

Lightning-Fast Web Performance

Scott Jehl

Author, Responsible Responsive Design

Course Agenda

1. Introduction
2. Why Performance Matters
3. Metrics! How do we define fast?
4. **Identifying Performance Problems**
5. Making Things Faster
6. Wrapping Up

Identifying Problems

[HOME](#) [TEST HISTORY](#) [FORUMS](#) [DOCUMENTATION](#) [ABOUT](#)

Test a website's performance

[Analytical Review](#) [Visual Comparison](#) [Traceroute](#)

Enter a Website URL

Test Location: [Select from Map](#)

Browser:

[Advanced Settings >](#)
1 run, Cable connection, results are public

START TEST

Run a free website speed test from multiple locations around the globe using real browsers (IE and Chrome) and at real consumer connection speeds. You can run simple tests or perform advanced testing including multi-step transactions, video capture, content blocking and much more. Your results will provide rich diagnostic information including resource loading waterfall charts, Page Speed optimization checks and suggestions for improvements.

If you have any performance/optimization questions you should visit the [Forums](#) where industry experts regularly discuss Web Performance Optimization.

Recent Industry Blog Posts

- [Five Tips for Enhanced DNS Reliability and Security](#)
- [Back-to-school ecommerce report card: Retailers' performance "sweet spot" now 2 seconds](#)
- [I'm not worried about you. It's the other guy.](#)
- [Test Your Site Faster with Bulk Performance Tests](#)
- [Fix performance issues fast with PRIORITAH!](#)
- [more...](#)

Recent Discussions

- [Should I use Cloudflare](#)
- [WPT load times vastly different from other speed tests](#)
- [Get 15% Discount on Shared Web Hosting | 24x7 Customer Support | Waxspace.com](#)
- [Longer content download times on some images](#)
- [AWS AutoScaling AMI Spot instances](#)
- [more...](#)

[WebPageTest Partners](#)



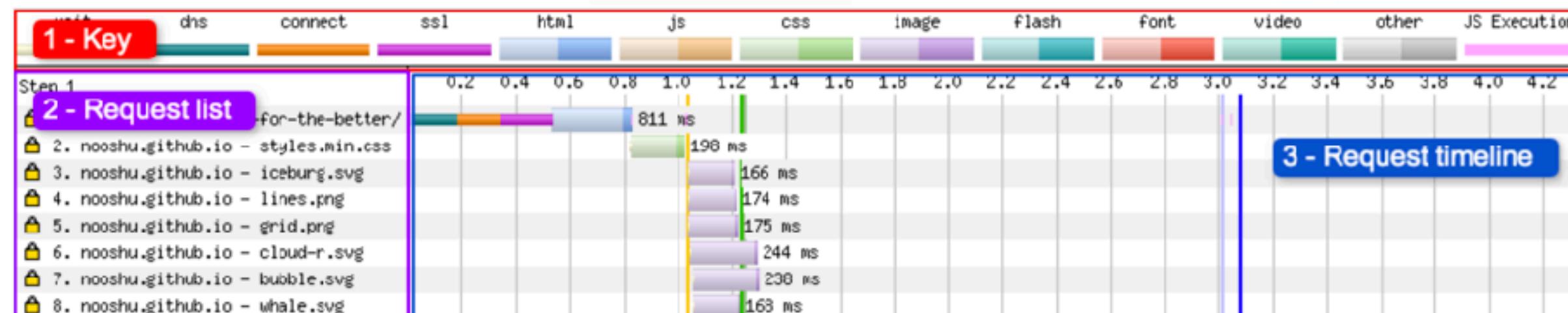
How to read a Web Page Test waterfall chart

Published: Oct 2, 2019 Tagged: [webperf](#), [ramblings](#). Read time: 20 mins

So I often find myself looking at [WebPageTest](#) (WPT) waterfall charts, but as I seem to have the [memory of a chimpanzee](#) (not a goldfish, that's a myth) I tend to forget some of the details and what they all mean. So I decided to pull together many bits of information into a single blog post I can then refer to at a later date. If you find it useful, or think I've forgotten anything, please [let me know](#).

Basic Layout

Here's the basic layout of the waterfall chart user interface:





Make your web pages fast on all devices

<https://theguardian.com/>

ANALYZE

What's New

Read about the [July 2018 Google Speed Update](#).

Give Feedback

Have specific, answerable questions about using PageSpeed Insights? Ask your question on [Stack Overflow](#). For general feedback and discussion, start a thread in our [mailing list](#).

