DRI3000
Status and Discussion

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Discussion Areas

- DRI3 design and status

- Present status

- Synchronization between X and DRM

- Present Redirection

DRI3 Requirements

- Share DMA bufs as X pixmaps

- Share synchronization objects

- Provide access to correct DRM device

DRI3 Status

- Finished
  - X Protocol, XCB binding
  - Mesa DRI3 loader, GLX API
  - X server
  - Intel Mesa and 2D driver
- To Do
  - EGL API
  - X server GL loader
- Needs more test cases

DRI3 Extension

- Open
  - X server opens DRM device
  - Prepares for rendering
  - Passes resulting FD back to client
  - Can transparently change to using Render Nodes
- PixmapFromBuffer
  - Client creates DRM object
  - Maps to DMABuf
  - Passes DMABuf FD to X server
  - X server creates pixmap referencing same DRM object
- BufferFromPixmap
  - X server maps Pixmap DRM object to DMABuf
  - Passes DMABuf FD to client
  - Client unwraps DMABuf to get DRM object
- FenceFromFD
  - Client allocates anonymous file with a single page containing futex
  - Passes FD to X server
  - X server maps file and creates an XSyncFence object pointing at it.

Present Extension

- PresentPixmap
  - Provide new content for window in a pixmap
- PresentNotifyMSC
  - Returns current media counters in an event
- PresentSelectInput
  - Selects for Present events
- PresentIdleNotify
  - Event sent when pixmap is free for re-use
- PresentConfigureNotify
  - Event sent when window size changes
- PresentCompleteNotify
  - Event sent when PresentRegion operation completes

PresentPixmap

- Parameters:
  - serial – client-provided number returned in matching PresentCompleteNotify
  - valid-area – Region of pixmap containing correct pixels
  - update-area – Region of pixmap containing changed pixels
  - x-off, y-off – offset within window for operation
  - wait-fence – SyncFence which blocks execution
  - options – Set of flags to control execution
  - target-msc, divisor, remainder – parameters defining display time
  - options – cut-through, force copy
  - List of window/serial to notify
- Supports vblank synchronized sub-window updates
- Allow flips even for small updates
- Separate out completion event from buffer idle event

Previous "PresentRegion"

- What's in git today

- No 'wait_fence'

  - Requires implicit synchronization between DRM client and X server

- 'idle_fence'

  - See discussion on dealing with idle buffers

- No options

  - force applications to support flipping

- No list of window/serial for notification

  - Needed for redirection

XCB changes

- FD passing
  - use recvmsg everywhere
  - Stick incoming Fds in reply structure
- "Special" event queues
  - Split off Present events to special queue
  - Bump pointer to integer to make checking for events cheap (and Mesa compatible)

Media Stream Counters

- Monotonic frame counter
- Challenges:
  - Switching monitors
  - DPMS off
  - Suspend/resume
  - VT switch
- Current design
  - Pick a counter for each window
  - Create a fake counter as needed
  - Per-window counter is offset from underlying counter
  - Counters adjusted on transition
- Not working with DPMS/suspend yet
  - events queued to kernel never happen
  - redesign to ignore queued events
- How fast should the fake counter run?
  - Thinking about 1Hz?

Present Status

- First protocol version finished
  - Initial protocol, XCB and Xlib bindings
  - Mesa loader, GLX API, various GL/GLX extensions
  - X server DIX
  - Intel Mesa, 2D driver
- Second protocol proposal
  - Adds wait-fence
  - Adds options
- To Do
  - Add more synchronization
  - Add redirect
  - Think about YUV?

DRM SyncFences

- Currently implemented with futexes

  - X/DRM details are hidden in video driver

- Not select/poll friendly

  - X server cannot be awoken when fence is signaled via futex API.

SyncFence adventures

- Original design included per-pixmap idle fence

- Client wants to wait for `any` idle fence

- Current implementation guesses which is likely to become idle.

- Can cause deadlocks

- Need to wait for one of a set of fences somehow

- Plan to use events instead of fences

Present Redirection

- Busy implementing simplest possible plan
    - Effectively forward PresentPixmap request and let compositor sort it out.
- Want more complicated mechanism (I think)
    - Over-allocate to page-align
    - What about auto-painting window manager frames?