Chromium's Way to Wayland

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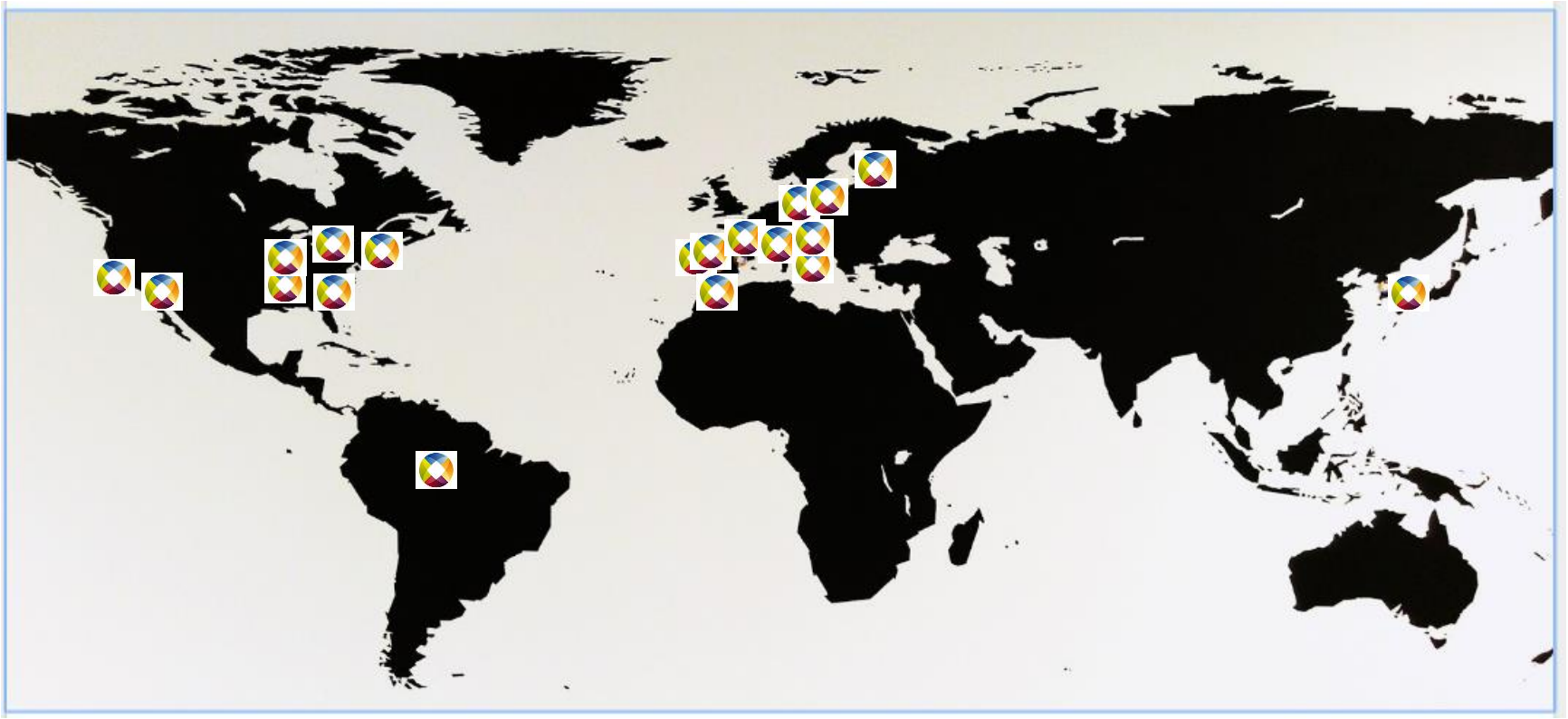
Introduction of Igalia

- Worker-owned, employee-run open source consultancy co mpany based on Galicia Coruna, Spain

Introduction of Igalia (Cont.)

- ~60 employees around the world
  - Areas
  - Chromium/Blink, WebKit, and Servo
  - Compilers, JavaScript engines (v8, JSC)
  - Multimedia (GStreamer), Graphics (Mesa), Networking, Accessibi lity

Introduction of Igalia (Cont.)