Web Performance

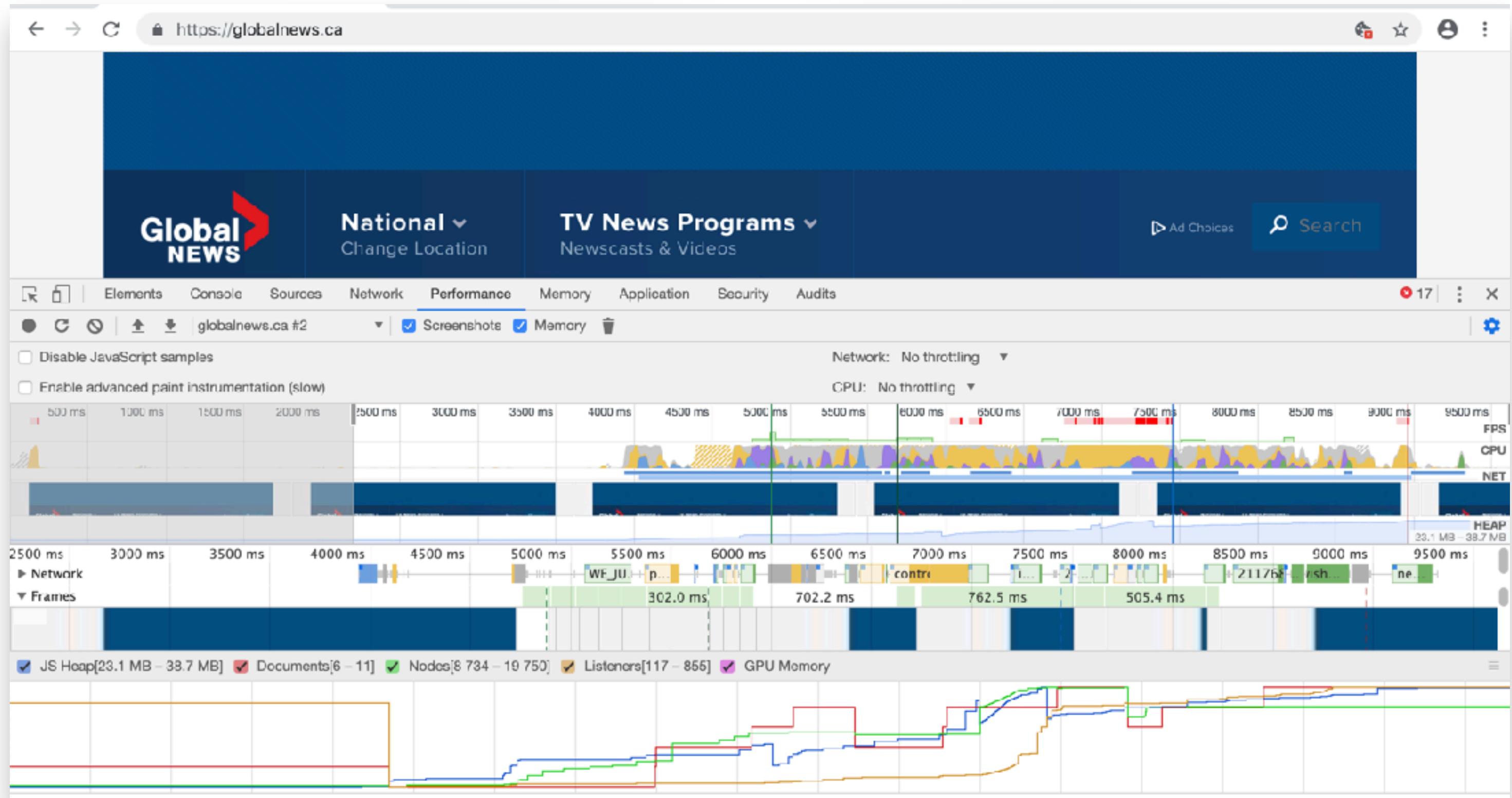
Learn more about [web performance tools at Google](#).

About PageSpeed Insights

PageSpeed Insights analyzes the content of a web page, then generates suggestions to make that page faster. [Learn more](#).



<https://developers.google.com/speed/pagespeed/insights/>



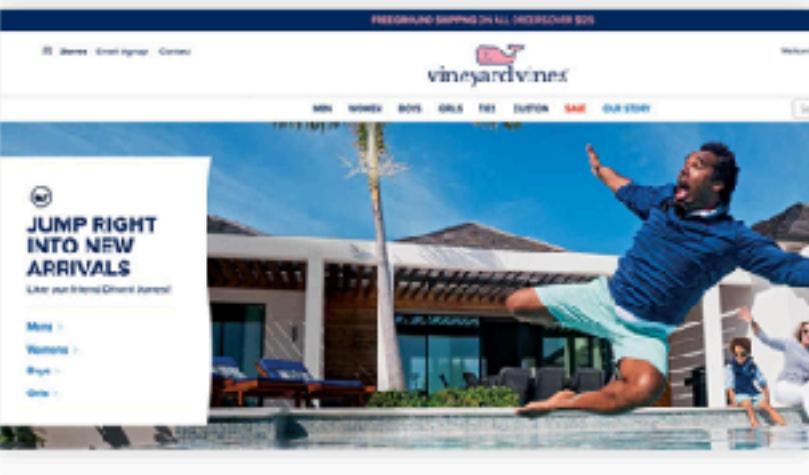
<https://developers.google.com/web/tools/chrome-devtools>

← → ⌂ filamentgroup.com

filament group

we design responsive, accessible, performant, resilient, & beautiful websites.

