



unite'08

Developing for the iPhone

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unite'08



Unity iPhone

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Unity iPhone focus



unite '08

Unity iPhone focus

OpenGL ES 1.1

Can combine 2 textures



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Can combine 2 textures

5 simultaneous touches



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Accelerometer



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Unity iPhone focus

OpenGL ES 1.1

Can combine 2 textures

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Accelerometer

WiFi/GPRS/3G





what WAS missing

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The logo for 'unite'08 features the text 'unite'08 in a white, sans-serif font. The text is partially overlaid by a stylized graphic of a bird or a flame in shades of red and blue, with sharp, pointed edges. The background is black.

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NO interpreted/JIT scripts are allowed on iPhone

LUA

Java

Python

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LUA

Java

Python

It takes **TIME** to upload apps to the device

XCode is the only official way to build them



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NO interpreted/JIT scripts are allowed on iPhone

LUA

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It takes **TIME** to upload apps to the device

XCode is the only official way to build them

Excitement is **NOT** supported by simulator

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1

The logo for 'unite'08, featuring the text 'unite'08 in white, with a stylized graphic of red and blue wings or flames behind it.

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Ahead-Of-Time (AOT) compilation for Mono

... **now** generates **native code** as **C/C++**

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2

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Unity Remote

... sends all input from iPhone to **Unity**

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Unity Remote

... captures **Game View** and **sends** back to **iPhone**

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3

The logo for 'unite'08, featuring the text 'unite'08' in a white, sans-serif font. The text is partially overlaid by a stylized graphic of red and blue flames or wings that appear to be rising from behind the letters.

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One click deployment

... generates **XCode project**, then **builds** and **runs**



Features, features, features...

The logo for 'unite'08, featuring stylized, overlapping shapes in red and blue that resemble wings or a flame.

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Scripting

Javascript

C#

Boo

and .NET assemblies

The logo for the 'unite '08 Scripting' event. It features the text 'unite '08' in a white, lowercase, sans-serif font, with 'unite' and '08' on the same line and an apostrophe between them. Below this, the word 'Scripting' is written in a larger, bold, white, lowercase, sans-serif font. The text is overlaid on a stylized graphic of a bird or wing, rendered in shades of red and blue, with a white outline. The background is black.

unite '08 Scripting

Full Unity scripting API

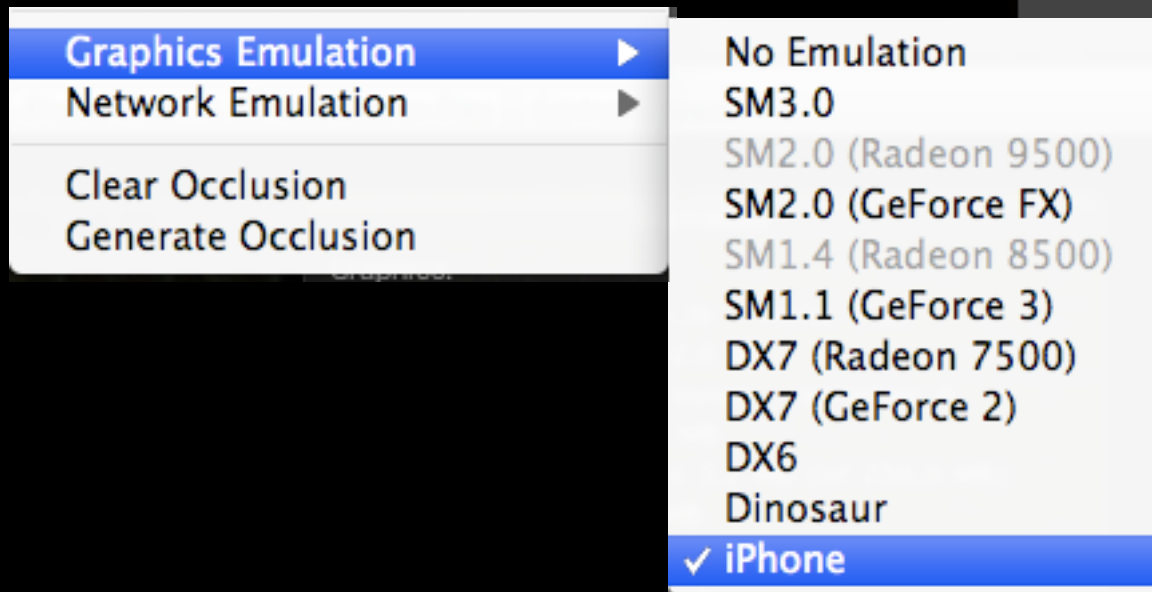
WWW class in all versions

Optimized Unity GUI

unite'08 Graphics

PowerVR texture compression (PVRTC)

