

Matt Hobbs

Head of Frontend, Lead Developer
Government Digital Service

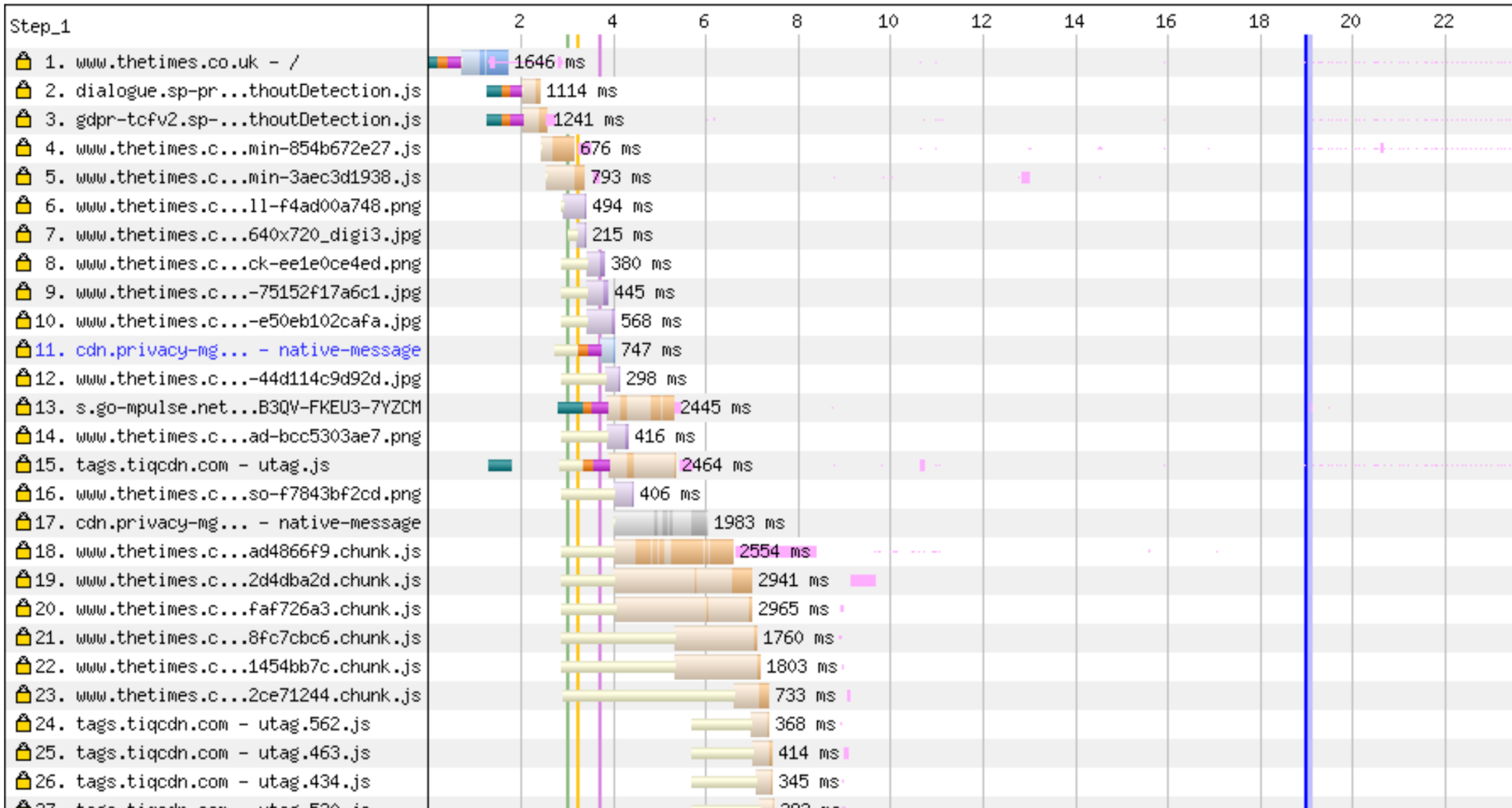
@TheRealNooshu



WEBPAGETEST

by Catchpoint[®]

How to Read a WebPageTest waterfall chart



**Assumed
knowledge**

Test a website's performance

[Advanced Testing](#) [Simple Testing](#) [Visual Comparison](#) [Traceroute](#)

Enter a Website URL

<https://www.webpagetest.org/>

START TEST

Browser

Chrome

Advanced Settings ▾

Test Settings

Advanced

Chromium

Auth

Script

Block

SPOF

Custom

Connection

Cable (5/1 Mbps 28ms RTT)

Number of Tests to Run

9

Up to 9

Repeat View

First View and Repeat View First View Only

Test a website's performance

Begin your journey here

- Advanced Testing
- Simple Testing
- Visual Comparison
- Traceroute

START TEST

Provided by

Test Location

Dulles, VA USA (Desktop, Android, iOS)

Select from Map

Browser

Chrome

Advanced Settings ▼

Test Settings

Advanced

Chromium

Auth

Script

Block

SPOF

Custom

Connection

Cable (5/1 Mbps 28ms RTT)

Number of Tests to Run

9

Up to 9

Repeat View

First View and Repeat View First View Only

{ KNEELING
ON THE
SHOULDERS
OF GIANTS }

<https://t.ly/Ys4v>

How to run a WebPageTest test

Published: Dec 31, 2020 Tagged: [webperf](#), [ramblings](#), [webpagetest](#). Read time: 64 mins

Table of contents

- [Simple testing tab](#)

**What is
WebPageTest?**

- Created by Pat Meenan in 2008 at AOL
- IE plugin called Pagetest
- Acquired by Catchpoint in 2020



Pats basement



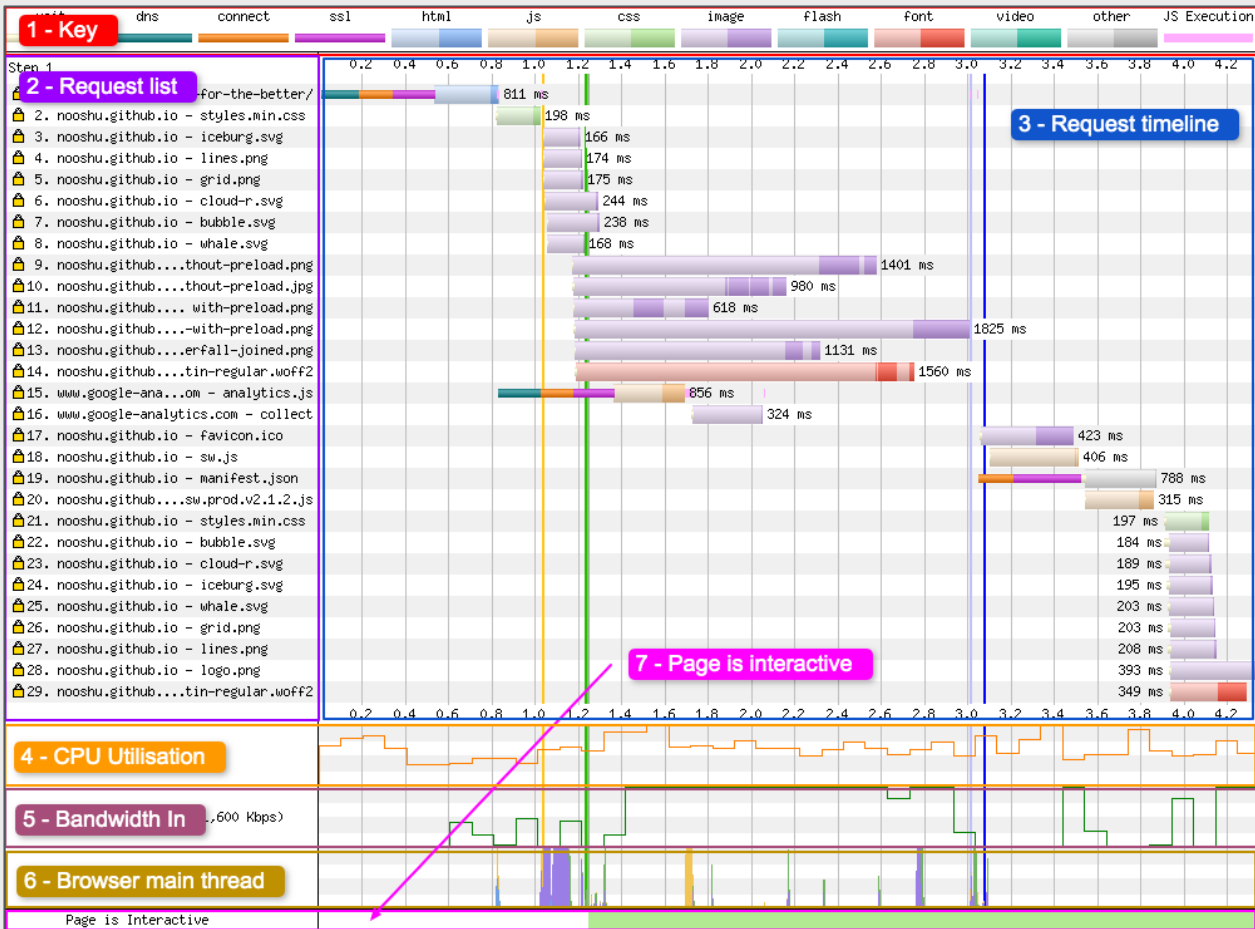
Select Test Location



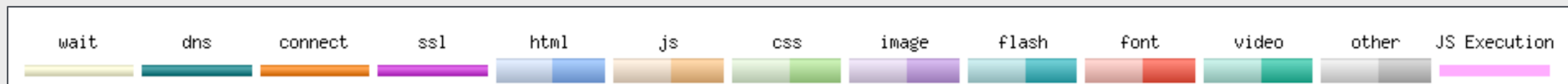
London, UK - Atlantic.net (Chrome,Firefox,Opera) ▼

OK

Basics



1: Key

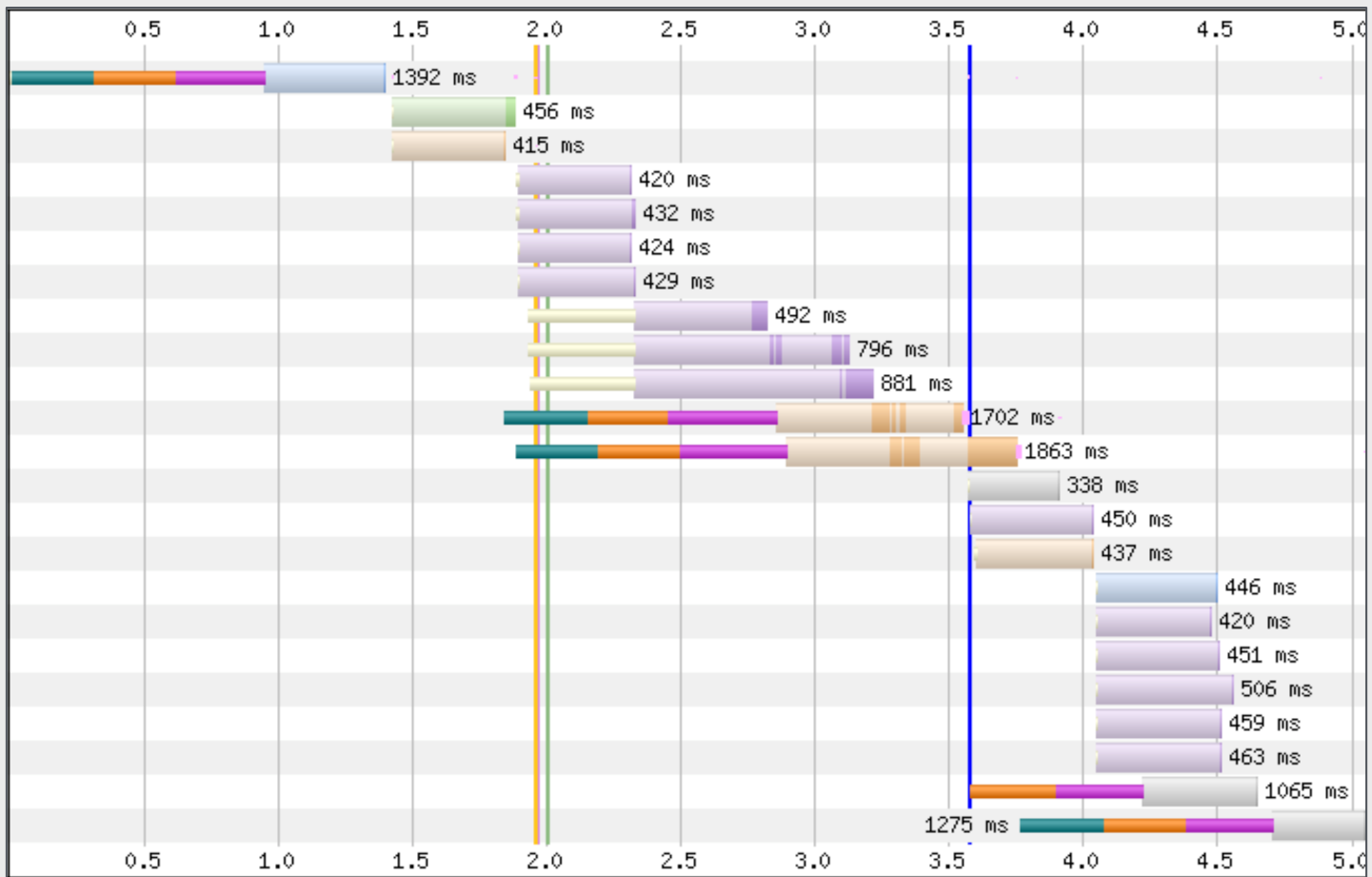


2: Request List

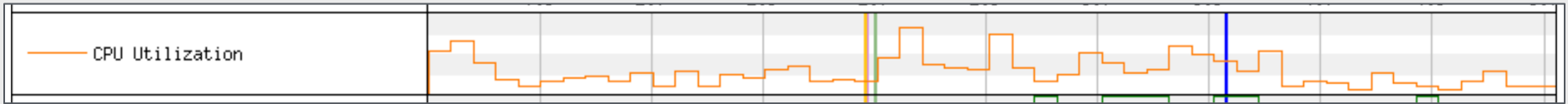
Step_1

1. nooshu.github.io - /
2. nooshu.github.io - styles.min.css
3. nooshu.github.io - app.js
4. nooshu.github.io - iceburg.svg
5. nooshu.github.io - lines.png
6. nooshu.github.io - grid.png
7. nooshu.github.io - cloud-r.svg
8. nooshu.github.io - featured.jpg
9. nooshu.github.io - featured.jpg
10. nooshu.github.io - featured.jpg
11. www.google-ana...om - analytics.js
12. s2.go-mpulse.n...DQNG8-J9Q6E-9JYX6
13. www.google-analytics.com - collect
14. nooshu.github.io - favicon.ico
15. nooshu.github.io - sw.js
16. nooshu.github.io - offline.html
17. nooshu.github.io - bubble.svg
18. nooshu.github.io - mm.png
19. nooshu.github.io - logo.png
20. nooshu.github.io - whale.svg
21. nooshu.github...ntions-loader.svg
22. nooshu.github.io - manifest.json
23. c.go-mpulse.net - config.json

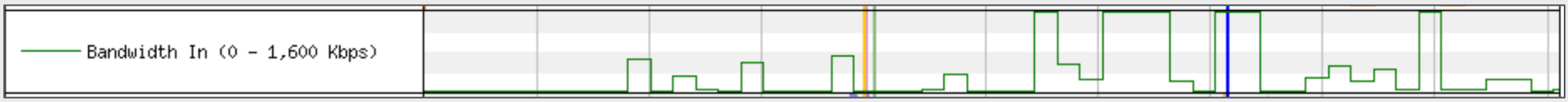
3: Request Timeline



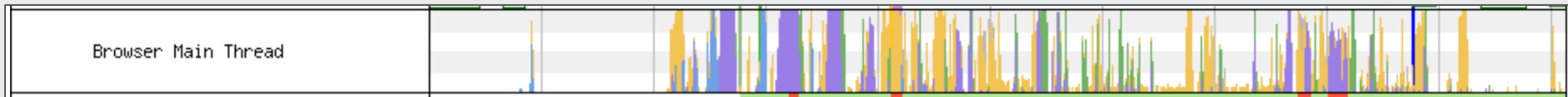
4: CPU Utilisation



5: Bandwidth In




6: Browser Main Thread



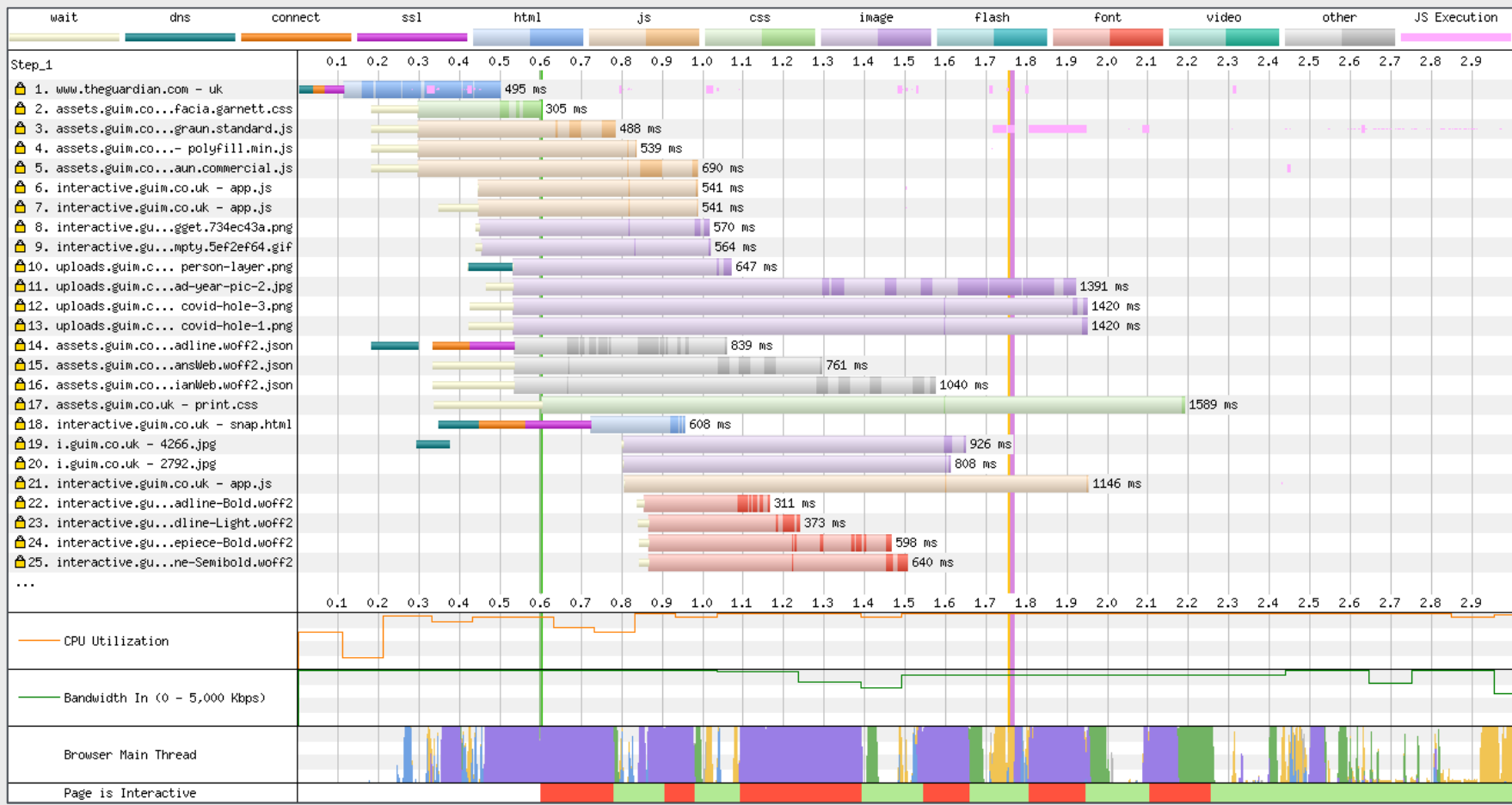
- Orange - Script parsing, evaluation and execution
- Purple - Layout
- Green - Painting
- Blue - HTML parsing
- Grey - Main thread time used for task processing not accounted for in other categories

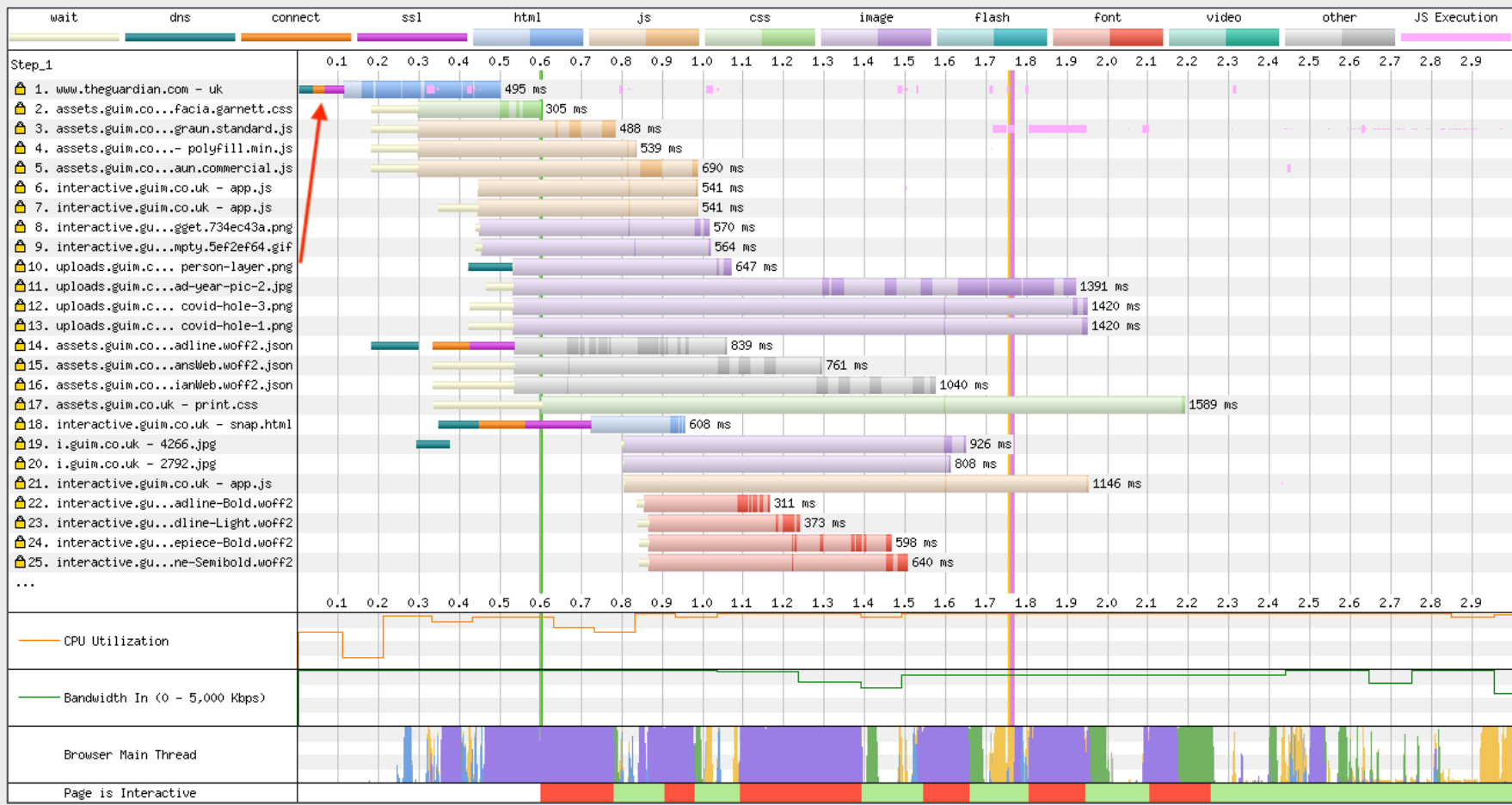
7: Long Tasks

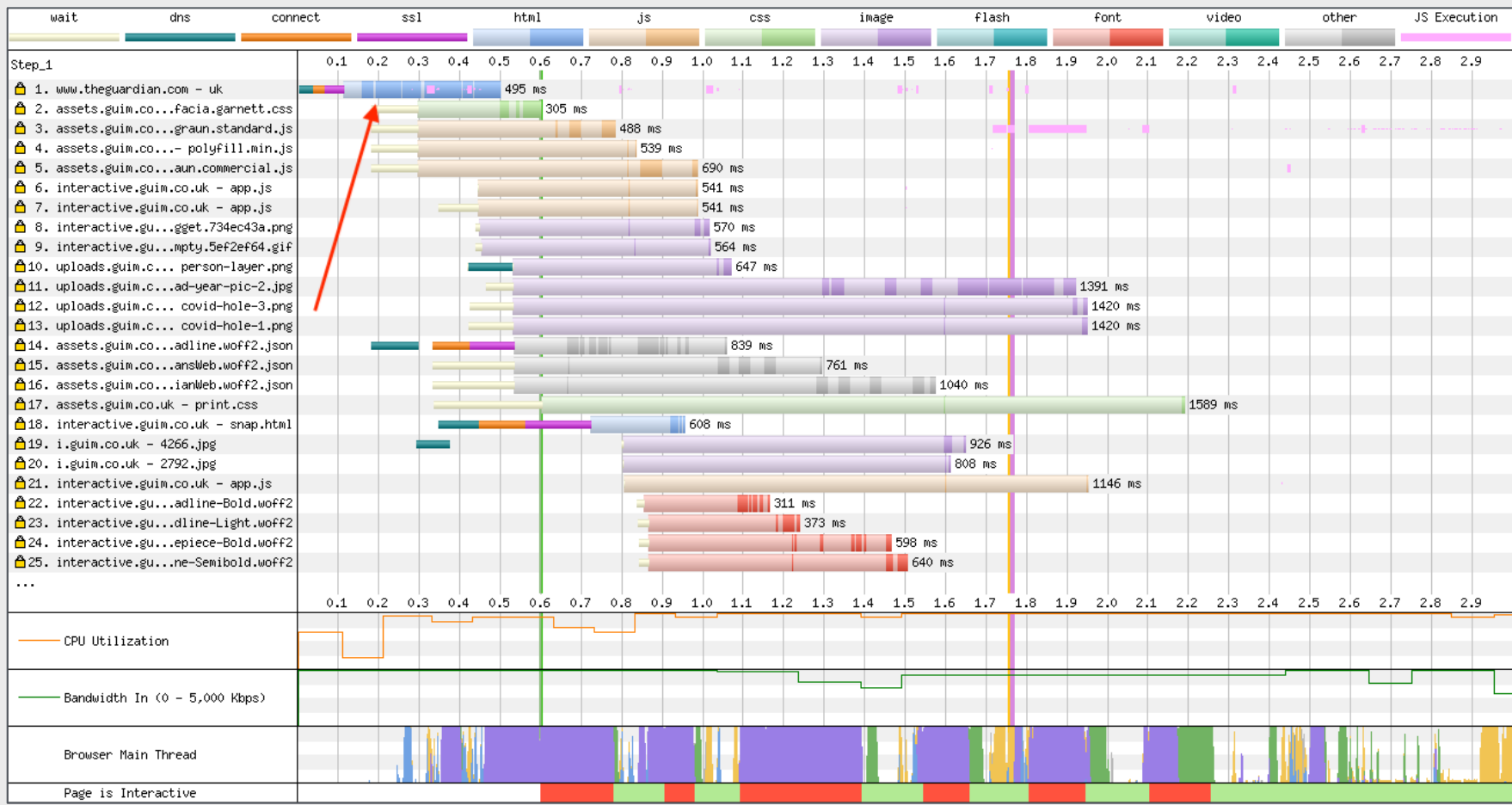
Page is Interactive

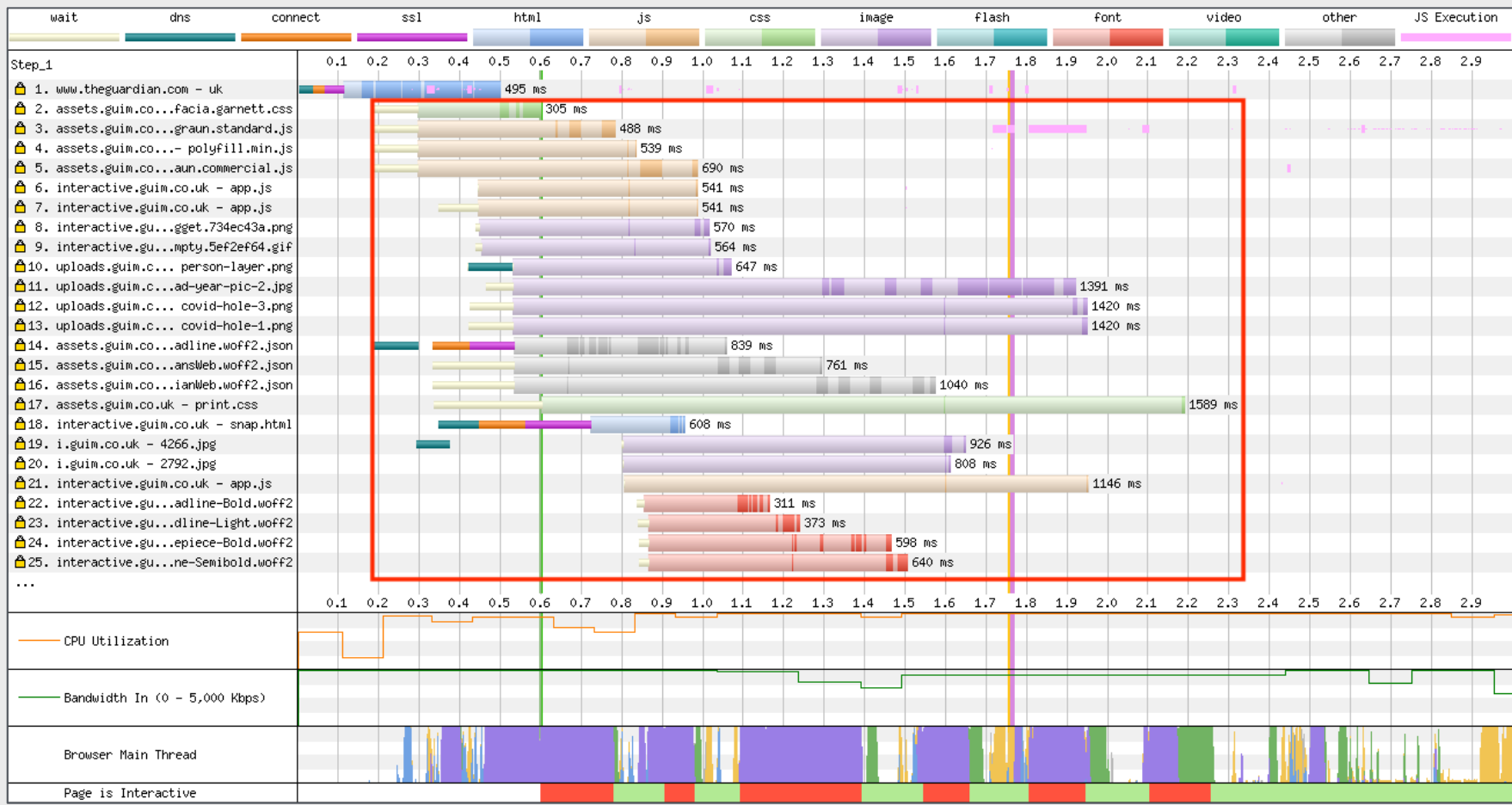


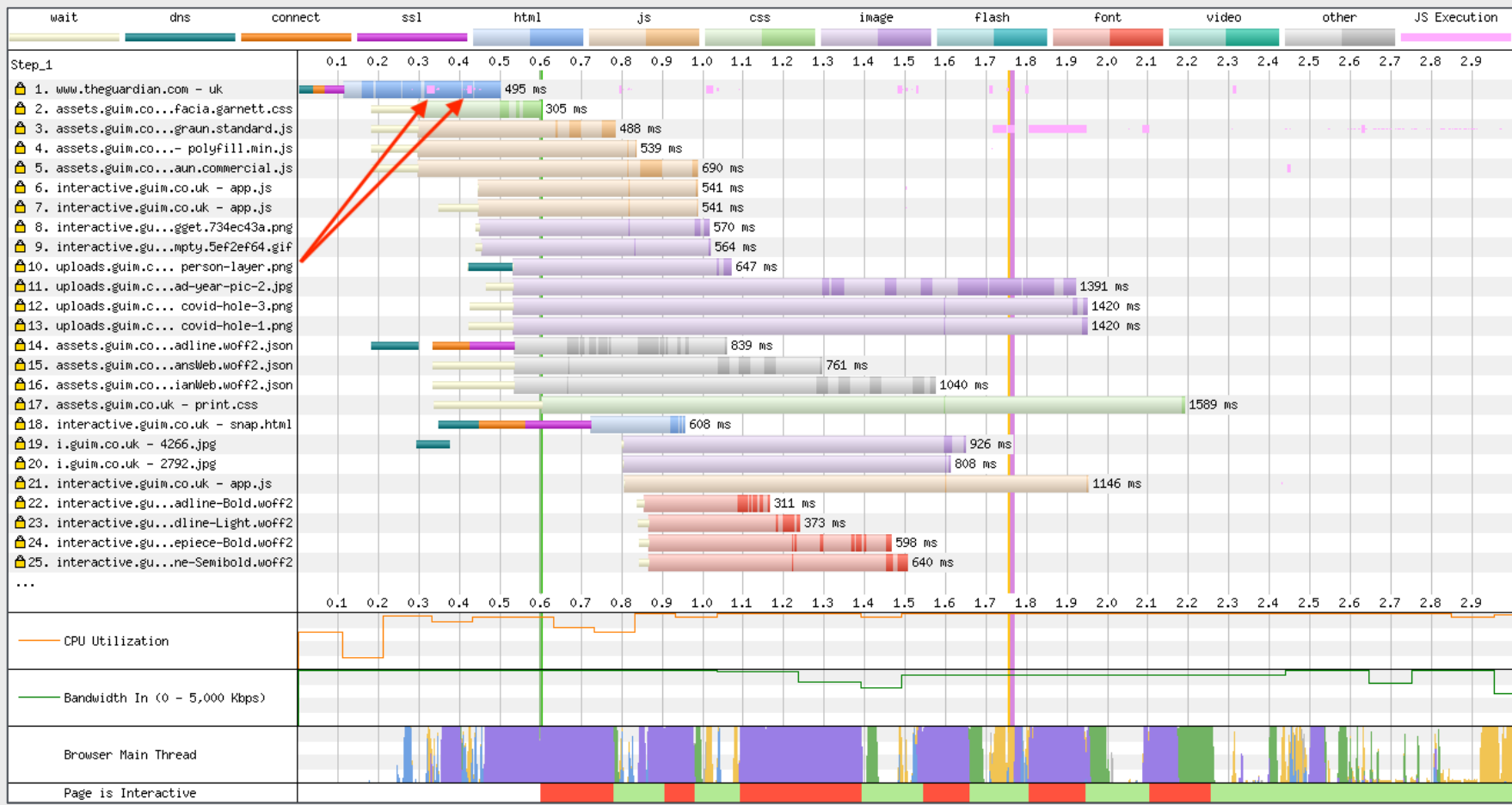
All together:

