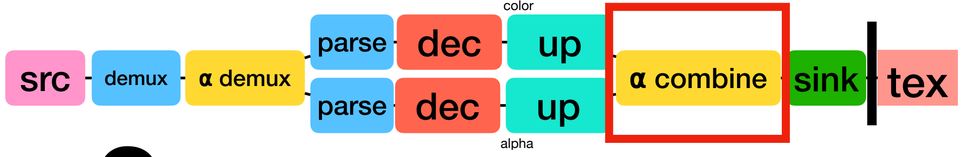


Alpha with memory:IOSurface?

alphacombine (with a twist) to the rescue

- Need to combine NV12 (color) + NV12 (alpha) with memory:IOSurface
- But **`IOSurface`** is not meant for processing (Metal is)
- Stitch 2 memory:IOSurface NV12 GstMemory with (improved) **`alphacombine`**

```
Factory Details:
  Long-name                Alpha Combiner
  Klass                    Codec/Demuxer
  Description              Use luma from an opaque stream as alpha plane on another
  SRC template: 'src'
    Capabilities:
      video/x-raw
      video/x-raw(memory:GLMemory)
      video/x-raw(memory:VulkanImage)
      video/x-raw(memory:IOSurface)
                 format: { (string)A420, (string)A422, (string)A444, (string)GBRA, (string)A420_10LE,
(string)A420_10BE, (string)A420_12LE, (string)A420_12BE, (string)A422_10LE, (string)A422_10BE, (string)A422_12LE,
(string)A422_12BE, (string)A444_10LE, (string)A444_10BE, (string)A444_12LE, (string)A444_12BE, (string)A444_16LE,
(string)A444_16BE, (string)AV12 } (GstValueList)
```



Alpha with memory:IOSurface?

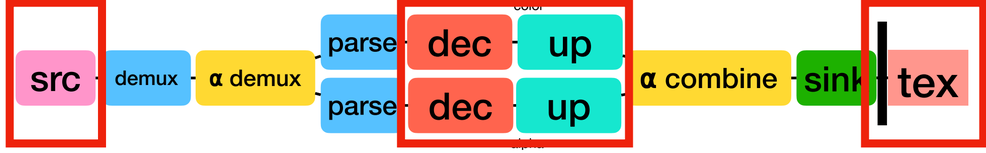
alphacombine (with a twist) to the rescue

- Need to combine NV12 (color) + NV12 (alpha) with memory:IOSurface
- But **`IOSurface`** is not meant for processing (Metal is)
- Stitch 2 memory:IOSurface NV12 GstMemory with (improved) **`alphacombine`**
- WIP: Support all **`alphacombine`** scenarios with **`alphadecodebin`** generalization

GStreamer / gstreamer / Merge requests / !11645

video: vpx: libav: GstAlphaDecodeBin is now reusable

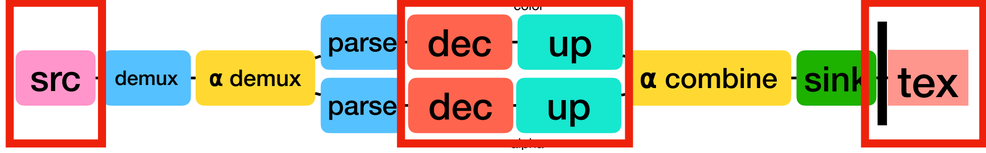
Open **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:alphadecodebin-shared-base` into `main` 4 months ago



Next up: Android!

TL;DR: memory:AHardwareBuffer



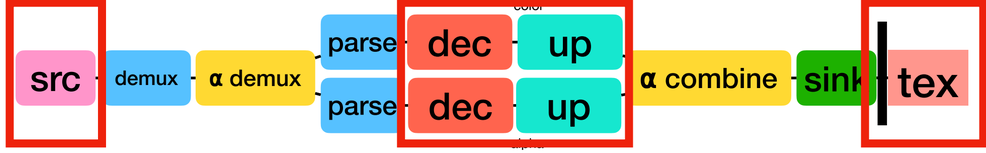


Next up: Android!

TL;DR: memory:AHardwareBuffer

- **`amcviddec-[...]vp9decoder`** to GLES path exists



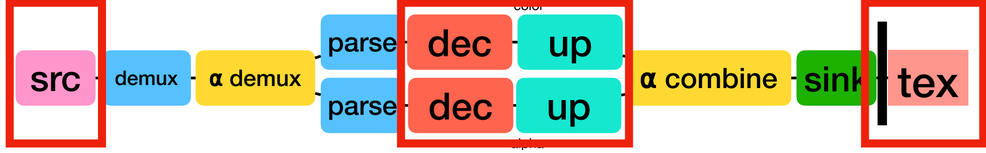


Next up: Android!

