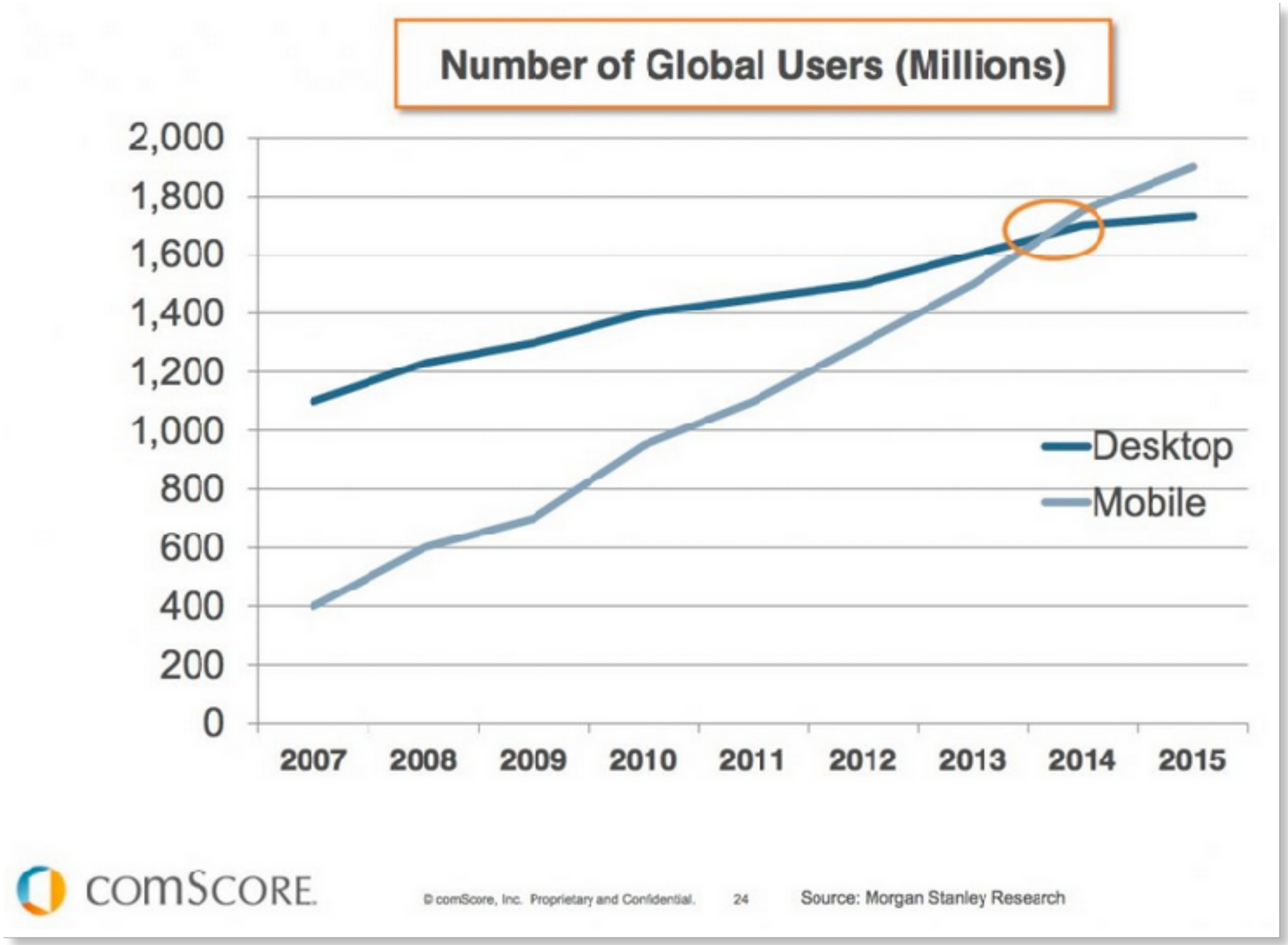
Mobile App Development with Ionic

CS498RK, Fall 2016

Mobile App Development Landscape

Using Ionic to build Hybrid Apps

Internet Usage



Number of Global Users (Millions)

© comScore, Inc. Proprietary and Confidential. 24

Source: Morgan Stanley Research

Mobile Development Landscape

Responsive Webpages

Native Apps

Mobile Development Landscape

Responsive Webpages

Native Apps

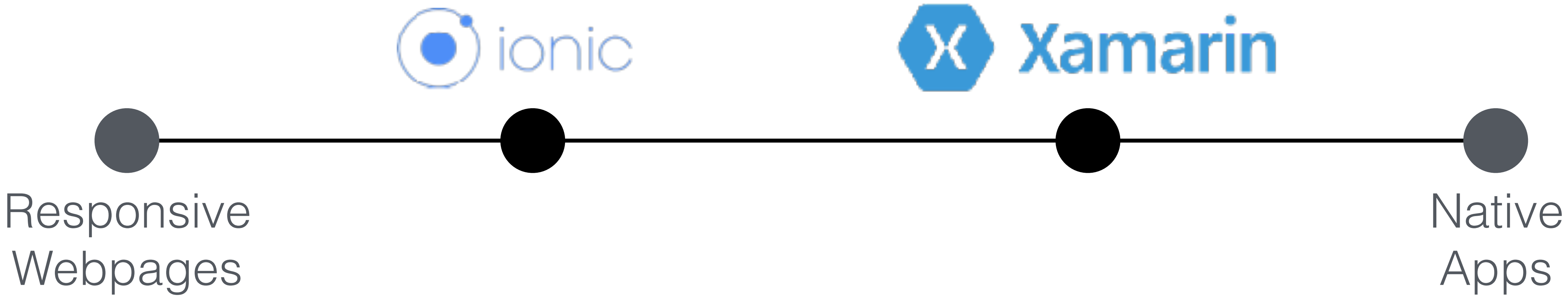
Limited access to device APIs

Misses out on benefits of distribution through app stores

Performance Penalty

Complexity of developing for multiple platforms

Alternatives



Responsive Webpages

Native Apps

Xamarin

C# based framework for building fully native, cross platform apps

Generates multi-platform native code

Ionic

Series of performance-focused, beautifully designed HTML, CSS and JavaScript components optimized for building mobile applications

Resulting apps are hybrid: neither purely web-based nor truly native

- Layout rendering is done via Web views
- Access to native device APIs
- Distribution similar to native apps possible