FEATURED PROJECTS



The screenshot shows the Vineyard Vines website homepage. At the top, there's a banner with the text "FREE GROUND SHIPPING ON ALL UNDER \$50". Below the banner, the Vineyard Vines logo is visible. A large, vibrant photograph of a man in a blue sweater and white shorts jumping into a swimming pool is the central focus. To the left of the photo, there's a sidebar with a "JUMP RIGHT INTO NEW ARRIVALS" section featuring a small image of a person and some text. The main navigation menu at the top includes links for MINI, WOMEN, BOYS, GIRLS, FATHER, DENIM, SALE, and OUR STORY.

Elements Console Sources Network Performance Memory Application Security Audits 1 1

Audits

Identify and fix common problems that affect your site's performance, accessibility, and user experience. [Learn more](#)

Device Mobile Desktop

Audits Performance Progressive Web App Best practices Accessibility SEO

Throttling Simulated Slow 4G, 4x CPU Slowdown Applied Slow 4G, 4x CPU Slowdown No throttling

Clear storage



<https://developers.google.com/web/tools/lighthouse/>

[Products](#) ▾[Developers](#)[Enterprise](#)[Pricing](#)[Support](#)[Sign in](#)[FREE TRIAL](#)

App & Browser Testing Made Easy

Give your users a seamless experience by testing on 2000+ real devices and browsers. Don't compromise with emulators and simulators.

[Get started free](#)

Test your websites

LIVE

Interactive cross browser testing

**AUTOMATE**

Instant Selenium testing



Test your mobile apps

APP LIVE

Interactive mobile app testing

**APP AUTOMATE**

Automated mobile app testing



<https://www.browserstack.com/>





Inspect with Chrome DevTools



Chrome | chrome://inspect/#devices

DevTools

Devices

Pages

Extensions

Apps

Shared workers

Devices

Discover USB devices

Port forwarding...

Discover network targets

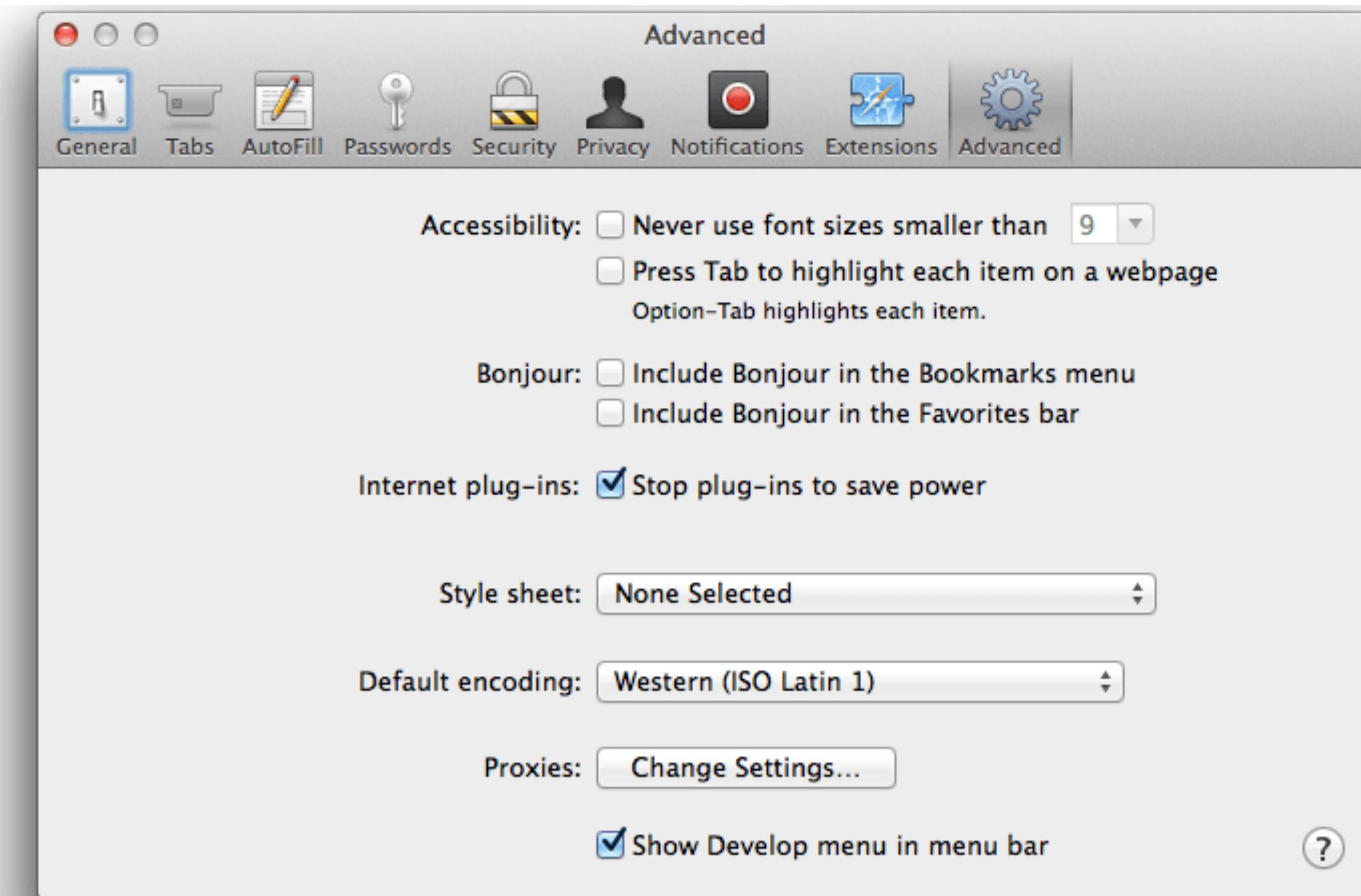
Configure...

