# Update on the open source browser space

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- Open Source experts and consultants
- 15 years of experience
- Important contributions to:
  - Client-side web technologies: WebKit, Blink/Chromium, Servo
  - Graphics & Multimedia: Mesa, GStreamer
  - Compilers: V8, JavaScriptCore, SpiderMonkey, Guile
  - Software-defined networking: Snabb
  - ...

# Outline

- Open source browser technologies
- Wayland support in Chromium
- WPE: support for Wayland and other backends in WebKit
- Other options

# Open source browser technologies

# Open source web platforms

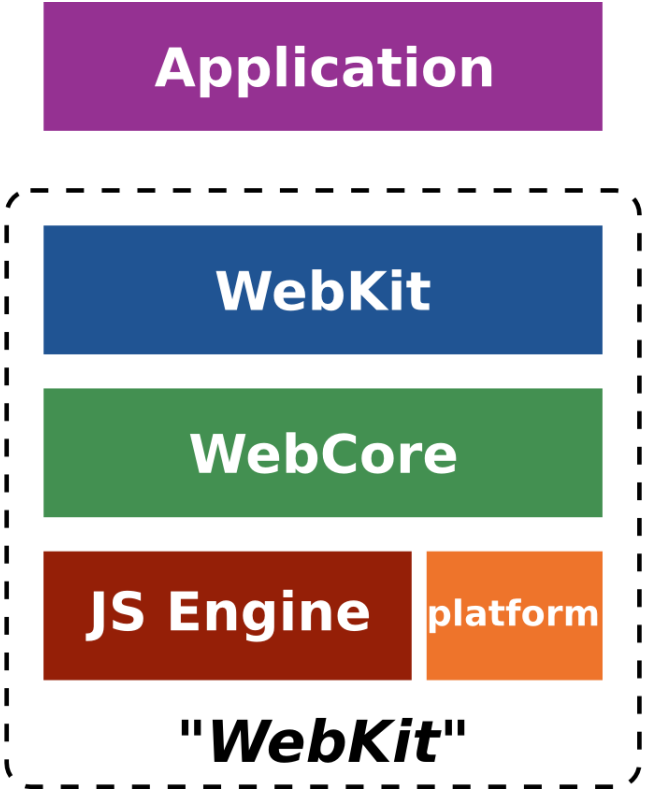
- Mozilla: Gecko and Servo
- WebKit family: OS X/iOS, WebKitGTK+, WPE
- Chromium and related projects

# Mozilla

- Gecko engine
  - Powers the Firefox browser
  - Embedding not officially supported
- Servo: next generation engine
  - Designed for memory-safety, parallelism, embedding
  - New set of tools and technologies: Rust
  - Currently under heavy development

# WebKit

- From a simplified point of view, WebKit is structured this way:
  - WebKit: thin layer to link against from the applications
  - WebCore: rendering, layout, network access, multimedia, accessibility support...
  - JS Engine: the JavaScript engine. JavaScriptCore by default.
  - platform: platform-specific hooks to implement generic algorithms



# WebKit ports

- Each port is an engine implementation with a specific set of technologies
  - Platform bits: network, graphics, multimedia
  - Specific API
- Many ports have existed: OS X and iOS, WebKitGTK+, EWebKit (EFL), QtWebKit, Chrome/Chromium..
- Currently official ports: OS X/iOS, WebKitGTK+, WPE (in process)

# Chromium

- Vertical solution, from low-level graphics to UX
- Engineered to power Chrome and Chrome OS
  - Embedding, portability use cases are secondary
- Designed to minimize external dependencies
  - External deps are managed by the project build system
  - Versions pinned, included in the build process
  - In general, not designed to exchange subsystems

# Chromium ecosystem

- External projects filling the gaps
- CEF: Chromium Embedded Framework
  - Embed web content in applications
  - Hybrid applications
- Electron
  - Web application runtime

# Wayland support in Chromium

# Ozone-Wayland project

- Most complete Wayland implementation yet
- Developed mainly by Intel
- Downstream project at github
- Currently in maintenance mode
  - No more active development
  - Latest supported version is 53

