# Creating Faster Websites

## AKA - A ComeUntoChrist.org performance case study

## AKA - What it takes to move from rendering in 4s to <1s

Sort 2022 - Aaron Barker - Front-end Stack Team

# What will we be covering?
## (Should I get up and walk out now)

- What this is not
- ComeUntoChrist history
- Web Vitals
- ComeUntoChrist performance improvements play by play
- Live review if time/bandwidth allows
- Questions

# What this is not

# Servers

# Micro-performance

# ComeUntoChrist - A Case Study

# ComeUntoChrist uniqueness

## At least at the church

- Traffic is primarily non-member
- Traffic is largely ad driven
- Competing for eyeballs/attention
- If the user doesn’t have a good experience, they go to the next ad, search, etc
- High bounce rate, so prioritize one to few page experience over many pages

[Frustration] is the path to the dark side.
[Frustration] leads to anger.
Anger leads to hate.
Hate leads to suffering.

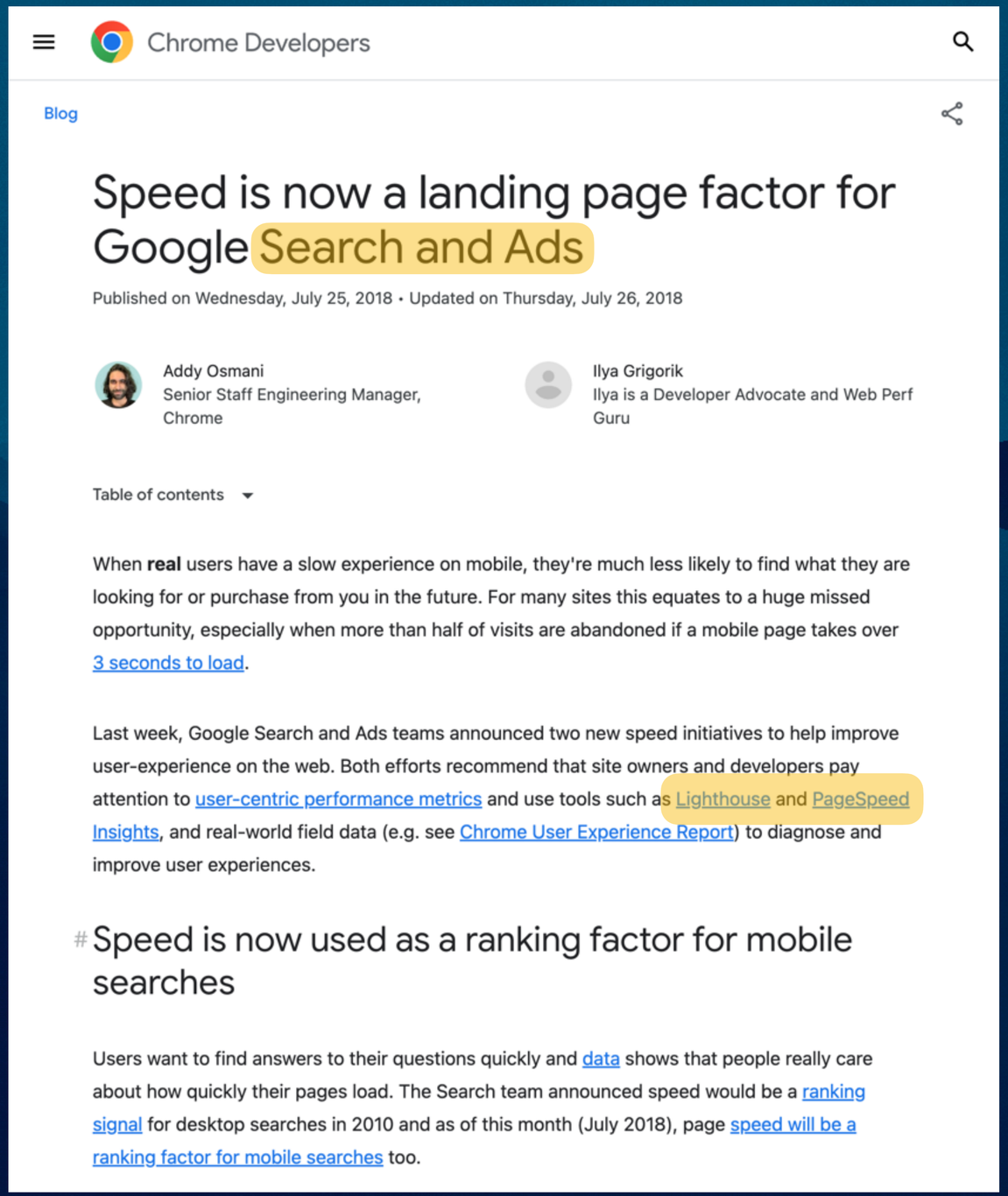
**Yoda**

# Pre 2019

- Work done by previous devs to get page loading in the 3 second range on a Fast 3g connection
- When I got on team, there wasn’t a push for better performance
- Leaders were not opposed to me working on it though

**So I did :)**

# Where to focus?



Chrome Developers

Blog

## Speed is now a landing page factor for Google Search and Ads

Published on Wednesday, July 25, 2018 • Updated on Thursday, July 26, 2018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When **real** users have a slow experience on mobile, they're much less likely to find what they are looking for or purchase from you in the future. For many sites this equates to a huge missed opportunity, especially when more than half of visits are abandoned if a mobile page takes over 3 seconds to load.

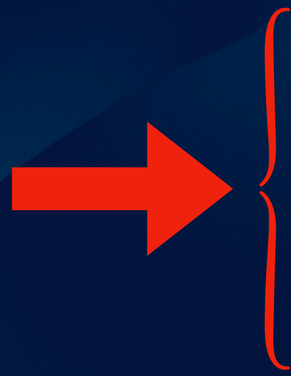
Last week, Google Search and Ads teams announced two new speed initiatives to help improve user-experience on the web. Both efforts recommend that site owners and developers pay attention to user-centric performance metrics and use tools such as Lighthouse and PageSpeed Insights, and real-world field data (e.g. see Chrome User Experience Report) to diagnose and improve user experiences.

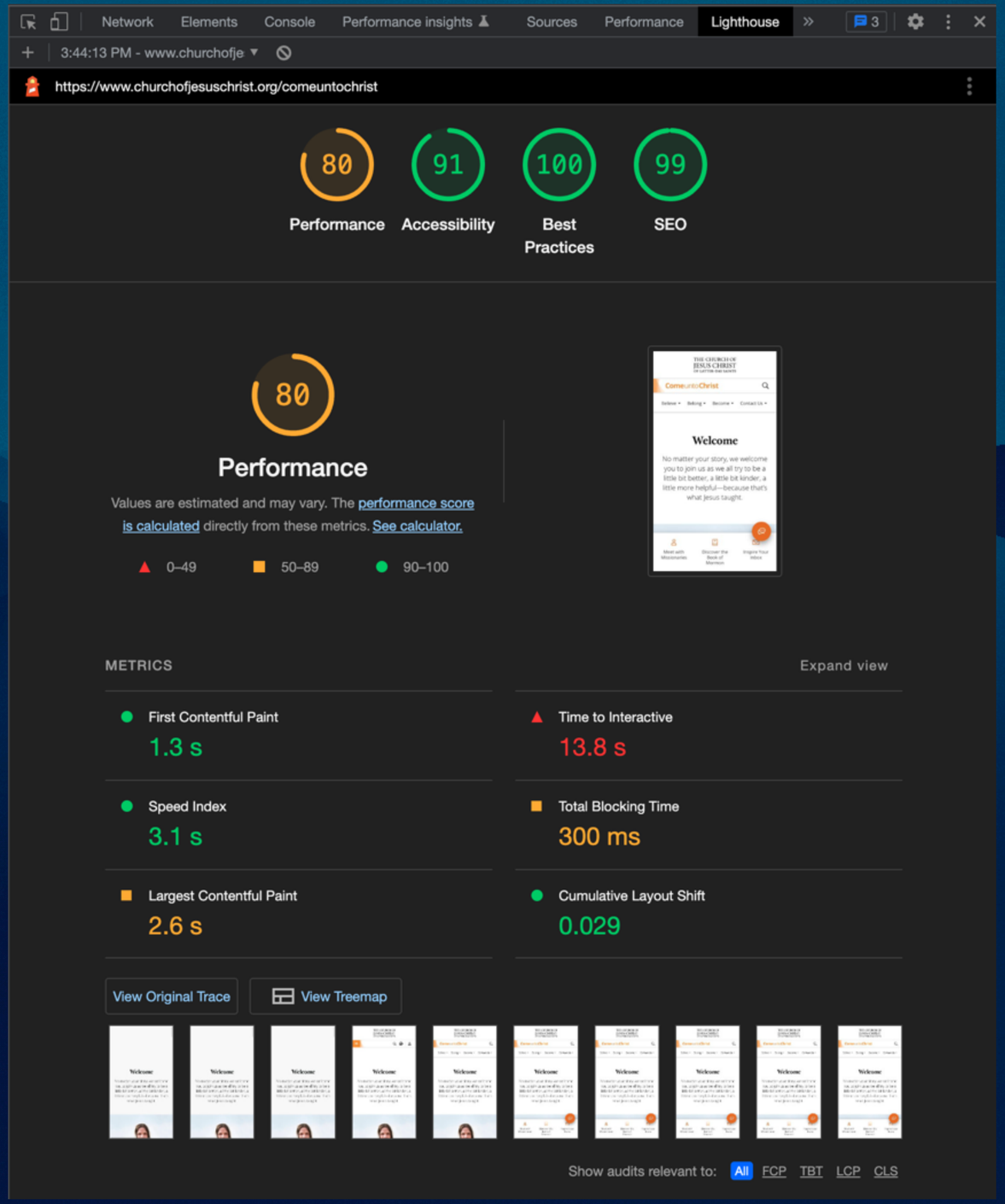
### # Speed is now used as a ranking factor for mobile searches

Users want to find answers to their questions quickly and data shows that people really care about how quickly their pages load. The Search team announced speed would be a ranking signal for desktop searches in 2010 and as of this month (July 2018), page speed will be a ranking factor for mobile searches too.

