Deep Dive into Browser Performance

Ilia Alshanetsky
@iliaa

Me, Myself and I

PHP Core Developer

Author of
Guide to PHP Security

CIO at Centah Inc.

Why Browser Performance Matters?

ZendCon - Total Page Load - 3.64s

PHP.net - Total Page Load - 1.45s

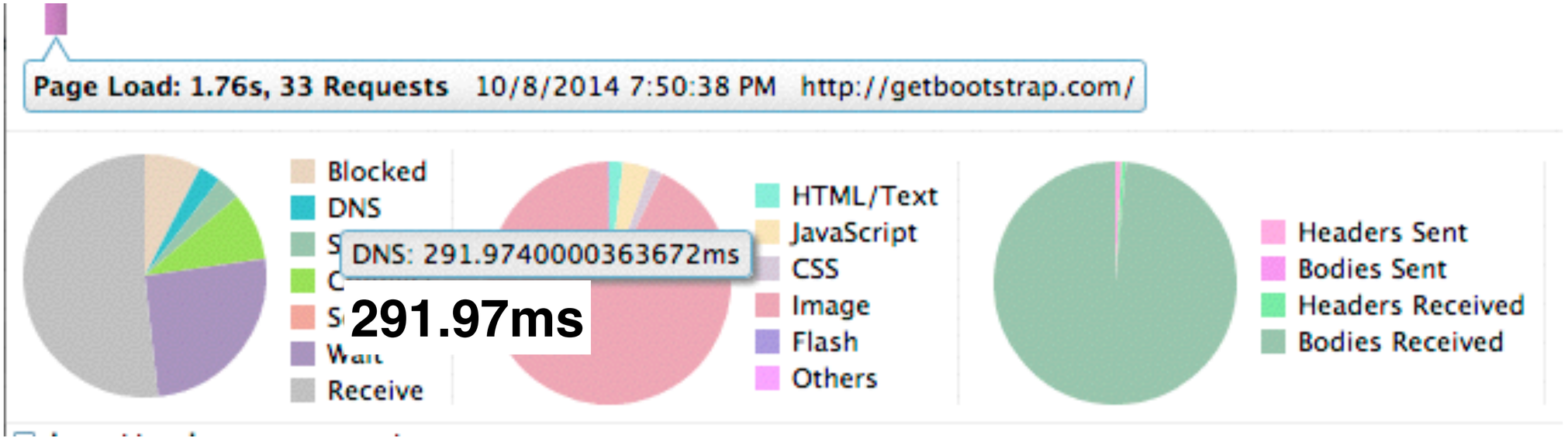
Github - Total Page Load - 1.43s

What Takes All This Time?

1. **DNS**
2. **HTTP + SSL Negotiation**
3. **JavaScript Processing**
4. **CSS Rendering**
5. **Image Processing**
6. **DOM Rendering**

by James Balderson

DNS



DNS may take up-to
20% of 1st page load!