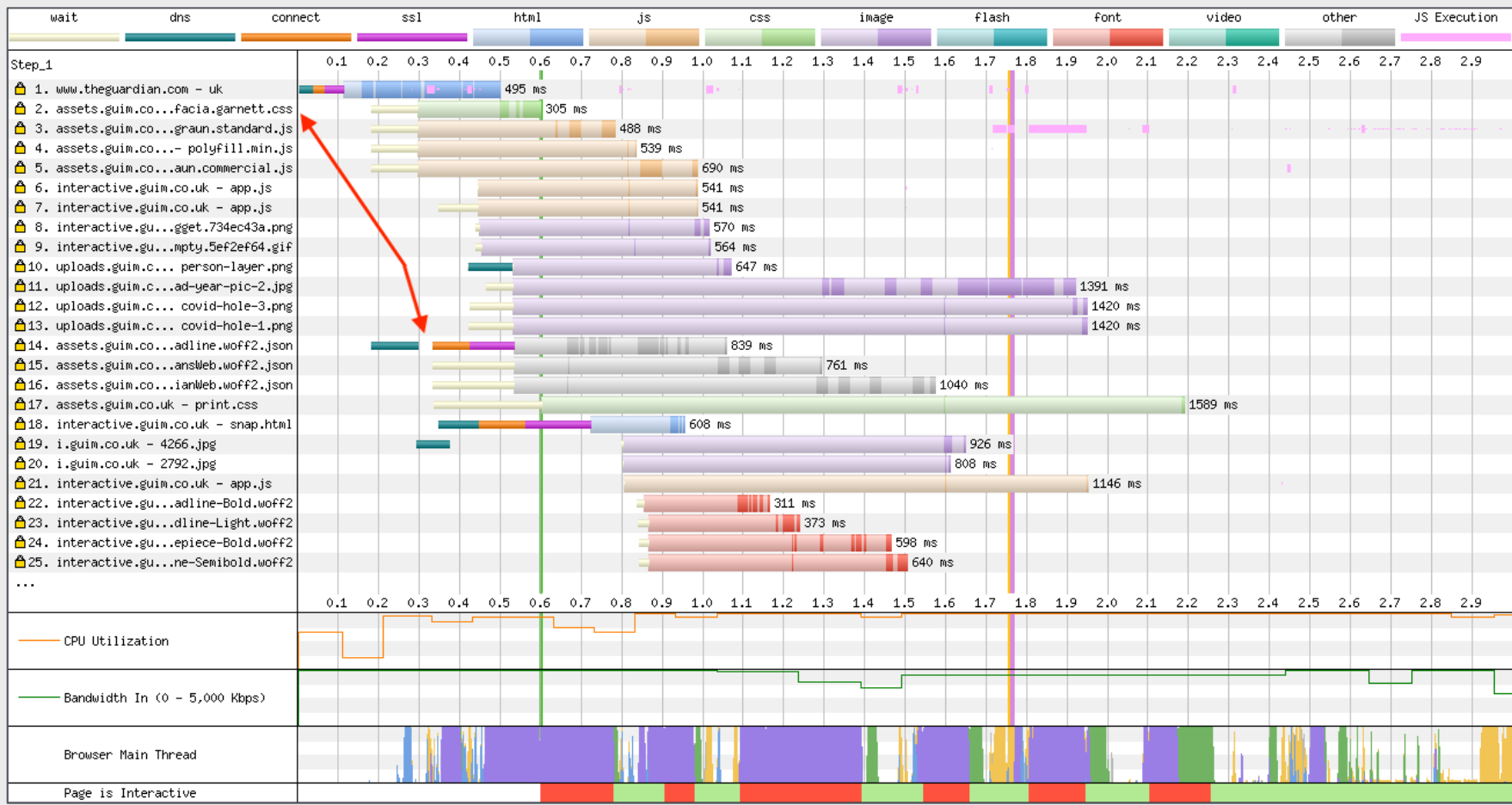


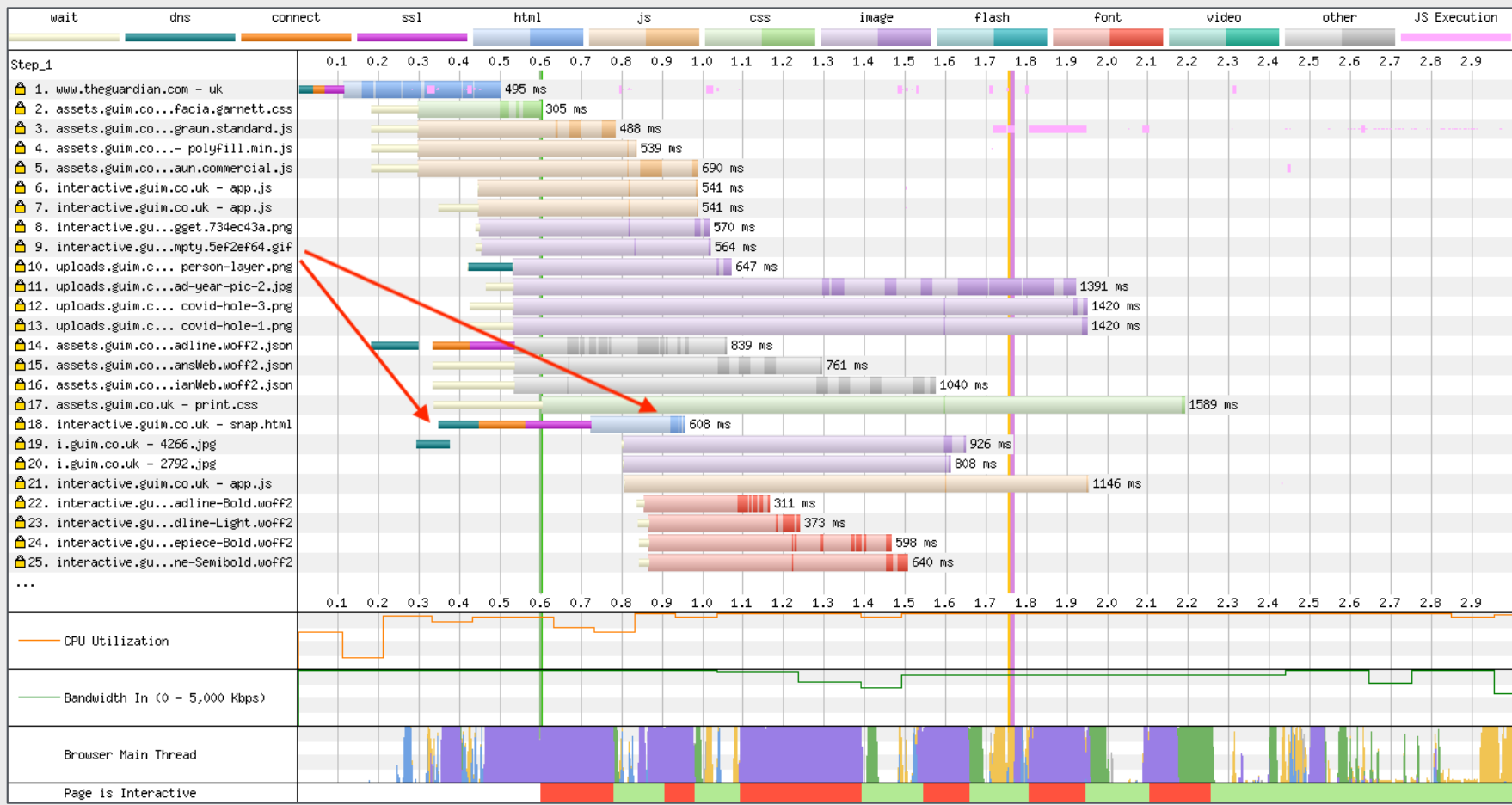


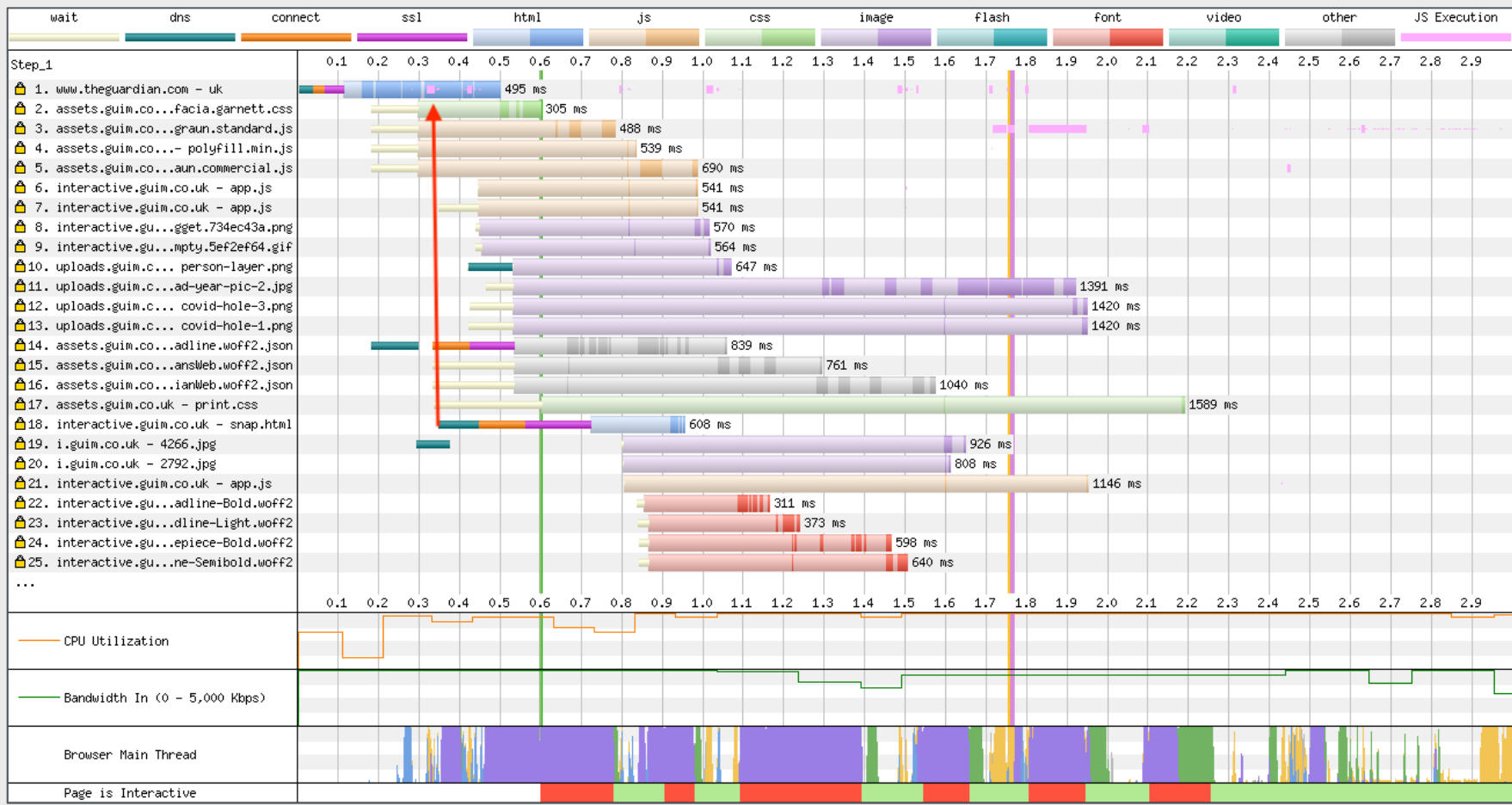


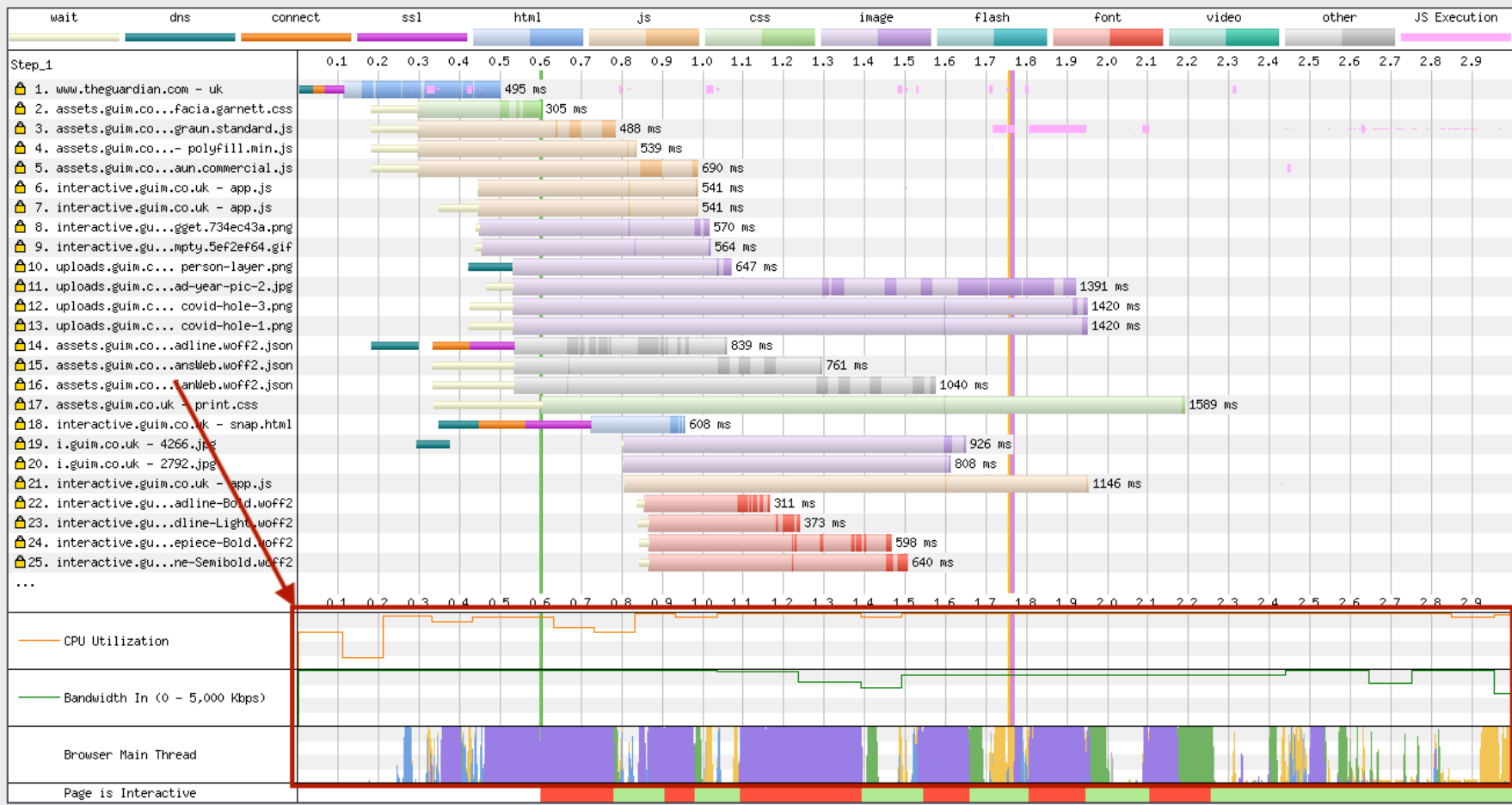






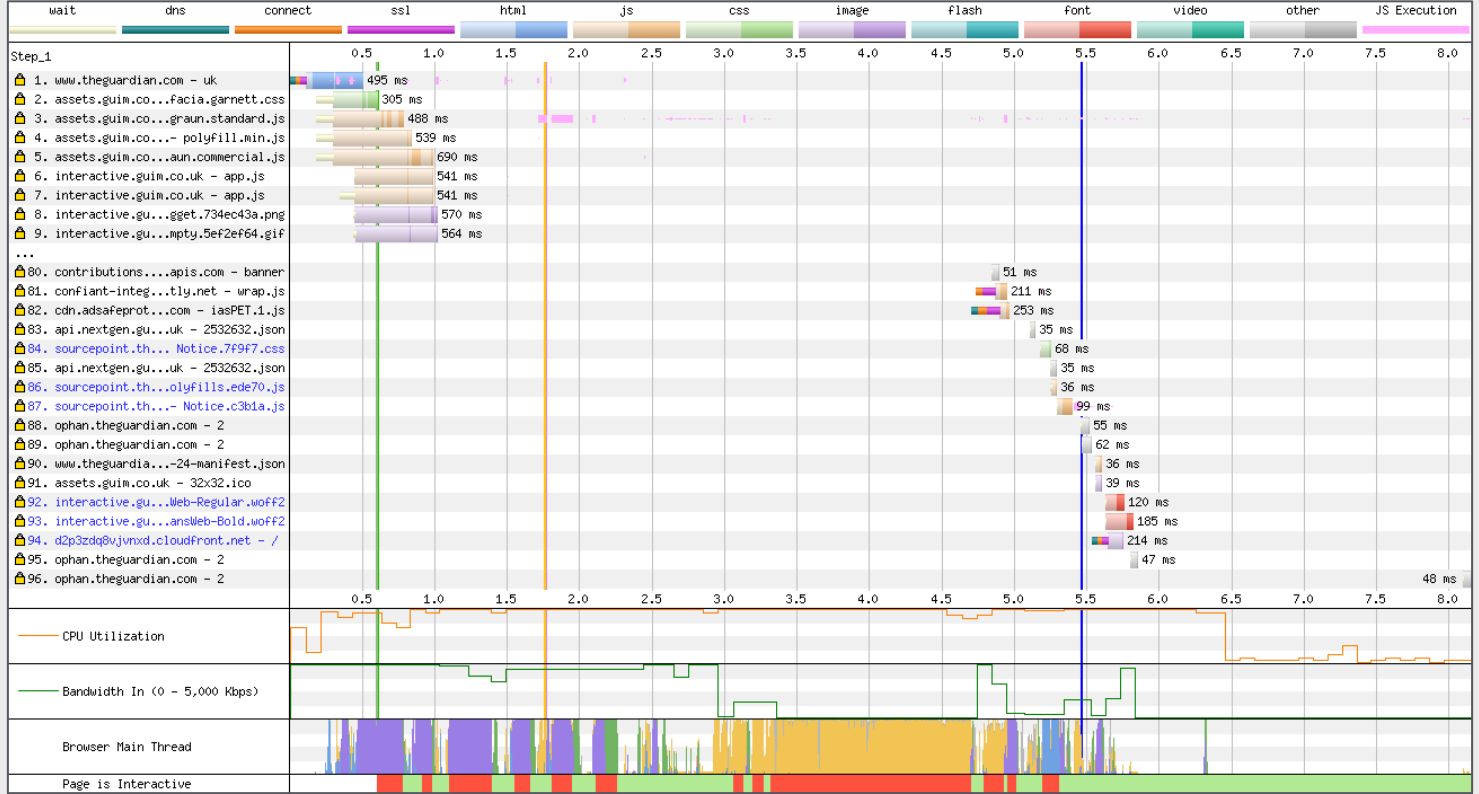






Vertical Lines

Start Render |
 RUM First Paint |
 DOM Interactive |
 DOM Content Loaded |
 On Load |
 Document Complete



Start Render

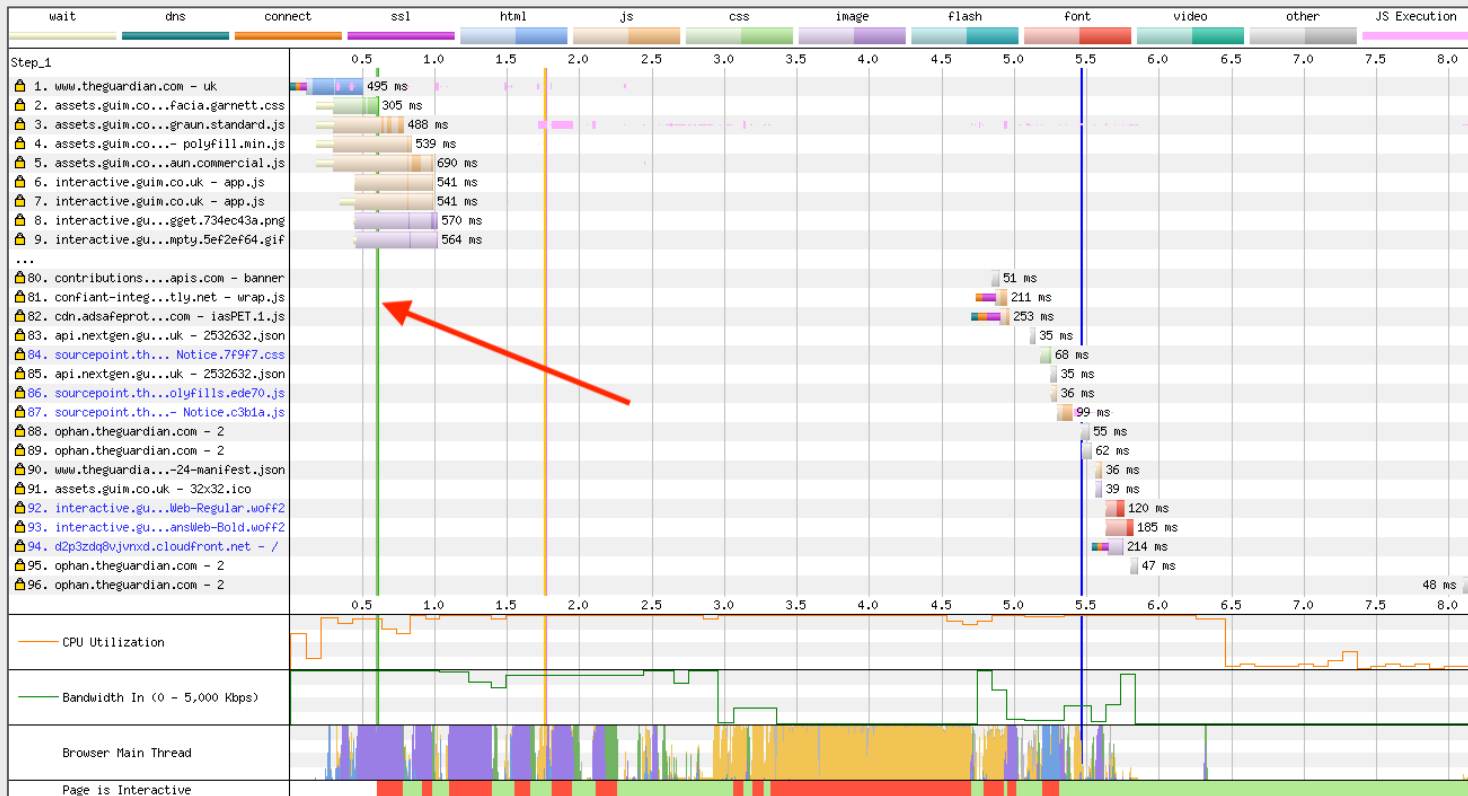
RUM First Paint

DOM Interactive

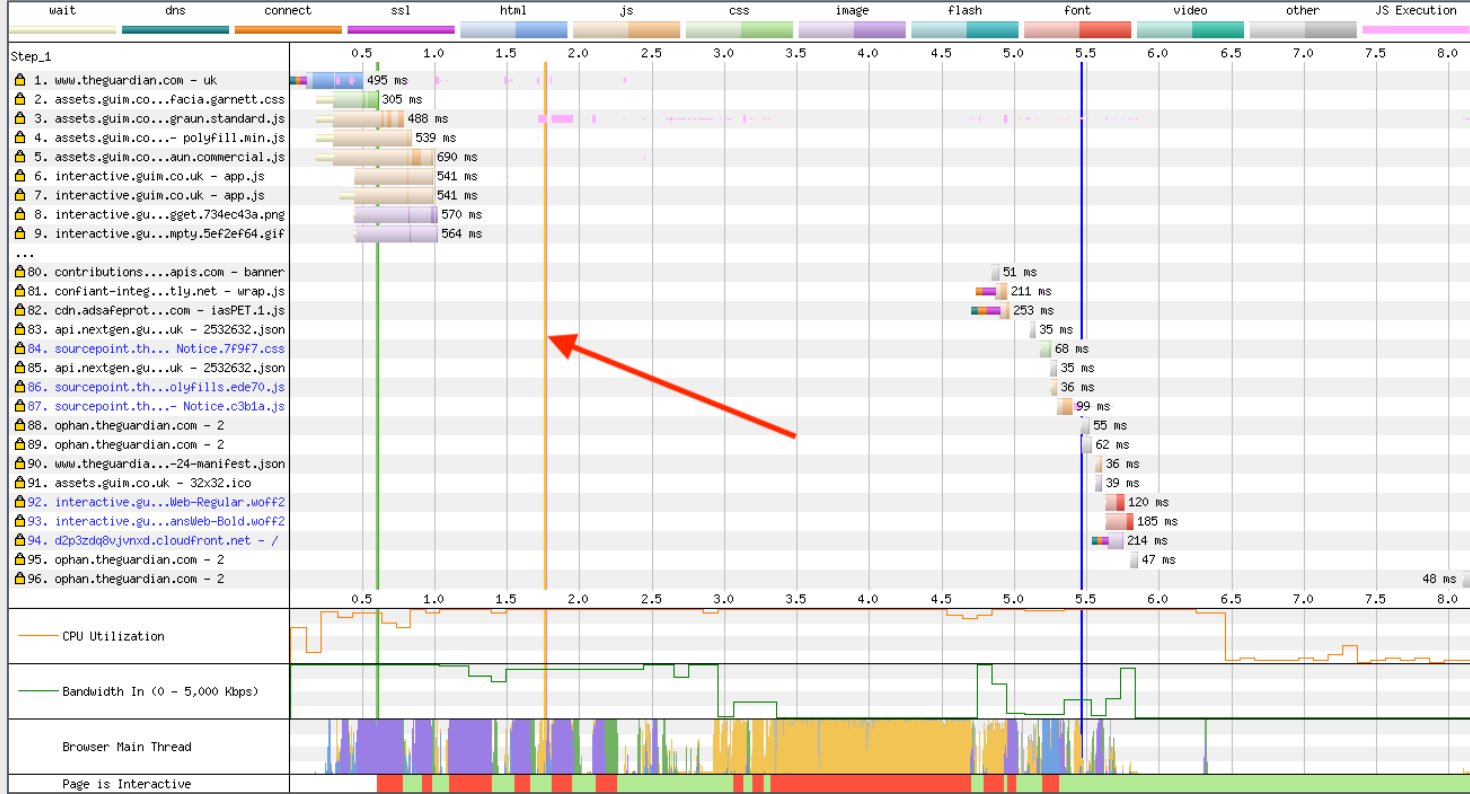
DOM Content Loaded

On Load

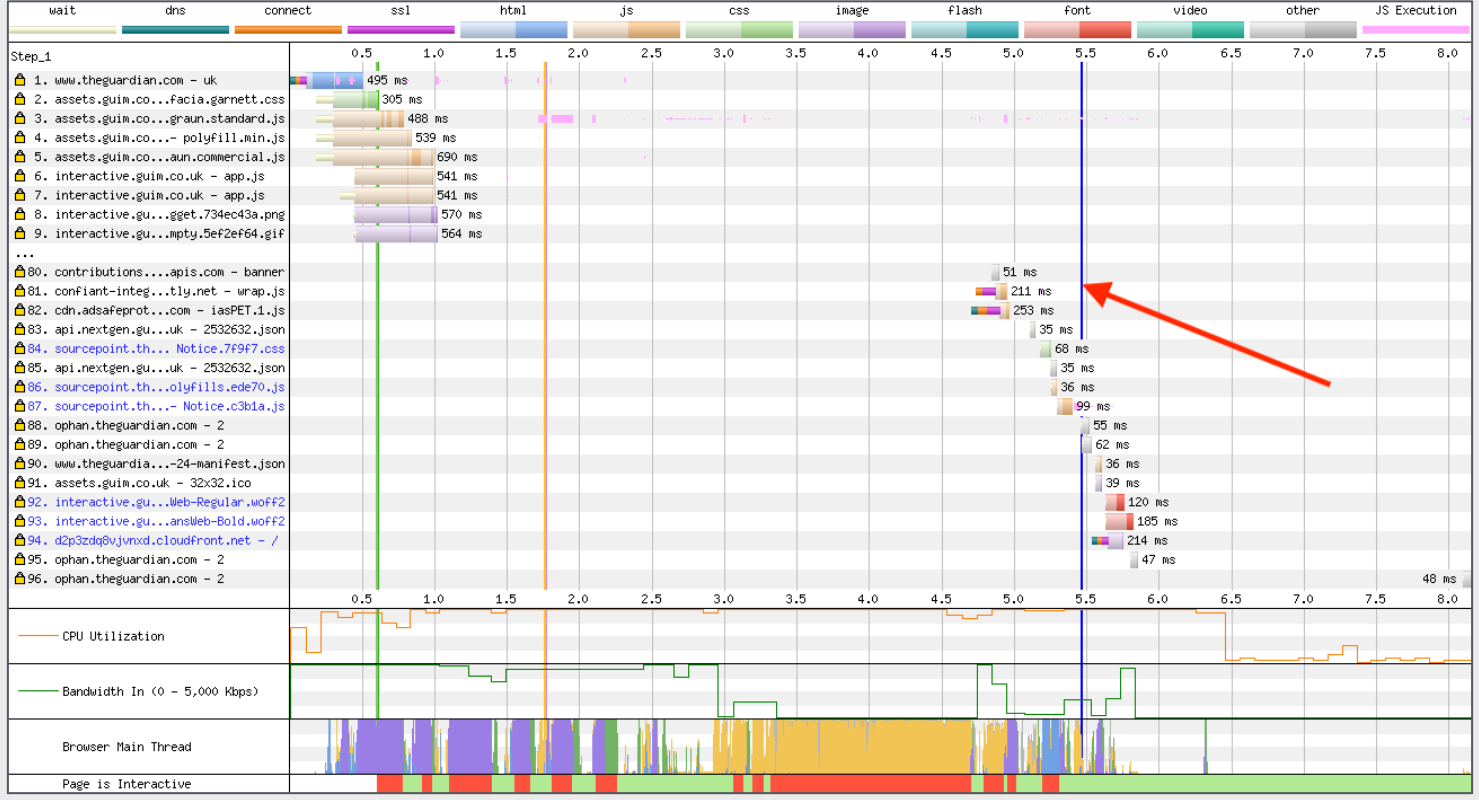
Document Complete



Start Render |
 RUM First Paint |
 DOM Interactive |
 DOM Content Loaded |
 On Load |
 Document Complete