# Lighthouse

## Built in test suite



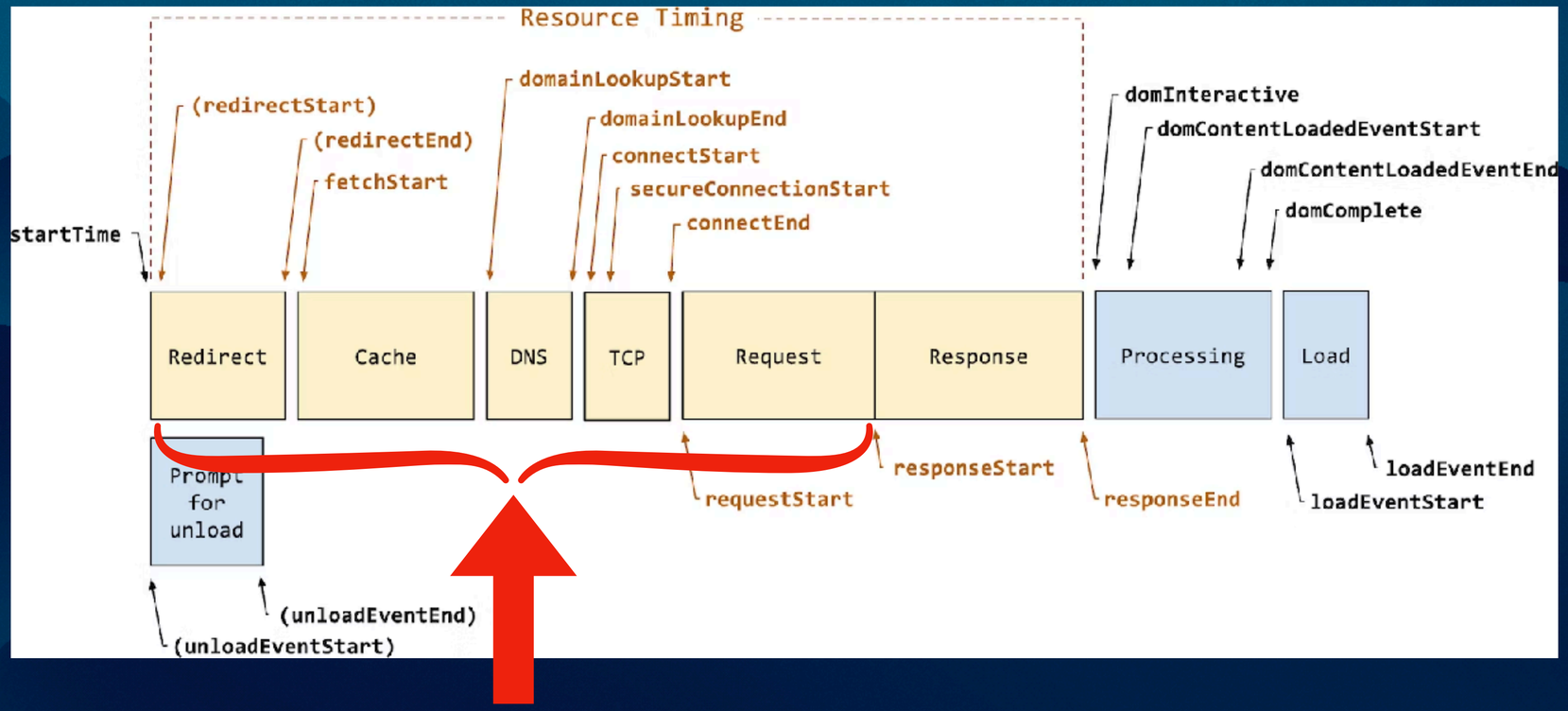



https://web.dev/measure/

# Web Vitals

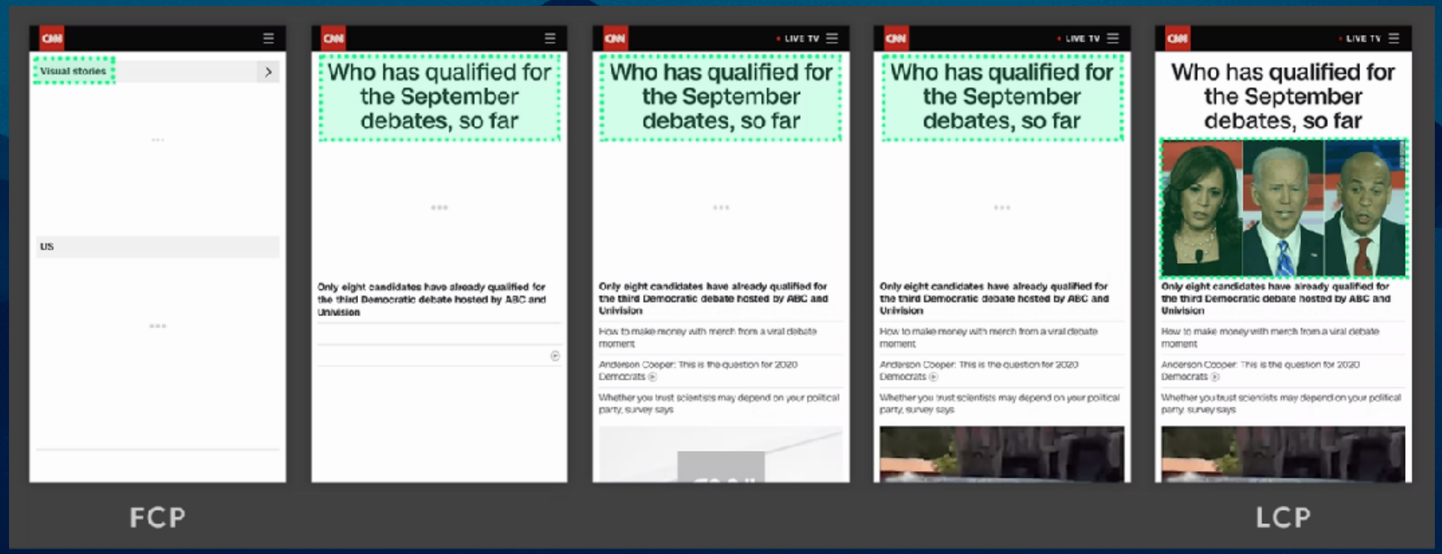
# TTFB

## Time to First Byte



# FCP

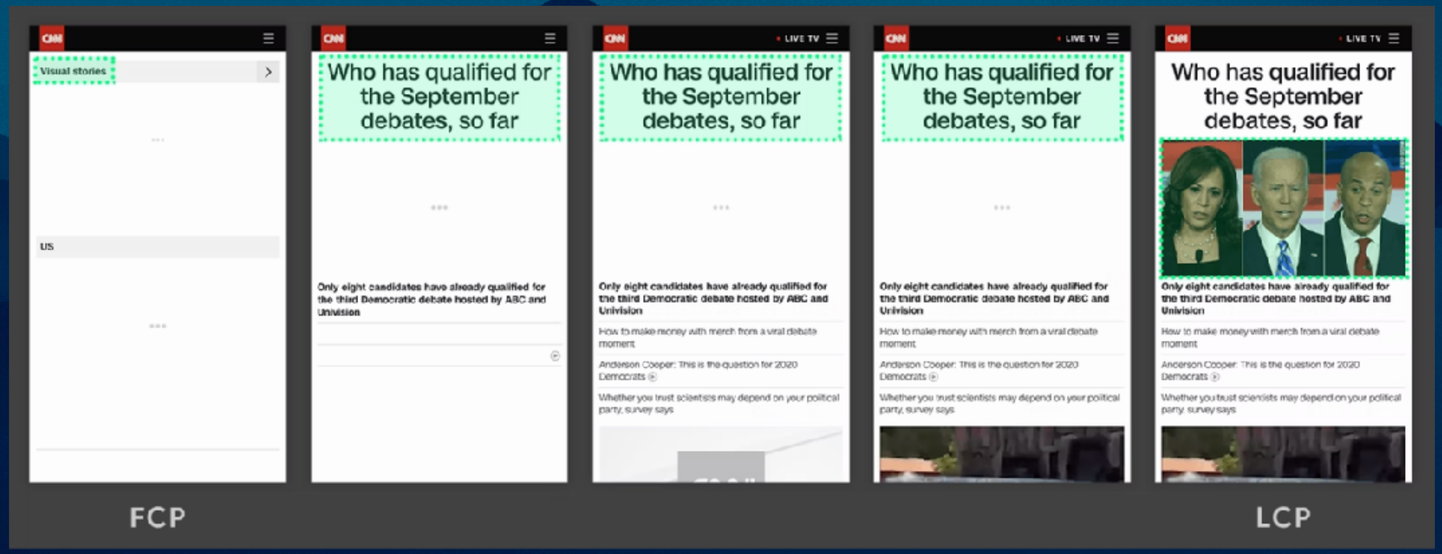
## First Contentful Paint
## AKA - Start Render