Technologies Used

Examples of Ionic Apps

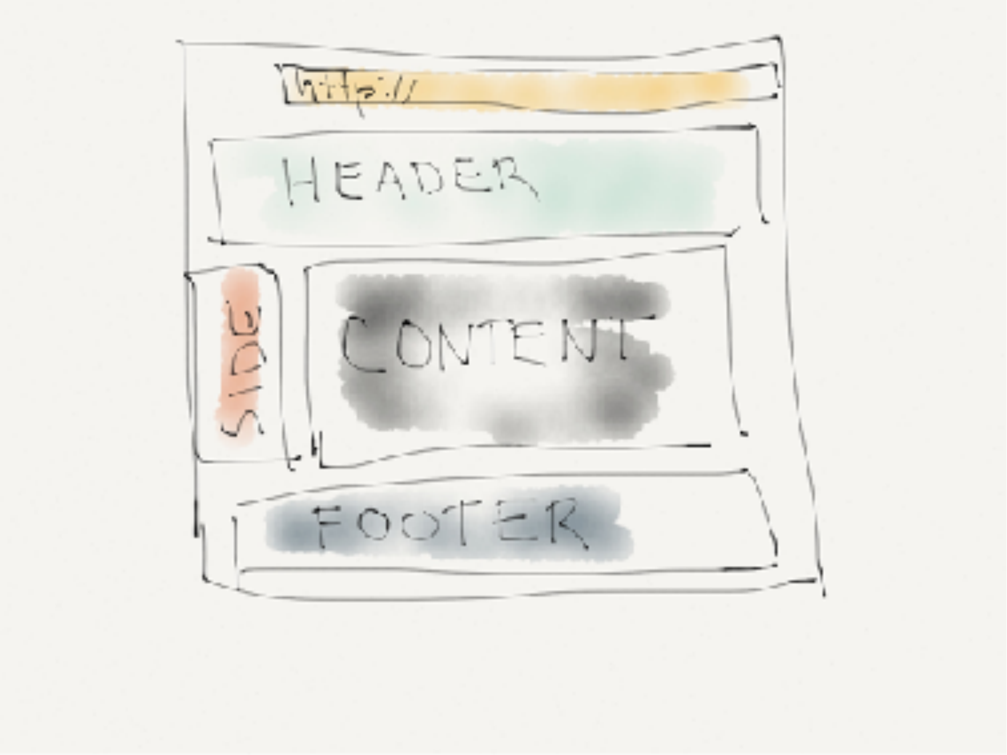
Routing in Ionic

Does not use `ngRoute`

Uses `ui-router` which is better suited for complex apps

https://github.com/angular-ui/ui-router/wiki#state-manager

ui-router



Nested Views

Multiple Views

http://www.funnyant.com/angularjs-ui-router/

Router as State Machine

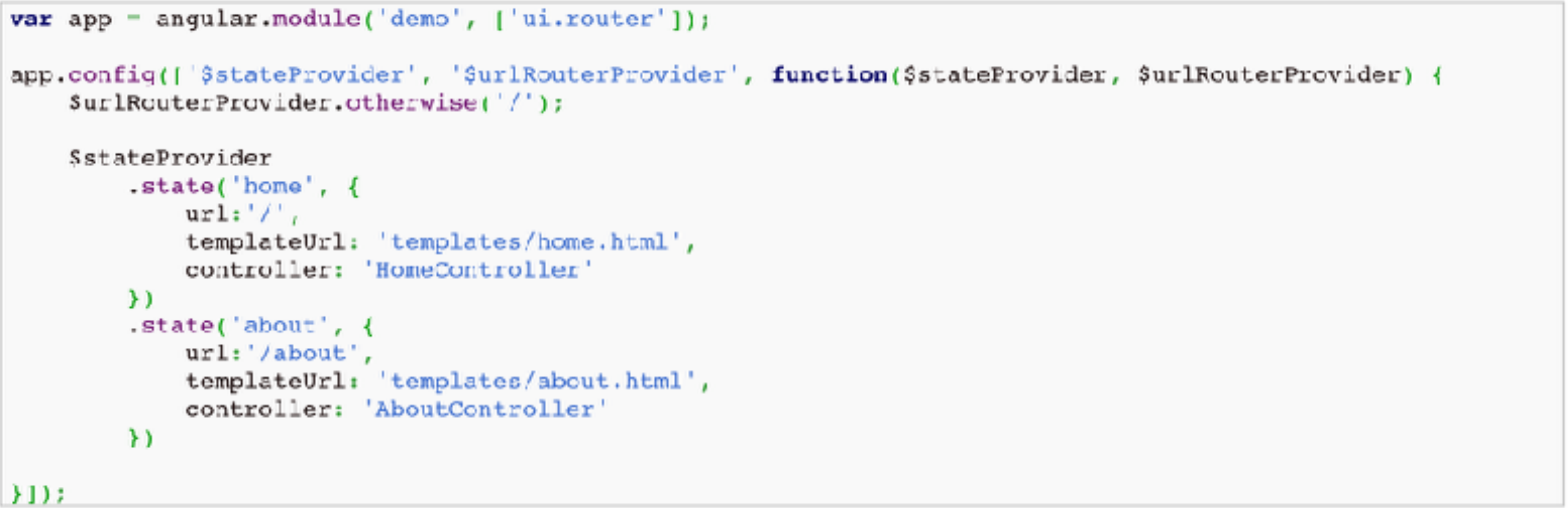
State Machine design abstraction on top of traditional router

Routes are referred to as states and URLs are properties of states

ui-sref directive instead of links in your HTML

http://www.funnyant.com/angularjs-ui-router/

Router as State Machine

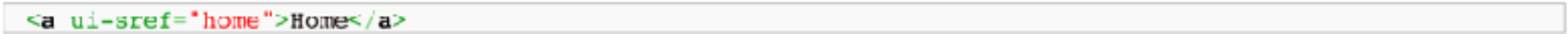


```
var app = angular.module('demo', ['ui.router']);

app.config(['$stateProvider', '$urlRouterProvider', function($stateProvider, $urlRouterProvider) {
    $urlRouterProvider.otherwise('/');

    $stateProvider
        .state('home', {
            url:'/',
            templateUrl: 'templates/home.html',
            controller: 'HomeController'
        })
        .state('about', {
            url:'/about',
            templateUrl: 'templates/about.html',
            controller: 'AboutController'
        })

}]);
```



```
<a ui-sref="home">Home</a>
```