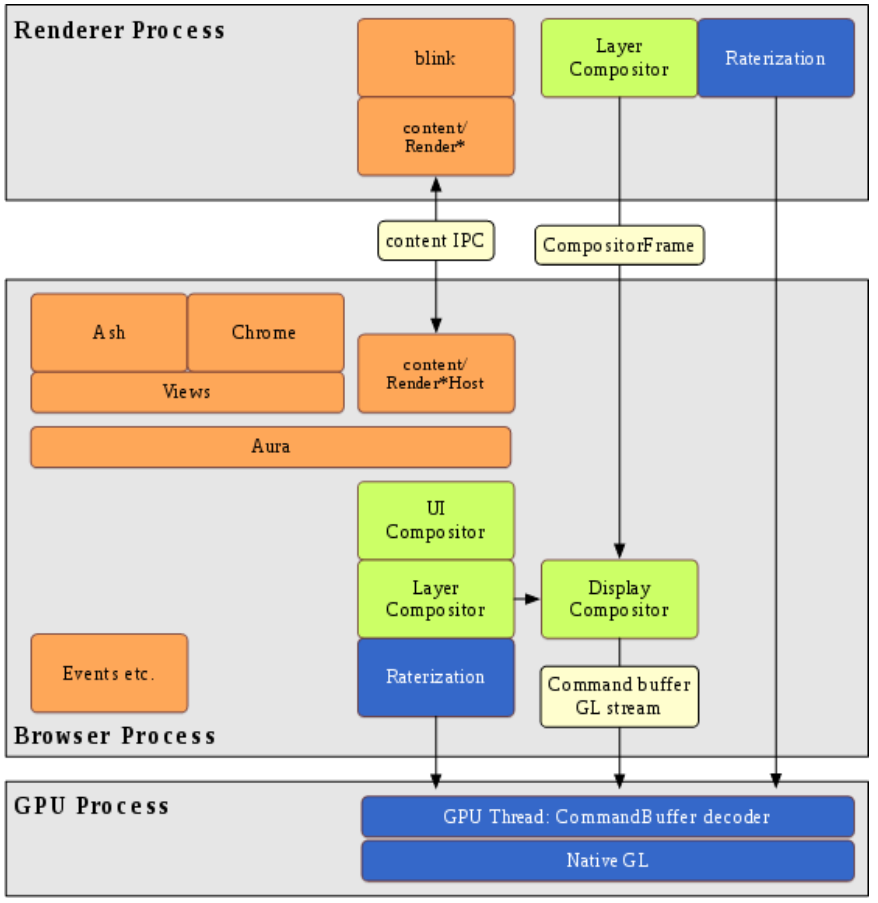
# Upstream Wayland implementation

- Preliminary state
- Following Chromium master
- Not high priority at Google → Igalia taking the lead of the implementation
- Framed in a bigger effort to re-architect Chromium