TL;DR: memory:AHardwareBuffer



- **`amcviddec-[...]vp9decoder`** to GLES path exists
- But gaming ecosystem is moving to Vulkan

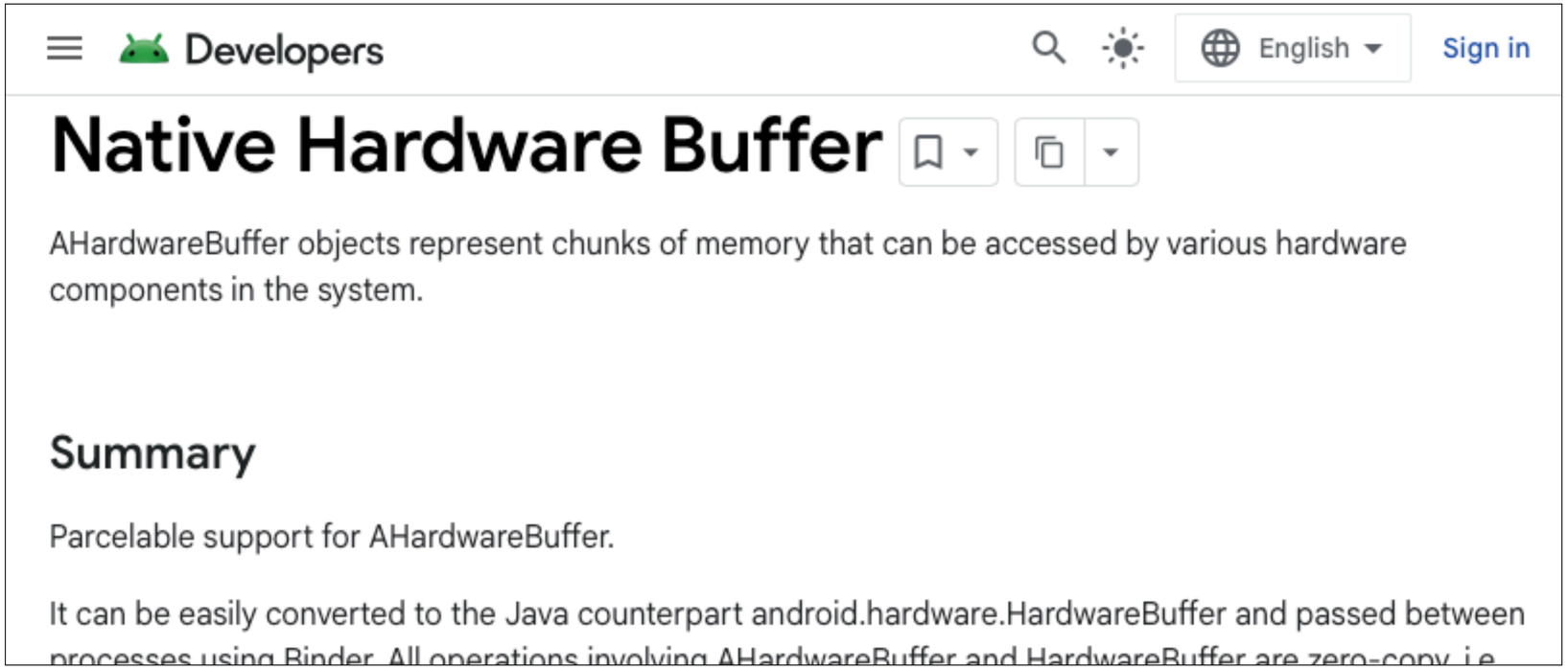


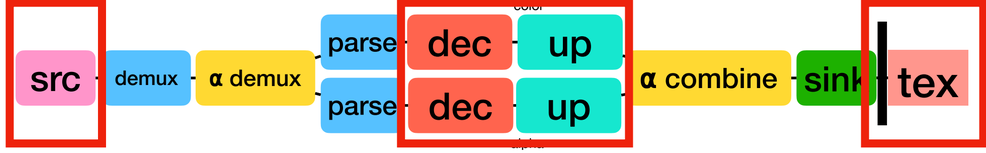
Next up: Android!

TL;DR: memory:AHardwareBuffer



- **`amcviddec-[...]vp9decoder`** to GLES path exists
- But gaming ecosystem is moving to Vulkan
- **`AHardwareBuffer`**, Android's DMA Buffer, works with Vk + GL





Next up: Android!

