

Performance

Course 5

Outline

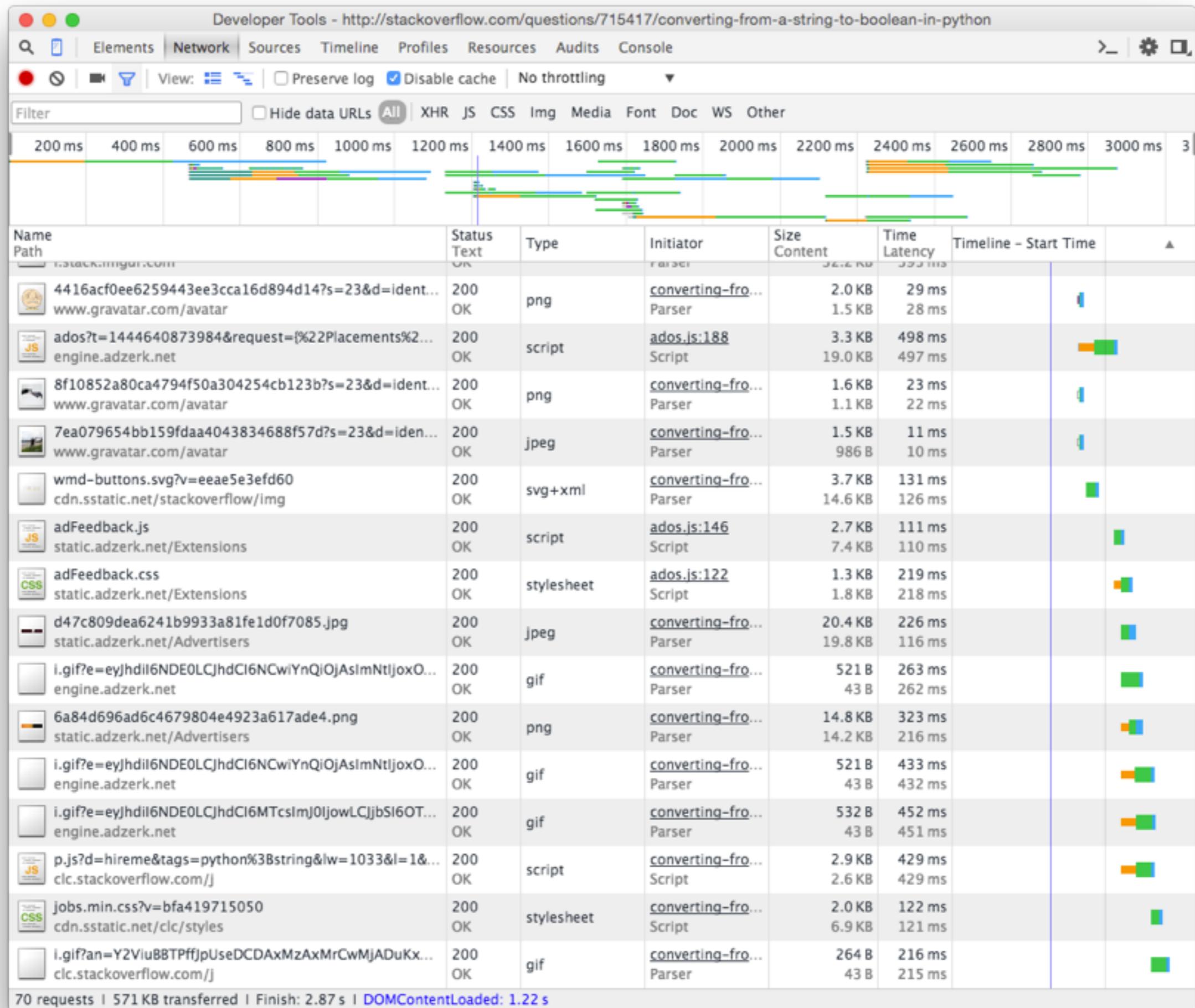
- Loading Performance
- Interaction Performance
 - CSS
 - JS
- Tools

onload

- Network request
- Flow DOM tree
- Execute JavaScript
- Paint page with style

Loading Performance

- All about network



Network Request

- HTTP request
- TCP/IP
- Every connection is dependent

Issues

- Lots of request
- TCP/IP warn up
- Connection limit on single domain

	TIME
Connection Setup	
Queueing	0.395 ms
Stalled	0.568 ms
DNS Lookup	0.605 ms
Initial connection	195.829 ms
Request/Response	
Request sent	0.080 ms
Waiting (TTFB)	228.172 ms
Content Download	394.989 ms
Explanation	820.723 ms

Solutions

- Reduce file size
- Reduce requests

File Size

- Minimize text files
- Choose smaller file type
- gzip

JS/CSS

- Plain text content
- Lots of whitespace for coding style
- Not necessary for machine

```
function add(value1, value 2) {  
    return value1 + value2;  
}
```

```
function add(a,b){return a+b}
```

```
.ui-helper-hidden {  
    display: none;  
}
```

```
.ui-helper-hidden{display:none;}
```

minimize tool

- yuicompressor
- UglifyJS
- csswring

JS/CSS

- Plain text content
- Lots of whitespace for coding style
- Not necessary for machine
- Also optimize code

Optimize JS

- Short variable name
- Combine expression
- Remove comments
- ...

Optimize CSS

- Shorthand style declaration
- Remove comments
- Normalize values
- ...

mishoo/UglifyJS2 · GitHub

GitHub, Inc. [US] https://github.com/mishoo/UglifyJS2

- `sequences` -- join consecutive simple statements using the comma operator
- `properties` -- rewrite property access using the dot notation, for example `foo["bar"]` → `foo.bar`
- `dead_code` -- remove unreachable code
- `drop_debugger` -- remove `debugger;` statements
- `unsafe` (default: false) -- apply "unsafe" transformations (discussion below)
- `conditionals` -- apply optimizations for `if`-s and conditional expressions
- `comparisons` -- apply certain optimizations to binary nodes, for example: `!(a <= b)` → `a > b` (only when `unsafe`), attempts to negate binary nodes, e.g. `a = !b && !c && !d && !e` → `a = !(b || c || d || e)` etc.
- `evaluate` -- attempt to evaluate constant expressions
- `booleans` -- various optimizations for boolean context, for example `!!a ? b : c` → `a ? b : c`
- `loops` -- optimizations for `do`, `while` and `for` loops when we can statically determine the condition
- `unused` -- drop unreferenced functions and variables
- `hoist_funs` -- hoist function declarations
- `hoist_vars` (default: false) -- hoist `var` declarations (this is `false` by default because it seems to increase the size of the output in general)
- `if_return` -- optimizations for if/return and if/continue
- `join_vars` -- join consecutive `var` statements
- `cascade` -- small optimization for sequences, transform `x, x` into `x` and `x = something(), x` into `x = something()`

Home · hail2u/node-csswring · GitHub

GitHub, Inc. [US] <https://github.com/hail2u/node-csswring/wiki>

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Home

Isaiah Odhner edited this page on 24 May · 22 revisions

Minify CSS file with *Source Maps*. That's only.

Minification Details

Also see [/test/ directory](#).

White Space

Minify or remove white spaces as possible.

```
.foo,  
  .bar {  
    display : block ;  
  }  
  
.baz + .qux {  
  display: block !important;  
  background-image: url( "baz.png" );  
}
```

becomes:

Clone this wiki locally
<https://github.com/hail2u/node-csswring/wiki>

Clone in Desktop

Pages 1
Home

Images

- JPG, PNG, GIF
- Remove all meta dat
- Choose smaller type

Types

- **GIF**
- **JPG**
- **PNG8, PNG32**
- **SVG**

GIF

- Suit for few colors
- 1 bit transparent
- GIF Animation
- For small assets

JPG

- Best for photos
- Much smaller than PNG

mozipeg

- by Mozilla
- Optimize jpeg file to compatible decoders

DEAR ISAAC
DO YOU LIKE ME?

- YES
- NO

there is as yet
insufficient data for
a meaningful answer

DEAR ISAAC
DO YOU LIKE ME?

- YES
- NO

there is as yet
insufficient data for
a meaningful answer

DEAR ISAAC
DO YOU LIKE ME?

- YES
- NO

there is as yet
insufficient data for
a meaningful answer

libjpeg 6b (6.2KB)

cjpeg -sample 1x1 -quality 16

Deringing disabled (6KB)

cjpeg -noovershoot ...

MozJPEG (6KB)

cjpeg -sample 1x1 -quality 35.5



ImageMagick (20.8KB)

convert -quality 18



MozJPEG (20.6KB)

cjpeg -quant-table 2 -quality 29.4

PNG

- Lossless
- 8bit alpha channel

pngquant

- High-quality palette generation
- Unique adaptive dithering algorithm

SVG

- Vector
- Alpha channel
- Small
- Less support

Optimize HTML

- Gzip
- PageSpeed Module

gzip

- Apache2 mod_deflate
- 50-80% size decrease (text file)

jQuery 1.11.3

Source

278kb

Minimized

94kb

Minimized & gzipped

33kb

Zopfli

- by Google
- Compatible with gzip decoder
- <https://github.com/google/zopfli>

Zopfli

- 3% - 8% smaller
- Take 80 times longer to compress

jQuery 1.11.3

Source	278kb
Minimized	94kb
Minimized & gzipped	33kb
Minimized & zopflied	31kb

jQuery 1.11.3

Source	278kb
Minimized	94kb
Minimized & gzipped	33kb
0.01s	
Minimized & zopflied	31kb
0.25s	

Reduce HTTP Header

- Cookie free domain

Reduce Request

- CSS/JS
- Images

JS/CSS

- Concat all files together

Images

- CSS Sprite



How

- Manuel produce
- Tools
- SASS ... etc

CDN

- Avoid domain connection limitation
- CDN have their local network
- Cookie free domain
- DDOS protection

Cache

- Set cache header
- Browser will not download file again

The screenshot shows a Mac OS X desktop environment with a browser window open. The window title is "Cache Control 與 ETag : othree". The address bar shows the URL <https://blog.othree.net/log/2012/12/22/cache-control-and-etag/>. The browser interface includes standard OS X controls like back, forward, and search, along with various icons for sharing and bookmarking.

