

# PERFORMANCE BUDGETS

(THAT STICK)

TIM KADLEC @TKADLEC



**A clearly defined limit on one or more performance metrics that the team agrees not to exceed, and that is used to guide design and development.**

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# Hold the line: Performance Budgets



## Budget:

- 80KB/chunk
- 200KB total

## Result:

- Reduced Time to Interactive by 2 seconds

## Impact:

- Bounce Rate: **14%** ▼
- Average Duration: **31%** ▲
- Pages/session: **25%** ▲



By setting a budget for tracking, and reporting build size deltas, we've prevented accidental changes that would have increased metrics like TTI, TTFMC and Time to First Tweet by over 100%. ”

**Paul Armstrong**

*Web Developer,  
Twitter*





**1. CONCRETE**

**2. MEANINGFUL**

**3. INTEGRATED**

**4. ENFORCED**

# 1. CONCRETE

“lightning quick”

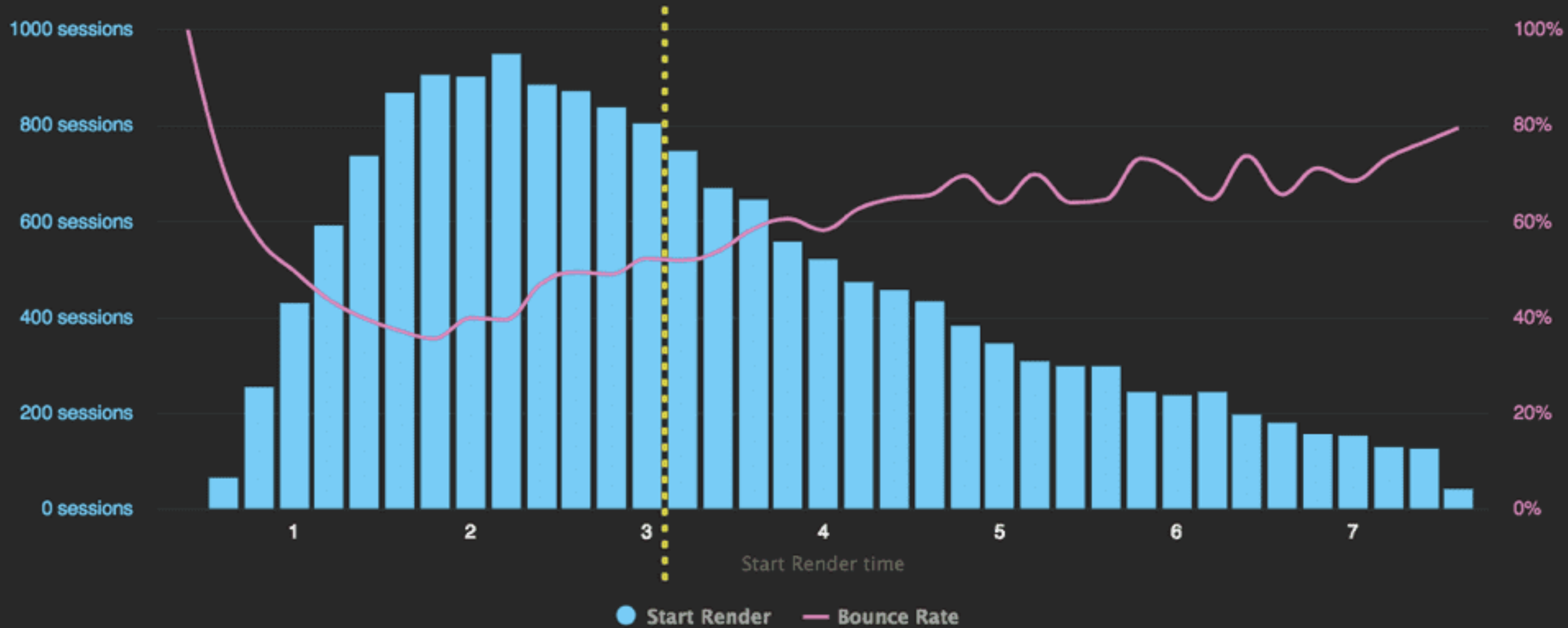
“as fast  
as possible”

