



CSS PERFORMANCE

with Jon Rohan

Thank you for coming

This talk is about

- Performance problems at GitHub
- How to create fast CSS and HTML
- CSS/HTML tools at GitHub



BRIEF ABOUT ME



photo by Zachary Kaplan

HELLO, I'M @JONROHAN

I'm a Design-gineer

B.S. Computer Science

8 years of CSS

I'm a GitHubber



photo by @janaboruta



PERFORMANCE WOES

SCARY

SLOW

GIT HUB

SCARY



SLOW



GIT HUB

I'm talking about diff pages

Bringing in the Awesome by bryanveloso · Pull Request #1 · github/codeconf

Search or type a command ⚙️ [Explore](#) [Gist](#) [Blog](#) [Help](#) jonrohan [📄](#) [✂️](#) [📄](#)

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[Code](#) [Network](#) [Pull Requests](#) 0 [Issues](#) 1 [Wiki](#) [Graphs](#) [Admin](#)

Closed 49 commits merged into `github:gh-pages` from `bryanveloso:gh-pages` almost 2 years ago 6,801 ████████ **#1**

[Discussion](#) [Commits](#) 49 [Files Changed](#) 63

[+](#) Showing **63 changed files** with **6,678 additions** and **123 deletions.** [Show Diff Stats](#)

485 ████████ `css/base.css` [View file @ 3aed6da](#)

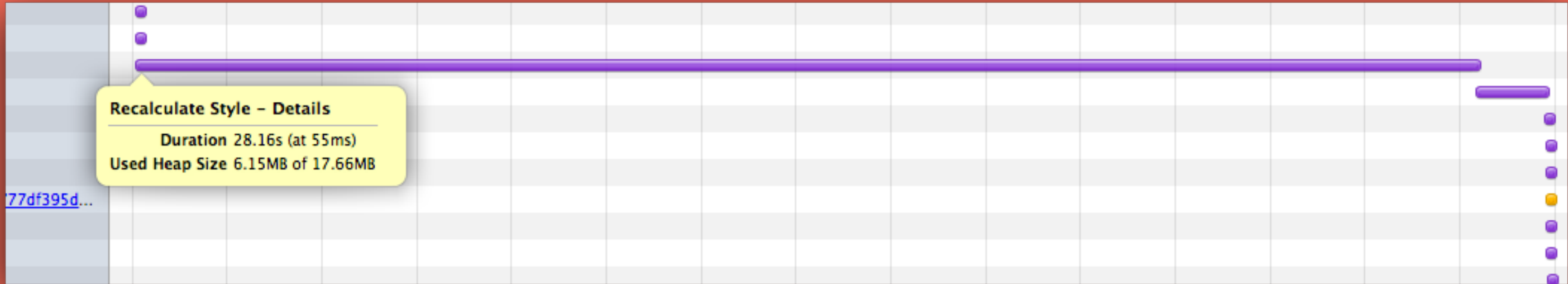
```
...  ...  @@ -1,113 +1,426 @@
1  - /*-----
2  - @group Global Reset
1  +/* @group Global Reset
3  2  -----*/
4  3  * {
5  - padding:0;
6  - margin:0;
4  + padding: 0;
5  + margin: 0;
7  6  }
8  -h1, h2, h3, h4, h5, h6, p, pre, blockquote, label, ul, ol, dl, fieldset, address { margin:1em 0; }
9  -li, dd { margin-left:5%; }
7  +h1, h2, h3, h4, h5, h6, p, pre, blockquote, label, ul, ol, dl, fieldset, address { margin: 1em 0; }
8  +li, dd { margin-left: 5%; }
10 9  fieldset { padding: .5em; }
```

"a medium size diff"



~9,000 lines across all files

~80% of pageload is recalculating



28.16s to recalculate style!

What causes style recalculation?

Manipulating the DOM

Hiding using `display: none;`
and `visibility: hidden;` .

CSS Animations

User Actions

All this is bad and...

may cause browser death



Aw, Snap!

Something went wrong while displaying this keynote. To continue, press Reload or go to another talk.



TROUBLE CSS

no unnecessary tag identifiers

```
1 ul#navigation,  
2 ul.menu {  
3     margin-left: 0;  
4 }
```

```
1 #navigation,  
2 .menu {  
3 margin-left: 0;  
4 }
```


no ancestors

```
1 html div tr td {  
2   font-weight: bold;  
3 }
```

```
1 html div tr td {  
2   font-weight: bold;  
3 }
```

```
1 html div tr td {  
2   font-weight: bold;  
3 }
```

```
1 html div tr td {  
2   font-weight: bold;  
3 }
```

no universal selectors

```
1 * {  
2   display: block;  
3 }
```

no unqualified selectors


```
1 [class^="mini-icon-"] {  
2   display: block;  
3 }
```

no chaining

```
1 .small.private.icon {  
2   width: 30px;  
3 }
```

```
1 .small-private-icon {  
2   width: 30px;  
3 }
```

order of importance
(when you do chain)

webkit bug?

```
1 .foo.bar {  
2   width: 30px;  
3 }
```

Indexed in `m_classRules`

under the key `.foo`

```
1 .bar.foo {  
2   width: 30px;  
3 }
```

Indexed in `m_classRules`

under the key `.bar`


```
1 input[type=text].error {  
2   width: 30px;  
3 }
```

Indexed in `m_tagRules`

```
1 input.error[type=text] {  
2   width: 30px;  
3 }
```

