Servicification:
Modularizing Chromium

{blundell, clamy, rjkroege}@chromium.org

What we want:
Isolation

What is Isolation?

What is Isolation?

Source

Reusable code.

What is Isolation?

Source

Run-Time

Reusable code.

Isolate state. Sandbox. Guard against crashes & exploit.

What is Isolation?

Source

Run-Time

Component

Reusable code.

Isolate state. Sandbox. Guard against crashes & exploit.

Download only what is needed.

What is Isolation?

Source

Run-Time

Component

Product

Reusable code.

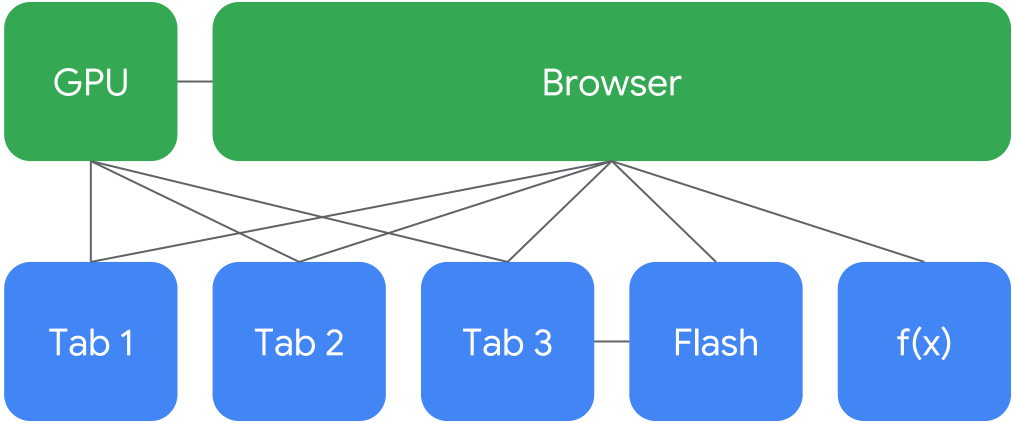
Isolate state. Sandbox. Guard against crashes & exploit.

Download only what is needed.

Different teams, with different repositories and release schedules.

