

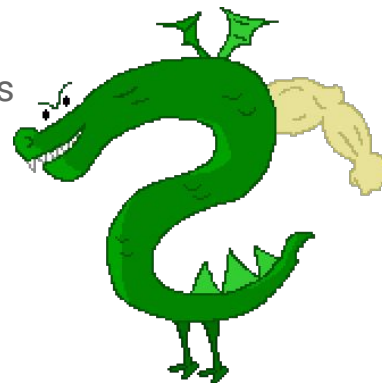


ChromeOS Freedreno Update

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XDC2021

Snapdragon Chromebooks

- Introducing Trogdor and Strongbad!
- Upstream Kernel Support
 - AFAIK the first CE snapdragon devices to ship with upstream kernel support
 - Before they shipped
- Open Source Graphics Drivers
 - AFAIK the first CE arm devices to ship with FOSS graphics
 - All in upstream mesa
 - Before they shipped



Current Status

- Gallium: GLES v3.2
- Turnip: Vulkan v1.1
 - With a *few* remaining CTS fails
 - 7 extensions away from v1.2
- Supports all four generations of a6xx
- Lots of nice developer tools
 - isaspec, crashdec, fdperf, etc
- Perfetto
 - Performance counters: standalone daemon
 - Render stage timeline

In the early days

- Starting at Google
- Big push for feature completeness
 - Geometry Shaders
 - Tessellation Shaders
 - Sample shading, blend-advanced, robustness, etc, etc
- Gitlab-CI!

In the early day (continued)

- Fixing lots of bugs!
 - All the deqp's..
 - All the play-store games..
- Work starts on medump
- And a618 bringup

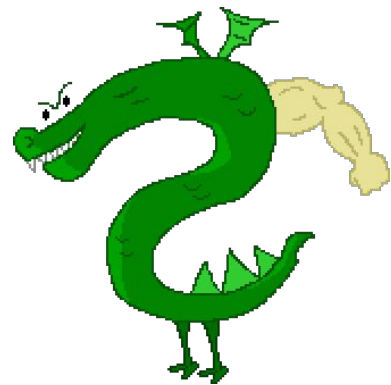
Trogdor.. the burninator!

- First “real” devices
 - Well, reference design
- More bug fixes
 - 100% deqp (and skqp) pass
 - There are a lot of games in play store



Trogdor.. the burninator! (continued)

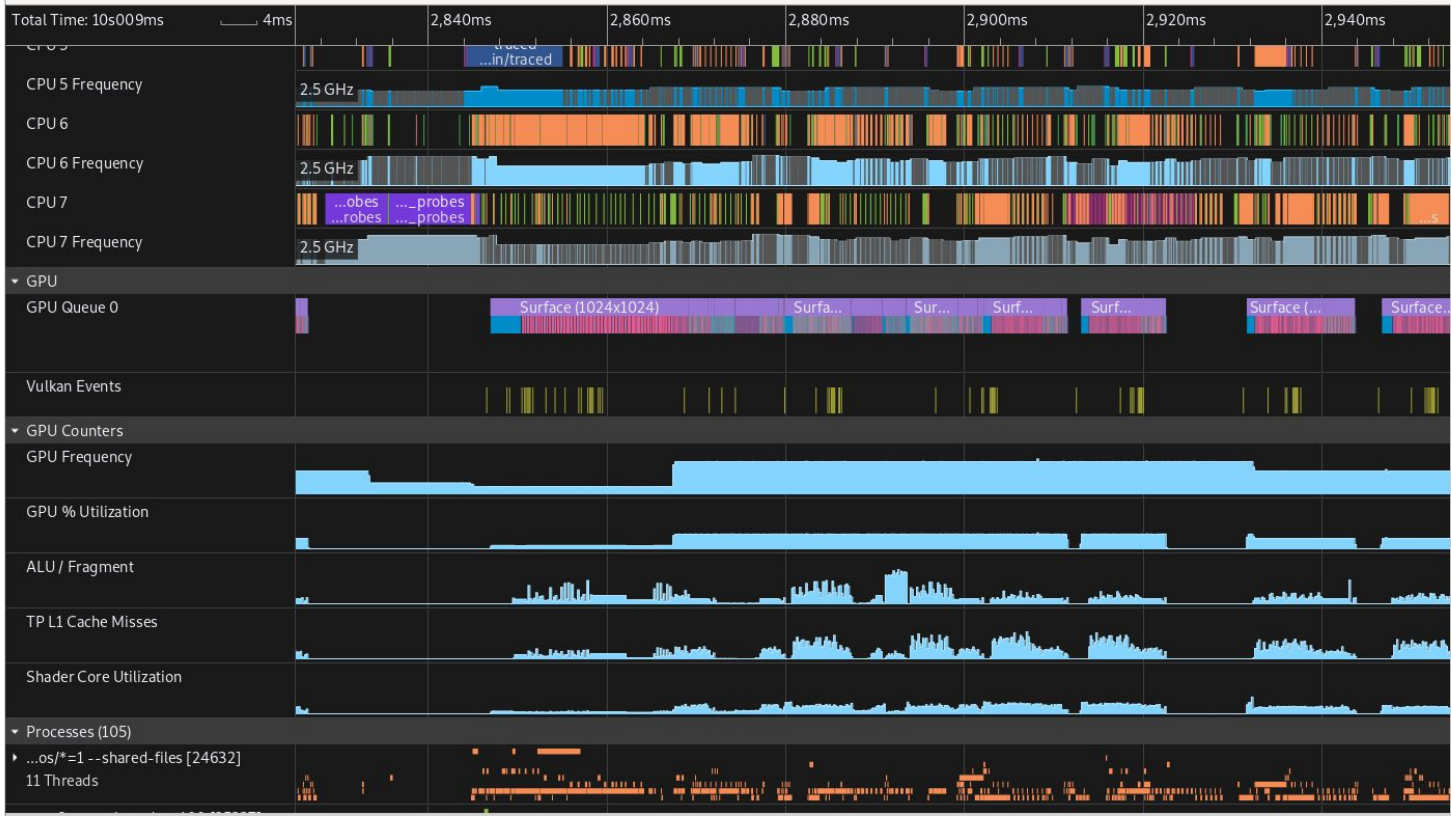
- Focus shifts to moar fps
 - medump
 - Shader compiler improvements: sched/ra/cf
 - LRZ improvements: early-lrz-late-z
 - Plumbing UBWC thru android
 - Shader disk-cache
- Then focus shifts to *system* performance
 - big.LITTLE: little janks, big Aarrrg
 - SCHED_FIFO vs SCHED_OTHER ??? Check this
 - etc