https://web.dev/fcp/

# LCP

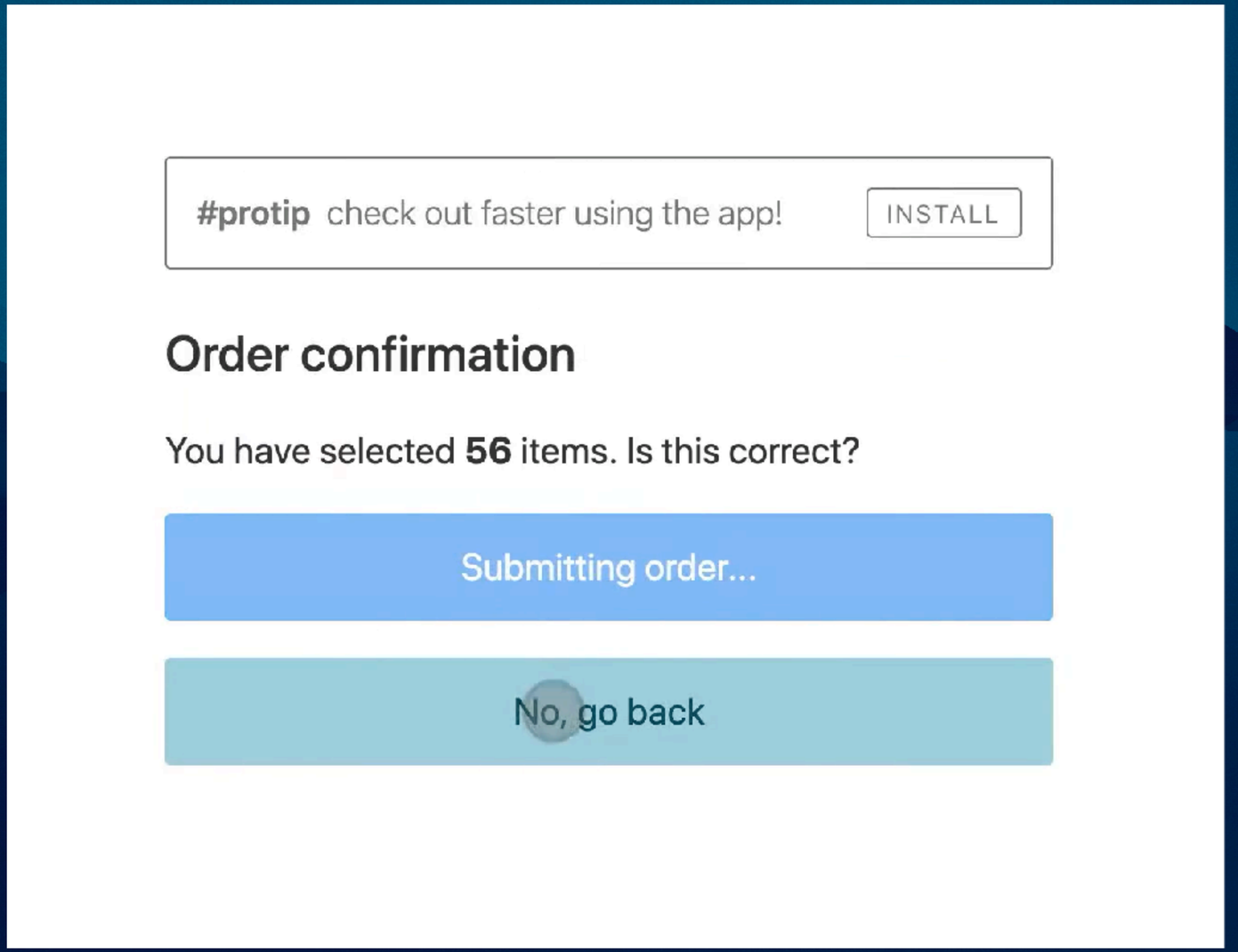
## Largest Contentful Paint




https://web.dev/lcp/

# CLS

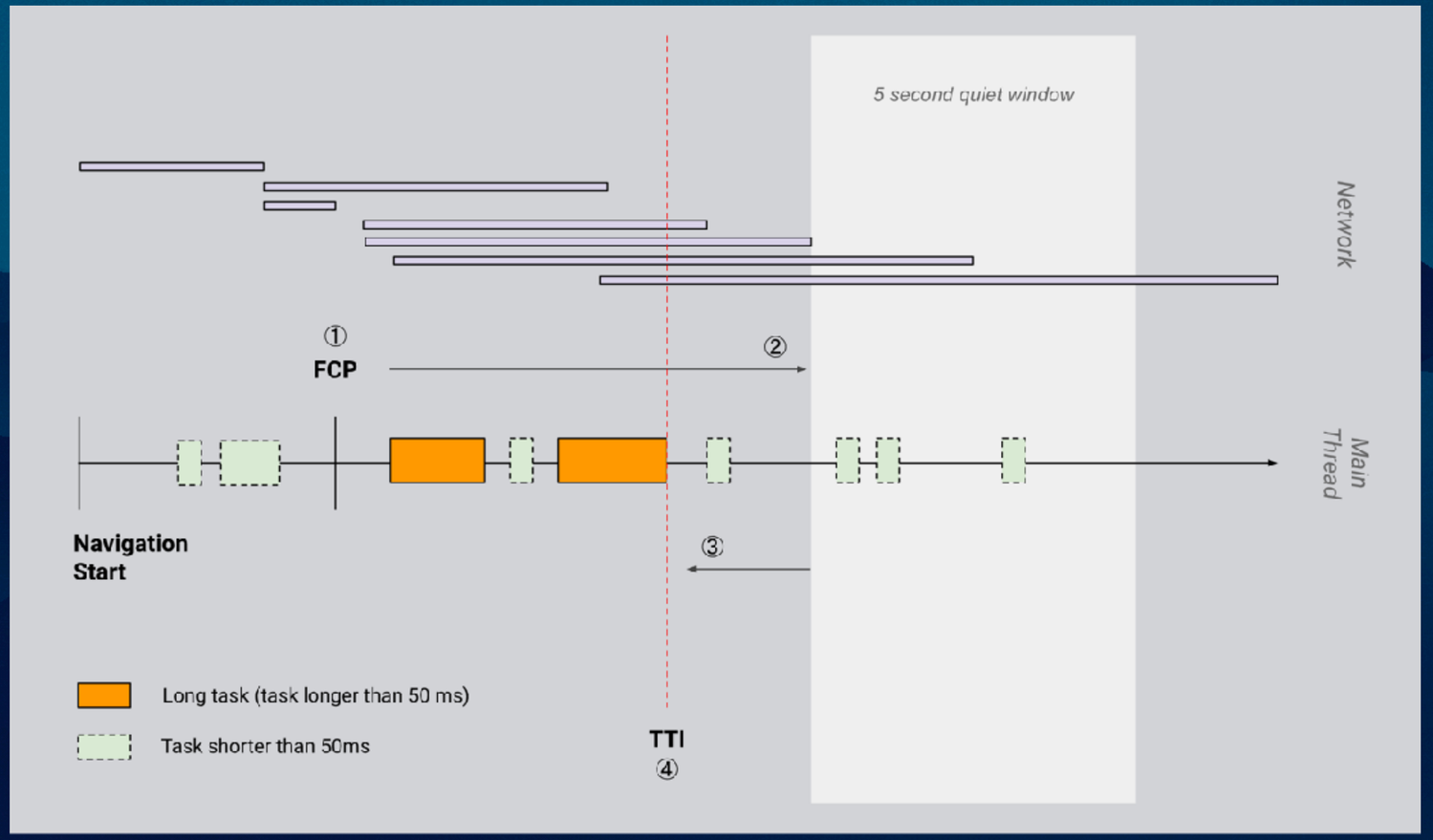
## Cumulative Layout Shift




https://web.dev/cls/

# TTI

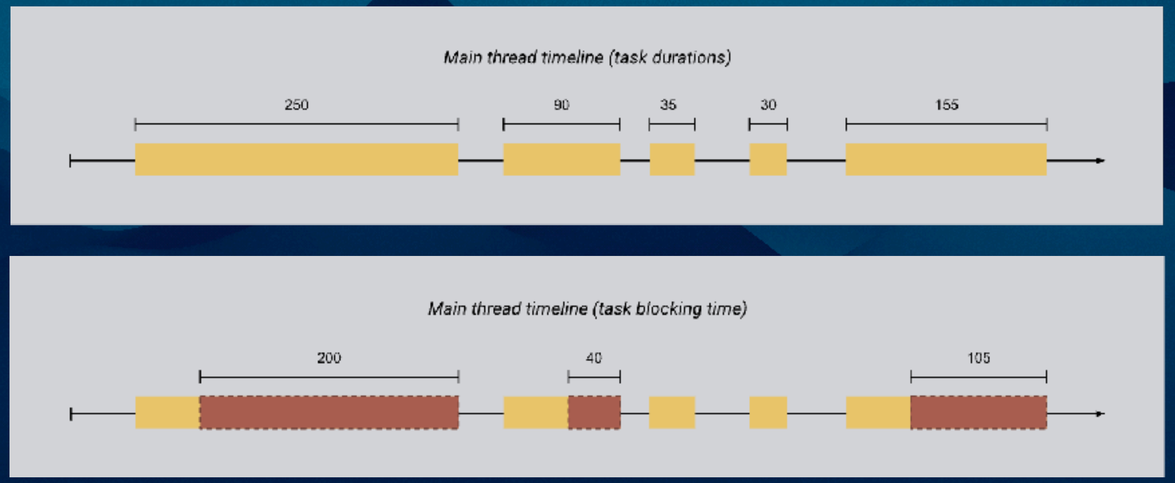
## Time to Interactive




https://web.dev/tti/

# TBT

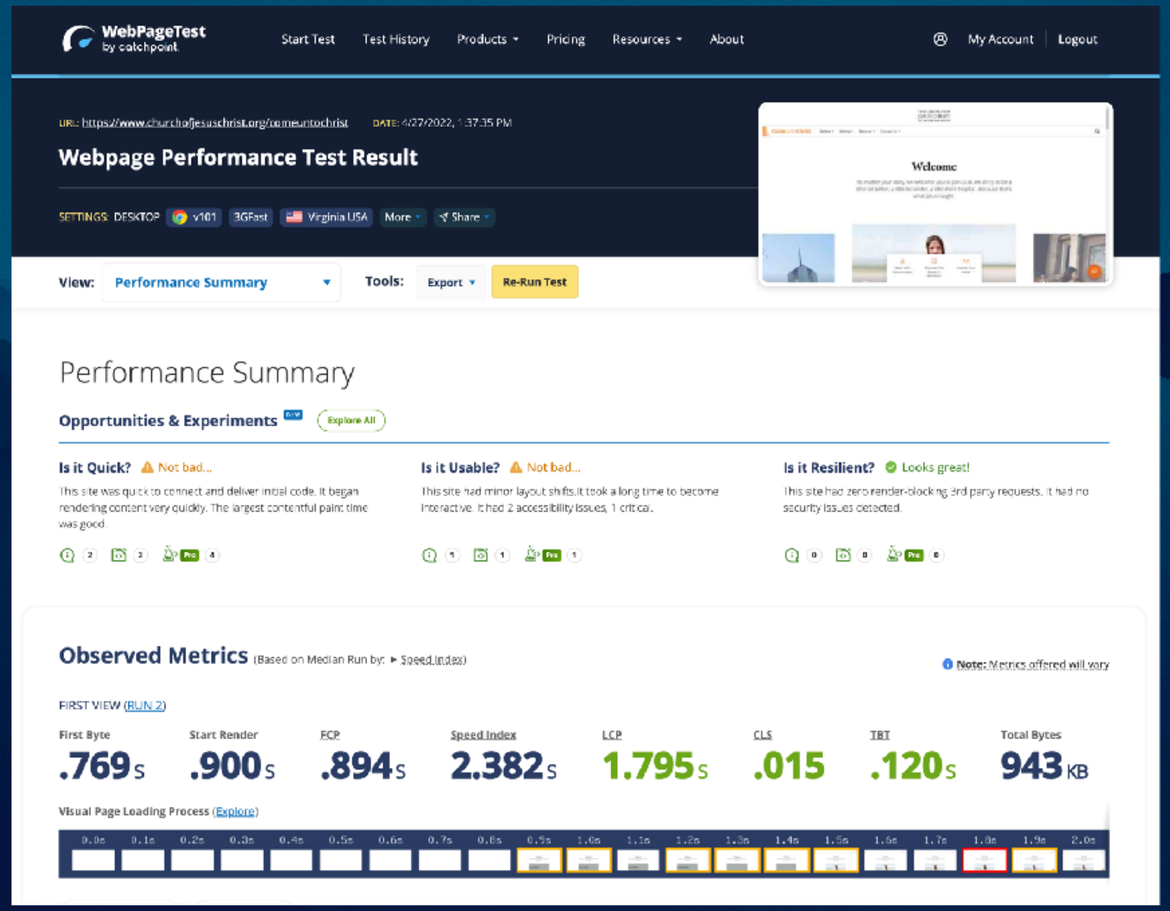
## Total Blocking Time




https://web.dev/tbt/

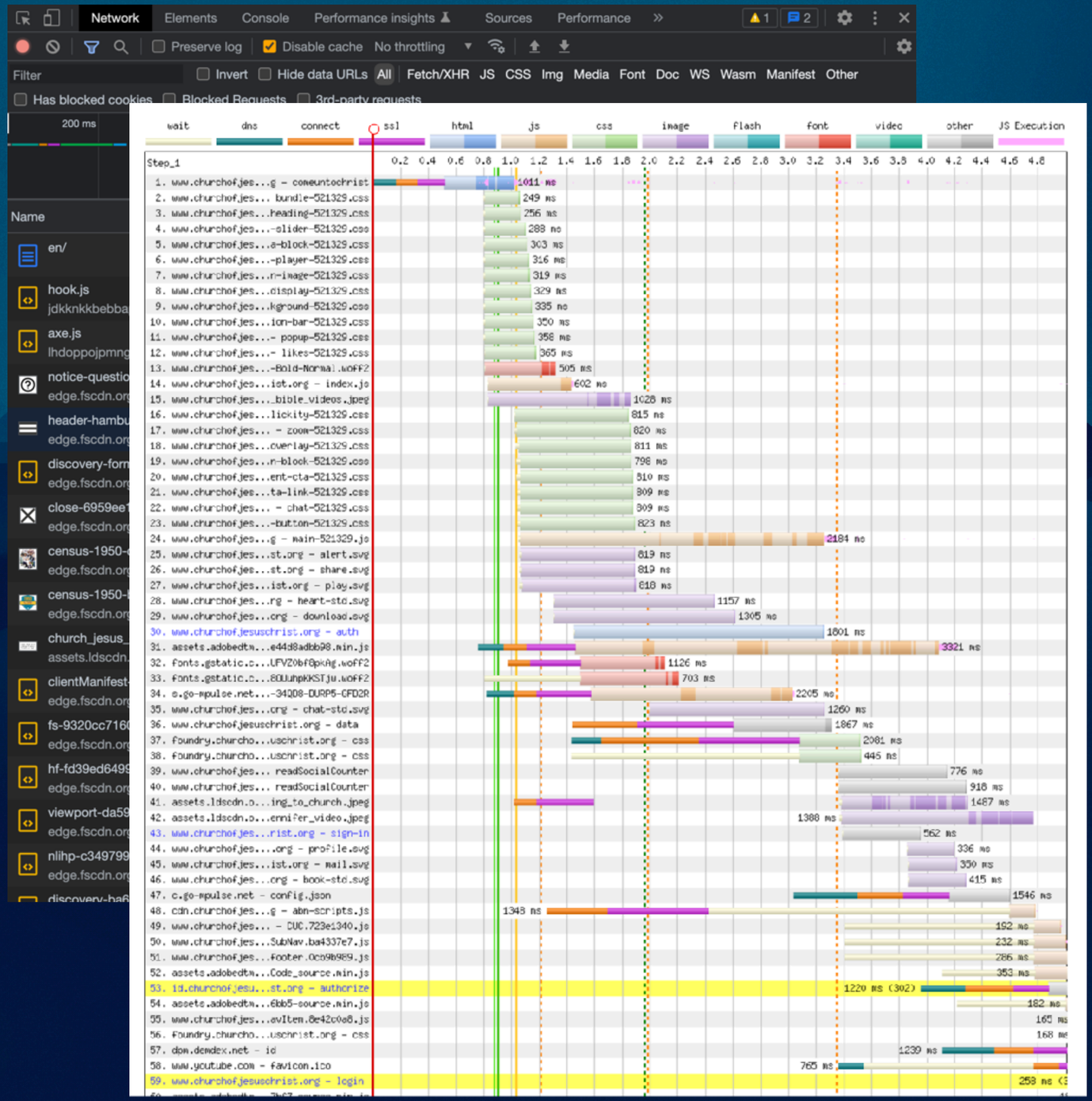
# WebPageTest.org

## For public sites



# Waterfall chart

## What loads when, how long did it take, etc



# History/Test Caveats

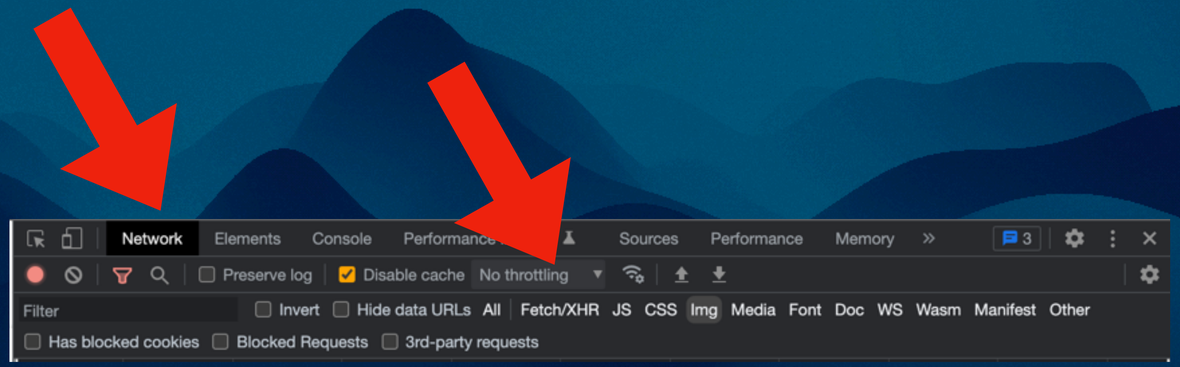
- 3 year old screenshots and they are small. But you'll get the idea of what is visible to the user
- I didn't take good notes at the start
- Tooling got updates so functionality and look will change
- ComeUntoChrist got updates so not always apples to apples
- Direct success is difficult to measure due to advertising/marketing tie
- Better performance was seen as a win by itself without measuring other things