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Motivation

- Various platforms have been adopting Wayland a s their windowing system
- AGL, GENIVI, Raspberry Pi, Tizen, Bose, Volvo, Bosch, Jolla
- Ubuntu 17.10 will ship Wayland by default
- Fedora 25 is shipping Wayland by default
- Major UI toolkits have built-in support, including Qt5, GTK+, Clutter, EFL

Motivation (Cont.)

- There have been a lot of demands that Chromium works on Wayland in the industries
- Wayland has been getting more complete

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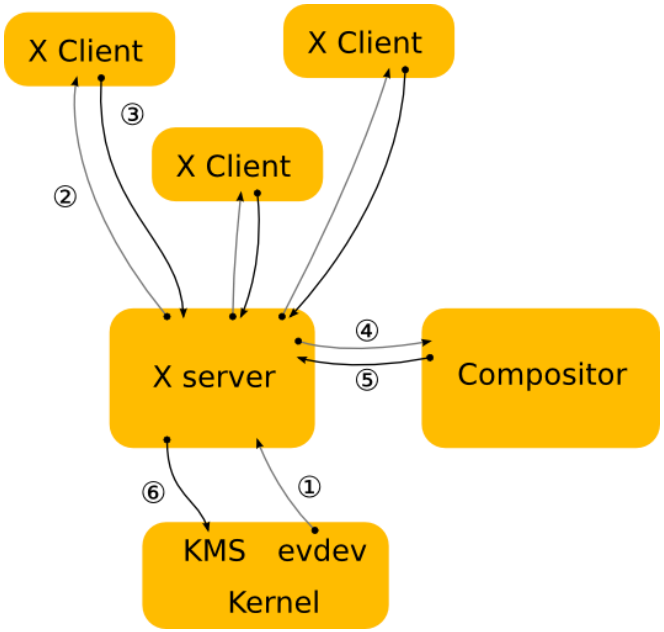
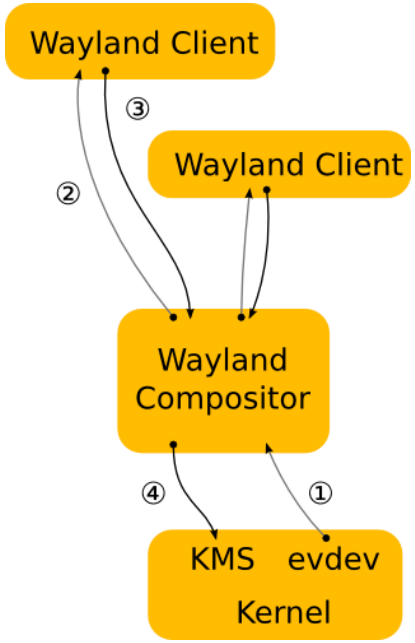
Background



vs.