Indexed in `m_classRules`

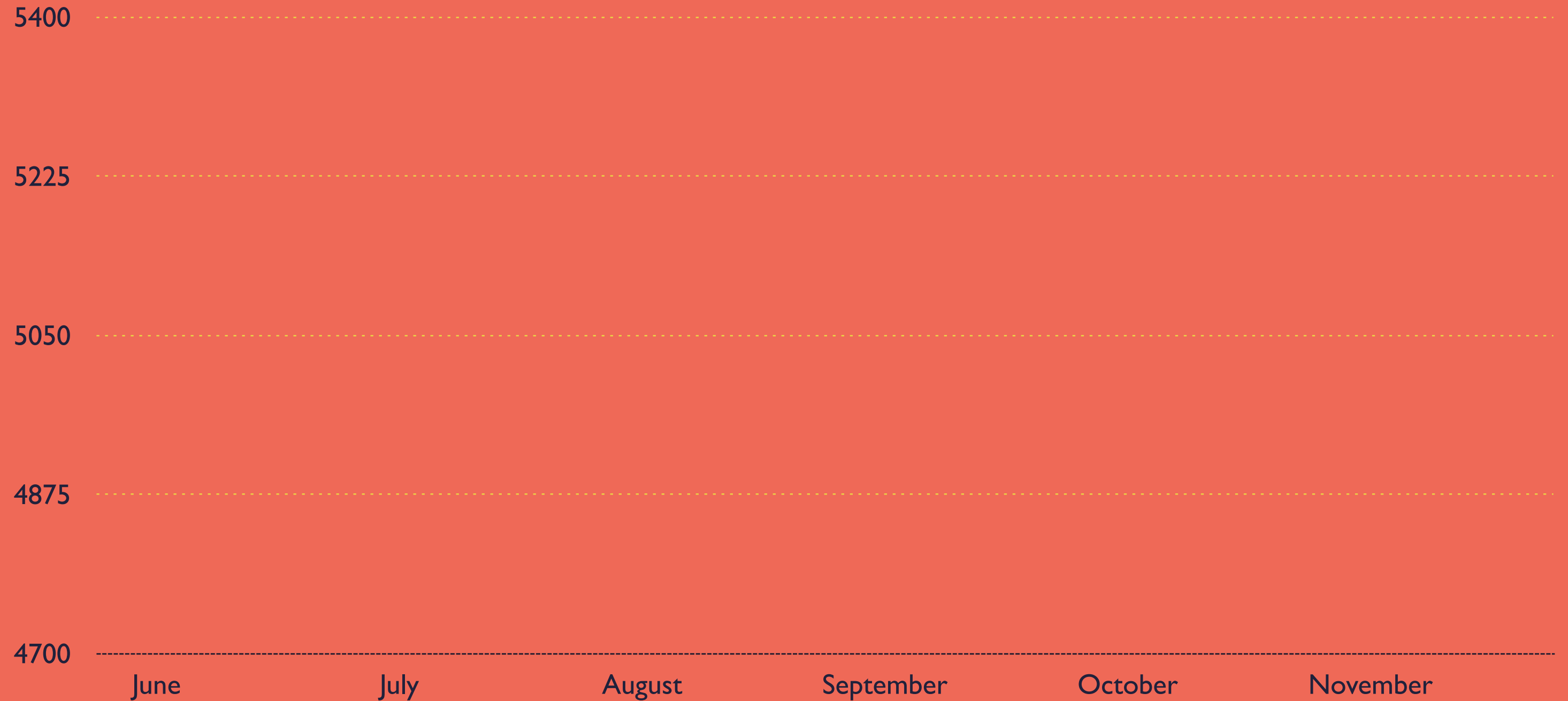
```
1 .bar#foo {  
2   width: 30px;  
3 }
```

Indexed in `m_classRules`

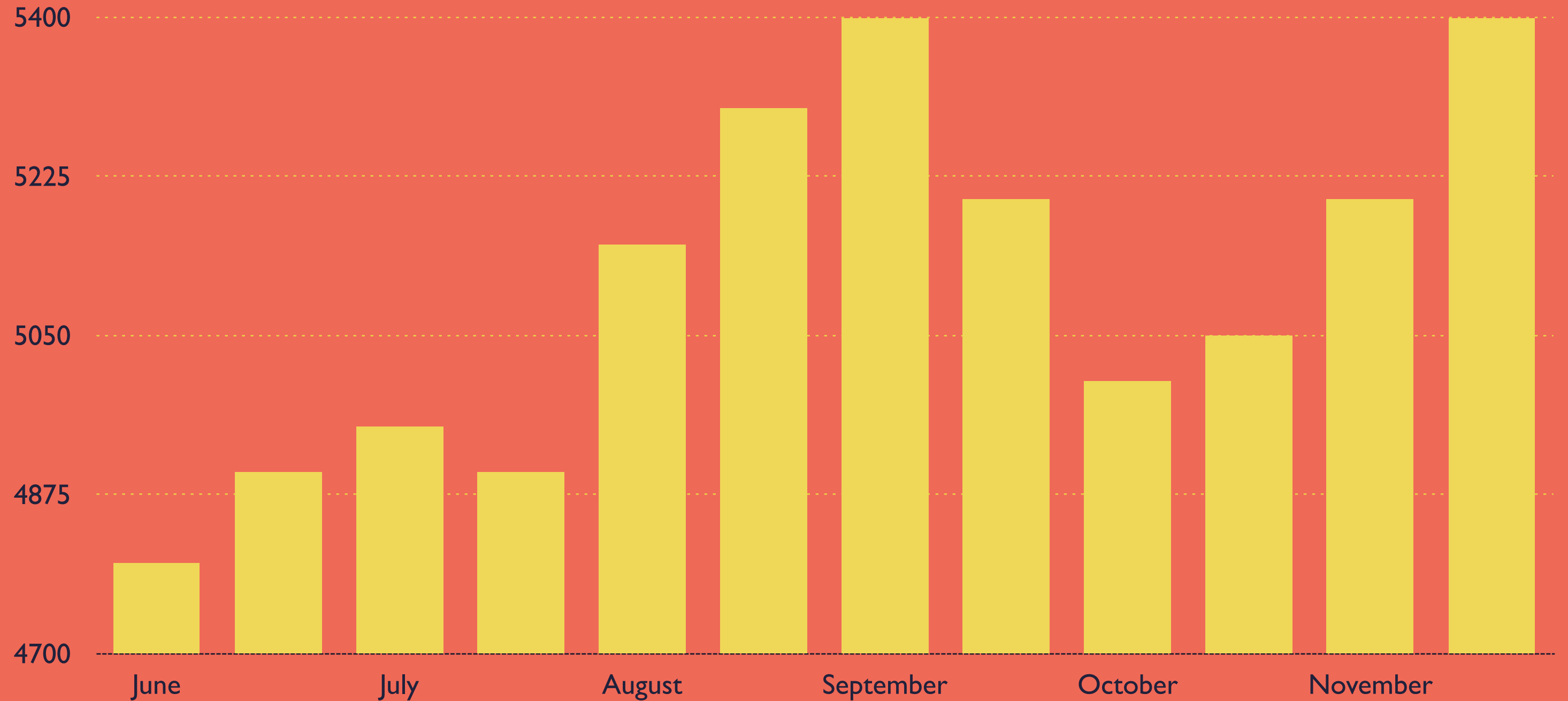
```
1 #foo.bar {  
2   width: 30px;  
3 }
```

