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## Graphics Feature Status

- Canvas: **Software only**, hardware acceleration unavailable
- Flash: **Software only**. Hardware acceleration disabled
- Flash Stage3D: **Software only**. Hardware acceleration disabled
- Flash Stage3D Baseline profile: **Software only**. Hardware acceleration disabled
- Compositing: **Software only**. Hardware acceleration disabled
- Multiple Raster Threads: **Enabled**
- Native GpuMemoryBuffers: **Hardware accelerated**
- Out-of-process Rasterization: **Disabled**
- Hardware Protected Video Decode: **Disabled**
- Rasterization: **Software only**. Hardware acceleration disabled
- Skia Renderer: **Disabled**
- Surface Control: **Disabled**
- Surface Synchronization: **Enabled**
- Video Decode: **Software only**. Hardware acceleration disabled
- Viz Service Display Compositor: **Enabled**
- WebGL: **Software only**, hardware acceleration unavailable
- WebGL2: **Software only**, hardware acceleration unavailable

## Problems Detected

- Skia renderer is not used by default.  
Disabled Features: **skia\_renderer**

## Version Information

Data exported	2019-03-21T16:22:06.373Z
Chrome version	Chrome/73.0.3683.86
Operating system	Mac OS X 10.12.6
Software rendering list URL	<a href="https://chromium.googlesource.com/chromium/src/+f9b0bec6063ea50ce2b7">https://chromium.googlesource.com/chromium/src/+f9b0bec6063ea50ce2b7</a>
Driver bug list URL	<a href="https://chromium.googlesource.com/chromium/src/+f9b0bec6063ea50ce2b7">https://chromium.googlesource.com/chromium/src/+f9b0bec6063ea50ce2b7</a>
ANGLE commit id	59b1ed4a60fc
2D graphics backend	Skia/73 636ee33902ddc27fd9683d250ceb23f65467488b-
Command Line	/Applications/Google Chrome.app/Contents/MacOS/Google Chrome --flag-switches-begin --flag-switches-end

## Driver Information

Initialization time	117
In-process GPU	false
Passthrough Command Decoder	false
Sandboxed	true
GPU0	VENDOR = 0x8086 [Google Inc.], DEVICE= 0x0126 [Google SwiftShader] *ACTIVE*
Optimus	false
AMD switchable	false
Driver vendor	
Driver version	4.1.0.5

<b>Driver date</b>	
<b>GPU CUDA compute capability major version</b>	0
<b>Pixel shader version</b>	3.00
<b>Vertex shader version</b>	3.00
<b>Max. MSAA samples</b>	4
<b>Machine model name</b>	MacBookPro
<b>Machine model version</b>	8.1
<b>GL_VENDOR</b>	Google Inc.
<b>GL_RENDERER</b>	Google SwiftShader
<b>GL_VERSION</b>	OpenGL ES 3.0 SwiftShader 4.1.0.5
<b>GL_EXTENSIONS</b>	GL_OES_compressed_ETC1_RGB8_texture GL_OES_depth24 GL_OES_depth32 GL_OES_depth_texture GL_OES_depth_texture_cube_map GL_OES_EGL_image GL_OES_EGL_image_external GL_OES_EGL_sync GL_OES_element_index_uint GL_OES_fbo_render_mipmap GL_OES_framebuffer_object GL_OES_packed_depth_stencil GL_OES_rgb8_rgba8 GL_OES_standard_derivatives GL_OES_surfaceless_context GL_OES_texture_float GL_OES_texture_float_linear GL_OES_texture_half_float GL_OES_texture_half_float_linear GL_OES_texture_npot GL_OES_texture_3D GL_OES_vertex_array_object GL_OES_vertex_half_float GL_EXT_blend_minmax GL_EXT_color_buffer_float GL_EXT_color_buffer_half_float GL_EXT_draw_buffers GL_EXT_instanced_arrays GL_EXT_occlusion_query_boolean GL_EXT_read_format_bgra GL_EXT_texture_compression_dxt1 GL_EXT_texture_filter_anisotropic GL_EXT_texture_format_BGRA8888 GL_EXT_texture_rg GL_ARB_texture_rectangle GL_ANGLE_framebuffer_blit GL_ANGLE_framebuffer_multisample GL_ANGLE_instanced_arrays GL_ANGLE_texture_compression_dxt3 GL_ANGLE_texture_compression_dxt5 GL_APPLE_texture_format_BGRA8888 GL_CHROMIUM_color_buffer_float_rgba GL_CHROMIUM_texture_filtering_hint GL_NV_depth_buffer_float2 GL_NV_fence GL_NV_framebuffer_blit GL_NV_read_depth GL_NV_read_depth_stencil GL_NV_read_stencil
<b>Disabled Extensions</b>	
<b>Disabled WebGL Extensions</b>	
<b>Window system binding vendor</b>	
<b>Window system binding version</b>	
<b>Window system binding extensions</b>	
<b>Direct rendering</b>	Yes
<b>Reset notification strategy</b>	0x0000