iPhone graphics emulation inside Unity

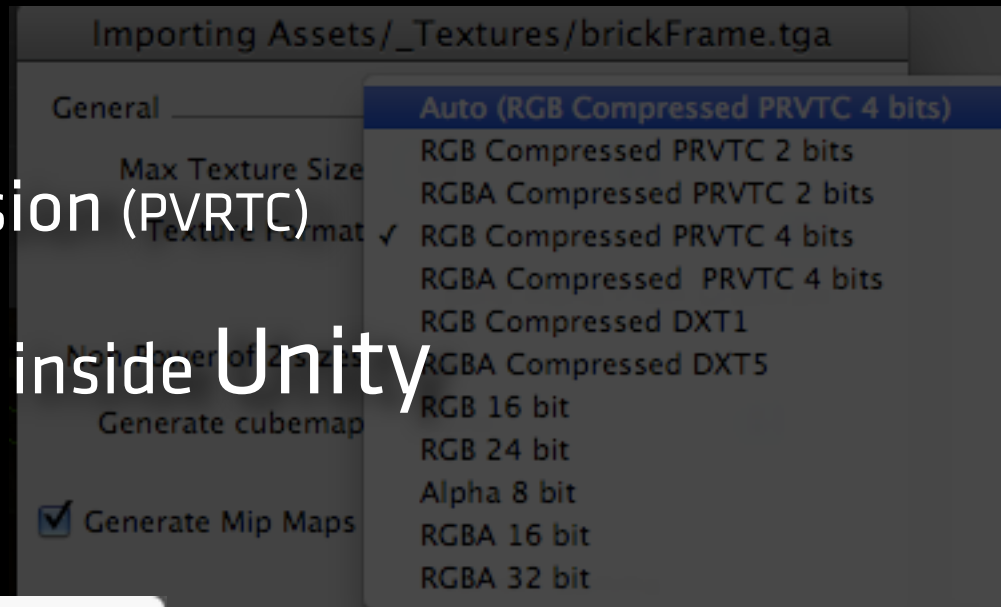


A screenshot of the Unity Graphics Emulation menu. The menu is open, showing a list of emulation options. The 'iPhone' option is selected and highlighted in blue. The menu items are:

- Graphics Emulation ▶
- Network Emulation ▶
- Clear Occlusion
- Generate Occlusion

The sub-menu for Graphics Emulation includes:

- No Emulation
- SM3.0
- SM2.0 (Radeon 9500)
- SM2.0 (GeForce FX)
- SM1.4 (Radeon 8500)
- SM1.1 (GeForce 3)
- DX7 (Radeon 7500)
- DX7 (GeForce 2)
- DX6
- Dinosaur
- ✓ iPhone



A screenshot of the Unity Texture Format selection dialog. The dialog is titled 'Importing Assets/_Textures/brickFrame.tga'. The 'Texture Format' dropdown menu is open, showing a list of texture formats. The 'Auto (RGB Compressed PVRTC 4 bits)' option is selected and highlighted in blue. The list of options includes:

- Auto (RGB Compressed PVRTC 4 bits)
- RGB Compressed PVRTC 2 bits
- RGBA Compressed PVRTC 2 bits
- RGB Compressed PVRTC 4 bits
- RGBA Compressed PVRTC 4 bits
- RGB Compressed DXT1
- RGBA Compressed DXT5
- RGB 16 bit
- RGB 24 bit
- Alpha 8 bit
- RGBA 16 bit
- RGBA 32 bit

