Mainline Explicit Fencing

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Open First
Agenda

• Android Sync Framework
• Mainline Explicit Fencing
• Current Status
Android Sync Framework

- Android's Explicit Fencing implementation
- Use fd for fence passing
- **Sync Timeline** to control ordering
- **Sync Point** to represent a fence
- **Sync Fence** for fd passing
Sync Timeline

- Monotonically increasing counter
- Usually one timeline per driver context
Sync Point

- It is the fence
- Represents a value on the timeline
- Three states: active, signaled and error
Sync Fence

- Wrap Sync Point into a file
- Also have active and signaled states
- Shared via fd-passing to/from userspace
Sync Fence

- Sync fences can be merged!
- It can contain many Sync Points
Android Sync Framework - ioctlS

• sync_wait(fd, timeout)
• fd3 = sync_merge(fd1, fd2)
• sync_fence_info(fd, info)
Sync Framework de-staging

- Android Sync added to staging in 2013
- Mainly need for fd-passing
- Removed Sync Timeline
- Removed Sync Point
- Reworked Sync Fence
Sync File

- Renamed Sync Fence to Sync File
- Changed ioctl API
  - Provided patch to Android's libsync
- Removed internal kernel API
- Used strictly for fd-passing
  - `sync_file = sync_file_create(fence)`
  - `fence = sync_file_get_fence(fd)`
struct fence_array

- Subclass of struct fence
- Store multiple fences
- Useful for merged Sync File
- Hide complexity from the drivers
- fence_is_array(fence)
DRM/KMS

- Only available for Atomic Modesetting
- Entirely in DRM Core
- Extended DRM properties
- in-fences: fences to wait on
- out-fences: fences to be signaled by KMS
DRM/KMS: in-fences

- in-fences: fences to wait on
- IN_FENCE_FD property on each DRM Plane
- Receives sync_file fds carrying fences
- drm_atomic_helper_wait_for_fences() helper
DRM/KMS: out-fences

- One out-fence per DRM CRTC
- `OUT_FENCE_PTR` property on each DRM CRTC
- It signals at CRTC scanout
  - It means the `previous` buffer can be reused.
  - New semantic supported by HWC2
DRM/renderer

- Similar to KMS side
- Extends execbuf ioctl args on each driver
- Every driver needs sync_file/fences support
- Done on freedreno
- WIP on i915 and virgl
Mesa

- EGL_ANDROID_native_fence_sync
  - Receive out fence fd
- EGL_ANDROID_wait_sync
  - Make the GPU wait for in fence to signal
- WIP by Rob Clark
- kmscube running on explicit fencing
### drm_hwcomposer

- Already support DRM fences semantic
- Use it as example userspace for upstream
- WIP by Sean Paul and Robert Foss
- Already working with padovan/fences
Current Status Summary

- Sync File synchronization de-stage: DONE
- SW_SYNC validation de-stage: DONE
- fence_array: DONE
- DRM/KMS: WIP – 4.10?
- DRM/renderer: WIP – 4.10?
- MESA: WIP
- igt-gpu-tools: WIP
- drm_hwcomposer: WIP
- Wayland: WIP
- V4L explicit fences: TODO
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