Indexed in `m_idRules`

number of css selectors



number of css selectors



It's all relative

CSS + HTML



HTML OVERLOAD

how much html do we have?

a typical diff line

```
1 <tr>
2   <td class="line_number"><a id="L1L5" href="#L1L5">5</a></td>
3   <td class="line_number"><a id="L1R7" href="#L1R7">7</a></td>
4   <td width="100%">
5     <div class="add-bubble"></div>
6     <pre><div>+ this is a line in the diff</div></pre>
7   </td>
8 </tr>
```

average diffs have around ~9,000 lines

```
> $( '#files_bucket *' ).length
```

```
> $( '#files_bucket *' ).length  
48917
```

but that's not all of the problem


```
1  -/*-----  
2  - @group Global Reset  
1  +/* @group Global Reset  
3  2  -----*/  
4  3  * {  
5  - padding:0;  
6  - margin:0;  
4  + padding: 0;  
5  + margin: 0;  
7  6  }  
8  -h1, h2, h3, h4, h5, h6, p, pre, blockquote, label, ul, ol, dl, fieldset, address { margin:1em 0; }  
9  -li, dd { margin-left:5%; }  
7  +h1, h2, h3, h4, h5, h6, p, pre, blockquote, label, ul, ol, dl, fieldset, address { margin: 1em 0; }  
8  +li, dd { margin-left: 5%; }
```

```
1  -/*-----  
2  - @group Global Reset  
1  +/* @group Global Reset  
3  2  -----*/  
4  3  * {  
5  - padding:0;  
6  - margin:0;  
4  + padding: 0;  
5  + margin: 0;  
7  6  }  
8  -h1, h2, h3, h4, h5, h6, p, pre, blockquote, label, ul, ol, dl, fieldset, address { margin:1em 0; }  
9  -li, dd { margin-left:5%; }  
7  +h1, h2, h3, h4, h5, h6, p, pre, blockquote, label, ul, ol, dl, fieldset, address { margin: 1em 0; }  
8  +li, dd { margin-left: 5%; }
```

15ms pageload

what can we do?

reduce the amount of matched html

Developer Tools - https://github.com/github/codeconf/pull/1/files

Elements Resources Network Sources Timeline Profiles Audits Console

Profiles

CSS SELECTOR PROFILES

Profile 1 (55 ms)

Selector	Source	Total	Matches
html, body, div, span, applet, object, iframe, h1, h2, h3, h4, h5, h6, p, blockquote, pre, a, abbr, acronym, addre...		28.2%	3767
strong, b		7.2%	1790
.mini-icon, .mega-icon		5.4%	904
pre, xmp, plaintext, listing		5.3%	909
#files .add-bubble		4.2%	882
pre, code, tt		3.8%	1035
.mini-icon		3.2%	901
.mini-icon-add-comment::before		3.1%	882
#files .file .data .line, .file-box .data .line		2.5%	909
#files tr:hover .add-bubble		2.4%	24
#files .file .view-modes ul.view-modes-menu li, .file-box .view-modes ul.view-modes-menu li		1.8%	432
ul, menu, dir		1.6%	117
#files .file .view-modes ul.view-modes-menu, .file-box .view-modes ul.view-modes-menu		1.4%	108
.progress-bar		1.2%	78
#files .file .meta .info span.icon, #files .file .meta .info span.diffstat, .file-box .meta .info span.icon		1.2%	63
#files .file .meta .info span:first-child, #files .file .meta .info .icon + span, #files .file .meta .info .diffstat + span,...		1.2%	189
li		1.1%	596
div		1.0%	300
#files .file .view-modes ul.view-modes-menu li:first-child, .file-box .view-modes ul.view-modes-menu li:first-c...		1.0%	108
#files .file .meta .info span, .file-box .meta .info span		0.9%	189
#files .progress .progress-bar, .file-box .progress .progress-bar		0.8%	78
span.diffstat		0.8%	64
#files .file .meta .actions li:first-child, .file-box .meta .actions li:first-child		0.7%	126
span.diffstat .diffstat-bar		0.7%	64
a:-webkit-any-link		0.6%	231
#files .file .meta .actions li, .file-box .meta .actions li		0.5%	126
#files .file .view-modes ul.view-modes-menu li.active, .file-box .view-modes ul.view-modes-menu li.active		0.4%	106
.button-group li		0.4%	126
.minibutton, .minibutton.disabled:hover, .button-group .disabled.grouped-button:hover, .minibutton.disabled:h...		0.4%	134
#files .progress, .file-box .progress		0.4%	48
#files .file .image img, .file-box .image img, #files .file .image canvas, .file-box .image canvas		0.3%	40
img		0.3%	84
tt, code, kbd, samp		0.3%	126
#files .file .view-modes ul.view-modes-menu li:hover, .file-box .view-modes ul.view-modes-menu li:hover		0.3%	0