“faster than  
the competition”



**No more than 2 seconds to start  
render at the 90th percentile on 3G  
networks.**

## **2. MEANINGFUL**



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Dismiss

Google App Script for spreadsheet that uses the WPT API to bulk test URLs

12 commits 1 branch 0 releases 1 contributor MIT

Branch: master New pull request Find file Clone or download

Andy Davies and Andy Davies Re-sync with v0.5 spreadsheet		Latest commit bf3a310 on Sep 17, 2018
LICENSE	Initial commit	5 years ago
README.md	Remove /edit from end of sheet URL	2 years ago
webpagetest.gs	Re-sync with v0.5 spreadsheet	6 months ago

README.md

# WebPageTest Bulk Tester

Use Google Docs to test multiple URLs using WebPageTest (either webpagetest.org if you have an API key, or another publicly

Rich text editor toolbar with icons for undo, redo, bold, italic, text color, background color, link, unlink, list, indent, and other formatting options.

URL	Test Results					Targets (Based on 20%)	
URL	Speed Index	Start Render	Visually Complete	Fully Loaded	Results Link	Start Render	Visually Complete
<a href="http://www.rferl.mobi/">http://www.rferl.mobi/</a>	4599	3.737	7.687	10.233	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.9896	6.1496
<a href="http://www.rferl.mobi/a/obama-us-eu-united-russia-ukraine/25307650.html">http://www.rferl.mobi/a/obama-us-eu-united-russia-ukraine/25307650.html</a>	4390	3.704	6.871	9.273	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.9632	5.4968
<a href="http://www.svoboda.mobi/">http://www.svoboda.mobi/</a>	4529	3.486	7.569	9.307	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.7888	6.0552
<a href="http://www.svoboda.mobi/a/25308058.html">http://www.svoboda.mobi/a/25308058.html</a>	4363	3.49	6.657	7.434	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.792	5.3256
<a href="http://www.azatutyun.mobi/">http://www.azatutyun.mobi/</a>	4725	4.21	6.76	8.895	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	3.368	5.408
<a href="http://www.azatutyun.mobi/a/25307874.html">http://www.azatutyun.mobi/a/25307874.html</a>	4089	3.44	5.74	7.961	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.752	4.592
<a href="http://m.alhurra.com/">http://m.alhurra.com/</a>	4606	3.61	7.693	11.737	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.888	6.1544
<a href="http://m.alhurra.com/a/%D8%A3%D9%86%D8%A8%D8%A7%D8%A1-%D8%B9%D9%86-%D8%B3%D9%8A%D8%B7%D8%B1%D8%A9-%D8%A7%D9%84%D9%85%D8%B9%D8%A7%D8%B1%D8%B6%D8%A9-%D8%A7%D9%84%D8%B3%D9%88%D8%B1%D9%8A%D8%A9-%D8%B9%D9%84%D9%89-%D9%85%D8%AF%D9%8A%D9%86%D8%A9-%D9%83%D8%B3%D8%A8-%D8%A8%D8%A7%D9%84%D9%84%D8%A7%D8%B0%D9%82%D9%8A%">http://m.alhurra.com/a/%D8%A3%D9%86%D8%A8%D8%A7%D8%A1-%D8%B9%D9%86-%D8%B3%D9%8A%D8%B7%D8%B1%D8%A9-%D8%A7%D9%84%D9%85%D8%B9%D8%A7%D8%B1%D8%B6%D8%A9-%D8%A7%D9%84%D8%B3%D9%88%D8%B1%D9%8A%D8%A9-%D8%B9%D9%84%D9%89-%D9%85%D8%AF%D9%8A%D9%86%D8%A9-%D9%83%D8%B3%D8%A8-%D8%A8%D8%A7%D9%84%D9%84%D8%A7%D8%B0%D9%82%D9%8A%</a>	4489	3.7	7.717	8.6	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.96	6.1736
<a href="http://www.ozodlik.mobi/">http://www.ozodlik.mobi/</a>	3906	3.563	5.797	9.273	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.8504	4.6376
<a href="http://www.ozodlik.mobi/a/25307800.html">http://www.ozodlik.mobi/a/25307800.html</a>	3979	3.319	5.769	8.296	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.6552	4.6152
<a href="http://m.darivoa.com/">http://m.darivoa.com/</a>	3805	3.498	5.448	8.197	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.7984	4.3584
<a href="http://m.darivoa.com/a/venue-for-new-year-changed-to-arg/1878141.html">http://m.darivoa.com/a/venue-for-new-year-changed-to-arg/1878141.html</a>	3736	3.341	5.108	7.608	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	2.6728	4.0864
<a href="http://www.cnn.com">http://www.cnn.com</a>	5241	5.178	5.311	10.533	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	4.1424	4.2488
<a href="http://www.cnn.com/2014/03/24/health/ohio-mumps/index.html?c=us">http://www.cnn.com/2014/03/24/health/ohio-mumps/index.html?c=us</a>	5743	5.458	9.574	12.483	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	4.3664	7.6592
<a href="http://www.npr.org">http://www.npr.org</a>	7060	5.175	13.542	26.377	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	4.14	10.8336
<a href="http://www.npr.org/2014/03/24/292420643/pritzker-winner-shigeru-ban-designs-solutions-in-the-face-of-disaster">http://www.npr.org/2014/03/24/292420643/pritzker-winner-shigeru-ban-designs-solutions-in-the-face-of-disaster</a>	6542	6.136	9.07	17.364	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	4.9088	7.256
<a href="http://www.theguardian.com/uk?view=mobile">http://www.theguardian.com/uk?view=mobile</a>	3931	2.087	18.82	22.177	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	1.6696	15.056
<a href="http://www.theguardian.com/world/2014/mar/24/russia-shrugs-threat-expulsion-g8?view=mobile">http://www.theguardian.com/world/2014/mar/24/russia-shrugs-threat-expulsion-g8?view=mobile</a>	5517	2.115	17.415	18.84	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	1.692	13.932
<a href="http://m.bbc.com/news">http://m.bbc.com/news</a>	9722	8.392	15.875	18.067	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	6.7136	12.7
<a href="http://m.bbc.com/news/world-europe-26725659">http://m.bbc.com/news/world-europe-26725659</a>	10461	9.045	20.312	23.457	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	7.236	16.2496
<a href="http://america.aljazeera.com">http://america.aljazeera.com</a>	6755	6.272	8.022	63.756	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	5.0176	6.4176
<a href="http://america.aljazeera.com/articles/2014/3/24/over-100-may-be-missing-in-washington-state-after-deadly-mudslide.html">http://america.aljazeera.com/articles/2014/3/24/over-100-may-be-missing-in-washington-state-after-deadly-mudslide.html</a>	7908	5.594	21.677	33.24	<a href="http://www.webpagetest.org/result/140324">http://www.webpagetest.org/result/140324</a>	4.4752	17.3416