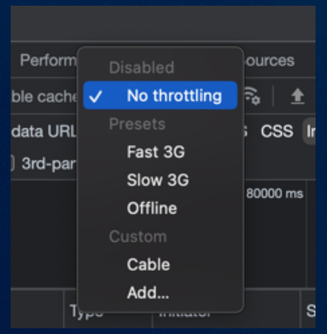
# Testing metrics

- All testing done on WebPageTest.org using the same settings
- Using Fast 3g connection
- Virgina
- Chrome on Desktop (more complex display than mobile)

# Network Throttling

## Fake slow connections

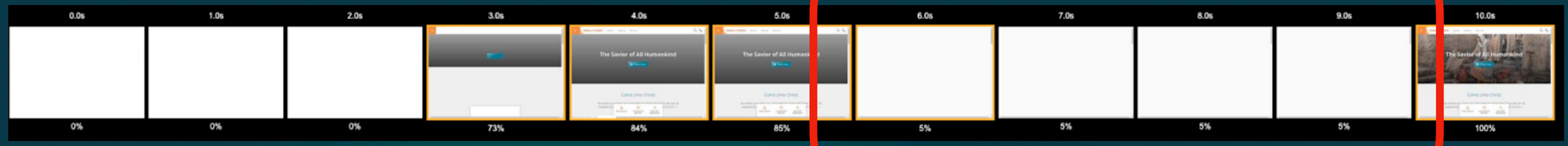


# July 2019

## Renders in 3, 4 or 10 seconds… depending on how you look at it

Something shows




Text shows

Page “complete”

# AB Testing

launch-fe44d8ad…n.js:formatted ×

```
21449             settings: {
21450                 source: '/*\n *Name: Adobe Target CS Integration\n *Version: 1.0\n */\nfun
21451                 language: "javascript"
21452             },
21453             timeout: 2e3,
21454             delayNext: !0
21455         }, {
21456             modulePath: "adobe-target-v2/lib/firePageLoad.js",
21457             settings: {
21458                 bodyHiddenStyle: "body {opacity: 0}",
21459                 bodyHidingEnabled: !0
21460             },
21461             timeout: 2e3,
21462             delayNext: !0
21463         }]
21464     }, {
21465         id: "RL496e89ff1cb14f799797a97a2f959b10",
21466         name: "Z - 3rd | CUC - Site/URL specific Facebook Pixel - Africa South Autonomous |
```

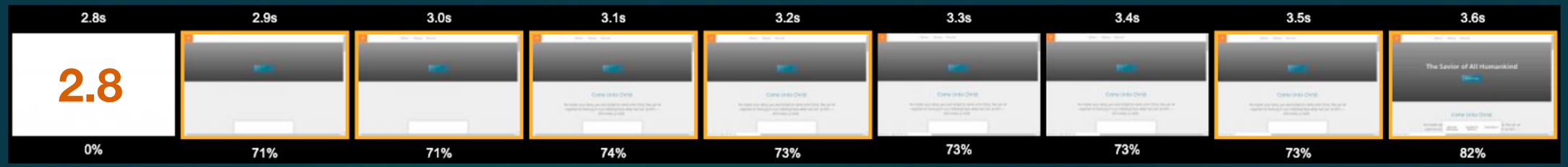
```css
body[class][class] {
  /* trump the test and target flicker/blink/blanking of the page... grrr */
  opacity: 1 !important;
}
```

LCP

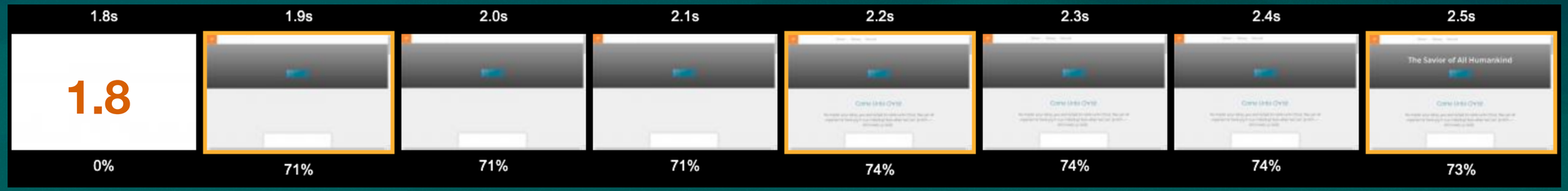
# August 2019

## Changed some JS to non-blocking, preconnect, remove unused fonts/components

Something shows




Text shows



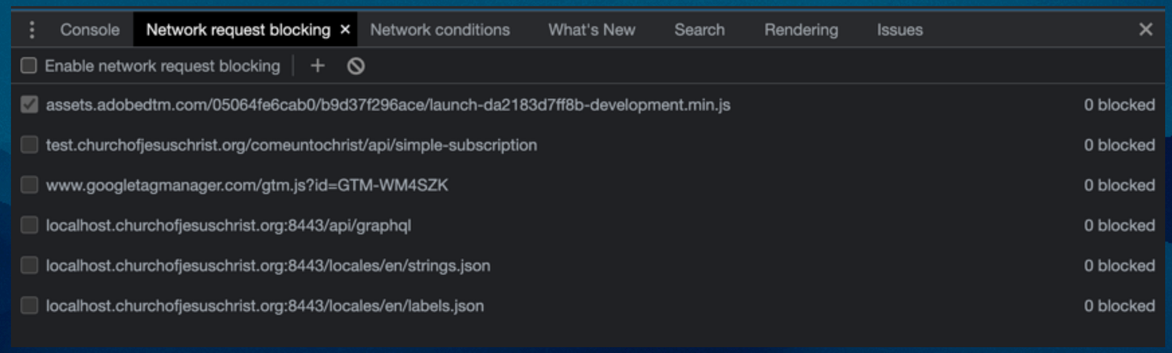
# Network Request Blocking

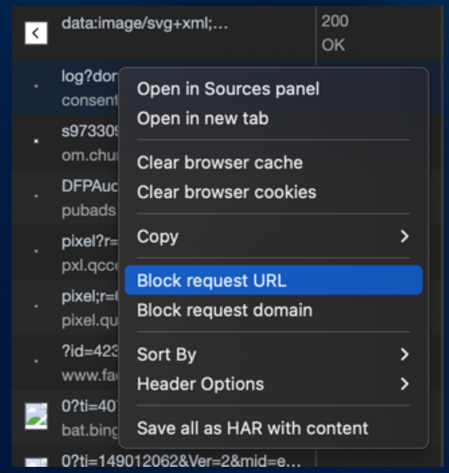
Open dev tools

Hit esc to toggle bottom drawer

Or

Right click a resource

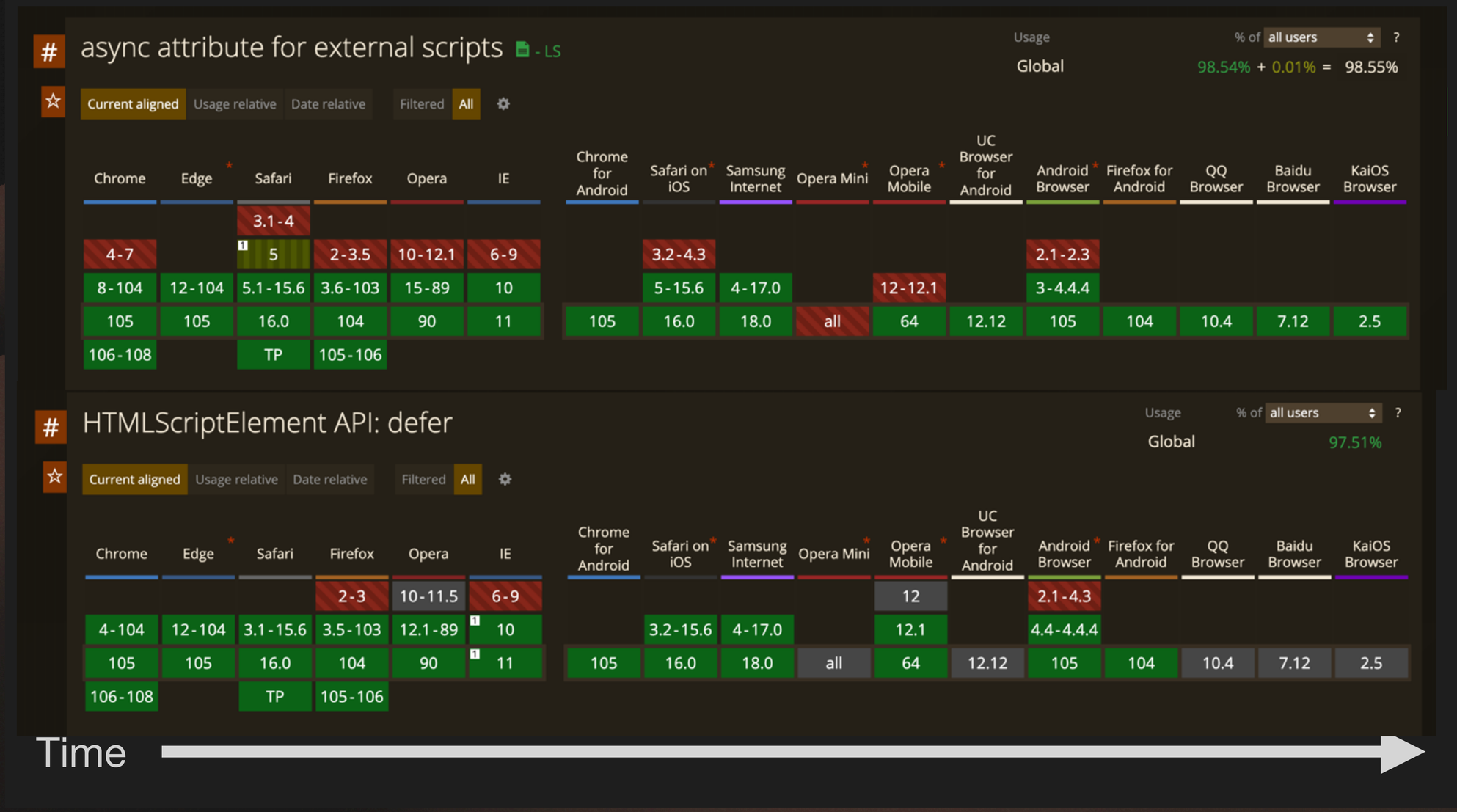


# Render Blocking


- A <script> tag that:
  - Is in the <head> of the document.
  - Does not have a defer attribute.
  - Does not have an async attribute.
- A <link rel="stylesheet"> tag that:
  - Does not have a disabled attribute. When this attribute is present, the browser does not download the stylesheet.
  - Does not have a media attribute that matches the user's device specifically. media="all" is considered render-blocking.