[Open dedicated DevTools for Node](#)

Remote Target #LOCALHOST



<https://developers.google.com/web/tools/chrome-devtools/remote-debugging>



Can I use

webp

?



Settings

9 results found

#

WebP image format - UNOFF

Usage

% of all users

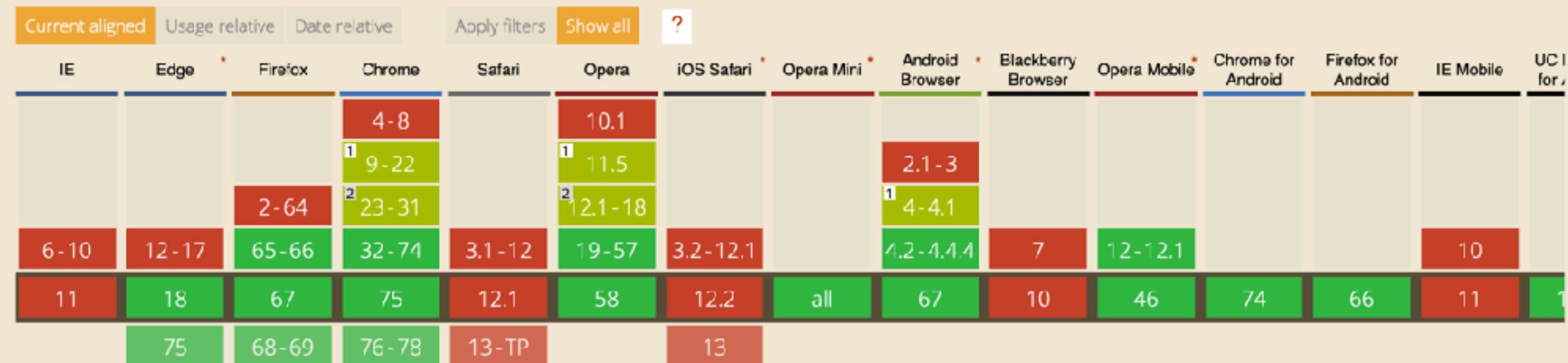


?

Global

78.4% + 0.41% = 78.81%

Image format that supports lossy and lossless compression, as well as animation and alpha transparency.

<https://caniuse.com/#feat=webp>

What Does My Site Cost?

Find out how much it costs for someone to use your site on mobile networks around the world.

<http://www.wired.com/2015/03/our-new-site/> weighs 11.27MB. Here's what that costs around the globe.

Want to make things better? Check out the [full results and recommendations at WebPageTest.org](#).

Cost in USD

Cost in USD, PPP

Cost as % of GNI, PPP

• Postpaid • Prepaid

Cost In USD, PPP (POSTPAID DATA)

This is the cost of the site based on data from the [ITU](#) and [World Bank](#). The cost of data is standardized based on the PPP factor. Prices were collected from the operator with the largest marketshare in the country, using the least expensive plan with a (minimum) data allowance of 500 MB over (a minimum of) 30 days. Prices include taxes. Because these numbers are based on the least expensive plan, they are **best case scenarios**.

Country	Cost (in USD, PPP)
Vanuatu	\$4.06
Switzerland	15

This exceeds the \$1.25 per day poverty level.

Goals & Budgets

Your site vs competitor 1



You display meaningful content (FMP)
0.3 seconds slower

You visually complete (VC)
2.4 seconds faster

you



Comp 1

WPO stats



Case studies and experiments demonstrating the impact of web performance optimization (WPO) on user experience and business metrics.



53% of visits to mobile sites are abandoned after 3 seconds according to research from Google's DoubleClick.

SHARE ON TWITTER

#abandonment #2016

Subscribe

Follow along using the magic of [RSS](#).

Mobile Perf Goals

PSI Score of 100 to
maximize SEO potential

Shift First Paint (FP) and Content Paint (FCP) to sub-2.0 seconds.



Speed up First Meaningful Paint (FMP) by 700ms to 2.3 seconds. This beats by 300ms (2.6s now)

Visually Complete (VC) by 300ms to 3.4 seconds. This widens your lead over to almost 3 seconds.

JANUARY 28, 2013

Setting a performance budget

[performance](#) [performance budget](#)

Jason Grigsby [once quipped](#) that “We’ve remade the Internet in our image....obese.” He was right, of course. Average page weight and number of connections has been increasing at a rather alarming rate.

This is why I’ve been so happy to see the recent rash of posts discussing performance as a fundamental component of design. [The latest comes from Mr. Brad Frost](#). He makes the case that performance is not just something developers need to worry about, but that it is an “essential design feature.”

One of the things he suggests doing is mentioning performance in project documents.