%

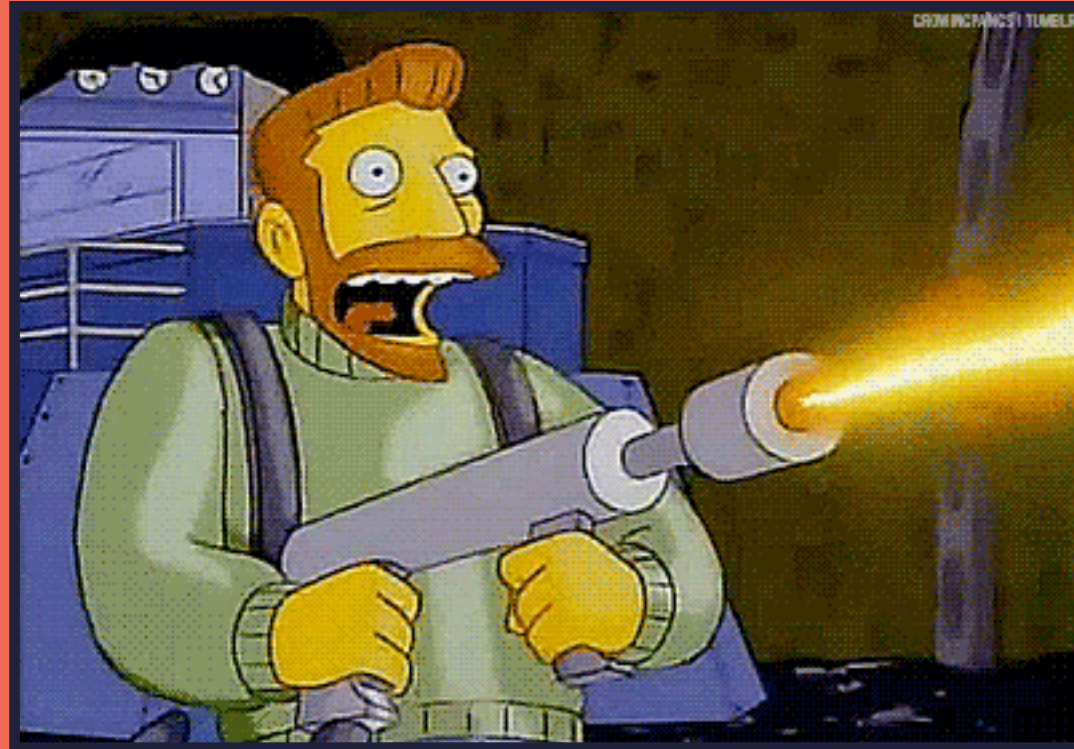


SOLUTIONS

think simple

remove unnecessary html

Kill it



with fire

```
1 <tr>
2   <td class="line_number"><a id="L1L5" href="#L1L5">5</a></td>
3   <td class="line_number"><a id="L1R7" href="#L1R7">7</a></td>
4   <td width="100%">
5     <div class="add-bubble"></div>
6     <pre><div>+ this is a line in the diff</div></pre>
7   </td>
8 </tr>
```

```
1 <tr>
2   <td class="line_number"><a id="L1L5" href="#L1L5">5</a></td>
3   <td class="line_number"><a id="L1R7" href="#L1R7">7</a></td>
4   <td width="100%">
5     <div class="add-bubble"></div>
6     <pre>+ this is a line in the diff</pre>
7   </td>
8 </tr>
```

6,387 unnecessary divs

remove <a> for line numbers

```
1 <tr>
2   <td class="line_number"><a id="L1L5" href="#L1L5">5</a></td>
3   <td class="line_number"><a id="L1R7" href="#L1R7">7</a></td>
4   <td width="100%">
5     <div class="add-bubble"></div>
6     <pre>+ this is a line in the diff</pre>
7   </td>
8 </tr>
```

```
1 <tr>
2   <td id="L1L5" class="line_number linkable-line-numbers">5</td>
3   <td id="L1R7" class="line_number linkable-line-numbers">7</td>
4   <td width="100%">
5     <div class="add-bubble"></div>
6     <pre>+ this is a line in the diff</pre>
7   </td>
8 </tr>
```

Improved Render speed by 37%

EES!!!



EES!!!

```
1 <tr>
2   <td id="L1L5" class="line_number linkable-line-numbers">5</td>
3   <td id="L1R7" class="line_number linkable-line-numbers">7</td>
4   <td width="100%">
5     <div class="add-bubble"></div>
6     <pre>+ this is a line in the diff</pre>
7   </td>
8 </tr>
```

```
1 <tr>
2   <td id="L1L5" class="line_number linkable-line-numbers">5</td>
3   <td id="L1R7" class="line_number linkable-line-numbers">7</td>
4   <td width="100%">
5     <b class="add-bubble"></b>
6     <pre>+ this is a line in the diff</pre>
7   </td>
8 </tr>
```

