optimising YOUR WORKFLOW FOR PERFORMANCE

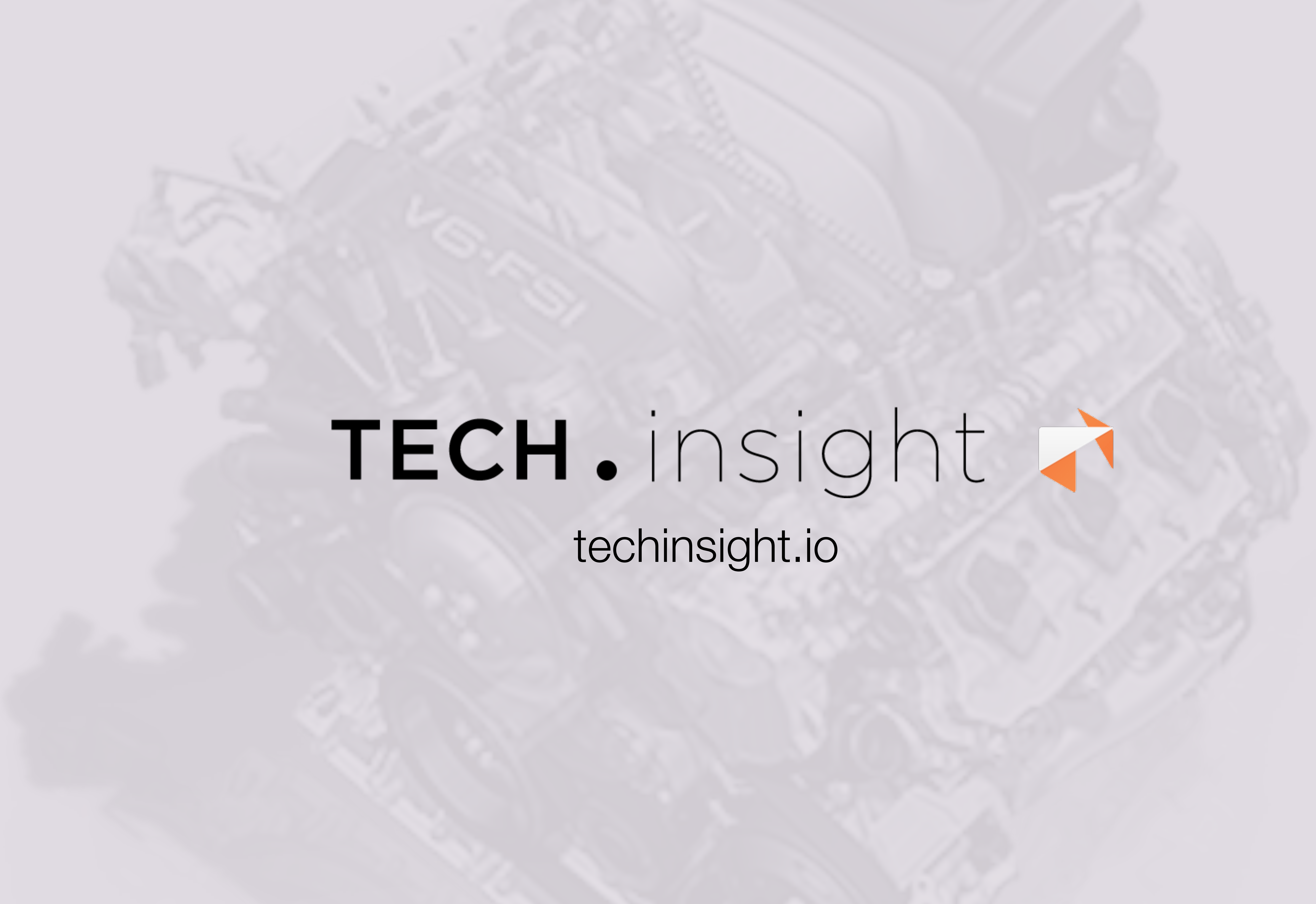
GENERATE LONDON

ANDI SMITH

DIRECTOR OF WEB DEVELOPMENT AT AKQA

@andismith andismith.com

Formula 1
WARNER BROS. PICTURES
WB
MARKS & SPENCER
BBC
HERMÈS
PARIS
MINI
dyson
NIVEA



TECH.insight

techinsight.io

PROJECTS

Tips, tricks
& techniques

THIS MONTH FEATURING...

EXCLUSIVE VIDEOS

Look out for the video icon throughout our tutorials. This issue, two authors have created exclusive screencasts to complement their articles and enhance your learning: Peter Nowell's tutorial on animating icons with Sketch, CSS and SVG, and Jérôme Lecomte's guide to mastering screen orientation.

owser suppo
@andismith's
n I Use web

that's me!

65 PAGES OF PRACTICAL WEB DESIGN TIPS AND TECHNIQUES!

/develop/discover/design

/issue 246 / october 2013 / www.netmagazine.com

net

★ Create slick CSS layouts

Build amazing user interfaces with the revolutionary Flexbox

MASTER BROWSER DEV TOOLS

*We reveal how to get the most out of Firefox, IE, Opera and Safari. **Plus** speed sites up in Chrome*

> Responsive wireframes
Techniques for HTML prototyping

> Develop with Grunt
Give your workflow a makeover

> Marketing analytics tips
How to measure social activity & more

10 ESSENTIAL MOBILE UX TIPS
Guidelines for user-focused mobile design

CREATE AN HTML PHYSICS GAME
Discover JavaScript 2D engine Matter.js

MASTER DESIGN FRAMEWORKS
Use Gulp, Foundation and Sassaparilla

RESPONSIVE IMAGES SOLVED!
Generate responsive images automatically

The voice of **web design**

net

Issue 255 : July 2014 : *net.creativebloq.com*

★ PROJECT

GET STARTED WITH GOOGLE APP ENGINE

Build and deploy scalable PHP applications

THE Complete WEB DESIGN TOOLKIT

WE REVEAL THE PERFECT WORKFLOW TO ELIMINATE FRONTEND DEVELOPMENT PAIN

USE A TASK RUNNER

Image Credit: https://www.flickr.com/photos/elsie/8229790

1

AUTOMATE WORKFLOW

2

REDUCE REPETITION

3

REDUCE ERRORS

4

REDUCE PAIN!