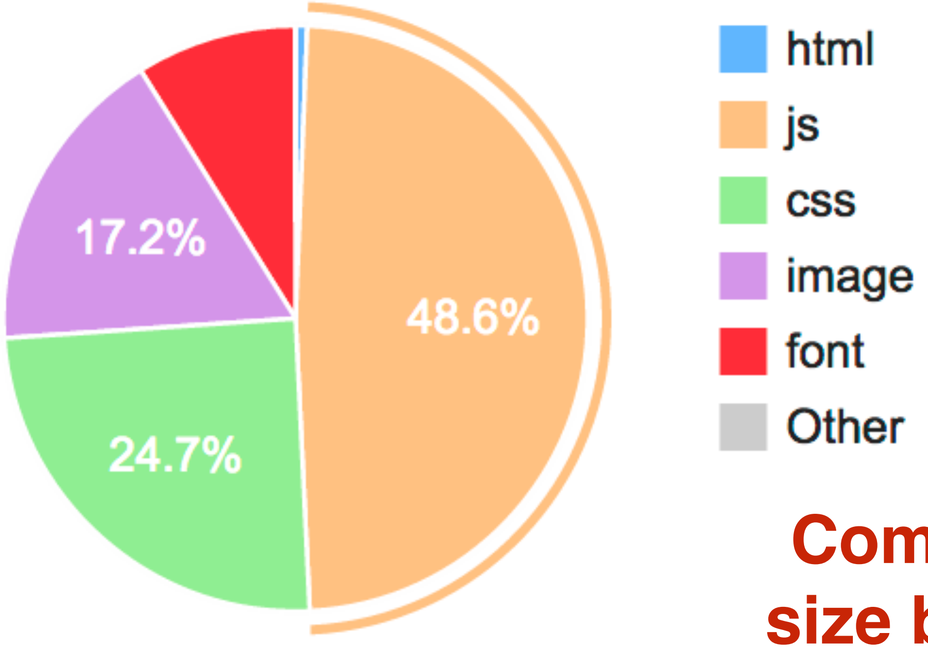
DNS Based Optimizations

1. **Use Embedded images via *data:image***
2. **Limit image requests via use of *sprites***
3. **Defer loading of external resources**
4. **Avoid multi-domain CDNs**
5. **Single-page applications for the win!**

Profile Page Loading

- Use Your Browser
  - **Developer Tools or Equivalent**
- Do Remote Tests
  - **http://www.webpagetest.org/**
  - **https://developers.google.com/speed/pagespeed/**
  - **https://www.modern.ie/en-us**
- Actual User Profiling
  - **http://www.lognormal.com/boomerang/doc/**
  - **Use Web-Timing API directly**

Compression For The Win!



1,394 KB
59 requests,
4.63 seconds to load

Compression Reduces data-size by >50% and makes page loads in 2.1 seconds!

Use gzip compression

965.8 KB total in compressible text, savings = 695.2 KB

Compress Images

171.6 KB total in images,savings = 51.8 KB

ZendCon.com via http://www.webpagetest.org

					Document Loaded			Fully Rendered		
	Load Time	First Byte	Start Render	DOM Elements	Time	Requests	Bytes In	Time	Requests	Bytes In
First View	4.964s	0.448s	3.592s	368	4.964s	62	1,395 KB	5.247s	64	1,396 KB
Repeat View	2.588s	0.263s	2.493s	368	2.588s	9	26 KB	2.816s	11	27 KB