03noBLOG

Cache Control 與 ETag

俗話說的好，最快的連線就是不要連線，最快的下載就是不要下載，訪客連到網站的網路狀況其實是不容易由網站這邊來控制的，所以要提升網頁的速度，除了提升網路的可達性外，還有一個方法就是 cache，瀏覽器在需要某個檔案的時候，首先它會檢查是否有 cache，有的話會看有沒有過期，過期的話就根據現有資訊去問 server 有沒有新版，如果 server 比對之後發現有新版的，才會把要求的檔案傳給瀏覽器。這一個流程一共有三個判斷點，分別是：

1. 是否需要無視 cache，前面沒講到，可能是 cache 設定或是瀏覽器設定
2. 有沒有 cache、有沒有過期
3. Server 端檔案有沒有更新

Cache 的機制早在 HTTP 1.0 時就有制訂了，不過當時只有 Expires 和 Pragma 這兩個 header，其中一個可以指定 cache 過期的時間，另外一個就只能指定叫瀏覽器 no-cache，到了 HTTP 1.1 之後，改成用 Cache-Control 提供更多功能來控制，支援 HTTP 1.1 的瀏覽器，只要看到 Cache-Control 就會忽略 Expires，除了因為 Cache-Control 的功能比較強大外，單純就過期時間的這點來看，Expires 看的是 ISO Time，會有 server 和 client 之間的時差問題，而 Cache-Control 則是用 max-age 直接說這個 Cache 可以活多久，就沒了時差問題。

Cache-Control 除了 max-age 外還有很多參數可以用，簡單介紹幾個常用的：

關於本文章

Cache Control 與 ETag 發表於 2012-12-22，文章類別為 Server Side，你可以為此篇文章留下你的想法。

57 8 6
讚 G+ 推文

上一篇：mod_proxy 的注意事項
下一篇：2012

關於本網站

本網站是 othree 的個人部落格，主要內容為網路標準、網頁設計，穿插些ACG心得和敗家紀錄，更詳細的資訊請見關於這，如要聯絡我請寄信到 othree@gmail.com。

Cache Time

- Set very long on static files
- JS, CSS, images, web font

Refresh File Content

- Use hash pre/post-fixed file name

網路 - https://www.kickstarter.com/projects/peak-design/the-everyday-messenger-a-bag-for-cameras-and-essen

	檢測器	主控台	除錯器	樣式編輯器	效能	網路						
✓	方法	檔案		網域	類型	已傳輸	大小	0 ms	10.24 秒	20.48 秒	30.72 秒	
● 200	GET	s.js		dtllztwypawv.cloudf...	js	15.64 KB	0 KB	→ 26 ms				
● 200	GET	base-c8e5143845ea307bbbf4c1445...		static.kickstarter.com	css	155.84 KB	823.73 KB		→ 110 ms			
● 200	GET	application-766180ac273abd0c244...		static.kickstarter.com	css	26.88 KB	126.06 KB		→ 69 ms			
● 200	GET	en.js		www.kickstarter.com	js	12.52 KB	38.15 KB		→ 73 ms			
● 200	GET	base-a69bdbdf3836c7b67be0368e...		static.kickstarter.com	js	310.63 KB	925.74 KB		→ 281 ms			
● 200	GET	widgets.js		platform.twitter.com	js	26.92 KB	86.15 KB		→ 117 ms			
● 200	GET	sdk.js		connect.facebook.net	js	52.89 KB	168.28 KB		→ 7 ms			
● 200	GET	share.js?_=1444792418411		platform.tumblr.com	js	0.87 KB	1.68 KB		→ 5 ms			
● 200	GET	jquery-b8e3fe3bb4adcb5166b7a40...		static.kickstarter.com	js	36.86 KB	94.24 KB		→ 46 ms			
▲ 304	GET	s.js		dtllztwypawv.cloudf...	js	15.64 KB	46.61 KB					→ 4 ms

網路 - https://www.kickstarter.com/projects/peak-design/the-everyday-m

 檢測器	 主控台	 除錯器	 樣式編輯器	 效能
✓ 方法	檔案	網域	類型	已傳輸
● 200 GET	s.js	dtlilztwypawv.cloudfla...	js	15.64 KB
● 200 GET	base-c8e5143845ea307bbbf4c1445...	static.kickstarter.com	css	155.84 KB
● 200 GET	application-766180ac273abd0c244...	static.kickstarter.com	css	26.88 KB
● 200 GET	en.js	www.kickstarter.com	js	12.52 KB
● 200 GET	base-a69bdbdf3836c7b67be0368e...	static.kickstarter.com	js	310.63 KB
● 200 GET	widgets.js	platform.twitter.com	js	26.92 KB
● 200 GET	sdk.js	connect.facebook.net	js	52.89 KB
● 200 GET	share.js?_=1444792418411	platform.tumblr.com	js	0.87 KB
● 200 GET	jquery-b8e3fe3bb4adcb5166b7a40...	static.kickstarter.com	js	36.86 KB
▲ 304 GET	s.js	dtlilztwypawv.cloudfla...	js	15.64 KB

HTTP/2

- based on SPDY
- Next generation HTTP Protocol

SPDY

- by Google
- Require HTTPS
- Support by old Chrome

HTTP/2

- Support by latest major browsers
- Not require HTTPS
- More features

Multiplex

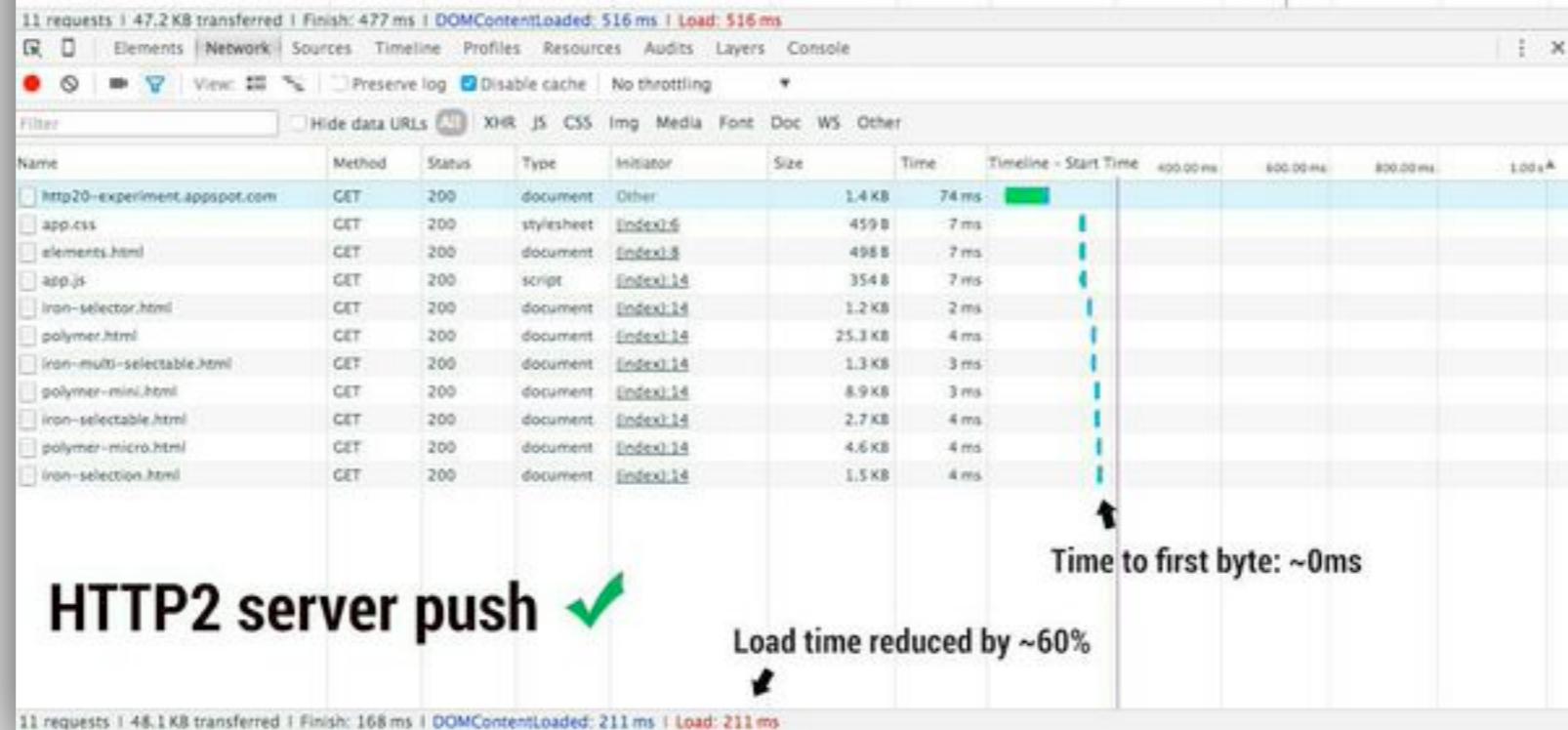
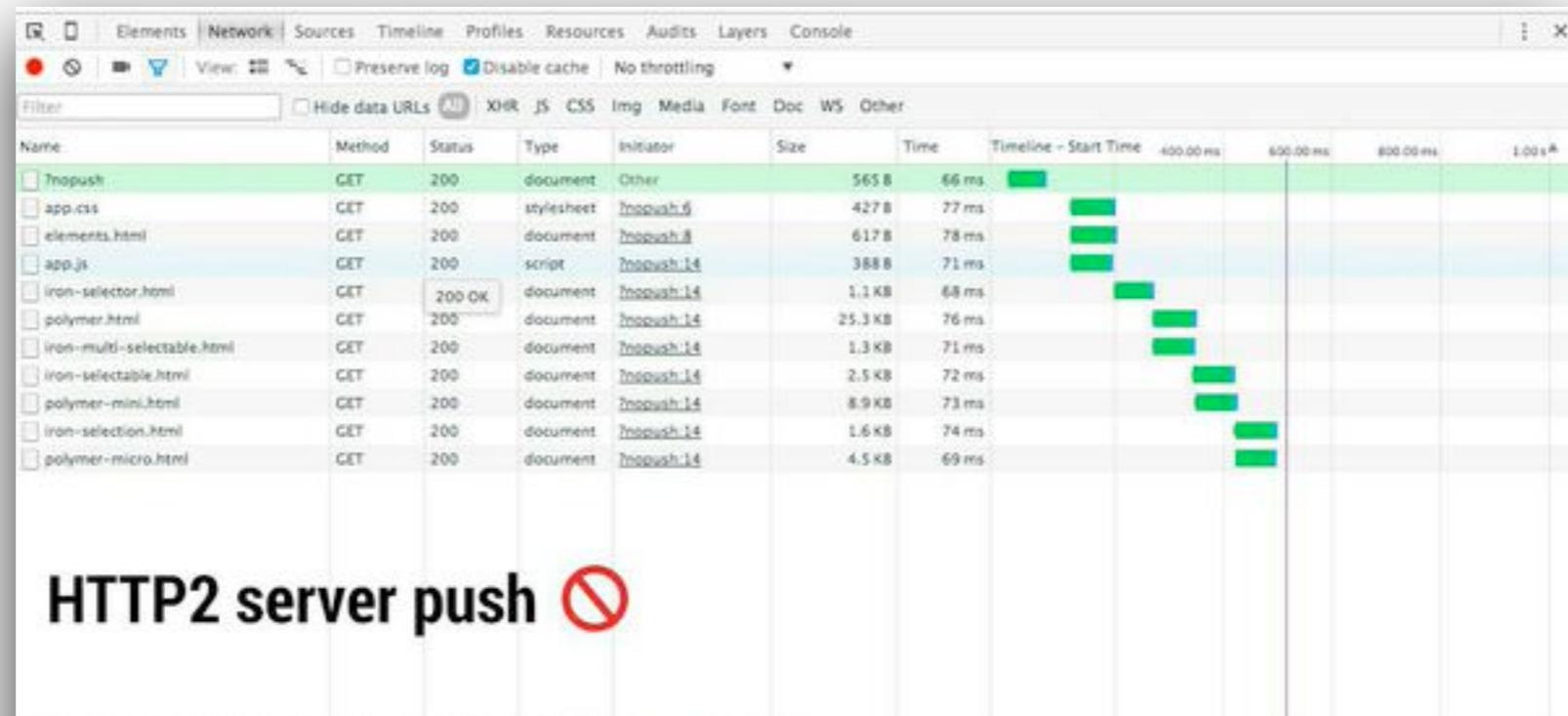
- One TCP/IP connection to grab all assets
- Bust benefit from CSS sprite and concat files