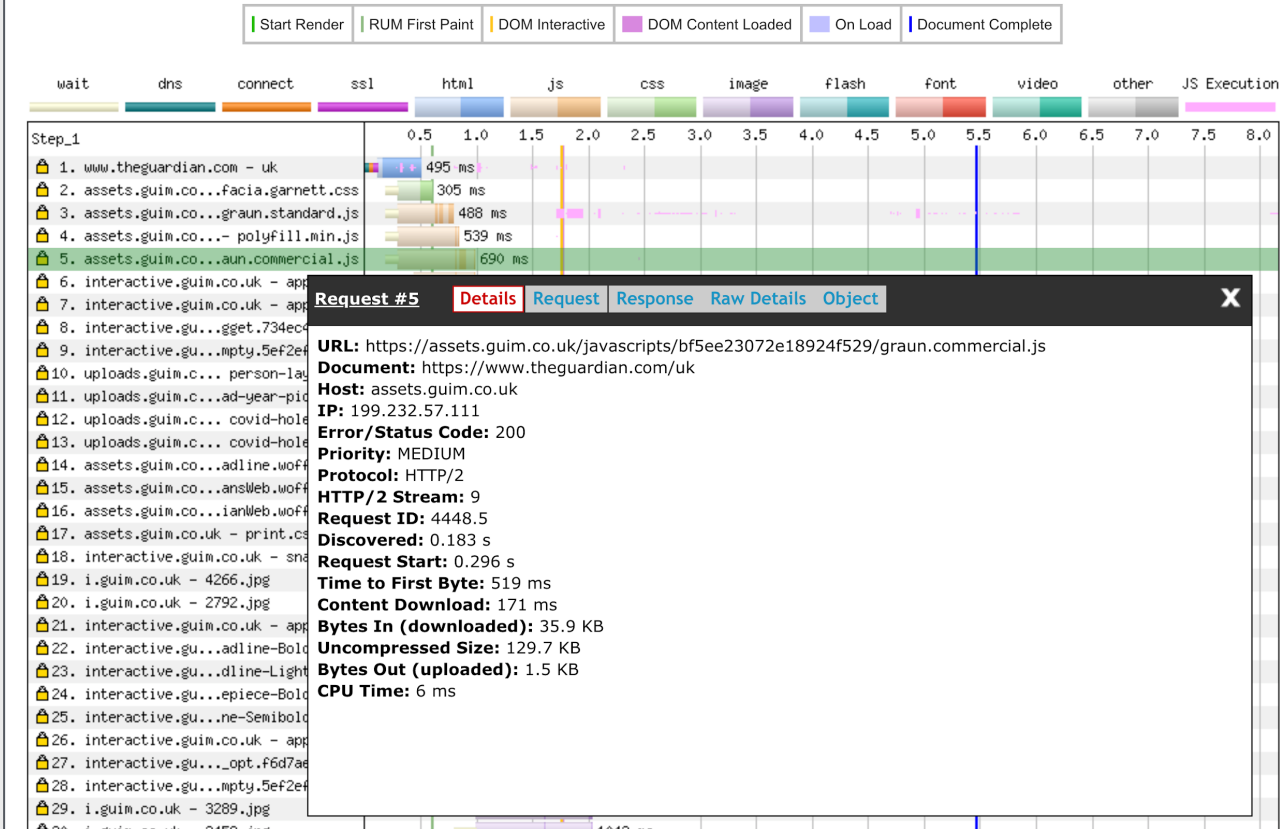


Start Render | RUM First Paint | DOM Interactive | DOM Content Loaded | On Load | Document Complete