# **3. INTEGRATED**

NEWS  
by RFE/RL  
June 1, 2014  
97 comments

# Hague Court Rules Against Russia In Yukos Case

A court based in The Hague has ordered Russia to pay about \$50 billion to a group of former shareholders of the Yukos oil company.

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	TARGET TIME	KILOBYTE WEIGHT
Start Render	1.194s	114kb
Document Complete	2.52s	242kb
Fully Loaded	2.822s	271kb



# Let's Make A Performance Budget!

## Template Name

Budget: 800KB

Actual: 700KB

HTML  
50

CSS  
100

JS  
200

Images  
200

Fonts  
100

Ads  
50

ADD NEW TEMPLATE

[More info on this project.](#) Made by Brad Frost (@brad\_frost)

Howdy!

*Chaparral Pro*

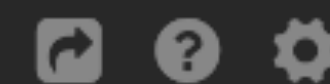
188k

Howdy!

*Tisa Pro*

140k

# STATUS



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

Start Render Budget

**2.35s** / 2s

A white line graph on a red background showing the fluctuation of the Start Render budget over time. The line starts near the bottom and ends with a sharp upward spike.

SpeedIndex Budget

**8.72s** / 4s

A white line graph on a red background showing the fluctuation of the SpeedIndex budget over time. The line shows several peaks and troughs, ending with a significant spike.