TL;DR: memory:AHardwareBuffer

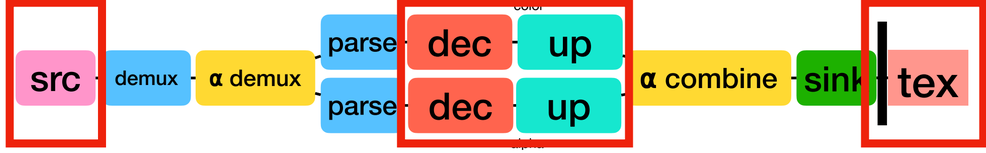
- **`amcviddec-[...]vp9decoder`** to GLES path exists
- But gaming ecosystem is moving to Vulkan
- **`AHardwareBuffer`**, Android's DMA Buffer, works with Vk + GL



GStreamer / gstreamer / Merge requests / **!11731**

androidmedia: vulkanupload: Add memory:AHardwareBuffer for decoding into VulkanImages

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:memory-ahardwarebuffer` into `main` 3 months ago



Next up: Android!

TL;DR: memory:AHardwareBuffer

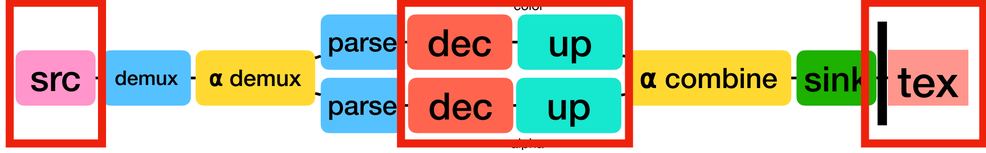


- **`amcviddec-[...]vp9decoder`** to GLES path exists
- But gaming ecosystem is moving to Vulkan
- **`AHardwareBuffer`**, Android's DMA Buffer, works with Vk + GL

GStreamer / gstreamer / Merge requests / **!11982**

glupload: Add support for importing AHardwareBuffer on Android

Merged **Sebastian Dröge** requested to merge `slomo/gstreamer:memory-ahardwarebuffer-glupload` into `main` 2 months ago



Next up: Android!

TL;DR: memory:AHardwareBuffer

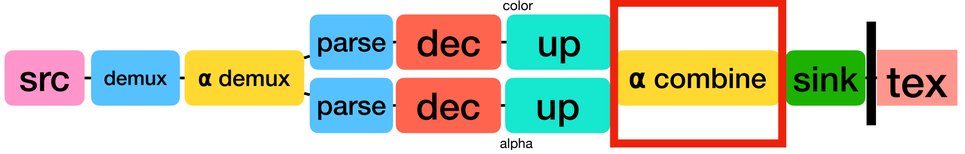


- **`amcviddec-[...]vp9decoder`** to GLES path exists
- But gaming ecosystem is moving to Vulkan
- **`AHardwareBuffer`**, Android's DMA Buffer, works with Vk + GL
- Bonus: **`aassetsrc`** to read directly from APK!

GStreamer / gstreamer / Merge requests / **!11718**

androidmedia: Add aassetsrc element for Android assets

Merged **Dominique Leroux** requested to merge `DominiqueLrx/gstreamer:androidmedia-aassetsrc` into `main` 4 months ago



And now, alpha on Android!