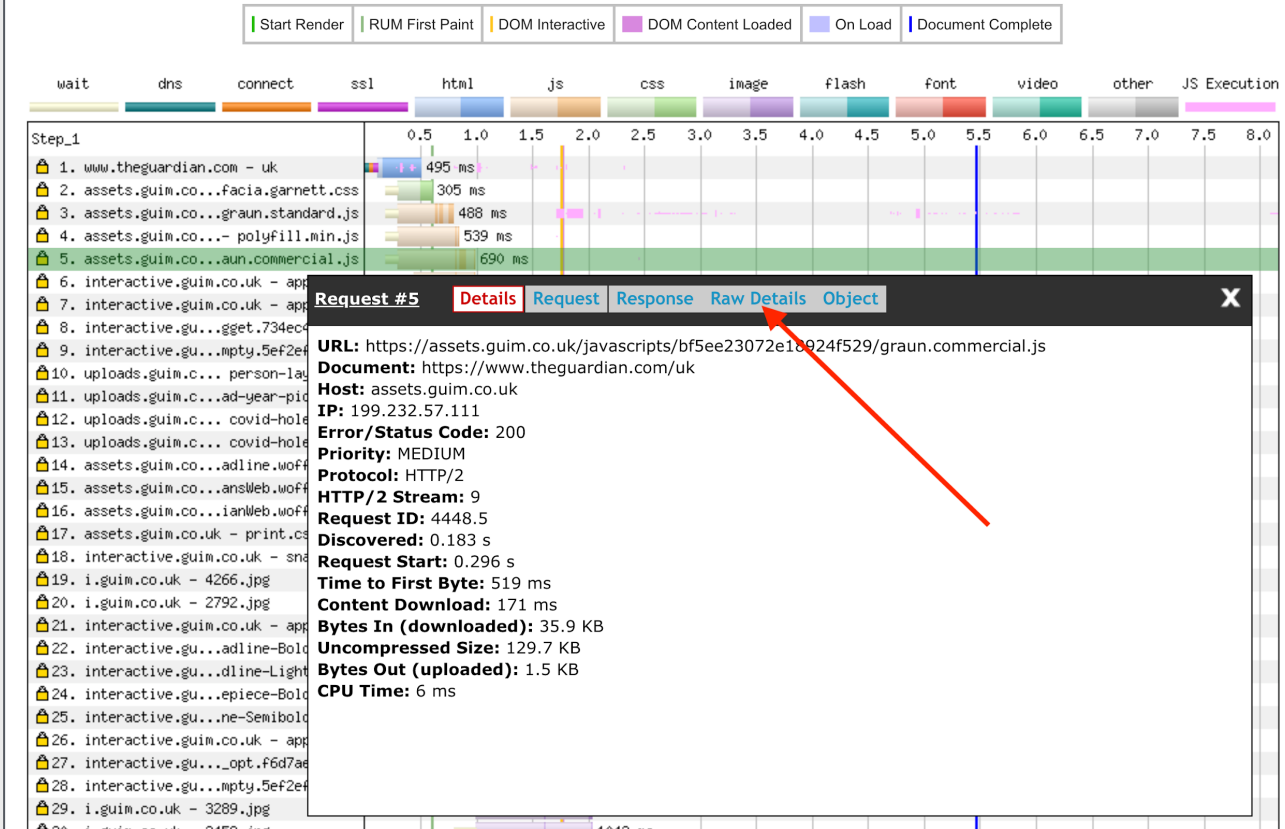


Request Details

Waterfall View

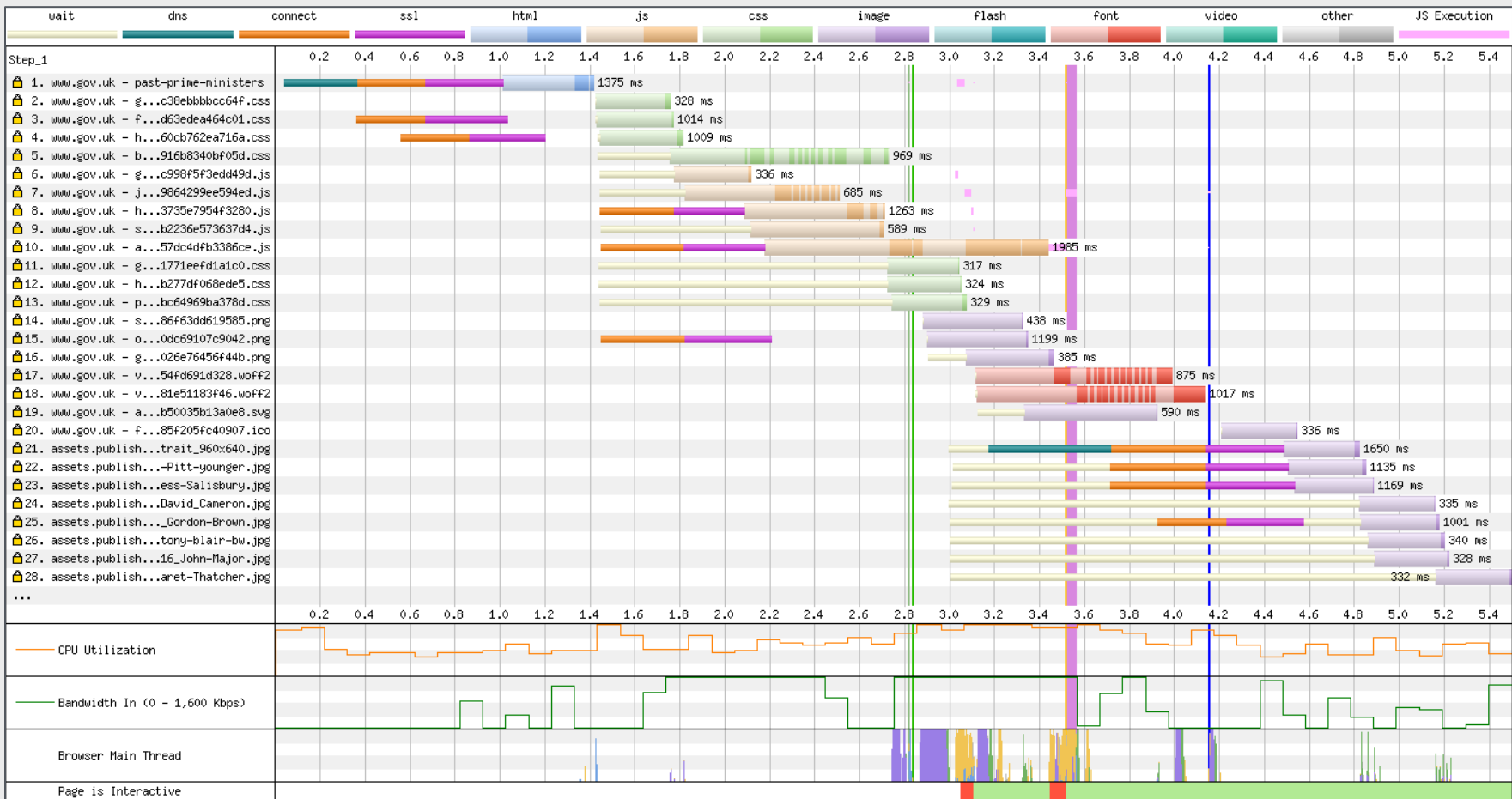


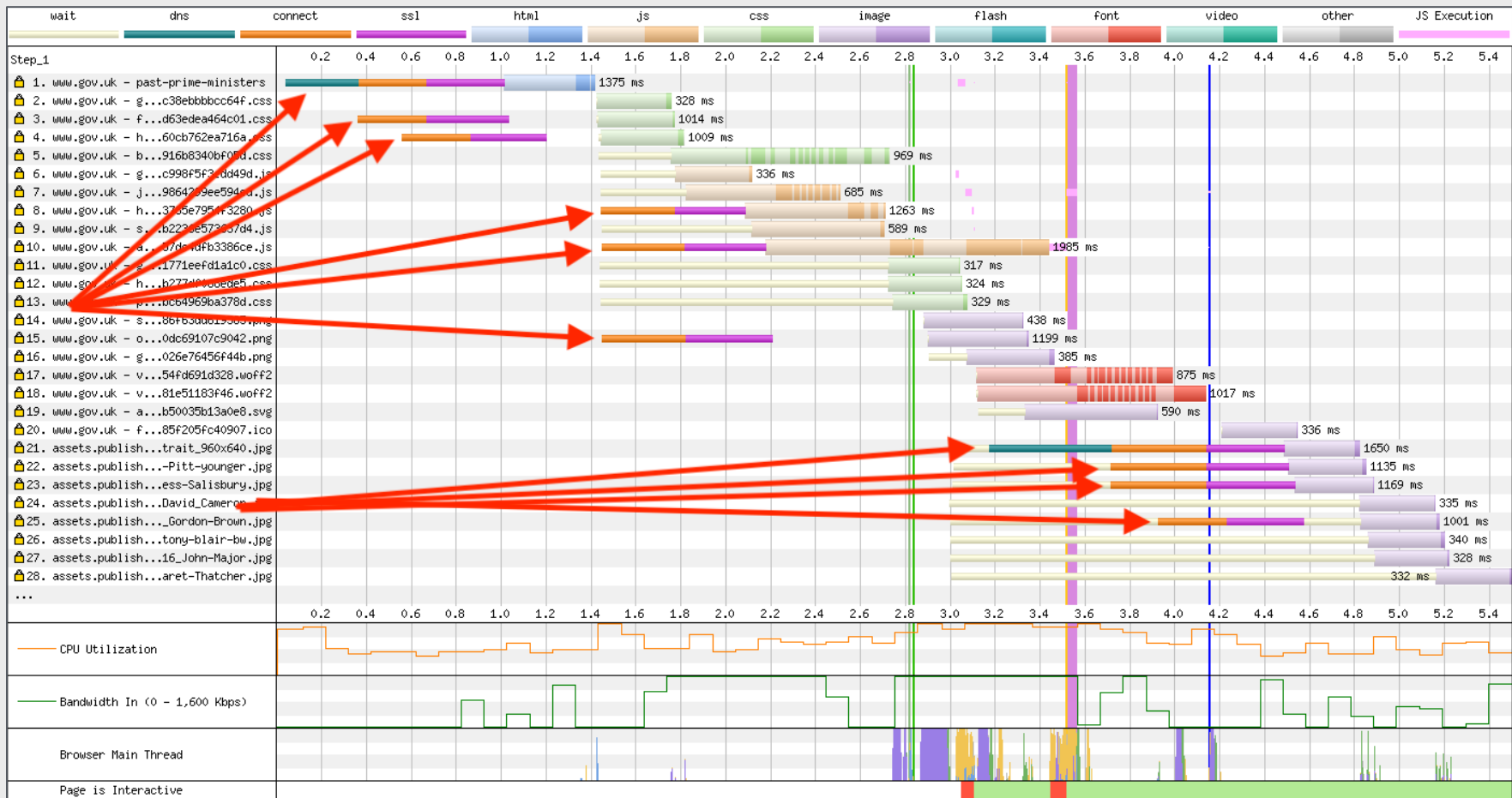
Waterfall View

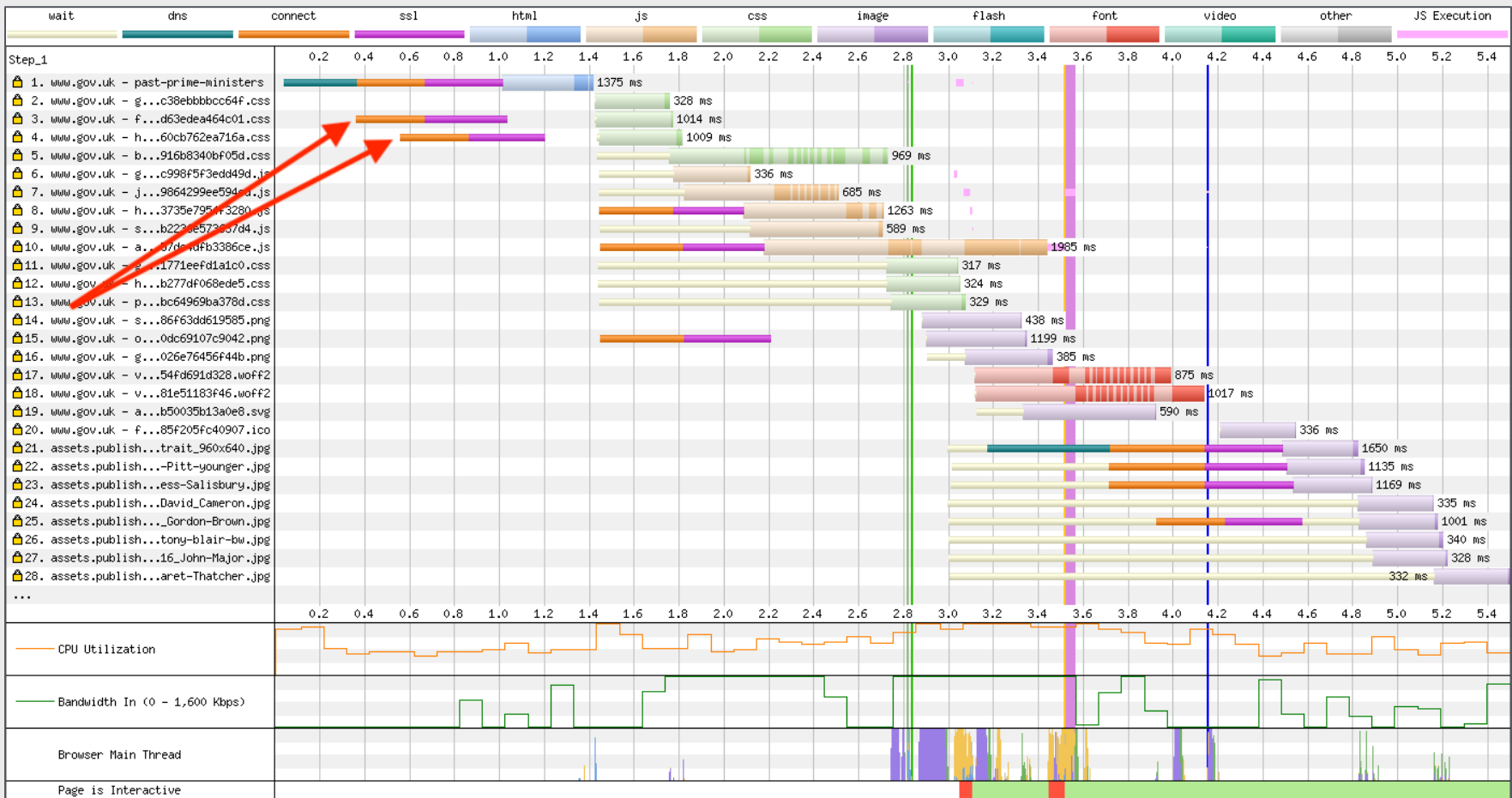


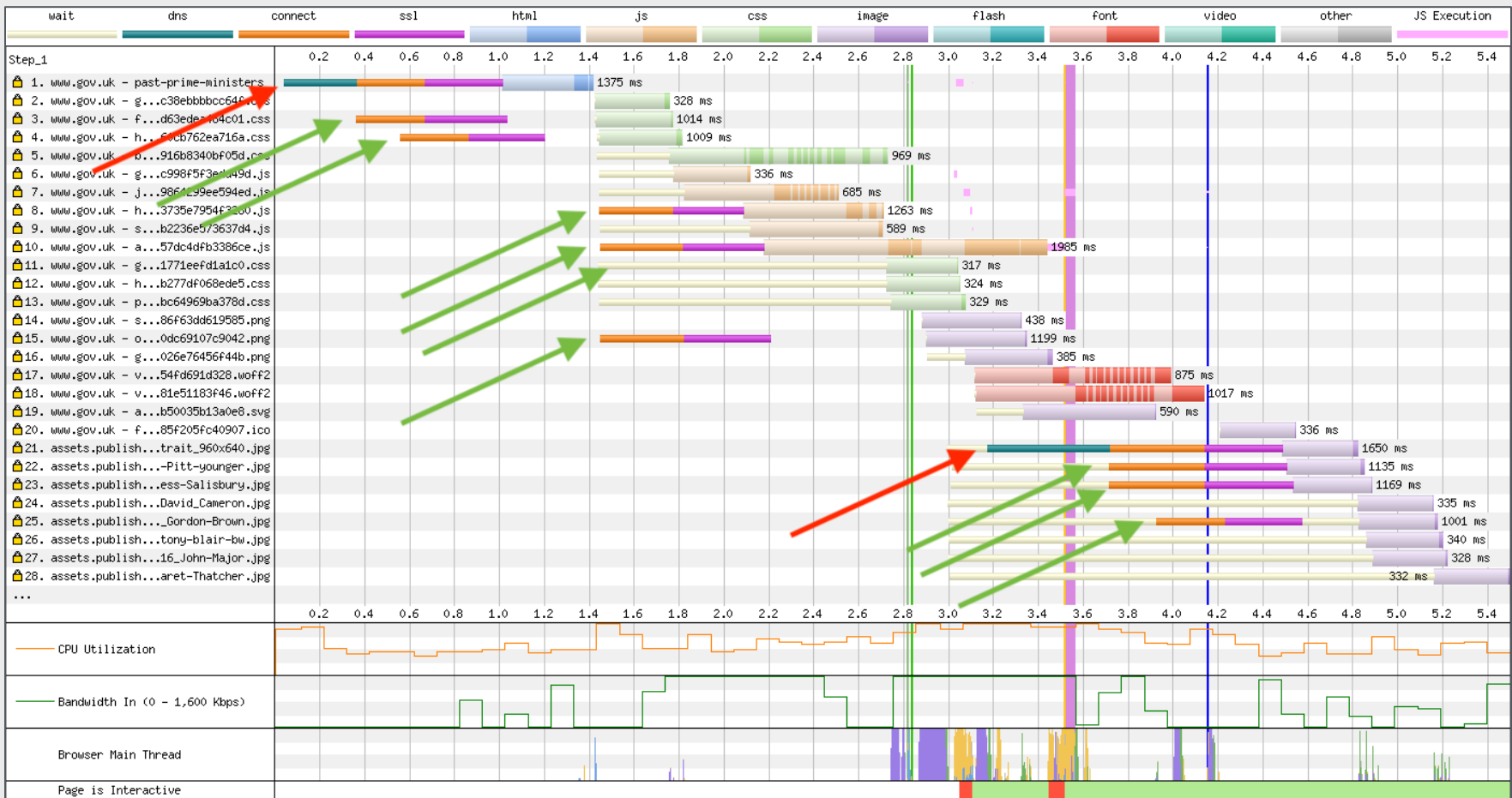
Beyond the basics

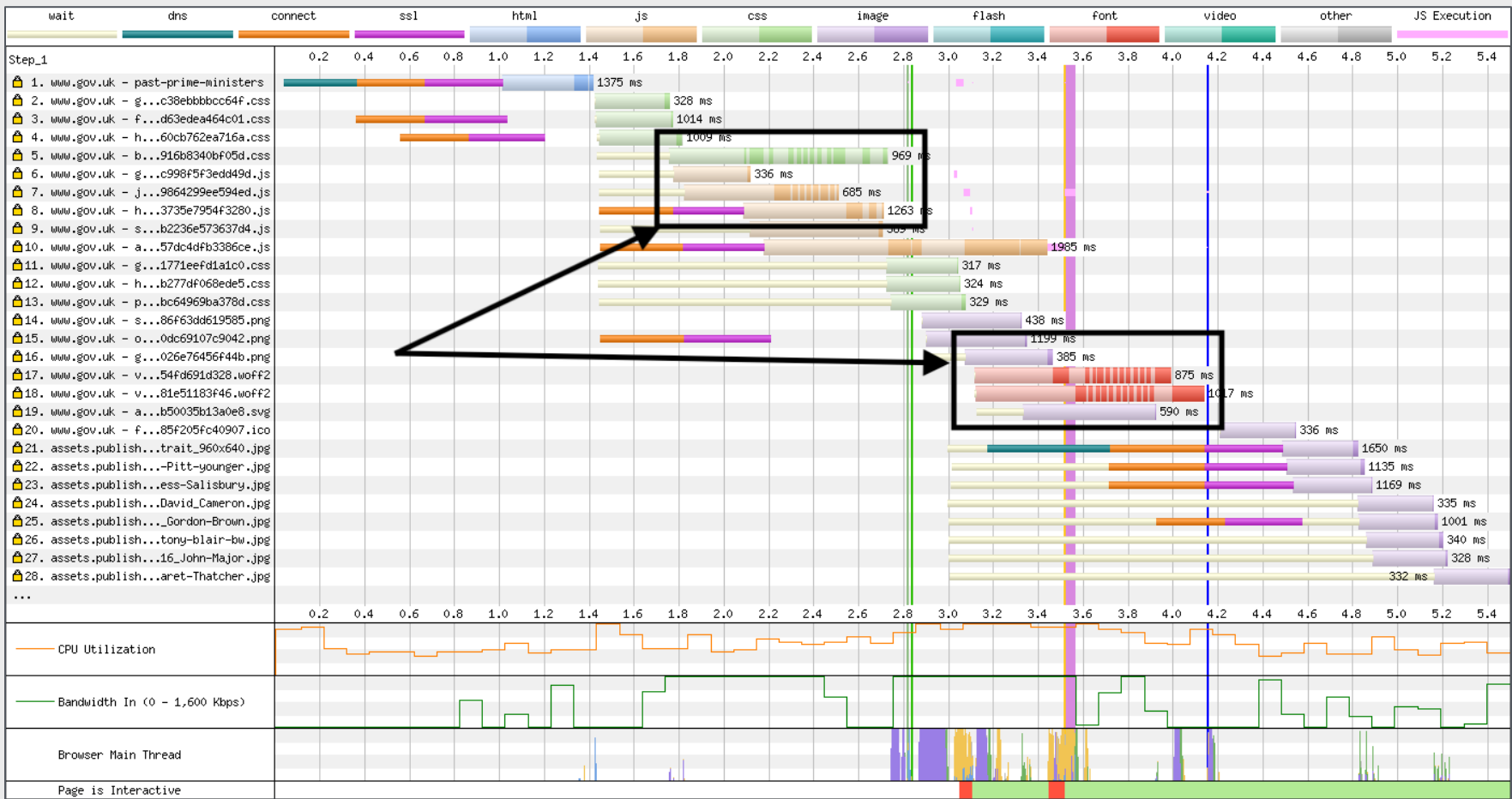
HTTP/1.1 vs HTTP/2

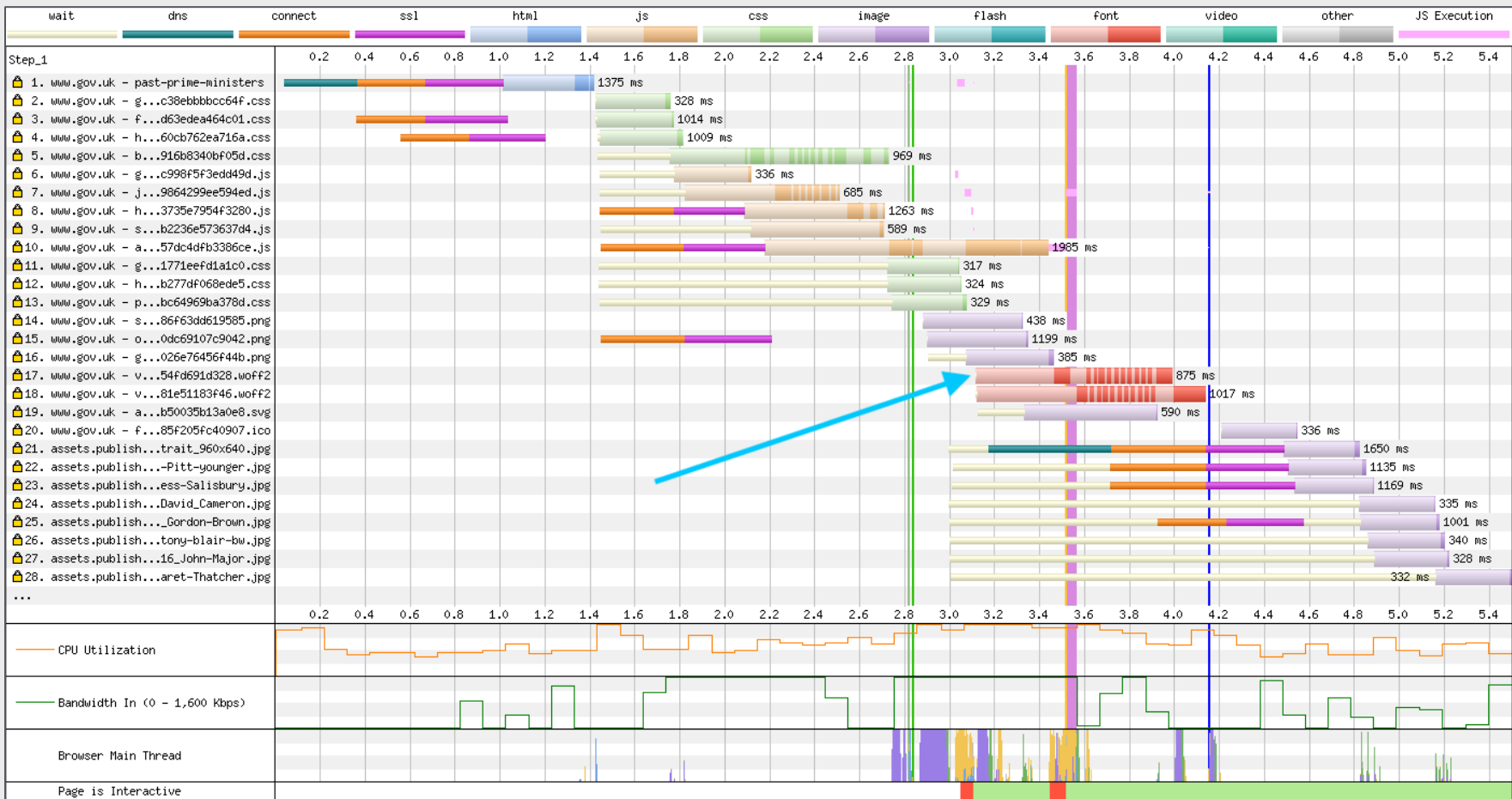


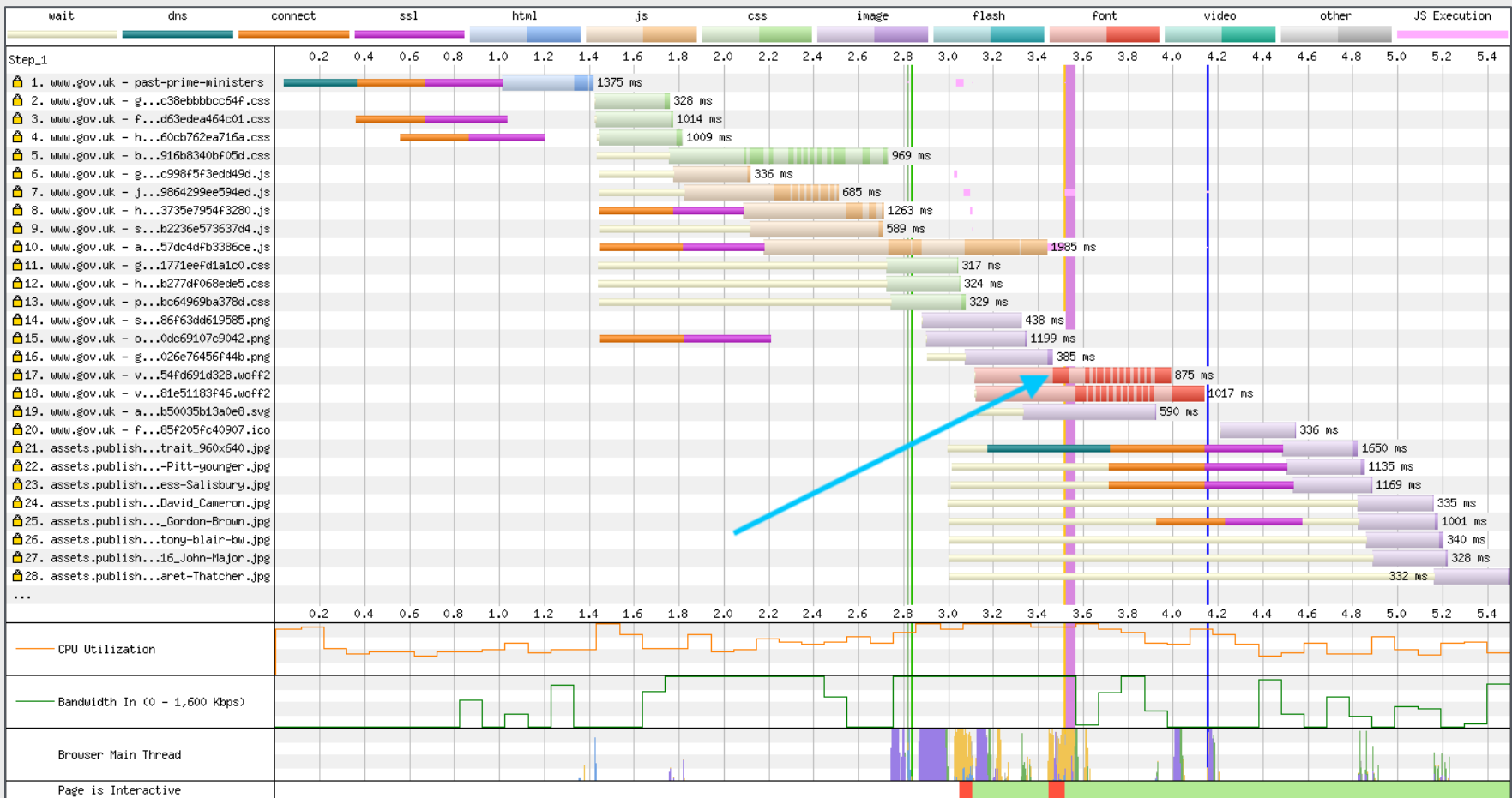


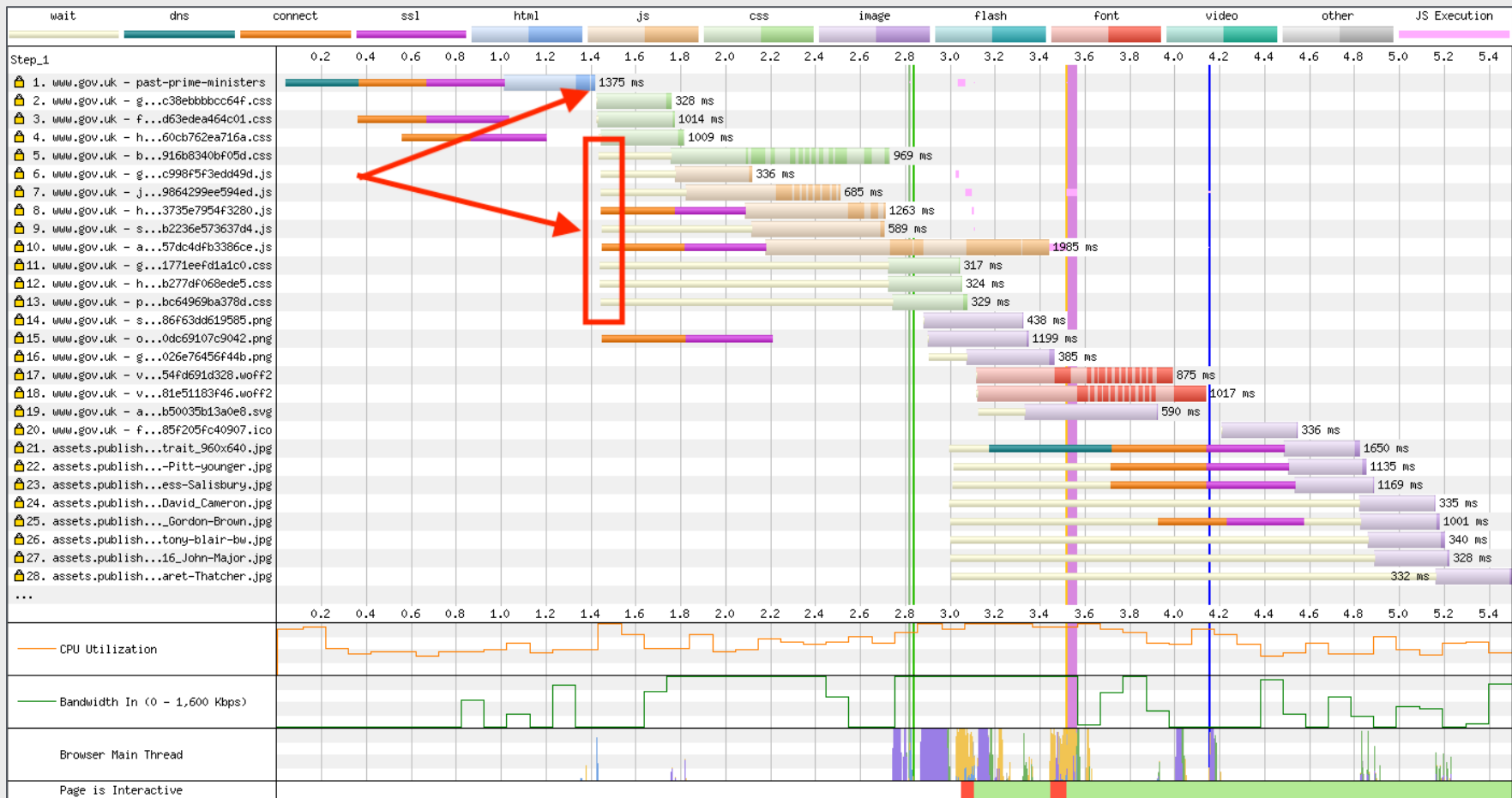


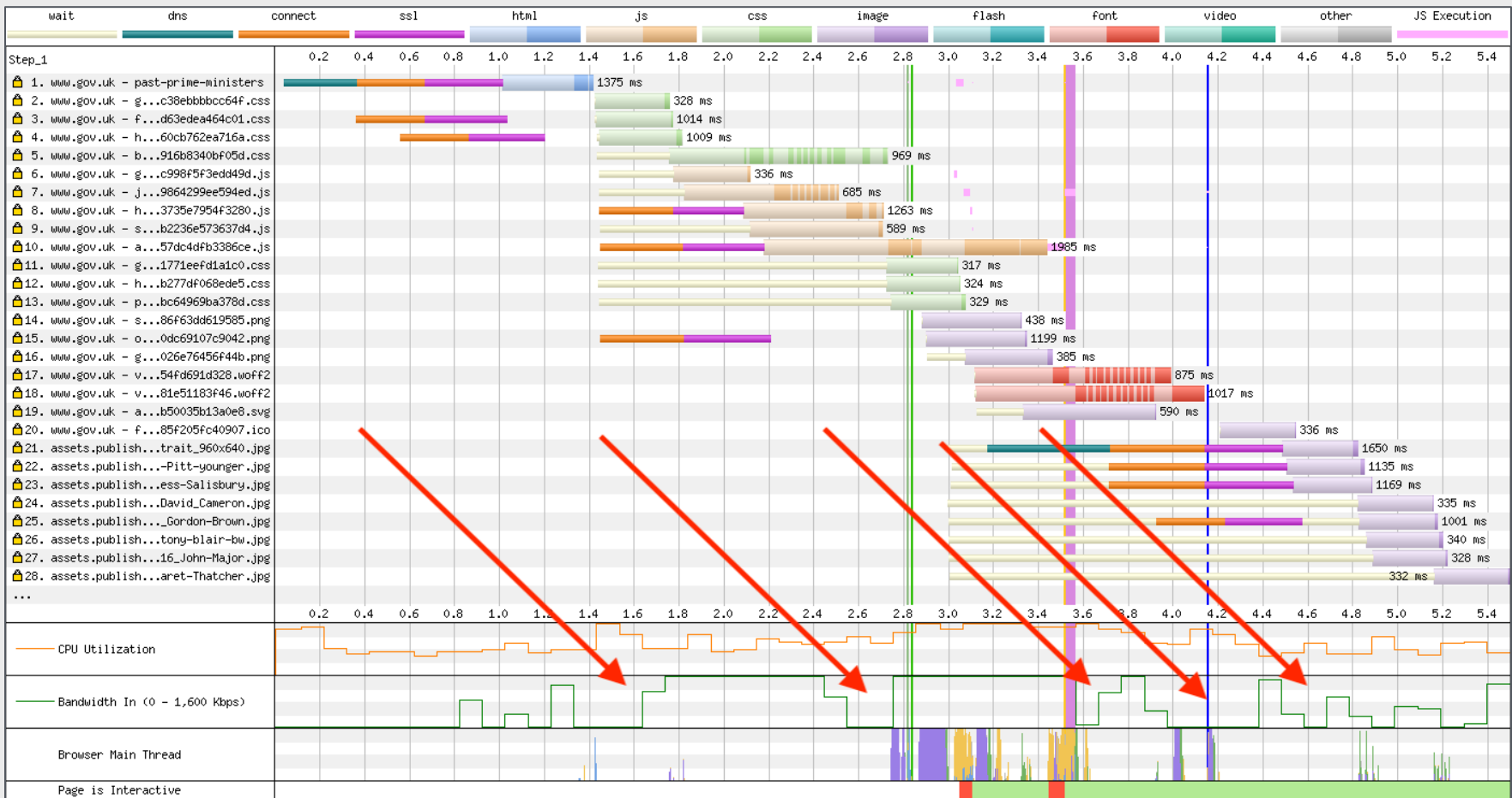


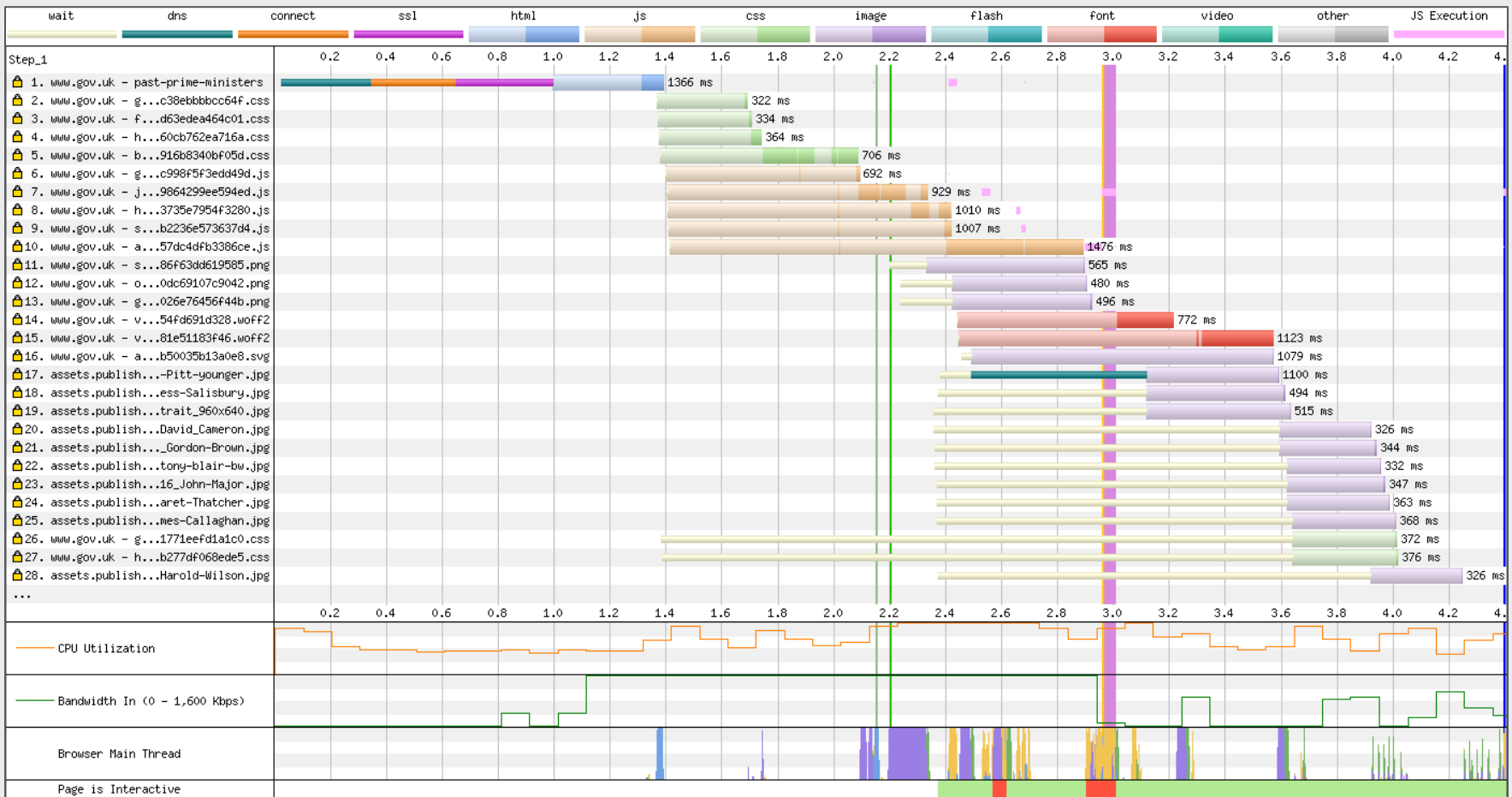


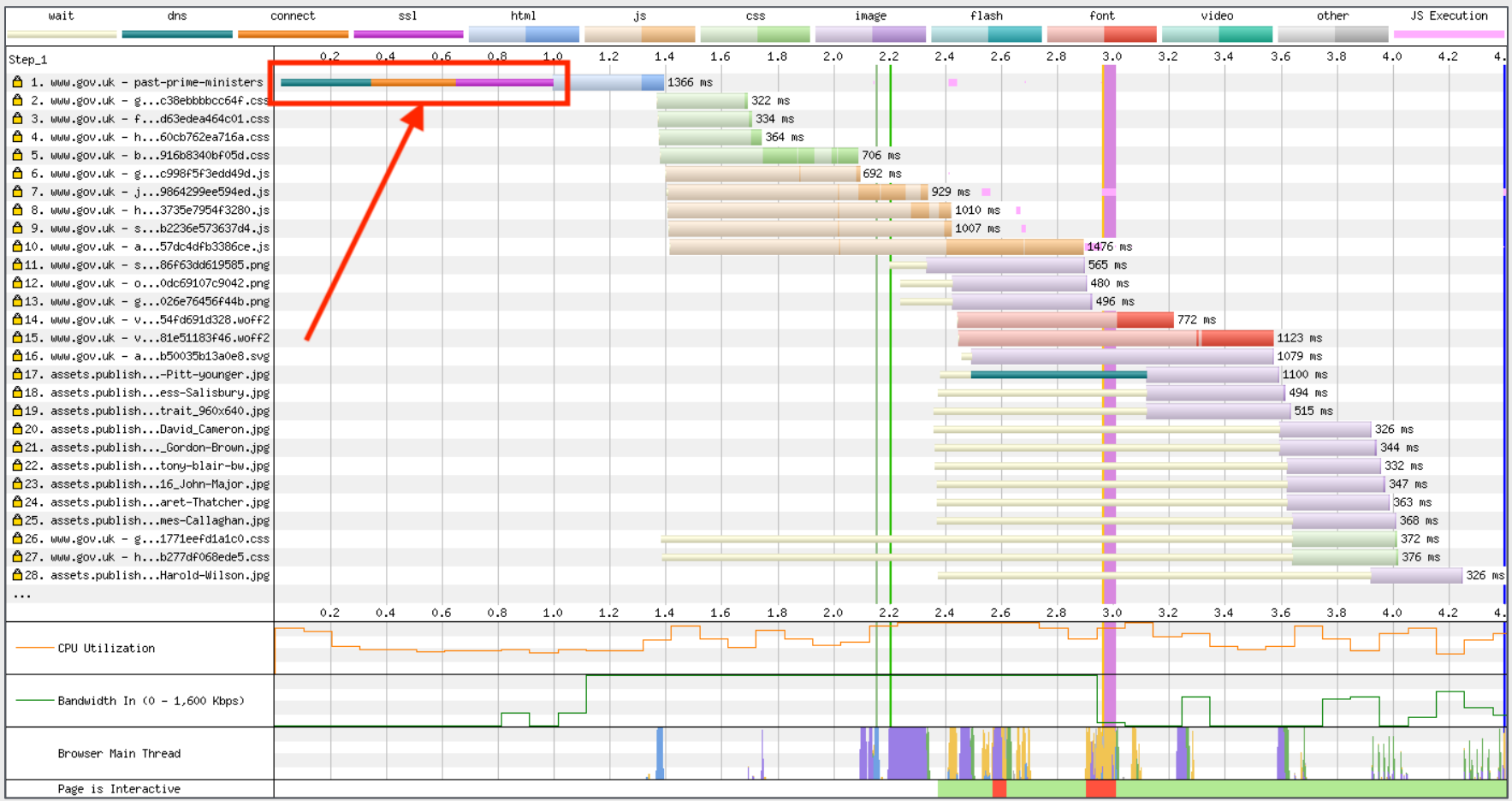


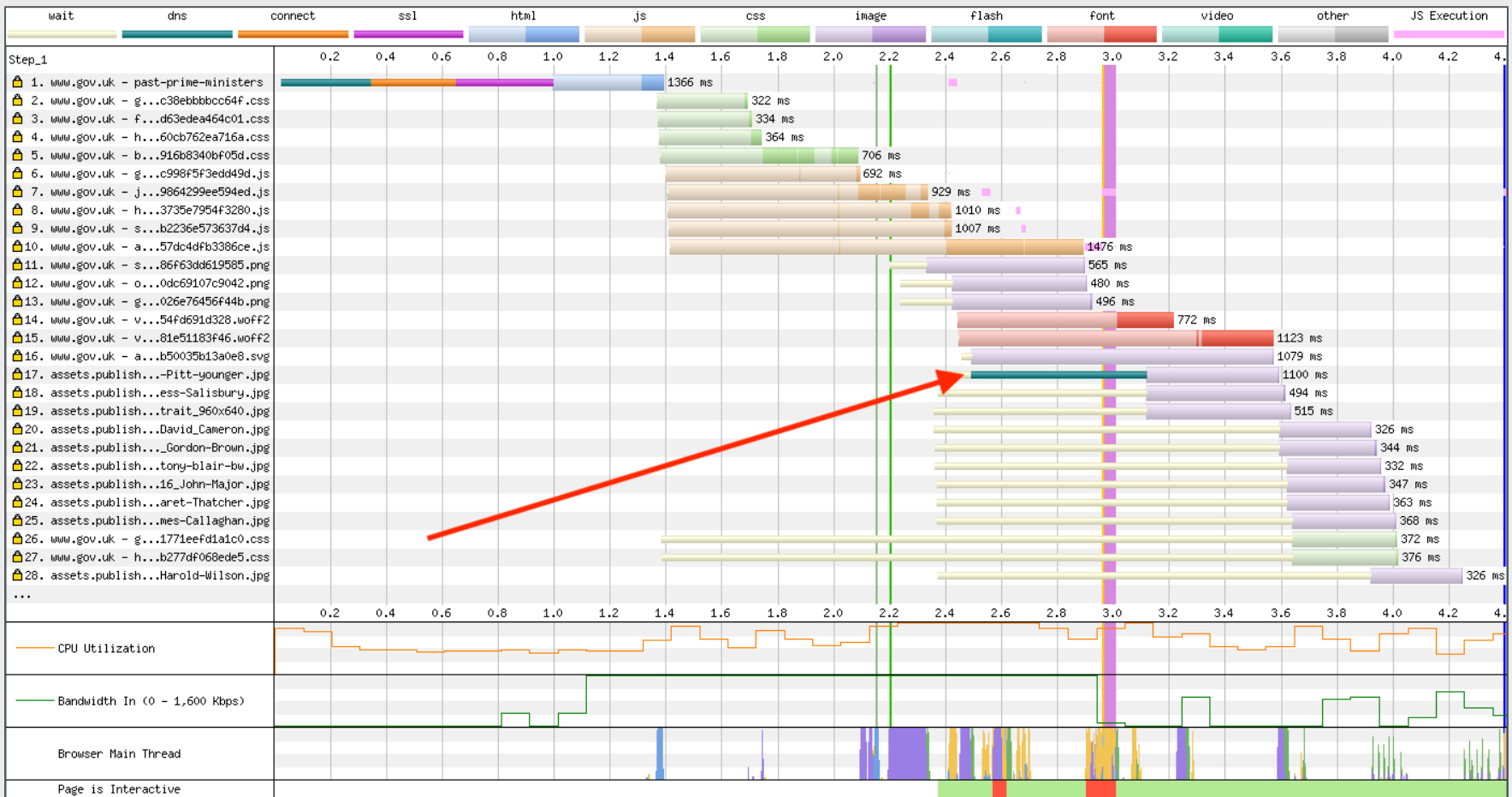


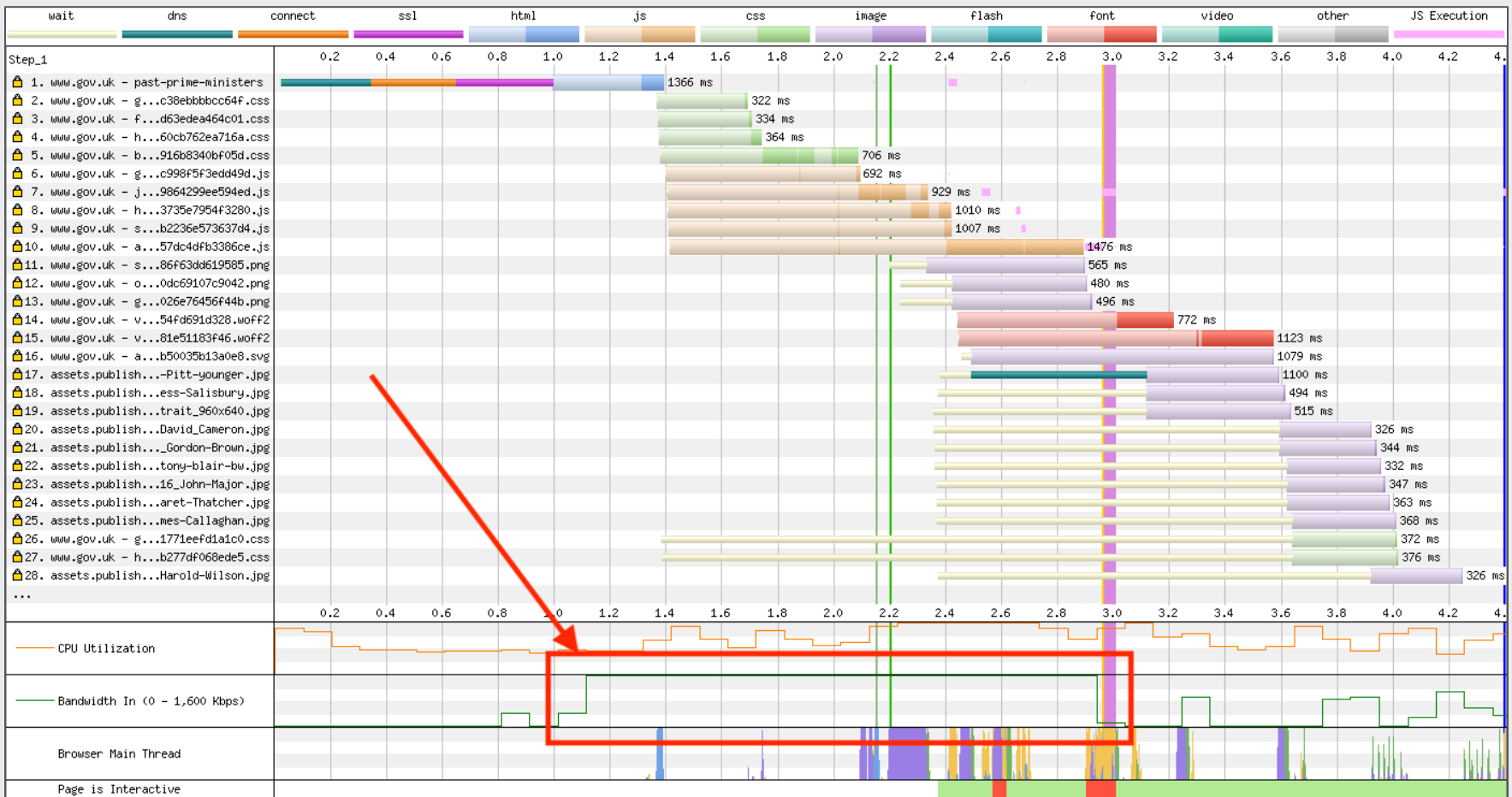


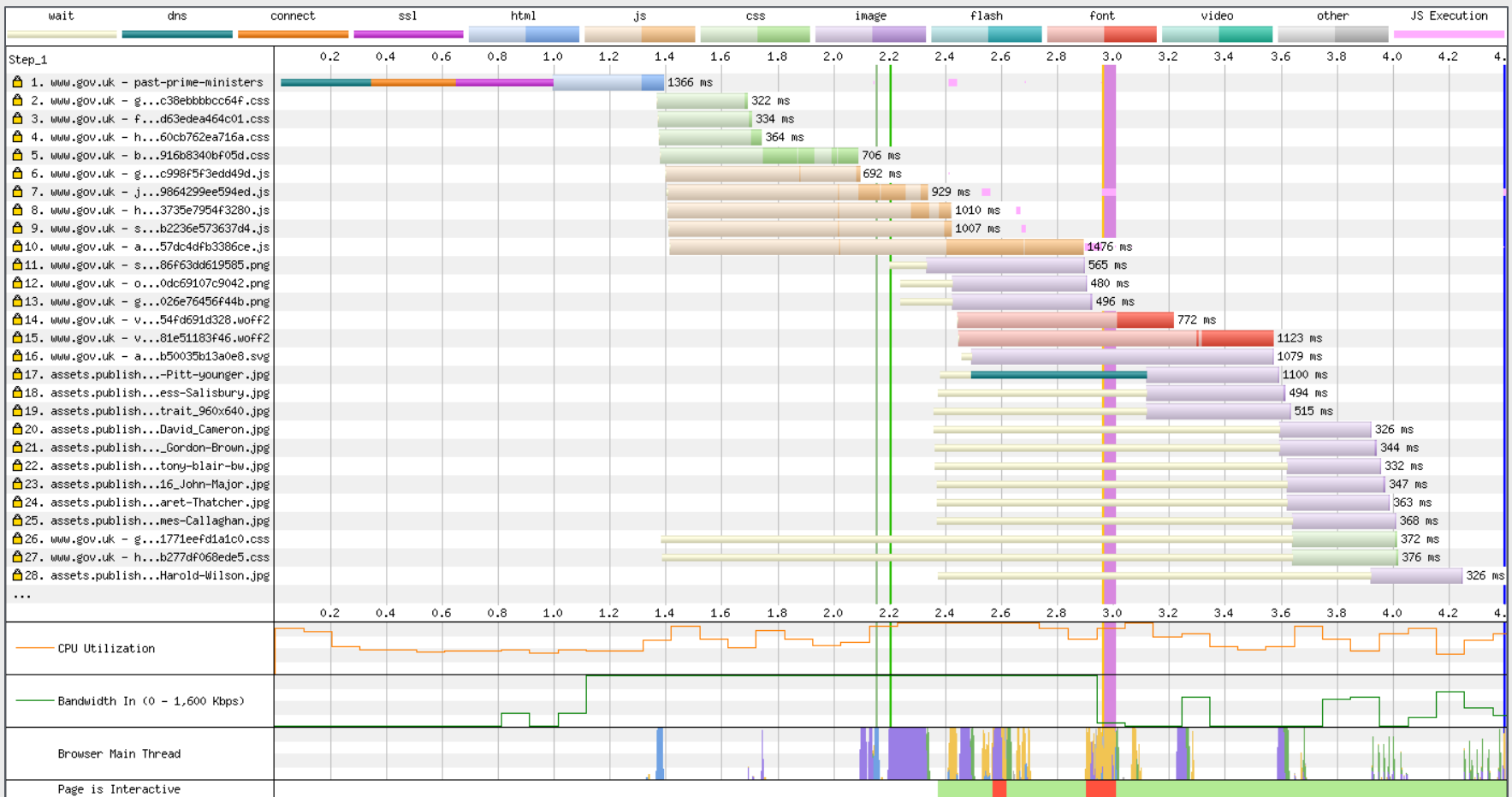


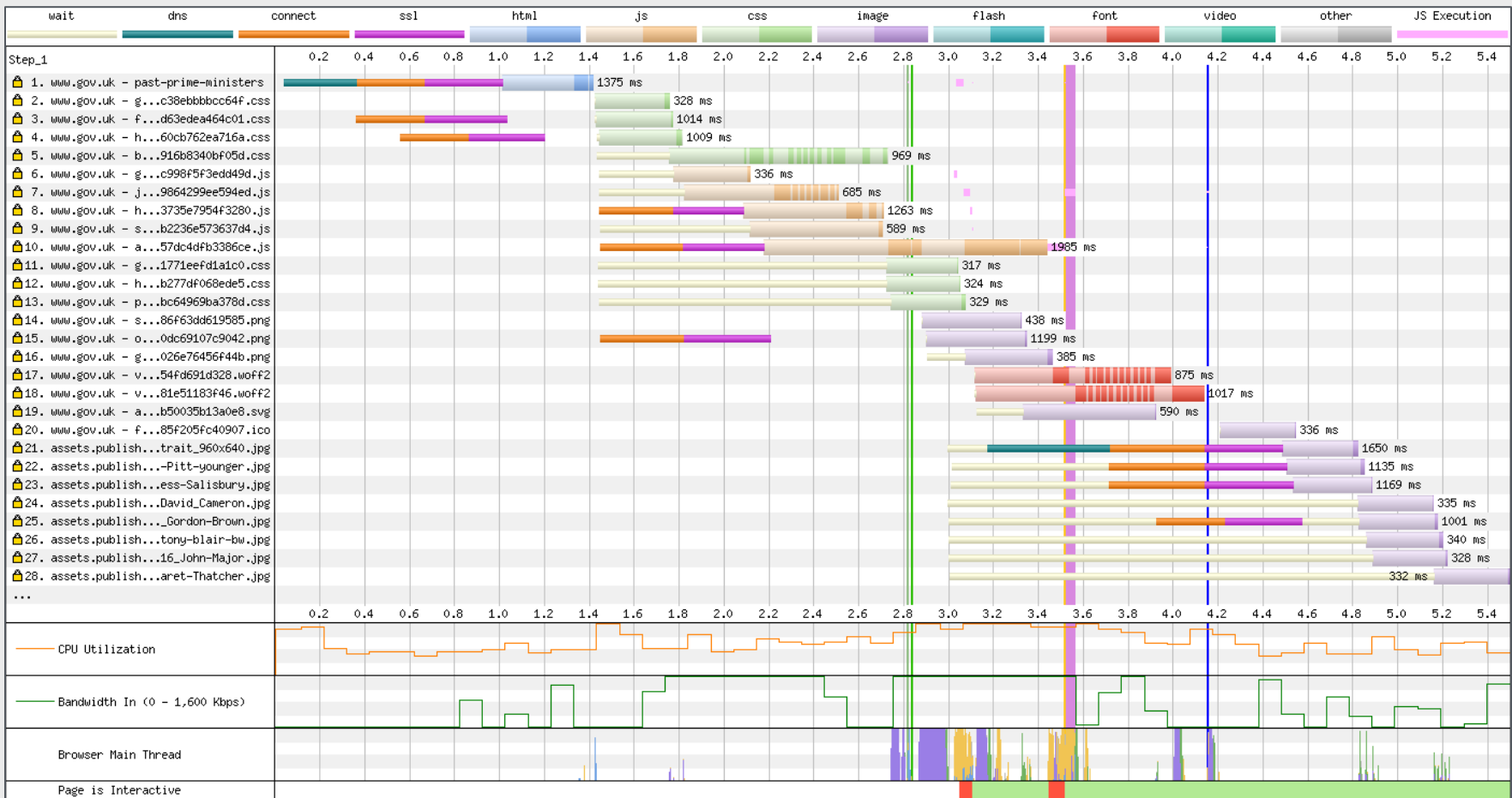












Chunk Data

18. www.gov.uk - v...81e51183f46.woff2

1017 ms

Request #18

Details

Request

Response

Raw Details

Object

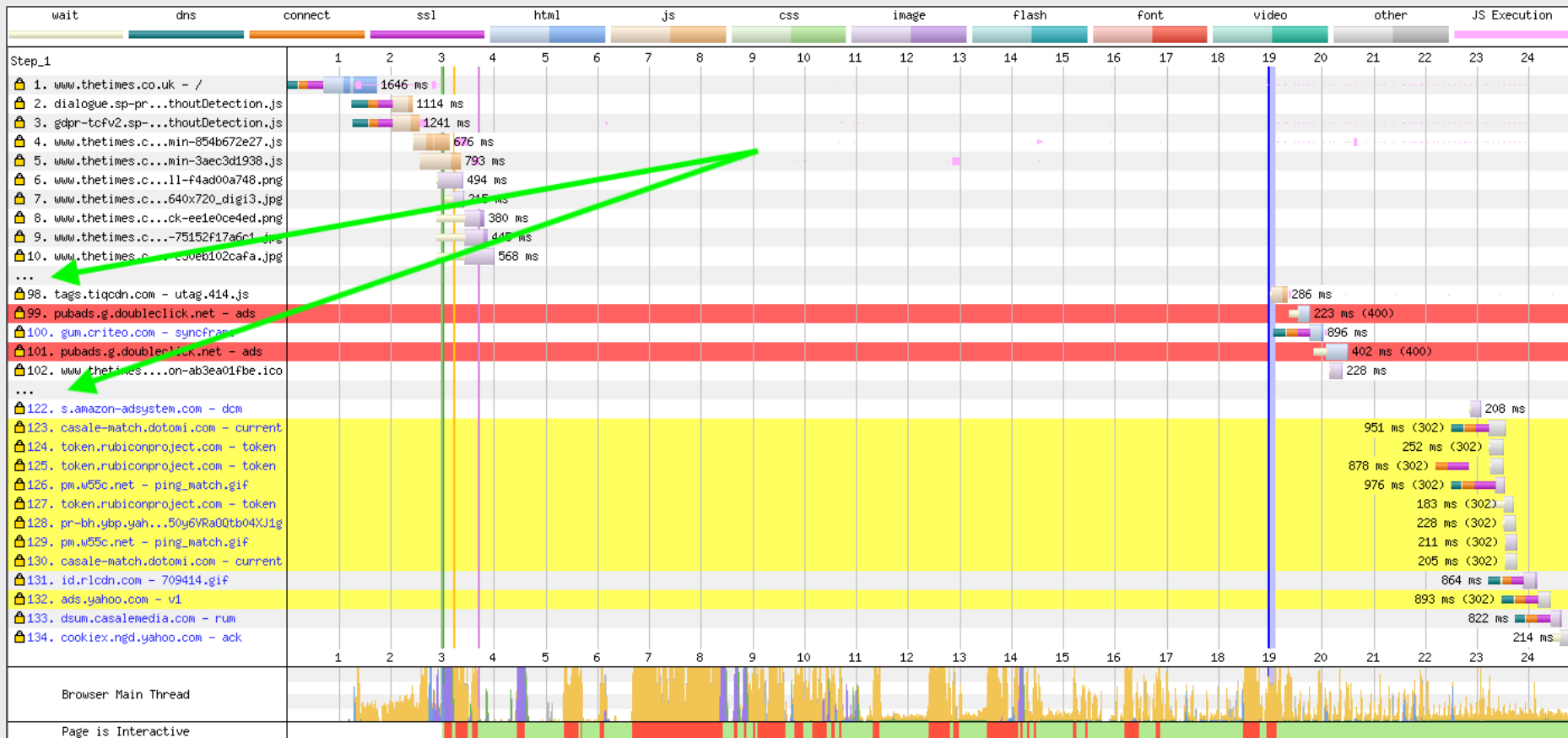


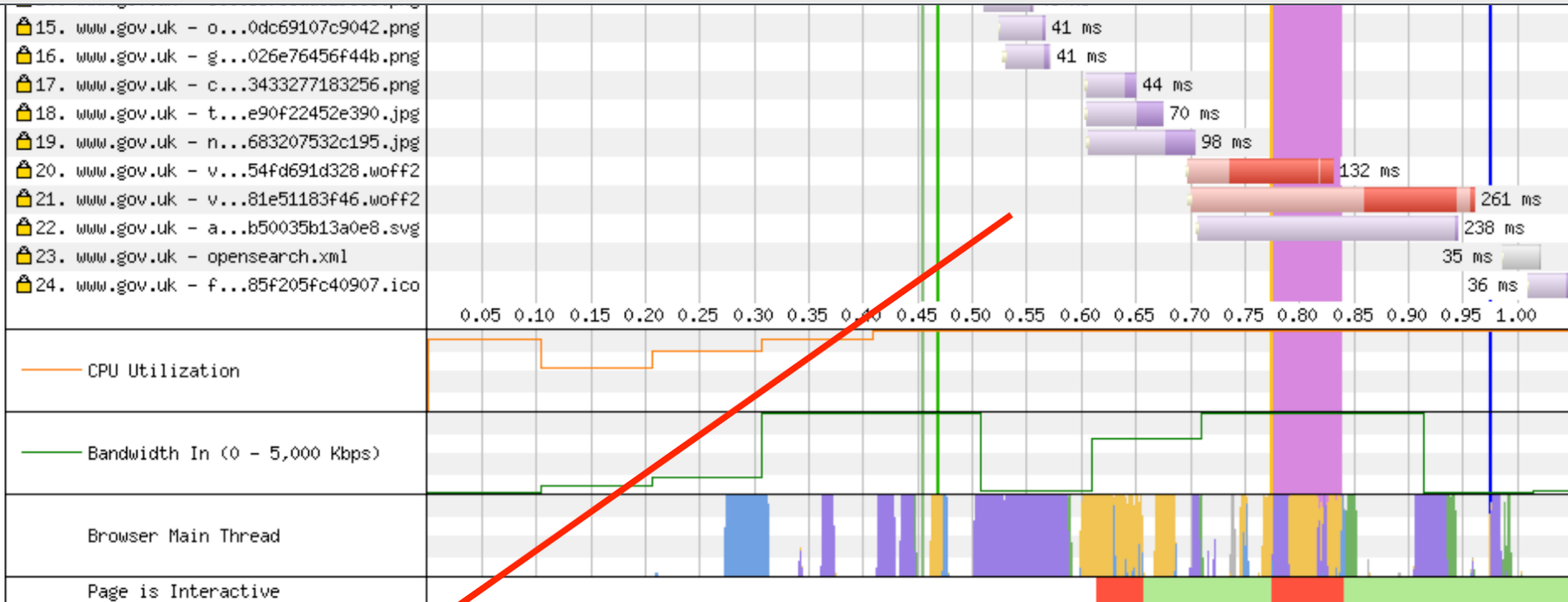
- 19. www.gov.uk - a...b50035b13a0
- 20. www.gov.uk - f...85f205fc409
- 21. assets.publish...trait_960xc
- 22. assets.publish...-Pitt-young
- 23. assets.publish...ess-Salisbu
- 24. assets.publish...David_Camer
- 25. assets.publish..._Gordon-Bro