<b>GPU process crash count</b>	0
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## Compositor Information

<b>Tile Update Mode</b>	Zero-copy
<b>Partial Raster</b>	Enabled

## GpuMemoryBuffers Status

<b>R_8</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT
<b>R_16</b>	Software only
<b>RG_88</b>	Software only
<b>BGR_565</b>	Software only
<b>RGBA_4444</b>	Software only
<b>RGBX_8888</b>	Software only
<b>RGBA_8888</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT
<b>BGRX_8888</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE
<b>BGRX_1010102</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT
<b>RGBX_1010102</b>	Software only
<b>BGRA_8888</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT
<b>RGBA_F16</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT
<b>YVU_420</b>	Software only
<b>YUV_420_BIPLANAR</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT
<b>UYVY_422</b>	GPU_READ, SCANOUT, SCANOUT_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE, GPU_READ_CPU_READ_WRITE_PERSISTENT

## Display(s) Information

<b>Info</b>	Display[69677248] bounds=[0,0 1280x800], workarea=[0,23 1280x726], scale=1, external.
<b>Color space information</b>	{primaries_d50_referred: [[0.6518, 0.3374], [0.3432, 0.6297], [0.1517, 0.0552]], transfer:0.0777*x + 0.0000 if x < 0.0450 else (0.9478*x + 0.0521)**2.4000 + 0.0002, matrix:RGB, range:FULL}
<b>Bits per color component</b>	8
<b>Bits per pixel</b>	24

## Video Acceleration Information

<b>Encode h264 baseline</b>	up to 4096x2160 pixels and/or 30.000 fps
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<b>Encode h264 main</b>	up to 4096x2160 pixels and/or 30.000 fps
<b>Encode h264 high</b>	up to 4096x2160 pixels and/or 30.000 fps

## Driver Information for Hardware GPU

<b>Initialization time</b>	0
<b>In-process GPU</b>	false
<b>Passthrough Command Decoder</b>	false
<b>Sandboxed</b>	false
<b>GPU0</b>	VENDOR = 0x8086, DEVICE= 0x0126 *ACTIVE*
<b>Optimus</b>	false
<b>AMD switchable</b>	false
<b>Driver vendor</b>	
<b>Driver version</b>	
<b>Driver date</b>	
<b>GPU CUDA compute capability major version</b>	0
<b>Pixel shader version</b>	
<b>Vertex shader version</b>	
<b>Max. MSAA samples</b>	
<b>Machine model name</b>	MacBookPro
<b>Machine model version</b>	8.1
<b>GL_VENDOR</b>	
<b>GL_RENDERER</b>	
<b>GL_VERSION</b>	
<b>GL_EXTENSIONS</b>	
<b>Disabled Extensions</b>	GL_KHR_blend_equation_advanced GL_KHR_blend_equation_advanced_coherent
<b>Disabled WebGL Extensions</b>	
<b>Window system binding vendor</b>	
<b>Window system binding version</b>	
<b>Window system binding extensions</b>	
<b>Direct rendering</b>	Yes
<b>Reset notification strategy</b>	0x0000
<b>GPU process crash count</b>	0

## Graphics Feature Status for Hardware GPU

- Canvas: **Software only, hardware acceleration unavailable**
- Flash: **Unavailable**
- Flash Stage3D: **Unavailable**
- Flash Stage3D Baseline profile: **Unavailable**