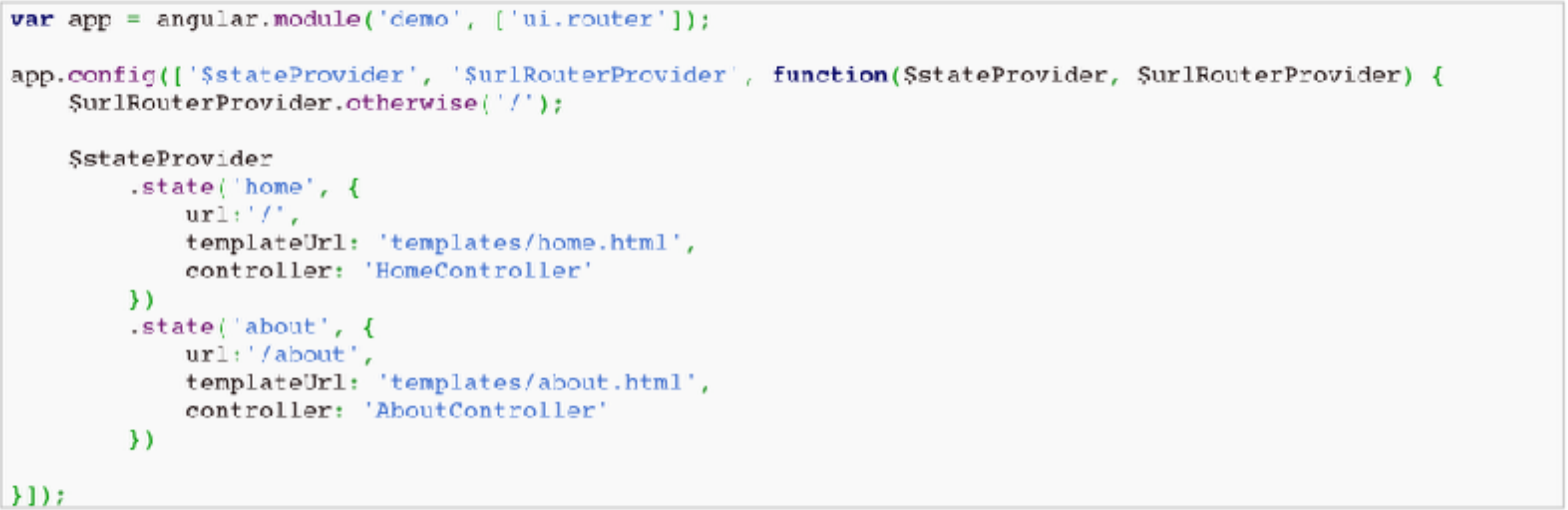
State Machine design abstraction on top of traditional router

Routes are referred to as states and URLs are properties of states

ui-sref directive instead of links in your HTML

http://www.funnyant.com/angularjs-ui-router/

Router as State Machine



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        })
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            url:'/about',
            templateUrl: 'templates/about.html',
            controller: 'AboutController'
        })

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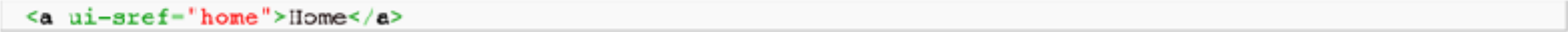
```



```
<a ui-sref="home">Home</a>
```

http://www.funnyant.com/angularjs-ui-router/

Persisting Data

Local Storage:

`angular-local-storage` TODO App Another Todo App

`ngStorage` Example

Consuming APIs

Mobile Backend As a Service Firebase

Next Class: Performance, Accessibility, Security

Web Components

•••

Reuse, reduce, recycle

What’s Web Components?

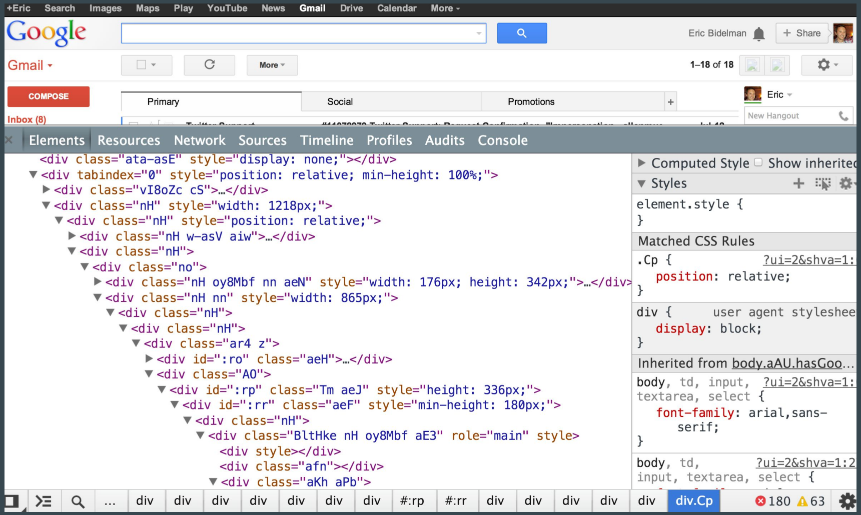
Component-based software engineering

Four features:

- Custom Elements
- Shadow DOM
- HTML Imports
- HTML Templates

Custom Elements

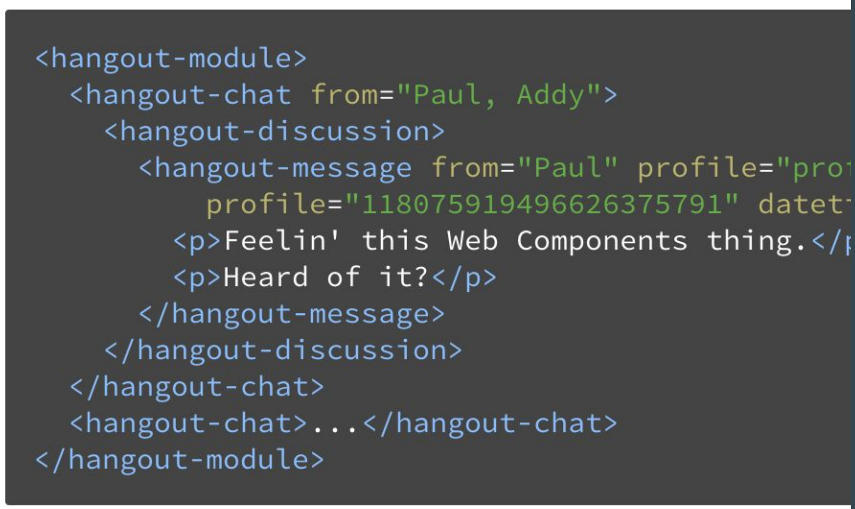
<div> soup


+Eric Search Images Maps Play YouTube News Gmail Drive Calendar More
Google
Eric Bidelman
+ Share
Gmail
More
1–18 of 18
COMPOSE
Inbox (8)
Primary
Social
Promotions
Eric
New Hangout
Elements Resources Network Sources Timeline Profiles Audits Console
... div div div div div div div #:rp #:rr div div div div div div.Cp
180 63

