Delegated Compositing - Utilizing Wayland Protocols for Chromium on ChromeOS

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Agenda

- Chromium/Wayland in ChromeOS - Goals and Motivation
- What is LaCrOS?
- Chromium Display Compositor
- Delegated Compositing
- Wayland Protocols
- A Big Picture
Chromium/Wayland in ChromeOS
Goals and Motivation

- Improve maintainability
- Let more users receive browser updates (old devices)
How?

- Decouple the browser from OS (LaCrOS project)
  - ChromeOS (system UI and Ash Window Manager) and Chrome are tied together
- Use Wayland
Why Wayland?

- ChromeOS has a Wayland server implementation called exosphere
  - Used by ARC (Android apps) and Crostini (Linux apps)
- Chromium is a Wayland client
  - Use Wayland for graphics and event handling
    - Stable Wayland protocols and custom extensions
  - Use crosapi (Mojo IPC) for higher-level features (e.g. file picking)
What is LaCrOS?

A project to decouple the Chrome Browser from the ChromeOS Window Manager (Ash) and System UI.
This split results in performance/resource cost.

- Why?
- How to mitigate that?
Chromium Display Compositor
LaCros Aggregates quads that make up this surface.

LaCros GPU renders quads to texture

This single buffer represents the entire surface

Surface is sent over Wayland Along with single buffer

LaCros window single quad in CompositorFrame

ASH- Chrome

igraphia
Double compositing and bigger resources overhead
How to Fix That?
Delegated Compositing
Wayland Protocols

- **wl_subsurface** - Each quad/overlay is represented by own surface
- **wl_buffer** - Can be attached to multiple subsurfaces
- **linux_explicit_synchronization** - Fence for each quad's buffer
- Additional protocols:
  - **surface-augmenter** - extending wl_surface (rounded corners and clipping, pixel precision)
  - **single-pixel-buffer** - for color buffers
surface-augmenter

- `wl_subsurface::set_position`
- `wp_viewport::set_destination`
augmented_sub_surface::set_position(augmented_surface, wl_fixed_t, wl_fixed_t)

augmented_surface::set_destination_size(augmented_surface, wl_fixed_t, wl_fixed_t)
augmented_surface::set_transform

augmented_surface::set_trusted_damage
Thank you