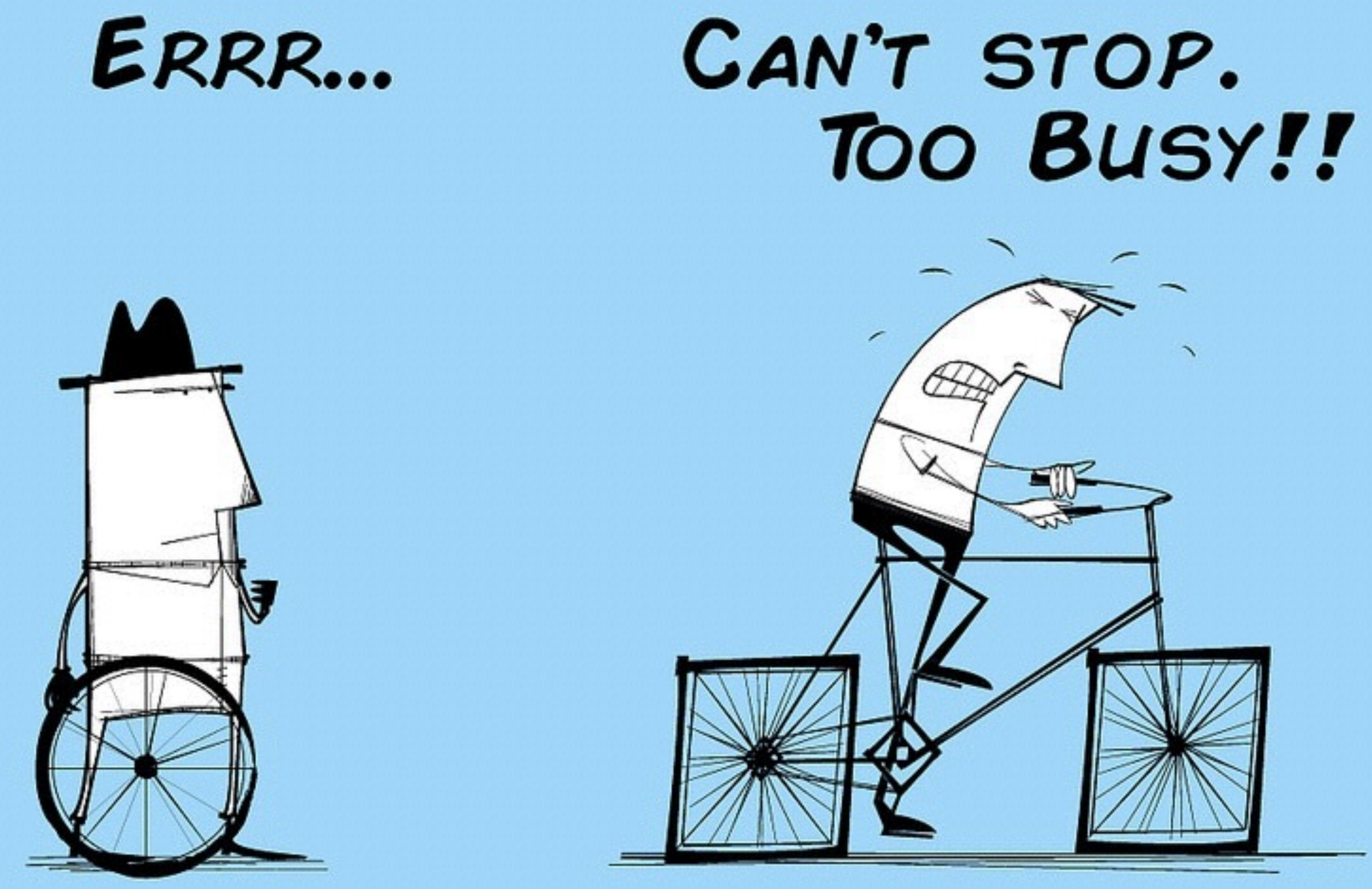


Image Credit: http://www.workcompass.com

GRUNT *or* GULP

GRUNT *or* GULP

- Configuration based setup
- Sequential tasks
- Writes to file system

- Code based setup
- Concurrent tasks
- Uses streams (faster)

TASKS TO *optimise* PERFORMANCE

why OPTIMISE SITE PERFORMANCE?

Image Credit: https://www.flickr.com/photos/ssoosay/2948843480

BUFFER FACE

Credit: https://www.youtube.com/watch?v=rpxE2ylyRhI

HOW LONG WILL USERS WAIT?

100ms	Feels like it is instantly reacting
1s	Feels like the computer is “working” on their request
10s	Users give up

Source: http://www.nngroup.com/articles/response-times-3-important-limits/

AMAZON

EXTRA 100MS WAIT COST 1% IN SALES

Source: http://blog.gigaspaces.com/amazon-found-every-100ms-of-latency-cost-them-1-in-sales/

GOOGLE

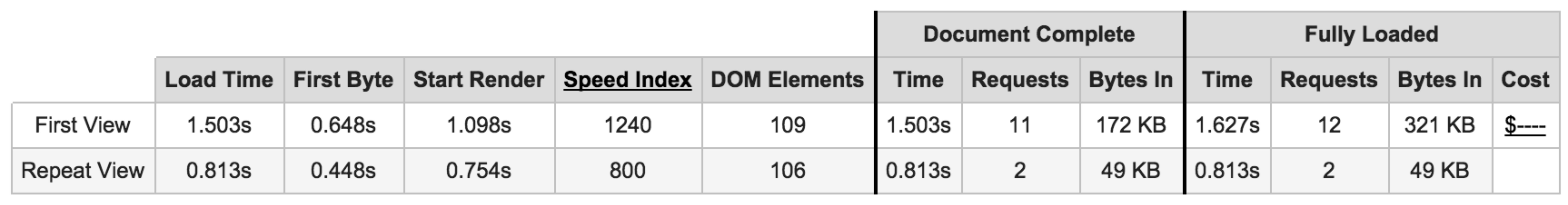
EXTRA 500MS WAIT FOR SEARCH RESULTS DROPPED 20% TRAFFIC

Source: http://glinden.blogspot.co.uk/2006/11/marissa-mayer-at-web-20.html

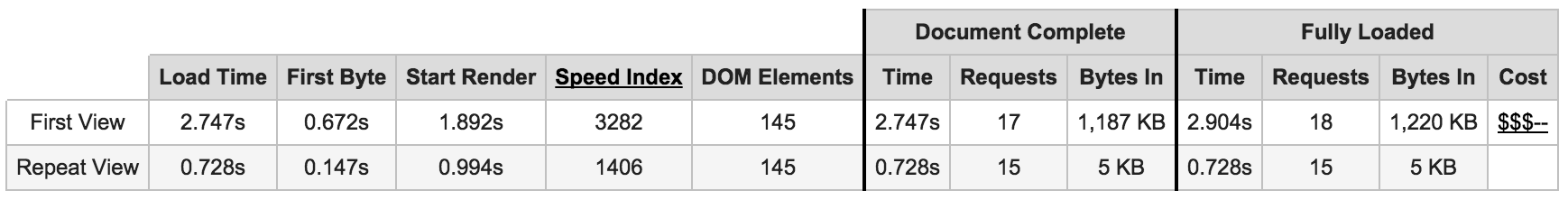
TESTING PERFORMANCE

Speed Index

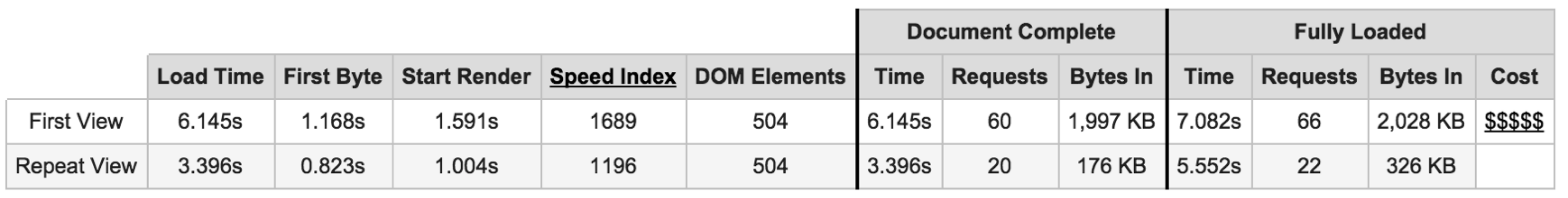
http://webpagetest.org



						Document Complete			Fully Loaded			
	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View	1.503s	0.648s	1.098s	1240	109	1.503s	11	172 KB	1.627s	12	321 KB	$----
Repeat View	0.813s	0.448s	0.754s	800	106	0.813s	2	49 KB	0.813s	2	49 KB	