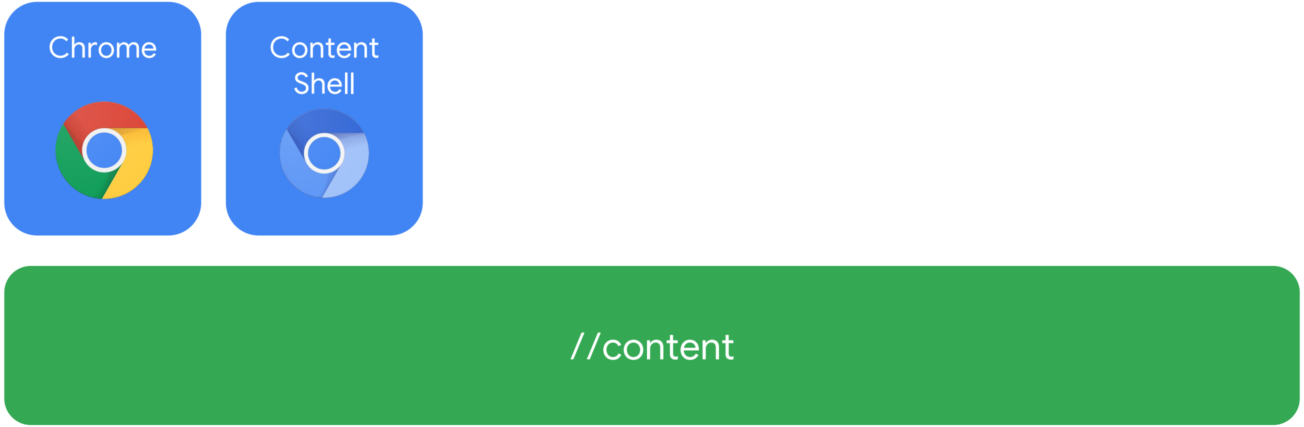
Process model

Cornerstone of security model



Dealing with Organic growth

Content refactor

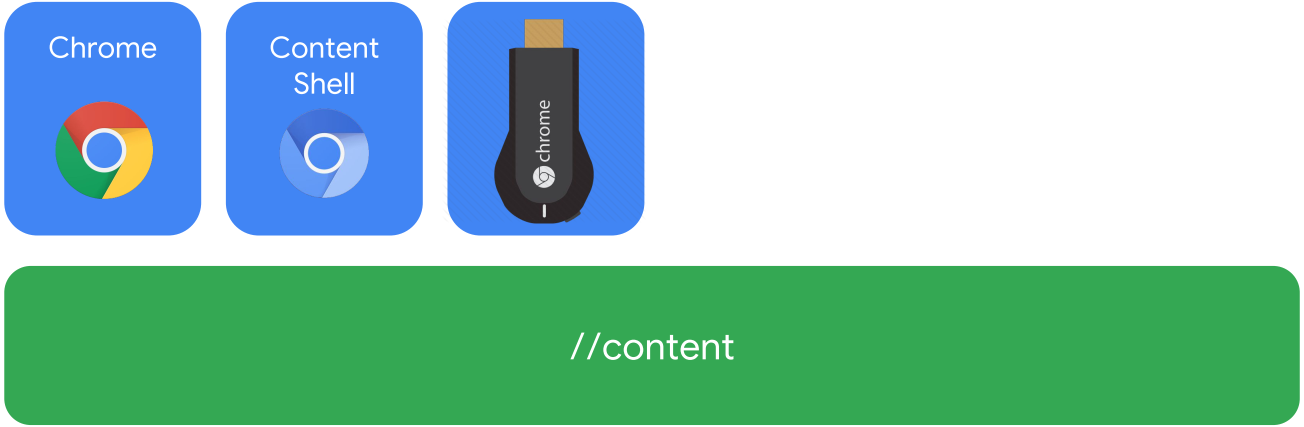


Chrome

Content Shell

//content

Content refactor