Scripting CPU Time to Fully Loaded Budget

**0.01s** / 2s

A white line graph on a green background showing the fluctuation of the Scripting CPU Time to Fully Loaded budget over time. The line is very flat and stays very close to the bottom.

Hero H1 Budget

**2.60s** / 2.5s

A white line graph on a red background showing the fluctuation of the Hero H1 budget over time. The line shows several peaks and troughs, ending with a sharp upward spike.

Largest Image Budget

**7.75s** / 5s

A white line graph on a red background showing the fluctuation of the Largest Image budget over time. The line shows several peaks and troughs, ending with a sharp upward spike.

Largest Background Image Budget

**9.20s** / 5s

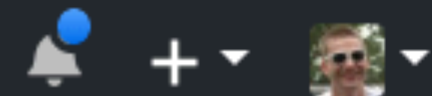
A white line graph on a red background showing the fluctuation of the Largest Background Image budget over time. The line shows several peaks and troughs, ending with a sharp upward spike.

# **4. ENFORCED**



Search or jump to...

Pull requests Issues Marketplace Explore



GoogleChrome / lighthouse

Watch 460

Star 16,152

Fork 5,403

Code

Issues 406

Pull requests 33

Projects 3

Insights

# Early Preview of LightWallet (Performance Budgets in Lighthouse) #7176



khempenius wants to merge 1 commit into GoogleChrome:master from khempenius:lightwallet

Conversation 12

Commits 1

Checks 0

Files changed 16

+1,137 -18



khempenius commented 28 days ago • edited by addyosmani

Collaborator +

⚠ This code is a preview of planned Lighthouse functionality. It is **not** intended for production use.

## TLDR;

LightWallet adds performance budget tooling to Lighthouse. It supports page weight, request, and timing-based performance budgets. See [#6053](#).

## How to Use

### Install this demo

```
$ git clone -b lightwallet git@github.com:GoogleChrome/lighthouse.git
```

```
$ cd lighthouse
```

```
$ npm install
```

### Reviewers

- brendankenny
- paulirish
- patrickhulce

At least 1 approving review is required to merge this pull request.

### Assignees

No one assigned

### Labels

None yet

### Projects

None yet



## All checks have passed

2 successful checks

[Hide all checks](#)



**bundlesize** — ./dist.js: 3.6Kb < threshold 4Kb (0.2Kb larger than master, careful!)



**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**





# PREACT

Fast 3kB alternative to React with the same modern API.