						Document Complete			Fully Loaded			
	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View	2.747s	0.672s	1.892s	3282	145	2.747s	17	1,187 KB	2.904s	18	1,220 KB	$$$--
Repeat View	0.728s	0.147s	0.994s	1406	145	0.728s	15	5 KB	0.728s	15	5 KB	

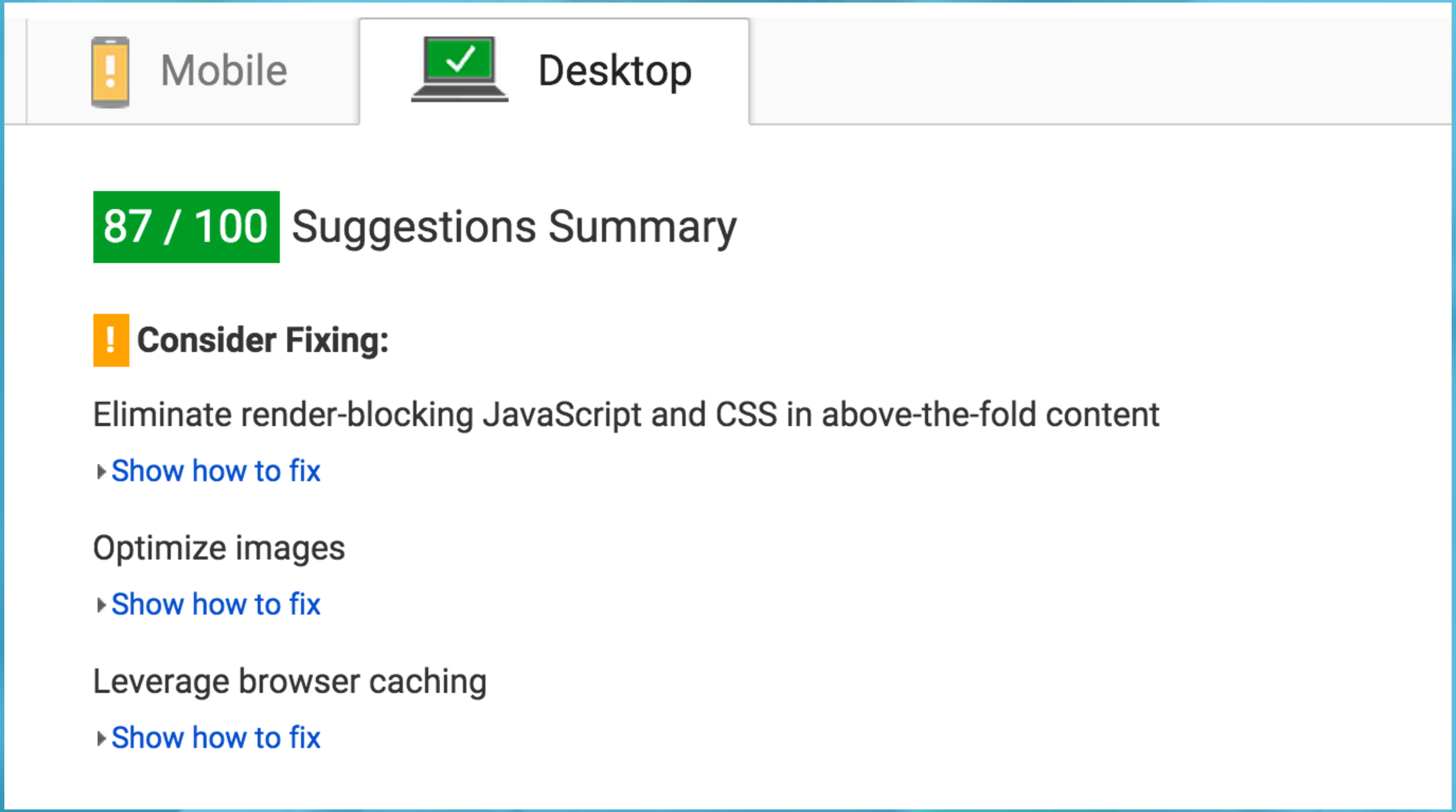


						Document Complete			Fully Loaded			
	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View	6.145s	1.168s	1.591s	1689	504	6.145s	60	1,997 KB	7.082s	66	2,028 KB	$$$$$
Repeat View	3.396s	0.823s	1.004s	1196	504	3.396s	20	176 KB	5.552s	22	326 KB	

TESTING PAGE SPEED

Page Speed Insights

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



87 / 100 Suggestions Summary

! **Consider Fixing:**

Eliminate render-blocking JavaScript and CSS in above-the-fold content

▸ Show how to fix

Optimize images

▸ Show how to fix

Leverage browser caching

▸ Show how to fix

WHY THE WAIT?