- 26. assets.publish...tony-blair-
- 27. assets.publish...16_John-Ma
- 28. assets.publish...aret-Thatch
- 29. assets.publish...mes-Callag
- 30. assets.publish...Harold-Wils
- 31. assets.publish..._Edward-Hea
- 32. assets.publish...bald-primr
- 33. assets.publish...iam-Gladsto
- 34. assets.publish...amin-Disrae
- 35. assets.publish...Duke-Portla
- 36. assets.publish...arl-Shelbur
- 37. assets.publish...ss-Rocking
- 38. assets.publish...16_Lord-Nor
- 39. assets.publish..._Duke-Graft
- 40. assets.publish..._Earl-Chat
- 41. assets.publish...rge-Grenvil
- 42. assets.publish...216_Earl-Bu

```
"chunks": [  
  {  
    "bytes": 3434,  
    "ts": 3565.355  
  },  
  {  
    "bytes": 700,  
    "ts": 3566.399  
  },  
  {  
    "bytes": 4134,  
    "ts": 3587.373  
  },  
  {  
    "bytes": 4134,  
    "ts": 3609.959  
  },  
  {  
    "bytes": 1378,  
    "ts": 3632.622  
  },  
  {  
    "bytes": 1378
```

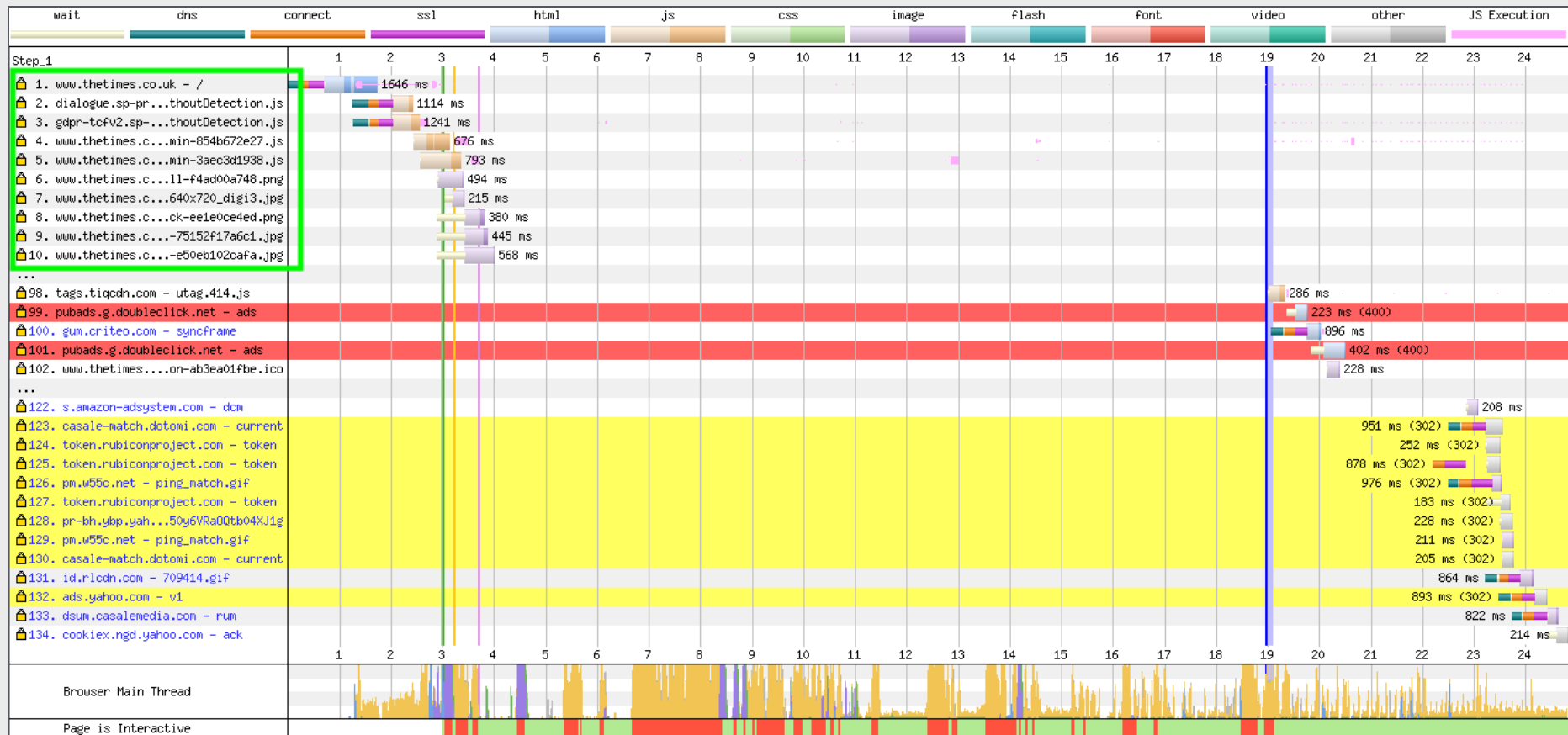
S
MS
MS
MS

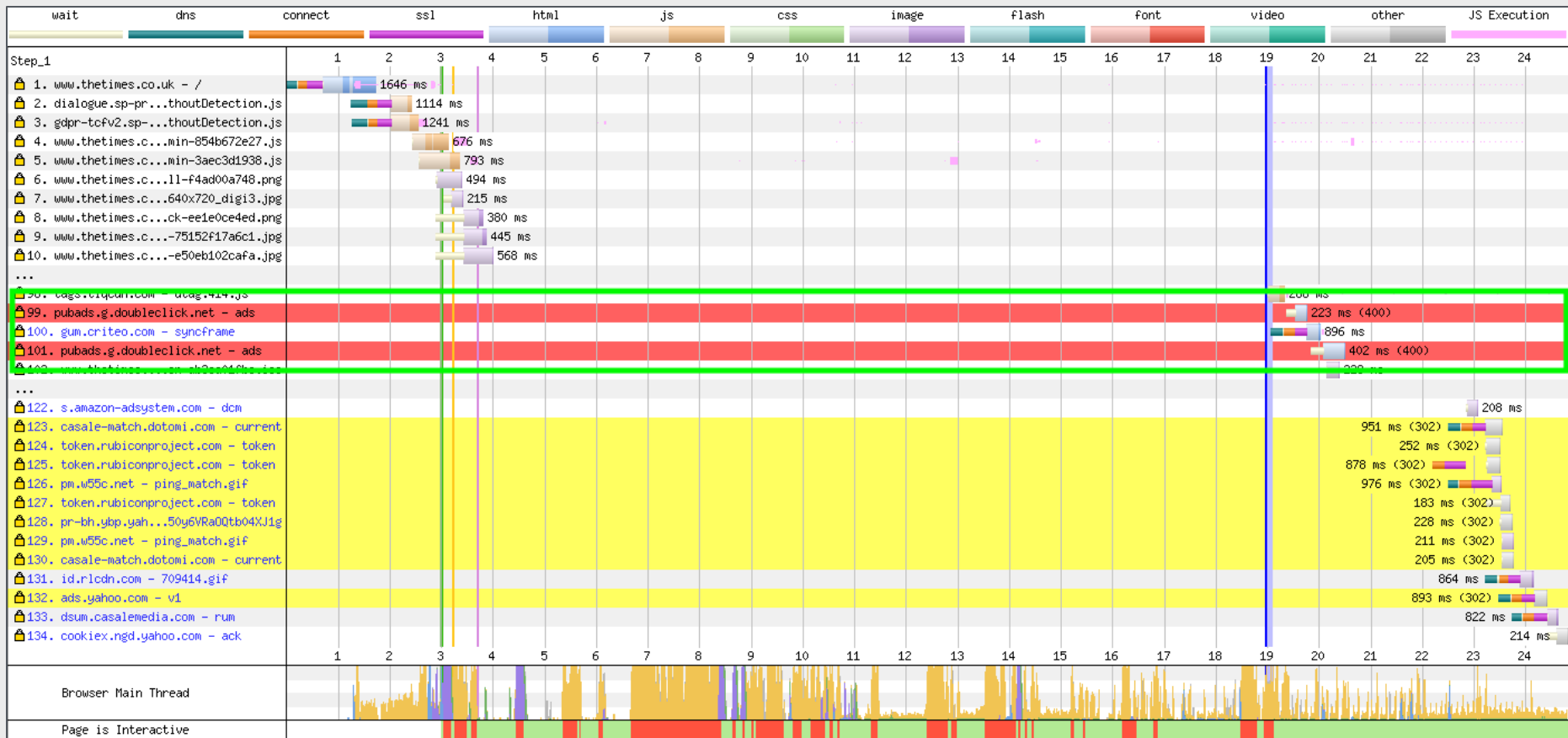
Error/Status Codes

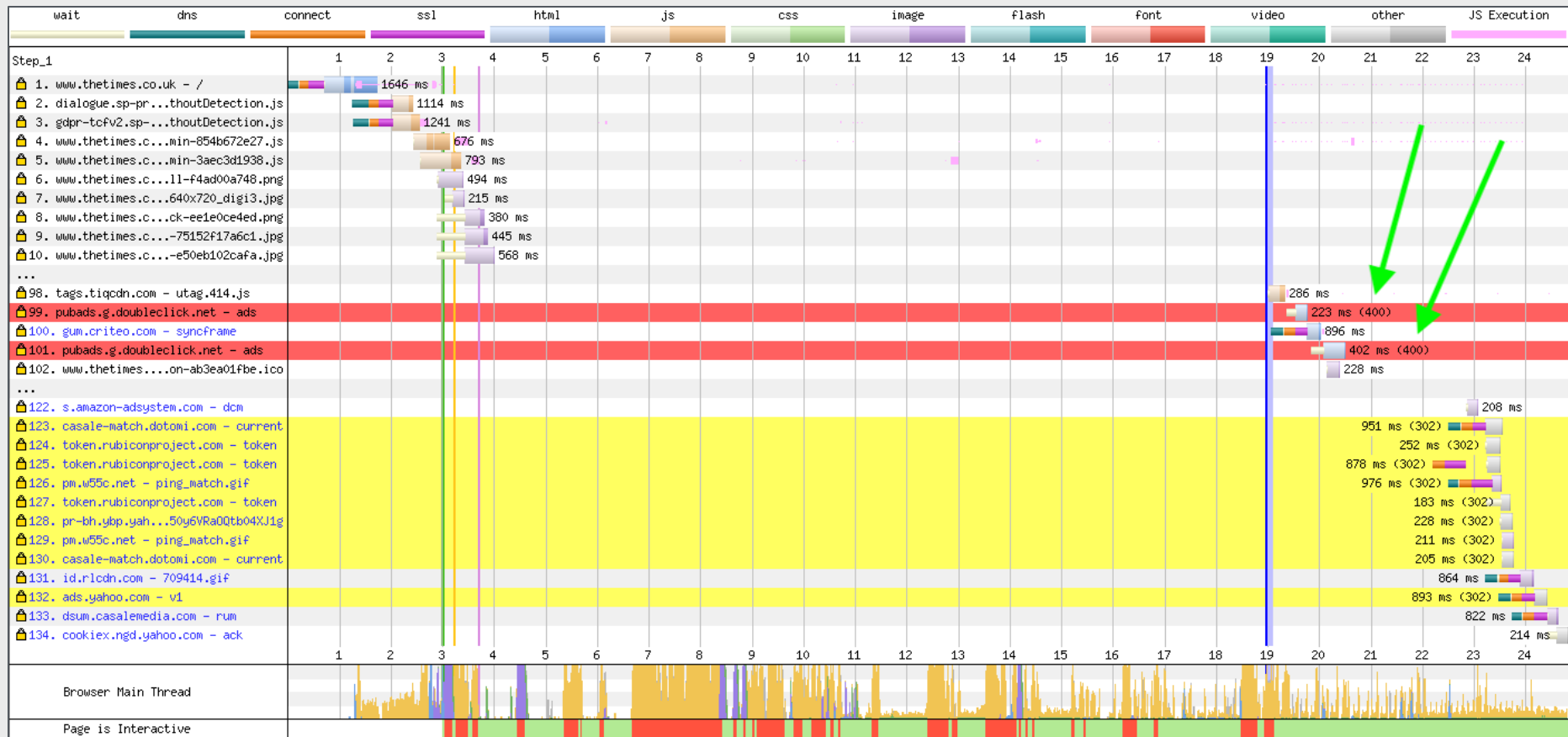


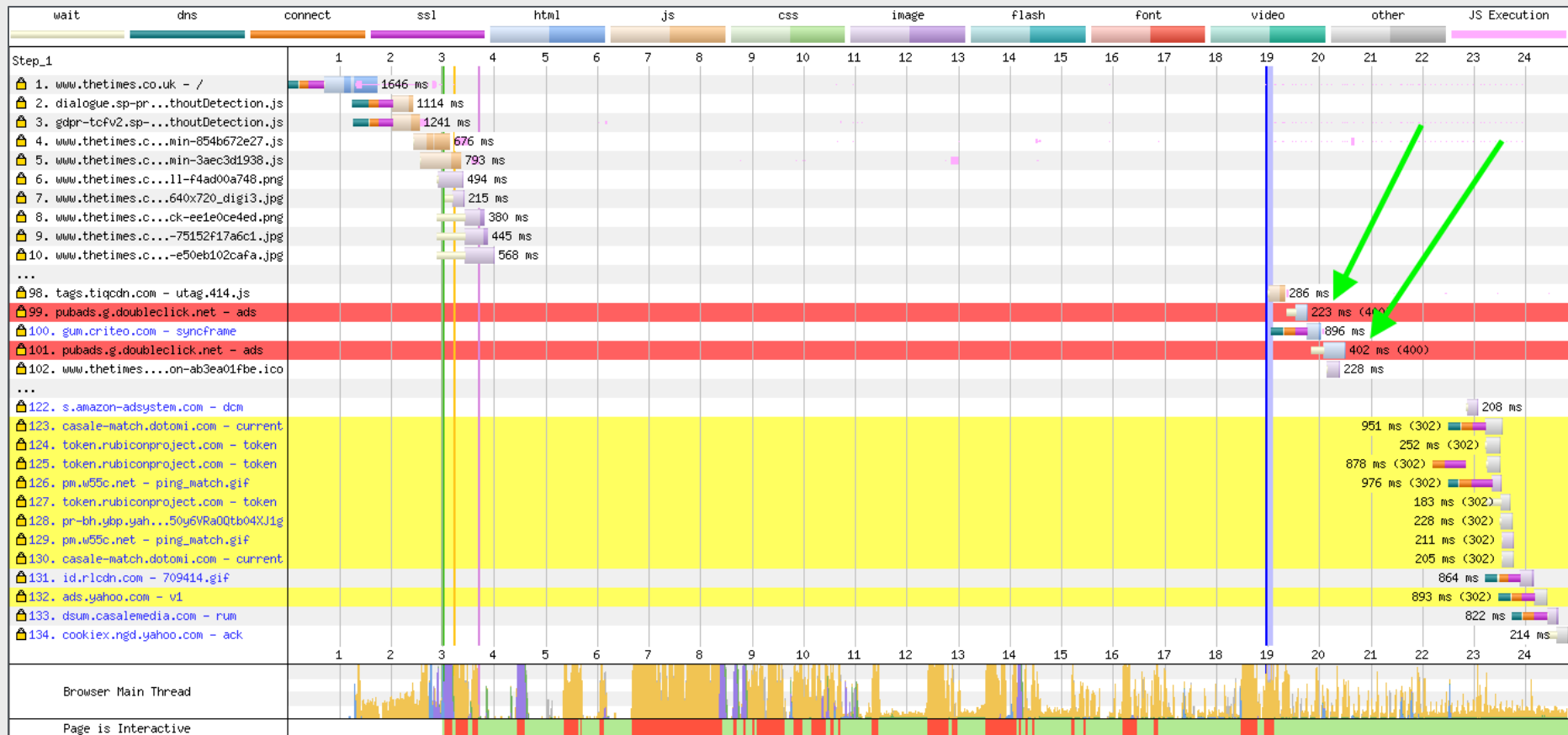


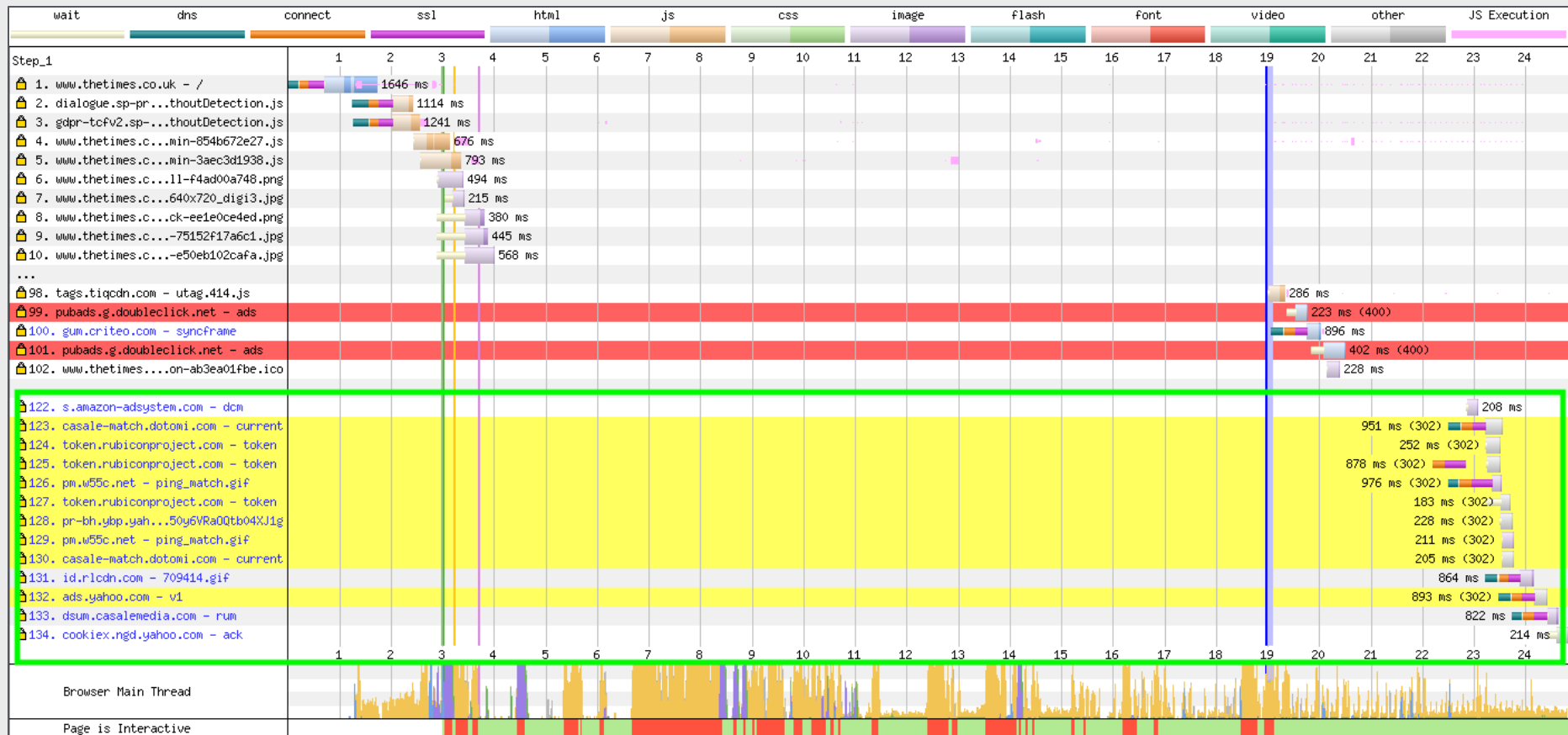
[customize waterfall](#) • [View all Images](#) • [View HTTP/2 Dependency Graph](#) • [Filmstrip](#)