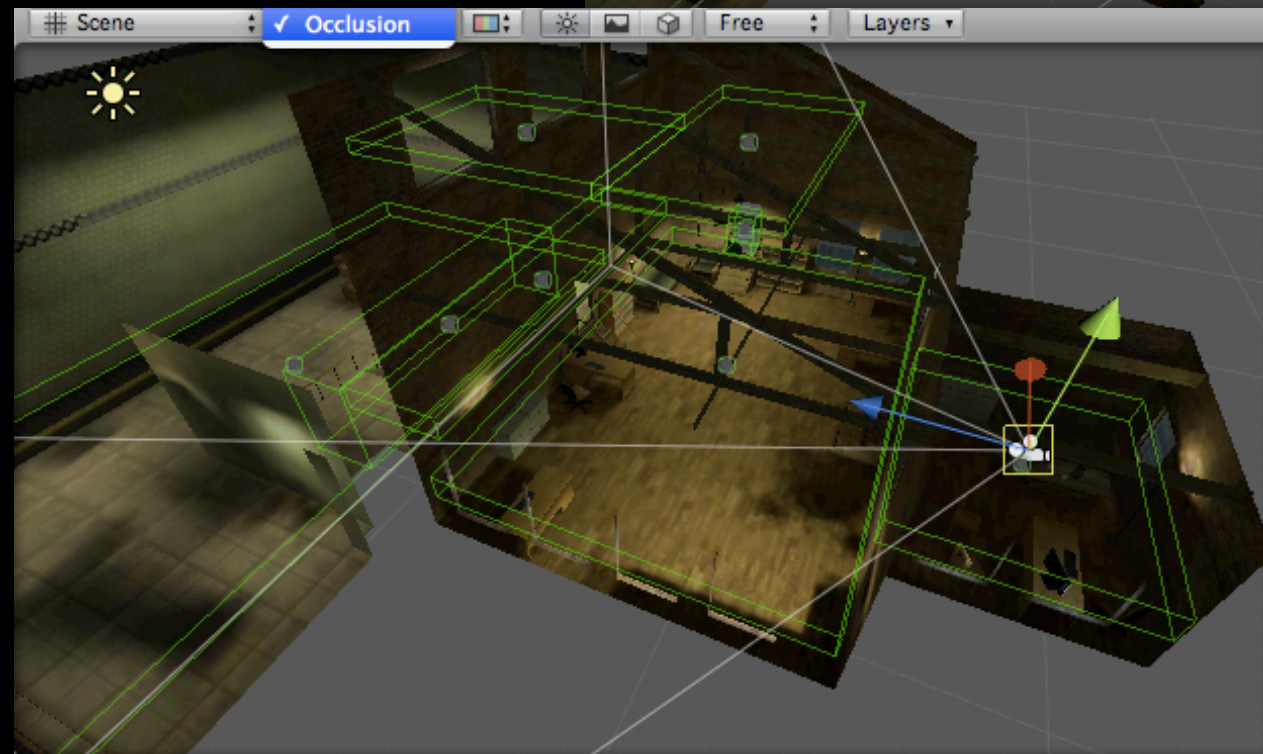
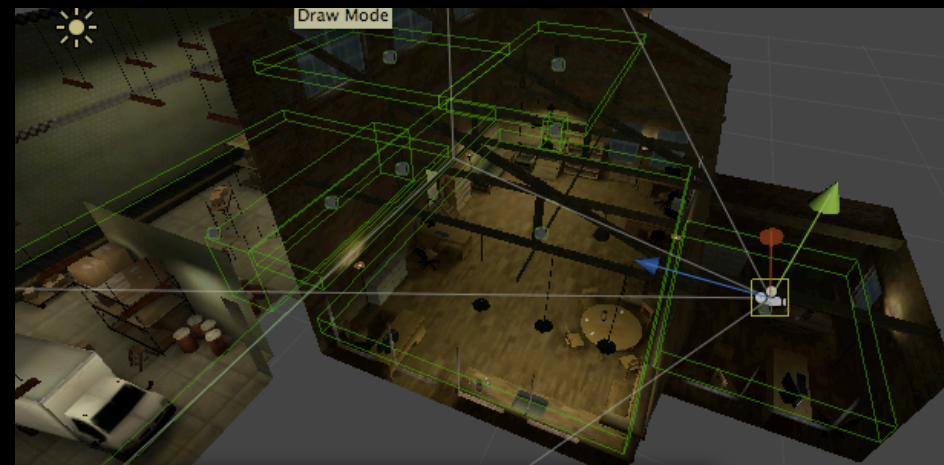
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Occlusion culling