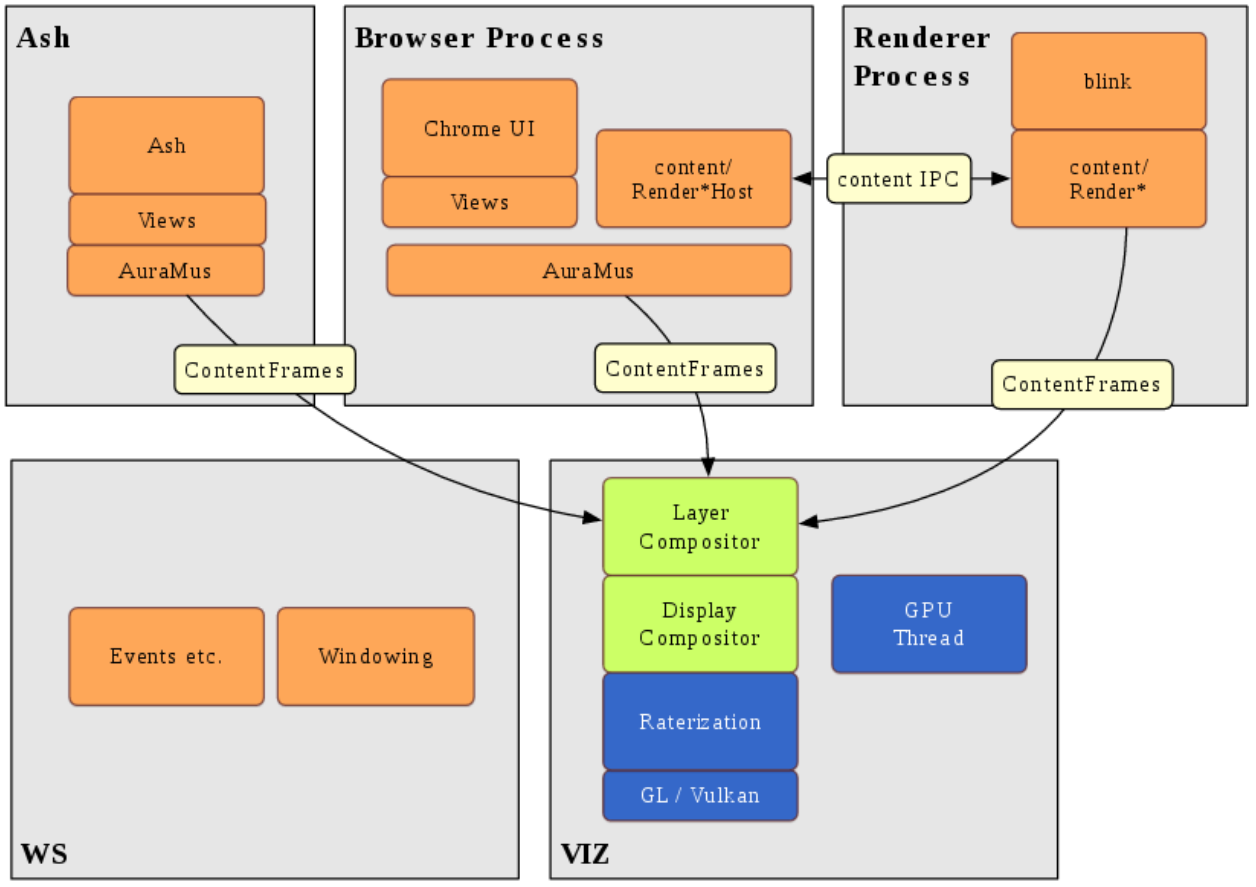
# Upstream Wayland implementation

- Why not merge Intel’s code upstream?
  - Blocker: architecture differences
    - Intel’s code doesn’t align with Chromium mid-term architecture plans
  - Approach: implement basic bits following new architecture, then migrate features and code as possible

# Chromium architecture now



# Long-term plan: service-based



# WPE: support for Wayland and other backends in WebKit

# WPE

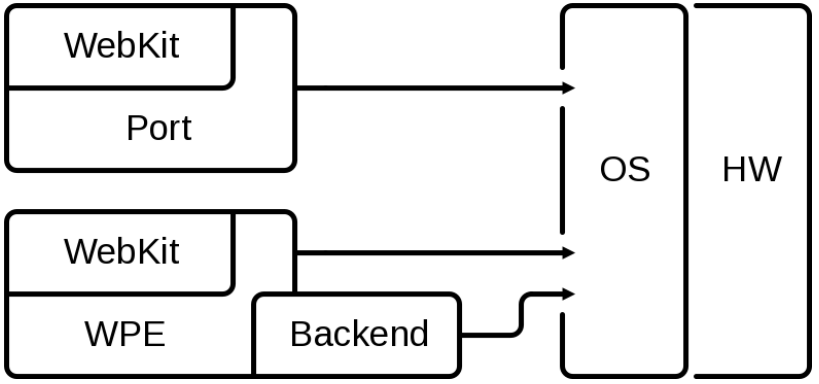
- *Web Platform for Embedded*
  - Previously known as *WebKit For Wayland*
- Designed for simplicity and performance
- Supports Wayland and also other backends
- Great performance in low-end hardware
- Currently in review process to become an official WebKit port

# WPE use cases

- Strong multimedia capabilities
- Very lightweight, low hardware requirements
  - Raspberry Pi 1/zero
- Well received in set-top-box market
- Official part of RDK stack

# WPE backends

- Backends use platform-specific libraries to implement drawing and window management
- Can be independently developed



# Other options

# Other options with Wayland support

- WebKitGTK+
  - Wayland through the GTK+ toolkit support
- QtWebEngine
  - Chromium-based
  - Wayland through the Qt toolkit support

# Conclusions

- Chromium
  - Full-featured browser and fast-paced development
  - Increased cost of maintenance
- Intel’s Ozone-Wayland
  - Available for short-term goals
  - Transition to upstream Chromium implementation as soon as it’s ready
- QtWebEngine
  - Ideal to integrate with Qt applications
  - Slower upgrade pace, linked to Qt releases

# Conclusions

- WPE
  - Lightweight
  - Customizable graphic backends
  - Stable APIs, designed for third-parties to build products upon
  - No browser features, it’s a web engine
- WebKitGTK+
  - Stable and also lightweight
  - Availability linked to the GTK+ toolkit