Statements of work, project proposals and design briefs should explicitly and repeatedly call out performance as a primary goal. “The goal of this project is to create a stunning,





8 January, 2020

Performance Budgets, Pragmatically

Table of Contents

One of the key tools that performance engineers have at their disposal is the Performance Budget: it helps us—or, more importantly, our clients—ensure that any performance-focused work is monitored and maintained after we've gone.

By establishing an acceptable threshold, be that based on RUM data, bundle analysis, image weight, milestone timings, or any other suitable metric, we can be sure that new or unrelated bodies of work do not have a detrimental impact on the performance of our site.

The difficulty, however, lies in actually defining those thresholds. This post is for anyone who has struggled with the question, '**But what should our budgets actually be?!**'

Targets vs. Safeguards

Hi there, I'm Harry. I am an **award-winning Consultant Front-end Architect, designer, developer, writer and speaker** from the UK. I **write, tweet, speak** and **share code** about authoring and scaling CSS for big websites. You can **hire me**.

Follow @csswizardry

I am currently **accepting new projects** for Q1–2 2020

Projects



“

Having a pre-defined ‘budget’ is a clear, tangible way to frame decisions about what can and can’t be included, and at a suitably early stage in the project.

Mark Perkins



What if a change breaks the budget?

- Optimize an existing feature or asset on the page.
- Remove an existing feature or asset from the page.
- Don't add the new feature or asset.

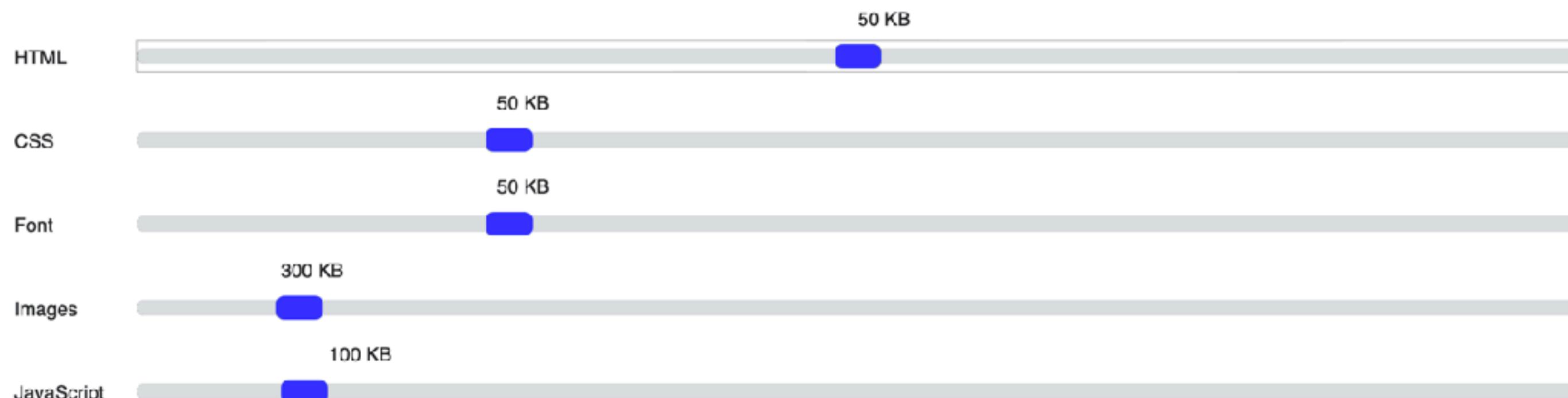
Performance Budget Calculator

4.5s Estimated Time to Interactive

Median TTI for similar mobile sites.

3.4 - 5.6s Time to Interactive Range

25th - 75th percentile TTI for similar mobile sites.



* Measurements represent *transferred* file size.

[Download budget.json](#)

A budget.json file can be used with the [Lighthouse](#) CLI to set performance budgets.



<https://perf-budget-calculator.firebaseioapp.com/>



The HTTP Archive Tracks How the Web is Built.

We periodically crawl the top sites on the web and record detailed information about fetched resources, used web platform APIs and features, and execution traces of each page. We then crunch and analyze this data to identify trends — [learn more](#) about our methodology.

[View Reports](#)

Codifying,
Monitoring



WEBPAGETEST



Travis CI



Some checks were not successful

1 failing and 2 successful checks

[Hide all checks](#)

- ✗  Lighthouse — Failed. Required scores: performance:96,pwa:100. [Details](#)

- ✓  continuous-integration/travis-ci/pr — The Travis CI build passed [Details](#)

- ✓  continuous-integration/travis-ci/push — The Travis CI build passed [Details](#)



This branch has no conflicts with the base branch

Merging can be performed automatically.

[Merge pull request](#)

You can also [open this in GitHub Desktop](#) or view [command line instructions](#).