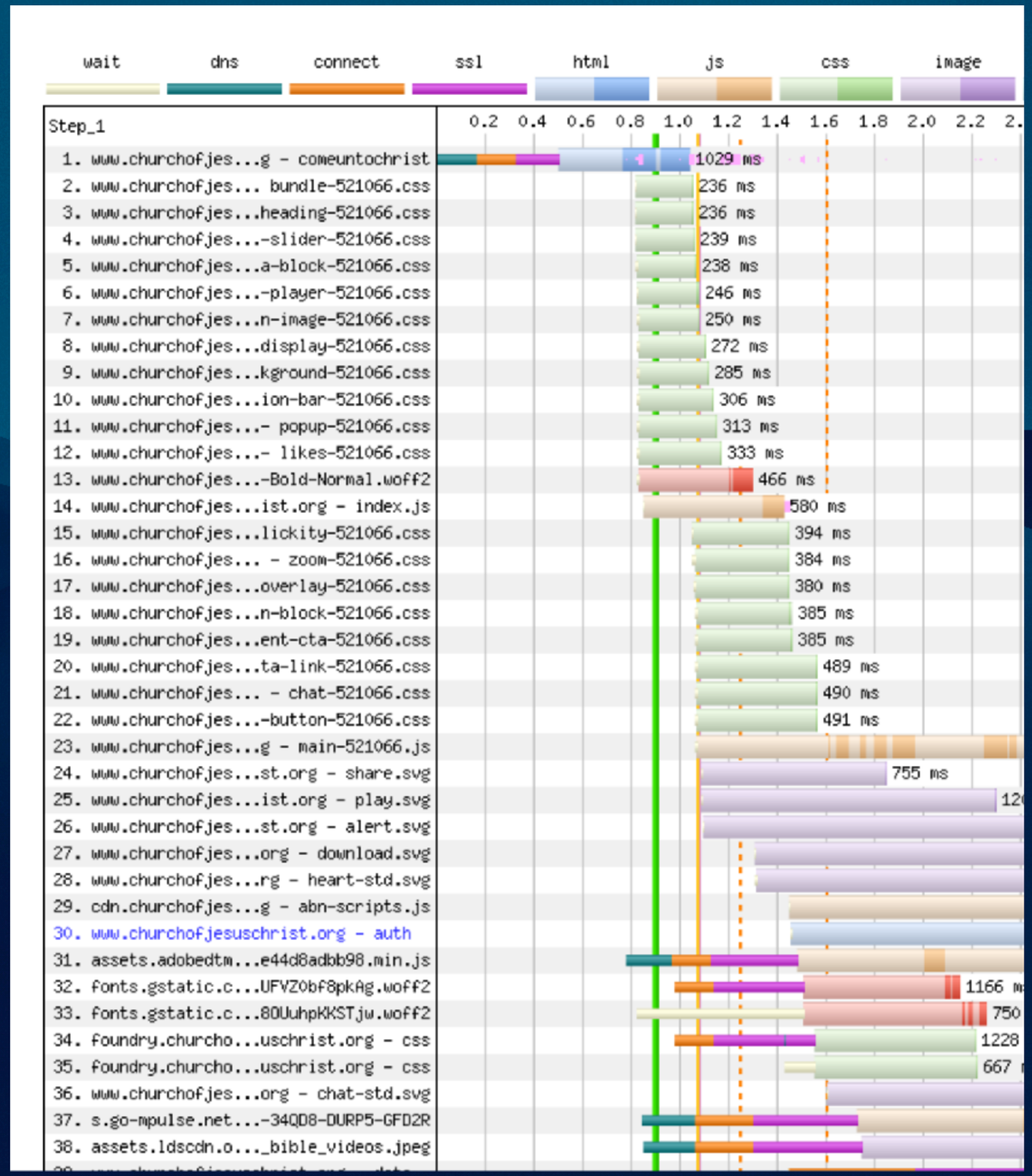
# async and defer




Time

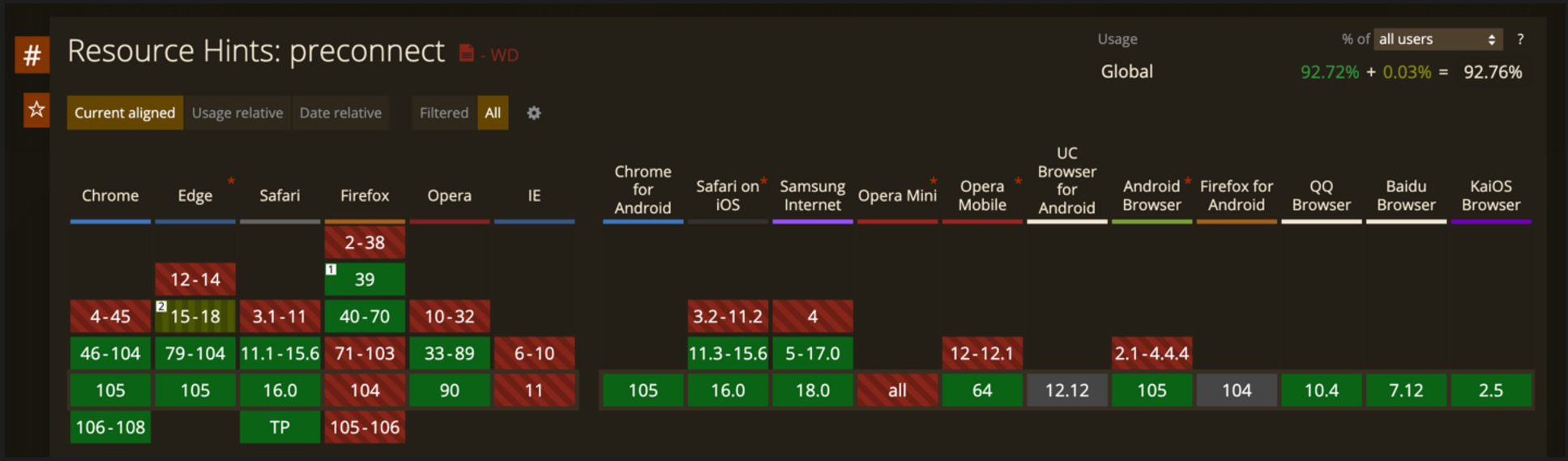
# Preconnect

## Make origin connections in advance



# Preconnect

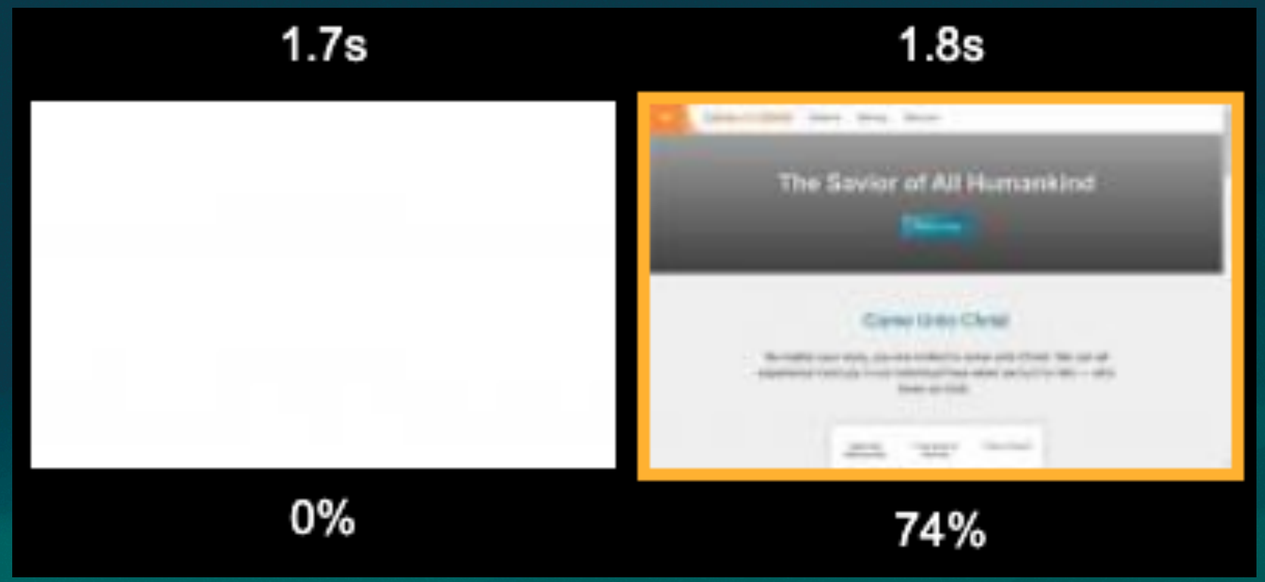
```
<link rel="preconnect" href="https://example.com">
```




https://developer.mozilla.org/en-US/docs/Web/HTML/Link_types/preconnect

# October 2019

## Mostly rendered in 1.8s

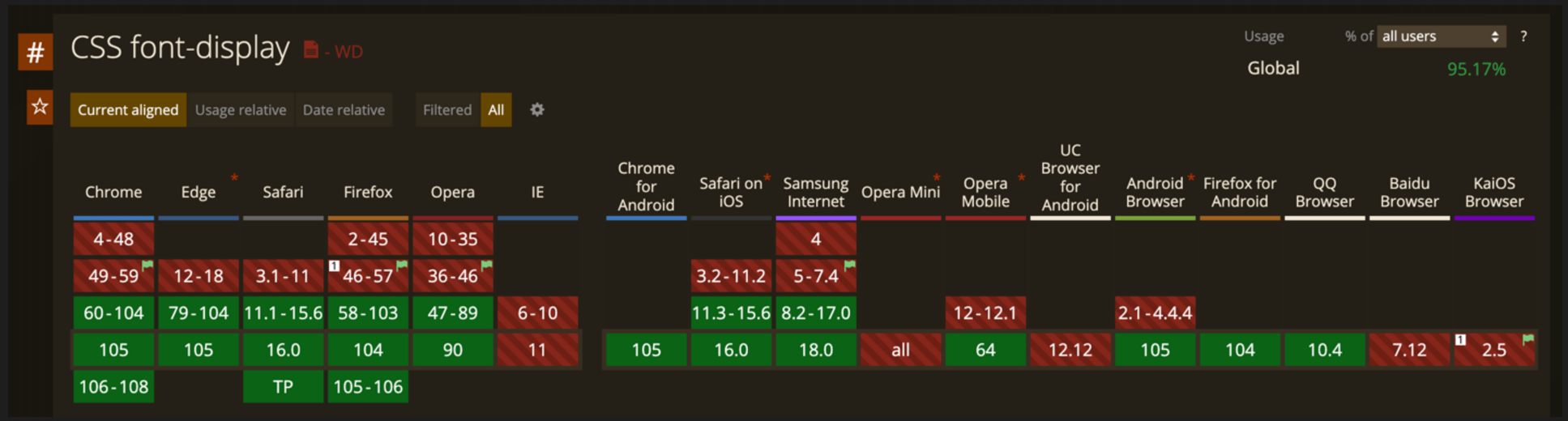



- CSS from 87k > 65k
- JS from 173K > 100K
- JS parsing time from 2.4s to 1.3s
- Homepage hero start load from 4.6s 3.8s
- Changed to use font-display:swap