Cache, Cache, Cache

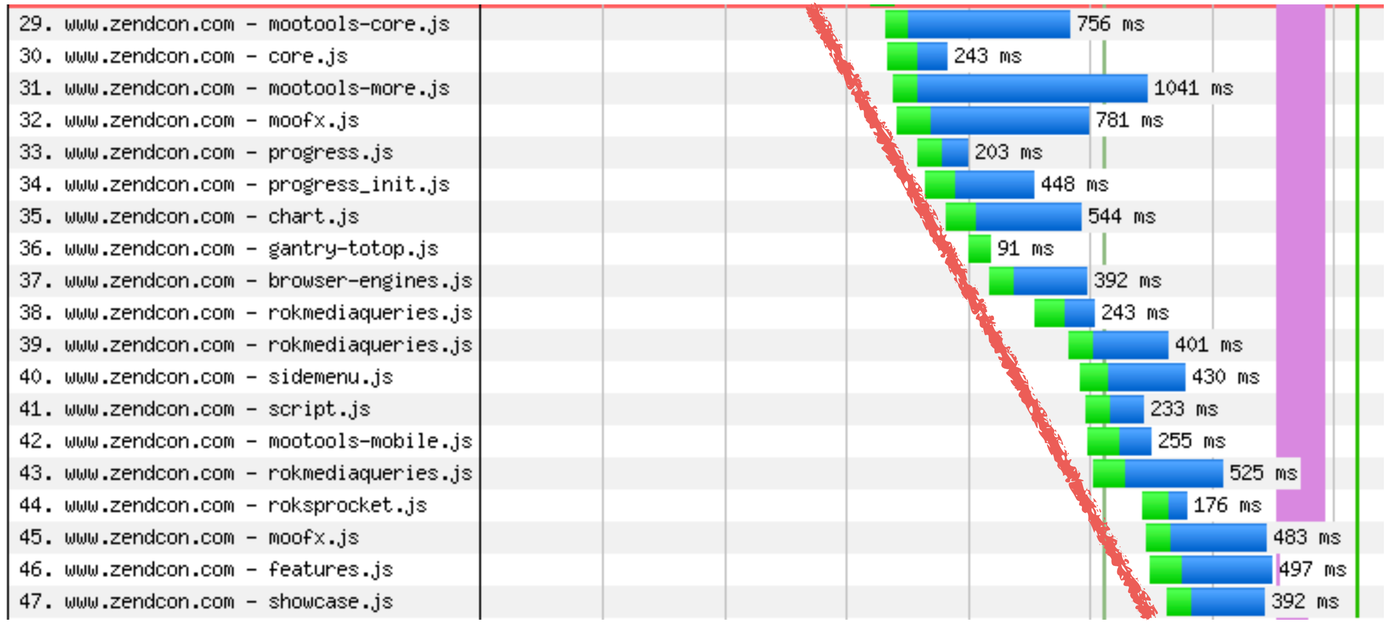
Set **max-age** or **expires** headers

Value should be at least **30 days**

To prevent stale content, **use unique file names** on new deployments for changed files.

Your goal is that 2nd page load only asks the server for the dynamic content!

JavaScript



JavaScript is loaded synchronously, so compact your files into a single compressed file!

JavaScript

Combination & minifying of JS files is best achieved with:

* Closure Compiler
  * http://goo.gl/8MVOIJ
* YUI Compressor
  * http://refresh-sf.com/yui/
  * http://yui.github.io/yuicompressor/
* PHP Based
  * https://github.com/tedious/JShrink

JavaScript

Don’t over-do combining of JS Files!

- Unnecessary data loading
- Decompression Overhead
- Extra JS Compilation

Micro-Case Study: SlashDot.org

One “BIG” JavaScript file

71kb compressed, 251kb actual size

199ms to receive

37ms to process

21.3% of total page load, 16% of total page size

< 10% of loaded JS code is executed

JavaScript

Only load up-front what you absolutely need

Defer loading of everything else via RequireJS

```
<head>
  <script src="scripts/require.js"></script>
</head>
```

```
require.config({
    baseUrl: 'js/lib',
    paths: { jquery: ‘jquery-1.11.1' }
});
```

```
define(['lib/jquery'], function ($) {...});
```

http://requirejs.org/

If you can’t win, cheat!


```
$(document).ready(function() {
  setTimeout(function() {
   $.get( “your-file.js” );
  }, 2000);
};
```

General JS Tips

1. **Avoid Xpath, reference/search by ID**
2. **Setup events pre-load as opposed to post-load**

```
onkeyup=“js_function()” vs $(“input”).each(function() {});
```

3. **For Grids only load the data to be displayed**
4. **innerHTML is not always faster than DOM**