```
    <div class="ata-asE" style="display: none;"></div>
  ▼<div tabindex="0" style="position: relative; min-height: 100%;">
    ▶<div class="vI8oZc cS">…</div>
    ▼<div class="nH" style="width: 1218px;">
      ▼<div class="nH" style="position: relative;">
        ▶<div class="nH w-asV aiw">…</div>
        ▼<div class="nH">
          ▼<div class="no">
            ▶<div class="nH oy8Mbf nn aeN" style="width: 176px; height: 342px;">…</div>
            ▼<div class="nH nn" style="width: 865px;">
              ▼<div class="nH">
                ▼<div class="nH">
                  ▼<div class="ar4 z">
                    ▶<div id=":ro" class="aeH">…</div>
                    ▼<div class="AO">
                      ▼<div id=":rp" class="Tm aeJ" style="height: 336px;">
                        ▼<div id=":rr" class="aeF" style="min-height: 180px;">
                          ▼<div class="nH">
                            ▼<div class="BltHke nH oy8Mbf aE3" role="main" style>
                                <div style></div>
                                <div class="afn"></div>
                              ▼<div class="aKh aPb">
```

```
▶ Computed Style □ Show inherited
▼ Styles
element.style {
}
Matched CSS Rules
.Cp {                ?ui=2&shva=1:
   position: relative;
}
div {       user agent styleshee
   display: block;
}
Inherited from body.aAU.hasGoo…
body, td, input,  ?ui=2&shva=1:
textarea, select {
   font-family: arial,sans-
      serif;
}
body, td,            ?ui=2&shva=1:2
input, textarea, select {
```

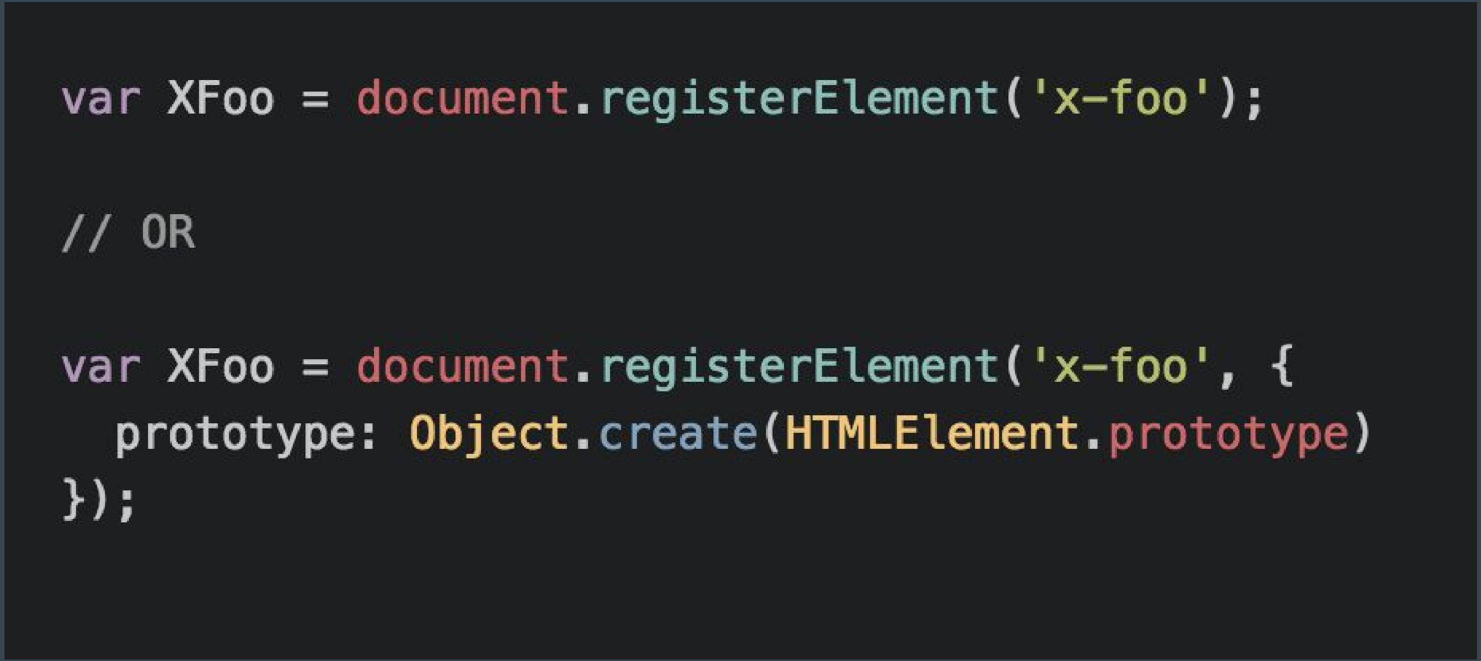
Art



```
<hangout-module>
  <hangout-chat from="Paul, Addy">
    <hangout-discussion>
      <hangout-message from="Paul" profile="prof
          profile="118075919496626375791" datet
        <p>Feelin' this Web Components thing.</p
        <p>Heard of it?</p>
      </hangout-message>
    </hangout-discussion>
  </hangout-chat>
  <hangout-chat>...</hangout-chat>
</hangout-module>
```

Custom Elements

Basic Declaration



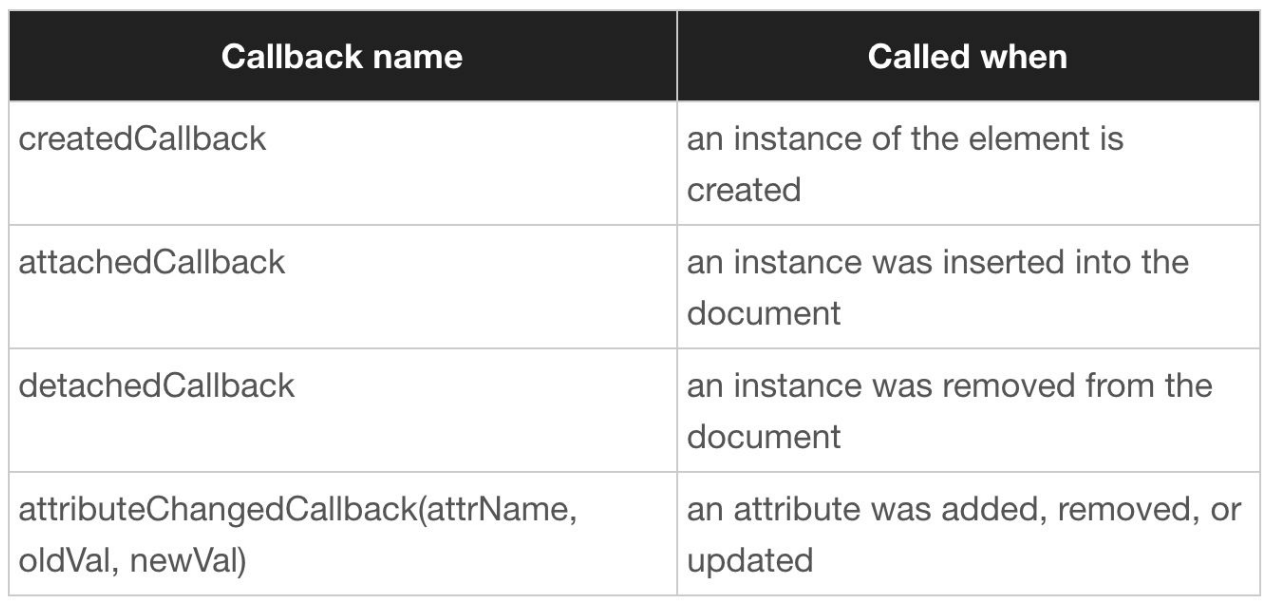
```
var XFoo = document.registerElement('x-foo');