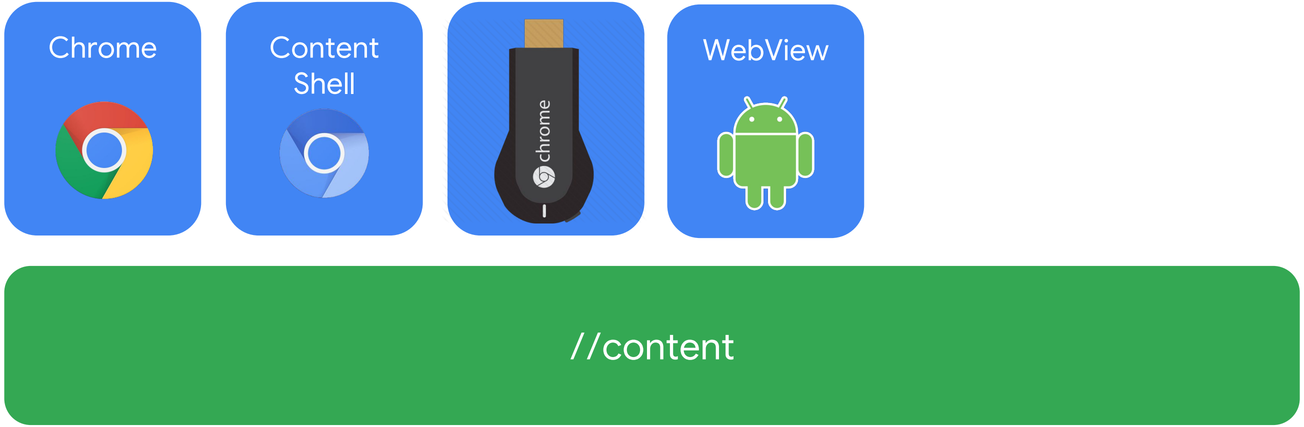


Chrome

Content Shell

//content

Content refactor



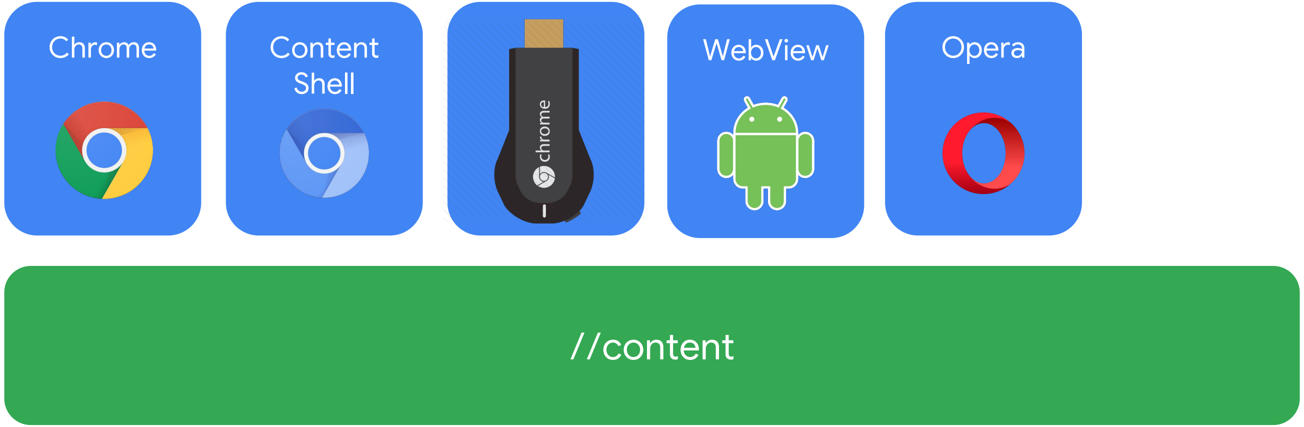
Chrome

Content Shell

WebView

//content

Content refactor



Chrome