<https://github.com/ebidel/lighthouse-ci>

Search or jump to... / Pull requests Issues Marketplace Explore

GoogleChrome / lighthouse-ci Used by 104 Watch 41 Star 2.8k Fork 164

Code Issues 36 Pull requests 1 Actions Projects 0 Wiki Security 0 Insights

Automate running Lighthouse for every commit, viewing the changes, and preventing regressions

712 commits 5 branches 0 packages 34 releases 29 contributors Apache-2.0

Branch: master New pull request Create new file Upload files Find file Clone or download

		Latest commit 03eb7aa 11 hours ago
	patrickhulce chore(ci): upgrade to lighthouserc.js	
	.dependabot chore: add dependabot configuration file (#185)	4 months ago
	.github misc: add semantic-pull-request validation (#177)	4 months ago
	docs: add basic architecture doc	7 days ago
	chore(ci): upgrade to lighthouserc.js	8 hours ago
	scripts fix(server): handle missing metric values in dashboard graphs	8 hours ago
	types fix(server): statistics now use median instead of average	8 hours ago
	.browserslistrc refactor: split package into cli and utils	9 months ago



<https://github.com/ebidel/lighthouse-ci>



webpack v4.41.6

| Print Section 📄

- > Configuration
- > Configuration Languages
- > Configuration Types
- > Entry and Context
- > Mode
- > Output
- > Module
- > Resolve
- > Optimization
- > Plugins
- > DevServer
- > Devtool
- > Target
- > Watch and WatchOptions
- > Externals
- ▼ Performance

Performance

These options allows you to control how webpack notifies you of assets and entry points that exceed a specific file limit. This feature was inspired by the idea of [webpack Performance Budgets](#).

performance

object

Configure how performance hints are shown. For example if you have an asset that is over 250kb, webpack will emit a warning notifying you of this.

performance.hints

```
string = 'warning': 'error' | 'warning' boolean: false
```

Turns hints on/off. In addition, tells webpack to throw either an error or a warning when hints are found.

Given an asset is created that is over 250kb:



<https://webpack.js.org/configuration/performance/>



<https://speedcurve.com/>



STATUS



Changes

Status

Improve

Favorites >

LUX

Synthetic >

Login

Below is the status of all of your performance budgets. [Learn how to manage your performance budgets](#)

CSS Size | Guardian | Each Label | AVG

83KB / 50KB

Start Render on homepage

3.01s / 3s

JS on homepage

1260KB / 1000KB

Chrome speedindex for each region

2.25s / 1.5s

First CPU Idle, Time To Interactive | Guardian | Home | AVG

10.37s / 11s

Guardian JS on Homepage

948KB / 1600KB

JS Size on mobile

970KB / 900KB

Guardian JS Size Desktop vs Mobile

959KB / 1000KB

Guardian JS Size for each URL

JS SIZE FOR EACH SITE





FILTERS **BUDGET**

Budget Metric: JS Size

Budget Threshold (KB): 170

Budget Rate of Change (%): 10

Send alerts for this budget (notification settings)

Only alert when the budget is crossed: 3 times

CANCEL **SAVE**



<https://speedcurve.com/>



JS Size is over by 55%

The budget on JS (Syn), US West Coast, Chrome has crossed over the threshold of 170 KB by 55% and is now 264 KB.

SpeedCurve's performance budget alerts inform me when I've exceeded my JavaScript size budget.



<https://speedcurve.com/>

Test Location Dulles, VA USA (Desktop, Android, iOS)  [Select from Map](#)

Browser Moto G4 - Chrome 

Advanced Settings ▼

[Test Settings](#) [Advanced](#) [Chrome](#) [Auth](#) [Script](#) [Block](#) [SPOF](#) [Custom](#)