GET STARTED

SWITCH TO PREACT

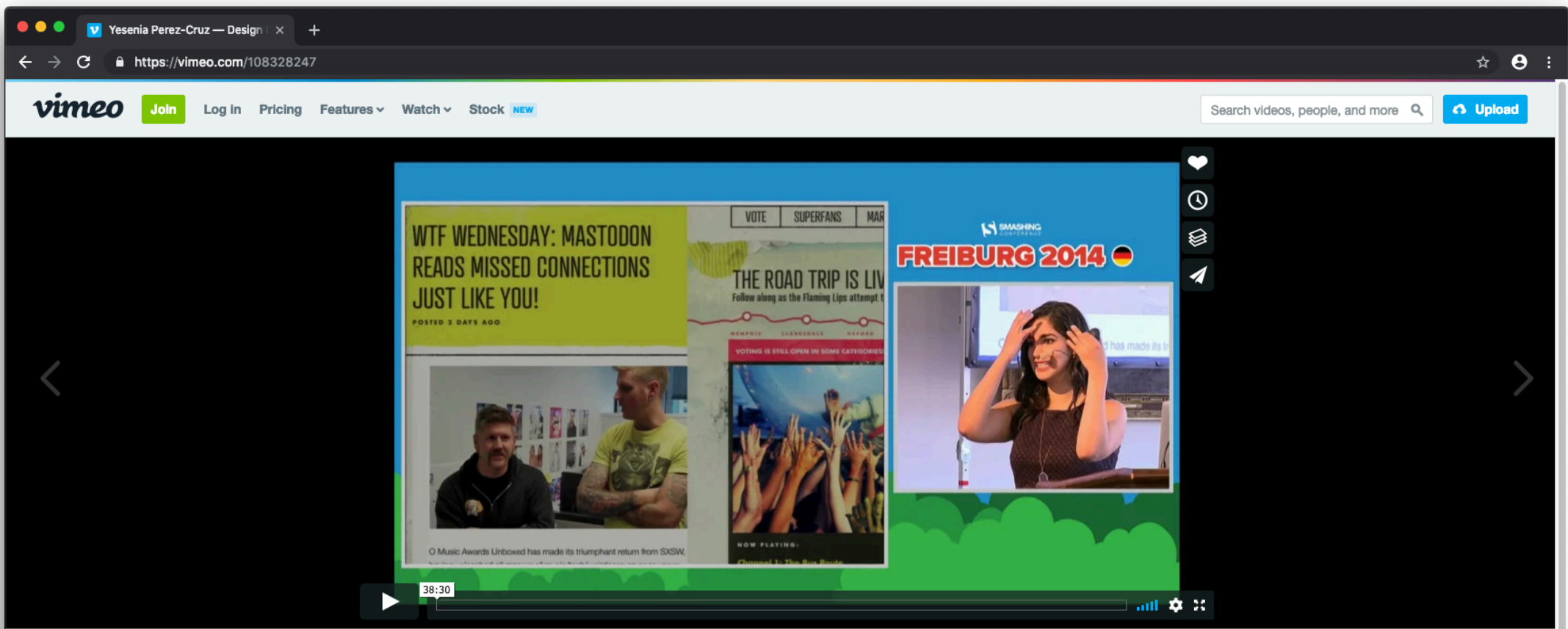


Star 20,403

A different kind of library.

**UNIFYING TARGET**





## Yesenia Perez-Cruz — Design Decisions Through The Lens Of A Performance Budget (Smashing Conference Freiburg 2014)

4 years ago | More

Smashing Magazine

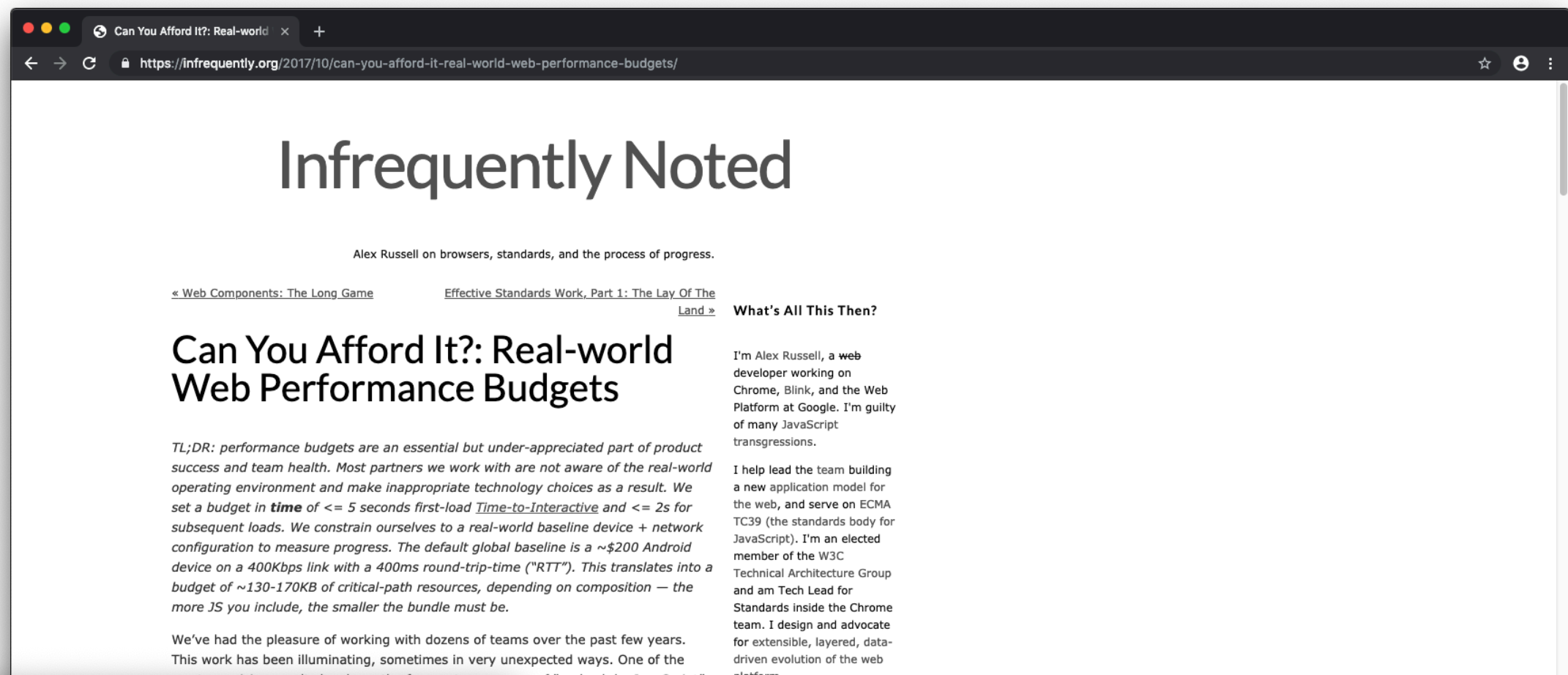
2,394 views 24 likes 3 shares 0 comments