Mark occluders

Define gameplay areas

Preview

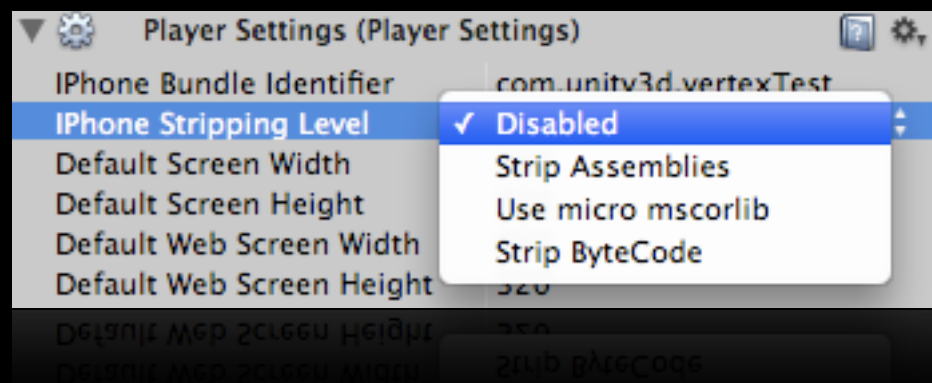


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Optimizations

Bytecode stripping

Micro-mscorlib



The logo for the Unite '08 conference, featuring the text "unite '08" in a white, sans-serif font. The text is partially overlaid by a stylized graphic of a bird or a flame in shades of red and blue, with a white outline. The background is black.

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Unity iPhone scripting API

iPhoneInput class

Multi touch

Acceleration

Physical orientation

iPhoneSettings class

Landscape or portrait

UNITY_IPHONE preprocessor macro

... just look them up in the **scripting reference**



Demo

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Unity iPhone Roadmap

The Unity logo, featuring a stylized red and blue flame or wing shape, is positioned behind the text.

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Unity iPhone Roadmap



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Unity iPhone Roadmap

Optimizations

Executable size

Conditional linking

GPU

CPU

The logo for Unity Unite '08, featuring stylized red and blue wings or flames behind the text.

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Unity iPhone Roadmap

Optimizations

- Executable size
- Conditional linking
- GPU
- CPU

Optimizations from Unity Wii

- Load time optimizations
- Run-time memory optimizations



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Unity iPhone Roadmap

Optimizations

- Executable size
- Conditional linking
- GPU
- CPU

Optimizations from Unity Wii

- Load time optimizations
- Run-time memory optimizations

Expose power of static linking

- Call your own ObjectiveC / C++
- Access script functions from your ObjectiveC / C++



The **Hardcore** stuff



POWERVR MBX Lite + VGP

unit 08

iPhone graphics hardware

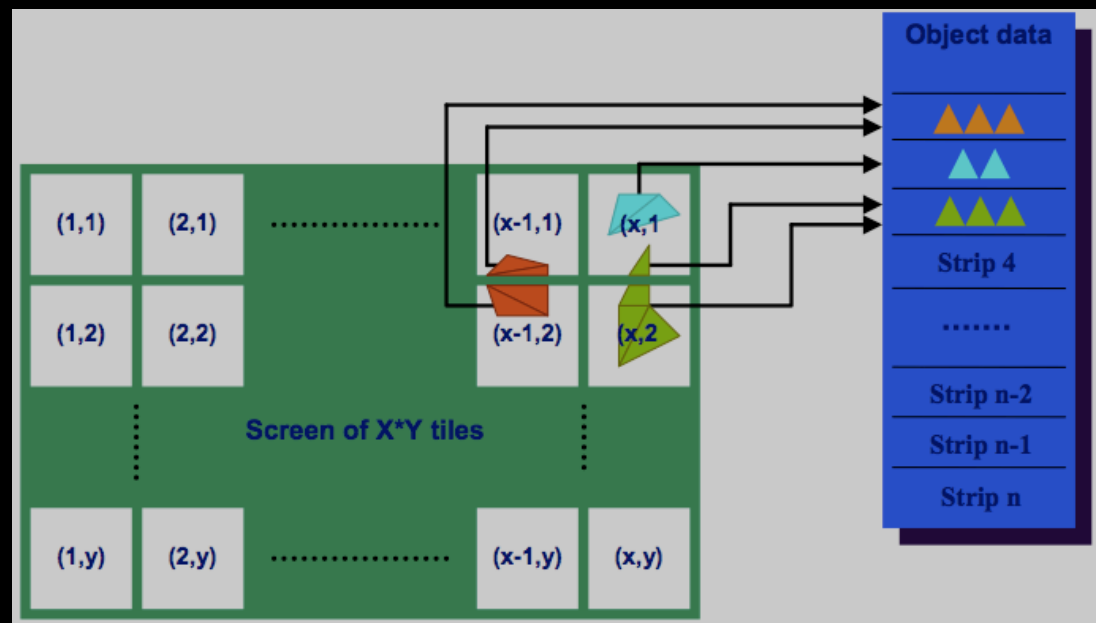
MBX Lite - Tile Based Deferred Renderer

Framebuffer is divided up into tiles

Triangles are assigned to tiles

Only visible fragments of each triangle are passed to rasterizer

Rasterization is done tile by tile



A stylized logo consisting of several overlapping, curved, flame-like shapes in shades of red, orange, and blue, positioned behind the text.