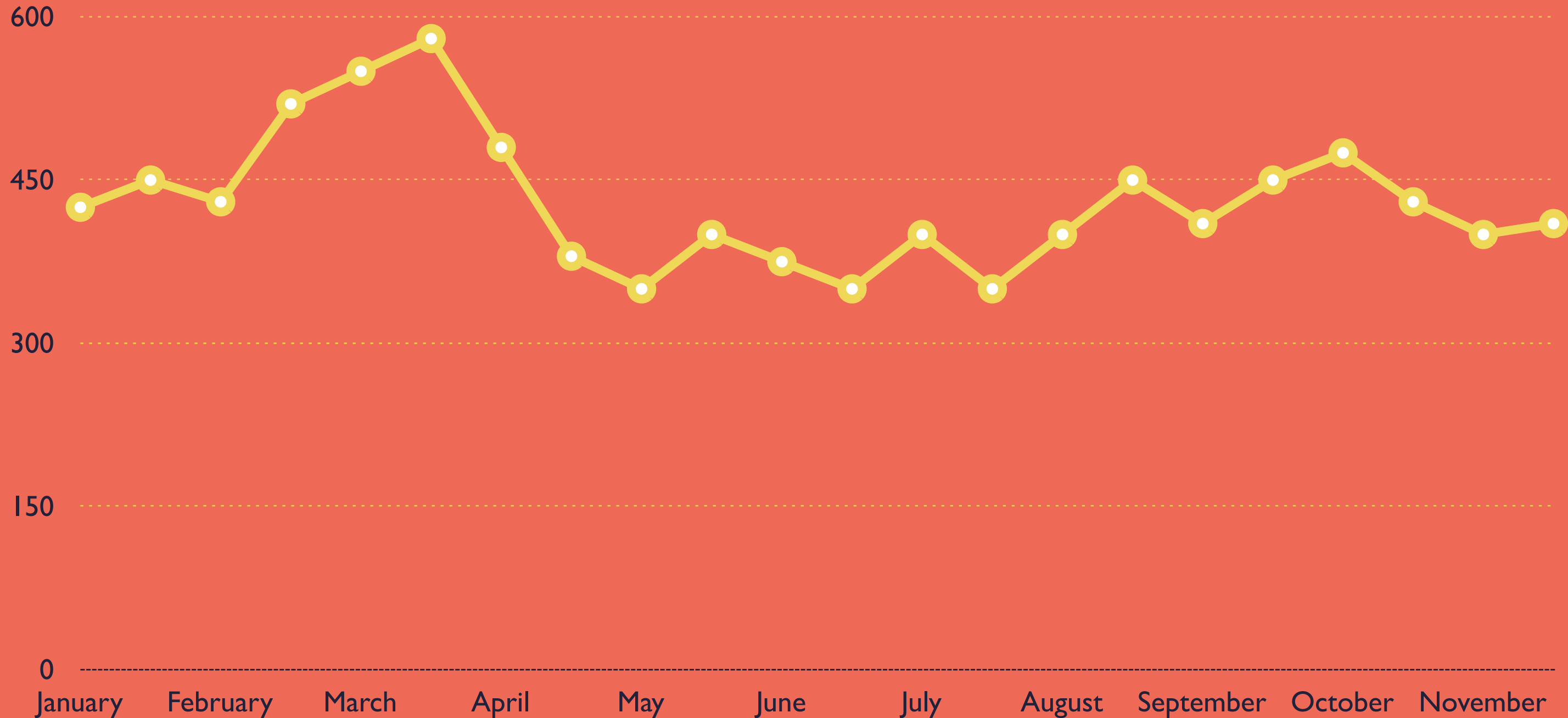
3.5% speed improvement

did it help?

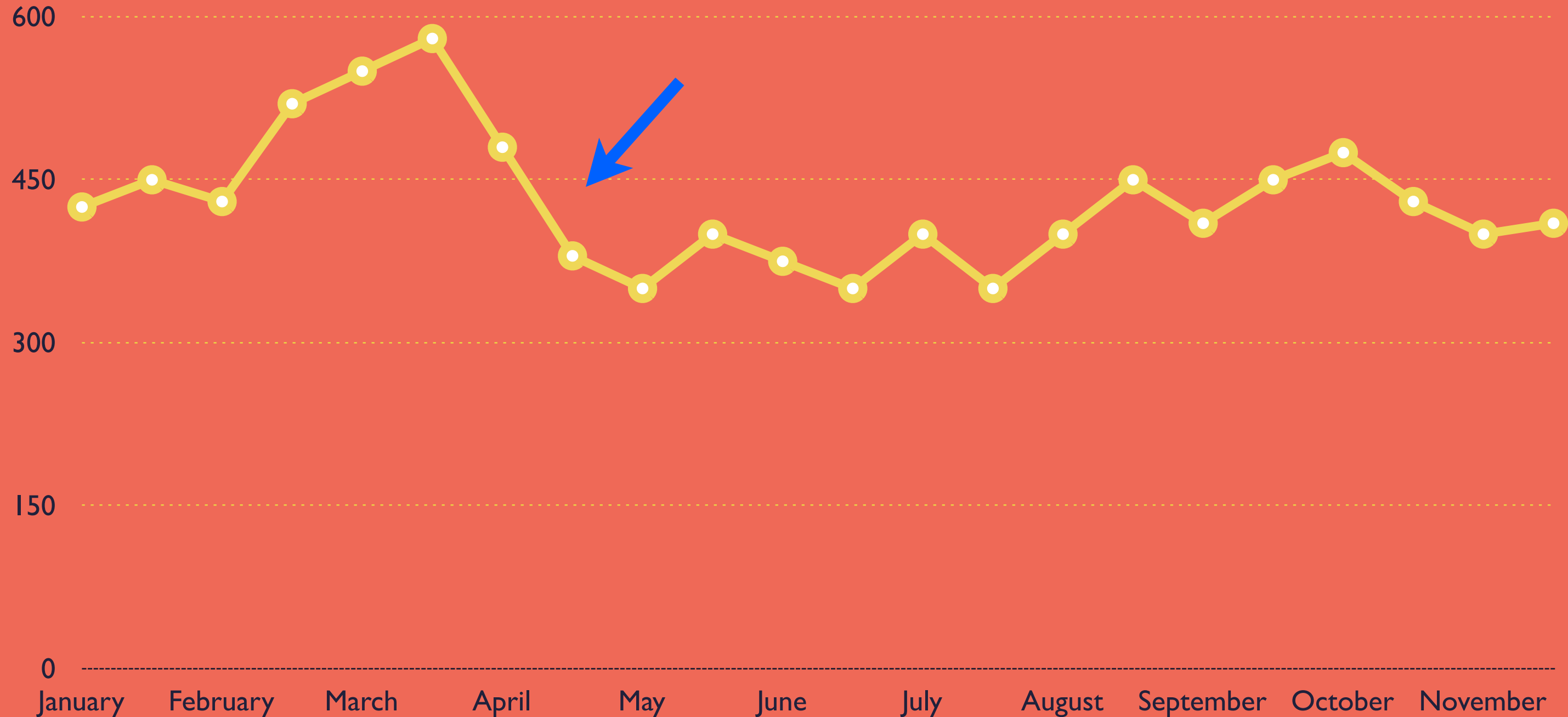
pageload time last 12 months



pageload time last 12 months



pageload time last 12 months





SHORTCUTS

GitHub Primer

refactor css into reusable components



SWEET! CSS



~~SWEET!~~ CSS
selectors

SASS is powerful and dangerous

```
1 button.classy, a.button.classy,  
2 button.classy:disabled:hover, a.button.classy.disabled:hover {  
3   border-radius: 3px;  
4   &.primary {  
5     color: #fff;  
6     &:hover { border-color: #4a993e; }  
7     &.mousedown { border-bottom-color: darken(#8add6d, 10%); }  
8     &:disabled, &.disabled {  
9       &, &:hover {  
10        border-color: #74bb5a;  
11      }  
12    }  
13  }  
14 }
```

```
button.classy:disabled:hover.  
mousedown, a.button.classy:dis  
abled:hover.mousedown, a.butto  
n.classy.disabled:hover.mouse  
down...
```