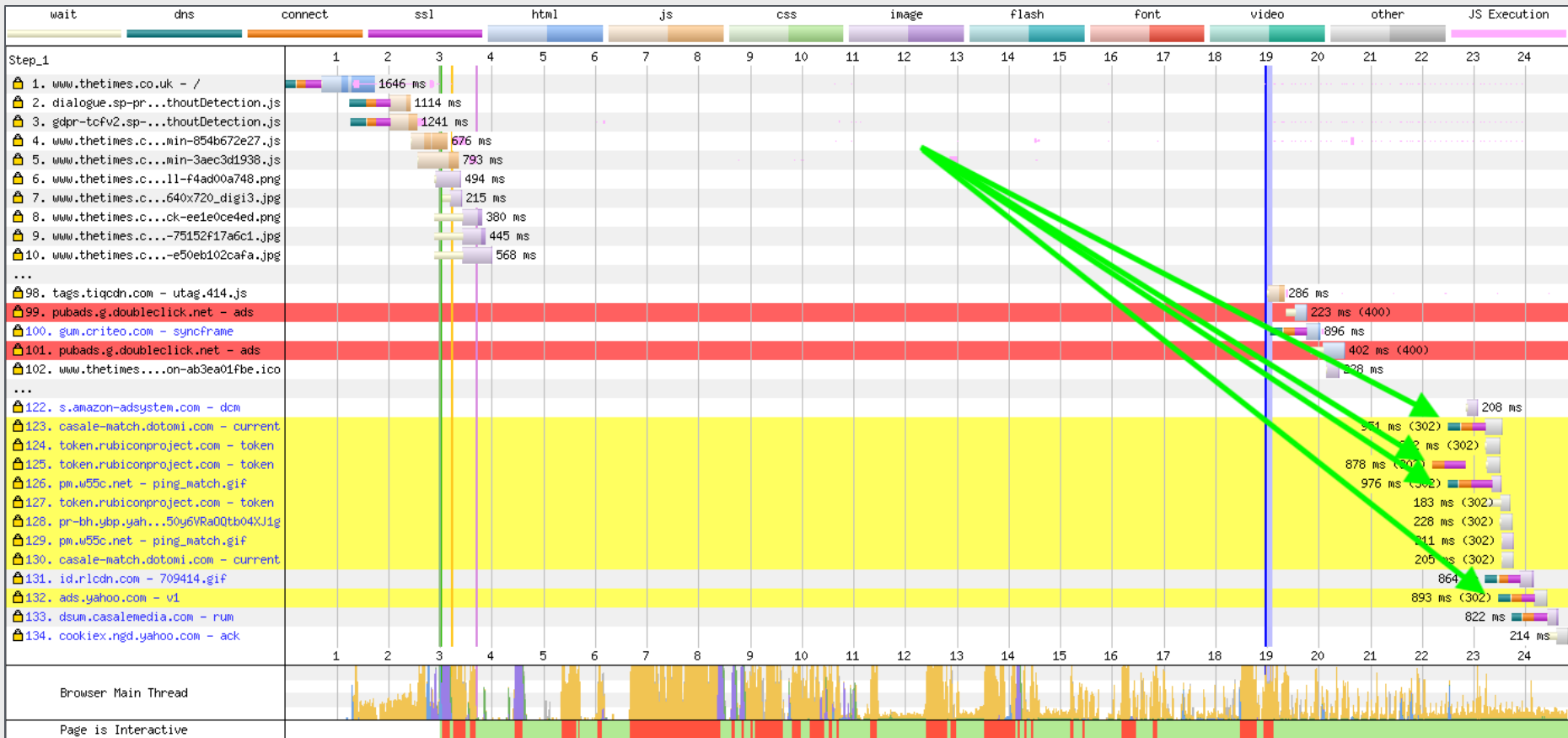




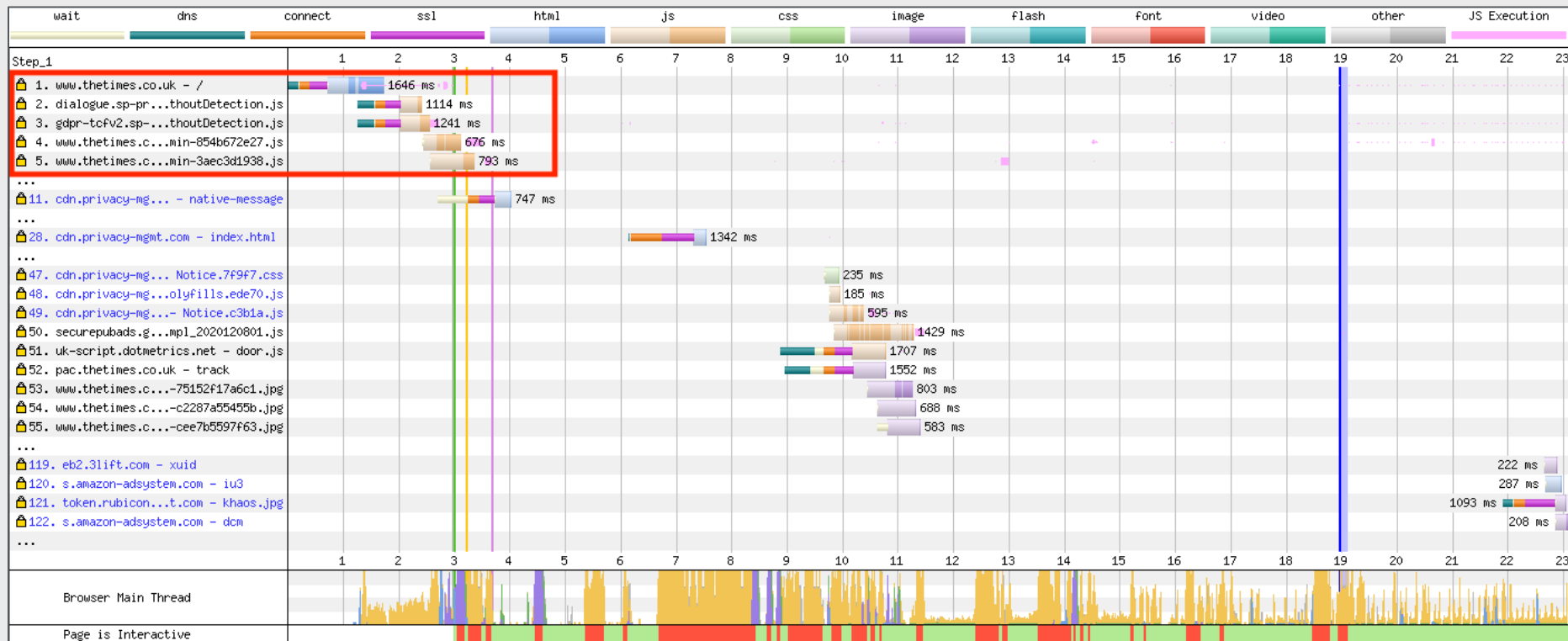


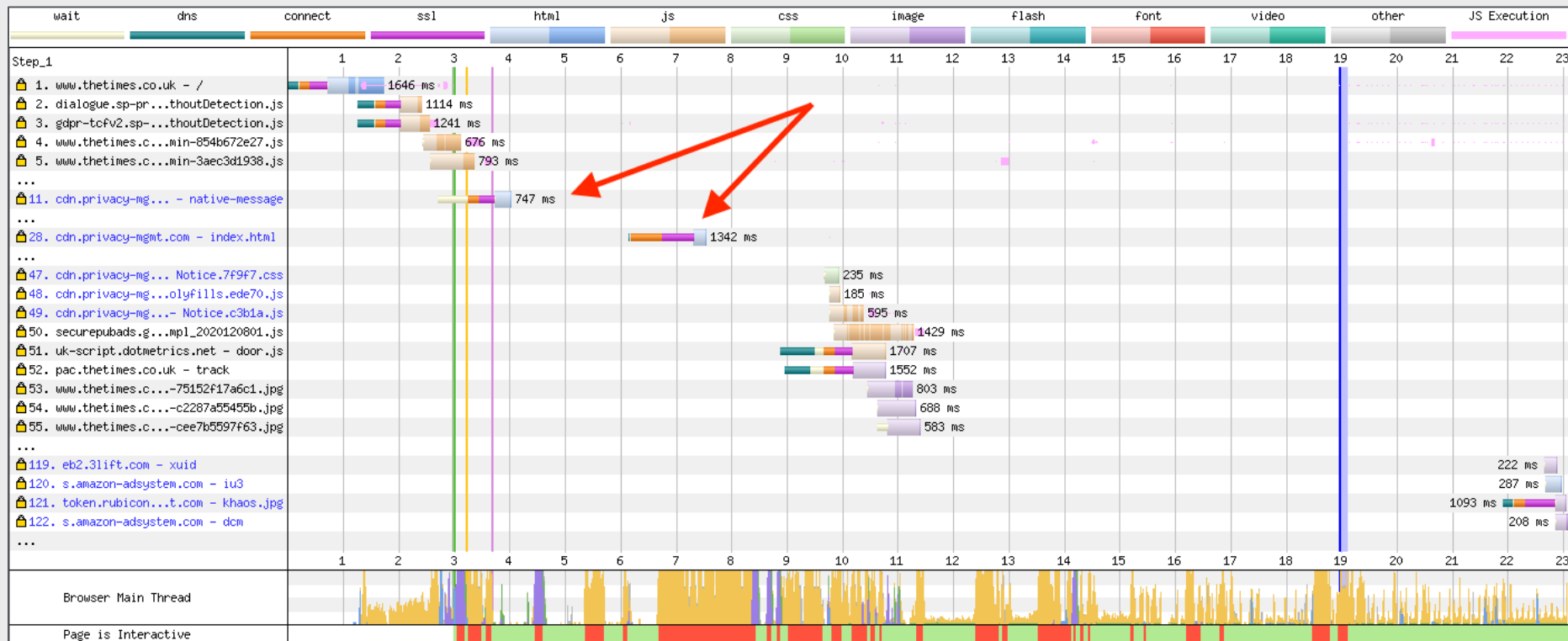


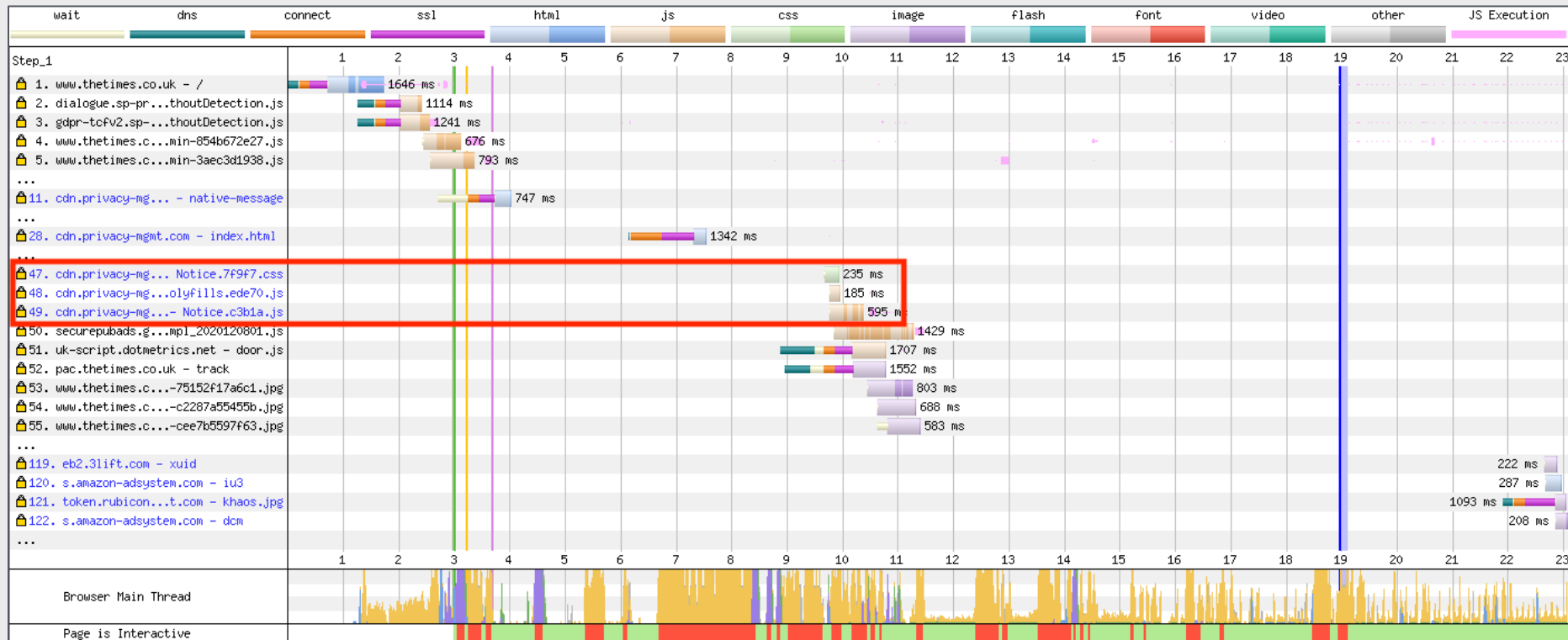


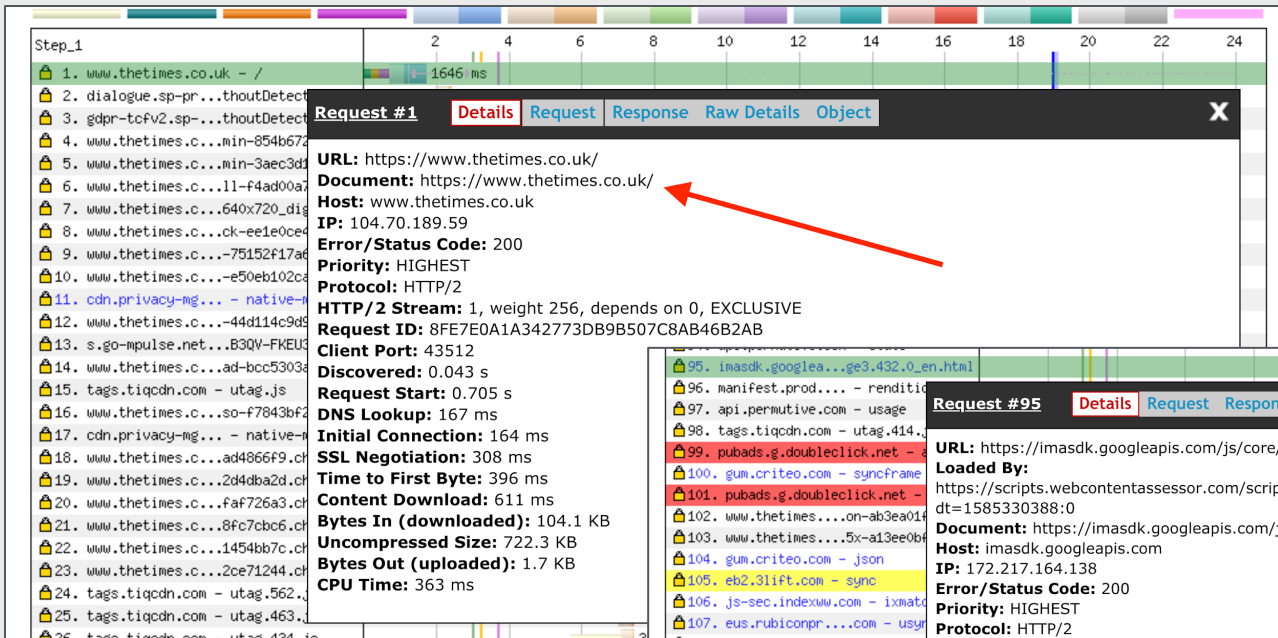


Identifying the request initialiser



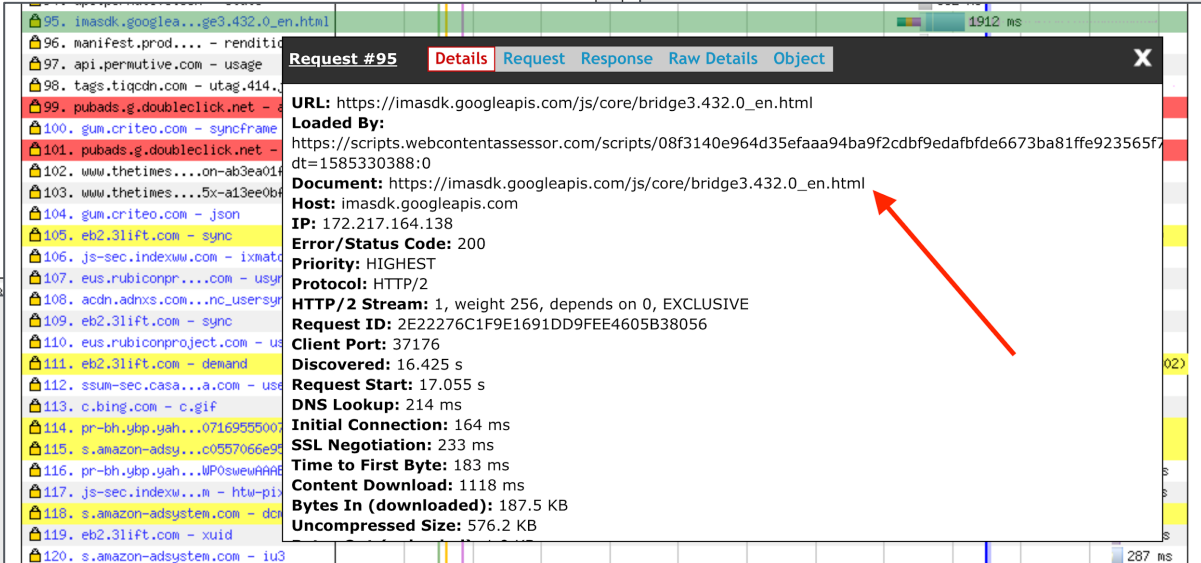






Request #1 Details Request Response Raw Details Object

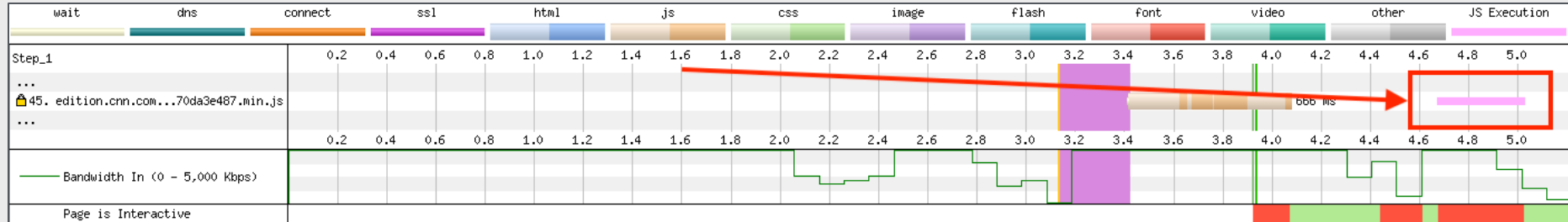
URL: https://www.thetimes.co.uk/
Document: https://www.thetimes.co.uk/
Host: www.thetimes.co.uk
IP: 104.70.189.59
Error/Status Code: 200
Priority: HIGHEST
Protocol: HTTP/2
HTTP/2 Stream: 1, weight 256, depends on 0, EXCLUSIVE
Request ID: 8FE7E0A1A342773DB9B507C8AB46B2AB
Client Port: 43512
Discovered: 0.043 s
Request Start: 0.705 s
DNS Lookup: 167 ms
Initial Connection: 164 ms
SSL Negotiation: 308 ms
Time to First Byte: 396 ms
Content Download: 611 ms
Bytes In (downloaded): 104.1 KB
Uncompressed Size: 722.3 KB
Bytes Out (uploaded): 1.7 KB
CPU Time: 363 ms

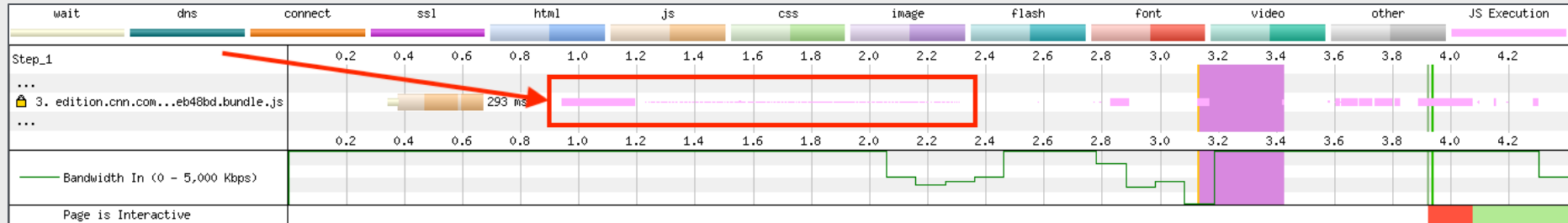


Request #95 Details Request Response Raw Details Object

URL: https://imasdk.googleapis.com/js/core/bridge3.432.0_en.html
Loaded By: https://scripts.webcontentassessor.com/scripts/08f3140e964d35efaaa94ba9f2cdf9edafbfde6673ba81ffe9233565F7
Document: https://imasdk.googleapis.com/js/core/bridge3.432.0_en.html
Host: imasdk.googleapis.com
IP: 172.217.164.138
Error/Status Code: 200
Priority: HIGHEST
Protocol: HTTP/2
HTTP/2 Stream: 1, weight 256, depends on 0, EXCLUSIVE
Request ID: 2E22276C1F9E1691DD9FEE4605B38056
Client Port: 37176
Discovered: 16.425 s
Request Start: 17.055 s
DNS Lookup: 214 ms
Initial Connection: 164 ms
SSL Negotiation: 233 ms
Time to First Byte: 183 ms
Content Download: 1118 ms
Bytes In (downloaded): 187.5 KB
Uncompressed Size: 576.2 KB

JavaScript Execution





User Timing Marks

```
<script>window.performance.mark('mark_custom_event');</script>
```

Generate a custom Waterfall:

Chart Type: Waterfall Connection View

Chart Coloring: Classic By MIME Type

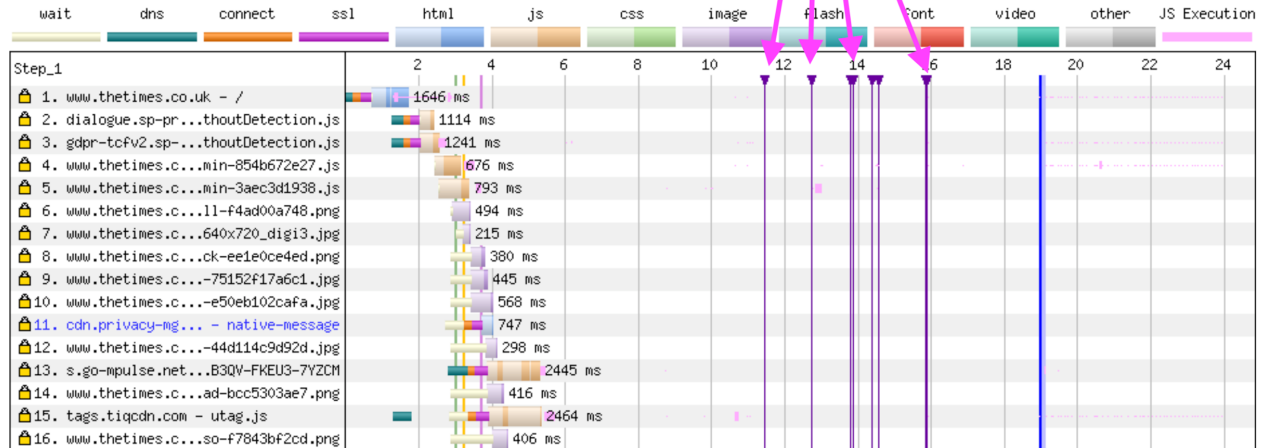
Image Width: Pixels (300-2000)

Maximum Time: Seconds (leave blank for automatic)

Requests (i.e. 1,2,3,4-9,8):

Draw lines for User Timing Marks Show CPU Utilization Show Bandwidth Utilization

Show Ellipsis (...) for missing items Show Labels for requests (URL) Show download chunks Show JS Execution chunks Show Wait Time




Tester: MotoG4_16-192.168.1.116

[Export HTTP Archive \(.har\)](#)

First View only

[Custom Metrics](#)

Test runs: 9

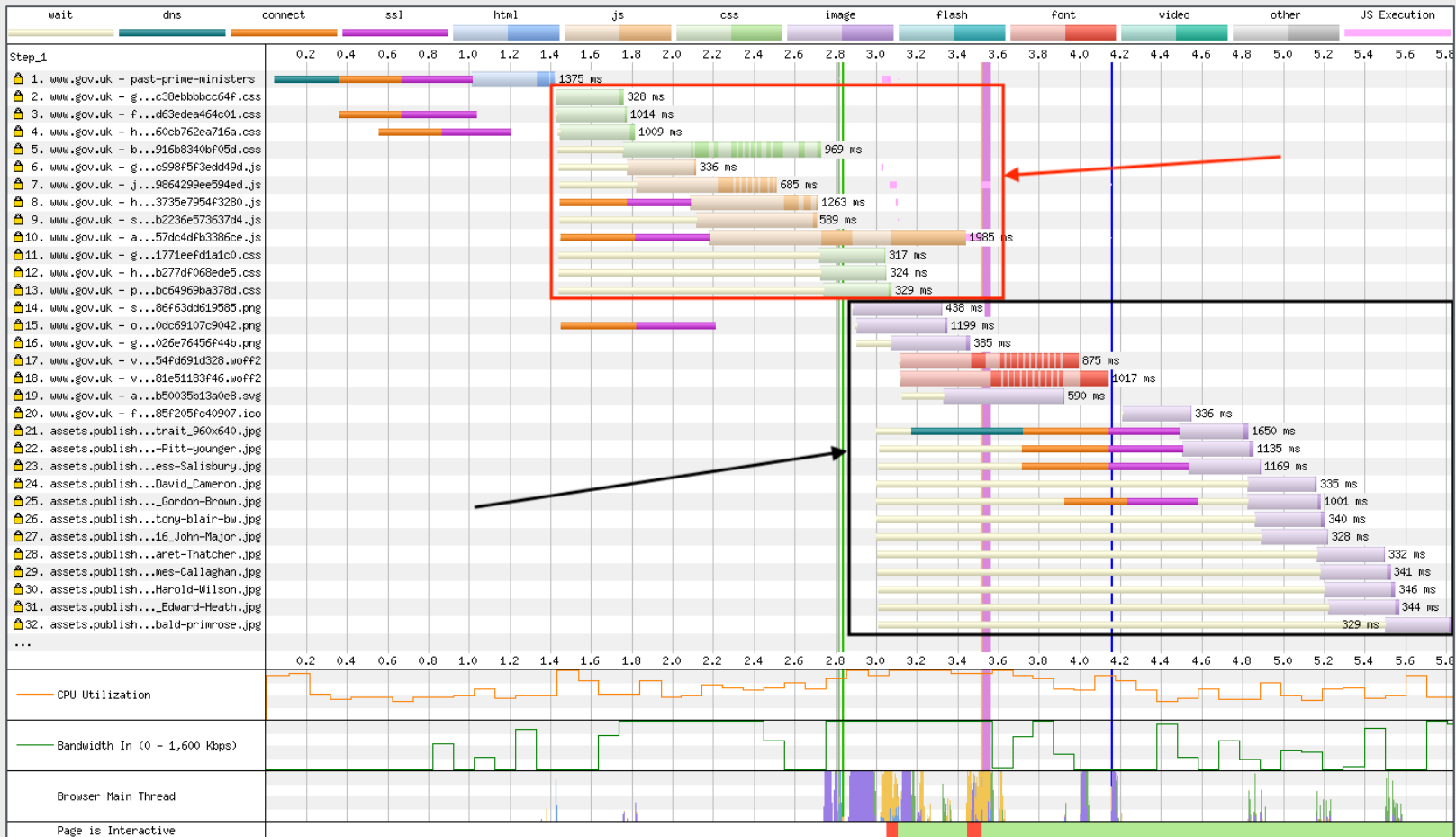


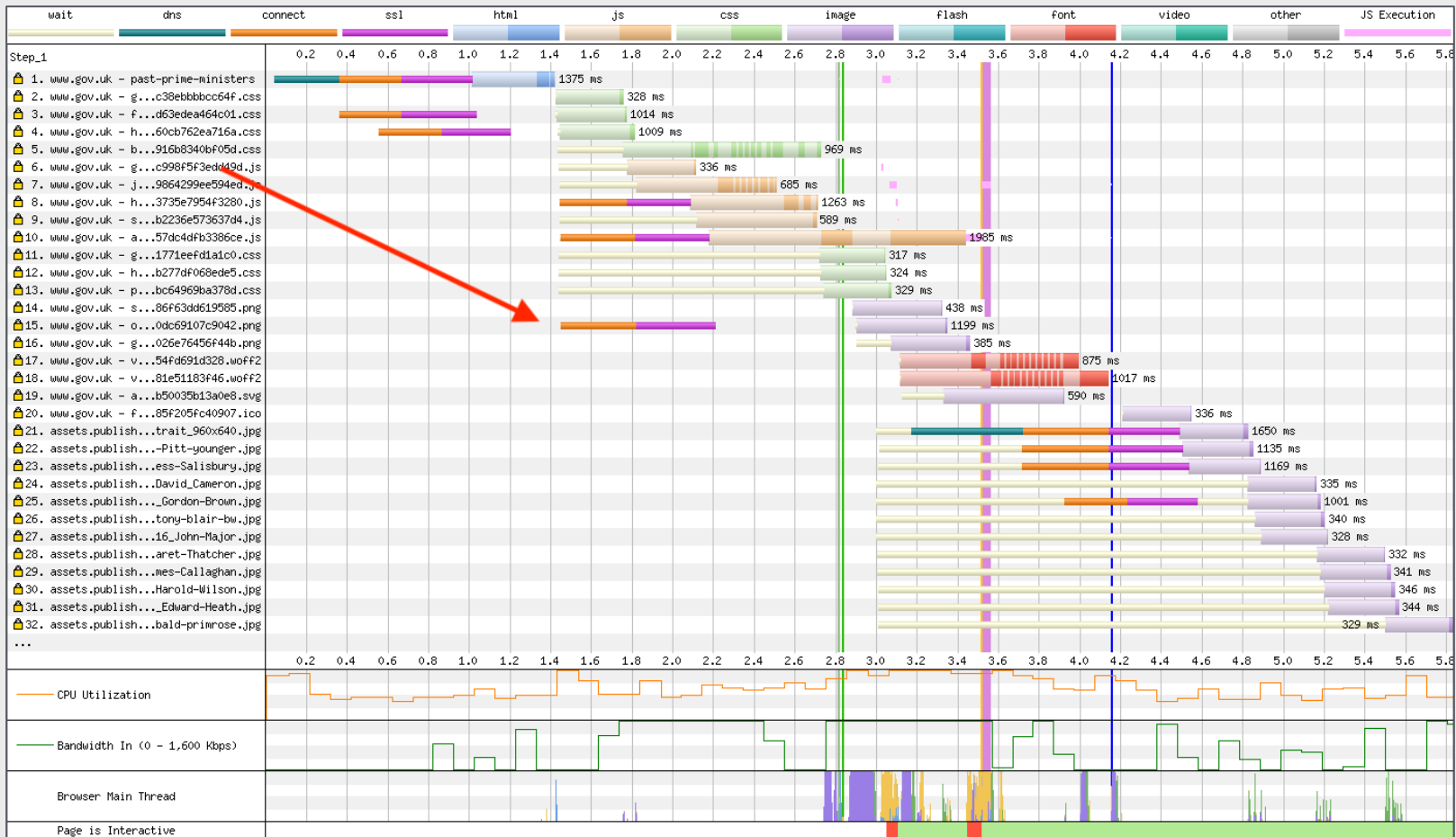
	First Byte	Start Render	First Contentful Paint	Speed Index	Result (error code)	Web Vitals			Document Complete			Fully Loaded		
						Largest Contentful Paint	Cumulative Layout Shift	Total Blocking Time	Time	Requests	Bytes In	Time	Requests	Bytes
First View (Run 1)	1.101s	2.985s	2.972s	7.930s	0	3.699s	0.008	5.350s	18.946s	97	2,222 KB	24.806s	134	2,276

gpt-tag-load	facebookPixelAddonInitStart	bcAdBlockDetectStart	bcInnitStart	bcInnitEnd	bcAdBlockDetectEnd	prebidAddonInitStart	prebidAddonInitEnd	Color
11.439s	12.737s	13.798s	13.874s	14.384s	14.565s	15.843s	15.870s	2