Download Share

In this talk, Yesenia will discuss how we can make smarter design decisions, from the beginning of a project, to ensure that our sites perform well. Some topics she'll discuss are optimizing typography and UI, responsive images, and how to get clients on board.

Leave the first comment:

Add a new comment



# Infrequently Noted

Alex Russell on browsers, standards, and the process of progress.

Web Components: The Long Game Effective Standards Work, Part 1: The Lay Of The Land

## Can You Afford It?: Real-world Web Performance Budgets

*TL;DR: performance budgets are an essential but under-appreciated part of product success and team health. Most partners we work with are not aware of the real-world operating environment and make inappropriate technology choices as a result. We set a budget in time of <= 5 seconds first-load Time-to-Interactive and <= 2s for subsequent loads. We constrain ourselves to a real-world baseline device + network configuration to measure progress. The default global baseline is a ~\$200 Android device on a 400Kbps link with a 400ms round-trip-time ("RTT"). This translates into a budget of ~130-170KB of critical-path resources, depending on composition — the more JS you include, the smaller the bundle must be.*

We've had the pleasure of working with dozens of teams over the past few years. This work has been illuminating, sometimes in very unexpected ways. One of the

### What's All This Then?

I'm Alex Russell, a web developer working on Chrome, Blink, and the Web Platform at Google. I'm guilty of many JavaScript transgressions.

I help lead the team building a new application model for the web, and serve on ECMA TC39 (the standards body for JavaScript). I'm an elected member of the W3C Technical Architecture Group and am Tech Lead for Standards inside the Chrome team. I design and advocate for extensible, layered, data-driven evolution of the web platform.