Max indent 3 levels

Wow, that was easy

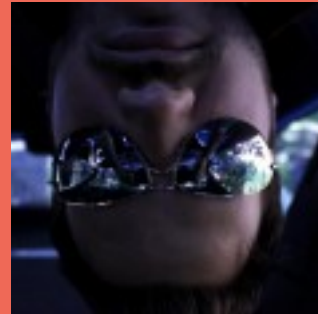
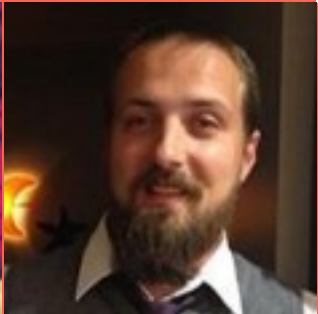
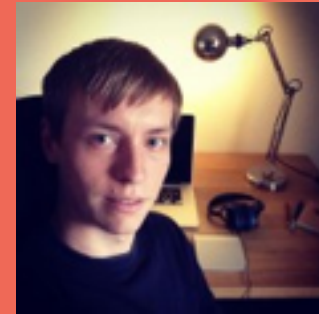
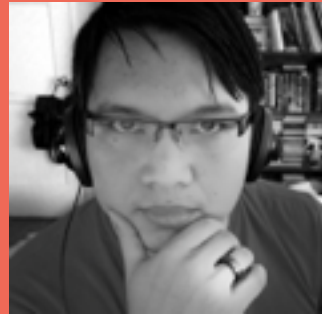
NOPE

GitHub has grown

people who touched css



css developers



restraint sucks!

GitHub operates like open source



GitHub's

TOOLS

CSS Explain

"Think of it like SQL EXPLAIN, but for CSS selectors."
- <https://github.com/josh/css-explain>

CSS EXPLAIN

.bar#foo



Category	ID	Class	Tag	Universal
Specificity	1	1	0	0

ID is overly qualified by a class name

```
> cssExplain("li .item")
{
  "selector": "li .item",
  "parts": ["li", ".item"],
  "specificity": [0, 1, 1],
  "category": "class",
  "key": "item",
  "score": 6
}
```

Webkit Dev Tools

CSS Profiler

Developer Tools - https://github.com/github/codeconf/pull/1/files

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Profiles

CSS SELECTOR PROFILES

Profile 1 (55 ms)

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strong, b		7.2%	1790
.mini-icon, .mega-icon		5.4%	904
pre, xmp, plaintext, listing		5.3%	909
#files .add-bubble		4.2%	882
pre, code, tt		3.8%	1035
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.mini-icon-add-comment::before		3.1%	882
#files .file .data .line, .file-box .data .line		2.5%	909
#files tr:hover .add-bubble		2.4%	24
#files .file .view-modes ul.view-modes-menu li, .file-box .view-modes ul.view-modes-menu li		1.8%	432
ul, menu, dir		1.6%	117
#files .file .view-modes ul.view-modes-menu, .file-box .view-modes ul.view-modes-menu		1.4%	108
.progress-bar		1.2%	78
#files .file .meta .info span.icon, #files .file .meta .info span.diffstat, .file-box .meta .info span.icon		1.2%	63
#files .file .meta .info span:first-child, #files .file .meta .info .icon + span, #files .file .meta .info .diffstat + span,...		1.2%	189
li		1.1%	596
div		1.0%	300
#files .file .view-modes ul.view-modes-menu li:first-child, .file-box .view-modes ul.view-modes-menu li:first-c...		1.0%	108
#files .file .meta .info span, .file-box .meta .info span		0.9%	189
#files .progress .progress-bar, .file-box .progress .progress-bar		0.8%	78
span.diffstat		0.8%	64
#files .file .meta .actions li:first-child, .file-box .meta .actions li:first-child		0.7%	126
span.diffstat .diffstat-bar		0.7%	64
a:-webkit-any-link		0.6%	231
#files .file .meta .actions li, .file-box .meta .actions li		0.5%	126
#files .file .view-modes ul.view-modes-menu li.active, .file-box .view-modes ul.view-modes-menu li.active		0.4%	106
.button-group li		0.4%	126
.minibutton, .minibutton.disabled:hover, .button-group .disabled.grouped-button:hover, .minibutton.disabled:h...		0.4%	134
#files .progress, .file-box .progress		0.4%	48
#files .file .image img, .file-box .image img, #files .file .image canvas, .file-box .image canvas		0.3%	40
img		0.3%	84
tt, code, kbd, samp		0.3%	126
#files .file .view-modes ul.view-modes-menu li:hover, .file-box .view-modes ul.view-modes-menu li:hover		0.3%	0

⌵ 🔍 ● ⌵ % ⚙

Timeline

Developer Tools - https://github.com/github/codeconf/pull/1/files

Elements Resources Network Sources Timeline Profiles Audits Console

Events
Frames
Memory

	1.66 s	3.32 s	4.99 s	6.65 s	8.3 s	9.97 s	11.63 s	13.29 s	14.96 s	16.62 s	18.28 s
Function Call (InjectedScript:1)											
Paint (16 x 702)											
Recalculate Style (frameworks-57542e0cba19d0681...)											
Layout (frameworks-57542e0cba19d068168099f28...)											
Function Call (InjectedScript:1)	2.78 s	3.30 s	3.83 s	4.35 s	4.88 s	5.40 s	5.93 s	6.45 s	6.98 s	7.50 s	8.03 s
Paint (16 x 702)											
Recalculate Style (frameworks-57542e0cba19d0681...)											
Layout (frameworks-57542e0cba19d068168099f28...)											
Layout											
Recalculate Style (frameworks-57542e0cba19d0681...)											
Layout (frameworks-57542e0cba19d068168099f28...)											
Layout											
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Layout (frameworks-57542e0cba19d068168099f28...)											
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Recalculate Style (frameworks-57542e0cba19d0681...)											
Layout (frameworks-57542e0cba19d068168099f28...)											
Recalculate Style (frameworks-57542e0cba19d0681...)											