FCP TBT LCP

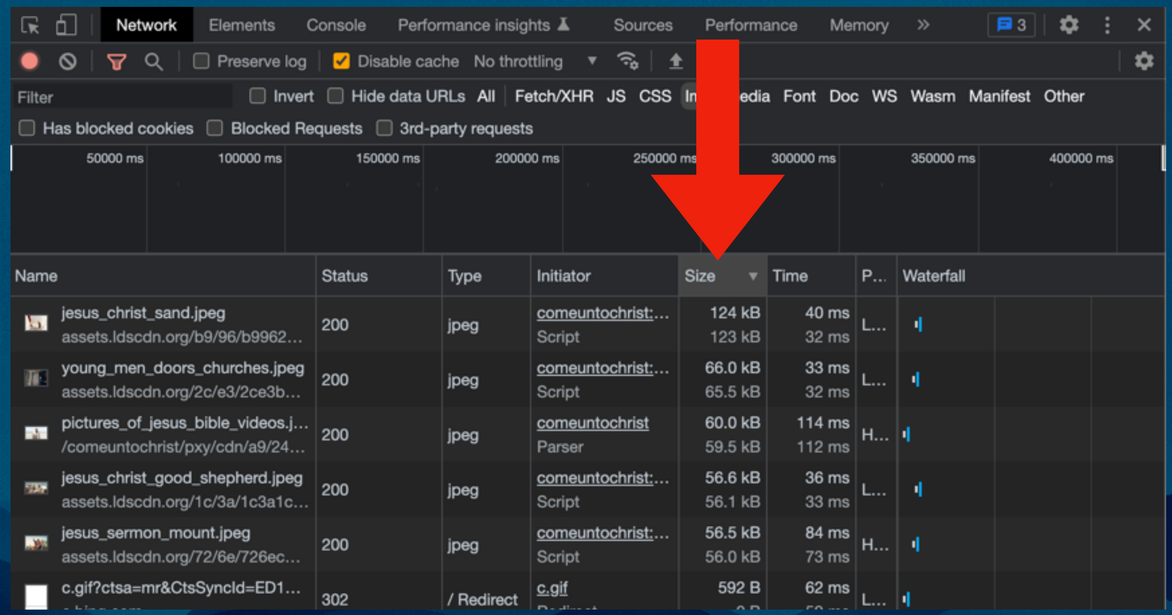
# font-display

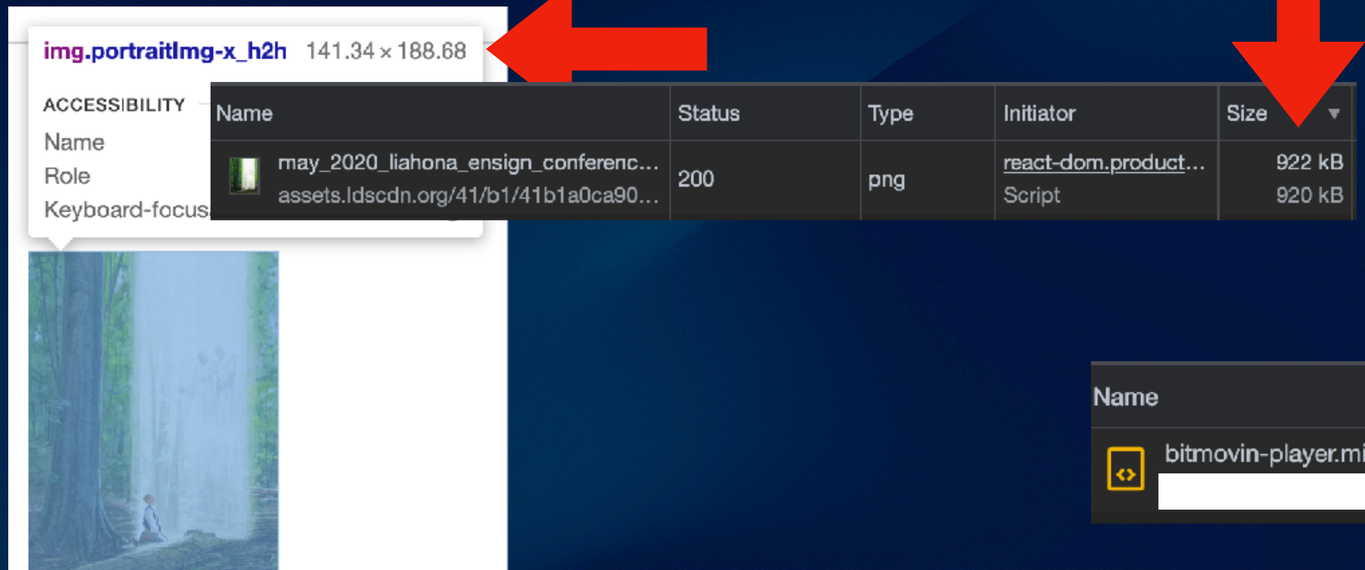
```
font-display: auto; /* Browser chooses */

/* No text for 3 seconds, then uses fallback, changes to font when loaded */
font-display: block;

/* Immediately use fallback font, uses font when loaded */
font-display: swap;

/* Immediately use fallback font, uses font when loaded ONLY if within 3 seconds */
font-display: fallback;

/* Immediately uses fallback font, font will NOT be used when loaded */
font-display: optional;
```

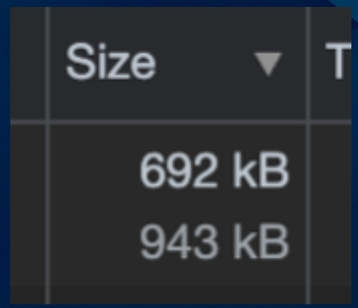


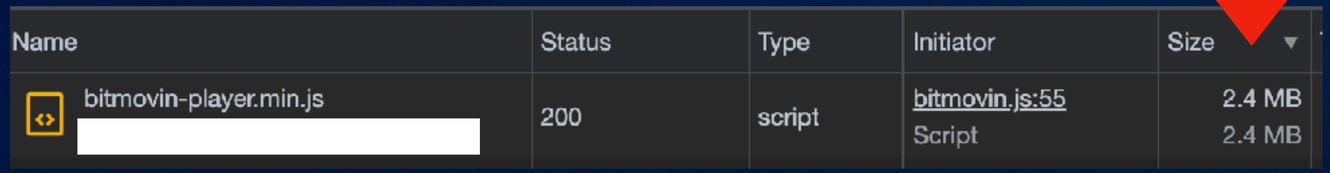
# Network tab sorted by file size

## Find large files



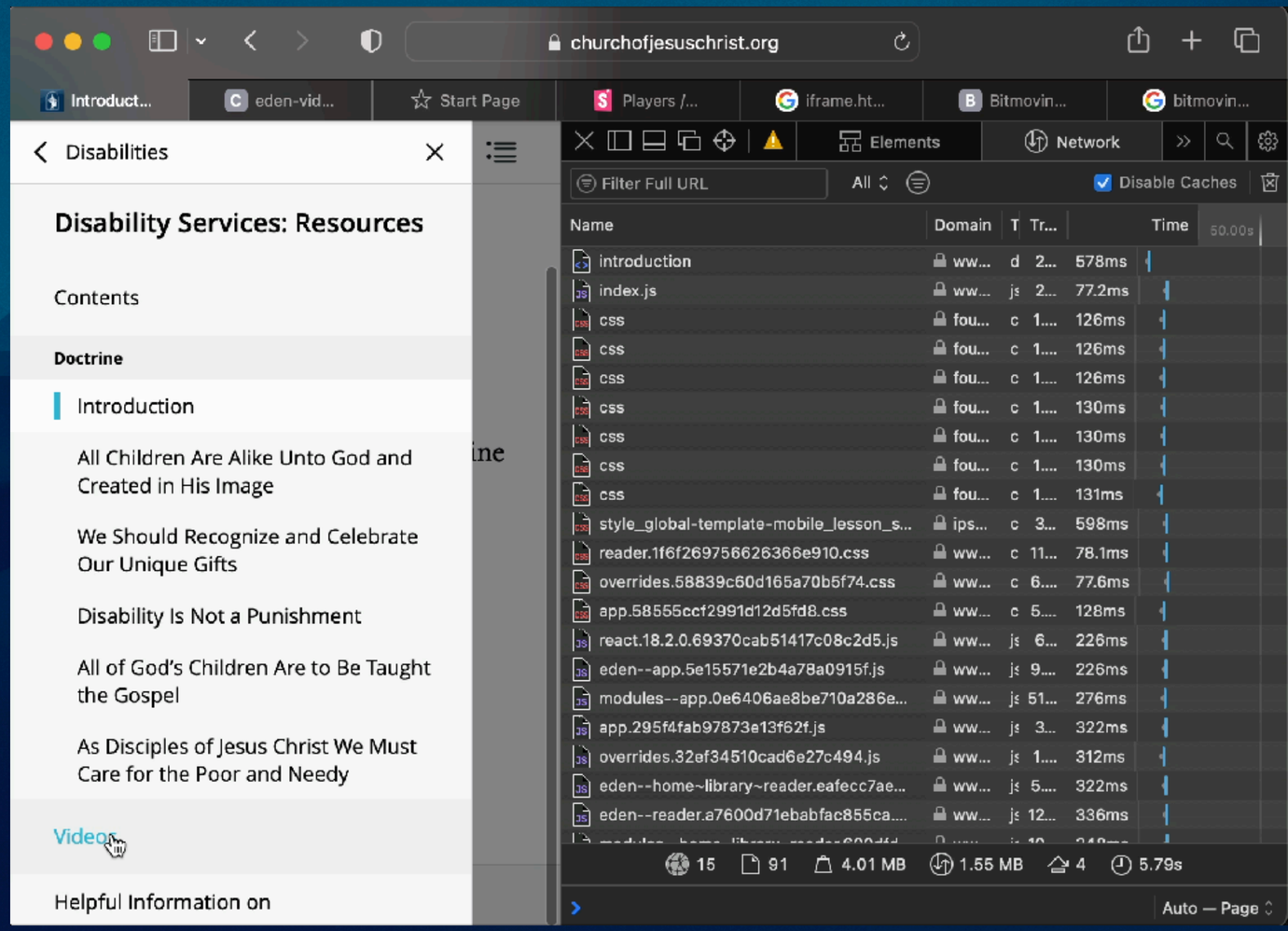



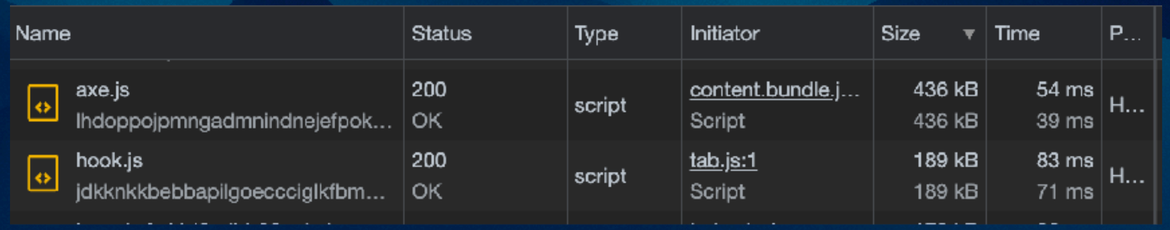
# Network tab sorted by file size

## Find large files



# Use incognito when you are serious

## Browser extensions can load extra files

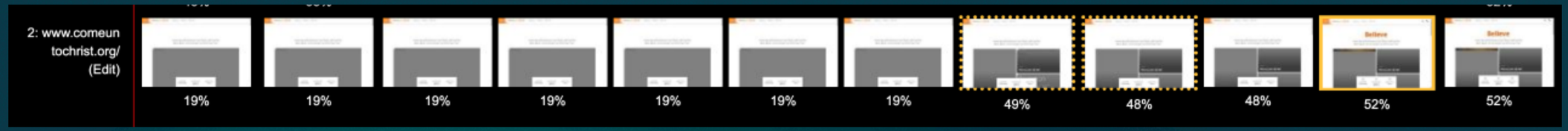


# July 2020

## Critical JS

Image Loading

Before




After

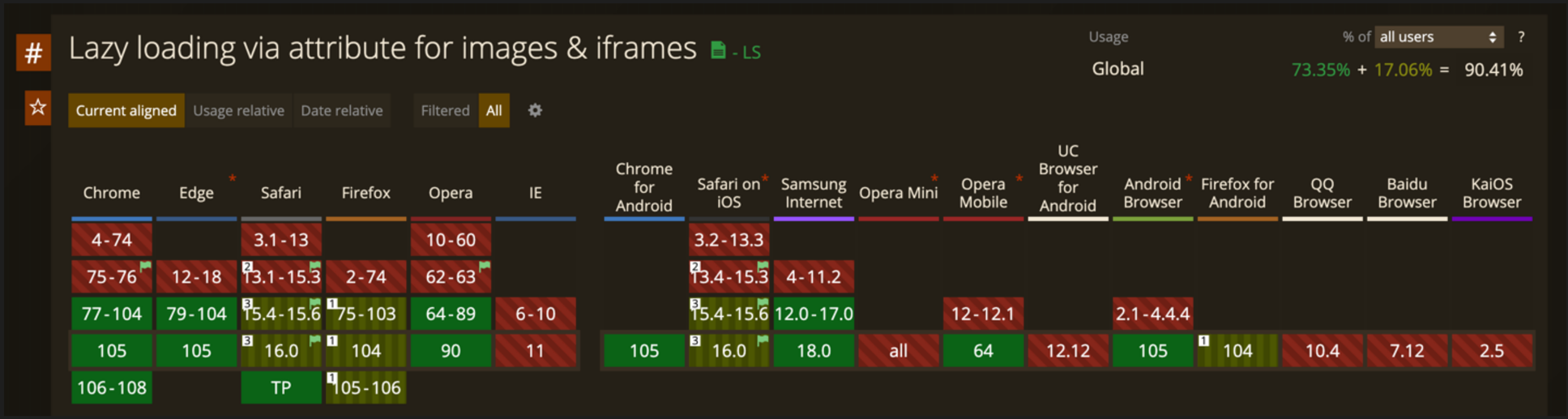

Image Loading

First render is still 1.8s

# Critical JS

# Native lazy loading

```
<img src="image.jpg" alt="..." loading="lazy">

<iframe src="video-player.html" title="..." loading="lazy"></iframe>
```

