Servicification: Modularizing Chromium

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What we want: 
Isolation
What is Isolation?
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Source

Reusable code.
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Run-Time

Isolate state.
Sandbox. Guard against crashes & exploit.
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Source
- Reusable code.

Run-Time
- Isolate state.
- Sandbox. Guard against crashes & exploit.

Component
- Download only what is needed.
What is Isolation?

<table>
<thead>
<tr>
<th>Source</th>
<th>Run-Time</th>
<th>Component</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reusable code.</td>
<td>Isolate state. Sandbox. Guard against crashes &amp; exploit.</td>
<td>Download only what is needed.</td>
<td>Different teams, with different repositories and release schedules.</td>
</tr>
</tbody>
</table>
Process model

Cornerstone of security model

Diagram:
- GPU
- Browser
- Tab 1
- Tab 2
- Tab 3
- Flash
- f(x)
Dealing with Organic growth
Content refactor

Chrome

Content Shell

//content
Content refactor

Chrome

Content Shell

Content

//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

- **Foundation**
- **Framework/Runtime**
- **Application**

Chrome’s Architecture derived from this layer.
Conceptual system layercake

Application

Framework/Runtime

Foundation

Web Platform Runtime & API lives here.
Post “servicification”
Some Major Ongoing Servicification Projects

- Chrome
- Chrome cast
- Chrome OS System UI
- Blink
- PDF
- Media
- Embedder Defined f(x)
- Service Manager
- Package Manager
- Network
- File System
- Window Server
- Viz: Compositor & GPU
- Navigation
- Bluetooth
- USB
- Identity
- Wallet
- Chrome'
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

Chrome

- Ash
- Aura
- Chrome UI
- Compositor
- Gpu host

Browser Process

- GpuService

GPU Process

Chrome Viz, m71,m72

- Ash
- Aura
- Chrome UI
- Viz host
- Compositor
- GpuService

Browser Process

Viz Process

Mus+Ash planned, deprecated, aspirational

- Chrome UI
- Aura mus

Browser Process

- Ash
- Aura mus

Ash Process

- Mus
- Compositor
- GpuService

Mus Process

WS2, soon

- Chrome UI
- Aura mus 2

Ash Process

- Ash
- WS2

Viz Process

- Aura
- Viz host
- Compositor
- GpuService
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?