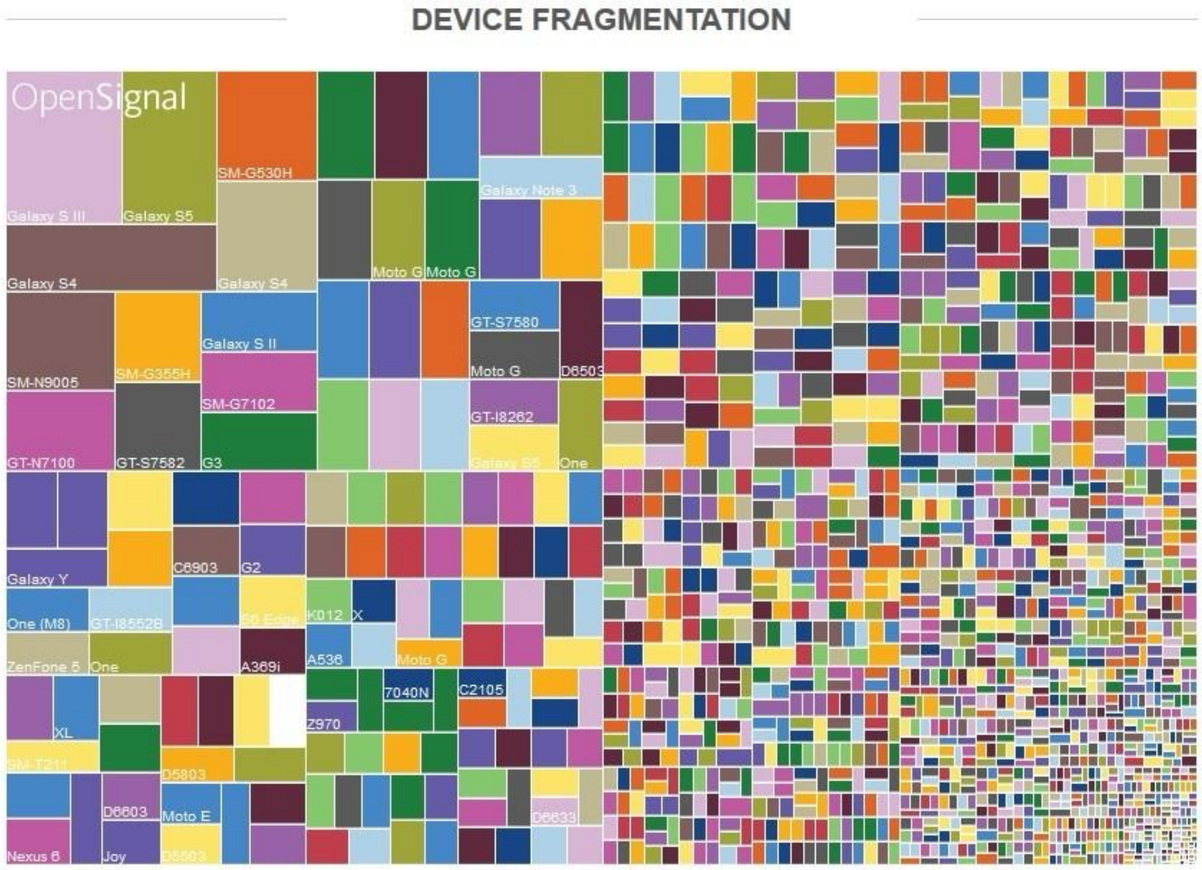
Wait! Testing matters!

No `meson test -C build` on Android? Oh my!

Wait! Testing matters!

No `meson test -C build` on Android? Oh my!

- Piling up features on a highly fragmented platform



Wait! Testing matters!

No `meson test -C build` on Android? Oh my!

- Piling up features on a highly fragmented platform
- Targeting a large audience: we need to detect failures early and often

CREATORS TARGETING MOBILE[1]

AAA ●●●●●●●●○○
Mid/Indie ●●●●●●○○○○
Hobby ●●●●●○○○○○

PLAYERS

🌐

~3.1 BILLION
mobile players worldwide[2]

[1] JetBrains State of Game Development 2025.
[2] Newzoo Global Games Market Report 2026.

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- Piling up features on a highly fragmented platform
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- New infrastructure to run all gstcheck suites on Android: Remote Check