// OR

var XFoo = document.registerElement('x-foo', {
  prototype: Object.create(HTMLElement.prototype)
});
```

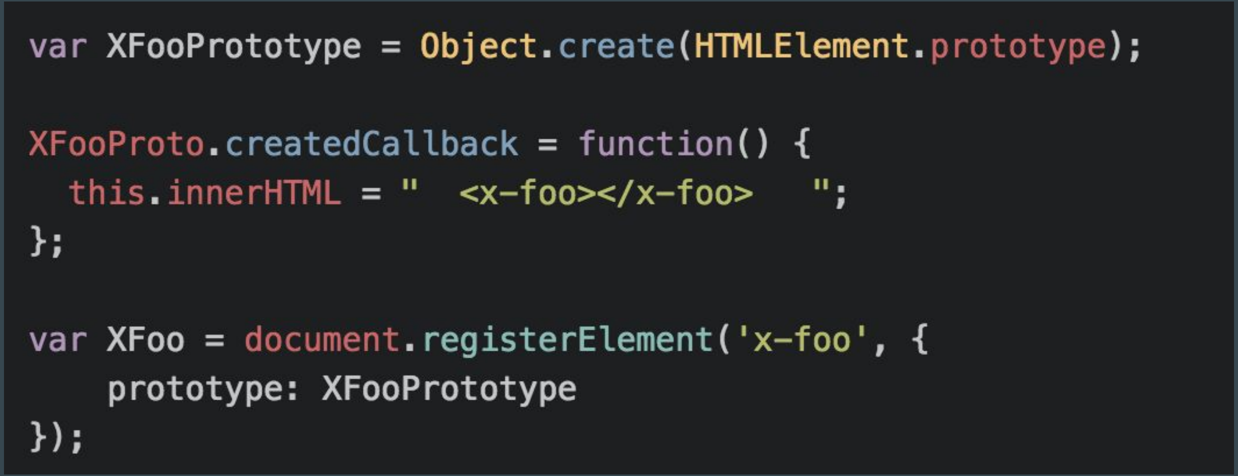
Custom Elements

Lifecycle methods



Callback name	Called when
createdCallback	an instance of the element is created
attachedCallback	an instance was inserted into the document
detachedCallback	an instance was removed from the document
attributeChangedCallback(attrName, oldVal, newVal)	an attribute was added, removed, or updated

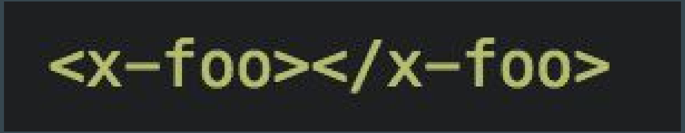
Custom Elements



```
var XFooPrototype = Object.create(HTMLElement.prototype);

XFooProto.createdCallback = function() {
  this.innerHTML = "  <x-foo></x-foo>   ";
};

var XFoo = document.registerElement('x-foo', {
    prototype: XFooPrototype
});
```



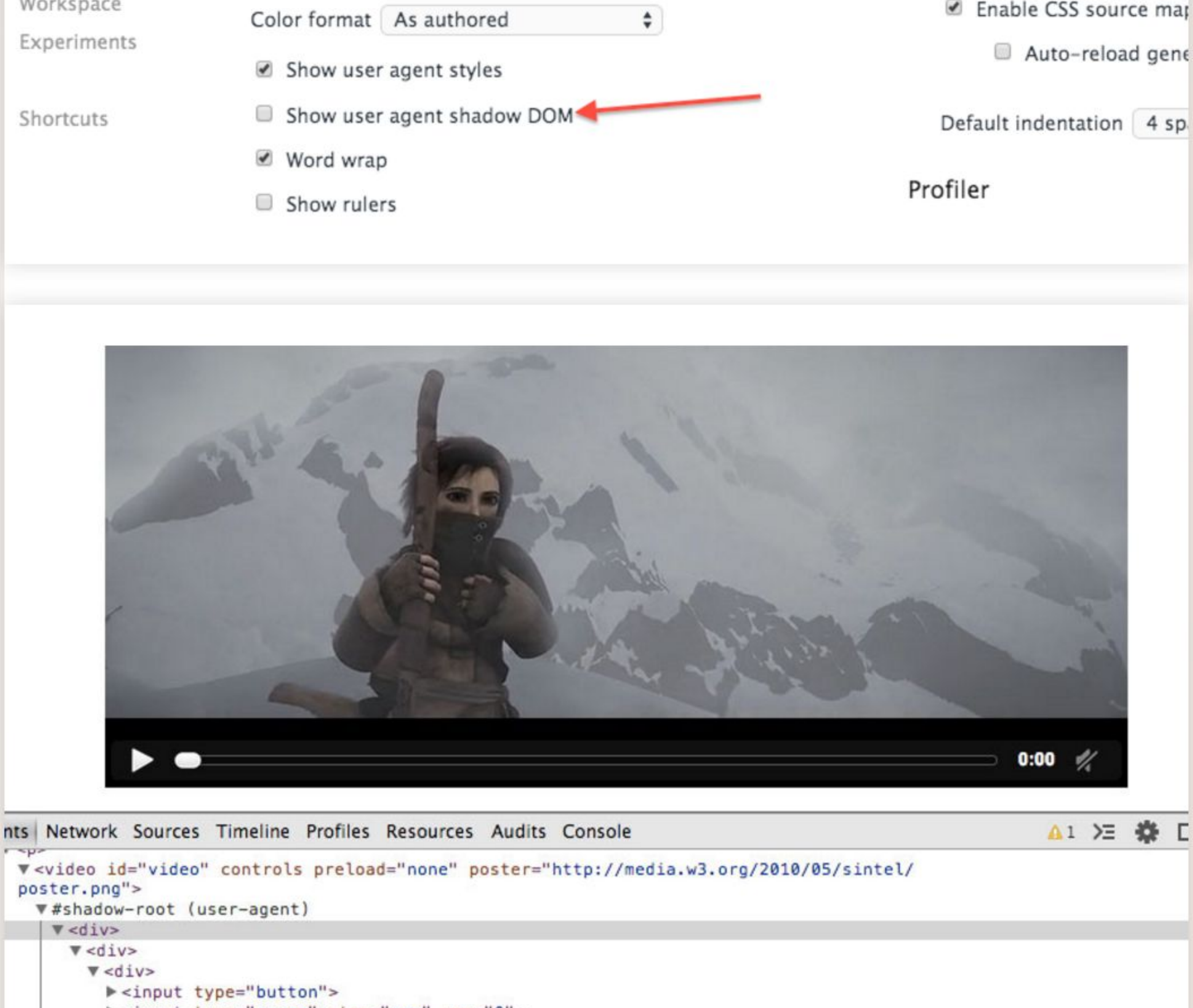
```
<x-foo></x-foo>
```

Shadow DOM

“Hidden in the shadows”

HTML, CSS, JS hidden away

For example, the <video> tag



Color format: As authored

☑ Show user agent styles

□ Show user agent shadow DOM

☑ Word wrap

□ Show rulers

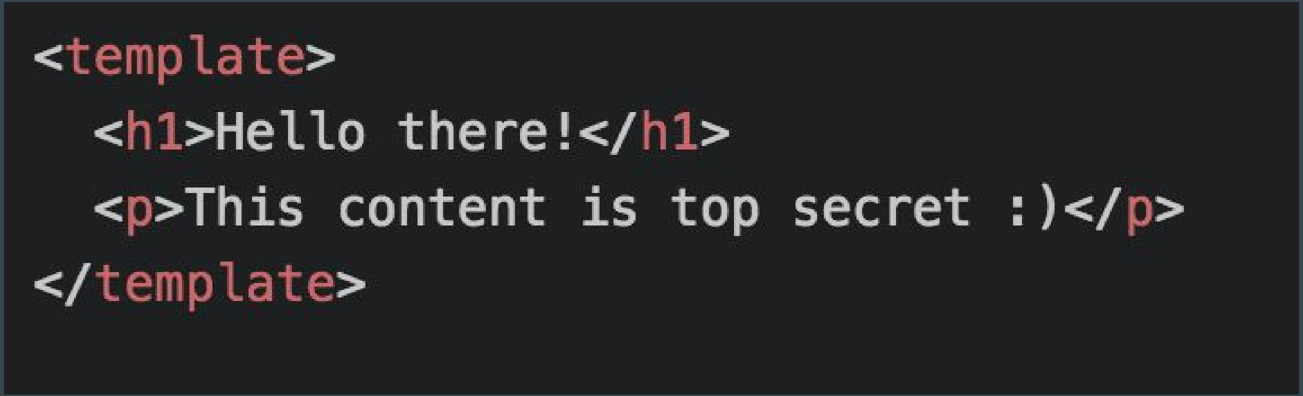
☑ Enable CSS source map

□ Auto-reload gene

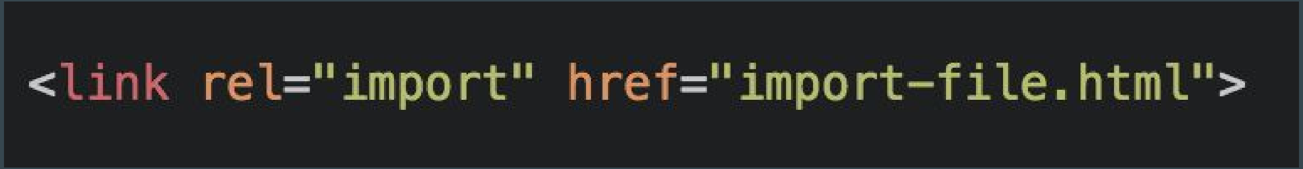
Default indentation: 4 sp