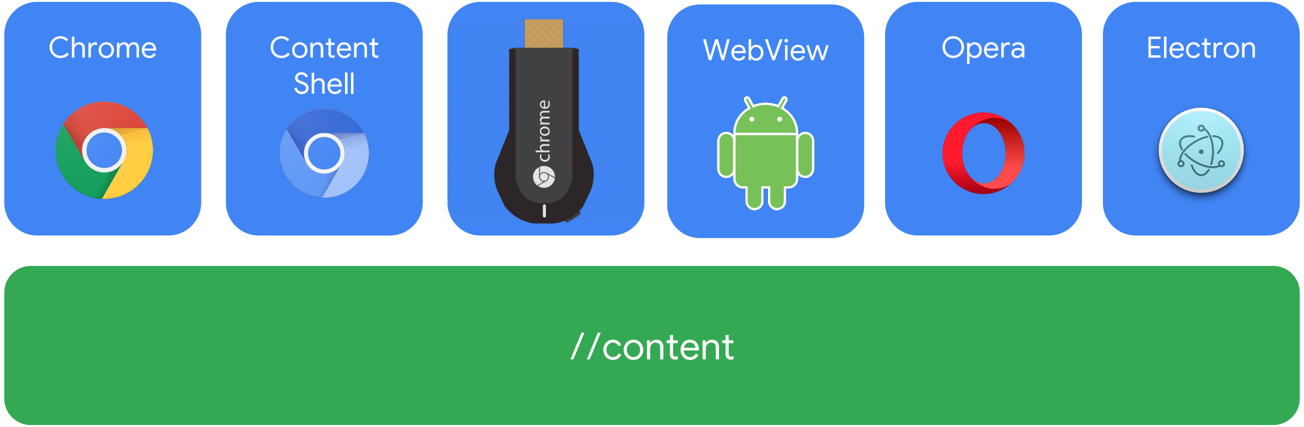
Content Shell

WebView

Opera

//content

Content refactor



Chrome

Content Shell

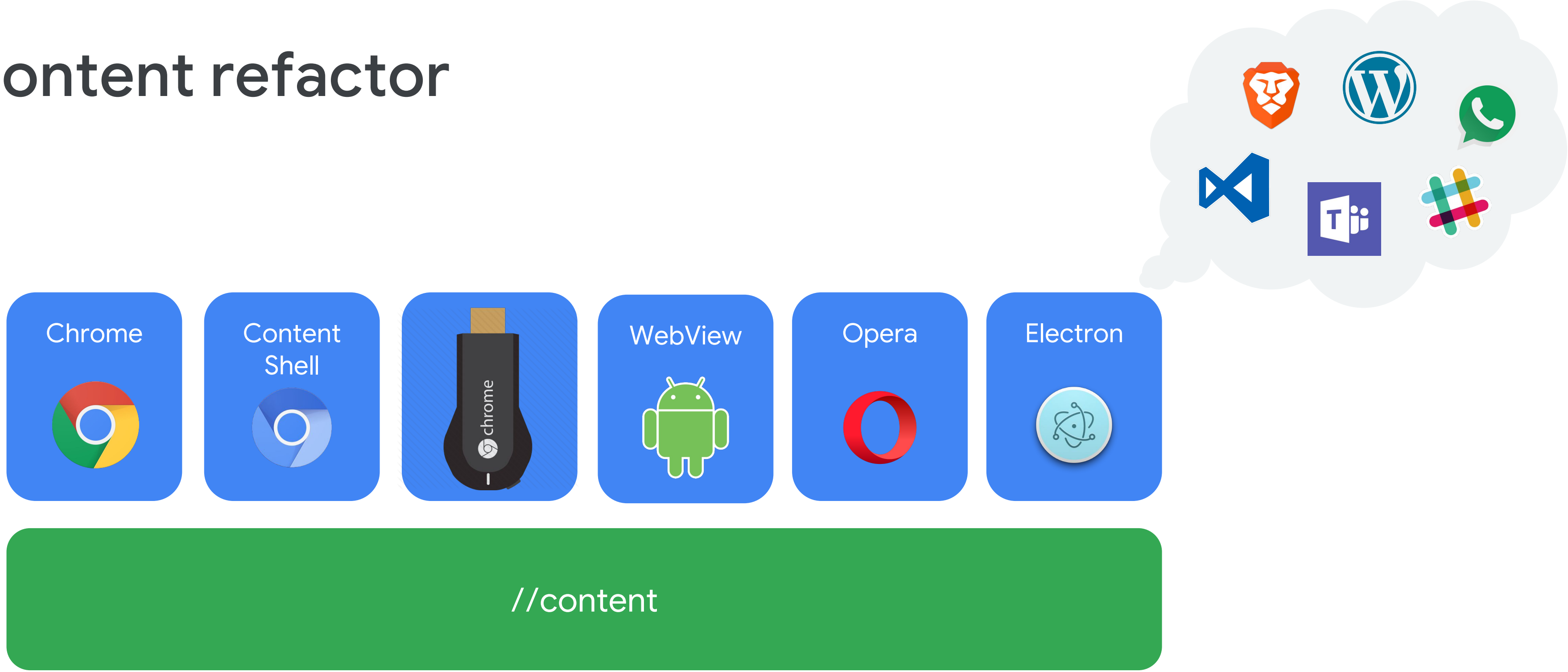
WebView

Opera

Electron

//content

Content refactor



Chrome

Content Shell