Header Compression

- HTTP 1.x can't compress header
- Only content can be compress
- Bust benefit from cookie free domain

Server Push

- Server send necessary files before browser know they need



Link: <<https://example.com/large-bg.jpg>>; rel=prefetch

Render Performance

Render Speed

- The fast user can see the page
- You can do some cheat

Critical CSS

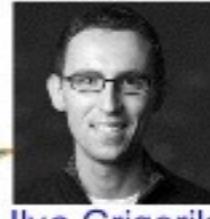
| Render Blocking CSS



}{ Critical Path CSS

}{ Non Priority CSS

Inline above-the-fold CSS to speed the page render.



Illya Grigorik

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Akamai

Critical CSS

- The style for first page(screen)
- Inline critical style for better performance
- Async load other styles

CSS Selector

- All about selector performance
- The time browser take to select all matches

Writing efficient CSS - Web X

Mozilla Foundation [US] https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Writing_efficient_CSS

Join MDN and developers like you at Mozilla's View Source conference, November 2-4 in Portland, Oregon. Learn more at <https://viewsourceconf.org/>.

MDN 10 YEARS

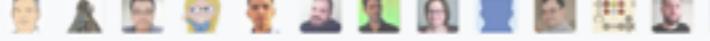
Sign in mozilla

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MDN > Web technology for developers > Web developer guide > CSS developer guide > Writing efficient CSS

LANGUAGES EDIT ⚙

Writing efficient CSS

by 28 contributors:  Show all...

IN THIS ARTICLE +

 Note: This document was originally written in 2000. Much has changed when it comes to writing CSS that is fast. This guide is not an accurate representation of the bottlenecks in the browser's rendering pipeline. For selectors in particular, read [CSS Selector Performance has changed! \(For the better\)](#) for a more recent take. For improving CSS speed, investigate improving costs of Reflow (layout) and Paint.

This document provides guidelines for optimizing CSS code, and more specifically on how to write efficient selectors.

The CSS specification doesn't specify how browsers must implement the style system, merely what it must do. Because of this, different style system engines may have completely different performance behaviors, and especially Gecko and WebKit which are open source, implement similar algorithms, with very similar strengths and weaknesses. Therefore the tips presented here should be useful for real-world Web documents.

The first section is a general discussion of how the usual style system categorizes rules. The following sections contain guidelines for writing rules that take advantage of such a style system implementation.

How the style system breaks up rules

DOM change

- Expensive
- Do lots of change in one time

```
var $elem = $('#container');

$elem.append($el[0]);
$elem.append($el[1]);
$elem.append($el[2]);
$elem.append($el[3]);
$elem.append($el[4]);
```

```
var $elem = $('#container');

$elem.detach();

$elem.append($el[0]);
$elem.append($el[1]);
$elem.append($el[2]);
$elem.append($el[3]);
$elem.append($el[4]);

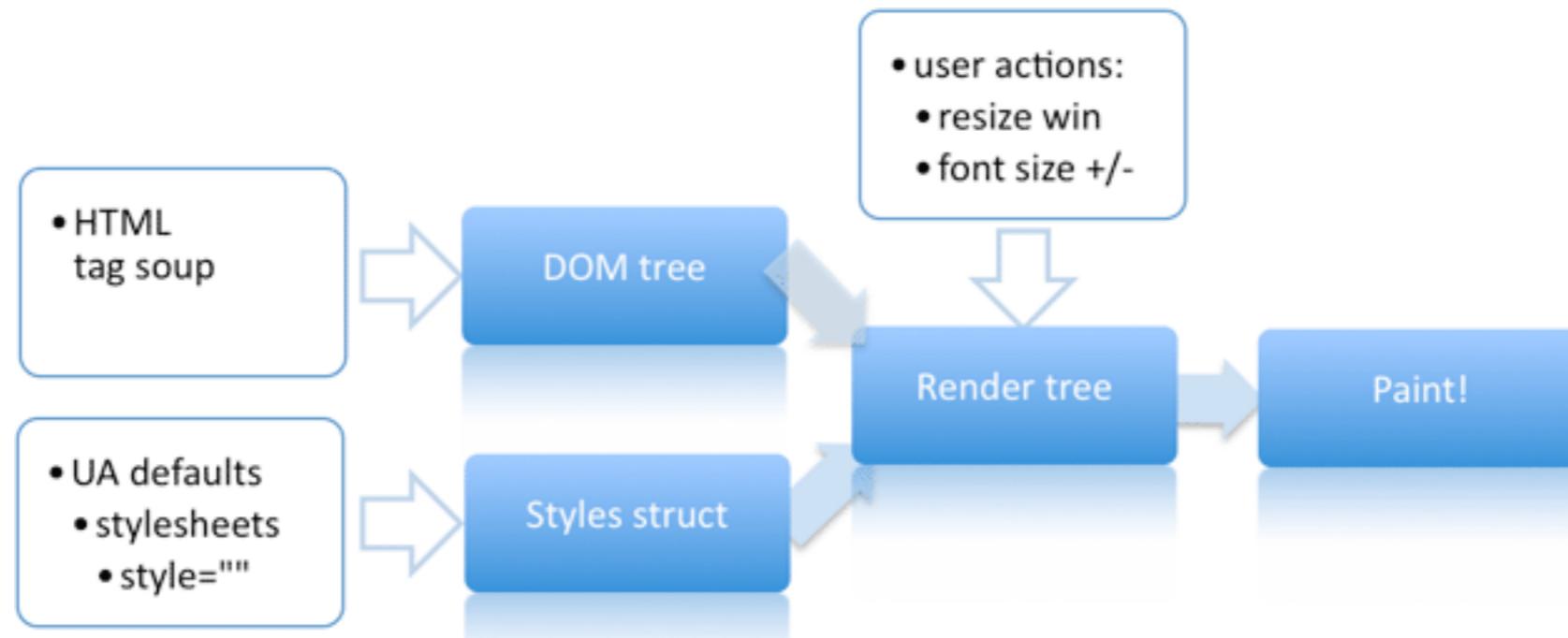
$('body').append($elem);
```

Flow, Paint

- Browser will parse HTML to DOM tree
- Then apply style, gen render Tree
- Then paint the canvas

Flow, Paint

- Browser will parse HTML to DOM tree
- Then apply style, gen render tree → **Flow**
- Then paint the canvas → **Paint**



```
var $elem = $('#container');

$elem.append($el[0]);
$elem.append($el[1]);
$elem.append($el[2]);
$elem.append($el[3]);
$elem.append($el[4]);
```

```
var $elem = $('#container');
```

```
$elem.append($el[0]);    Reflow  
$elem.append($el[1]);    Reflow  
$elem.append($el[2]);    Reflow  
$elem.append($el[3]);    Reflow  
$elem.append($el[4]);    Reflow
```

```
var $elem = $('#container');

$elem.detach();

$elem.append($el[0]);
$elem.append($el[1]);
$elem.append($el[2]);
$elem.append($el[3]);
$elem.append($el[4]);

$('body').append($elem);
```

```
var $elem = $('#container');
```

```
$elem.detach();
```