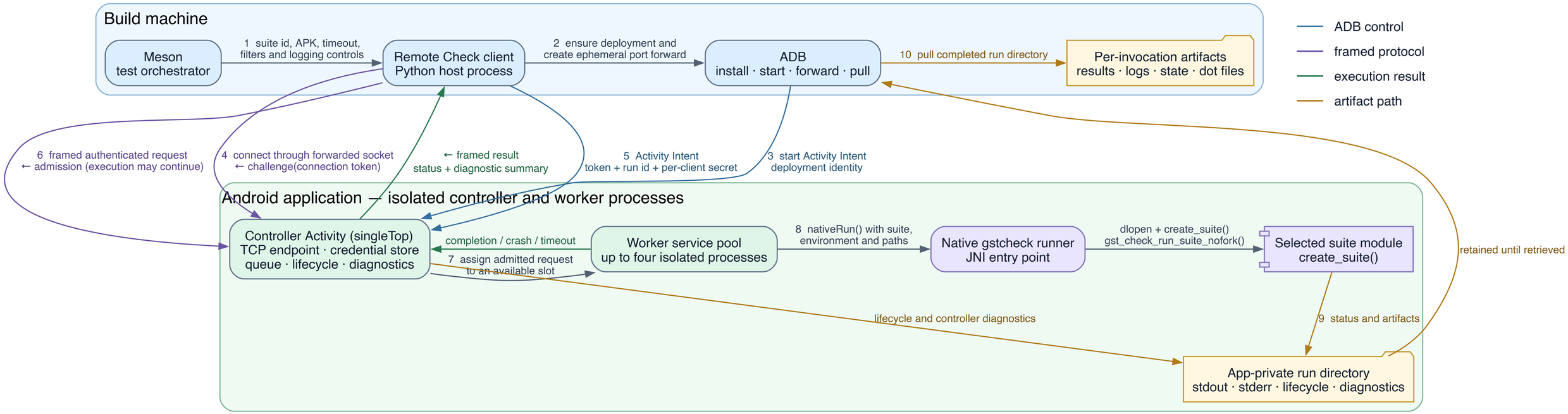


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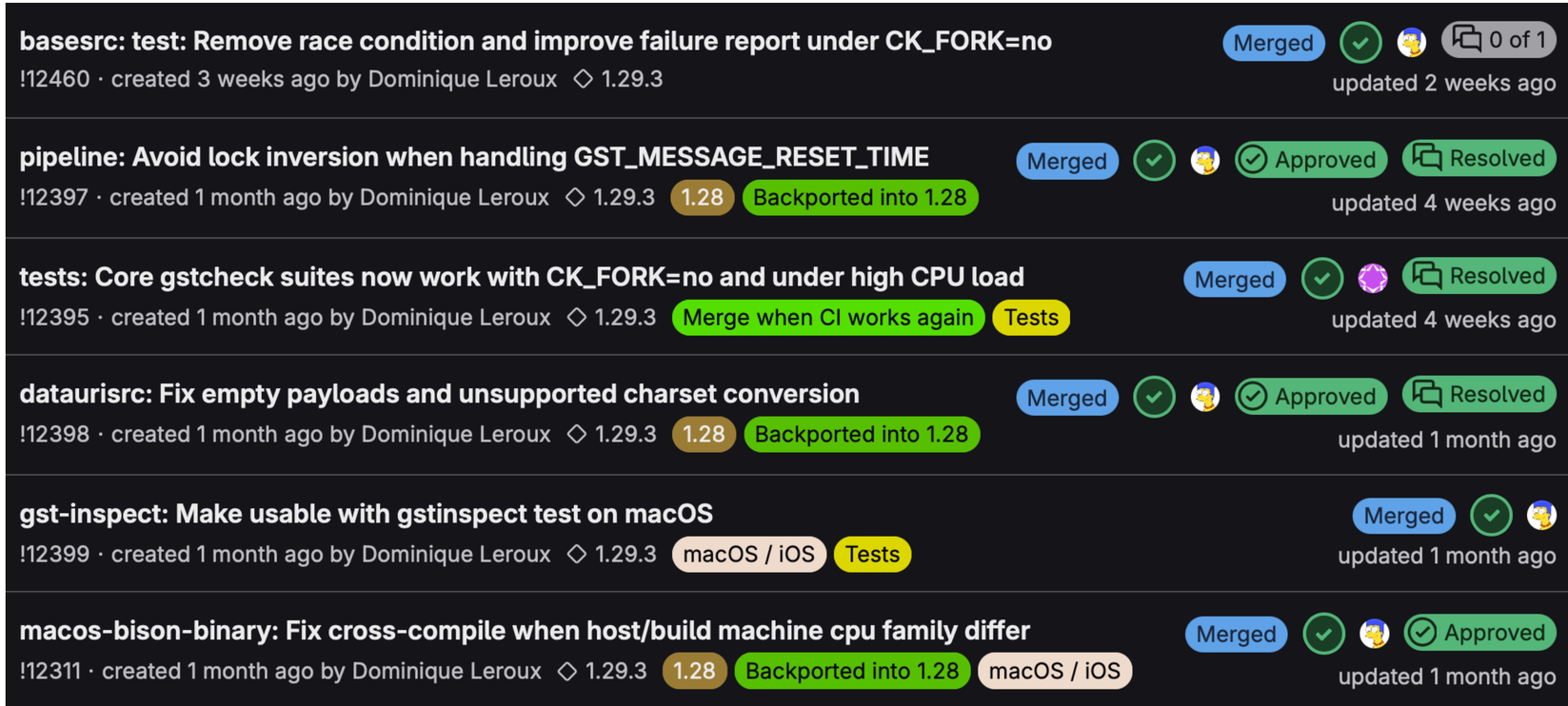
Remote Check — Android backend