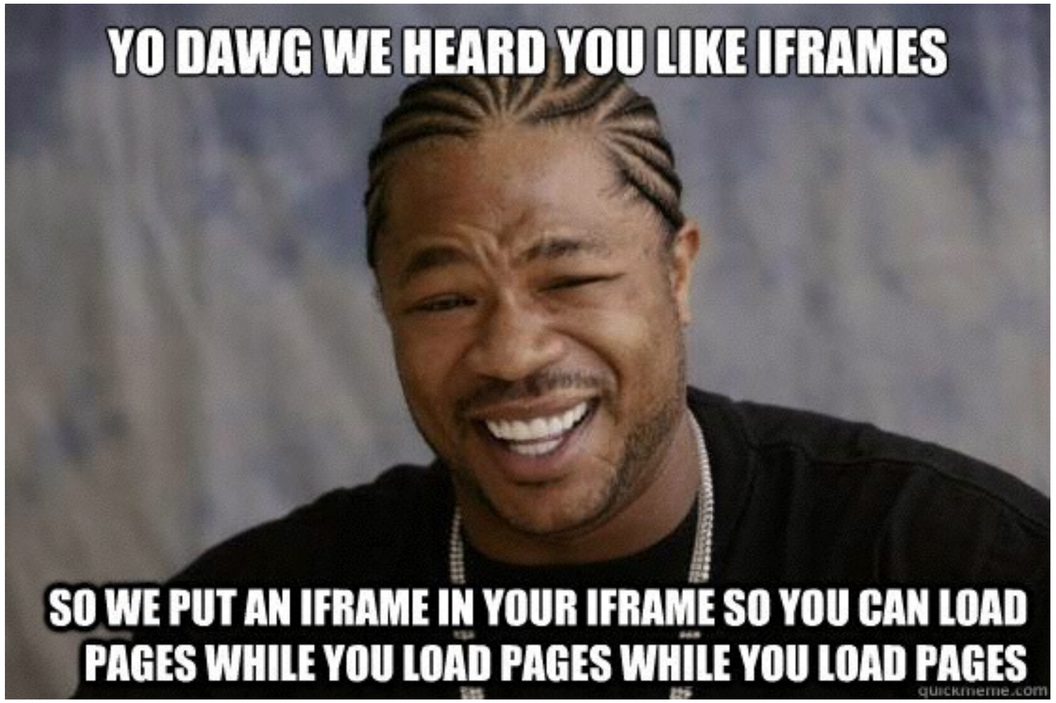
http://jsperf.com/dom-vs-innerhtml/37

General JS Tips

- Most browsers leak memory with JS, avoid the common culprits:
  - ✦ Avoid passing objects (can result in circular references)
  - ✦ Avoid global variables
  - ✦ Use closures

General JS Tips

Help browser to make use of multiple CPUs by using iFrames to embed complex components such as grids.



CSS

* **Minimize**
* **Combine**
* **Compress**

* **Don’t fear inlined CSS**

Avoid Repaints & Reflows

reflow time by browser

DHTML action	Chr1	Chr2	FF2	FF3	IE6,7	IE 8	Op	Saf3	Saf4
className	1x	1x	1x	1x	1x	1x	1x	1x	1x
display none	-	-	-	-	1x	-	-	-	-
display default	1x	1x	1x	2x	1x	1x	-	1x	1x
visibility hidden	1x	1x	1x	1x	1x	1x	-	1x	1x
visibility visible	1x	1x	1x	1x	1x	1x	-	1x	1x
padding	-	-	1x	2x	4x	4x	-	-	-
width length	-	-	1x	2x	1x	1x	-	1x	-
width percent	-	-	1x	2x	1x	1x	-	1x	-
width default	1x	-	1x	2x	1x	1x	-	1x	-
background	-	-	1x	1x	1x	-	-	-	-
font-size	1x	1x	1x	2x	1x	1x	-	1x	1x

reflow performance varies by browser and action

"1x" is 1-6 seconds depending on browser (1K rules)

https://developers.google.com/speed/articles/reflow

- Changes to DOM nodes
- Hiding DOM nodes
- Actions that extend the page (causes scroll)
- Changes to colour, background and outline properties

Merge Style Changes

```
// slowest
el.style.left = "10px";
el.style.top  = "10px";

// getting better
el.className += " top-left-class";

// best
el.style.cssText += "; left: 10px; top: 10px;";
```

Peekaboo Trick

```
var me = $("#el");
me.hide();

// make various changes to DOM/Content

me.show();
```

Dolly Trick

```
var $dolly = el.clone();

// make changes to the copy

el.replaceWith($dolly);
```

Don’t Abuse Computed Styles

```
// nein, nein, nein!!!!
for (var i = 0; i < 100; i++) {
    el[i].style.left = el.offsetLeft + "10px";
    el[i].style.top  = el.offsetTop  + "10px";
}

// Wunderbar
for (
var left = el.offsetLeft, top = el.offsetTop, i = 0;
i < 100;
i++, top+=10, left+=10) {
  el[i].style.cssText += "; left: " + left +
                  "px; top: " + top + "px;";
}
```