WebView

Opera

Electron

//content

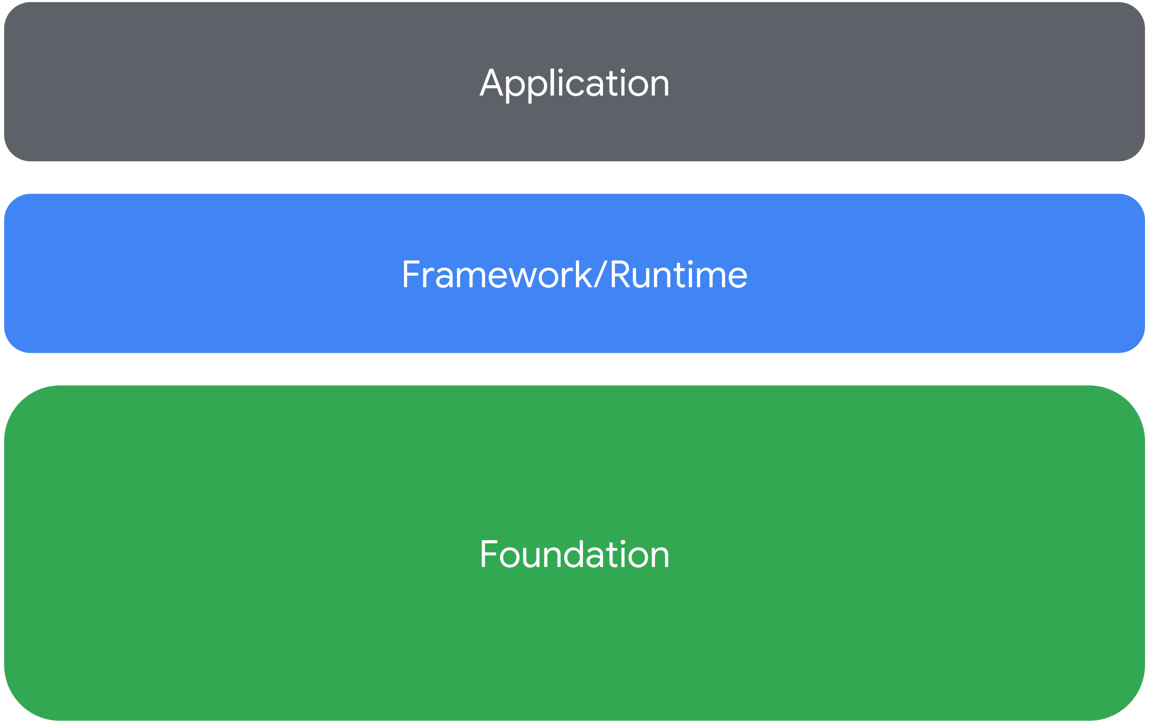
Towards Modularization

Post content refactor

~10M lines of code

← *Chrome code architecture, ~2017*

Conceptual system layercake