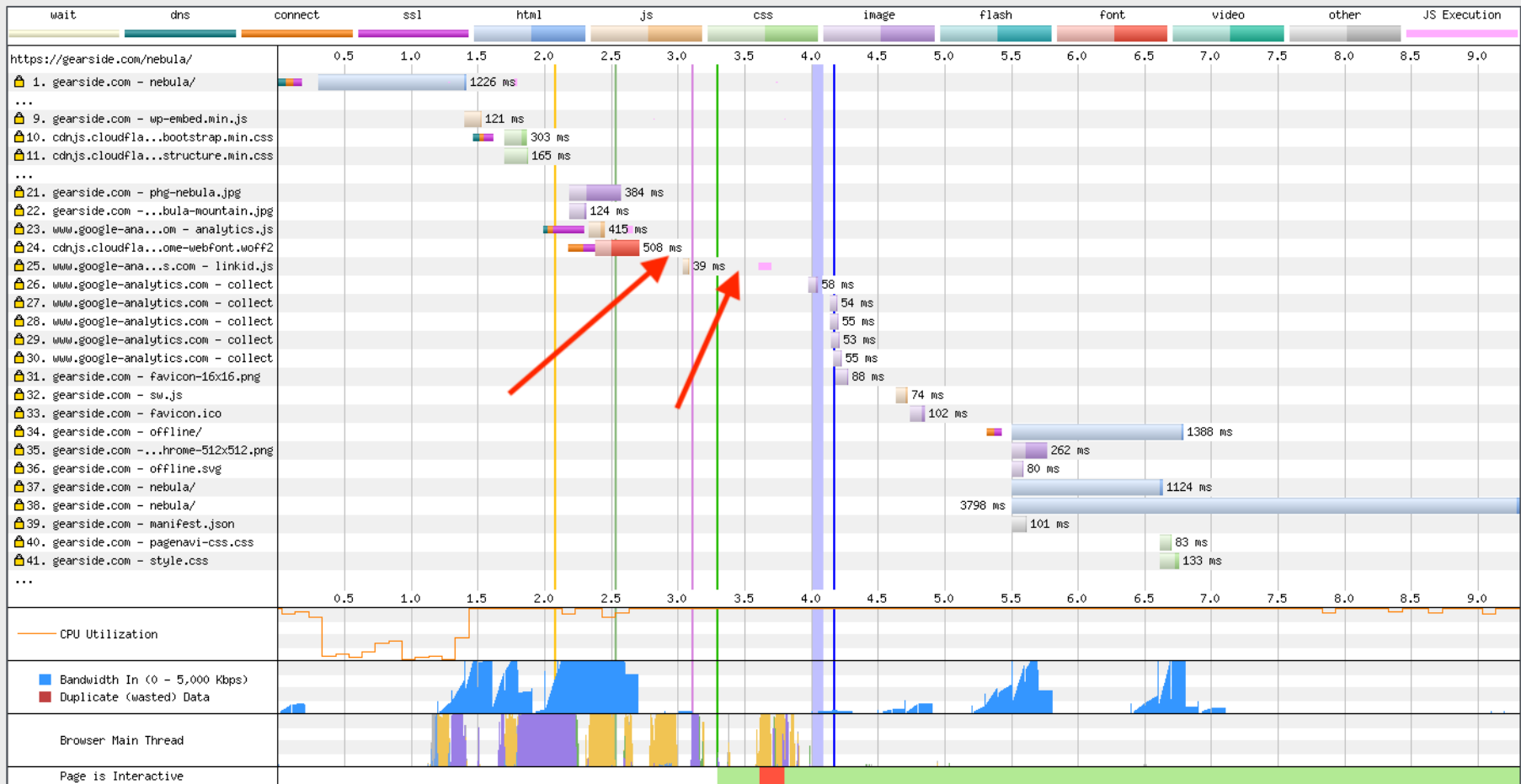
Scenarios

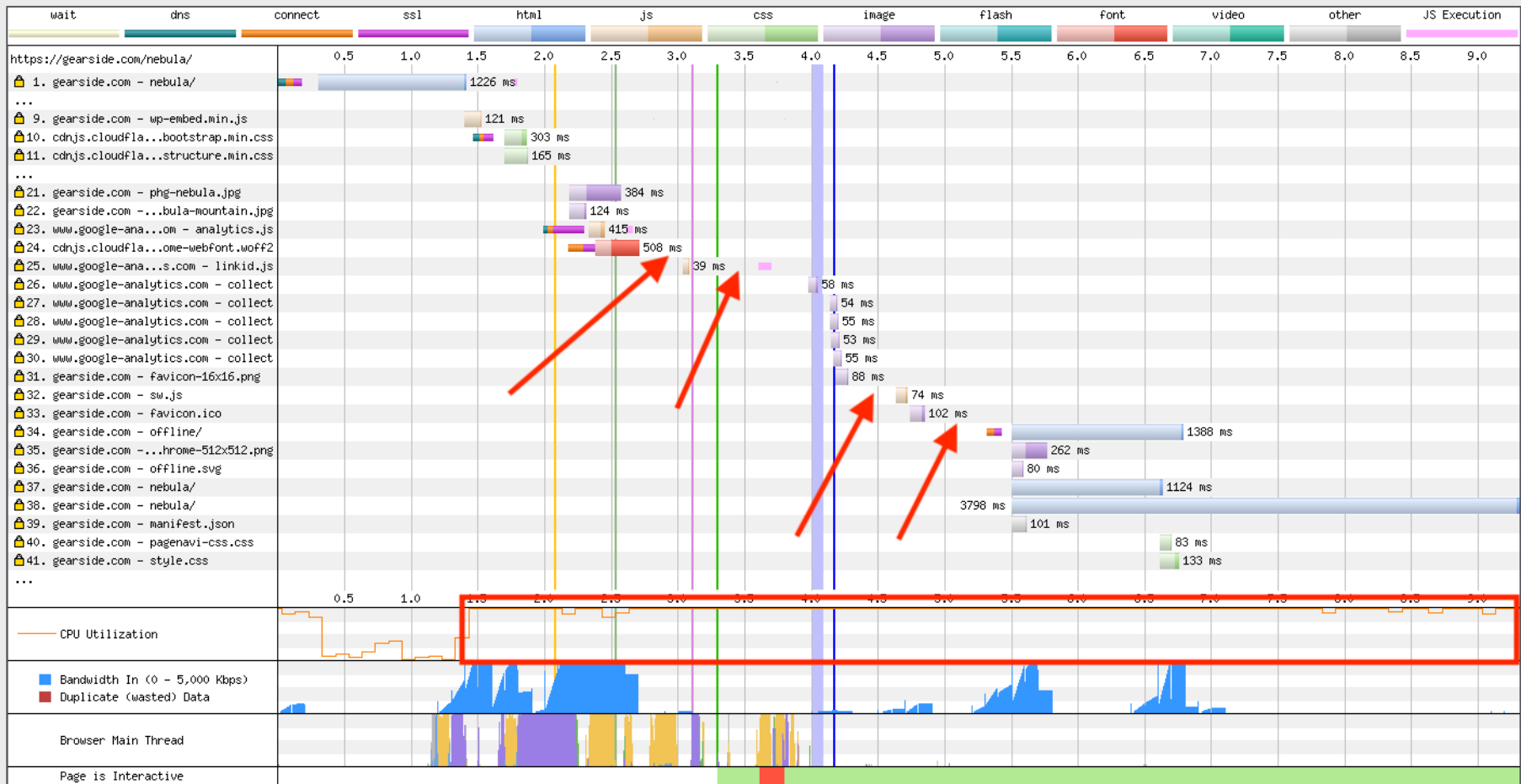
Chrome Stair-Step

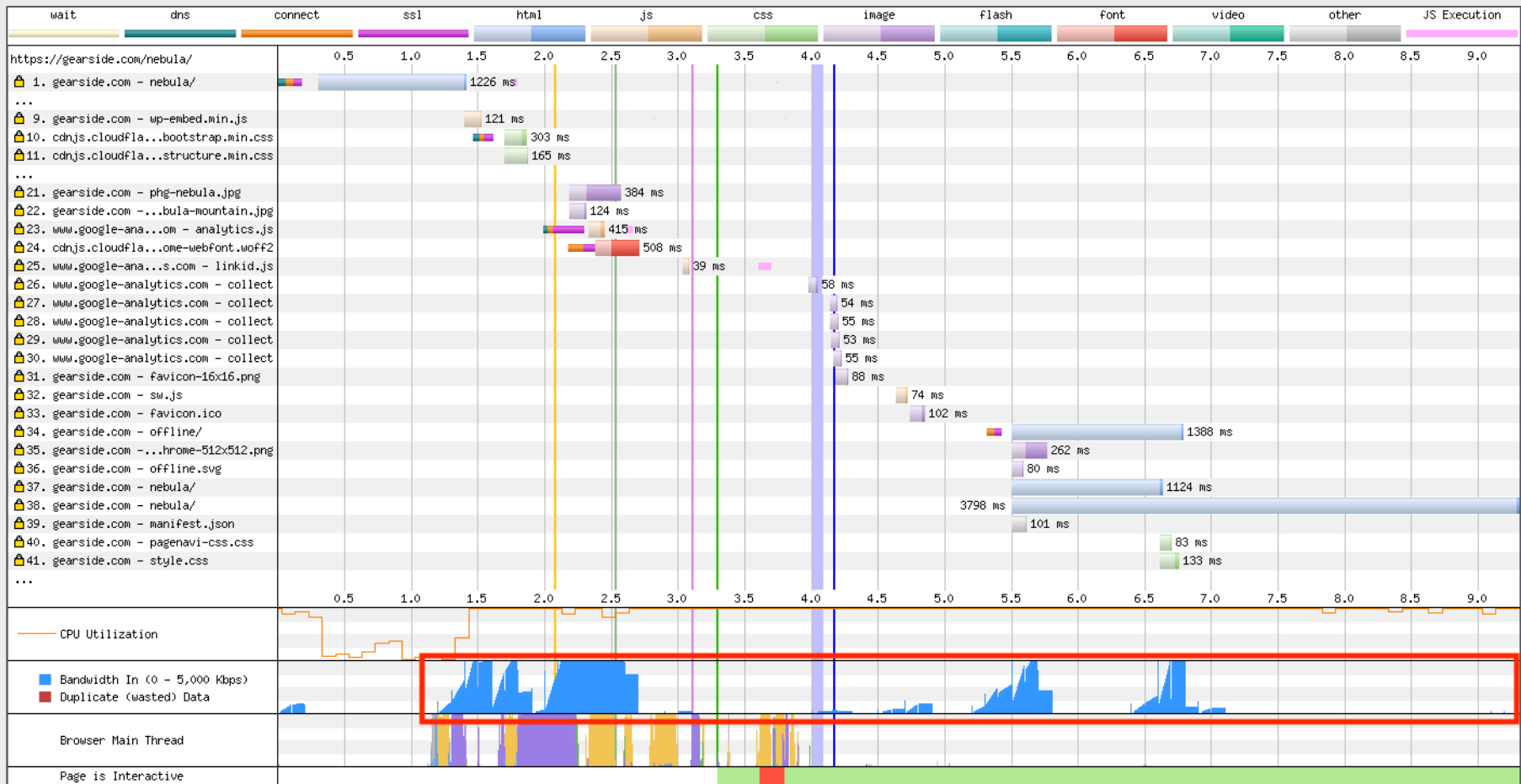


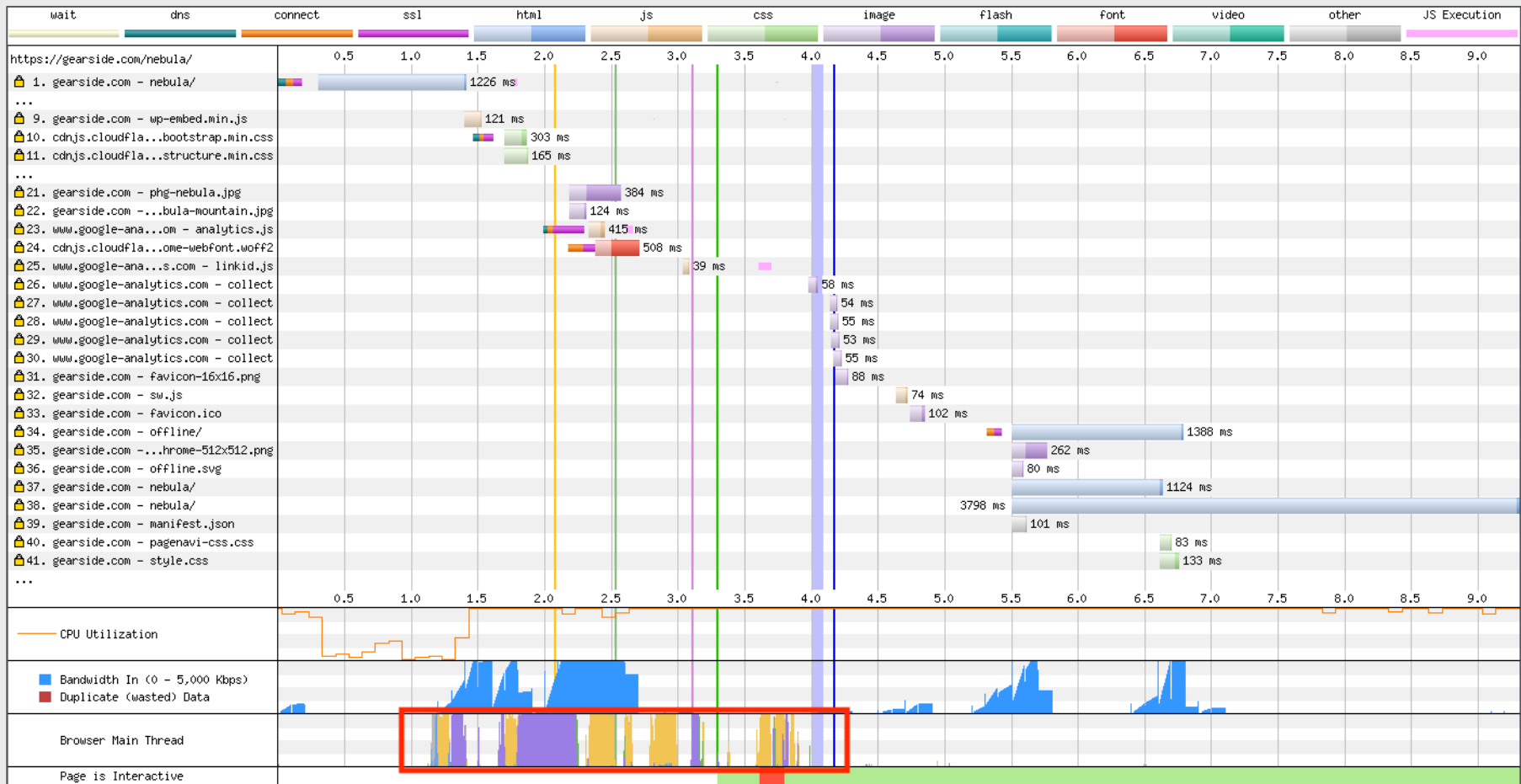


CPU Bottleneck

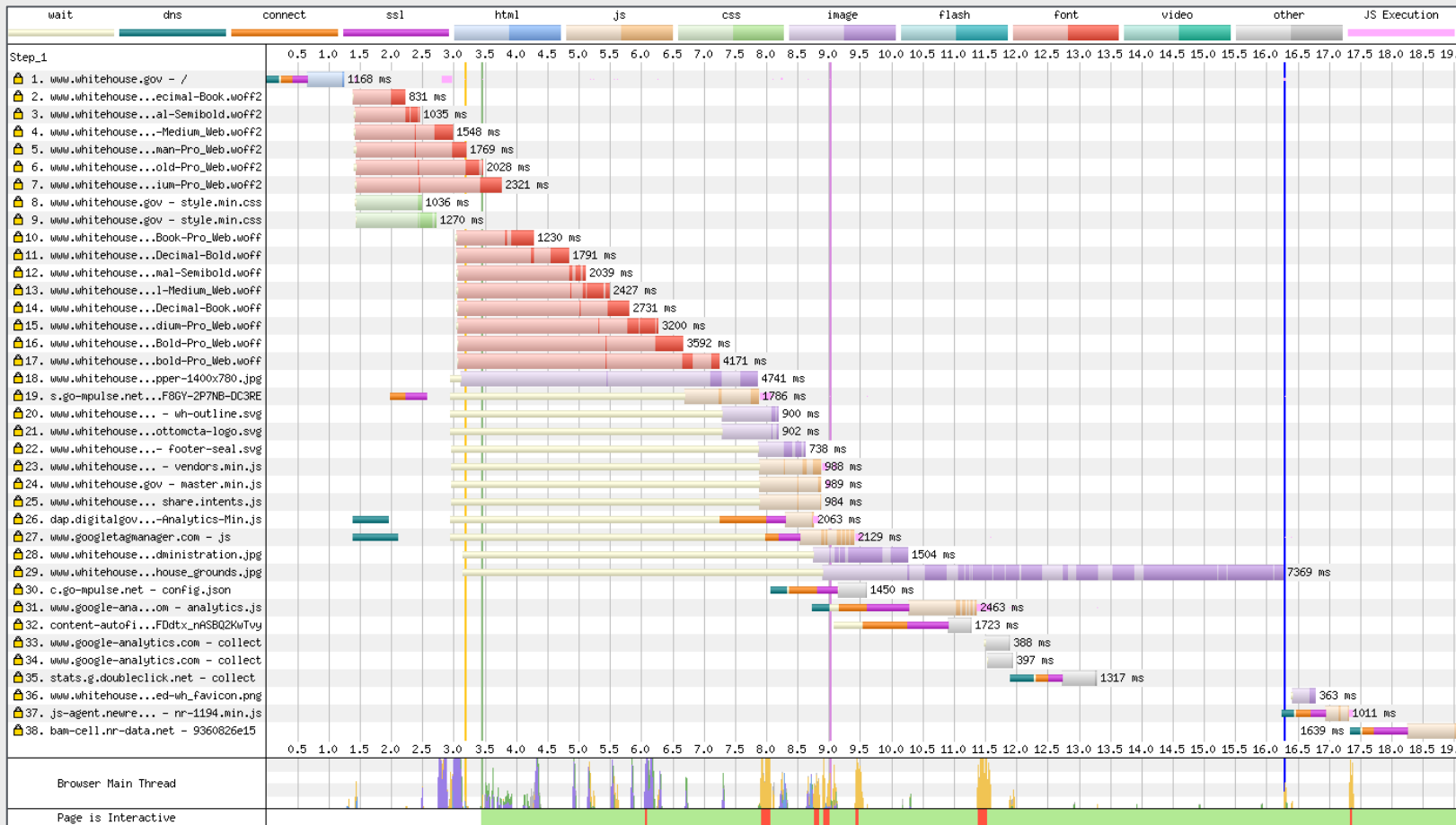


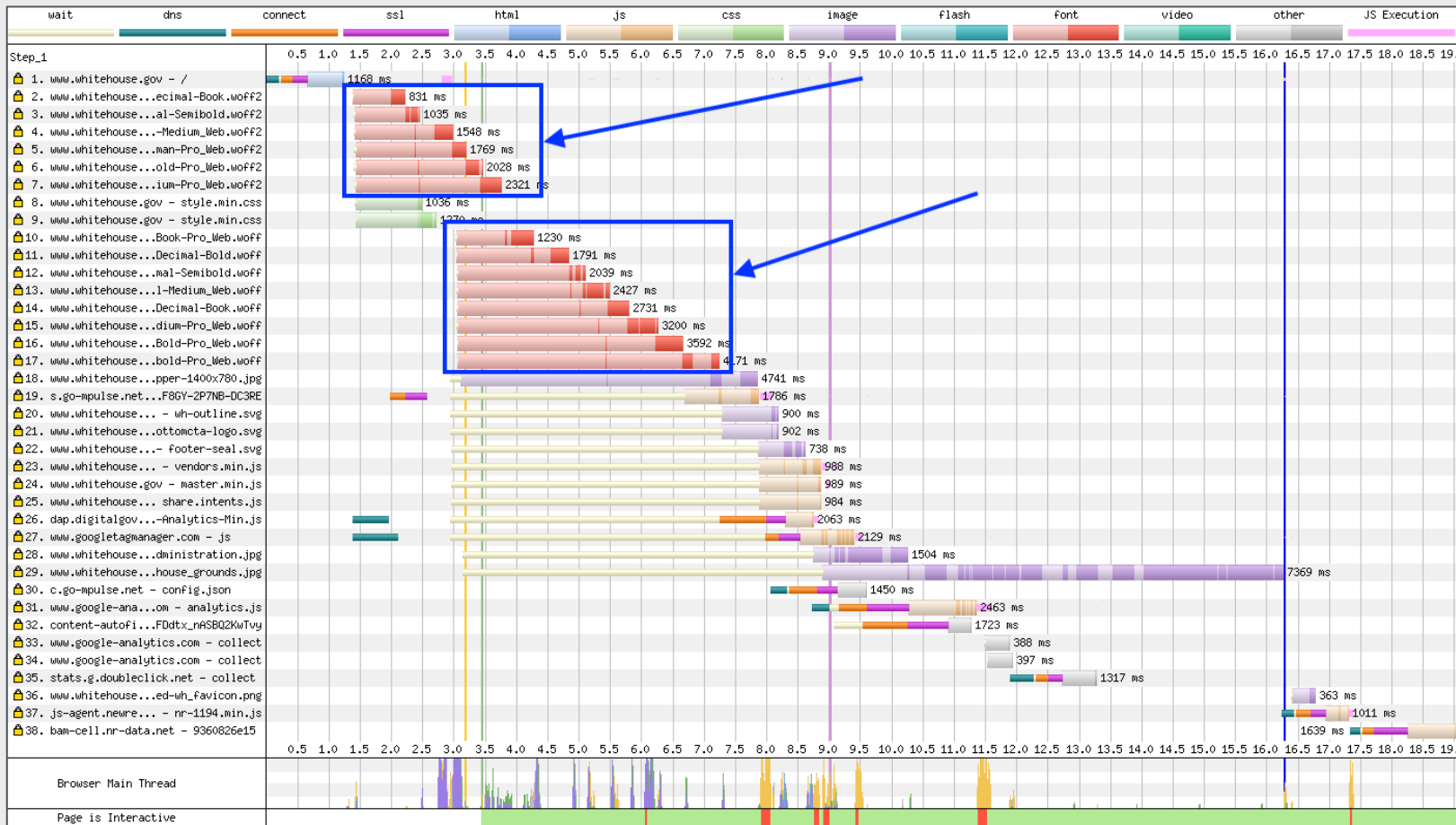


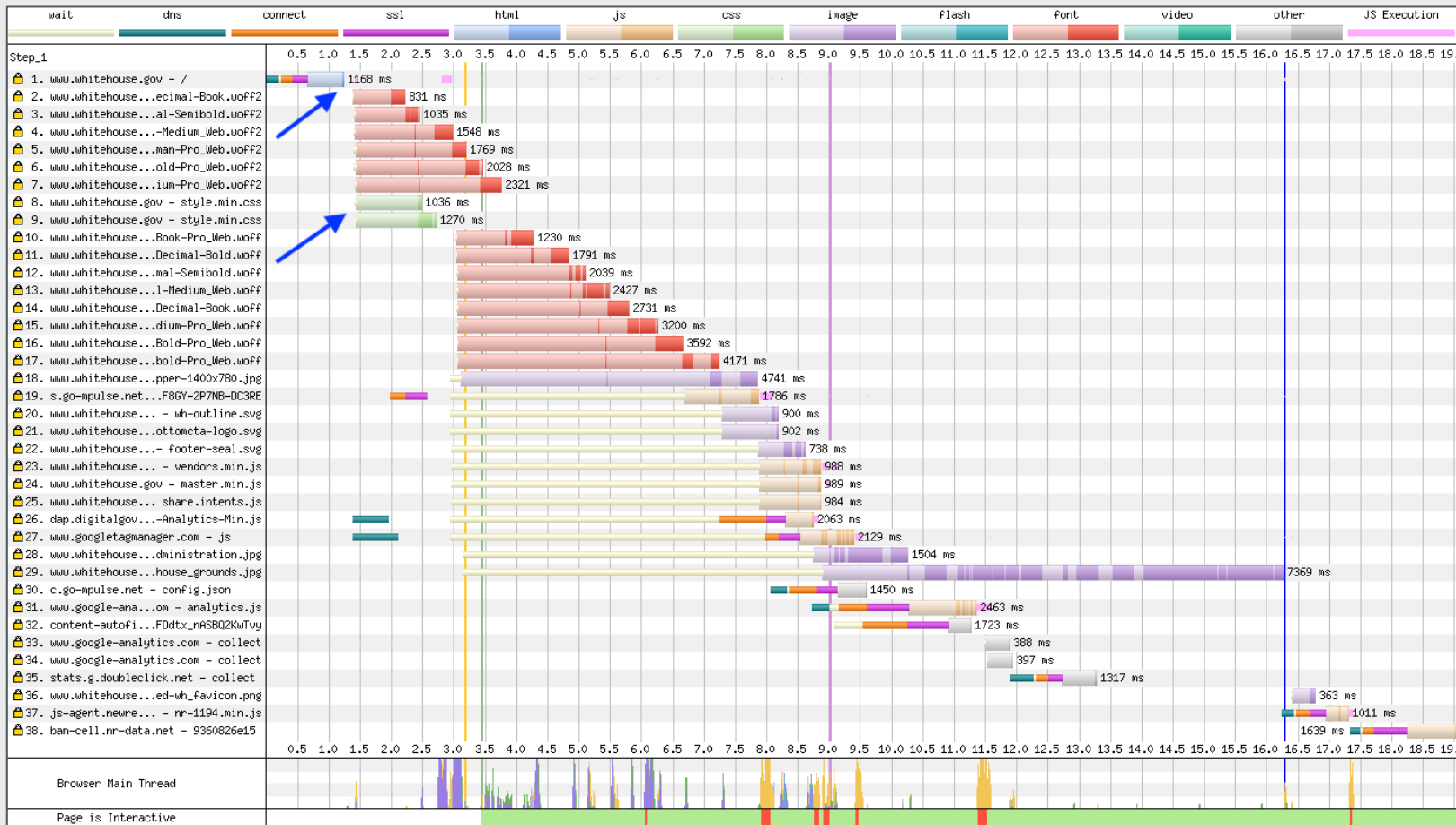


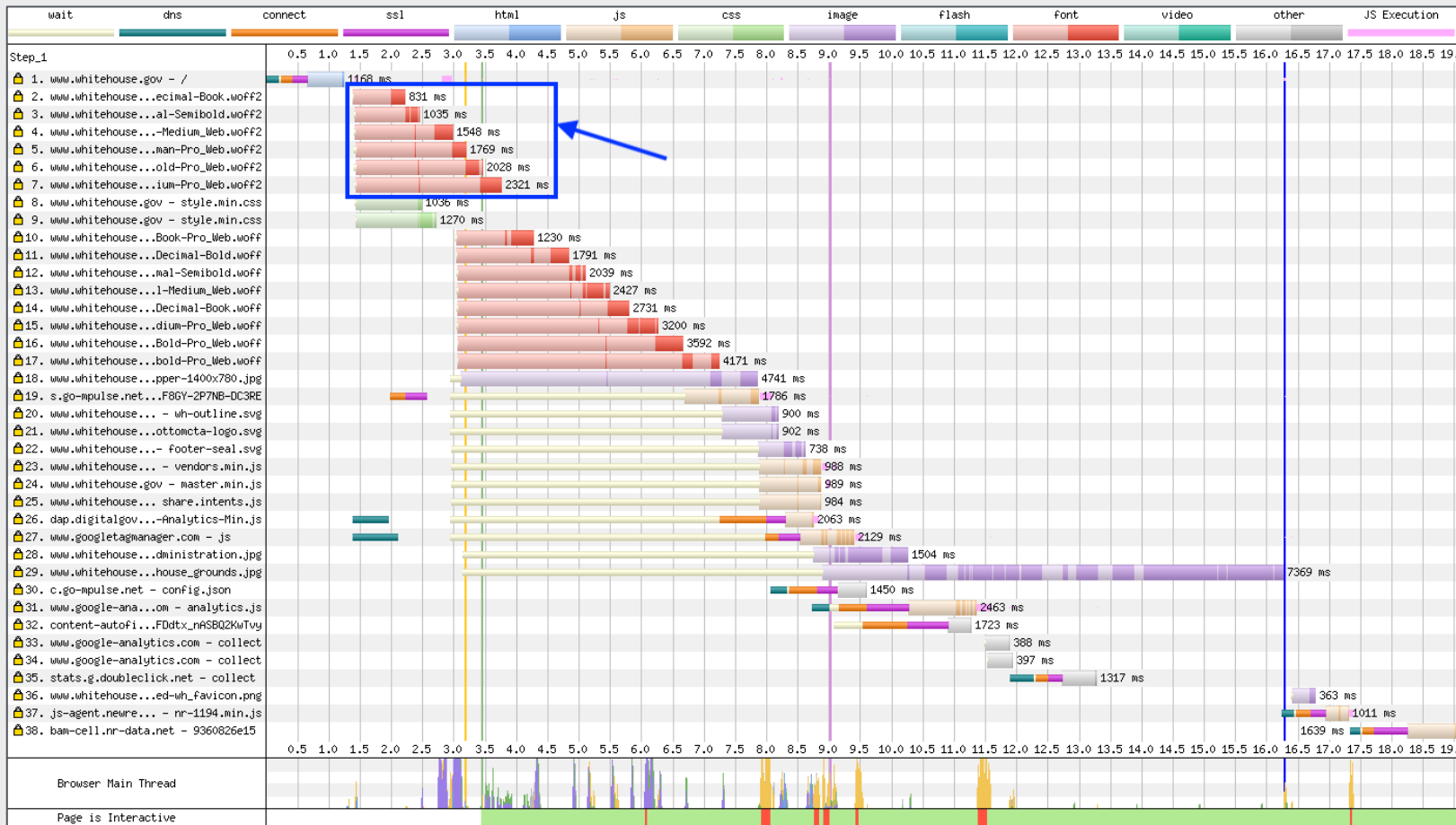


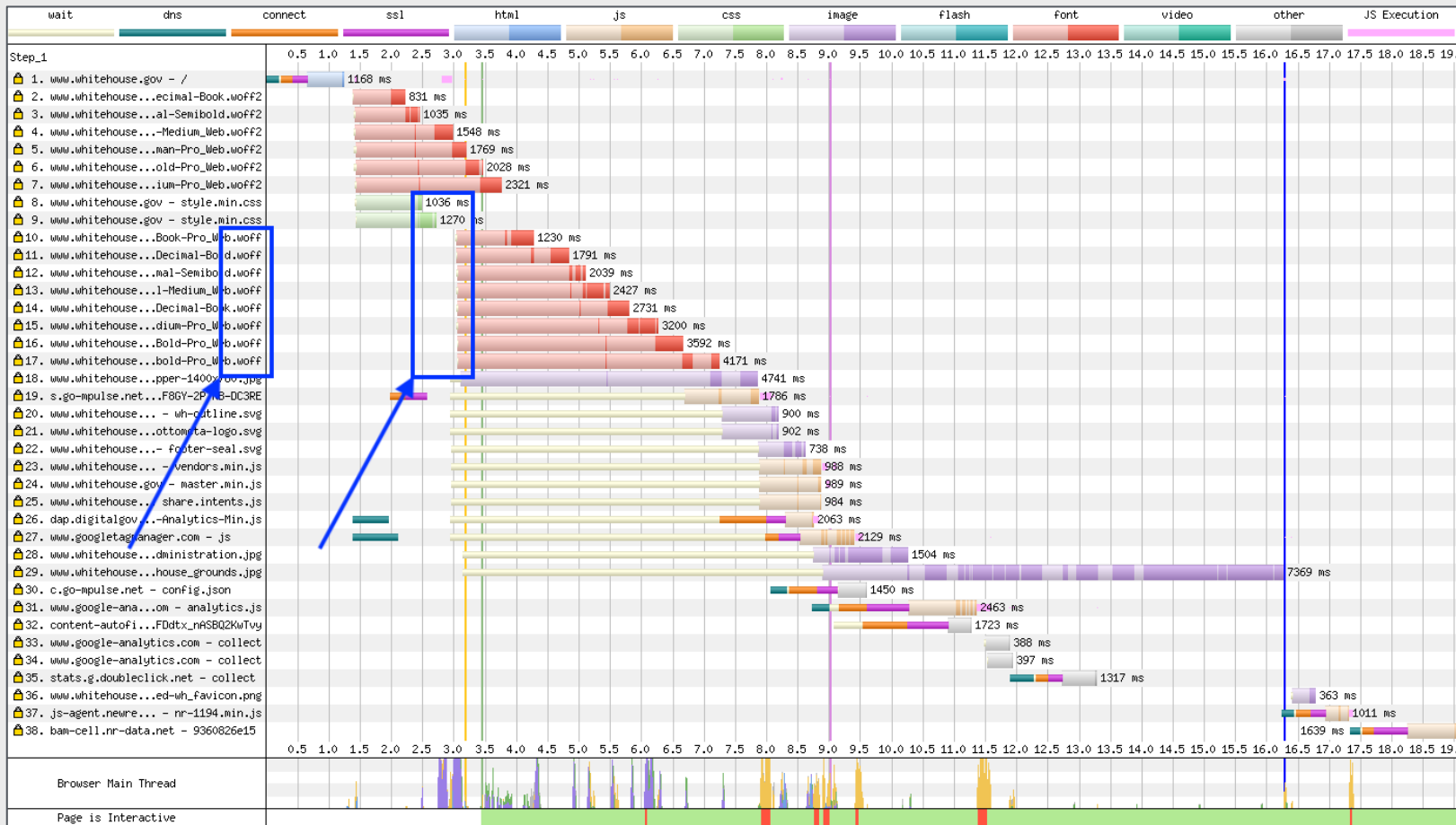
Preloading fonts

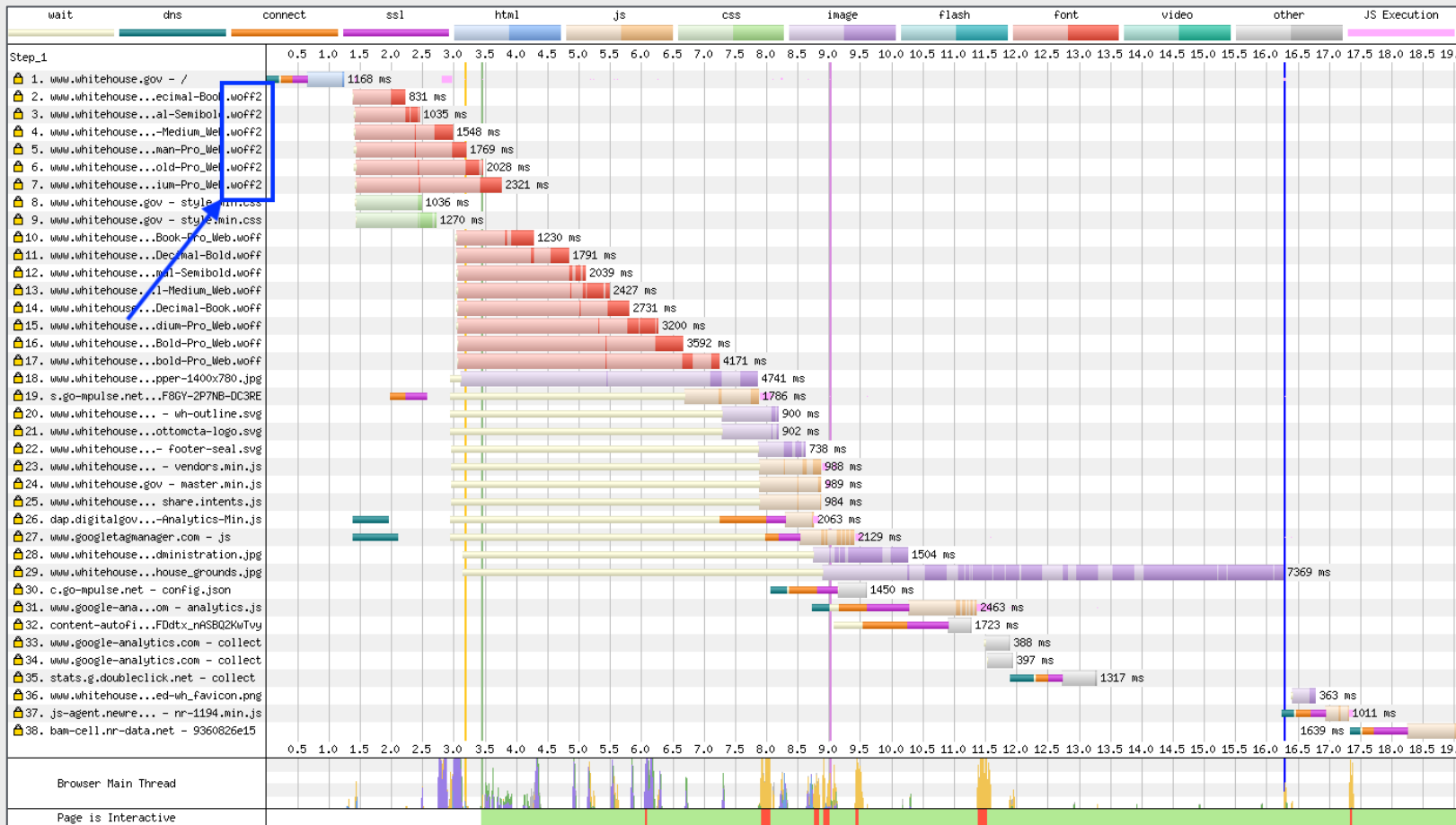






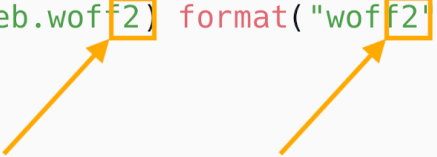




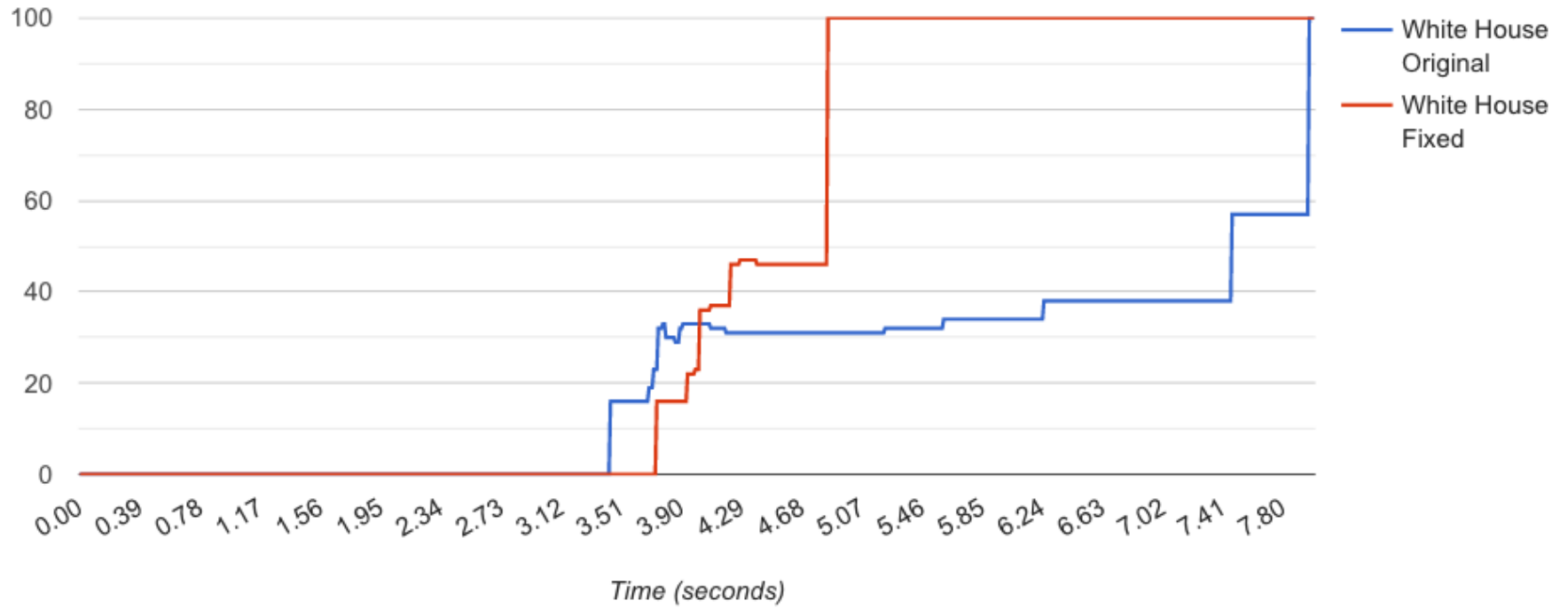


```
@font-face {  
  font-family: MercuryTextG2-Semibold-Pro_Web;  
  src: url(.../fonts/MercuryTextG2-Semibold-Pro_Web.woff) format("woff"),  
       url(.../fonts/MercuryTextG2-Semibold-Pro_Web.woff2) format("woff2");  
  font-weight: 400;  
  font-style: normal;  
  font-display: block  
}
```

```
@font-face {  
  font-family: MercuryTextG2-Semibold-Pro_Web;  
  src: url(.../fonts/MercuryTextG2-Semibold-Pro_Web.woff) format("woff"),  
       url(.../fonts/MercuryTextG2-Semibold-Pro_Web.woff2) format("woff2");  
  font-weight: 400;  
  font-style: normal;  
  font-display: block  
}
```

The image shows a CSS code block with two orange arrows pointing to the '2' in the file names of the font URLs. The first arrow points to the '2' in 'MercuryTextG2-Semibold-Pro_Web.woff2' in the second 'url()' call. The second arrow points to the '2' in 'MercuryTextG2-Semibold-Pro_Web.woff2' in the 'format()' call. Both '2' characters are enclosed in small orange boxes.