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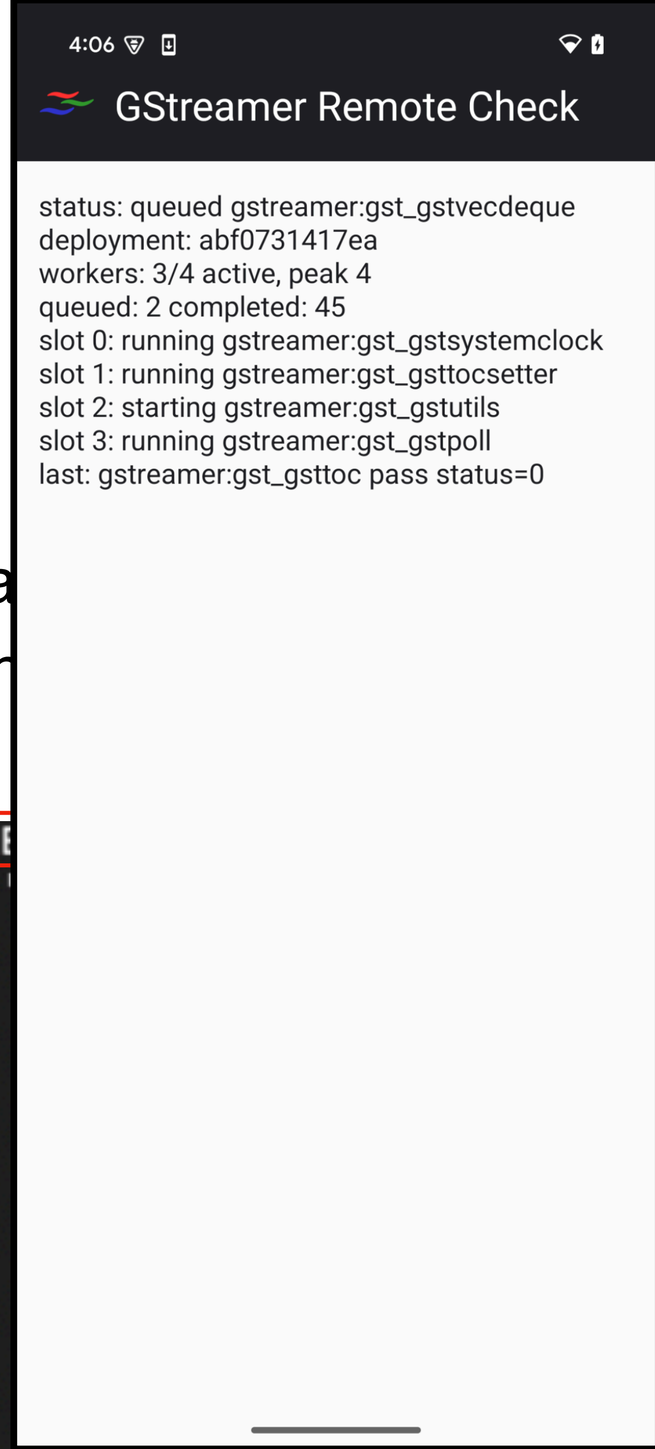
```
[Dominiques-MacBook-Pro:gstreamer dominique$ GST_REMOTE_DEVICE=51050DLAQ001FV GST_REMOTE_JOBS=4 meson test -C bu
ninja: Entering directory `/Users/dominique/src/gstreamer/build-remote-check-pixel'
ninja: no work to do.
  1/112 gstreamer:remote-check / gst_gst                    OK              1.01s
  2/112 gstreamer:remote-check / gst_gstbuffer              OK              1.05s
  3/112 gstreamer:remote-check / gst_gstbufferpool          OK              1.14s
  4/112 gstreamer:remote-check / gst_gstabi                 OK              1.16s
  5/112 gstreamer:remote-check / gst_gstbufferlist          OK              1.28s
  6/112 gstreamer:remote-check / gst_gstchildproxy          OK              1.31s
  7/112 gstreamer:remote-check / gst_gstclock               OK              1.34s
  8/112 gstreamer:remote-check / gst_gstcontext             OK              0.59s
  9/112 gstreamer:remote-check / gst_gstcontroller          OK              0.57s
 10/112 gstreamer:remote-check / gst_gstcapsfeatures        OK              0.54s
 11/112 gstreamer:remote-check / gst_gstcaps                OK              0.59s
```

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- New infrastructure to run all gstcheck suites on Android: Ren
- iOS: next. Benefits: now

```
[Dominiques-MacBook-Pro:gstreamer dominique$ GST_REMOTE_DEVICE=51050DLAQ001FV GST_RE
ninja: Entering directory `/Users/dominique/src/gstreamer/build-remote-check-pixel'
ninja: no work to do.
  1/112 gstreamer:remote-check / gst_gst                                    OK
  2/112 gstreamer:remote-check / gst_gstbuffer                              OK
  3/112 gstreamer:remote-check / gst_gstbufferpool                          OK
  4/112 gstreamer:remote-check / gst_gstabi                                 OK
  5/112 gstreamer:remote-check / gst_gstbufferlist                          OK
  6/112 gstreamer:remote-check / gst_gstchildproxy                          OK
  7/112 gstreamer:remote-check / gst_gstclock                               OK
  8/112 gstreamer:remote-check / gst_gstcontext                             OK
  9/112 gstreamer:remote-check / gst_gstcontroller                          OK
 10/112 gstreamer:remote-check / gst_gstcapsfeatures                        OK
 11/112 gstreamer:remote-check / gst_gstcaps                                OK
```





What next?