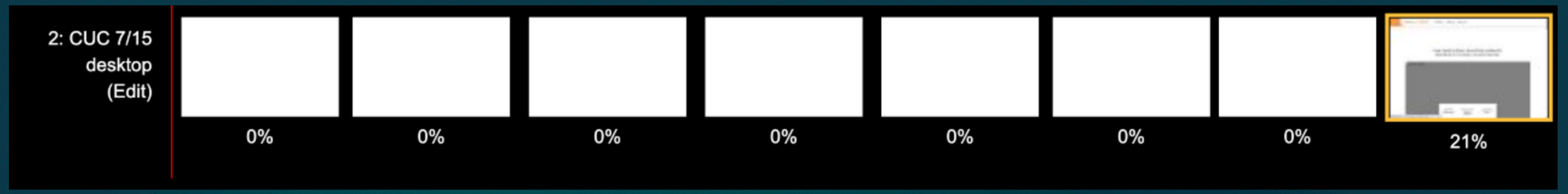


# Oct 2020

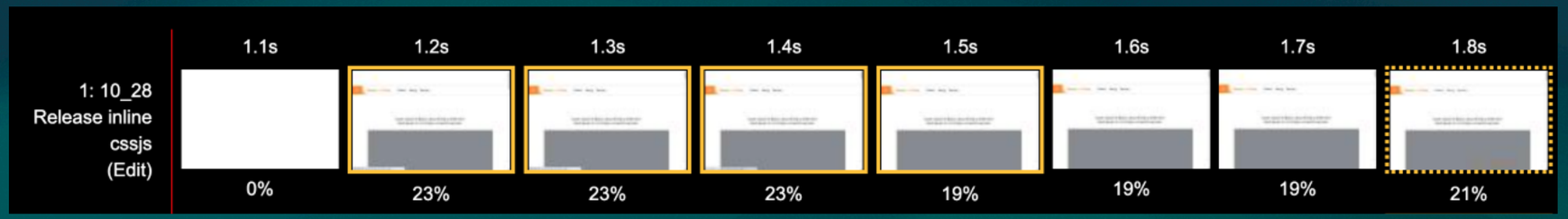
## Critical CSS

FCP

Before




After




FCP

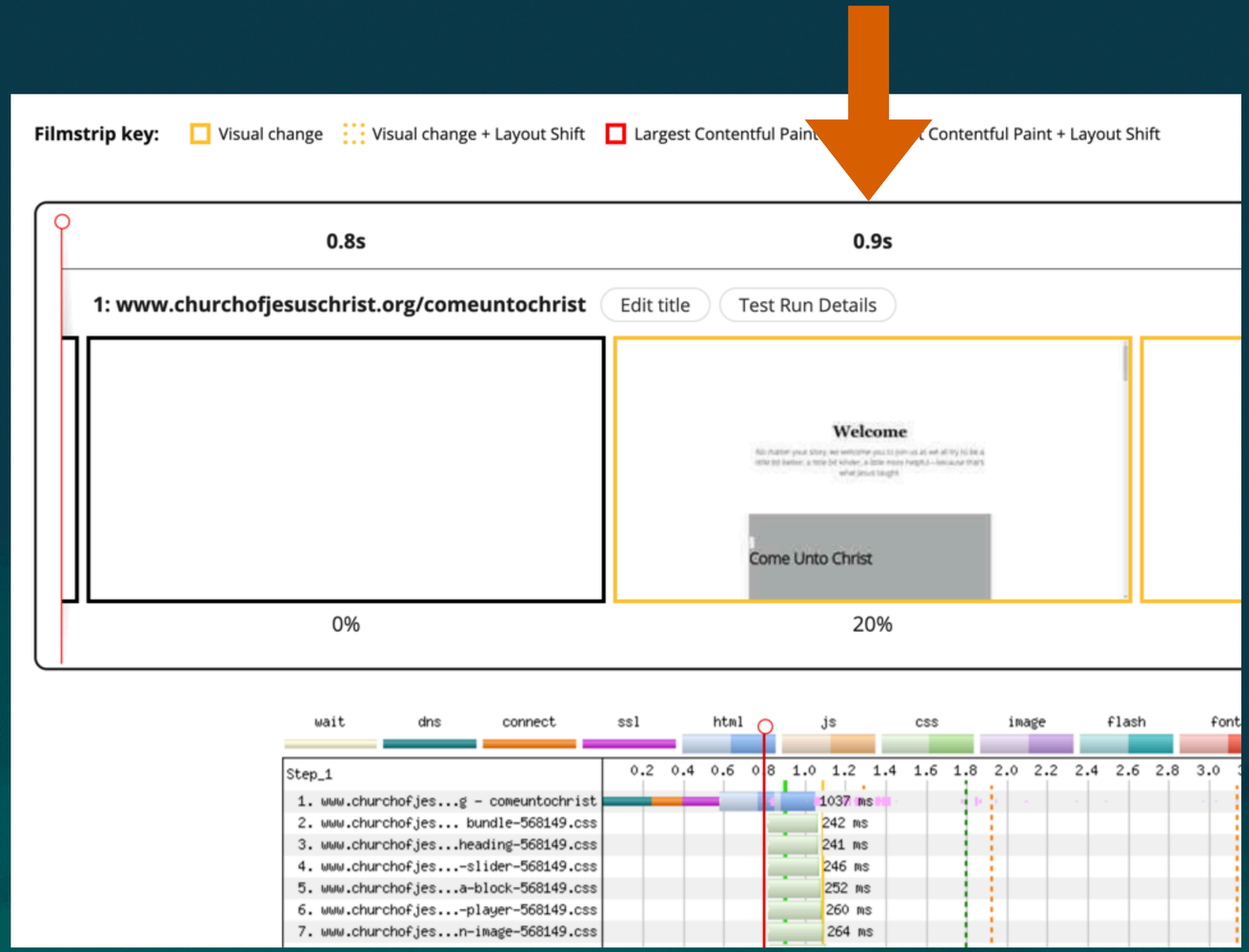
# Critical CSS

# June 2021

## CSS/JS Parts

Critical CSS ++

Critical JS ++

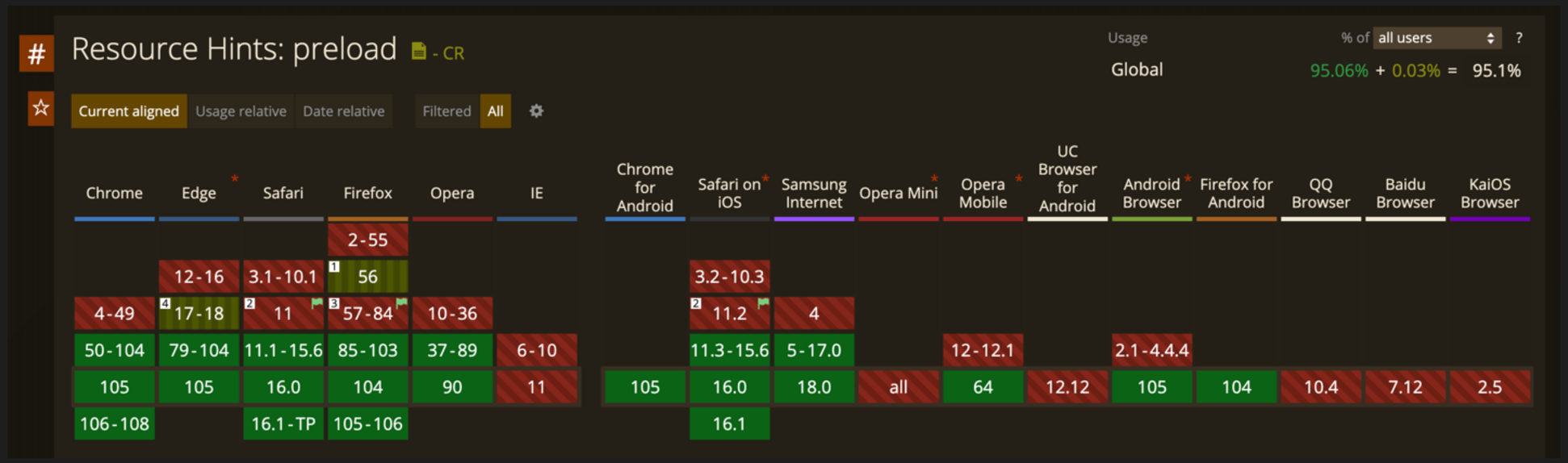


# CSS/JS Parts

1. Change bundler to output a CSS/JS file per component instead of combined
2. Update logic to determine first 10 components on page, load related files
3. Inline Critical CSS/JS (inline doesn’t render block)
4. Lazy load other CSS/JS files as the user scrolls down the page

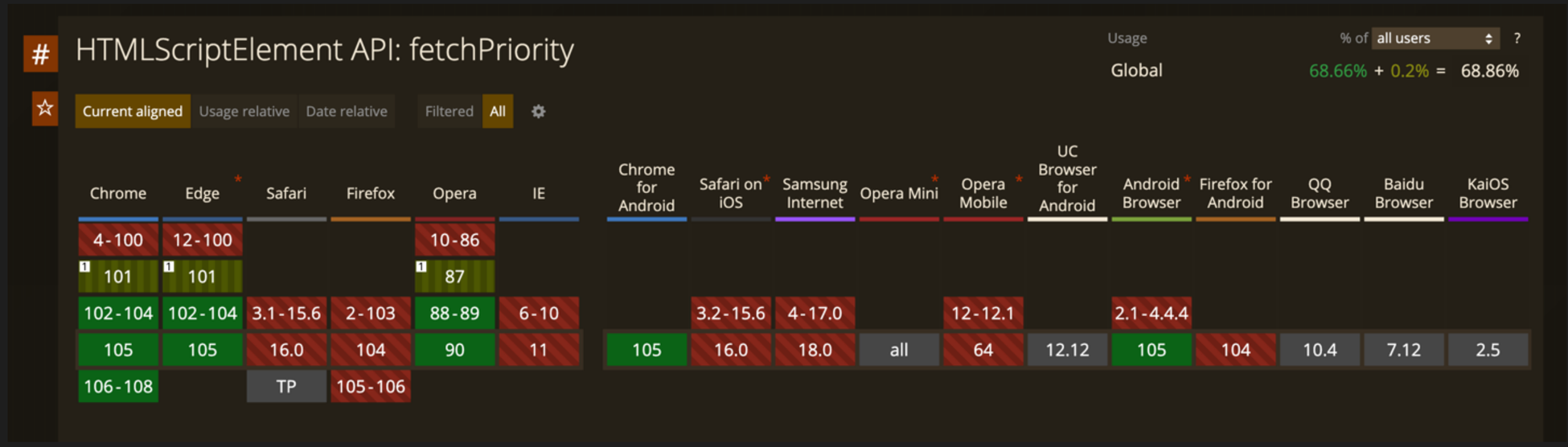
# Preload

```
<link rel="preload" href="styles.css" as="style"
 onload="this.onload=null;this.rel='stylesheet'">

// Fallback for JS not working
<noscript><link rel="stylesheet" href="styles.css"></noscript>
```



# Priority Hints

```
<ul class="carousel">
  <img src="img/carousel-1.jpg" fetchpriority="high">
  <img src="img/carousel-2.jpg" fetchpriority="low">
  <img src="img/carousel-3.jpg" fetchpriority="low">
</ul>

<!-- Lower priority only for non-critical preloaded scripts -->
<link rel="preload" as="script" href="critical-script.js">
<link rel="preload" as="script" href="/js/script.js" fetchpriority="low">
```