- Compositing: **Unavailable**
- Multiple Raster Threads: **Enabled**
- Native GpuMemoryBuffers: **Hardware accelerated**
- Out-of-process Rasterization: **Unavailable**
- Hardware Protected Video Decode: **Unavailable**
- Rasterization: **Unavailable**
- Skia Renderer: **Disabled**
- Surface Control: **Disabled**
- Surface Synchronization: **Enabled**
- Video Decode: **Unavailable**
- Viz Service Display Compositor: **Enabled**
- WebGL: **Unavailable**
- WebGL2: **Unavailable**

## Driver Bug Workarounds for Hardware GPU

- add\_and\_true\_to\_loop\_condition
- adjust\_src\_dst\_region\_for\_blitframebuffer
- clamp\_texture\_base\_level\_and\_max\_level
- decode\_encode\_srgb\_for\_generatemipmap
- disable\_2d\_canvas\_auto\_flush
- disable\_framebuffer\_cmaa
- disable\_webgl\_rgb\_multisampling\_usage
- dont\_use\_loops\_to\_initialize\_variables
- emulate\_abs\_int\_function
- get\_frag\_data\_info\_bug
- init\_two\_cube\_map\_levels\_before\_copyteximage
- max\_msaa\_sample\_count\_4
- msaa\_is\_slow
- pack\_parameters\_workaround\_with\_pack\_buffer
- rebind\_transform\_feedback\_before\_resume
- regenerate\_struct\_names
- remove\_invariant\_and\_centroid\_for\_essl3
- reset\_teximage2d\_base\_level
- rewrite\_texelfetchoffset\_to\_texelfetch
- scalarize\_vec\_and\_mat\_constructor\_args
- set\_zero\_level\_before\_generating\_mipmap
- unfold\_short\_circuit\_as\_ternary\_operation
- unpack\_alignment\_workaround\_with\_unpack\_buffer
- unpack\_image\_height\_workaround\_with\_unpack\_buffer
- use\_intermediary\_for\_copy\_texture\_image
- use\_unused\_standard\_shared\_blocks
- disabled\_extension\_GL\_KHR\_blend\_equation\_advanced
- disabled\_extension\_GL\_KHR\_blend\_equation\_advanced\_coherent

## Problems Detected for Hardware GPU

- Intel HD 3000 driver crashes frequently on Mac: [592130](#), [661596](#)  
Disabled Features: **flash\_stage3d**, **gpu\_compositing**, **gpu\_rasterization**, **flash3d**, **accelerated\_webgl2**, **accelerated\_2d\_canvas**, **protected\_video\_decode**, **oop\_rasterization**, **accelerated\_video\_decode**, **android\_surface\_control**, **accelerated\_webgl**, **flash\_stage3d\_baseline**
- Some GPUs on Mac can perform poorly with GPU rasterization. Disable all known Intel GPUs other than Intel 6th and 7th Generation cards, which have been tested.: [613272](#), [614468](#)  
Disabled Features: **gpu\_rasterization**

