

# The pathway to Chromium on Wayland

WebEngines Hackfest  
(Oct/2018)

Antonio Gomes, tonikitoo@

Maksim Sisov, msisov@

Jeongeun Kim, jkim@



# Agenda

- History
- Desktop Integration
- Current Status
  - UI/GPU split
- Plans
- Demonstration



# History

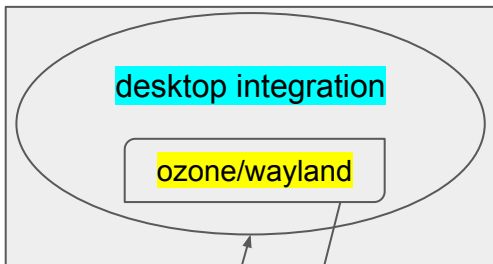
- **Started by Intel off the trunk**
  - Entered in 'maintenance mode'.
  - The version was based on m49.
- **Igalia started Wayland-support with Mus**
  - Extended Mus and Ozone to support 'External Window' mode.
- **Moved to AURA desktop integration without Mus**
  - Comply with the plan from upstream.
  - Simpler design.



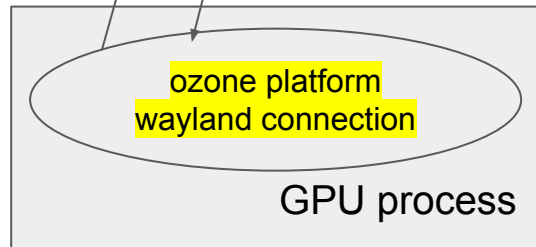
# History - Design Comparison

Intel

Browser process

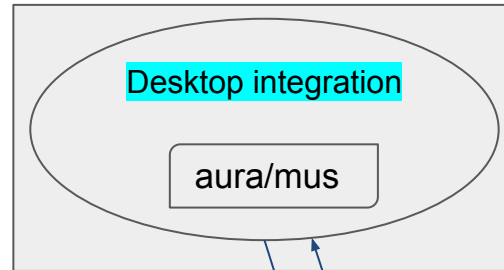


IPC (old API)

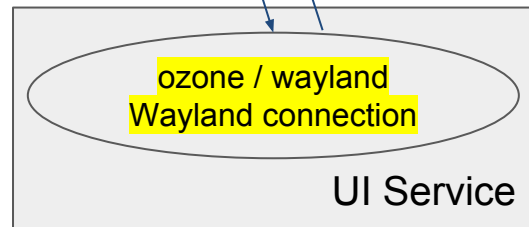


w/ mus

Browser process

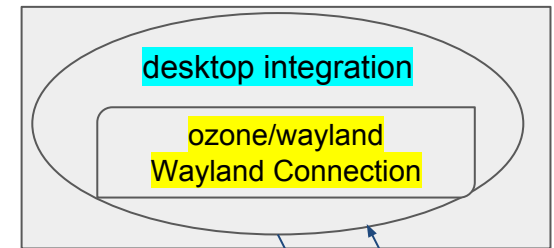


IPC ([Mojo](#) API)

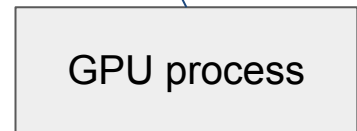


AURA Desktop Integration

Browser process

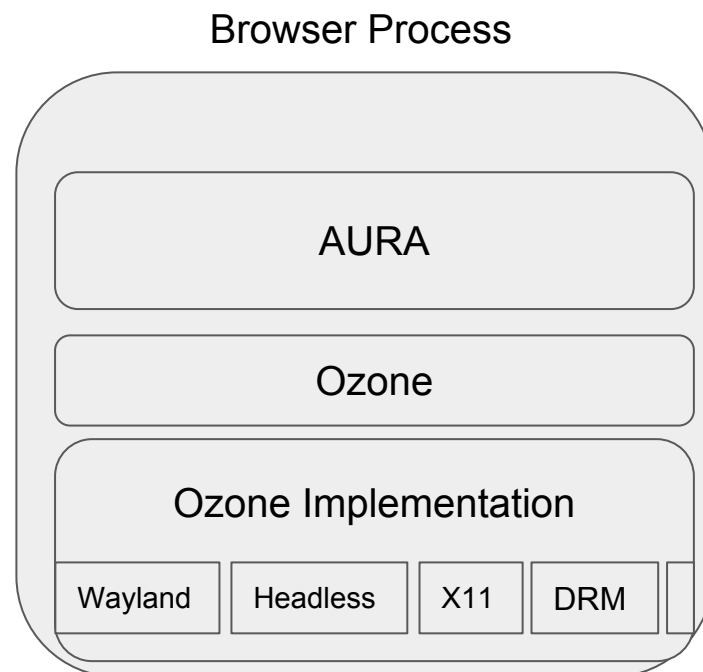


IPC ([Mojo](#) API)



# Aura Desktop Integration

- Moved the design without Mus.
  - Dropped the changes for Mus integration.
    - Dropped Mojo IPC for communicating with Mus.
  - Reused Wayland port implementation.
    - ui/ozone/platform/wayland
  - Figured out the changes we have to keep.
  - Re-implemented some changes.
- Continued to support Wayland.