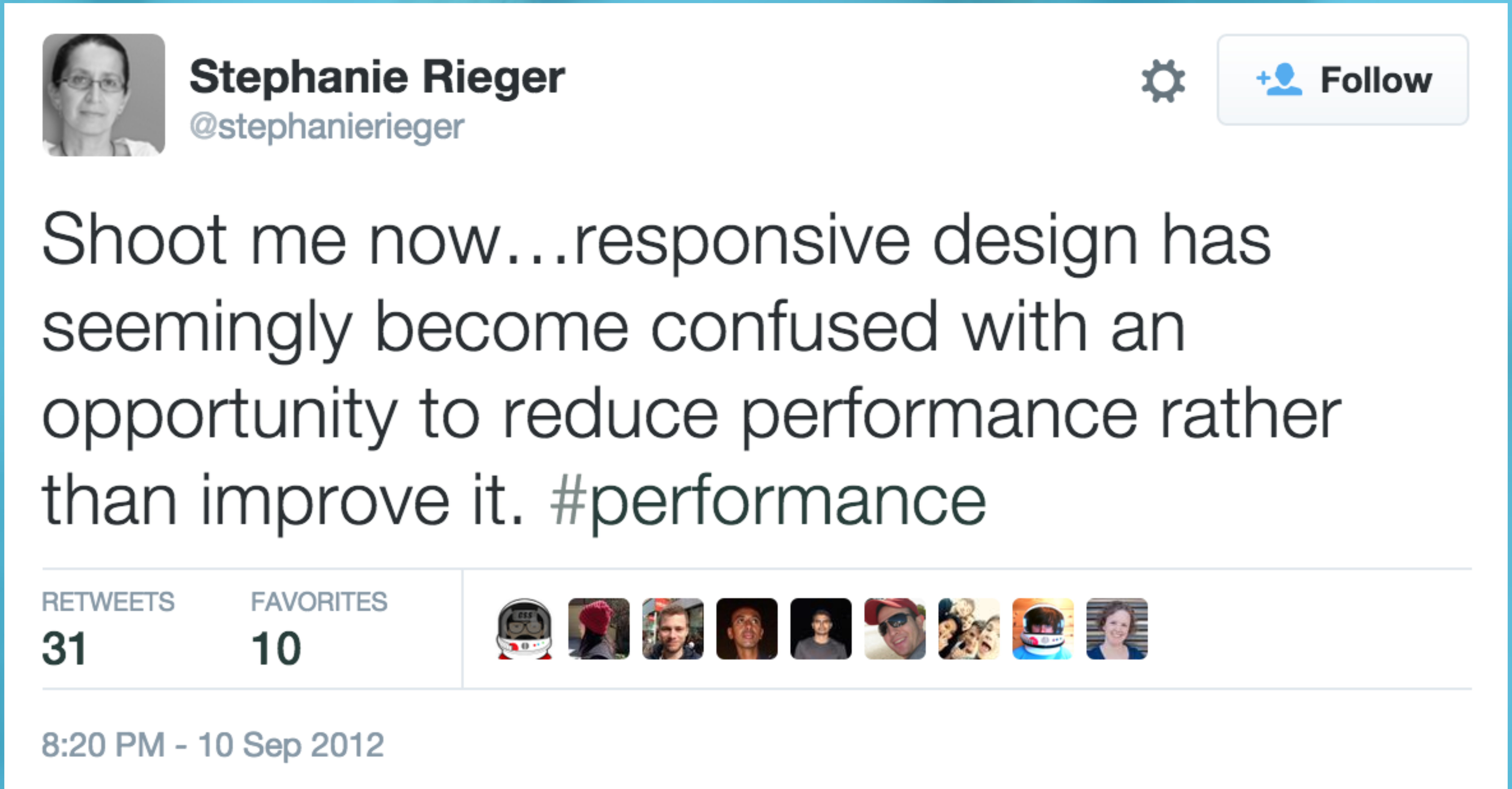
TOO MANY REQUESTS

PAGE SIZE

BLOCKING SCRIPTS

CONNECTION SPEED

LATENCY



Stephanie Rieger
@stephanierieger

Shoot me now…responsive design has seemingly become confused with an opportunity to reduce performance rather than improve it. #performance

RETWEETS 31

FAVORITES 10

8:20 PM - 10 Sep 2012

optimising YOUR WEBSITE FOR PERFORMANCE

Image Credit: https://www.flickr.com/photos/noddymini/17368814772

FEWER REQUESTS

FIX THE WAIT!

SMALLER PAGE SIZE

NO BLOCKING SCRIPTS

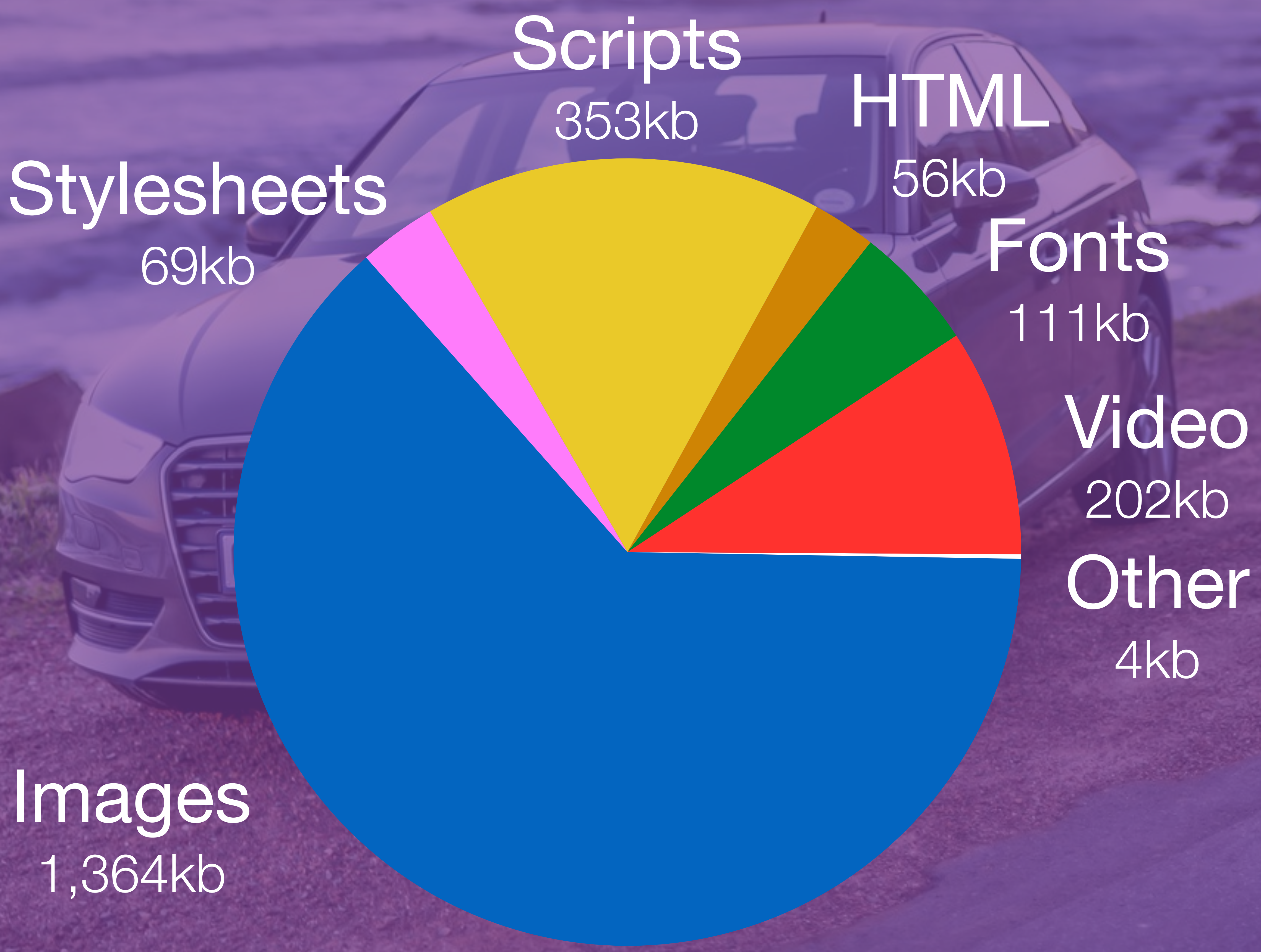
REDUCE LATENCY

CONNECTION SPEED

smaller PAGE SIZE

Image Credit: https://www.flickr.com/photos/rockingcars/10083247036/

Average bytes per page by Content Type for top 1,000,000 web sites



Total: 2,169kb

Source: http://httparchive.org/interesting.php?a=All&l=Aug%2015%202015

SET A PERFORMANCE BUDGET

A BASELINE FOR PAGE SIZE AND NUMBER OF REQUESTS

More Info: http://timkadlec.com/2013/01/setting-a-performance-budget/

RESPONSIVE IMAGES

Serve images that fit the size of the users' device appropriately.