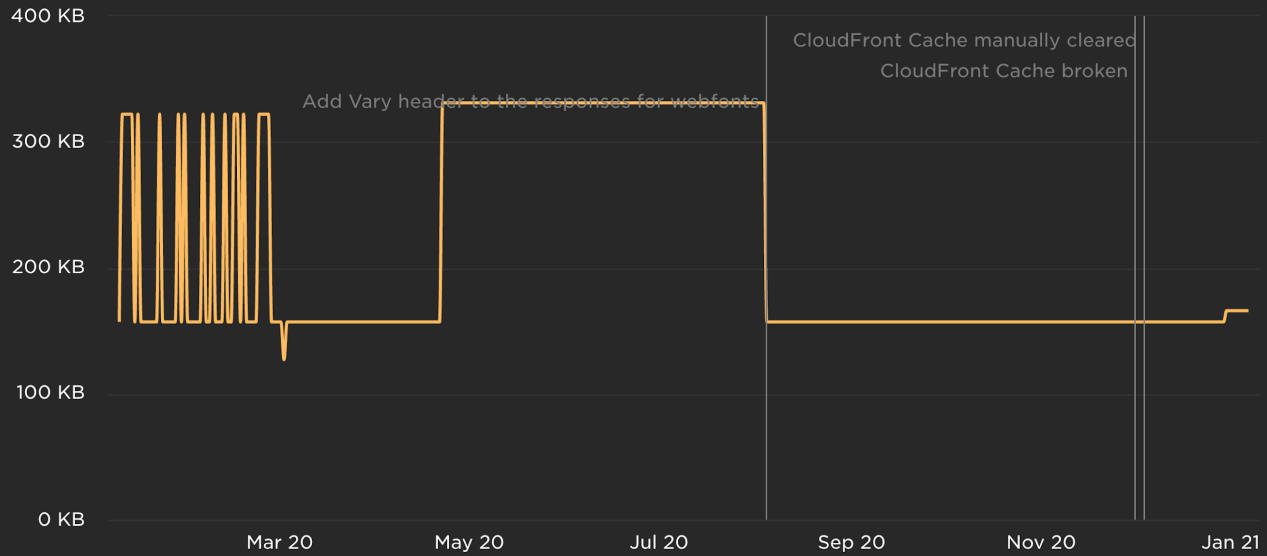
Visual Progress (%)



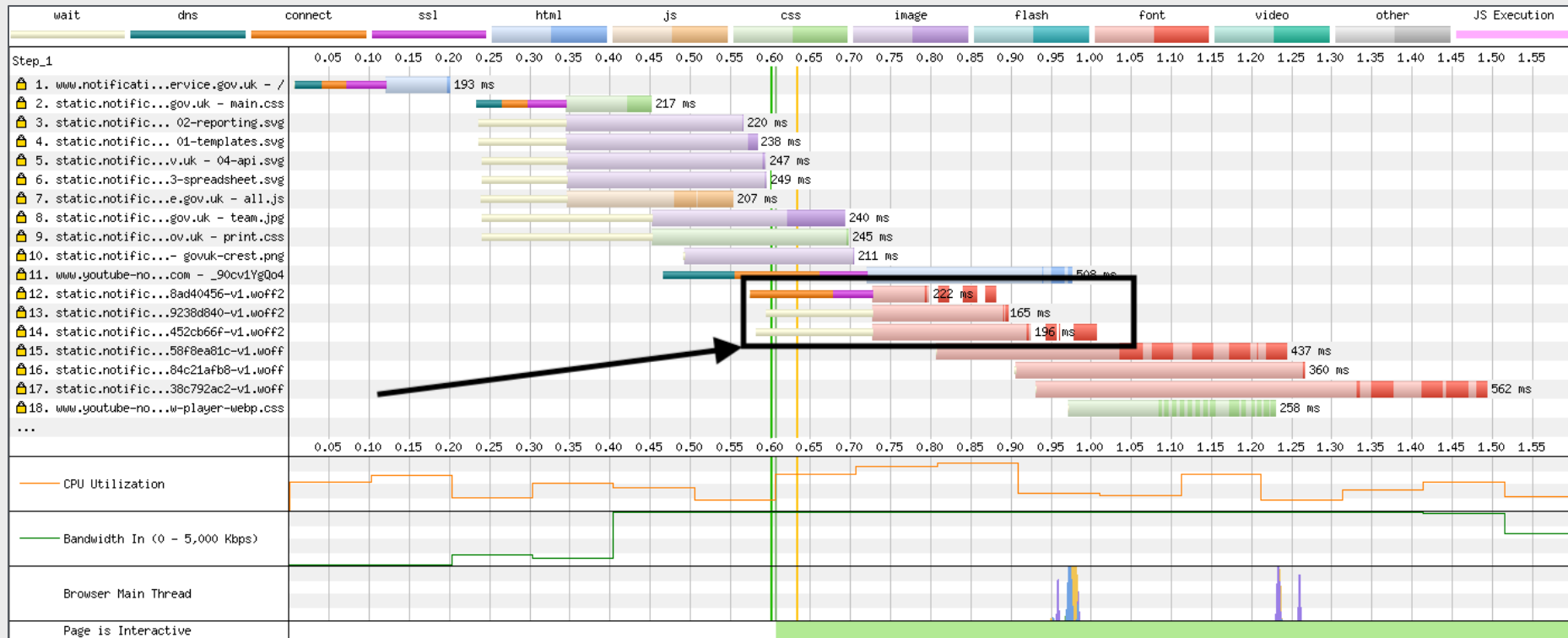
Vary unusual waterfall

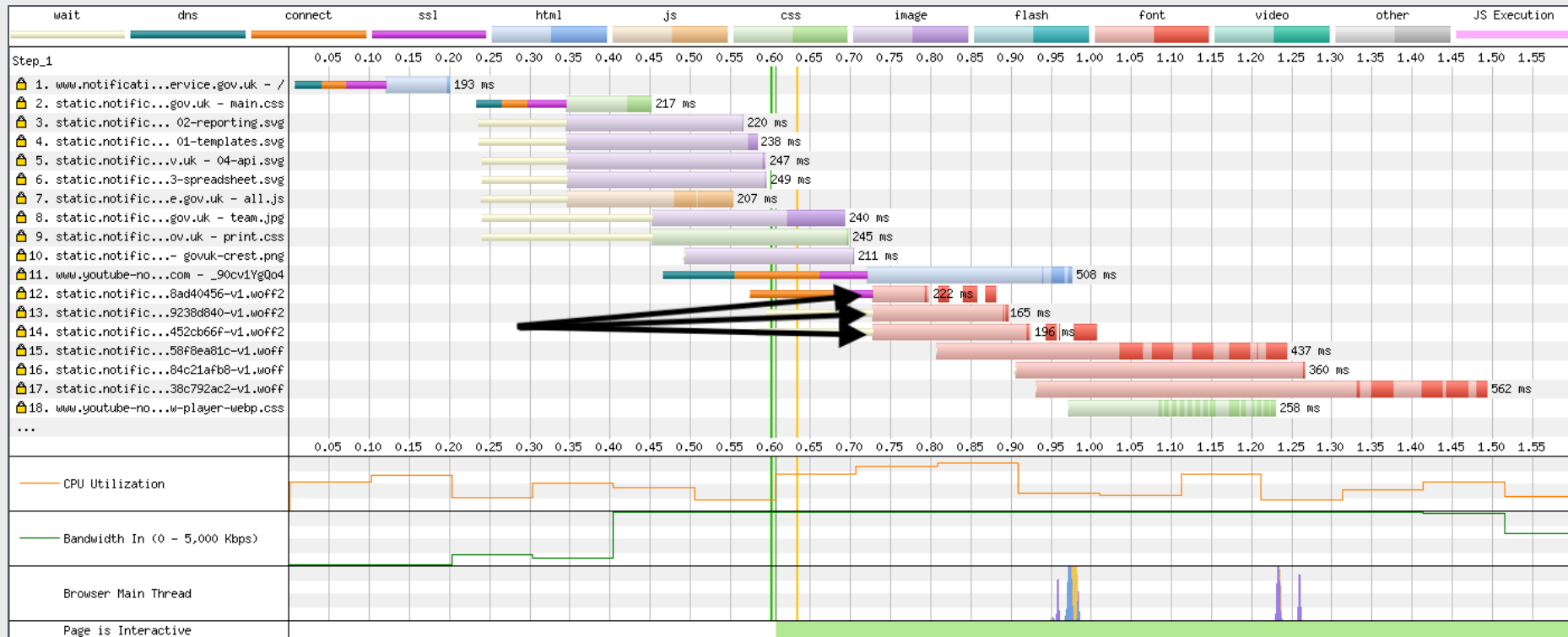
Font Size

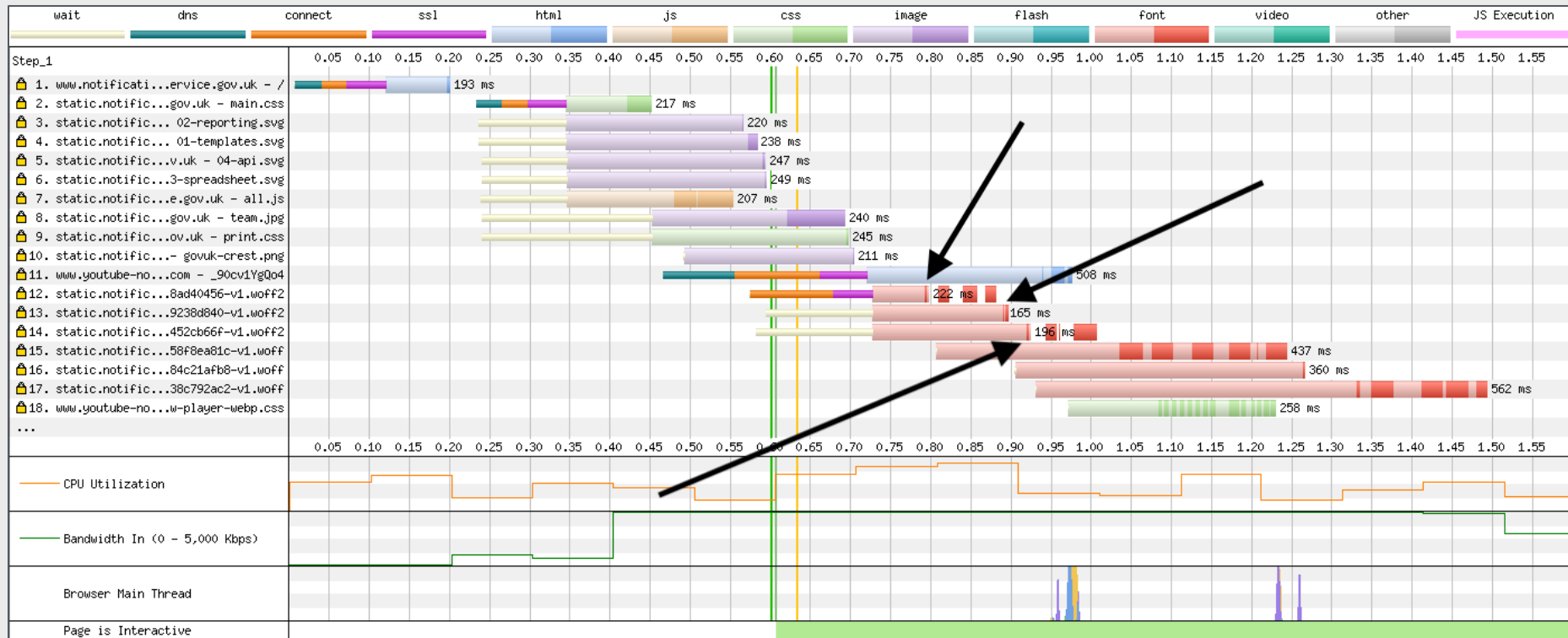
157KB

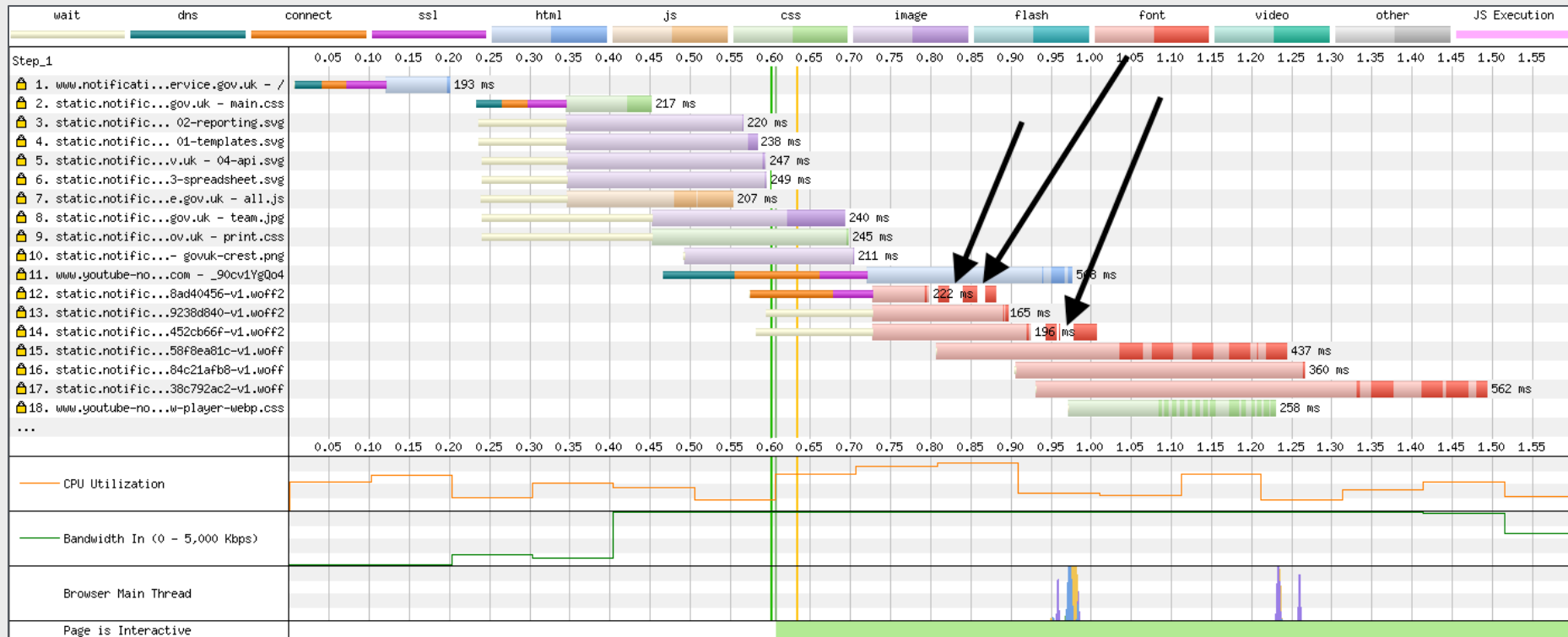


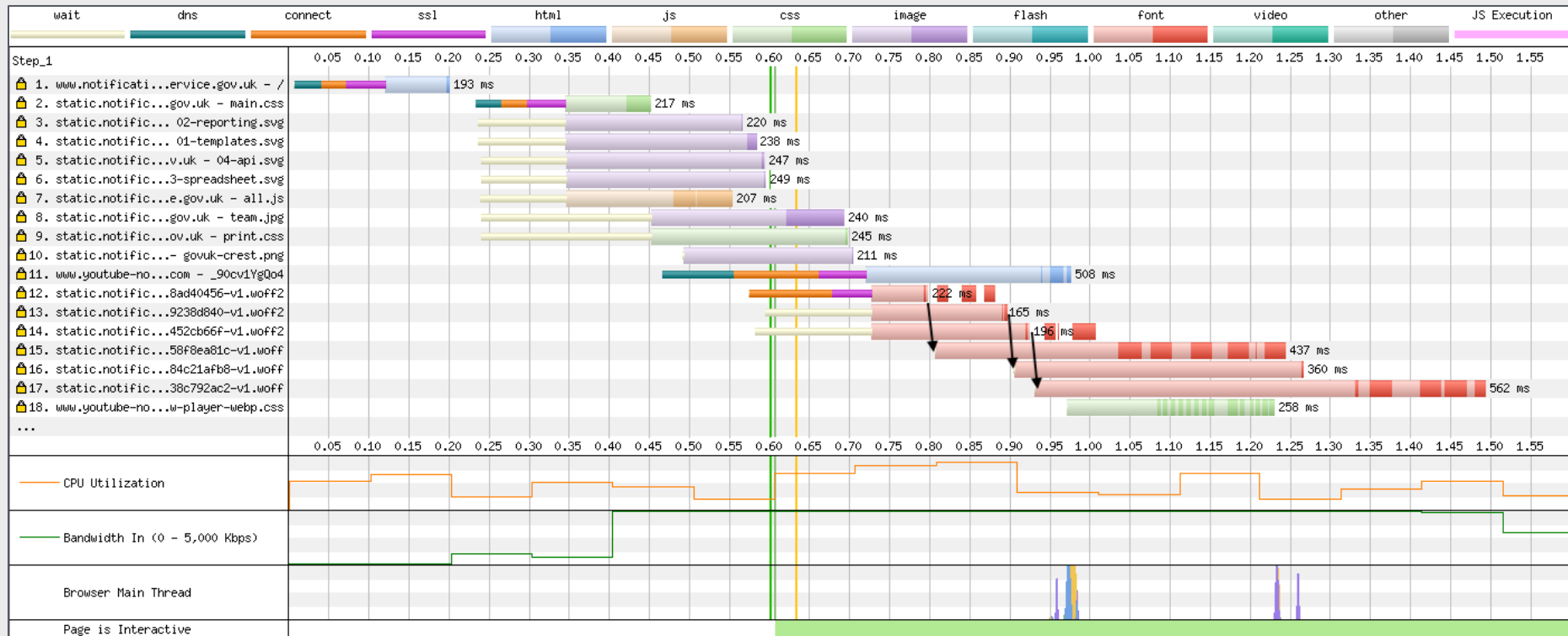
— Font Size (Syn), GOV.UK Notify, Notify - Homepage, England, Chrome

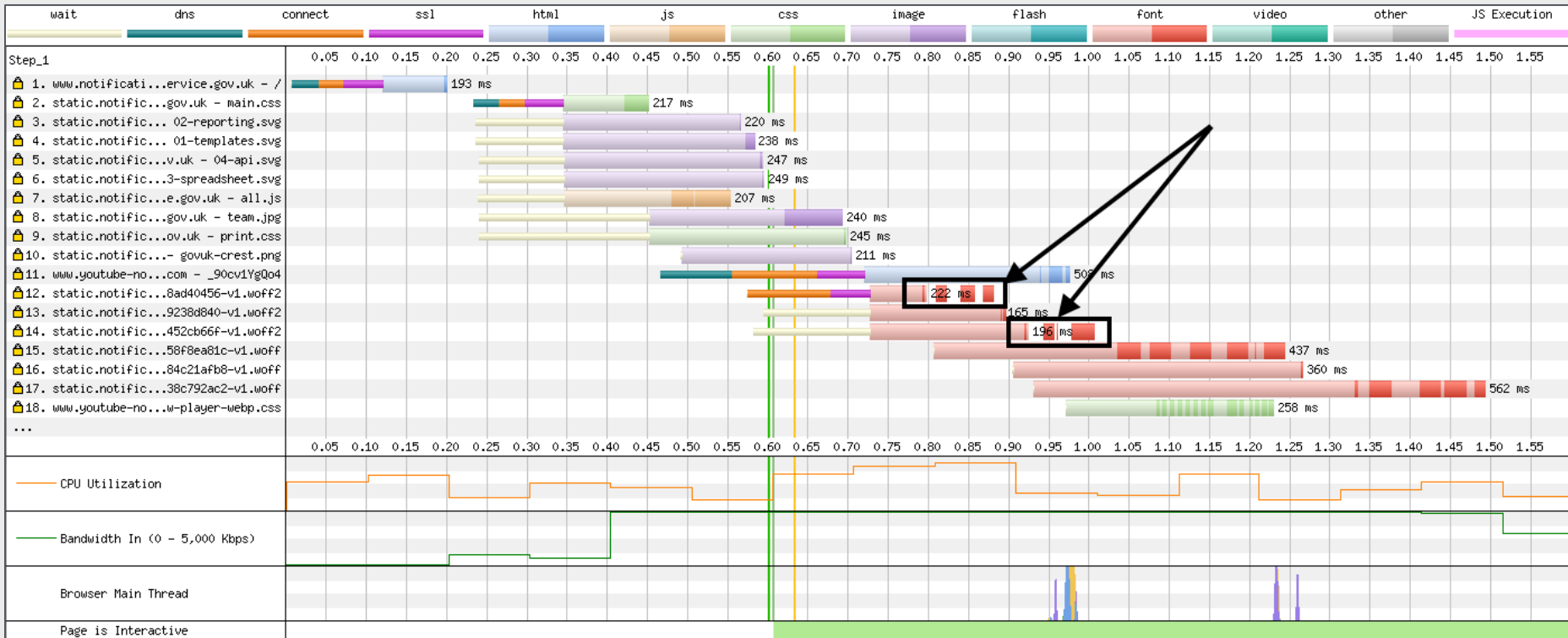












More information

- [Using WebPageTest](#) - Rick Viscomi, Andy Davies, Marcel Duran
- [Velocity 2014 - WebPagetest Power Users - Part 1](#) - Pat Meenan
- [Velocity 2014 - WebPagetest Power Users - Part 2](#) - Pat Meenan
- [Velocity 2014 - WebPagetest Private Instances - Part 1](#) - Pat Meenan
- [Velocity 2014 - WebPagetest Private Instances - Part 2](#) - Pat Meenan
- [Using WebPageTest – Scripting / API / Private Instances](#) - Andy Davies
- [How to read a WebPageTest Waterfall View chart](#) - Matt Hobbs
- [How to read a WebPageTest Connection View chart](#) - Matt Hobbs
- [How to run a WebPageTest test](#) - Matt Hobbs

Thank You's

- Pat Meenan ([@patmeen](#))
- Andy Davies ([@AndyDavies](#))
- Barry Pollard ([@tunetheweb](#))
- Ryan Townsend ([@RyanTownsend](#))
- Simon Hearne ([@simonhearne](#))
- Boris Schapira ([@boostmarks](#))
- Joseph Scott ([@josephscott](#))
- Mike Herchel ([@mikeherchel](#))
- Šime Vidas ([@simevidas](#))
- Rick Viscomi ([@rick_viscomi](#))
- Radu Micu ([@radumicu](#))
- Jeff Posnick ([@jeffposnick](#))
- George Liu ([@centminmod](#))

Thanks for listening!

Matt Hobbs

Twitter: @TheRealNooshu

Q&A