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Wayland

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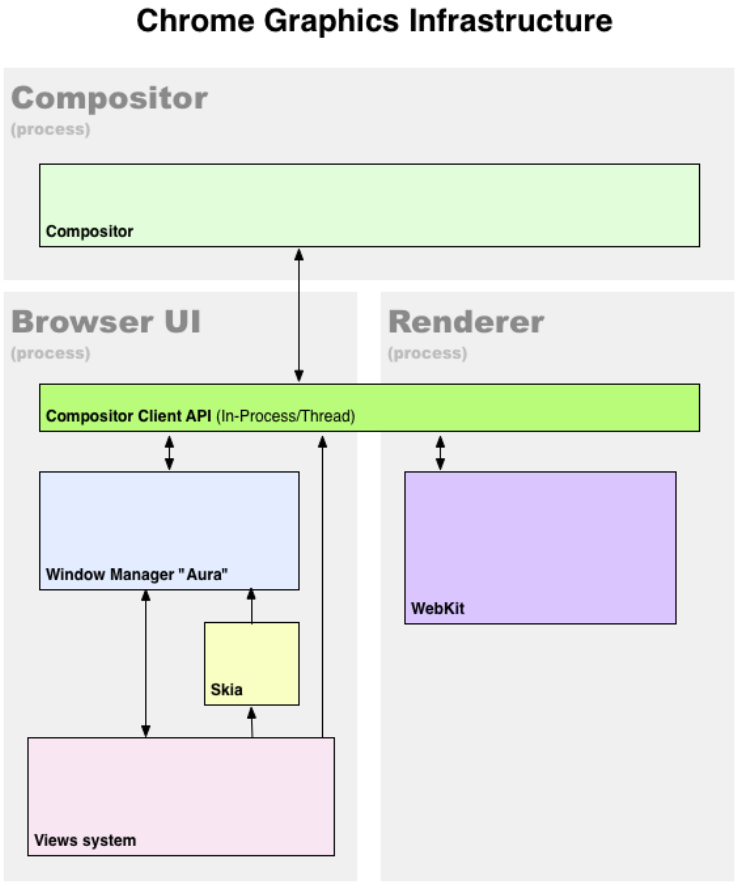
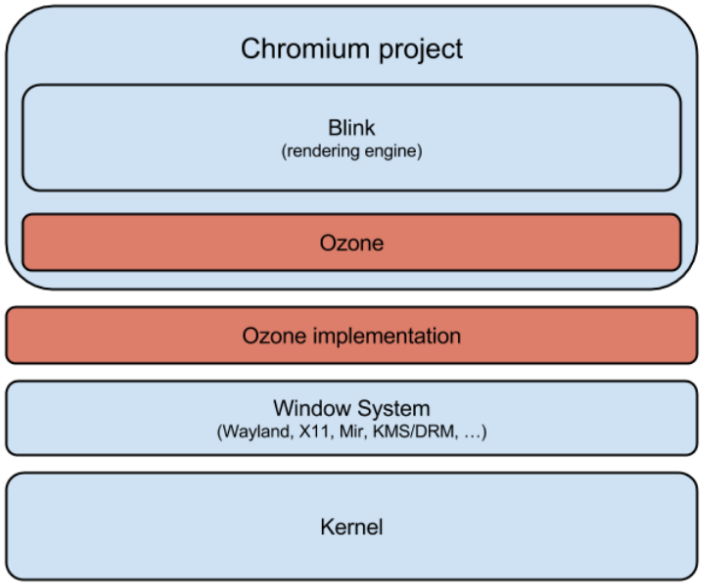
Background (Cont.)

- **Aura**
  - To be brief, Aura is UI fram ework working on Chrome OS/Chromium
  - Aura provides window and event types, as well as inte rfaces to customize their b ehavior



Background (Cont.)

- **Ozone**
  - Abstraction layer for the construction of accelerated surfaces underlying the Aura toolkit
  - Process input devices assignment and event handling



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History

- Ozone/Wayland project had been started by Intel since 2014 as their own Opensource project
- The project entered maintenance mode in Dece mber 2015
- However there was conflicts between Intel’s impl ementation and Google’s plan
  - Intel’s implementation vs. Chromium servicification