Otherwise we're just sending wasted pixels

```
npm install grunt-responsive-images
```

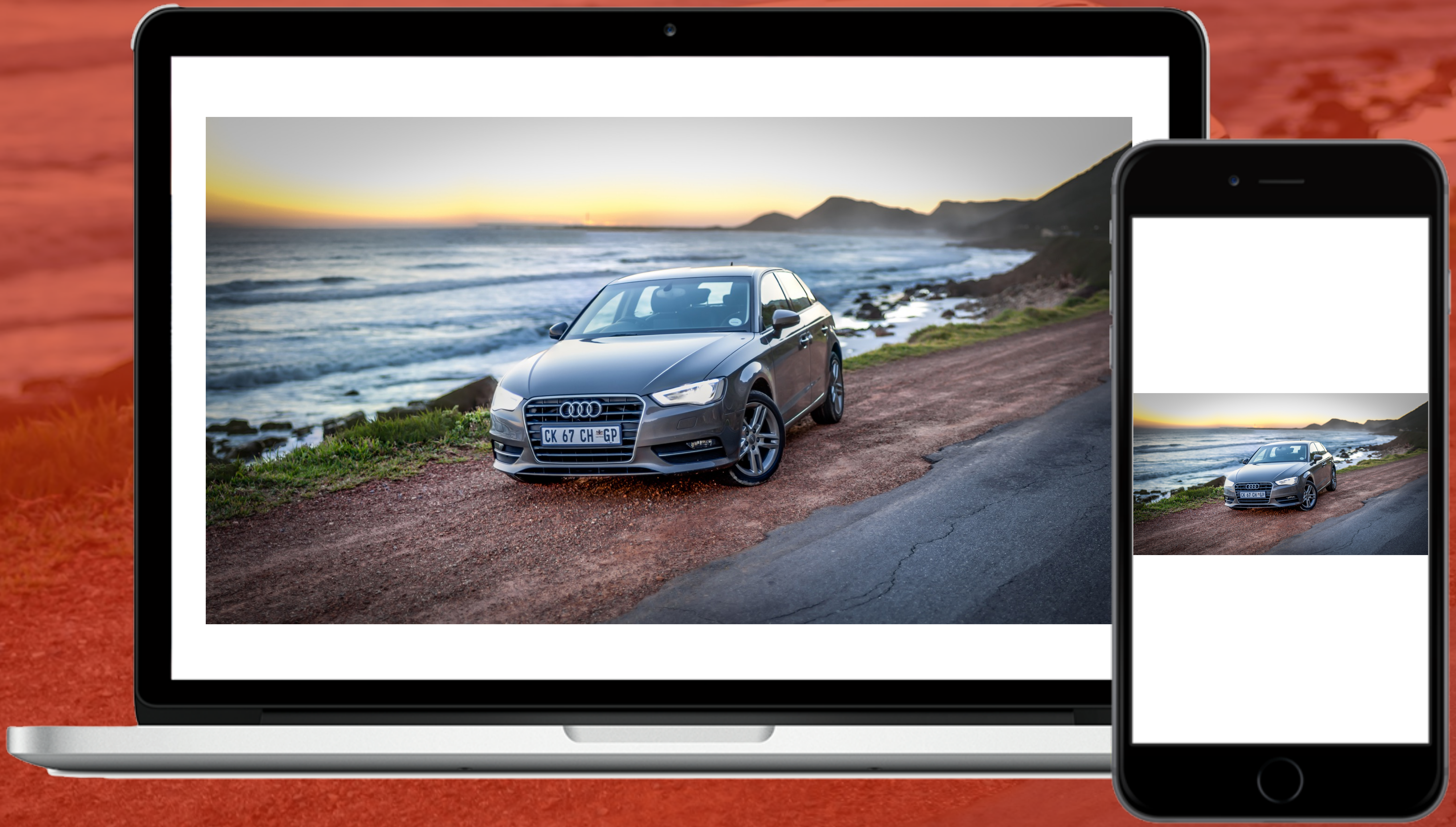
```
npm install gulp-responsive
```

Workflow task **resizes** image

Use **srcset** and **picture** element

SRCSET *vs* PICTURE

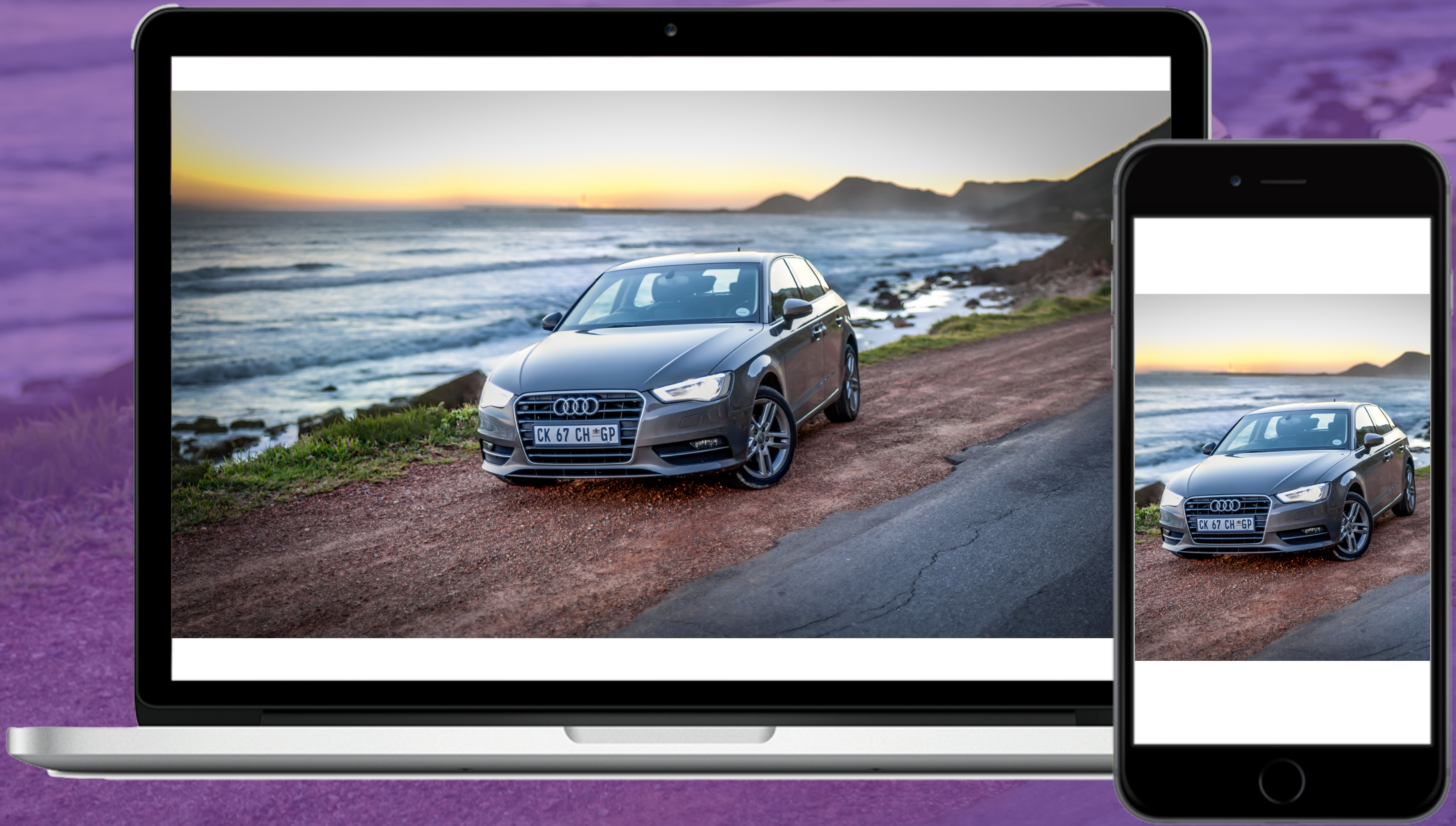
SIZE/DPI



USE IMG WITH SRCSET & SIZES

```
<img src="small.jpg"
     srcset="large.jpg 1024w, medium.jpg 640w,
small.jpg 320w"
     sizes="(min-width: 640px) 90vw, 100vw"
     alt="My lovely horse">
```