- Protected video decoding with swap chain is for Windows and Intel only  
Disabled Features: [protected\\_video\\_decode](#)
- Unfold short circuit on Mac OS X: [307751](#)  
Applied Workarounds: [unfold\\_short\\_circuit\\_as\\_ternary\\_operation](#)
- Always rewrite vec/mat constructors to be consistent: [398694](#)  
Applied Workarounds: [scalarize\\_vec\\_and\\_mat\\_constructor\\_args](#)
- Mac drivers handle struct scopes incorrectly: [403957](#)  
Applied Workarounds: [regenerate\\_struct\\_names](#)
- On Intel GPUs MSAA performance is not acceptable for GPU rasterization: [527565](#)  
Applied Workarounds: [msaa\\_is\\_slow](#)
- glGenerateMipmap fails if the zero texture level is not set on some Mac drivers: [560499](#)  
Applied Workarounds: [set\\_zero\\_level\\_before\\_generating\\_mipmap](#)
- Pack parameters work incorrectly with pack buffer bound: [563714](#)  
Applied Workarounds: [pack\\_parameters\\_workaround\\_with\\_pack\\_buffer](#)
- Alignment works incorrectly with unpack buffer bound: [563714](#)  
Applied Workarounds: [unpack\\_alignment\\_workaround\\_with\\_unpack\\_buffer](#)
- copyTexImage2D fails when reading from IOSurface on multiple GPU types.: [581777](#)  
Applied Workarounds: [use\\_intermediary\\_for\\_copy\\_texture\\_image](#)
- Multisample renderbuffers with format GL\_RGB8 have performance issues on Intel GPUs.: [607130](#)  
Applied Workarounds: [disable\\_webgl\\_rgb\\_multisampling\\_usage](#)
- Use GL\_INTEL\_framebuffer\_CMAA on ChromeOS: [535198](#)  
Applied Workarounds: [disable\\_framebuffer\\_cmaa](#)
- glGetFragData{Location|Index} works incorrectly on Max: [638340](#)  
Applied Workarounds: [get\\_frag\\_data\\_info\\_bug](#)
- glResumeTransformFeedback works incorrectly on Intel GPUs: [638514](#)  
Applied Workarounds: [rebind\\_transform\\_feedback\\_before\\_resume](#)
- Result of abs(i) where i is an integer in vertex shader is wrong: [642227](#)  
Applied Workarounds: [emulate\\_abs\\_int\\_function](#)
- Rewrite texelFetchOffset to texelFetch for Intel Mac: [642605](#)  
Applied Workarounds: [rewrite\\_texelfetchoffset\\_to\\_texelfetch](#)
- Rewrite condition in for and while loops for Intel Mac: [644669](#)  
Applied Workarounds: [add\\_and\\_true\\_to\\_loop\\_condition](#)
- Decode and encode before generateMipmap for srgb format textures on macosx: [634519](#)  
Applied Workarounds: [decode\\_encode\\_srgb\\_for\\_generatemipmap](#)
- Init first two levels before CopyTexImage2D for cube map texture on Intel Mac 10.12: [648197](#)  
Applied Workarounds: [init\\_two\\_cube\\_map\\_levels\\_before\\_copyteximage](#)
- Insert statements to reference all members in unused std140/shared blocks on Mac: [618464](#)  
Applied Workarounds: [use\\_unused\\_standard\\_shared\\_blocks](#)
- Tex(Sub)Image3D performs incorrectly when uploading from unpack buffer with GL\_UNPACK\_IMAGE\_HEIGHT greater than zero on Intel Macs: [654258](#)  
Applied Workarounds: [unpack\\_image\\_height\\_workaround\\_with\\_unpack\\_buffer](#)
- adjust src/dst region if blitting pixels outside read framebuffer on Mac: [644740](#)  
Applied Workarounds: [adjust\\_src\\_dst\\_region\\_for\\_blitframebuffer](#)
- Mac driver GL 4.1 requires invariant and centroid to match between shaders: [639760](#), [641129](#)  
Applied Workarounds: [remove\\_invariant\\_and\\_centroid\\_for\\_essl3](#)
- Disable KHR\_blend\_equation\_advanced until cc shaders are updated: [661715](#)  
Applied Workarounds: [disable\(GL\\_KHR\\_blend\\_equation\\_advanced\)](#), [disable\(GL\\_KHR\\_blend\\_equation\\_advanced\\_coherent\)](#)
- Reset TexImage2D base level to 0 on Intel Mac 10.12.4: [705865](#)  
Applied Workarounds: [reset\\_teximage2d\\_base\\_level](#)
- Shader variable initialization in a loop caused perf regression on Mac Intel.: [809422](#)  
Applied Workarounds: [dont\\_use\\_loops\\_to\\_initialize\\_variables](#)

- 8x MSAA is slow for alpha:false WebGL contexts on Mac Intel: [812071](#)  
Applied Workarounds: [max\\_msaa\\_sample\\_count\\_4](#)
- glFlush error on Mac: [841755](#)  
Applied Workarounds: [disable\\_2d\\_canvas\\_auto\\_flush](#)
- Clamp texture's BASE\_LEVEL/MAX\_LEVEL for GenerateMipmap: [913301](#)  
Applied Workarounds: [clamp\\_texture\\_base\\_level\\_and\\_max\\_level](#)
- Skia renderer is not used by default.  
Disabled Features: [skia\\_renderer](#)