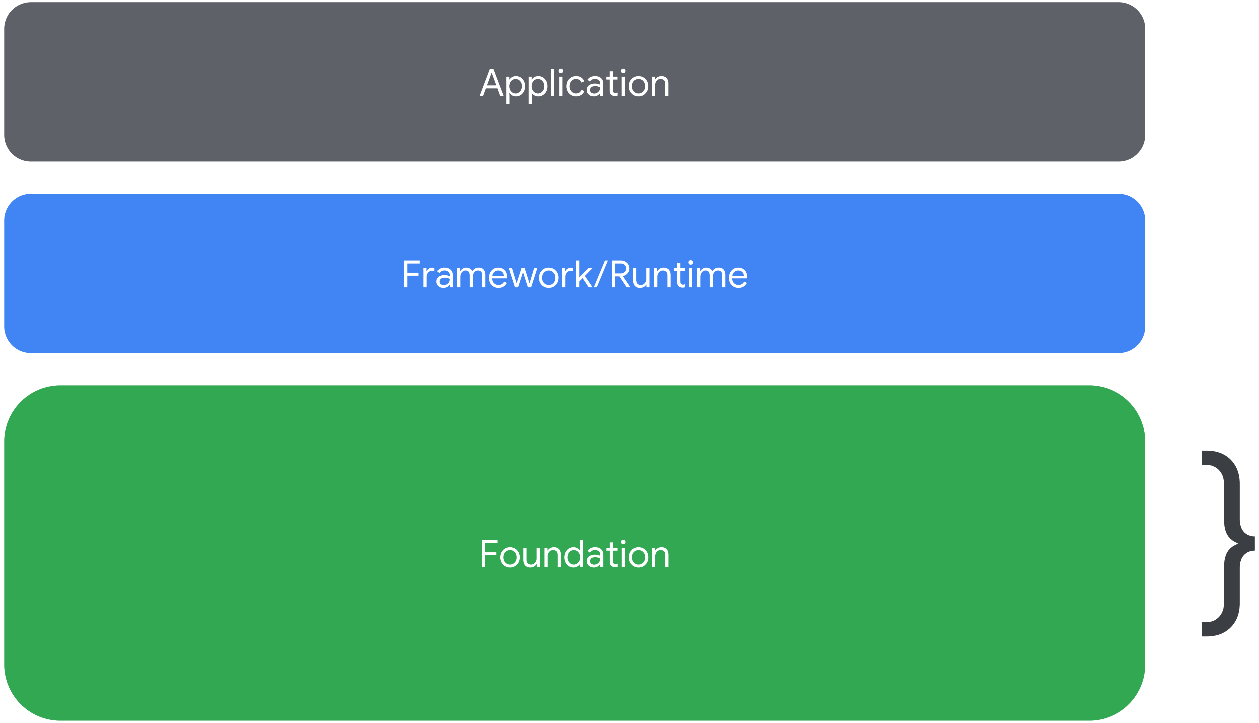


Application

Framework/Runtime

Foundation

Conceptual system layercake



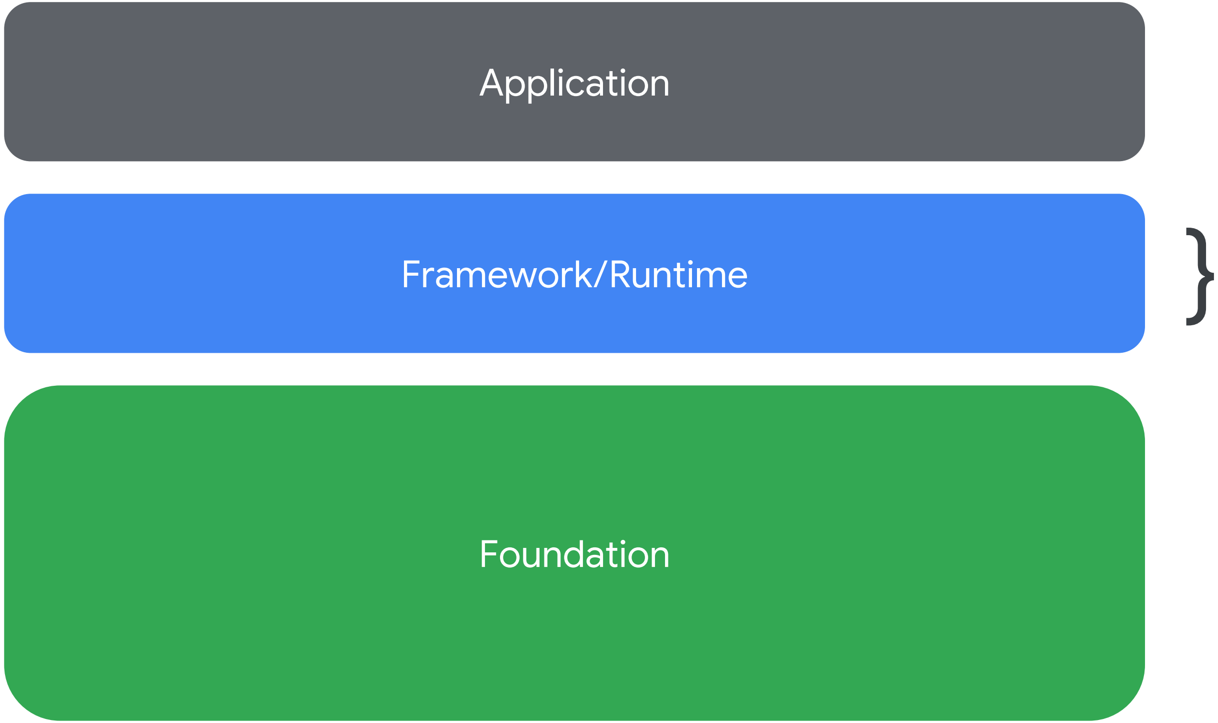
Application

Framework/Runtime

Foundation

Chrome’s Architecture derived from this layer.