ART DIRECTION



USE PICTURE

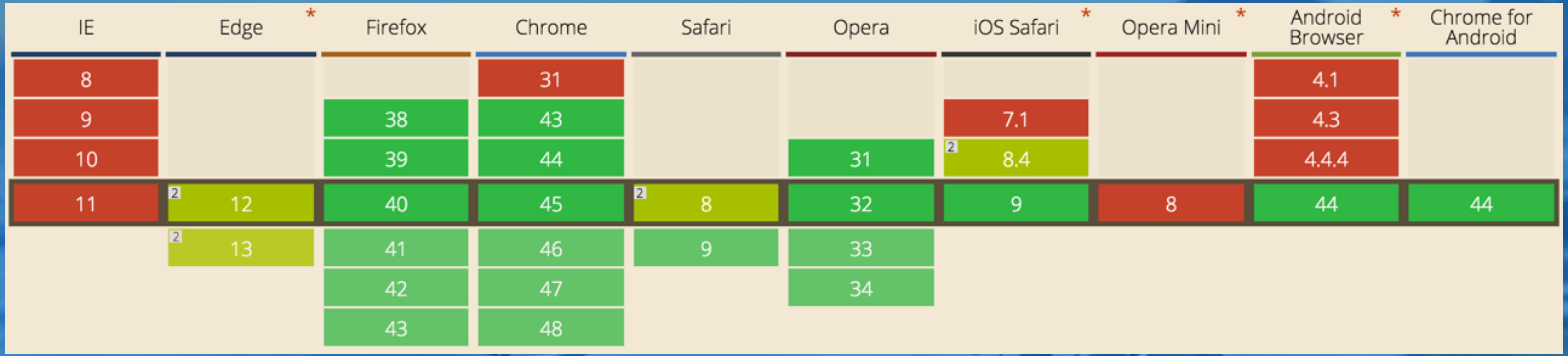
```
<picture>
  <source media="(min-width: 640px)"
    srcset="large.jpg 1x, large-hd.jpg 2x">
  <source
    srcset="small.jpg 1x, small-hd.jpg 2x">
  <img src="fallback.jpg" alt="My lovely horse">
</picture>
```

RESPONSIVE IMAGES

	SRCSET	PICTURE
Resize	Yes	No
Pixel Density (e.g. Retina)	Yes	No
Art Direction Changing	No	Yes
MIME Type (e.g. WebP)	No	Yes

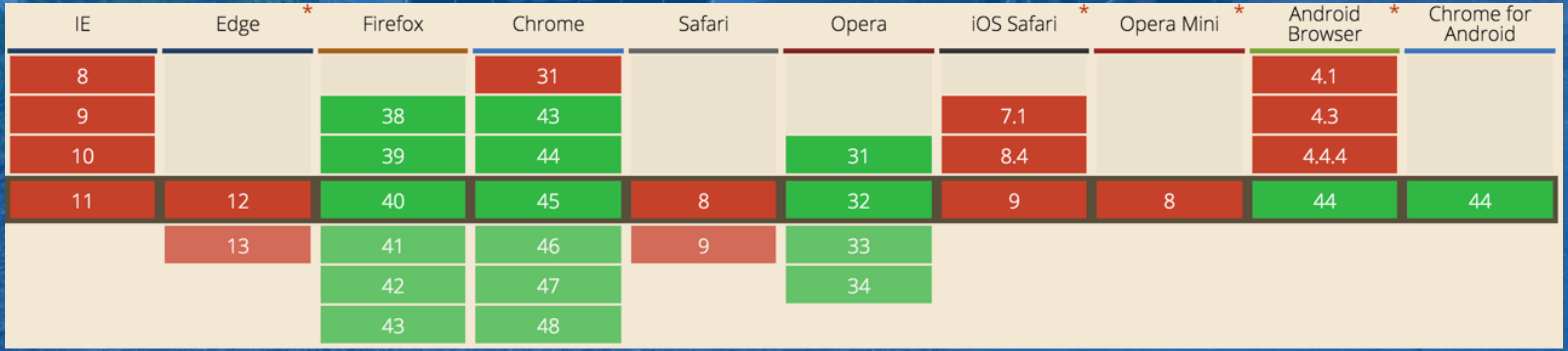
More Info: https://dev.opera.com/articles/responsive-images/

SRCSET



IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
8			31					4.1	
9		38	43			7.1		4.3	
10		39	44		31	2 8.4		4.4.4	
11	2 12	40	45	2 8	32	9	8	44	44
	2 13	41	46	9	33				
		42	47		34				
		43	48						

PICTURE



IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
8			31					4.1	
9		38	43			7.1		4.3	
10		39	44		31	8.4		4.4.4	
11	12	40	45	8	32	9	8	44	44
	13	41	46	9	33				
		42	47		34				
		43	48						

Source: http://caniuse.com/

LACKING BROWSER SUPPORT?

USE A POLYFILL!

https://github.com/scottjehl/picturefill

COMPRESS IMAGES

Compress images so they take less time to download

```
npm install grunt-contrib-imagemin
```

```
npm install gulp-imagemin
```

FILE SIZE SAVINGS

BEFORE

273KB

AFTER

240KB

UNUSED CSS

No need to include unused CSS on our pages.

```
npm install grunt-uncss
```

```
npm install gulp-uncss
```

MINIFY, UGLIFY

Image Credit: https://www.flickr.com/photos/abrinsky/14836518223

MINIFY, UGLIFY & CONCATENATE

Usemin runs a number of performance helper tasks such as uglify, cssmin and concatenate automatically.

```
npm install grunt-usemin
```

```
npm install gulp-usemin
```

HTML SETUP

```
<!-- build:css /assets/css/main.min.css -->
<link href="/assets/css/vendors/bootstrap.css"
rel="stylesheet" />
<link href="/assets/css/main.css" rel="stylesheet" />
<!-- endbuild -->
```

HTML SETUP

```
<!-- build:js /assets/js/main.min.js -->
<script src="/assets/js/vendors/jquery.js"></script>
<script src="/assets/js/vendors/picturefill.js"></
script>
<script src="/assets/js/main.js"></script>
<!-- endbuild -->
```

EXAMPLE SETUP

```
usemin: {
  html: '**/*.html',
  css: PATHS.DEST + PATHS.CSS + '**/*.css',
  js: PATHS.DEST + PATHS.JS + '**/*.js'
},
useminPrepare: {
  html: 'src/index.html',
  options: {
     root: 'src'
  }
}
```

TASK ORDER

```
grunt.registerTask('usemin',
  ['useminPrepare',
   'concat',
   'cssmin',
   'uglify',
   'filerev',
   'usemin',
   'htmlmin']);
```

COMPRESS FILES

GZIP our HTML, CSS, JavaScript.

```
npm install grunt-contrib-compress
```

```
npm install gulp-gzip
```

LAZY LOADING

fewer REQUESTS

SPRITE IMAGES

Combine smaller images in to one sprite file, and generate CSS for the sprite

```
npm install grunt-spritesmith
```

```
npm install gulp.spritesmith
```

Add-on Item
AutoRip
Add to Watchlist
Adding...
Add to Cart
Add to Cart
AutoRip
Prime
GO
12
15
18
U
E
PG
TBC
PrimeFresh
PrimeFresh
PrimePantry
kindleunlimited
GO
Prime (3-5 Days)
amazonPrime
PrimeCampus
See more like this
#1 Best Seller
amazon instant video
Get Started
2DS
Wii
PS2
PSP
PS4
DS
3DS
PS VITA
Prime
IMDb
GO
Prime
Ultimata
amazonultimata