« Just one more year… »

What next?

« Just one more year… »



- Land Remote Check, add iOS and enable more suites

What next?

« Just one more year… »

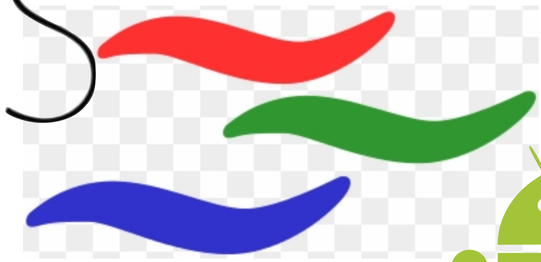


- Land Remote Check, add iOS and enable more suites
- Land alphadecodebin generalization

What next?

« Just one more year… »







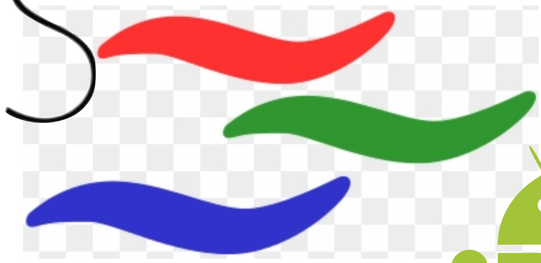


- Land Remote Check, add iOS and enable more suites
- Land alphadecodebin generalization
- Go back to Android/Vulkan/alpha

What next?

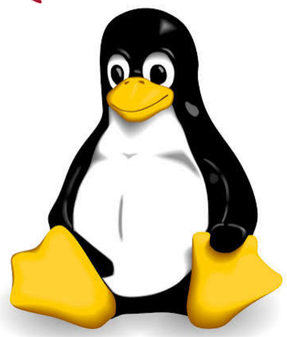
« Just one more year… »



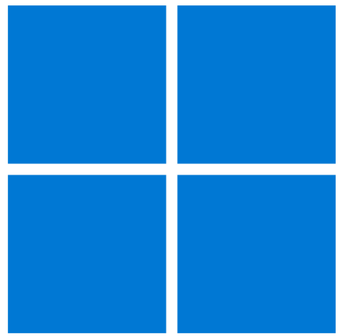










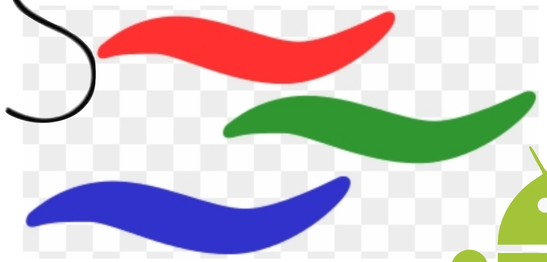


- Land Remote Check, add iOS and enable more suites
- Land alphadecodebin generalization
- Go back to Android/Vulkan/alpha
- Repeat exploration on Windows, Linux and Browser

What next?

« Just one more year… »

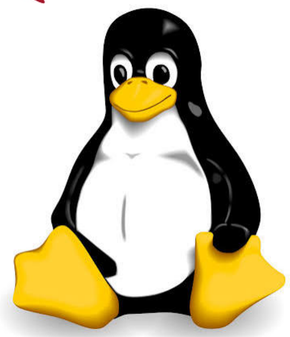




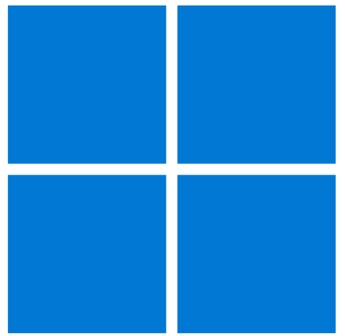


- Land Remote Check, add iOS and enable more suites
- Land alphadecodebin generalization
- Go back to Android/Vulkan/alpha
- Repeat exploration on Windows, Linux and Browser
- Multichannel audio and ambisonics with Opus

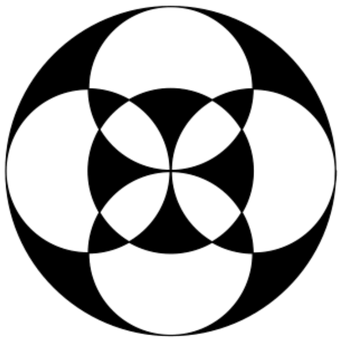








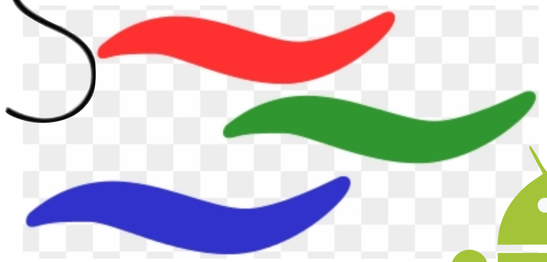




What next?