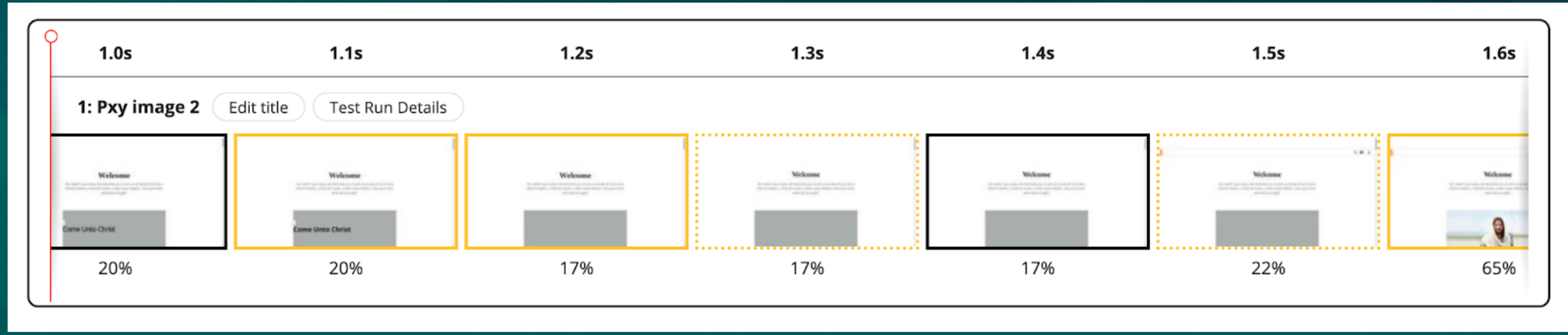


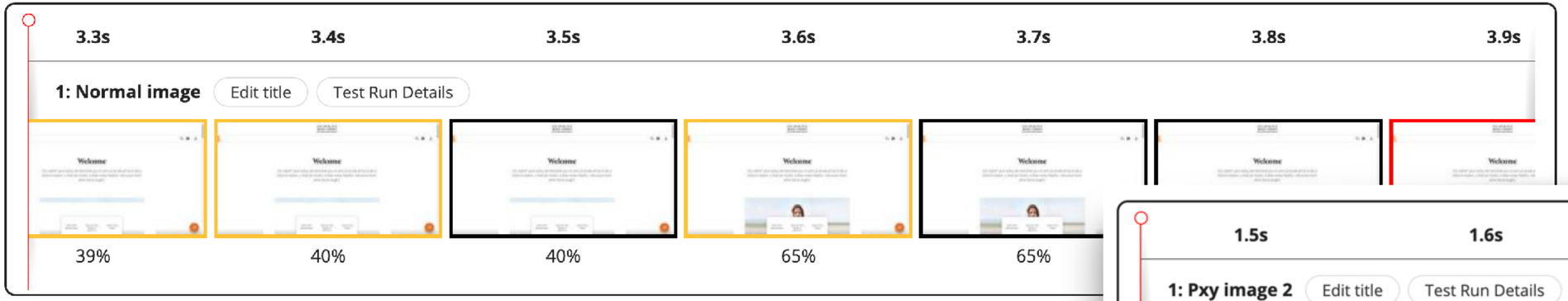
# Mar 2022

## Image Proxy

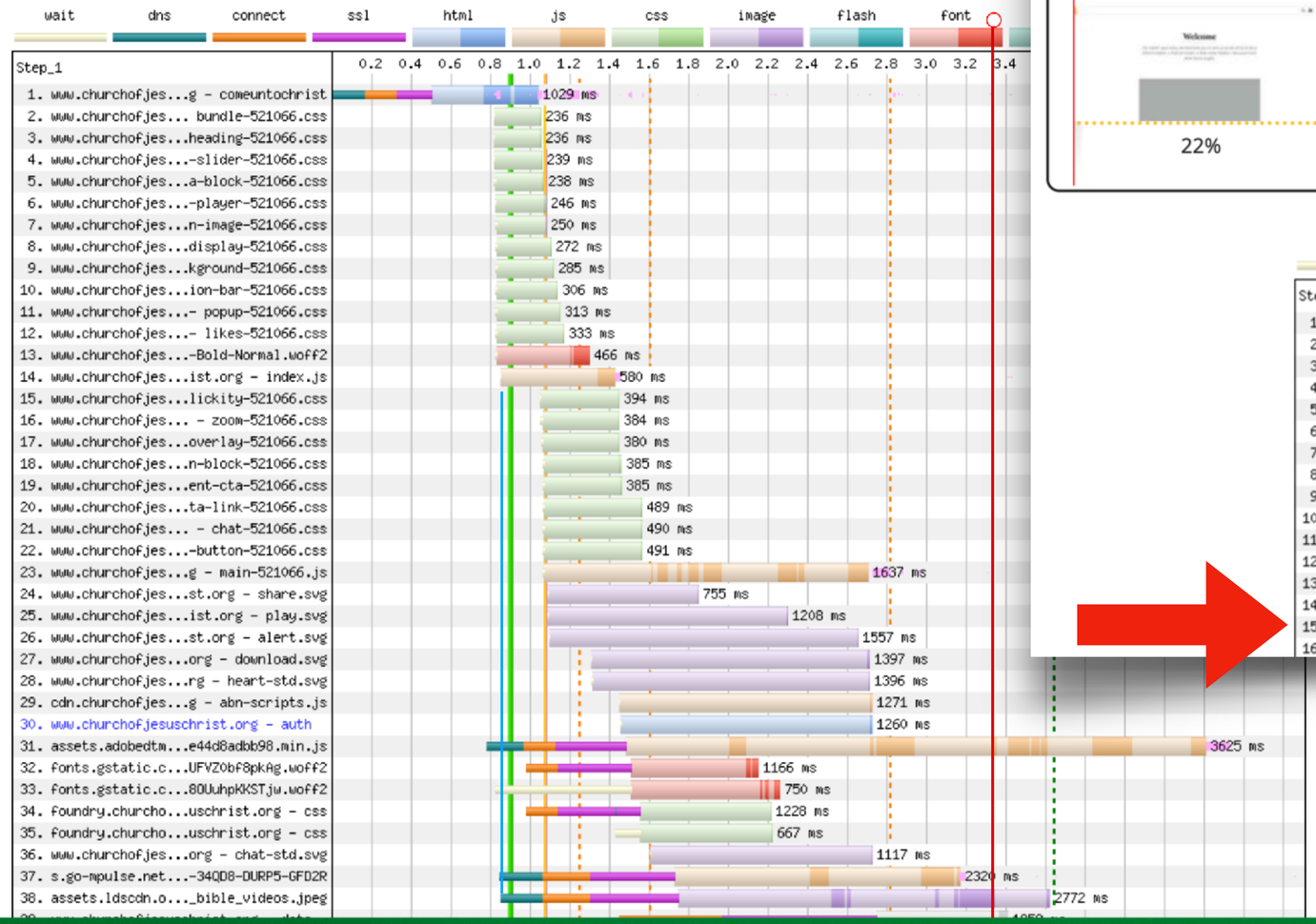
Before

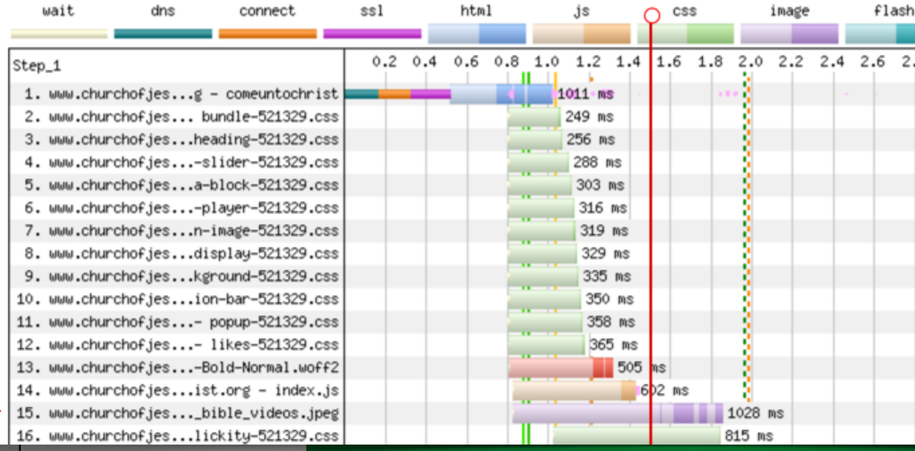

After




3.3s
3.4s
3.5s
3.6s
3.7s
3.8s
3.9s
1: Normal image
Edit title
Test Run Details
39%
40%
40%
65%
65%


1.5s
1.6s
1.7s
1.8s
1: Pxy image 2
Edit title
Test Run Details
22%
65%
65%
65%


wait
dns
connect
ssl
html
js
css
image
flash
font
Step_1
1. www.churchofjes...g - comeuntochrist 1029 ms
2. www.churchofjes... bundle-521066.css 236 ms
3. www.churchofjes...heading-521066.css 236 ms
4. www.churchofjes...-slider-521066.css 239 ms
5. www.churchofjes...a-block-521066.css 238 ms
6. www.churchofjes...-player-521066.css 246 ms
7. www.churchofjes...n-image-521066.css 250 ms
8. www.churchofjes...display-521066.css 272 ms
9. www.churchofjes...kground-521066.css 285 ms
10. www.churchofjes...ion-bar-521066.css 306 ms
11. www.churchofjes...- popup-521066.css 313 ms
12. www.churchofjes...- likes-521066.css 333 ms
13. www.churchofjes...-Bold-Normal.woff2 466 ms
14. www.churchofjes...ist.org - index.js 580 ms
15. www.churchofjes...lickity-521066.css 394 ms
16. www.churchofjes... - zoom-521066.css 384 ms
17. www.churchofjes...overlay-521066.css 380 ms
18. www.churchofjes...n-block-521066.css 385 ms
19. www.churchofjes...ent-cta-521066.css 385 ms
20. www.churchofjes...ta-link-521066.css 489 ms
21. www.churchofjes... - chat-521066.css 490 ms
22. www.churchofjes...-button-521066.css 491 ms
23. www.churchofjes...g - main-521066.js 1637 ms
24. www.churchofjes...st.org - share.svg 755 ms
25. www.churchofjes...ist.org - play.svg 1208 ms
26. www.churchofjes...st.org - alert.svg 1557 ms
27. www.churchofjes...org - download.svg 1397 ms
28. www.churchofjes...rg - heart-std.svg 1396 ms
29. cdn.churchofjes...g - abn-scripts.js 1271 ms
30. www.churchofjesuschrist.org - auth 1260 ms
31. assets.adobedtm...e44d8adbb98.min.js 3625 ms
32. fonts.gstatic.c...UFVZ0bf8pkAg.woff2 1166 ms
33. fonts.gstatic.c...80UuhpKKSTjw.woff2 750 ms
34. foundry.churcho...uschrist.org - css 1228 ms
35. foundry.churcho...uschrist.org - css 667 ms
36. www.churchofjes...org - chat-std.svg 1117 ms
37. s.go-mpulse.net...-34QD8-DURP5-GFD2R 2320 ms
38. assets.ldscdn.o..._bible_videos.jpeg 2772 ms


wait
dns
connect
ssl
html
js
css
image
flash
Step_1
1. www.churchofjes...g - comeuntochrist 1011 ms
2. www.churchofjes... bundle-521329.css 249 ms
3. www.churchofjes...heading-521329.css 256 ms
4. www.churchofjes...-slider-521329.css 288 ms
5. www.churchofjes...a-block-521329.css 303 ms
6. www.churchofjes...-player-521329.css 316 ms
7. www.churchofjes...n-image-521329.css 319 ms
8. www.churchofjes...display-521329.css 329 ms
9. www.churchofjes...kground-521329.css 335 ms
10. www.churchofjes...ion-bar-521329.css 350 ms
11. www.churchofjes...- popup-521329.css 358 ms
12. www.churchofjes...- likes-521329.css 365 ms
13. www.churchofjes...-Bold-Normal.woff2 505 ms
14. www.churchofjes...ist.org - index.js 602 ms
15. www.churchofjes..._bible_videos.jpeg 1028 ms
16. www.churchofjes...lickity-521329.css 815 ms

# Live WPT.org review if time and bandwidth allow…

# Questions?

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