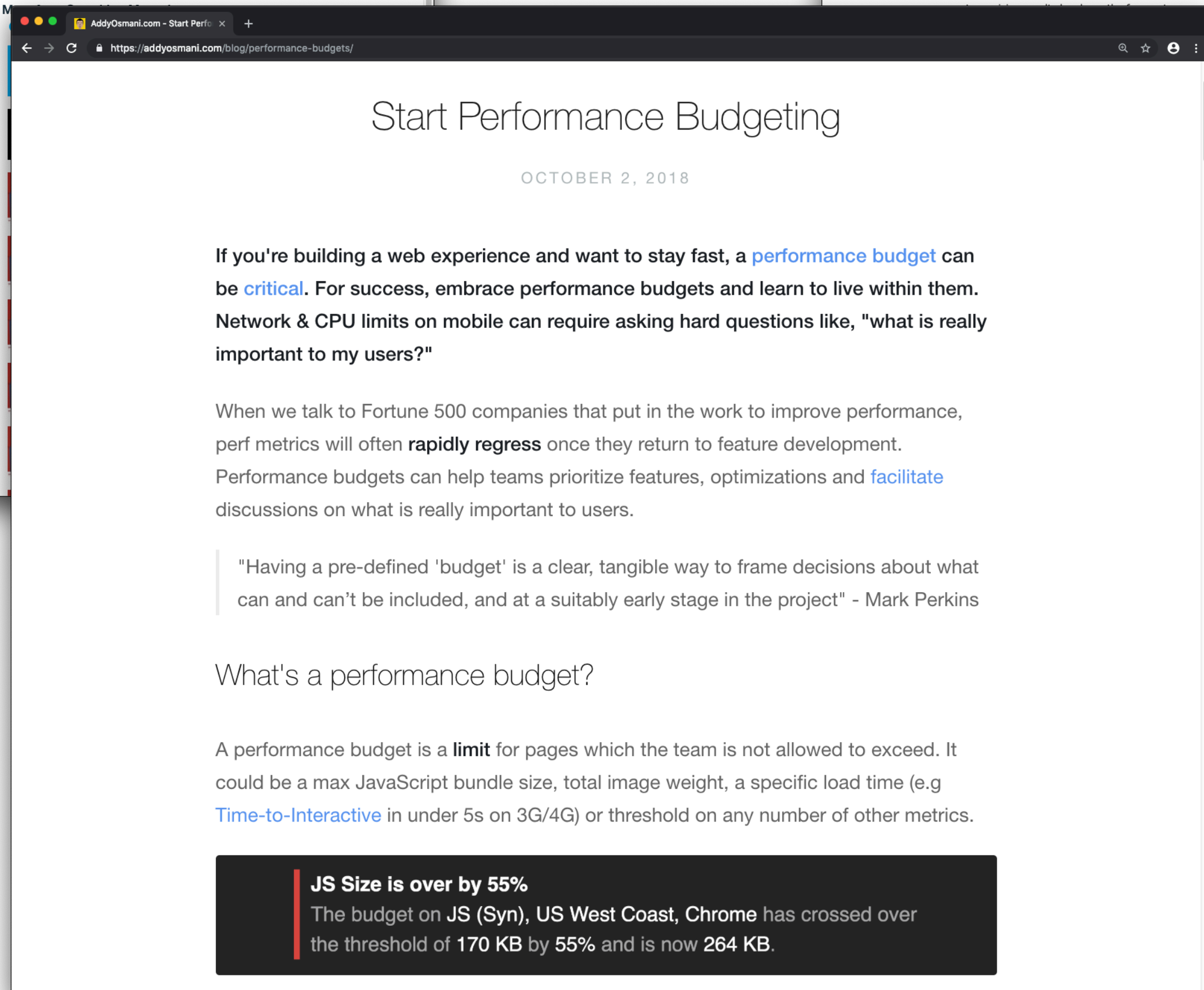
My professional aim is to make the web a better platform and to the extent that I can keep politics and economics from creeping in, that's what this blog is about.

Other facets available upon HTTP request: twitter, facebook, flickr, linkedin, lanyrd, and quora. Expect less self-restraint there.

I'm proud husband to Frances Berriman. We live and work in San Francisco.

### Recent Comments

- Jason on The "Developer Experience" Bait-and-Switch
- Sam on The "Developer Experience" Bait-and-Switch
- Ken Brown on The "Developer Experience" Bait-and-Switch
- alex on The "Developer Experience" Bait-and-Switch
- Bridget M Stewart on The "Developer Experience" Bait-and-Switch



## Start Performance Budgeting

OCTOBER 2, 2018

If you're building a web experience and want to stay fast, a **performance budget** can be **critical**. For success, embrace performance budgets and learn to live within them. Network & CPU limits on mobile can require asking hard questions like, "what is really important to my users?"

When we talk to Fortune 500 companies that put in the work to improve performance, perf metrics will often **rapidly regress** once they return to feature development. Performance budgets can help teams prioritize features, optimizations and **facilitate** discussions on what is really important to users.

"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's a performance budget?

A performance budget is a **limit** for pages which the team is not allowed to exceed. It could be a max JavaScript bundle size, total image weight, a specific load time (e.g **Time-to-Interactive** in under 5s on 3G/4G) or threshold on any number of other metrics.

#### 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.

# THANK YOU!



**TIM KADLEC @TKADLEC**