Recalculate Style - Details
Duration 0.273 ms (at 4.04 s)

Styles invalidated

- p.extend.style @ frameworks-57542e0cba19d068168099f287c117efal42863c.js:4
- Zc.propHooks._default.set @ frameworks-57542e0cba19d068168099f287c117efal42863c.js:4
- Zc.run @ frameworks-57542e0cba19d068168099f287c117efal42863c.js:4
- Wc.i @ frameworks-57542e0cba19d068168099f287c117efal42863c.js:1
- p.fx.tick @ frameworks-57542e0cba19d068168099f287c117efal42863c.js:4

483 of 1040 records shown

Audits

Developer Tools - http://github.dev/

Elements Resources Network Sources Timeline Profiles Audits Console PageSpeed

Audits

RESULTS

http://github.dev/ (1)

- ▶ **Serve static content from a cookieless domain (6)**
- ▼ **Web Page Performance**
- ▶ **Optimize the order of styles and scripts (108)**
- ▶ **Remove unused CSS rules (3806)**
 - 396.25KB (79%) of CSS is not used by the current page.
 - ▶ [reset.css](#): 207B (17%) is not used by the current page.
 - ▶ [books.css](#): 274B (100%) is not used by the current page.
 - ▶ [callouts.css](#): 5.82KB (98%) is not used by the current page.
 - ▶ [forms.css](#): 8.78KB (86%) is not used by the current page.
 - ▶ [navigation.css](#): 3.95KB (88%) is not used by the current page.
 - ▶ [plans.css](#): 2.01KB (100%) is not used by the current page.
 - ▶ [notification_settings.css](#): 1.90KB (100%) is not used by the current page.
 - ▶ [listings-layout.css](#): 2.27KB (95%) is not used by the current page.
 - ▶ [jquery.date_input.css](#): 1.95KB (87%) is not used by the current page.
 - ▶ [jquery.facebook.css](#): 458B (57%) is not used by the current page.
 - ▶ [jquery.tipsy.css](#): 1.85KB (100%) is not used by the current page.
 - ▶ [code-frequency.css](#): 1.02KB (100%) is not used by the current page.
 - ▶ [commit-activity.css](#): 1.13KB (100%) is not used by the current page.
 - ▶ [contributors.css](#): 1.89KB (93%) is not used by the current page.
 - ▶ [index.css](#): 3.28KB (91%) is not used by the current page.
 - ▶ [punchcard.css](#): 260B (87%) is not used by the current page.
 - ▶ [icons.css](#): 302B (2%) is not used by the current page.
 - ▶ [markdown.css](#): 5.89KB (83%) is not used by the current page.
 - ▶ [pygments.css](#): 3.09KB (100%) is not used by the current page.
 - ▶ [buttons.css](#): 4.01KB (17%) is not used by the current page.
 - ▶ [nav.css](#): 2.08KB (96%) is not used by the current page.
 - ▶ [sticky.css](#): 167B (100%) is not used by the current page.
 - ▶ [about_page.css](#): 6.53KB (100%) is not used by the current page.
 - ▶ [account.css](#): 2.36KB (93%) is not used by the current page.

⌵ ≡ 🔍 ⌵ 1 ⚠️ 1 ⚙️

▼ [dashboard.css](#): 6.88KB (44%) is not used by the current page.

p.tip

p.tip strong.protip

.bootcamp

.bootcamp h1

.bootcamp h1 a

.bootcamp h1 span

.bootcamp .mini-icon-remove-close

.bootcamp .dismiss-bootcamp

.bootcamp .bootcamp-body

.bootcampo ul

.bootcamp ul li

.bootcamp ul li a

.bootcamp .image

Graphite

"Graphite is a highly scalable real-time graphing system."
- <http://graphite.wikidot.com/faq>

carbon (backend)

"Data collection agents connect to carbon and send their data..."
- <http://graphite.wikidot.com/carbon>

whisper (DB)

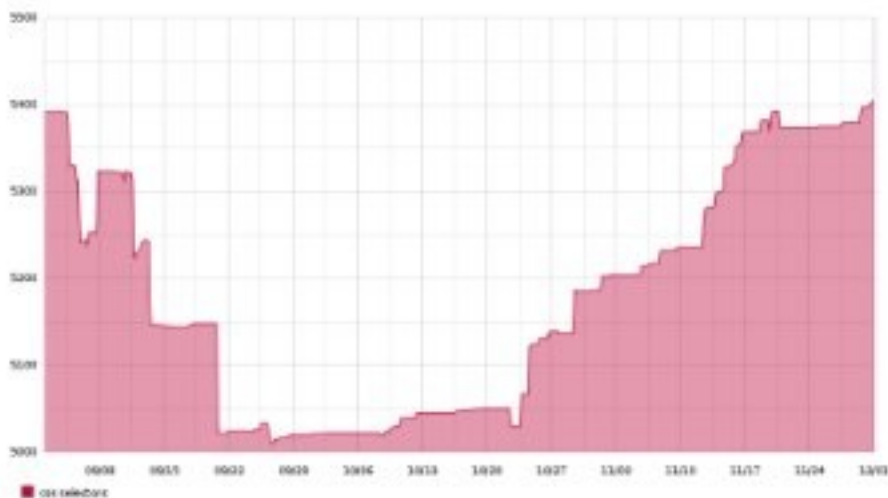
"It provides fast, reliable storage of numeric data over time."
- <http://graphite.wikidot.com/whisper>