Reflow

```
$elem.append($el[0]);  
$elem.append($el[1]);  
$elem.append($el[2]);  
$elem.append($el[3]);  
$elem.append($el[4]);
```

```
($('body').append($elem); Reflow
```

Avoid Reflow

- Trigger reflow will also trigger repaint
- Minimize the operations on major DOM tree
- Detach it before change

documentFragment

- The fake element container
- No parent
- For operation, XHR response

```
var ul = document.getElementsByTagName("ul")[0];
var docfrag = document.createDocumentFragment();
var browserList = [
    "Internet Explorer",
    "Mozilla Firefox",
    "Safari",
    "Chrome",
    "Opera"];
```



```
browserList.forEach(function(e) {
    var li = document.createElement("li");
    li.textContent = e;
    docfrag.appendChild(li);
});
```



```
ul.appendChild(docfrag);
// a list with well-known web browsers
```

```
var ul = document.getElementsByTagName("ul")[0];
var docfrag = document.createDocumentFragment();
var browserList = [
    "Internet Explorer",
    "Mozilla Firefox",
    "Safari",
    "Chrome",
    "Opera"];
```



```
browserList.forEach(function(e) {
    var li = document.createElement("li");
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    docfrag.appendChild(li);
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```



```
ul.appendChild(docfrag);
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```
var ul = document.getElementsByTagName("ul")[0];
var docfrag = document.createDocumentFragment();
var browserList = [
  "Internet Explorer",
  "Mozilla Firefox",
  "Safari",
  "Chrome",
  "Opera"];
```



```
browserList.forEach(function(e) {
  var li = document.createElement("li");
  li.textContent = e;
  docfrag.appendChild(li);
});
```


ul.appendChild(docfrag); Reflow
// a list with well-known web browsers

```
<ul>
  <li>Internet Explorer</li>
  <li>Mozilla Firefox</li>
  <li>Safari</li>
  <li>Chrome</li>
  <li>Opera</li>
</ul>
```

Avoid Repaint

- Style change might trigger repaint only
- Do all changes in one operation
- Change class name

CSSTrigger

- A list of style and reflow/repaint relation

CSS Triggers... csstriggers.com See Legend

BETA

CSS TRIGGERS...

A GAME OF LAYOUT, PAINT, AND COMPOSITE.

Filter:

	Change from default	Update value
align-content	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
align-items	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
align-self	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
backface-visibility	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
background-attachment	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
background-blend-mode	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
background-clip	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
background-color	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>
background-image	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
background-origin	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
background-position	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
background-repeat	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
background-size	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-bottom-color	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
border-bottom-left-radius	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-bottom-right-radius	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-bottom-width	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-top-color	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-top-left-radius	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-top-right-radius	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-top-width	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
border-width	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
box-decoration-break	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
box-sizing	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
color	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
display	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
font-family	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
font-size	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
font-style	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
font-weight	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
height	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
width	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
z-index	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>

Animation

- Keep change style with time passed

```
var $target = $('#target');  
var i = 0;
```

```
setInterval(function () {  
    $target.css({left: i++});  
}, 100);
```

Animation

- `setTimeout` instead of `setInterval`
- Get real time on every function call

```
var $target = $('#target');
var i = 0;
var start = (new Date()).getTime();

var move = function () {
    var dt = (new Date()).getTime() - start;
    i = i + (dt / 100);
    $target.css({left: i});
    setTimeout(move, 100);
};

move();
```

requestAnimationFrame

- Better than setTimeout
- Trigger when browser is painting next frame
- Avoid unnecessary function call

```
var $target = $('#target');
var i = 0;
var start = (new Date()).getTime();

var move = function () {
    var dt = (new Date()).getTime() - start;
    i = i + (dt / 100);
    $target.css({left: i});
    requestAnimationFrame(move);
};

move();
```

CSS Transform

- Not trigger reflow
- Much powerful than position
- Translate, Rotate, Scale, Skew

The screenshot shows a web browser window titled "THE MAGNIFICENT 2D MATRIX". The URL is "ncase.me/matrix/". The main content area displays a diagram illustrating matrix-vector multiplication. At the top, there is a 2D coordinate system with a grid. A vector is shown as a series of black dots forming a curve. Below the diagram, the following mathematical expression is shown:

$$\begin{bmatrix} 1.0 & 0.0 & 0.0 \\ 0.0 & 1.0 & 0.0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix} = \begin{bmatrix} 1.0*x + 0.0*y + 0.0*1 \\ 0.0*x + 1.0*y + 0.0*1 \\ 0*x + 0*y + 1*1 \end{bmatrix} = \begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix}$$

Below the matrices, labels provide context:

- "the transformation matrix (adjust the numbers!)"
- "a vector (hover over the dots)"
- "how to multiply transformation matrix & vector (hover over each cell)"
- "new vector (hover over the dots)"

At the bottom, a large, bold, stylized text reads "BEHOLD THE BEAST! THE MAGNIFICENT 2D MATRIX!" flanked by two hand icons pointing towards the text.

CSS Transition

- Let browser do the animation
- Transition means process between state change

```
#delay1 {  
    position: relative;  
    font-size: 14px;  
}  
  
#delay1:hover {
```

```
    transition-property: font-size;  
    transition-duration: 4s;  
    transition-delay: 2s;  
    font-size: 36px;  
}
```

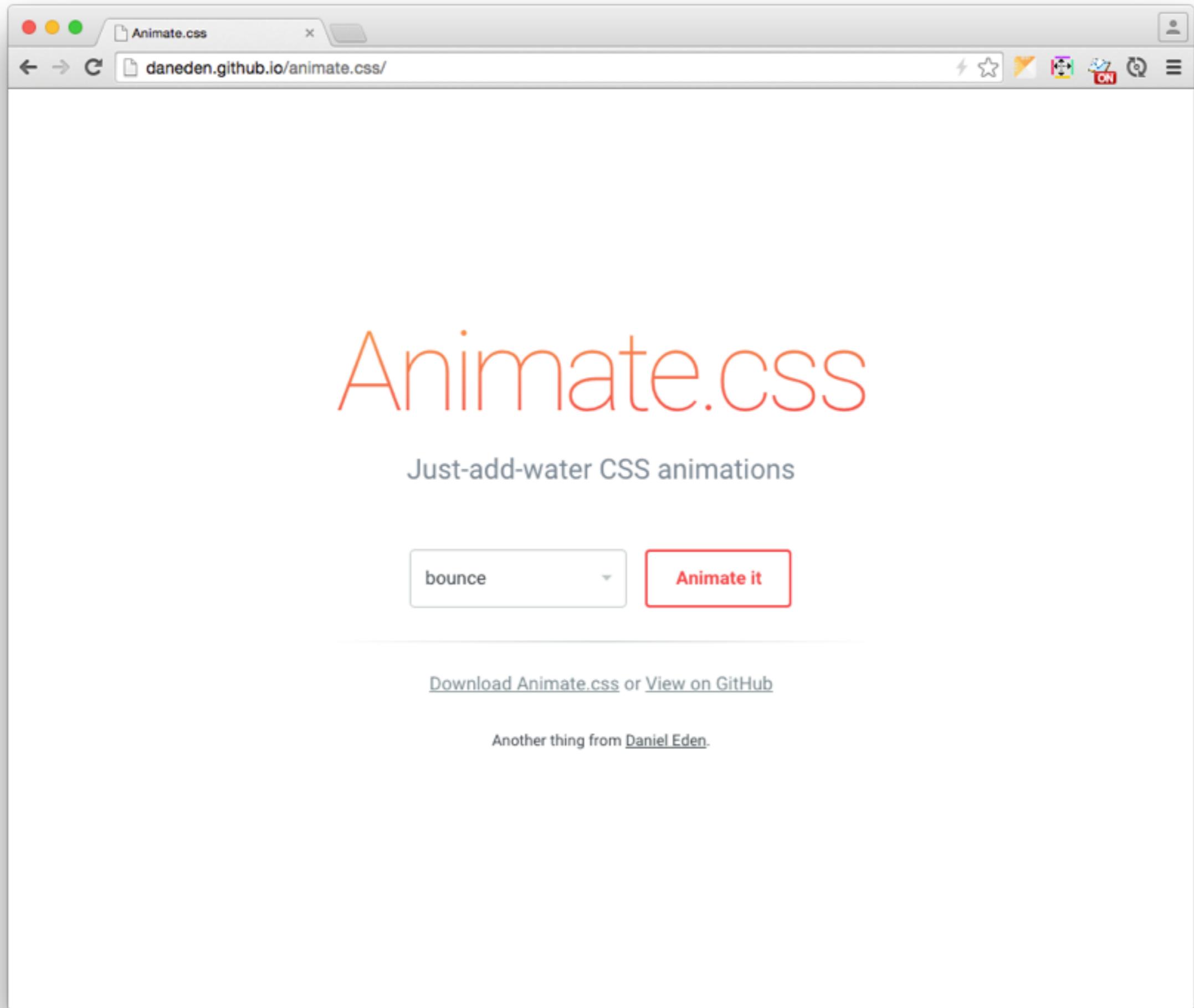
```
#delay1 {  
    position: relative;  
    transition-property: font-size;  
    transition-duration: 4s;  
    transition-delay: 2s;  
    font-size: 14px;  
}
```

```
#delay1:hover {  
    transition-property: font-size;  
    transition-duration: 4s;  
    transition-delay: 2s;  
    font-size: 36px;  
}
```

DEMO

CSS Animation

- Not just state A to B
- Assign middle point
- Infinity animation



Web Animation

- Next generation web animation API

```
var elem = document.querySelector('.pulse');

var player = elem.animate([
  {opacity: "0.5", transform: "scale(0.5)"},  

  {opacity: "1.0", transform: "scale(1)"}
], {  

  direction: "alternate", duration: 500, iterations: Infinity  

});
```

```
var groupEffect = new GroupEffect([
  new SequenceEffect([
    new KeyframeEffect(..., {duration: 3000}),
    new KeyframeEffect(..., {duration: 5000, fill: 'both'})
  ], {duration: 6000, delay: 3000, fill: 'none'}),
  new KeyframeEffect(..., {duration: 8000, fill: 'forwards'})
], {iterations: 2, fill: 'forwards'});
```