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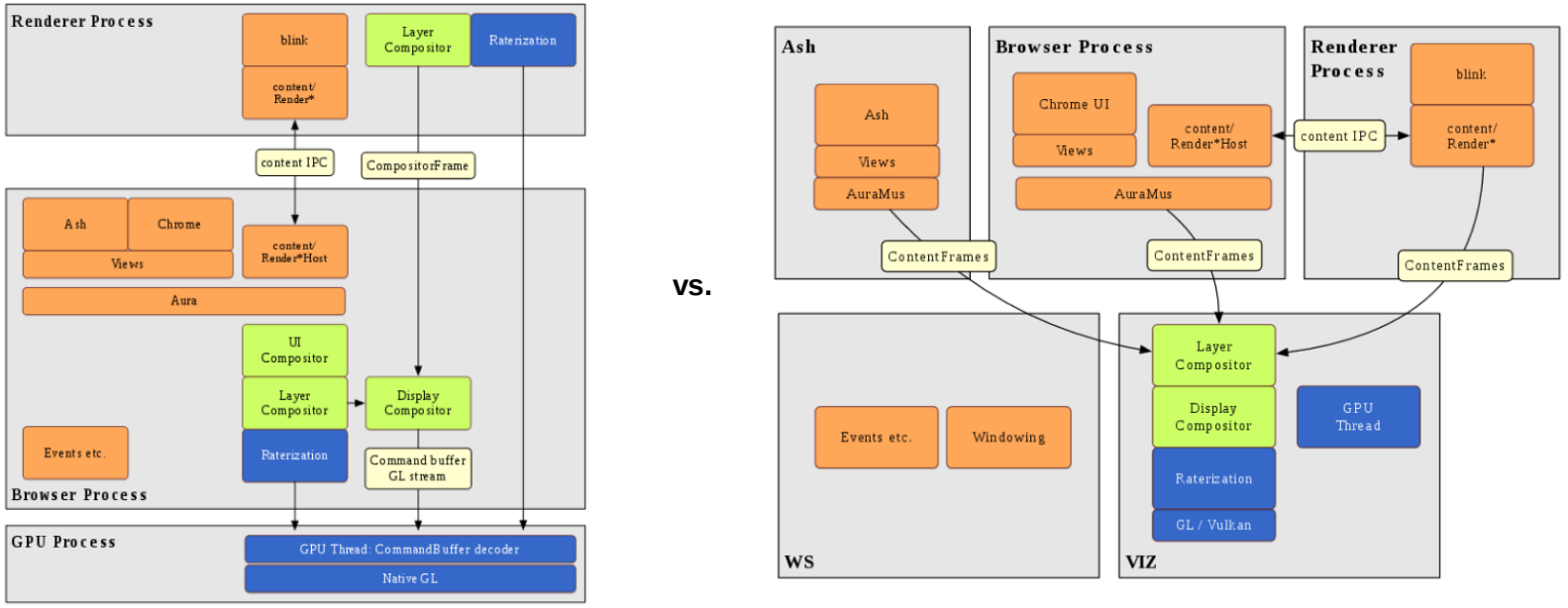
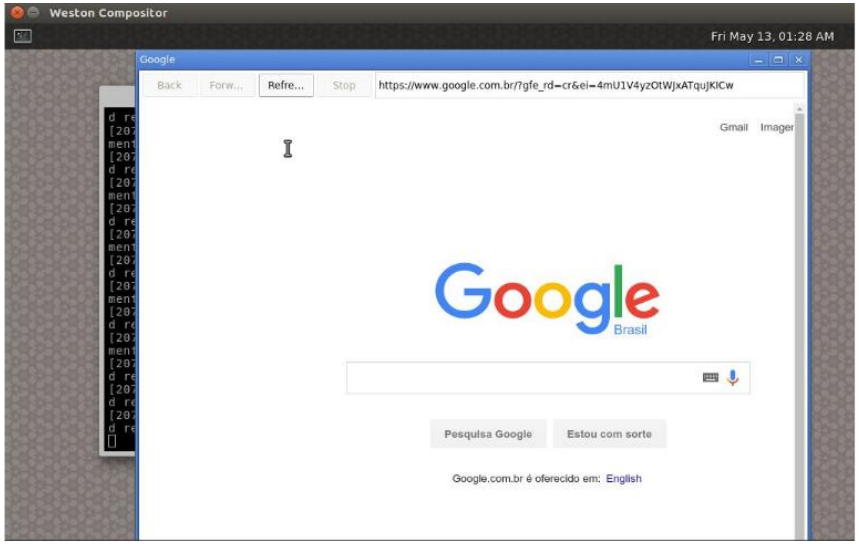
History (Cont.)

- Eventually Intel stopped managing the Ozone/Wayland project



History (Cont.)

- Igalia decided to start a new project with same end goal with Intel
  - We fixed Ozone's Wayland backend in Chromium mainline
  - Didn't start to upstream
- Succeed to launch a content shell on Ozone/Wayland



History (Cont.)

- Igalia got in touch with Google/Chromium developers to understand their plans for Ozone/Wayland
  - Servicification
  - Mus/Ash
- Igalia decided to follow up Chromium’s new architecture for Ozone/Wayland

History (Cont.)

- Start to work on Ozone/Wayland in earnest
  - Some problems at that time prior to Sep. 2016
    - Partial upstream from original Intel's project
    - Insufficient documentation
    - Limited buildbot coverage
- Improved by Igalia
  - Brought up of Ozone's Wayland backend in Chromium trunk
  - Start experimenting with Ozone on Chromium desktop as well
  - Documentation
  - Setup buildbots
  - Design discussion with Robert Kroeger who is a lead UI frame work at Google