The Graph Store

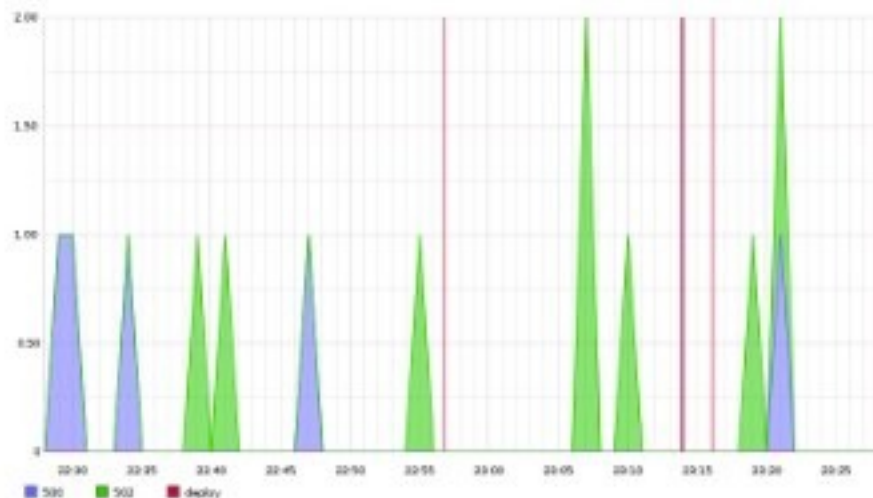


BROWSER

CSS Selectors



@browser.errors



windc



ASSETS

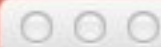
@assets.size.css.github



@assets.size.js.github



Graphs Everywhere



The Design Room Call me SkrilLUX. I drop the SASS.

See messages from [earlier today](#)

Nov 30 9:55 PM

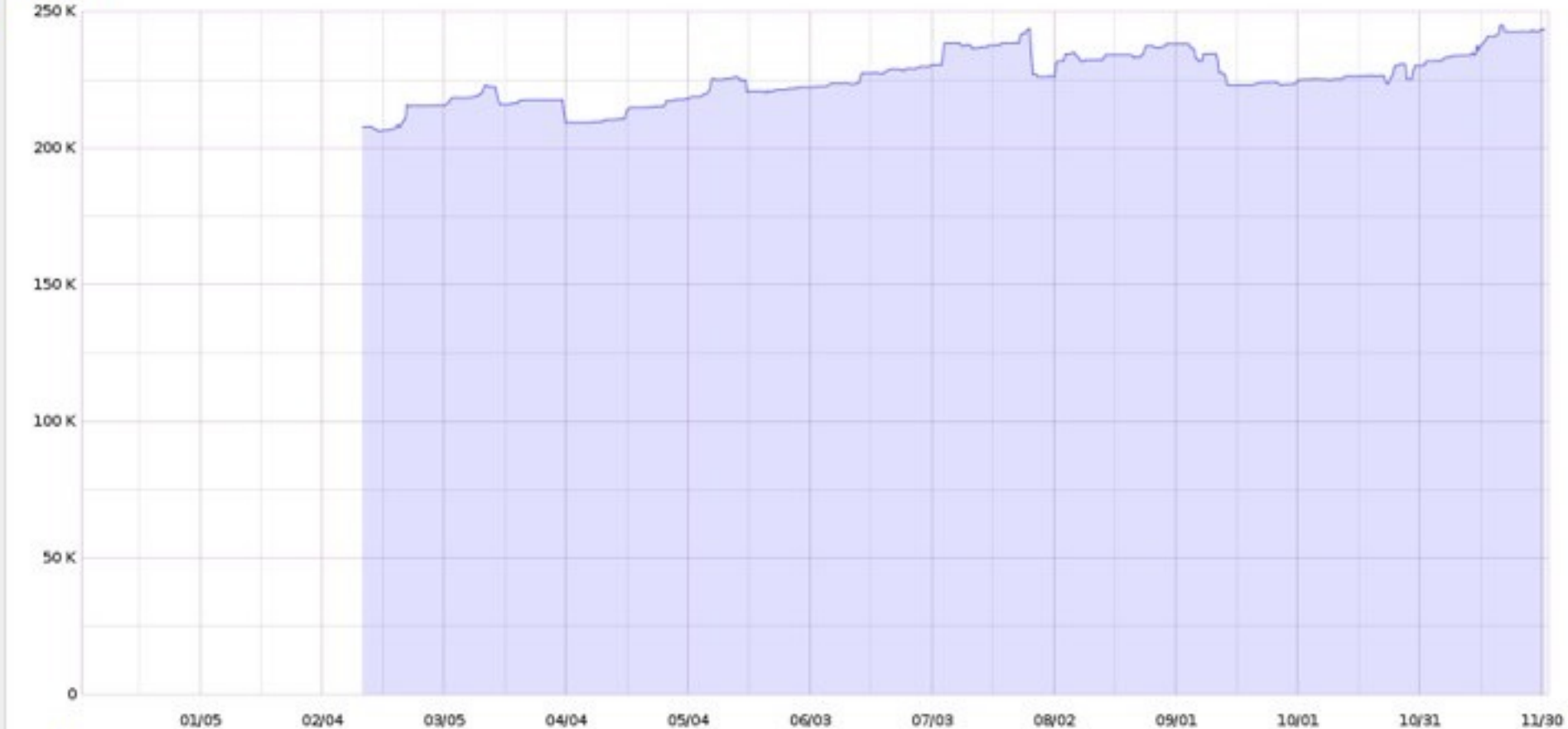


jonrohan Jon Rohan
/graph me -12months @assets.size.css.github



Hubot

250 K



keepLastValue(github.assets.size.css.github)





TOO LONG; DIDN'T READ

simplified CSS

Try to minimize HTML DOM matches

Refactor and reuse CSS

Teamwork

Graph and Monitor Everything

Thank You



@jonrohan

You can find this presentation at <http://speakerdeck.com/jonrohan>