# Current Status (Upstream)

- Upstreamed patches allowed to run Ozone/Wayland from ToT (some functionality still has been missing). You can
  - Launch Chromium with ‘--ozone-platform=wayland’.
  - Do regular multi tabbed/windowed browsing
  - Open popup menus and tooltips.
  - **Have a separate GPU process.**
- Upstreamed ~89% of existing Ozone/Wayland patches.
  - Tracking with [crbug.com/578890](https://crbug.com/578890)
- Upstreamed the GPU/Browser process split patches:
  - Including refactoring of the Ozone/Drm to share GBM related code with Ozone/Wayland
  - Upstreamed other related patches.



# Current Status (Upstream)

- Window states
  - Maximize / Minimize / Fullscreen
- Session restore (including windows' bounds and placement)
- Touch events support
- Fixed content\_shell support
- Added menu/submenu windows support
- Maksim Sisov and Antonio Gomes are owners of Ozone/Wayland now.



# Current Status (Downstream)

- **Window Interactions**
  - Move/Resize (under review for upstream)
- **Implemented additional features**
  - Drag and Drop: WIP
  - Copy and Paste : WIP
- **File Dialog**
  - Reused SelectFileDialogsExtension





# GPU/Browser process split

- Goal:
  - Run a separate sandboxed GPU process,
  - Be able to use GpuMemoryBuffer framework,
  - Improve overall performance.