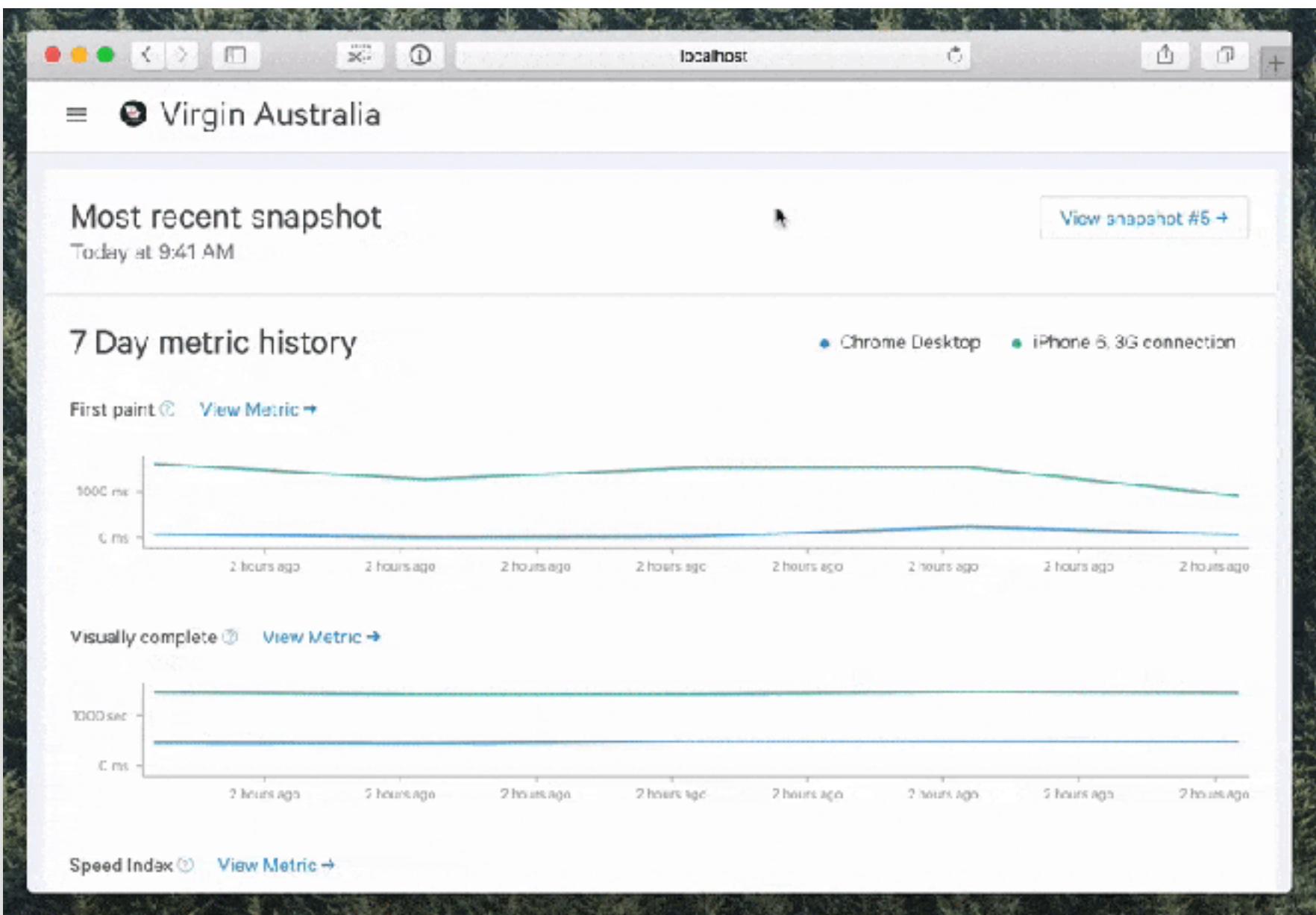
Block Requests Containing...
Space separated list

`dynamicyield`





<https://calibreapp.com/>



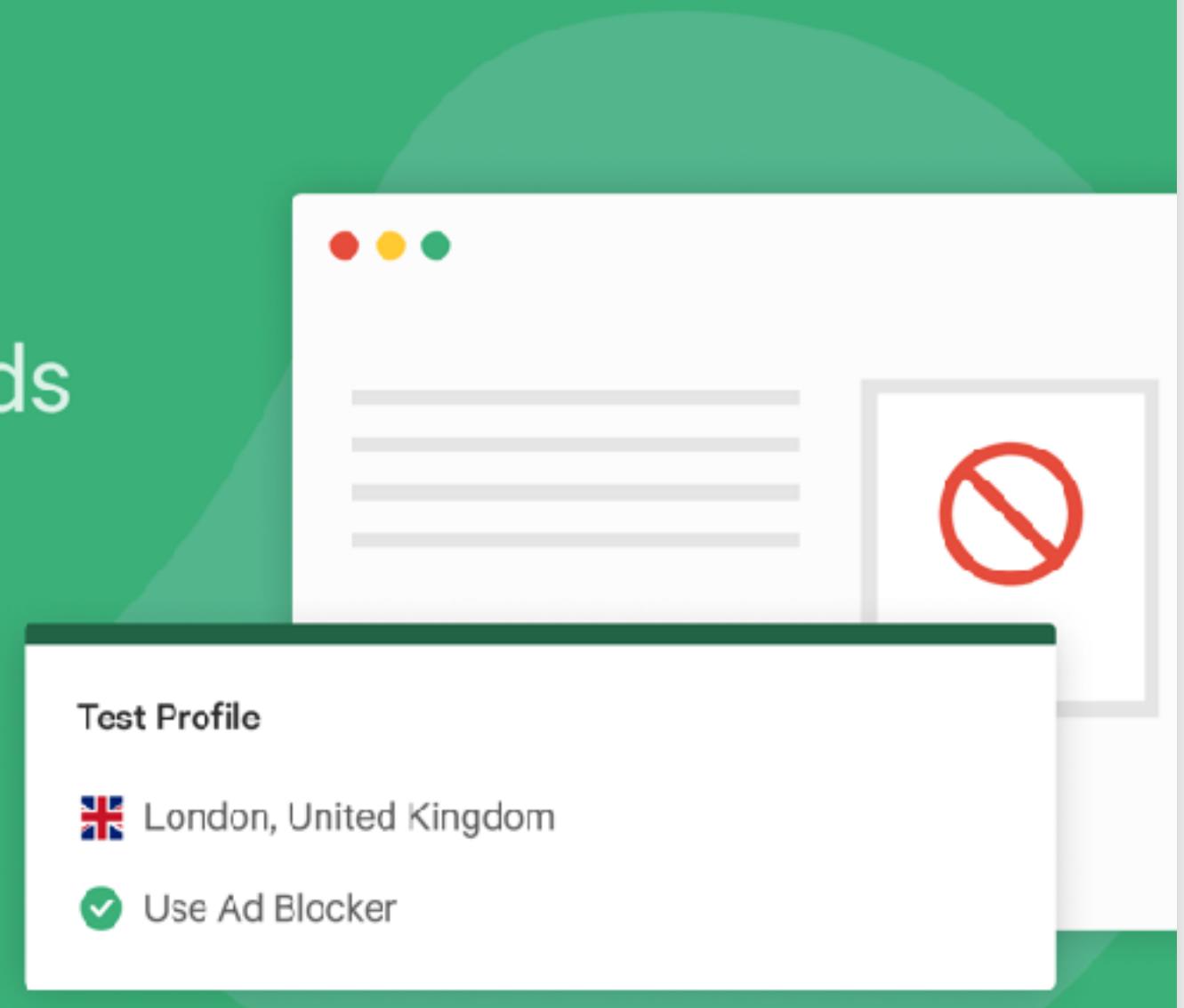
<https://calibreapp.com/docs/metrics/budgets>