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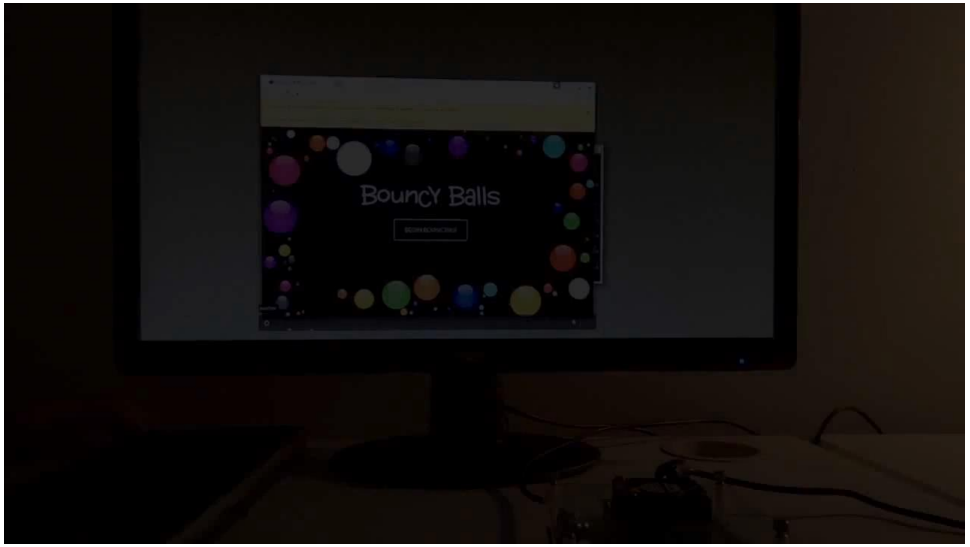
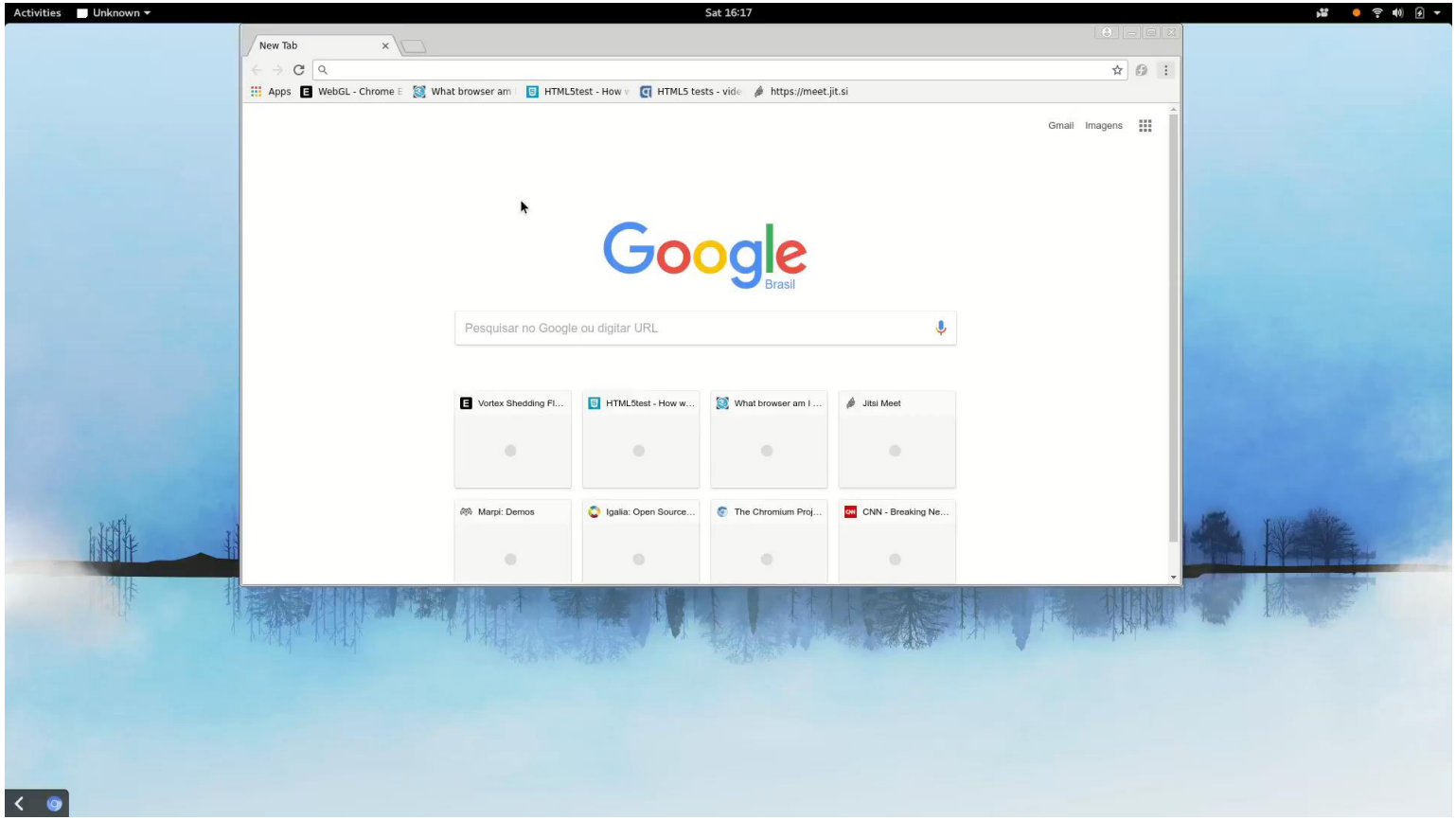
History (Cont.)