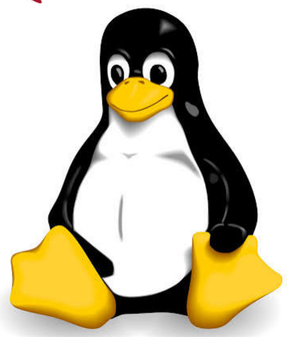
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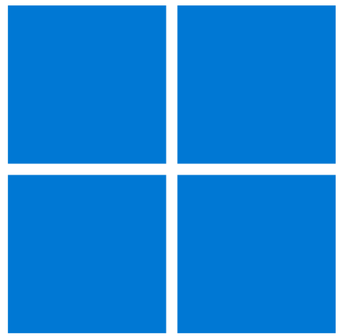




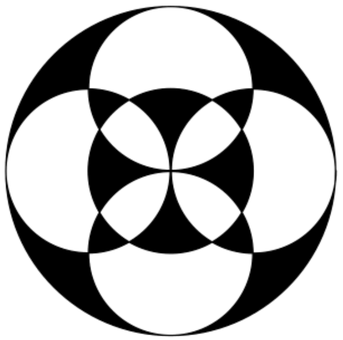


- Land Remote Check, add iOS and enable more suites
- Land alphadecodebin generalization
- Go back to Android/Vulkan/alpha
- Repeat exploration on Windows, Linux and Browser
- Multichannel audio and ambisonics with Opus
- Minimize number of threads









What next?

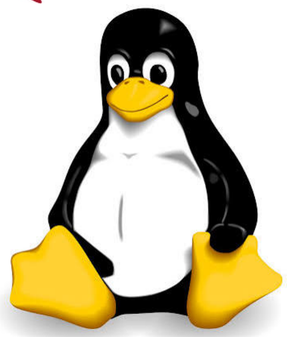
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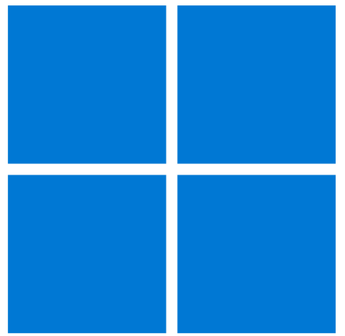
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- Multichannel audio and ambisonics with Opus
- Minimize number of threads
- And more



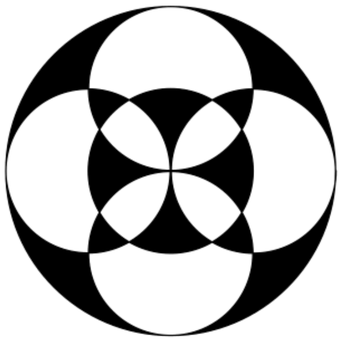












Credits

And thanks!



- **GStreamer mentoring**: Nirbheek Chauhan
- **Merge reviewers**:

  Sebastian Dröge (@slomo), Nirbheek Chauhan (@nirbheek), Matthew Waters (@ystreet), Nicolas Dufresne (@ndufresne), Seungha Yang (@seungha.yang), Tim-Philipp Müller (@tpm), Mathieu Duponchelle (@meh), He Junyan (@He_Junyan), Stéphane Cerveau (@dabrain34), Edward Hervey (@bilboed), Amyspark (@amyspark), Víctor Manuel Jáquez Leal (@vjaquez)

- **GStreamer / Game engine plugins**:

  GstUnityPlugin: https://github.com/sealfoss/GstUnityPlugin
  mrayGStreamerUnity: https://github.com/mrayy/mrayGStreamerUnity
  ue4-gstreamer: https://github.com/wongfei/ue4-gstreamer
  Streamer: https://github.com/Simbotic/Streamer

Questions? Comments?

Dominique Leroux

- ✉️Email `dominique.p.leroux [at] gmail.com`
- GitLab `gitlab.freedesktop.org/DominiqueLrx`
- **[matrix]** `@domleroux:matrix.org`