Conceptual system layercake



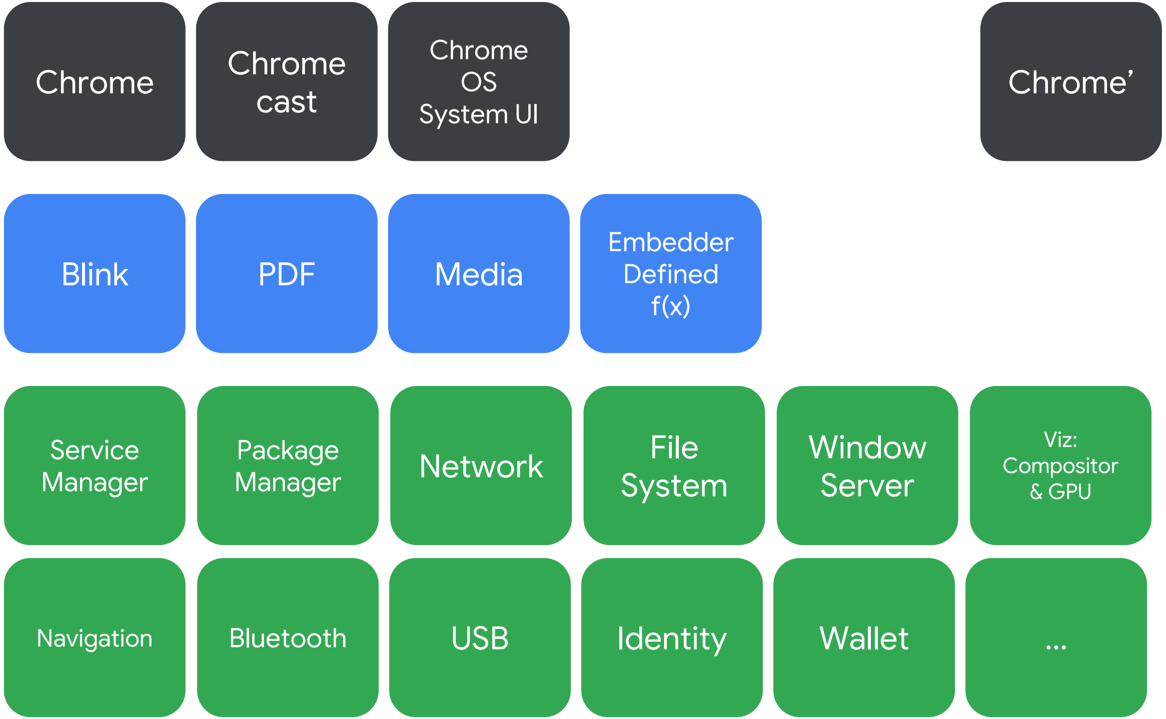
Application

Framework/Runtime

Foundation

Web Platform
Runtime & API
lives here.

Post “servicification”



Chrome

Chrome cast

Chrome OS System UI

Chrome’

Blink

PDF

Media

Embedder Defined f(x)

Service Manager

Package Manager

Network

File System

Window Server

Viz: Compositor & GPU

Navigation

Bluetooth

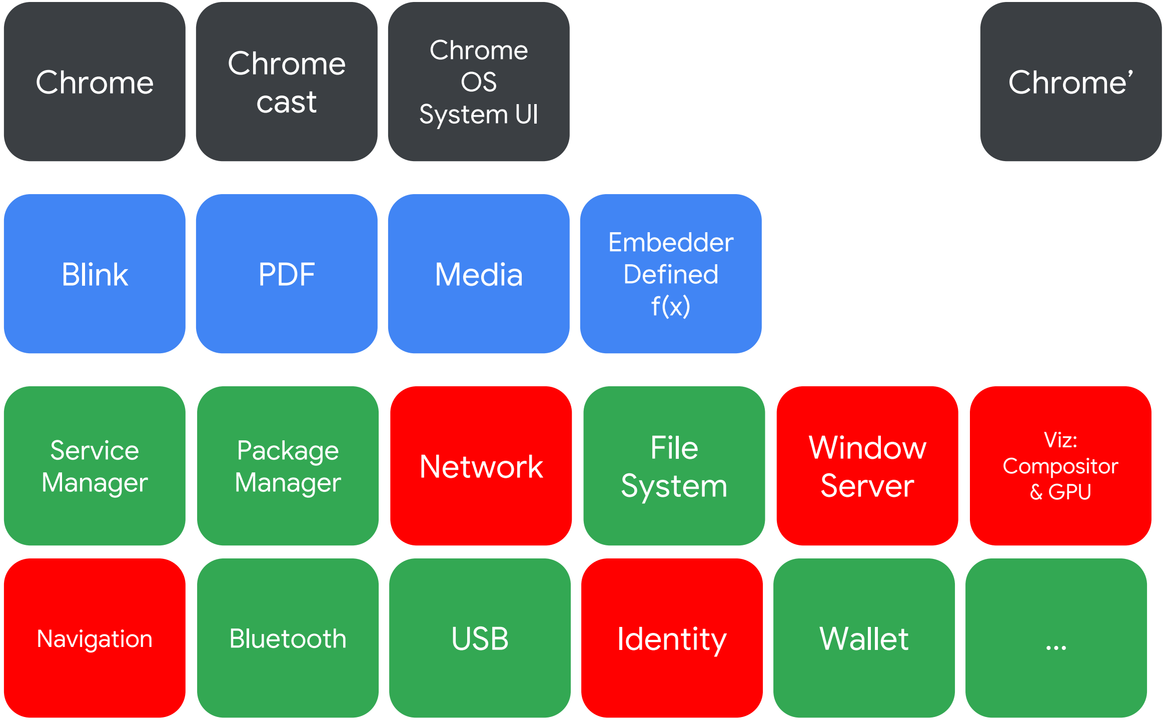
USB

Identity

Wallet

...