Good Reference Points

http://www.phpied.com/rendering-repaint-reflowrelayout-restyle/

http://www-archive.mozilla.org/newlayout/doc/reflow.html

https://developers.google.com/speed/articles/reflow

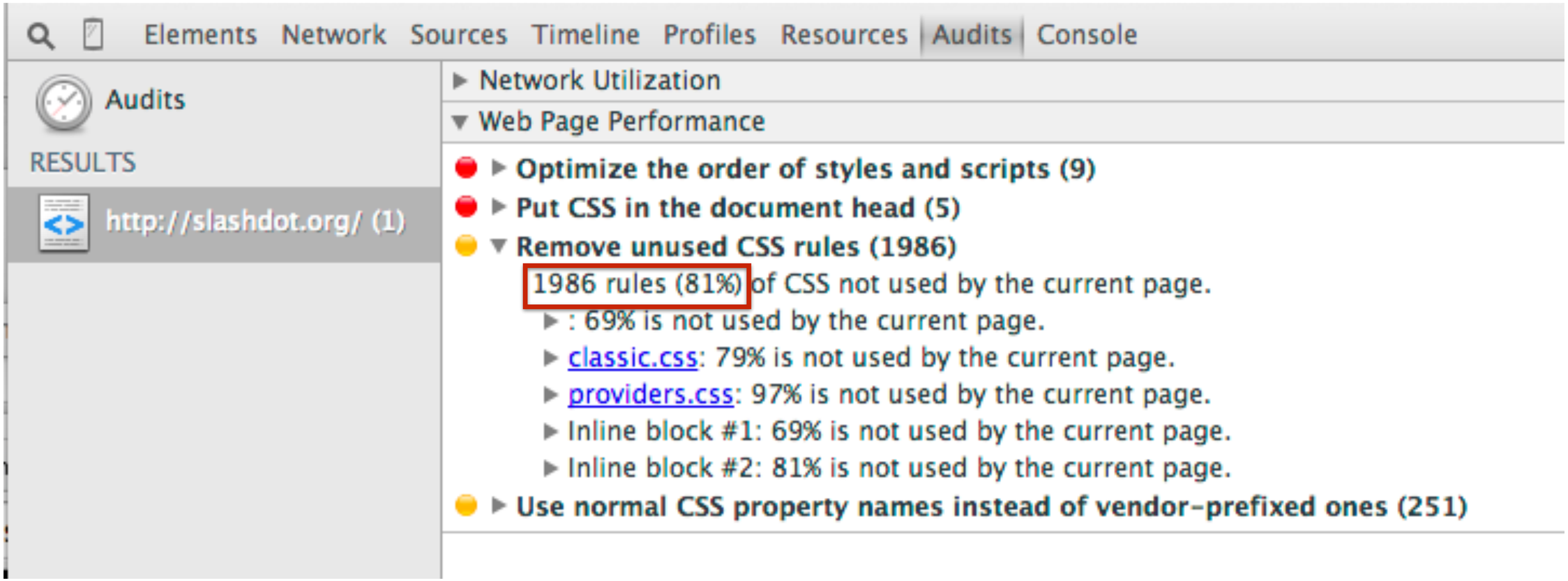
More CSSery

- **Reference by element ID**
- **Be specific, but avoid child selectors**
- **Avoid @import()**
- **Avoid multi-class css rule (.foo.bar.baz)**

More CSSery

- **Pseudo selectors are slow**
- **Name space attribute selectors (type=“…” vs input[type=“…”])**
- **Eliminate un-used rules**
- **Avoid browser specific extensions (-webkit, -opera, -moz, etc…)**

Micro-Case Study: SlashDot.org



CSS Tools

https://github.com/Cerdic/CSSTidy

PHP

http://devilo.us/

Web-based

Slides: http://ilia.ws

@iliaa

Please leave feedback @
https://joind.in/12055