- Finally Igalia exhibited initial Chromium Wayland on R-Car M3 board at CES 2016

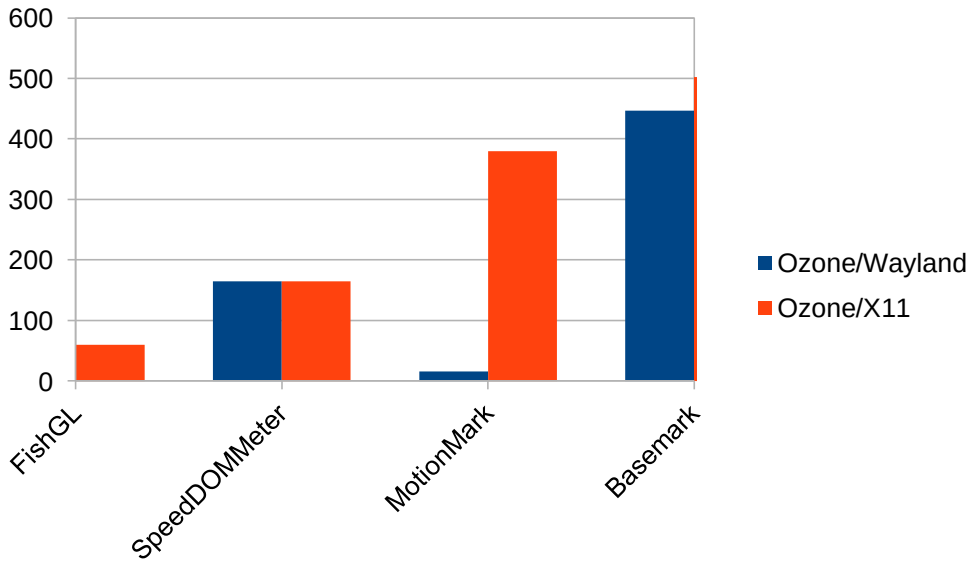


Demo of Chromium Wayland



Performance

- In some benchmarks, Ozone/Wayland is still a slightly lower performance compared to X11 version