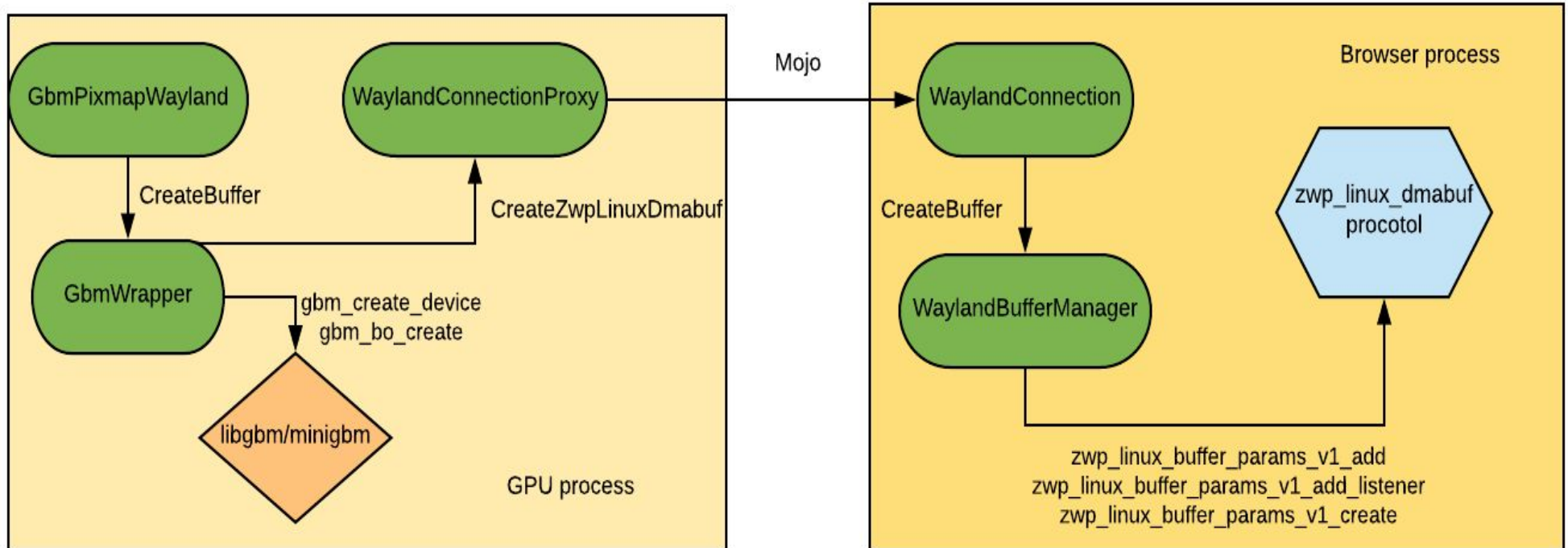


# Design

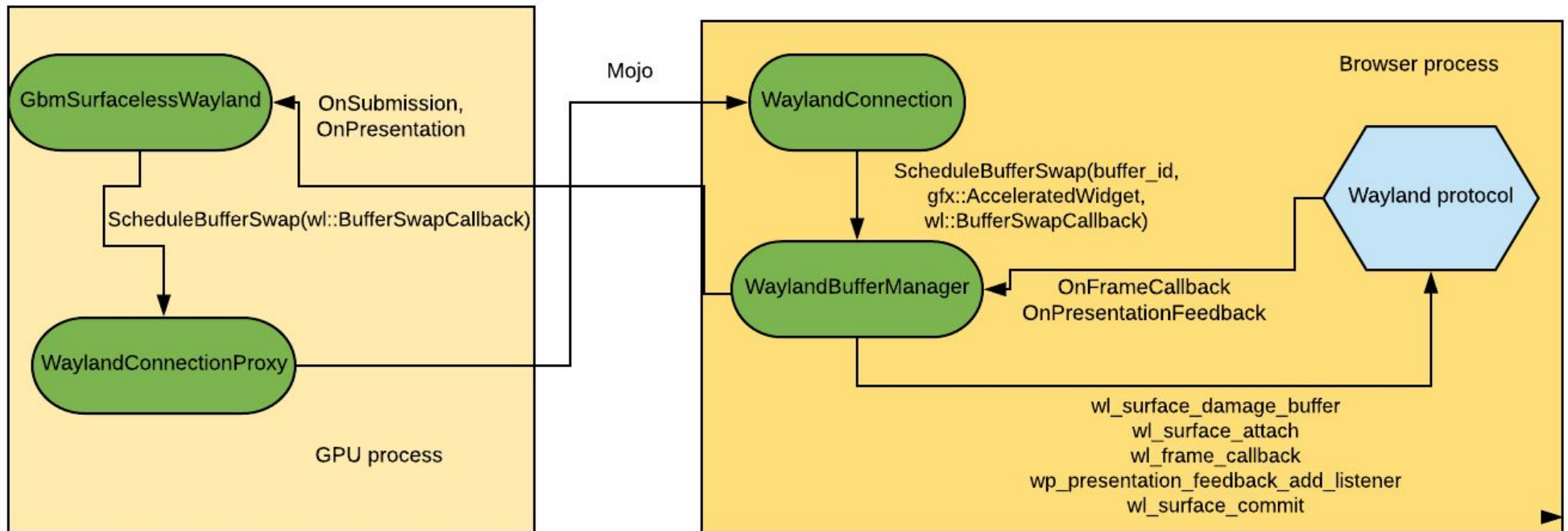
- Uses Generic Buffer Management (GBM) with drm render nodes on the GPU process,
- Imports prime fds and sends them to the browser process,
- *zwp\_linux\_dmabuf* protocol is used to create *wl\_buffers* based on the send dmabuf prime fds.
- *wl\_surface\_buffer\_damage* is used to identify changed parts of the buffer.
- The communication between processes is done with Mojo.



# How buffers are created



# How buffers are swapped



# GPU/Browser process split

- Outcome:
  - ~10 FPS (~30 vs ~40 FPS) performance gain in the WebGL Aquarium demo on the Renesa R-car M3 board running with yocto image based on the meta-renesas' sumo branch compared to --in-process-gpu mode.
  - Ability to use GpuMemoryBuffers framework and CPU\_READ\_WRITE\* buffer usages,
  - **Chromium security model is followed.**



# Plans

- Enable native gpu memory buffers support:
  - Better performance with css and skia draws. (under review)
- Improve the GPU/Browser process split:
  - Add missing support for presentation feedback. (DONE)
  - Add Vulkan support.
- Support Tab dragging.
- **Upstream all the Ozone/Wayland patches + Ozone/X11 patches.**
- Ensure there are no differences for end-users compared to stock Chromium.



# Plans (cont.)

- Add PlatformScreen. ([crbug.com/872339](http://crbug.com/872339))
- Add ClipboardOzone support. ([crbug.com/875168](http://crbug.com/875168))
- Add multi-screen support.
- Support non-english keyboard layouts.
- Enable tests in a ToT buildbot.
  - unit\_tests, browser\_tests
- Integration with AGL
  - analyzing and fixing performance problems of Chromium in AGL.
  - Support Chromium as WebEngine for Web Runtime.



# Demonstration

- Chromium ToT
- Chromium/Wayland Project from github
  - Linux Desktop
  - Renesas M3 board





# Questions

[tonikitoo@igalia.com](mailto:tonikitoo@igalia.com) - Antonio Gomes

[msisov@igalia.com](mailto:msisov@igalia.com) - Maksim Sisov

[jkim@igalia.com](mailto:jkim@igalia.com) - Jeongeun Kim