Some Major Ongoing Servicification Projects



Chrome

Chrome cast

Chrome OS System UI

Chrome’

Blink

PDF

Media

Embedder Defined f(x)

Service Manager

Package Manager

Network

File System

Window Server

Viz: Compositor & GPU

Navigation

Bluetooth

USB

Identity

Wallet

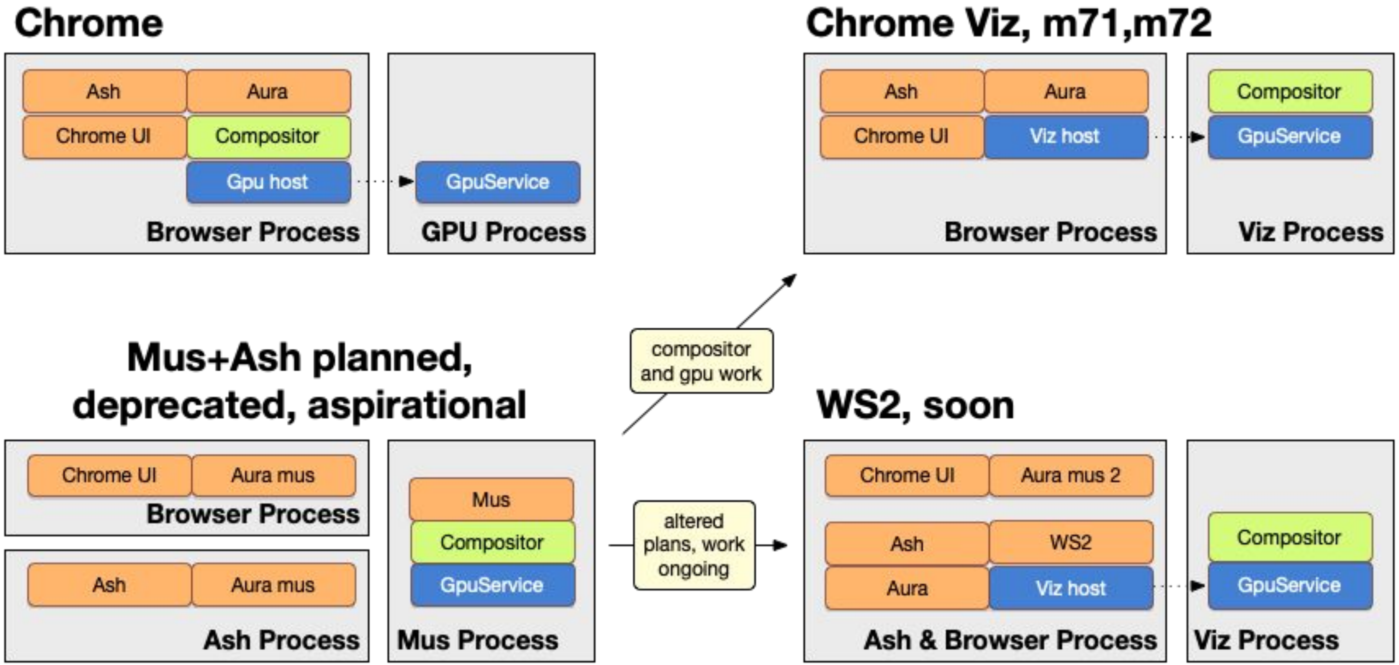
...

Zooming In On These Efforts: Network and UI

- **Network Service**
  - **Use case:** Chrome’s net stack without a browser
  - **Use case:** Survive net stack crashes in Chrome
  - **Status:** OOP Network Service launched on desktop ~~Canary!~~ **Beta at 50%!**

- **UI Service**
  - **Use case:** Decoupling ChromeOS SysUI from the browser
  - **Status:** Come on up, Rob!

Zooming In on These Efforts: UI Service (MUS) & Viz



Zooming In On These Efforts: Identity and Content

- **Identity Service**
  - **Use case:** Access user’s Google identities outside of the browser
  - **Status:** Identity Service built, major effort underway to use it in the browser

- **Content Service**
  - **Use case:** Display web content without the browser being live!
  - **Use case:** “Chrome WebView”
  - **Status:** In design exploration

Zooming Out: Our Approach to These Services

- Each one of these stretches across all of Chromium!
- Meanwhile, hundreds of engineers adding code “the old way”
- How are we tackling this challenge?

Zooming Out: Our Approach to These Efforts

- **“Surge toward success”**
  - Get a project ready to topple and coalesce resources on it

- **Tremendous impact** from collaboration with **Igalia**
  - **Critical** to launch of Network Service on beta
  - Now expanding to Identity Service

- **Excited about this model** more broadly for Chromium
  - We care about the long-term health of the codebase
  - Impactful projects beyond servicification (e.g., Blink Onion Soup)

Thank you.
Questions?