```
▼<video id="video" controls preload="none" poster="http://media.w3.org/2010/05/sintel/
poster.png">
  ▼#shadow-root (user-agent)
    ▼<div>
      ▼<div>
        ▼<div>
          ▶<input type="button">
```

HTML Templates & Imports



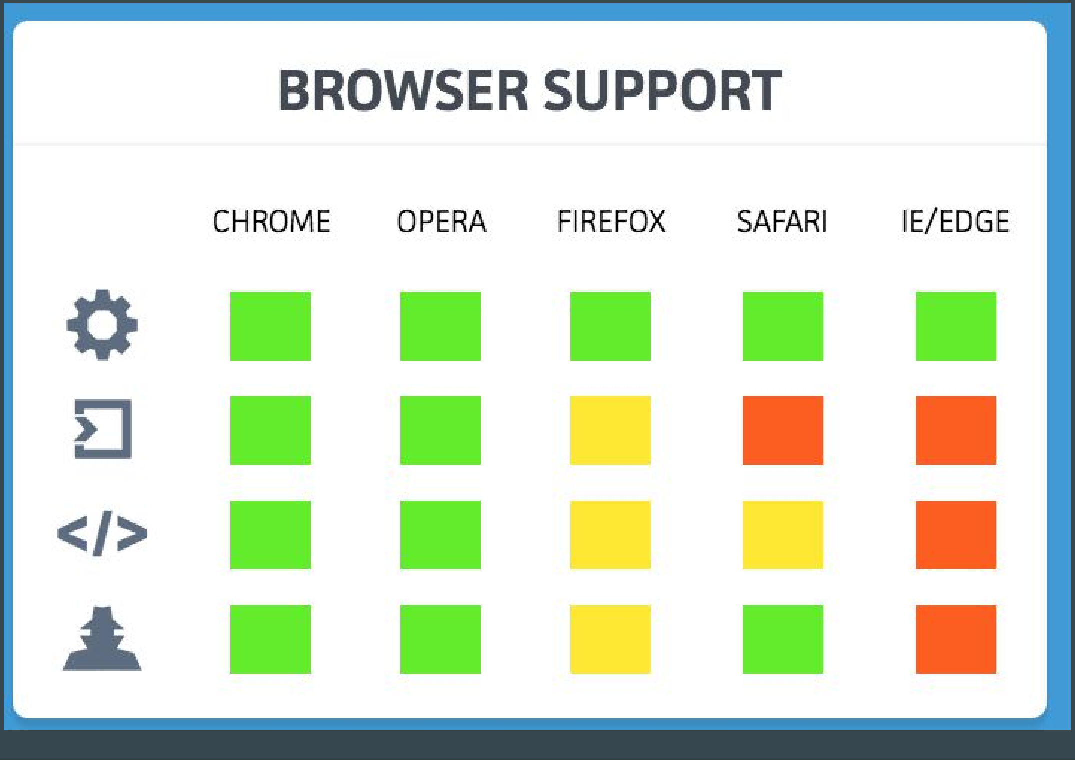
```html
<template>
  <h1>Hello there!</h1>
  <p>This content is top secret :)</p>
</template>
```