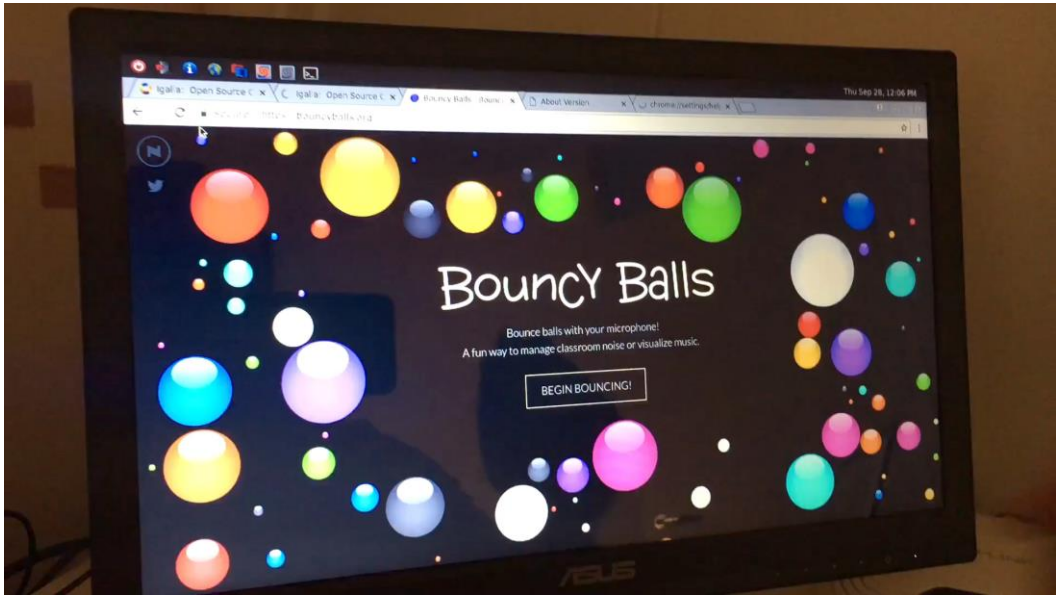


- Bigger score is better

- **System under test**
  - HW: Dell XPS15
  - CPU: i7 cpu
  - RAM: 16GB
  - Source : Igalia Ozone wayland github on 27th Sep .

Performance (Cont.)

- After rebasing Ozone/Wayland version based on Chromium m62, rendering performance is much faster than before on R-Car m3 board



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Todo list

- Fix drag and drop
- Fix clipboard (it works as in internal window mode)
- Multi screen support
- Non-English keyboard layouts
- Window closing
- Mouse cursor
- Ensure no feature losses or major performance penalties when compared to stock Chromium X11/Linux
- Start to upstream the changes

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Plan to upstream

- In WebEngine Hackfest on 1-3 October 2017, Antonio and Maksim have talked with Robert (Lead of Ozone at Google) about the upstream plan
  - Changes will be split in two big parts
  - We will start upstreaming one of them immediately

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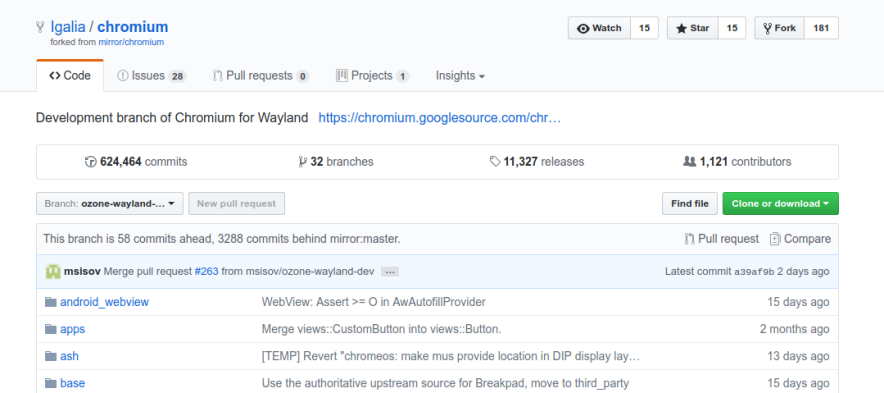
Rebase strategy

- Ozone wayland has been developed at github
  - https://github.com/Igalia/chromium



- Rebased every week against Chromium ToT. Our goal is t o be as close as possible to the latest Chromium code
  - Every week, a member of the Igalia Chromium team takes the rebase shift.
  - Commits that are complementary of each other, receive a "fixup!" prefix on the co mmit title, and keep the rest of original commit title unchanged.

How to run Chromium Wayland

- **Steps**
  - Setup Chromium build environment first
    - Install depot_tools and clone Chromium source code
  - Get Chromium Wayland branch from Igalia github
    - $ git remote add Igalia https://github.com/Igalia/chromium.git
    - $ git fetch Igalia
    - $ git checkout ozone-wayland-dev
  - Configuration
    - $ gn args out/Ozone --args="use_ozone=true enable_package_mash_services=true use_xkbcommon=true is_debug=false"
  - Build
    - $ ninja -C out/Ozone chrome
  - Run
    - $ .out/Ozone/chrome --mus --ozone-platform=wayland

References

- The Chromium project's way to Wayland written by Antonio Gomes(tonikitoo)
- Update on the open source browser space written by Jacobo Aragunde Pérez
- Ozone-Wayland Architecture written by Intel

Thank you!

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