```
var animation = document.timeline.play(myEffect);
```

Can I use... Support tables X

← → C caniuse.com/#feat=web-animation

x Feature: Web Animations API

Web Animations API WD

Global 0% + 54.97% = 54.97%

Lets you create animations that are run in the browser and as well as inspect and manipulate animations created through declarative means like CSS.

Current aligned Usage relative Show all

IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser	Chrome for Android
8		38	31					4.1	
9		39	43					4.3	
10		40	44	8				4.4	
11	12	41	45	9	32	8.4	8	4.4.4	
	13	42	46		33			44	45
		43	47		34				
		44	48						

Notes Known issues (0) Resources (8) Feedback

Current MS Edge status: Under Consideration

1 Partial support refers to basic support of `element.animate()`

2 Partial support refers to basic support of `element.animate()` and playback control of `AnimationPlayer`

3 Partial support in Firefox is detailed in [Are we animated yet?](#)

Are we animated yet? <https://birtles.github.io/areweanimatedyet/>

This page tracks the progress of implementing the [Web Animations API](#) in Firefox. The status here refers to the status in the latest [Firefox Nightly build](#). In Firefox Developer Edition (aka Aurora) you'll see bits and pieces of the API, and in beta and release versions you'll see nothing at all unless you set `dom.animations-api.core.enabled` to true.

[Firefox Nightly »](#)

AnimationTimeline	DocumentTimeline
currentTime ...	[Constructor]
getAnimations ...	

Animation	AnimationEffectReadOnly
[Constructor] ...	timing
id ...	computedTiming
effect ...	
timeline ...	
startTime ...	
currentTime ...	
playbackRate ...	
playState ...	

GitHub web-animations/web-anim... GitHub, Inc. [US] https://github.com/web-animations/web-animations-js

GitHub This repository Search Explore Features Enterprise Pricing Sign up Sign in

web-animations / web-animations-js Watch 67 Star 568 Fork 42

JavaScript implementation of the Web Animations API <http://web-animations.github.io>

1,226 commits 1 branch 12 releases 16 contributors

Branch: master web-animations-js / +

Remove web-animations.min.js.gz ...

File	Description	Time
dstockwell authored 4 days ago	latest commit 4f0c0ee122	
node_modules	Update chai	11 months ago
src	Change back to manually defining timing getters and setters. I don't ...	3 months ago
templates	Revert "boilerplate: reduce & add project name"	11 months ago
test	add getter and test	4 months ago
.travis-setup.sh	Added some license headers.	8 months ago
.travis.yml	Add Travis support	a year ago
COPYING	Initial revision	a year ago
Gruntfile.js	Fix karma issue.	4 months ago
History.md	Release notes for 2.1.2	3 months ago
README.md	Update feature table now that additive animations are level 1.	6 months ago
bower.json	added bower.json	7 months ago
package.json	Mark package.json private for now	11 months ago
target-config.js	Small cleanup	4 months ago
target-loader.js	Added some license headers.	8 months ago

Code Issues 7 Pull requests 1 Pulse Graphs

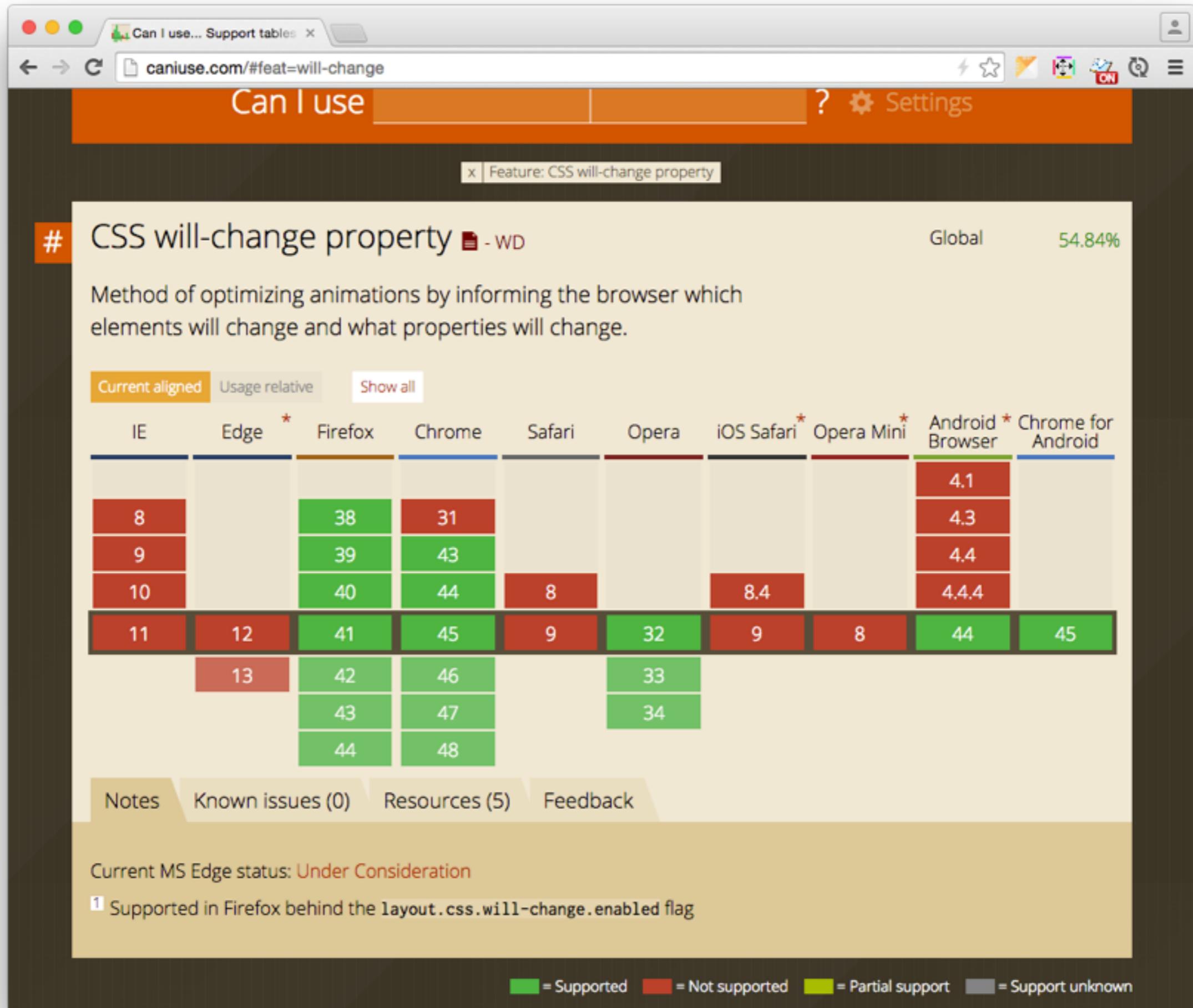
HTTPS clone URL <https://github.com/web-animations/web-animations-js>

You can clone with **HTTPS** or **Subversion**.

Clone in Desktop Download ZIP

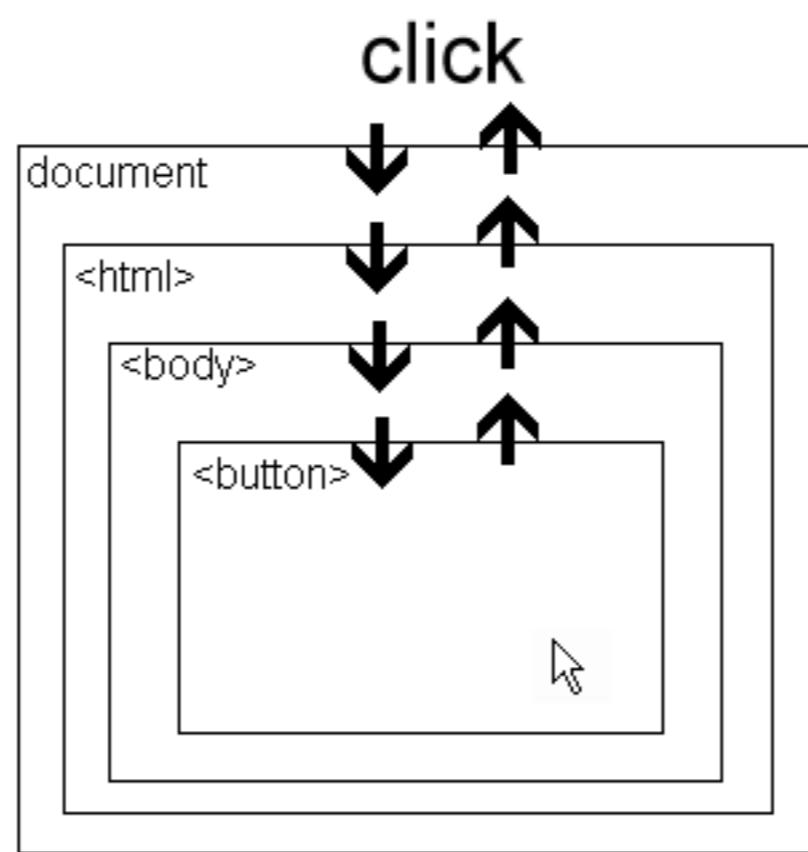
CSS will-change

- Tell the browser which style will change
- For optimization



Event Delegation

- Lots of element have the same event handler
- ex: mouseover event
- Don't attach event listener on every element



```
<ul id="parent-list">
  <li id="post-1">Item 1</li>
  <li id="post-2">Item 2</li>
  <li id="post-3">Item 3</li>
  <li id="post-4">Item 4</li>
  <li id="post-5">Item 5</li>
  <li id="post-6">Item 6</li>
</ul>
```