```html
<link rel="import" href="import-file.html">
```

Tying it all together

Browser Support

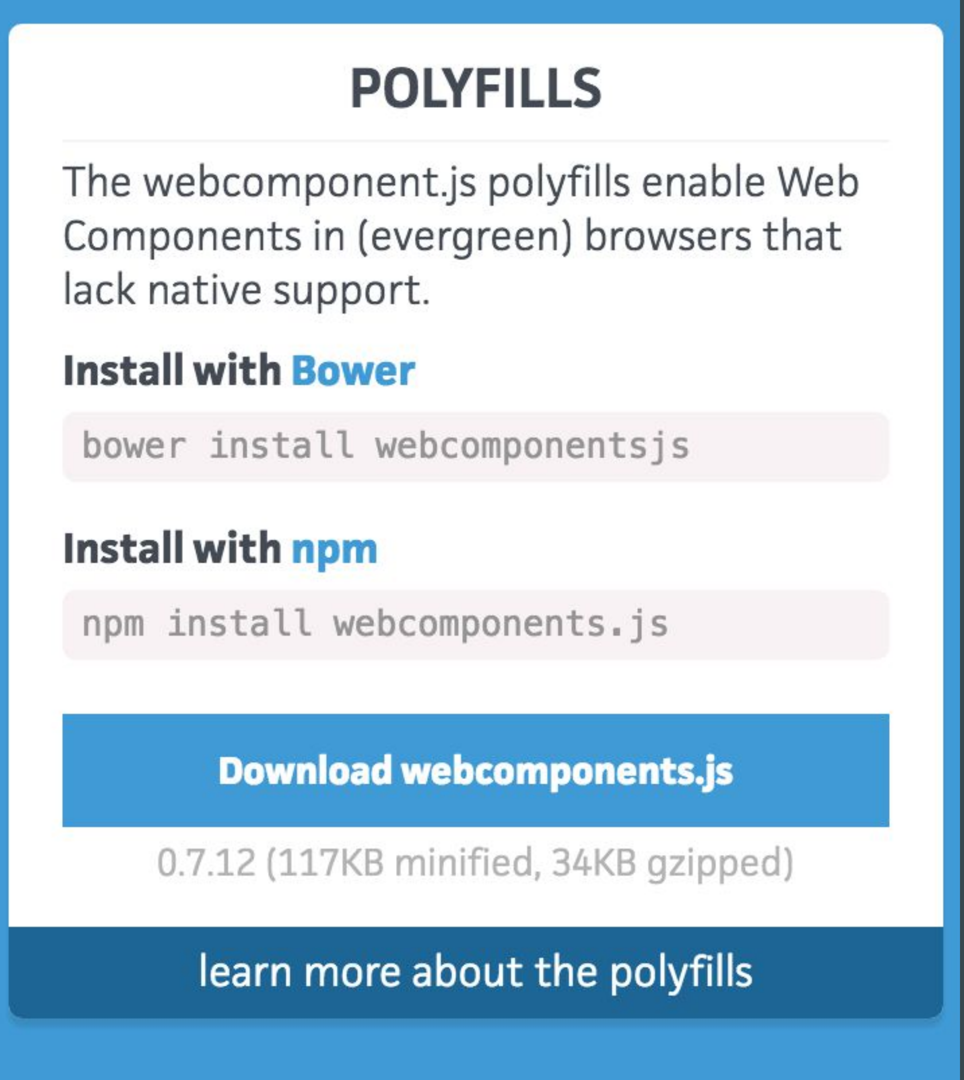


BROWSER SUPPORT

	CHROME	OPERA	FIREFOX	SAFARI	IE/EDGE
⚙	🟩	🟩	🟩	🟩	🟩
⌨	🟩	🟩	🟨	🟧	🟧
</>	🟩	🟩	🟨	🟨	🟧
🕵	🟩	🟩	🟨	🟩	🟧

Polyfills

http://webcomponents.org/



POLYFILLS

The webcomponent.js polyfills enable Web Components in (evergreen) browsers that lack native support.

Install with Bower

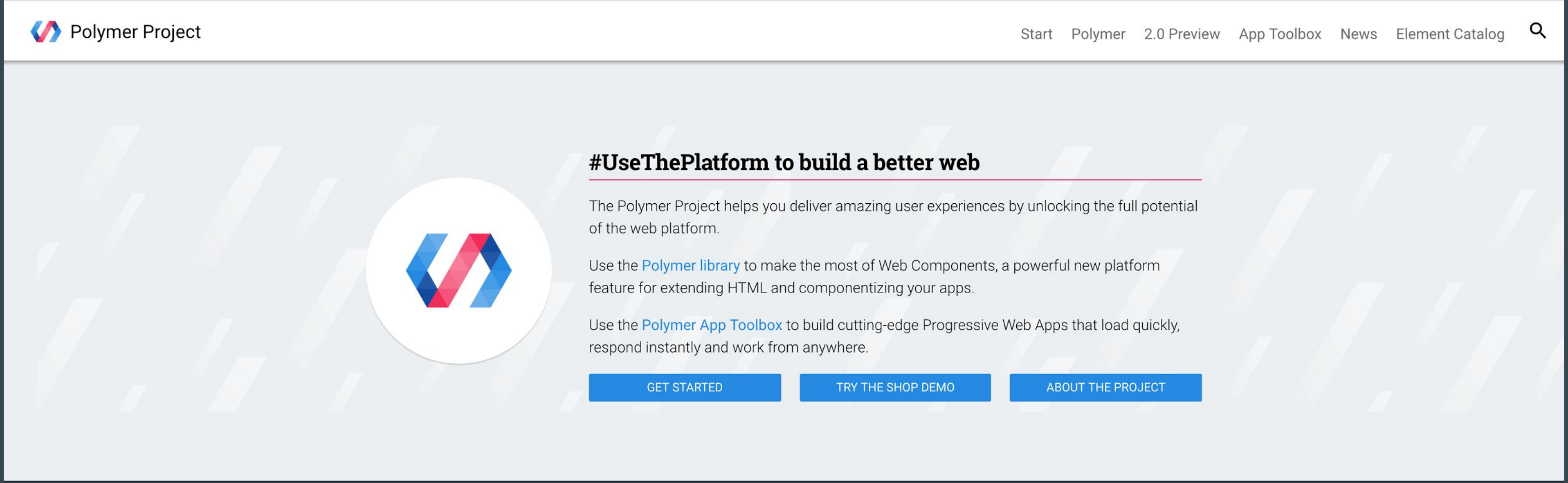
```
bower install webcomponentsjs
```

Install with npm