CRITICAL CSS

Inline critical CSS for above-the-fold content in to the first 14kb.

```
npm install grunt-penthouse
```

```
npm install gulp-critical-css
```

no BLOCKING SCRIPTS

<SCRIPT> AT BOTTOM OF PAGE

<SCRIPT **ASYNC**>

<SCRIPT **DEFER**>*

*IE 10+

reduce LATENCY

CDN

SOME DOMAIN SHARDING

CONCATENATION

CONNECTION SPEED

CACHE

CACHE FILES

Use filerev to set your workflow to assign file revision numbers

```
npm install grunt-filerev
```

```
npm install gulp-filerev
```

FILEREV SETS A FILENAME BASED ON THE FILE CONTENTS

main.css → main.a1b2c3.css

HEAVILY CACHE JAVASCRIPT, CSS AND IMAGES

CHANGES TO THE FILE WILL CREATE A NEW FILENAME

main.css → main.d4e5f6.css

SUMMARY OF TASKS

- **Smaller Page Size**
  Responsive Images, Image Optimisation, Unused CSS, Minify and Uglify

- **Fewer Requests**
  Concatenate, Sprite Images, Critical CSS

- **Connection Speed**
  Cache Files

After GO LIVE

Image Credit: https://www.flickr.com/photos/ecodallaluna/3987049662

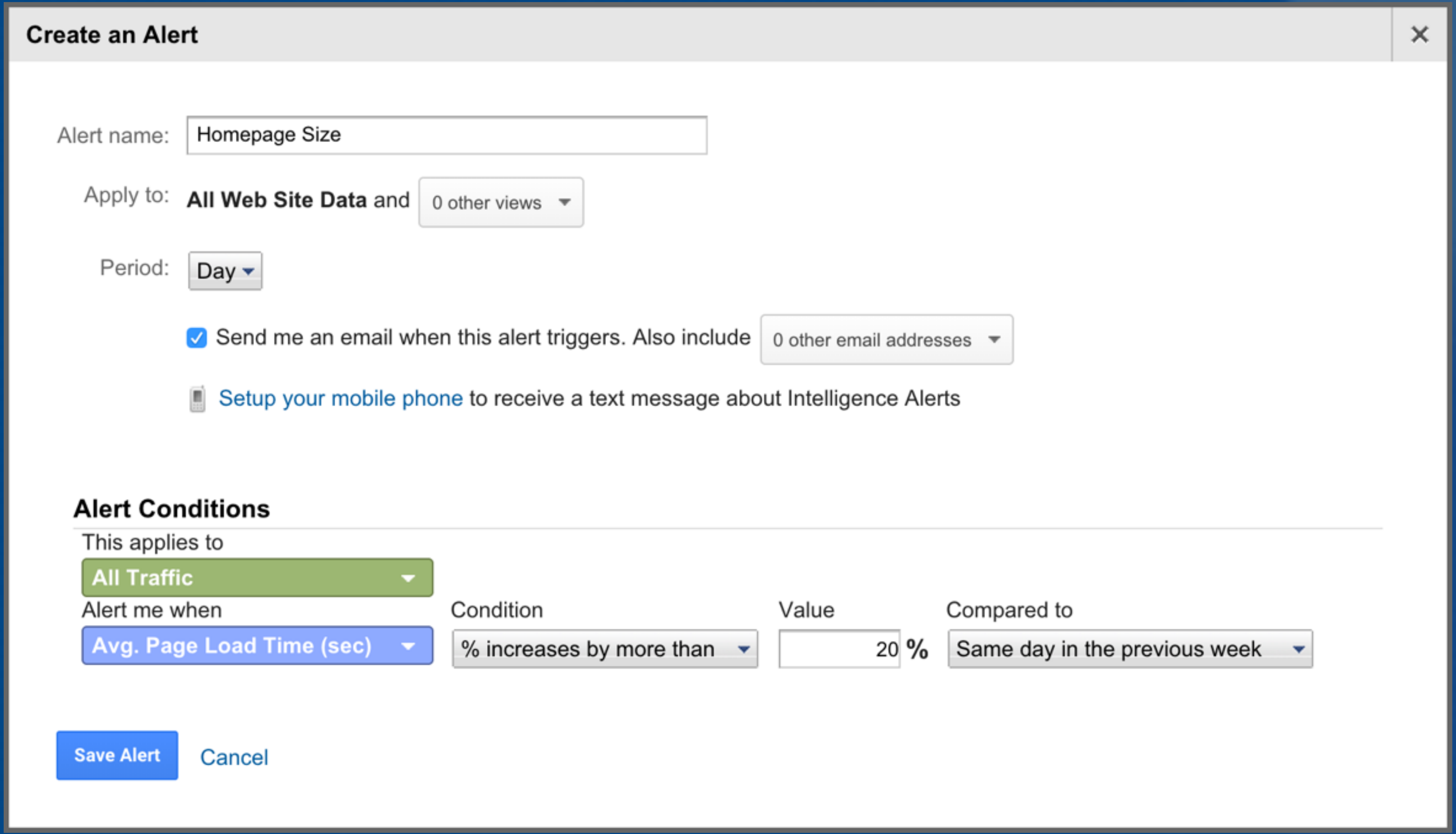
MEASURE PERFORMANCE

Measure SpeedIndex and Google PageSpeed to check performance.

```
npm install grunt-perfbudget
npm install grunt-pagespeed
```

```
https://github.com/addyosmani/psi-gulp-sample
http://bit.ly/1iGsRXP
```

SETUP ALERTS IN ANALYTICS



Create an Alert ✕

Alert name: Homepage Size

Apply to: **All Web Site Data** and 0 other views

Period: Day

☑ Send me an email when this alert triggers. Also include 0 other email addresses

Setup your mobile phone to receive a text message about Intelligence Alerts

Alert Conditions

This applies to: All Traffic

Alert me when	Condition	Value	Compared to
Avg. Page Load Time (sec)	% increases by more than	20 %	Same day in the previous week

Intelligence events in Google Analytics

WATCH YOUR IMAGE SIZES!

BEWARE OF CMS AUTHORS

to

Image Credit: https://www.flickr.com/photos/jaguarcarsmena/13979908838
https://www.flickr.com/photos/paul_appleyard/11009129905

IMAGE OPTIMISATION IN YOUR CMS

CONCLUSION

Design with a performance budget

Use a workflow to save you pain

Optimise your images, CSS and JavaScript

Educate the people who are going to be maintaining the site!