```
$( '#parent-list' ).on( 'click', 'li', fucntion () { } );
```

```
// Get the element, add a click listener...
document.getElementById("parent-list")
  .addEventListener("click", function(e) {
    // e.target is the clicked element!
    // If it was a list item
    if (e.target && e.target.nodeName == "LI") {
      // List item found! Output the ID!
      console.log(e.target.id);
    }
});
```

Load JS

- Load JS at page end
- or use async loading

Async Load

- Trigger onload event first
- Execute script when script ready
- Not able to control execution order by HTML

```
<script type="text/javascript">

setTimeout(function() {
    var el = document.createElement("script");
    el.type = "text/javascript";
    el.src = "http://vk.com/js/api/openapi.js";
    el.async = true;
    document.getElementById("vk_api_transport")
        .appendChild(el);
}, 0);

</script>
```

```
<script type="text/javascript" src="app.js" async>
</script>
```

document.write

- Will change document tree
- So browser need to wait all script execute complete

Web Worker

- Worker process don't block UI
- Use message to communicate with main process
- Good for lots of calculation

```
var myWorker = new Worker("worker.js");  
myWorker.postMessage([first.value,second.value]);
```

```
onmessage = function(e) {  
    console.log('Message received from main script');  
    var workerResult = 'Result: ' + (e.data[0] * e.data[1]);  
    console.log('Posting message back to main script');  
    postMessage(workerResult);  
}
```

Transfer

- Normally postMessage is send cloned message
- Will block UI if data is huge, ex: audio binary
- Use transfer to avoid clone

```
var objData = {  
    str: "string",  
    ab: new ArrayBuffer(100),  
    i8: new Int8Array(200)  
};  
  