Recent History

- Lazor ships :-)
- Initial Performance hiccups :-(
 - Shrinker vs zram swap!
 - Lock contention
 - Make count_objects() lockless
 - Reduce critical section in scan_objects()
- Perfetto - improved system level visibility



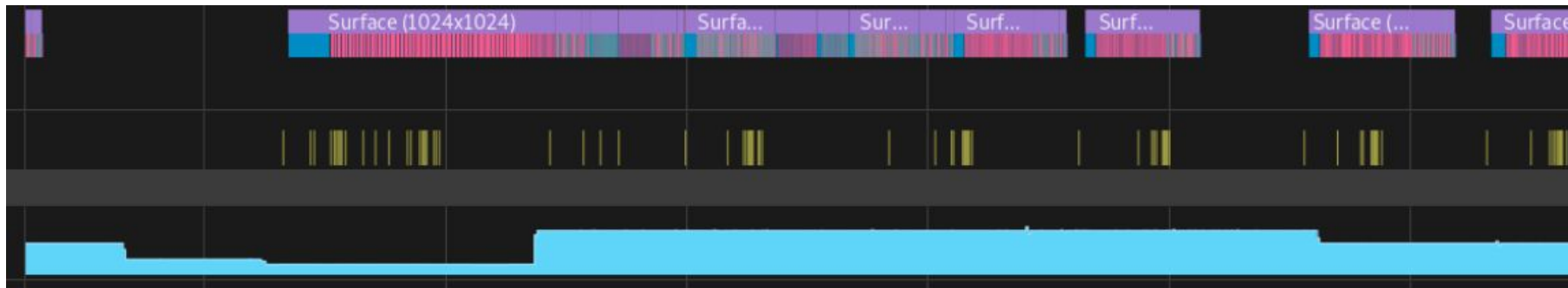


Recent History (continued)

- CPU optimizations
 - u_threaded_context
 - Async shader compile
 - Userspace fences and submit merging
- Kernel improvements
 - Recent gpu devfreq rework
 - drm/scheduler conversion
- GL_VENDOR/GL_RENDERER shenanigans
- Oh, and gles32
 - All the copy_image sharp edges