CHALLENGER APPROACHING

Image Credit: https://www.flickr.com/photos/134832191@N08/19984768723

HTTP/2

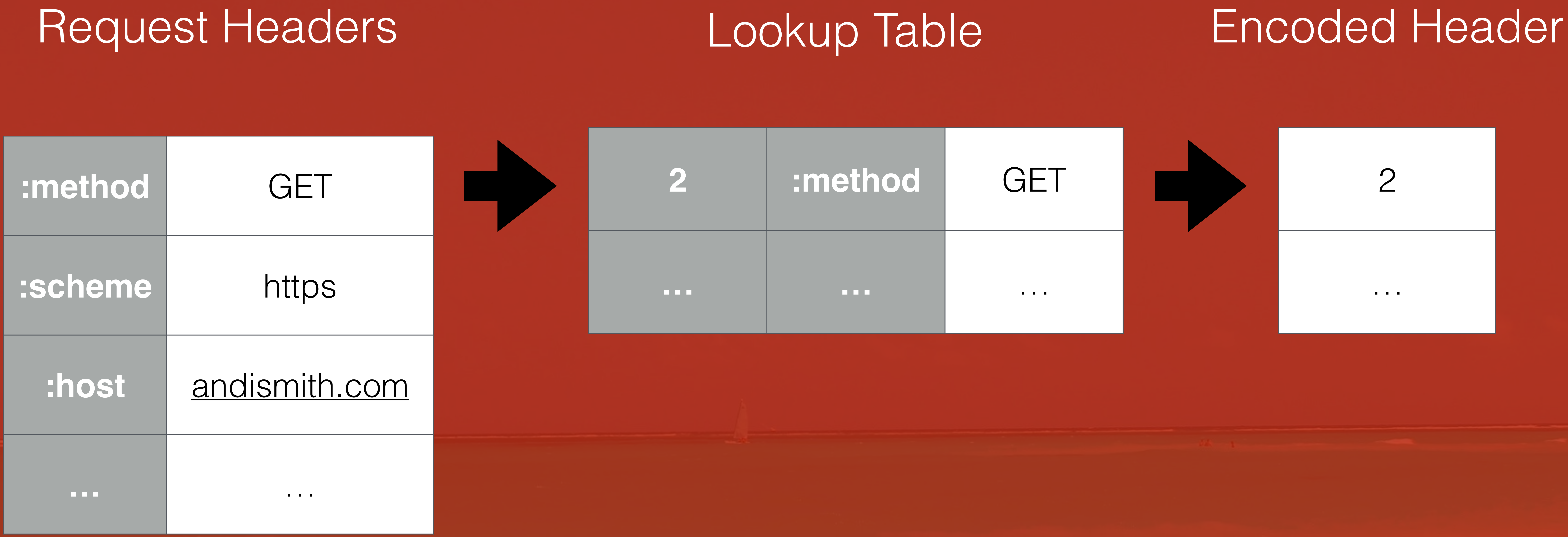
1 CONNECTION CAN DOWNLOAD **MULTIPLE RESOURCES** IN PARALLEL

BINARY RATHER THAN TEXTUAL

LOWER PARSE OVERHEAD

SIMPLER, SO LESS ERROR PRONE

HEADER COMPRESSION



Request Headers

:method	GET
:scheme	https
:host	andismith.com
…	…

Lookup Table

2	**:method**	GET
…	**…**	…

Encoded Header

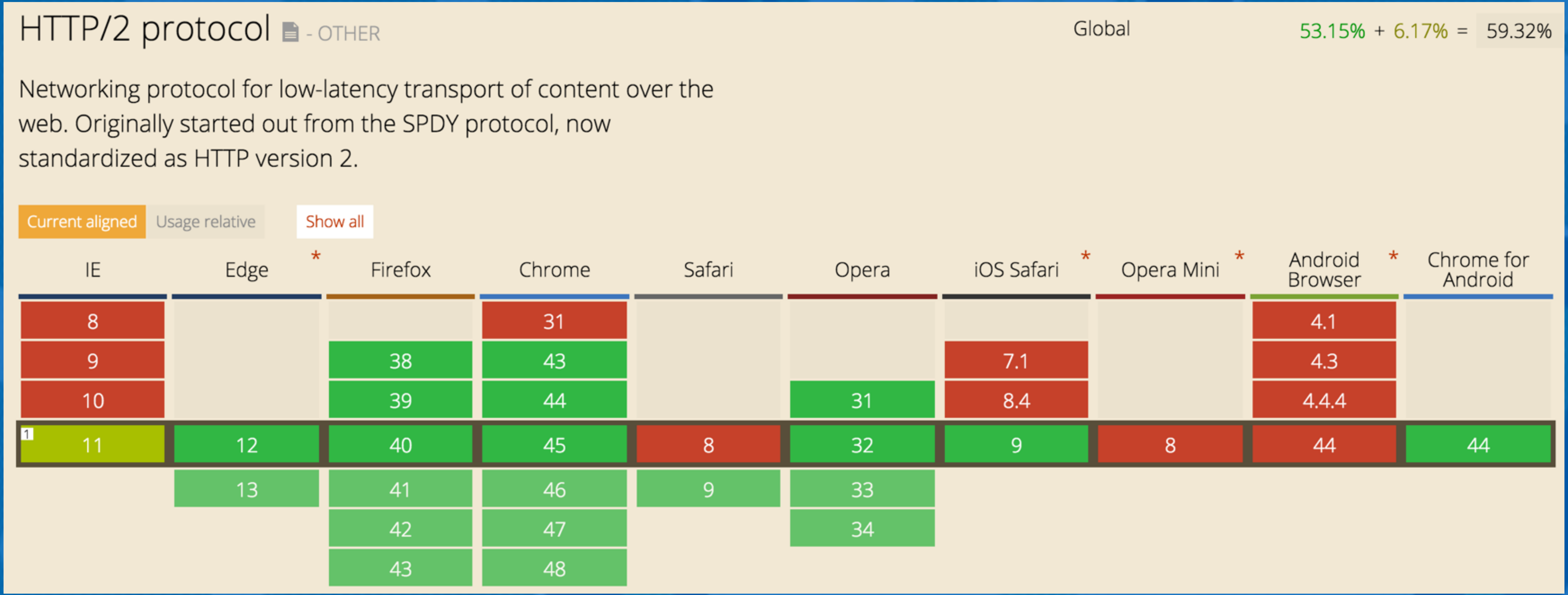
2
…

Source: http://chimera.labs.oreilly.com/books/1230000000545/ch12.html#HTTP2_HEADER_COMPRESSION

ALLOWS SERVERS TO **PUSH RESPONSES** TO CLIENT

E.G. SEND CSS BEFORE REQUESTED

WHEN CAN I USE HTTP/2?



HTTP/2 protocol - OTHER

Global 53.15% + 6.17% = 59.32%

Networking protocol for low-latency transport of content over the web. Originally started out from the SPDY protocol, now standardized as HTTP version 2.

IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
8			31					4.1	
9		38	43			7.1		4.3	
10		39	44		31	8.4		4.4.4	
1 11	12	40	45	8	32	9	8	44	44
	13	41	46	9	33				
		42	47		34				
		43	48						

Source: http://caniuse.com/#search=http2

HTTP/2 ADOPTION

- Support from most major server software by end of 2015
- **nginx** alpha now available
- **Apache** 2.4.12 supported via patching, in next release
- **IIS** for Windows 10

optimising YOUR HTTP/2 WEBSITE FOR PERFORMANCE

Image Credit: https://www.flickr.com/photos/noddymini/17368814772

SMALLER REQUESTS

AVOID CONCATENATION

DON’T INLINE RESOURCES

WITH HTTP/2,
LOAD RESOURCES ON DEMAND

http://www.http2demo.io/

REDUCE LATENCY

RE-EVALUATE CDN

REDUCE DOMAIN SHARDING

STILL IMPORTANT

SMALLER PAGE SIZE

NO BLOCKING SCRIPTS

	HTTP/1.X	HTTP/2.X
Responsive Images	Yes	Yes
Image Min	Yes	Yes
Spriting	Yes	No
Inline CSS	Yes	No
CSS Minification	Yes	Yes
CSS Concatenation	Yes	No
JavaScript Minification	Yes	Yes
JavaScript Concatenation	Yes	No
HTML Minification	Yes	Yes

MORE ON HTTP/2

https://http2.github.io/

https://www.mnot.net/blog/2014/01/30/
http2_expectations

THANKS!

@andismith

andismith.com

Image Credit: https://www.flickr.com/photos/eurosporttuning/19261694863