objWorker.postMessage(objData,  
    [objData.ab, objData.i8.buffer]);
```

```
self.onmessage = function(objEvent) {  
    var strText = objEvent.data.str;  
    var objTypedArray = objEvent.data.ab;  
    var objTypedArrayView = objEvent.data.i8;  
}
```

Transfer

- Only ArrayBuffer and MessagePort can be transferred

Profiling Tool

Google PageSpeed

PageSpeed Insights

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

Google Developers

產品 > PageSpeed Insights

PageSpeed Insights G+1

 讓您的網頁在所有裝置上都能快速載入。

輸入網頁網址 分析

網頁效能
進一步瞭解 Google 提供的網頁效能工具，包括 Insights 瀏覽器擴充功能和 Insights API、PageSpeed 服務，以及我們的最佳化程式庫。

提供意見
您對 PageSpeed Insights 有任何意見或疑問嗎？歡迎[提供意見](#)或透過我們的郵寄清單進行討論。

關於 PageSpeed Insights
PageSpeed Insights 會分析網頁內容，並提供如何加快網頁載入速度的建議。[瞭解詳情](#)

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PageSpeed Insights 

<https://developers.google.com/speed/pagespeed/insights/?url=https%3A%2F%2Fblog.othree.net>

产品 > PageSpeed Insights

PageSpeed Insights

分析

 行動版  電腦版

71 / 100 速度

必須修正的問題：
清除前幾行內容中的禁止轉譯 JavaScript 和 CSS
[顯示修正問題的做法](#)

建議修正的問題：
最優化圖片
[顯示修正問題的做法](#)
使用瀏覽器快取功能
[顯示修正問題的做法](#)
壓縮 JavaScript
[顯示修正問題的做法](#)

 通過 6 項規則



WebPageTest

WebPagetest - Website Pe X

www.webpagetest.org

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HOME TEST HISTORY FORUMS DOCUMENTATION ABOUT

Test a website's performance

Analytical Review Visual Comparison Traceroute

Enter a Website URL

START TEST

Test Location Dulles, VA USA (IE 8-11,Chrome,Firefox,Android,iOS) Select from Map 5

Pending Tests

Browser Chrome

Advanced Settings ▶ 1 run, Cable connection, results are public

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

- Everything You Need to Know about UserTiming, NavigationTiming and ResourceTiming
- Why a Digital Operations Center (DOC) must be a central part of your digital strategy
- Zoompf Gets Acquired!
- How a conversation about outcomes can bring tech and business closer
- Five Tips for Enhanced DNS Reliability and Security
- more...

Recent Discussions

- Strange gap on repeat view between HTML & Analytics
- Understand the webpagetest results after some changes on a website
- [Paid Job] Need someone to set up webpagetest on our servers
- WPTMonitor Download
- Magic? F in "cache static content" but requests go from 55 to 2 in repeat view
- more...

WebPagetest Partners

DOVER PAGE

WebPagetest Test Result -

www.webpagetest.org/result/151014_4G_6DN/

Need help improving?

Web Page Performance Test for <https://blog.othree.net>

From: Dulles, VA - Chrome - Cable
2015/10/14 上午11:54:49

First Byte Time: A | Keep-alive Enabled: A | Compress Transfer: A | Compress Images: N/A | Cache static content: A | Effective use of CDN: X

Summary **Details** **Performance Review** **Content Breakdown** **Domains** **Screen Shot**

Tester: VM6-IE11-3-192.168.101.163 [Raw page data](#) - [Raw object data](#)
[Re-run the test](#) [Export HTTP Archive \(.har\)](#) [View Test Log](#)

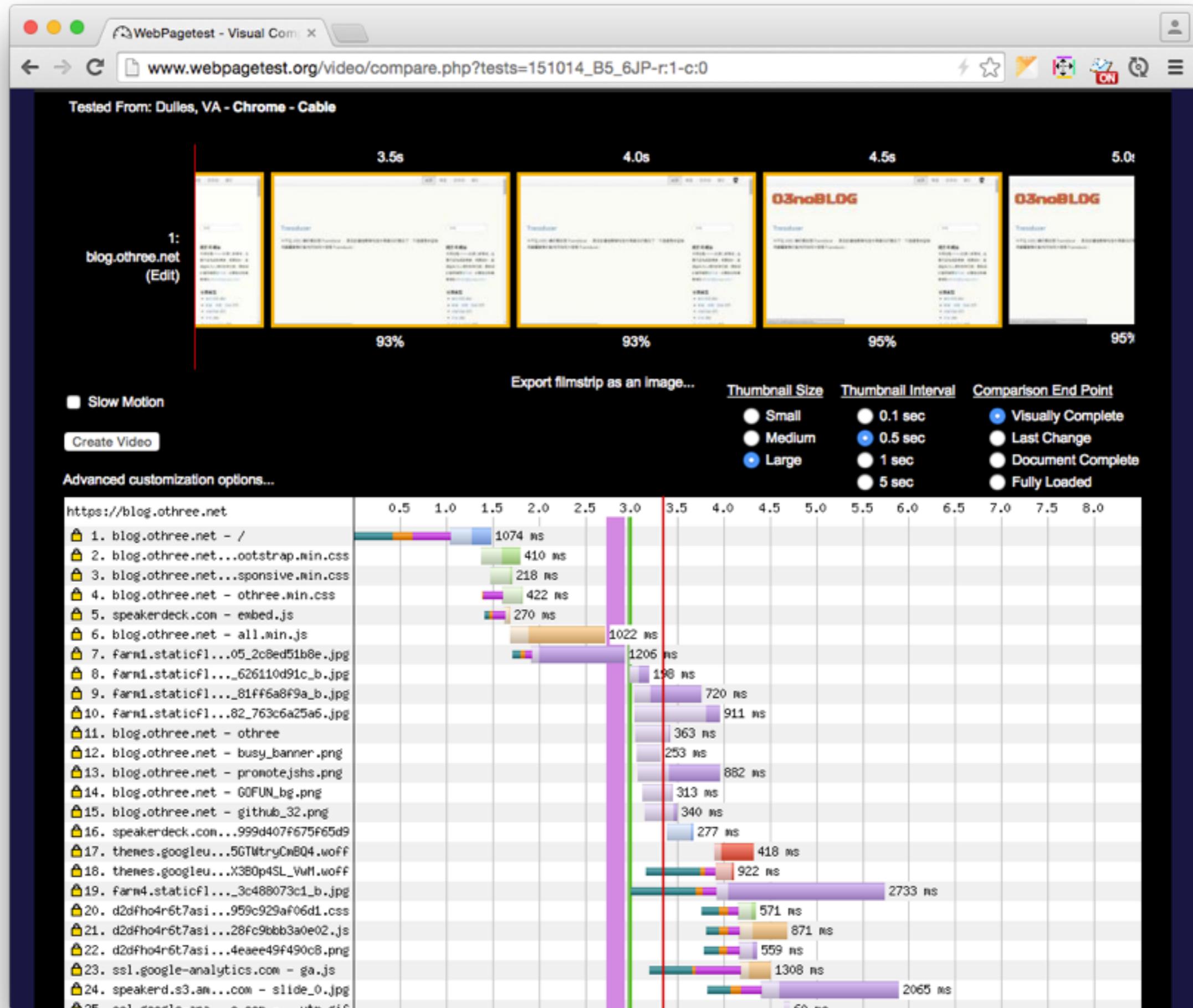
	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Document Complete			Fully Loaded			
						Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View	8.401s	1.142s	3.880s	4022	265	8.401s	156	2,005 KB	9.004s	159	2,024 KB	\$\$\$\$\$
Repeat View	1.557s	1.585s	1.251s	1491	265	1.557s	1	109 KB	6.756s	7	396 KB	

Waterfall

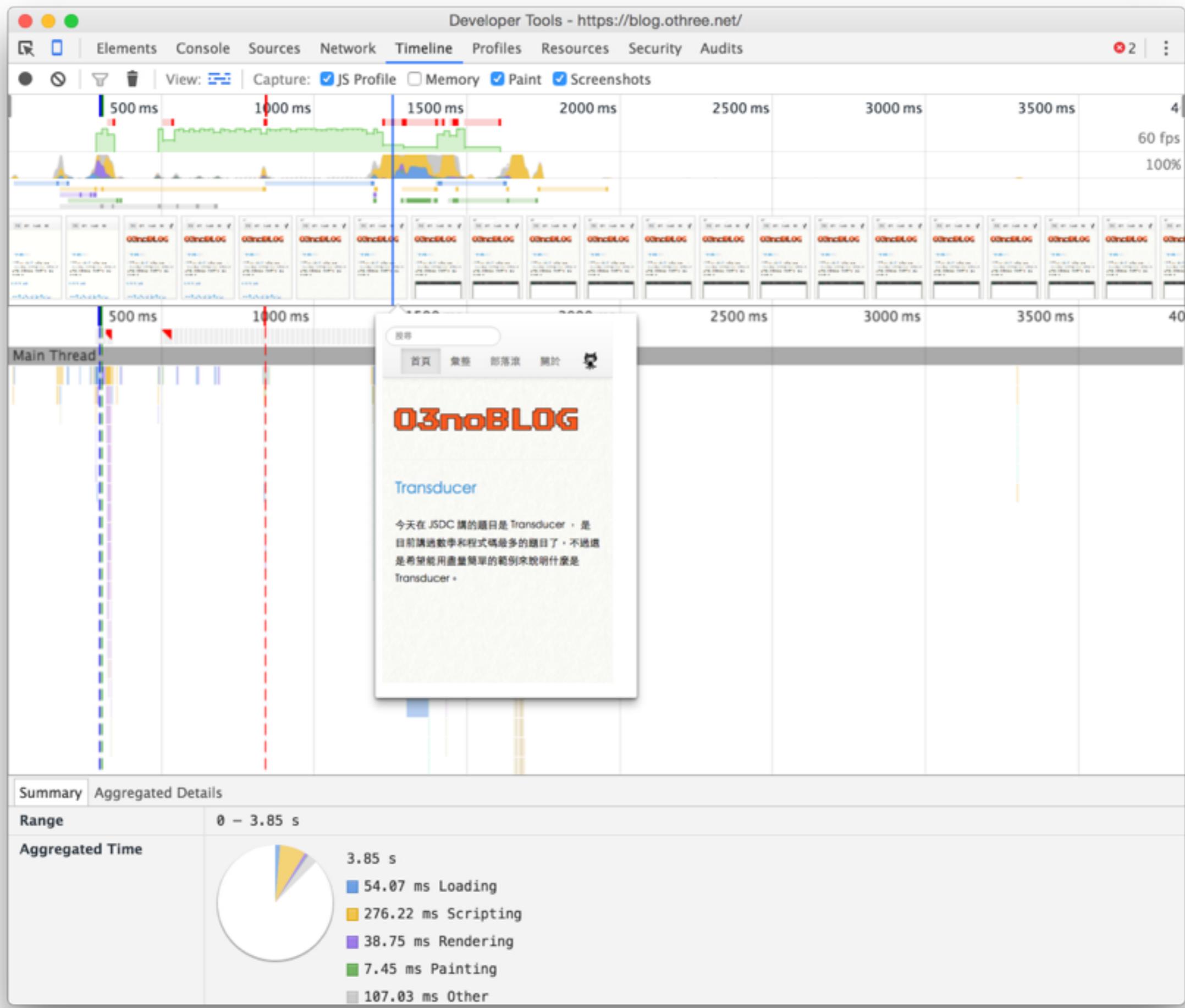
First View (8.401s)

Screen Shot





Chrome Network Panel



JS Profiling

- Recording the JS execution
- For debugging

Demo

Make the Web Faster | Go X

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

Google Developers Make the Web Faster 搜尋 othree360@gmail.... 登出

產品 > Make the Web Faster

Make the Web Faster

Tools and information to help you build high performance web sites.

Analyze and optimize your website with PageSpeed tools

PageSpeed Insights

http://www.google.com/

Mobile Desktop

99 / 100 Speed

Consider-Flying

Mixed JavaScript

Show how to fix

Passed Rules

Show details

Download optimized image, JavaScript, and CSS resources for this page

100 / 100 User Experience

Congratulations! No issues found.

Install plugins

Your page does not appear to use plugins, which could prevent content from being usable on many platforms. Learn more about the importance of installing plugins.

Configure the viewport

Your page specifies a viewport matching the device's size, which allows it to render properly on all devices. Learn more about configuring viewports.

mod_pagespeed/ GET 200 text... Other 16.5... 209...

index-e65947e698... GET 200

index-e51499f7d2... GET 200

octocat-spinner-32... GET 200

frameworks-447ce6... GET 200

index-96b16c6093... GET 200

2762072?v=3&s=40 GET 200

68747479733a2f2f7... GET 200

687474703a2f2f696... GET 200

687474703a2f2f696... GET 200

exticons-70c2cafa5... GET 200

show_partial/partial... GET 200

api.js GET 200

collect POST 200

counts GET 200

collect?v=18_v=v30... GET 200 254.8 24 ms

collect?v=18_v=v30... GET 200 254.8 0 ms

ZeroClipboard v2... GET 200 4.3 kB 1 ms

page.v1 GET 200 545.8 31 ms

stats POST 200 879.9 0 ms

Analyze with PageSpeed Insights

Get your PageSpeed score and use PageSpeed suggestions to make your web site faster through our online tool.

[RUN INSIGHTS](#) [READ DOCS](#)

Speed up with the PageSpeed Modules

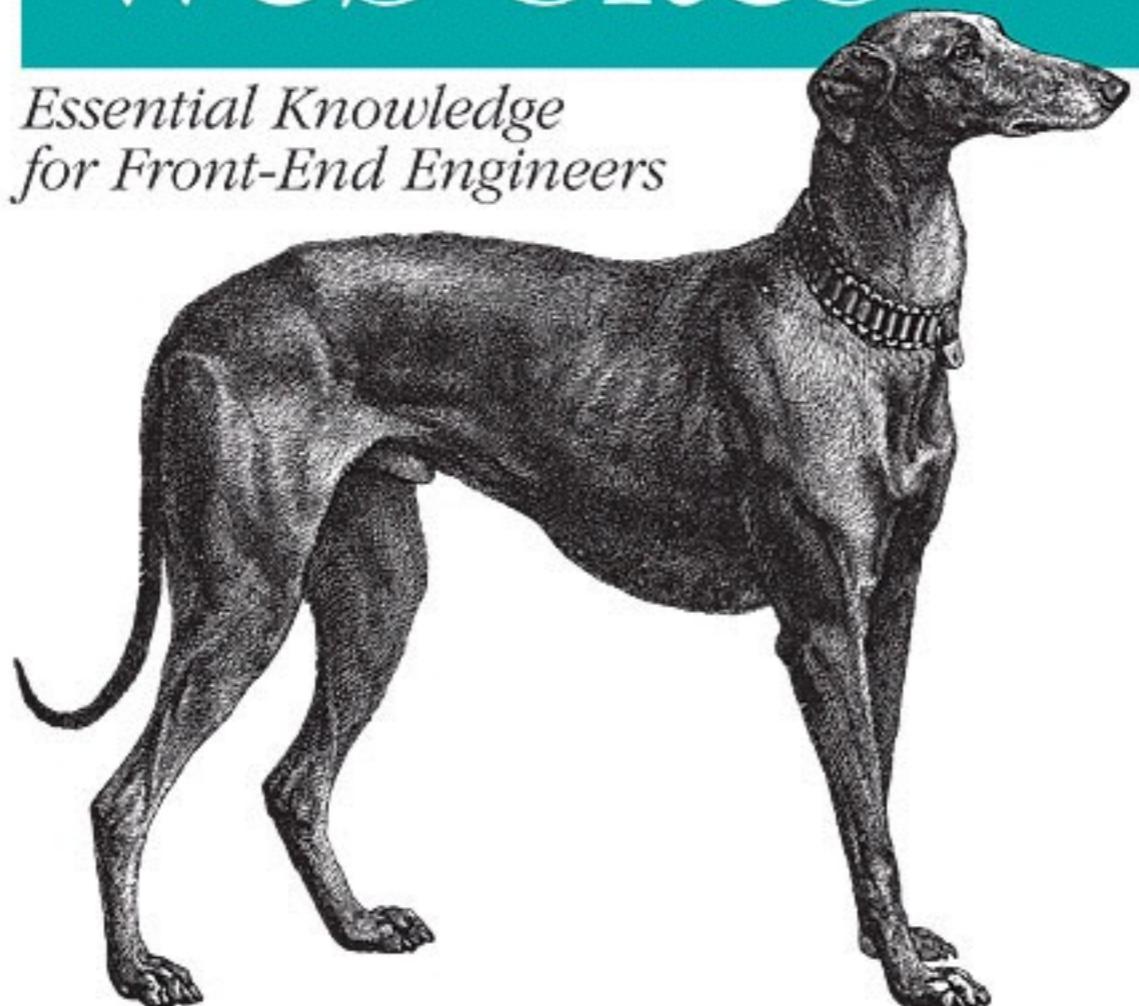
Run the open source PageSpeed Modules on your Apache or Nginx server to automatically rewrite and optimize resources on your web site.

[LEARN MORE ABOUT THE PAGESPEED MODULES](#)

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High Performance Web Sites

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for Front-End Engineers*



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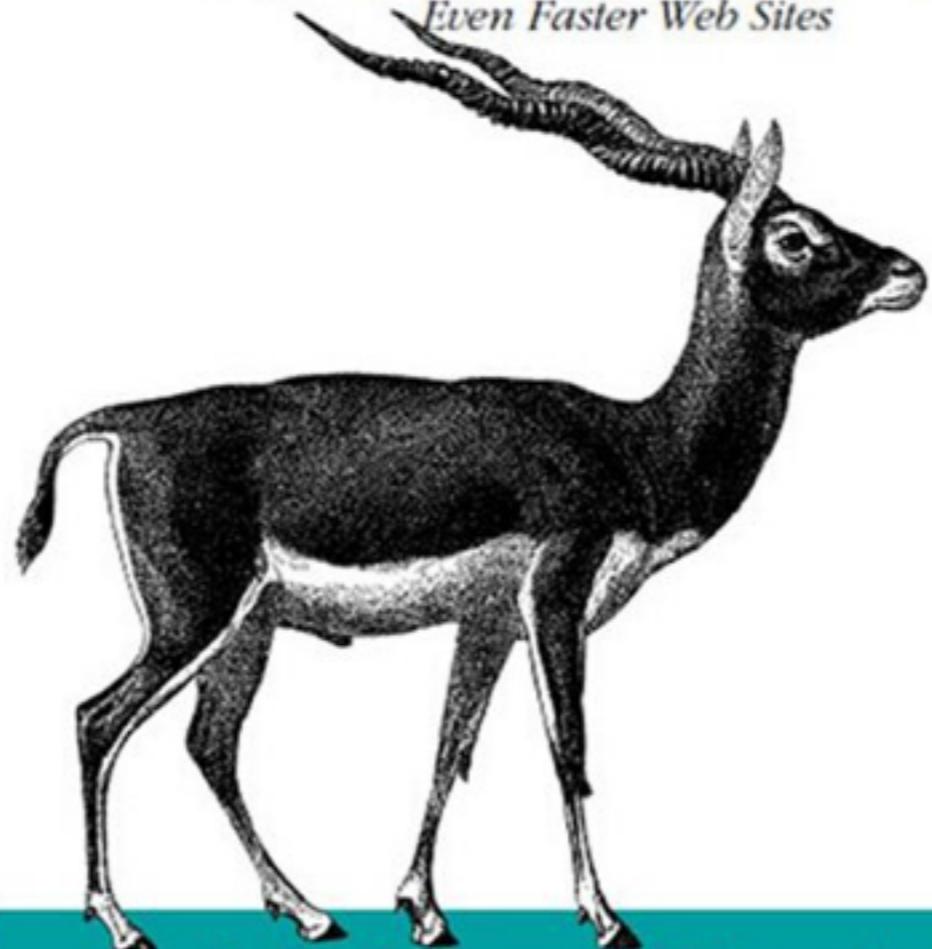
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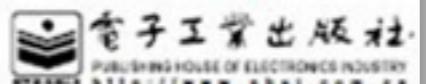
高性能网站建设 进阶指南

Web开发者性能优化最佳实践

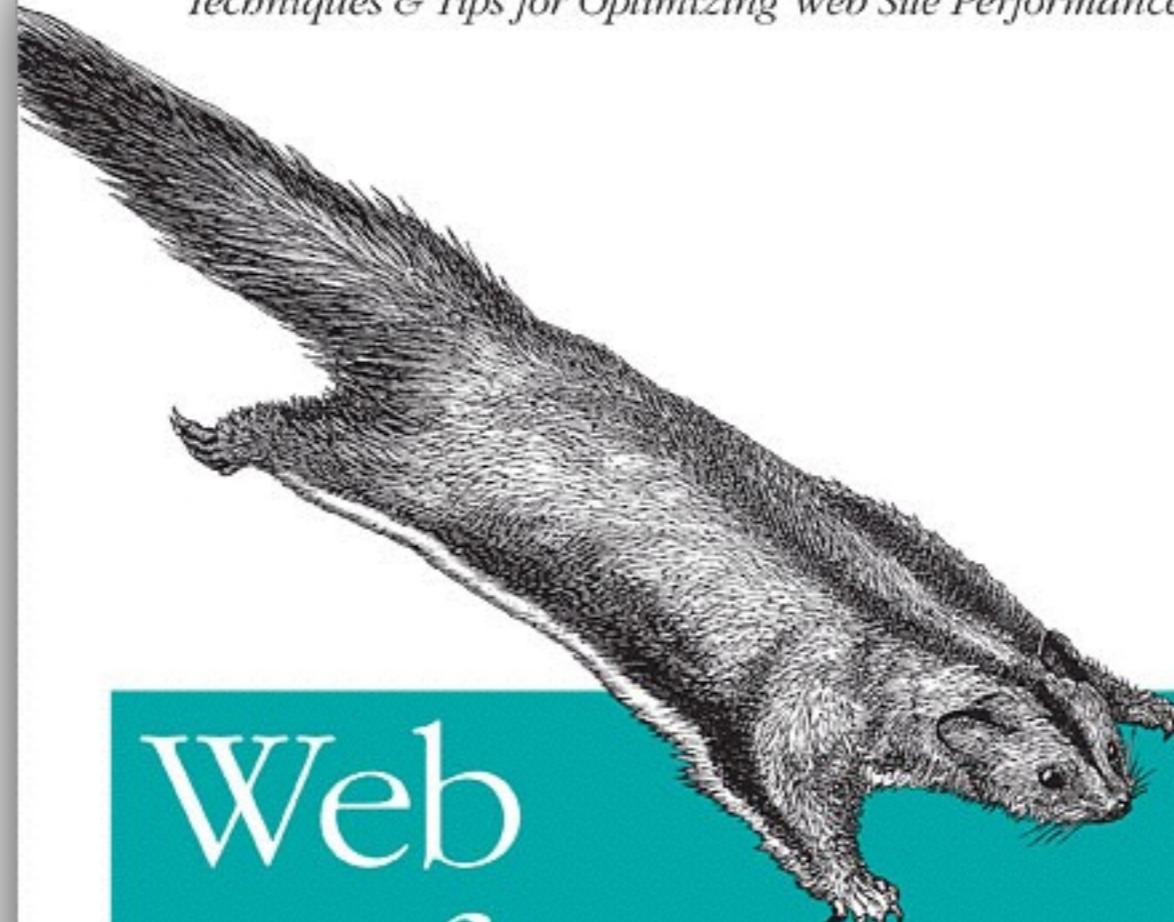
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Techniques & Tips for Optimizing Web Site Performance



Web Performance Daybook

Volume Two

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Web 效能優化日誌

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High Performance Browser Networking

Ilya Grigorik
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Table of Contents

- Foreword
- Preface
- About This Book
- Conventions Used in This Book
- Safari® Books Online
- How to Contact Us
- Content Updates

May 23, 2014

I. Networking 101

i18n

i18n

- Not just about translation
- Time, number, currency format
- Right to left

123 456	fr_FR
345 987,246	fr_FR
123.456	de_DE
345.987,246	de_DE
123,456	en_US
345,987.246	en_US

Intl

- ECMA-402

Can I use... Support tables ×

caniuse.com/#feat=internationalization

Internationalization API - OTHER

Global 67.82%

Locale-sensitive collation (string comparison), number formatting, and date and time formatting.

Current aligned Usage relative Show all

IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser	Chrome for Android
8			31					4.1	
9		38	43					4.3	
10		39	44					4.4	
11		40	45	8			8.4	4.4.4	
12		41	46	9	32	9	8	44	45
	13	42	47		33				
		43	48		34				
		44	49						

Notes Known issues (0) Resources (6) Feedback

No notes

█ = Supported █ = Not supported █ = Partial support █ = Support unknown

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```
var date = new Date(Date.UTC(2012, 11, 20, 3, 0, 0));  
(new Intl.DateTimeFormat()).format(date)
```