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Tile-Based Deferred Rendering

Less **memory** bandwidth

Lower **power** consumption

Better texture **cache** usage



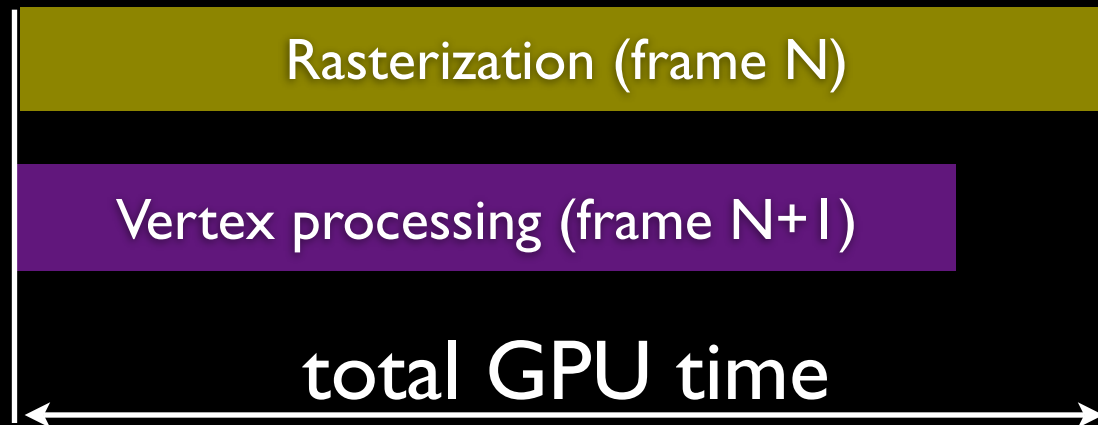
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iPhone graphics hardware

VGP - Vertex Processor

Parallel with rasterization

Aim <10K vertices per frame @ 30fps



The logo for the 'unite '08' conference, featuring stylized, overlapping shapes in red, orange, and blue that resemble a bird or a flame.

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iPhone graphics hardware

Unified Memory Architecture



unit 8

No pixel shaders!

Texture combiners

2 textures per fragment

Operations:

- add
- mul
- lerp
- x2, x4

The logo for 'unite '08 Alpha' features the text 'unite '08' in a white, lowercase, sans-serif font, with 'Alpha' below it in a larger, bold, white, sans-serif font. The text is partially overlaid by a stylized, abstract graphic of a bird or wing in shades of red and blue.