Adblocking

NEW

Test your site with or without ads
and third-party scripts.

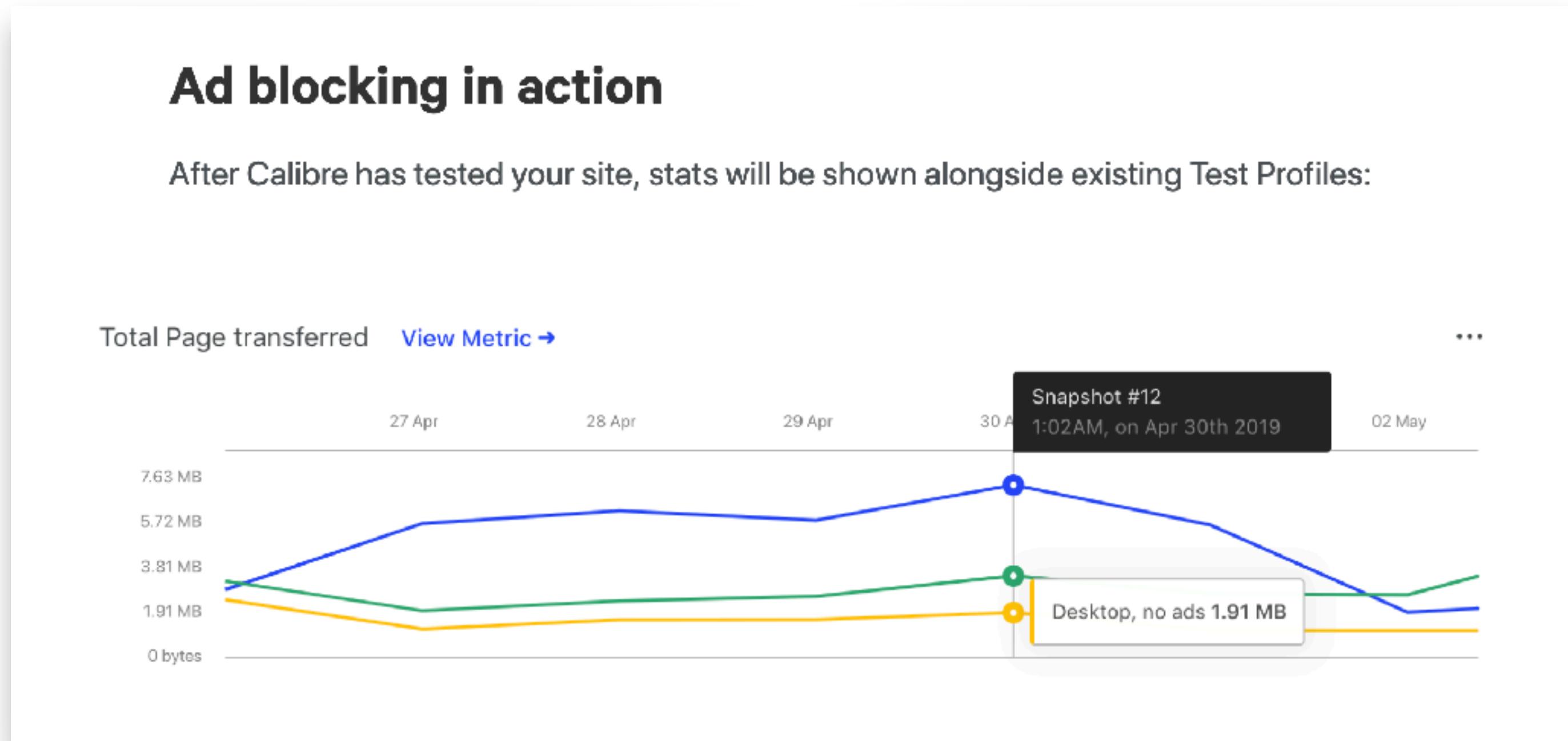
- ✓ Effortlessly compare performance
- ✓ No code changes required



<https://calibreapp.com/blog/test-without-ads/>

Ad blocking in action

After Calibre has tested your site, stats will be shown alongside existing Test Profiles:



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Taking it further!

- Audit some sites you've worked on. (Or any site!)
- Check it in Webpage Test, PSI, Dev Tools
- Identify 3 most critical performance problems