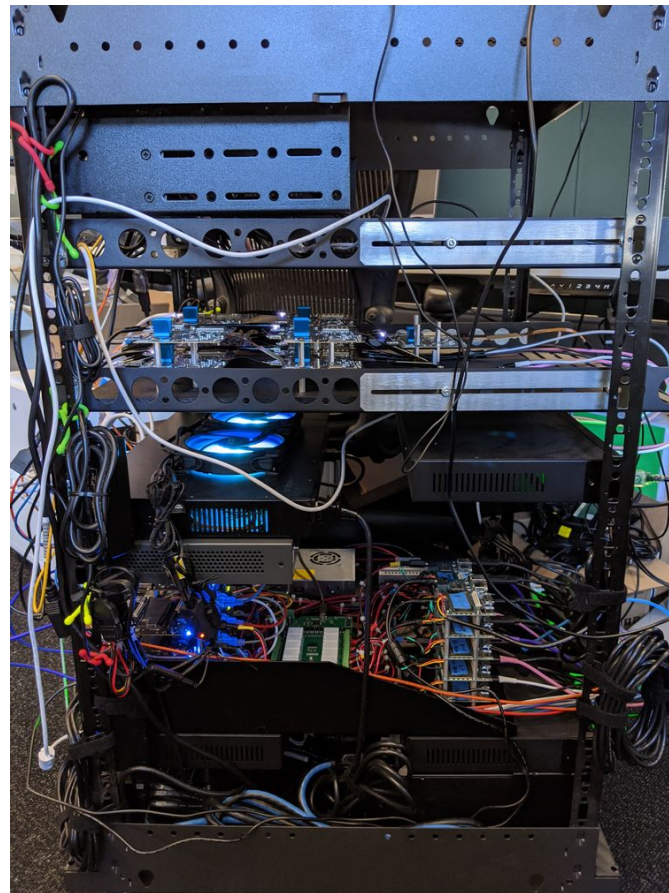
GPU devfreq



- Idle time at higher freqs, busy time at lower freqs
- Solution combination of:
 - Longer sampling period
 - Idle clamp to fmin
 - Idle->Active boost

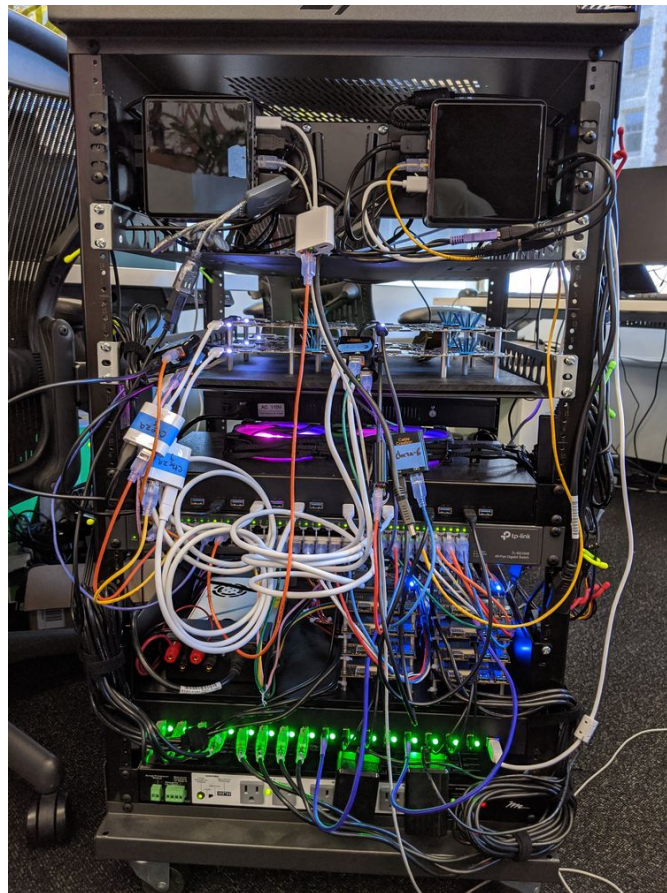
Gitlab CI: fd-farm

- 25 runners
 - 9x a630 (sdm845 cheza)
 - 8x a530 (apq8096 db820c)
 - 8x a307 (apq8016 db410c)
- a630 coverage
 - 100% deqp-egl/gles2/3/31[*]
 - 10% deqp-gles31 with ASAN
 - 33% vk
 - traces, traces-restricted, traces-performance
 - piglit
- a530 coverage
 - 100% deqp-gles2
 - 50% deqp-gles3/31
- a306 coverage
 - 100% deqp-gles2/3
 - Traces
- 500-1000 jobs/day



Gitlab CI: shipping green ToT

- How to uprev:
 - git fetch upstream main
 - git merge upstream/main
 - Play games.. I mean test
- Roughly every 4-6 weeks
- It's actually worked pretty well



demo

The codez

- https://chromium.googlesource.com/chromiumos/third_party/mesa/+/refs/heads/chromeos-freedreno
- https://chromium.googlesource.com/chromiumos/third_party/kernel/+/refs/heads/chromeos-5.4
- https://chromium.googlesource.com/chromiumos/third_party/kernel/+/refs/heads/chromeos-5.10

Also Useful:

- <https://gitlab.freedesktop.org/jbarnes/cros-util>

Other Useful Things

- [SuzyQ!](#)
- usb-c hub with ethernet & power
- usb-c thumb drive
- <https://gitlab.freedesktop.org/jbarnes/cros-util>
- <https://docs.mesa3d.org/android.html#replacing-android-drivers-on-chrome-os>



Thank You