unite '08 Alpha

Alpha BLEND

efficient

but adds **overdraw**

Alpha TEST

avoid if you can

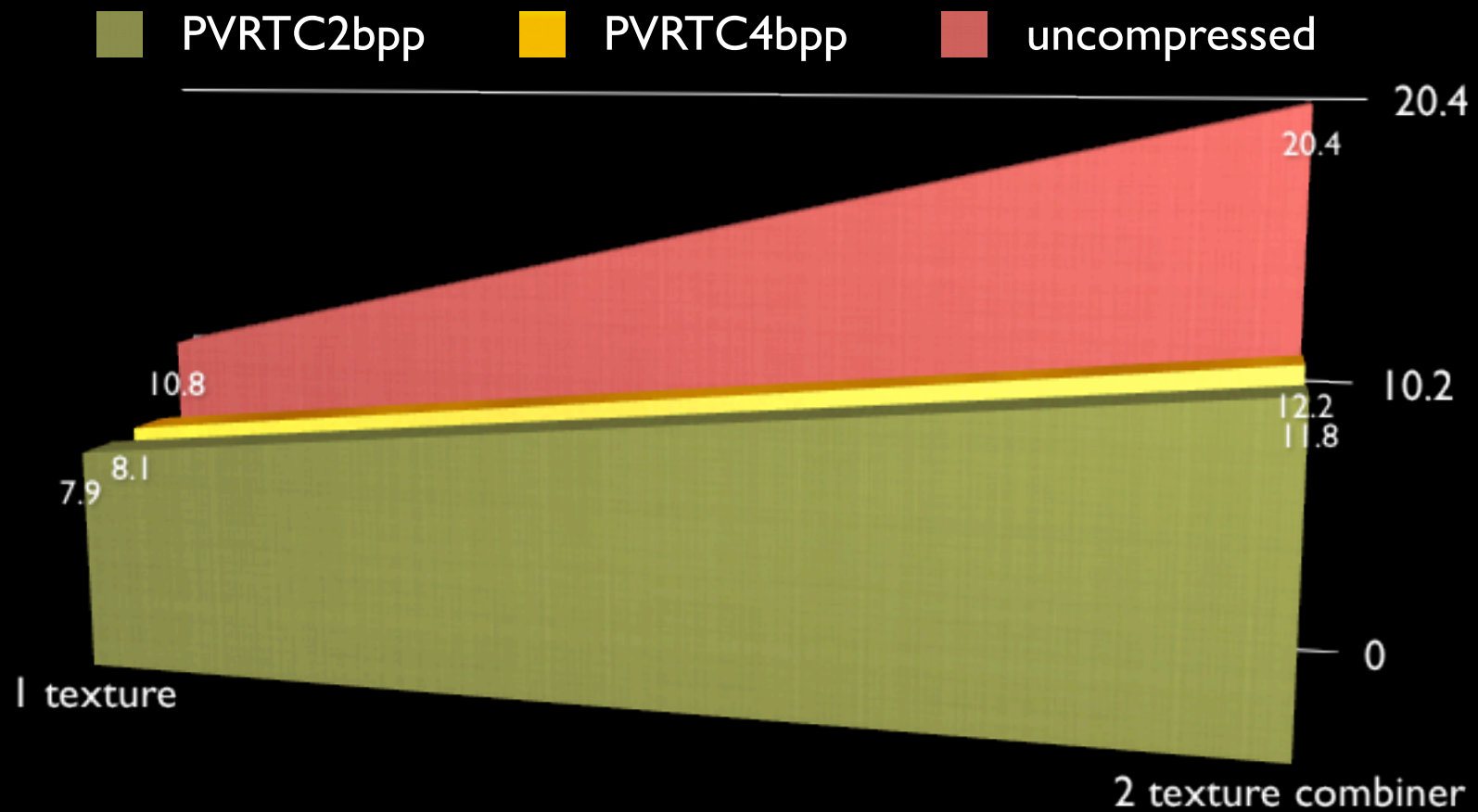
alpha-blend if you can

check your shaders!

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Texture compression

Why do I care?



Sampling 512x512 texture for a full screen quad



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Optimization Summary



unit 8

Optimization Summary

Keep vertex count below 10K per frame

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Optimization Summary

Keep vertex count below 10K per frame

Use PVRTC texture compression



unit 8

Optimization Summary

Keep vertex count below 10K per frame

Use PVRTC texture compression

Use combiners to mix two textures per fragment instead of multi-pass approach

The logo for Unit 8 features the text 'Unit 8' in a white, sans-serif font. The number '8' is stylized with a red and blue graphic element that resembles a flame or a winged figure. The background is black.

Unit 8

Optimization Summary

Keep vertex count below 10K per frame

Use PVRTC texture compression

Use combiners to mix two textures per fragment instead of multi-pass approach

Prefer single texture instead of two per fragment



unit 8

Optimization Summary

Keep vertex count below 10K per frame

Use PVRTC texture compression

Use combiners to mix two textures per fragment instead of multi-pass approach

Prefer single texture instead of two per fragment

Make sure you don't use lights when you don't need to



unit 8

Optimization Summary

Keep vertex count below 10K per frame

Use PVRTC texture compression

Use combiners to mix two textures per fragment instead of multi-pass approach

Prefer single texture instead of two per fragment

Make sure you don't use lights when you don't need to

Avoid alpha-testing, prefer alpha-blending instead

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unite'08

Optimization Summary

Keep vertex count below 10K per frame

Use PVRTC texture compression

Use combiners to mix two textures per fragment instead of multi-pass approach

Prefer single texture instead of two per fragment

Make sure you don't use lights when you don't need to

Avoid alpha-testing, prefer alpha-blending instead

Use skyboxes