andyearnshaw/Intl.js · GitHub

GitHub, Inc. [US] https://github.com/andyearnshaw/Intl.js

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andyearnshaw / Intl.js Watch 27 Star 519 Fork 55

Compatibility implementation of the ECMAScript Internationalization API (ECMA-402) for JavaScript

332 commits 2 branches 11 releases 15 contributors

Branch: master / +

caridy Merge pull request #138 from Luckz/patch-1 ... Latest commit 1680ec 14 days ago

dist	improving linting configuration	3 months ago
locale-data	generating new locale data after the fix for traversing up to root.	3 months ago
src	improving linting configuration	3 months ago
tasks	* fixing the resolution of the ancestor by traversing until we find d...	3 months ago
tests	updating tests262	3 months ago
.gitignore	Include CLDR data via NPM instead of Grunt/CURL	4 months ago
.npmignore	using all CLDR data for datetime formats instead of the subset define...	6 months ago
.travis.yml	Travis CI improvements	4 months ago
CONTRIBUTING.md	Release Candidate 1.0.0-rc1	7 months ago
Gruntfile.js	improving linting configuration	3 months ago
LICENSE.txt	added more licensing info	2 years ago
README.md	Update README.md	14 days ago
bower.json	updating bower for 1.0.0	3 months ago

Code Issues 21 Pull requests 2 Wiki Pulse Graphs

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momentjs.com

MOMENT TIMEZONE

Home Docs Tests Fork on GitHub



Moment.js 2.10.6

Parse, validate, manipulate, and display dates in JavaScript.

Download

moment.js

moment.min.js 12.4k gz

moment+locales.js

moment+locales.min.js 45.4k gz

Install

```
bower install moment --save # bower  
npm install moment --save # npm  
Install-Package Moment.js # NuGet  
spm install moment --save # spm  
meteor add momentjs:moment # meteor
```

Numeral.js

numeraljs.com

Numeral.js

A javascript library for formatting and manipulating numbers.

1.5.3

[Github](#) [.ZIP](#) [.TGZ](#)

Language English

Use it

In the Browser

```
<script src="numeral.min.js"></script>
```

or include from cdnjs.com

```
<script src="//cdnjs.cloudflare.com/ajax/libs/numeral.js/1.4.5/numer  
al.min.js"></script>
```

In Node.js

```
npm install numeral
```

```
var numeral = require('numeral');
```

Format

Numbers can be formatted to look like currency, percentages, times, or even plain old numbers with decimal places, thousands, and abbreviations.

```
var string = numeral(1000).format('0,0');  
// '1,000'
```

Numbers

Number	Format	String
10000	'0,0.0000'	10,000.0000
10000.23	'0,0'	10,000

This is a project by [adamwdraper](#)

正在解析主機...

RTL

- Arabic
- or Chinese, Japanese (EBook)

RTL

- Add dir attribute
- Add rtl style

```
<html lang="ar" dir="rtl">
```

RTL style

- direction
- text-align/float
- margin/border/padding
- left/right
- transform

RTL style

- Attribute selector
- Only overwrite left/right related style
 - Reuse, cache
 - Complete style but flipped
 - Total size is smaller

RTL mark

- Mix LTR and RTL content
- Some character need we define their direction
 - Punctuations