```
npm install webcomponents.js
```

0.7.12 (117KB minified, 34KB gzipped)

Google Polymer



#UseThePlatform to build a better web

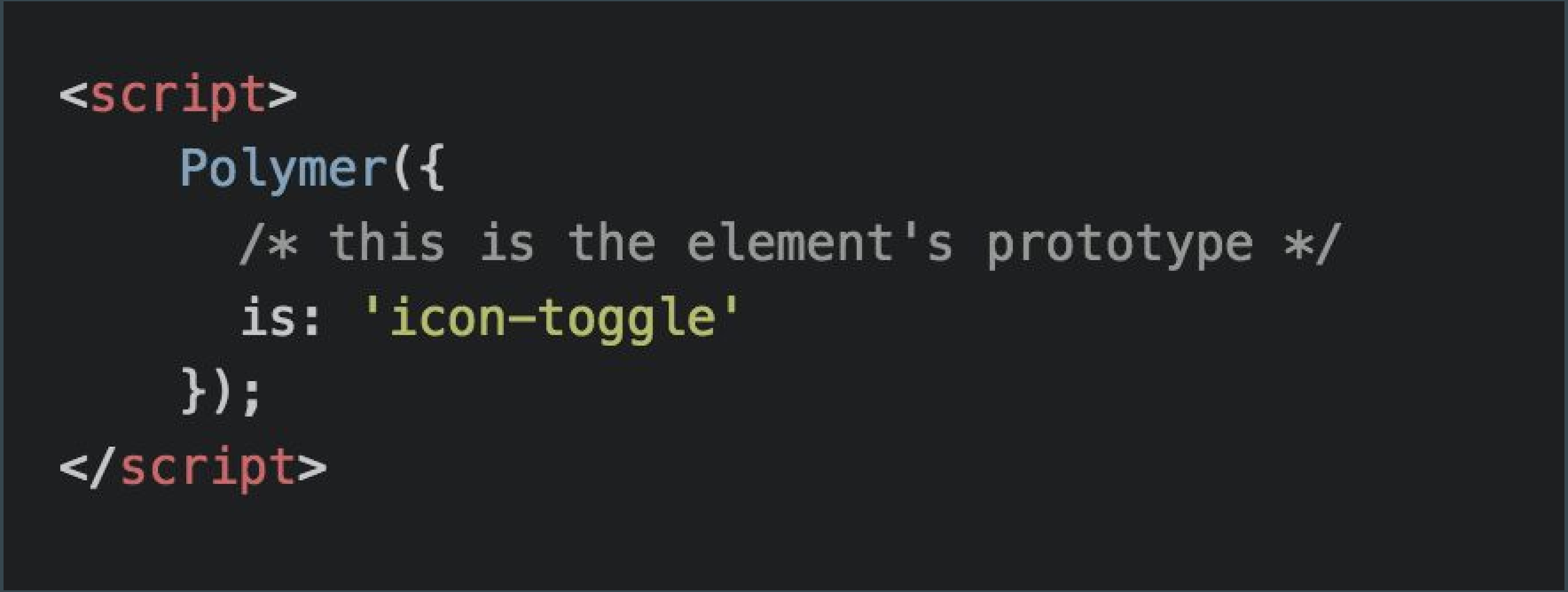
The Polymer Project helps you deliver amazing user experiences by unlocking the full potential of the web platform.

Use the Polymer library to make the most of Web Components, a powerful new platform feature for extending HTML and componentizing your apps.

Use the Polymer App Toolbox to build cutting-edge Progressive Web Apps that load quickly, respond instantly and work from anywhere.

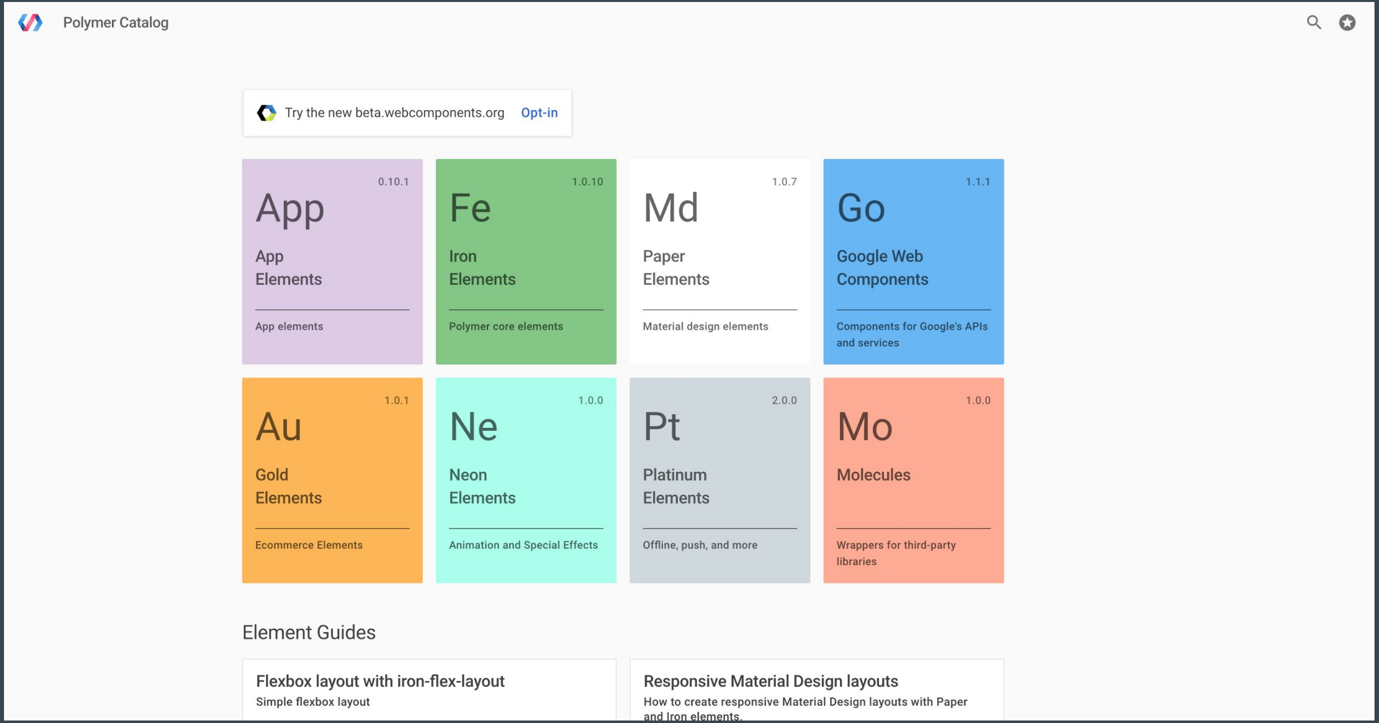
https://www.polymer-project.org/1.0/

Google Polymer



```
<script>
    Polymer({
      /* this is the element's prototype */
      is: 'icon-toggle'
    });
</script>
```

Open Source



Polymer Catalog

Try the new beta.webcomponents.org Opt-in

0.10.1 App App Elements App elements	1.0.10 Fe Iron Elements Polymer core elements	1.0.7 Md Paper Elements Material design elements	1.1.1 Go Google Web Components Components for Google's APIs and services
1.0.1 Au Gold Elements Ecommerce Elements	1.0.0 Ne Neon Elements Animation and Special Effects	2.0.0 Pt Platinum Elements Offline, push, and more	1.0.0 Mo Molecules Wrappers for third-party libraries

Element Guides

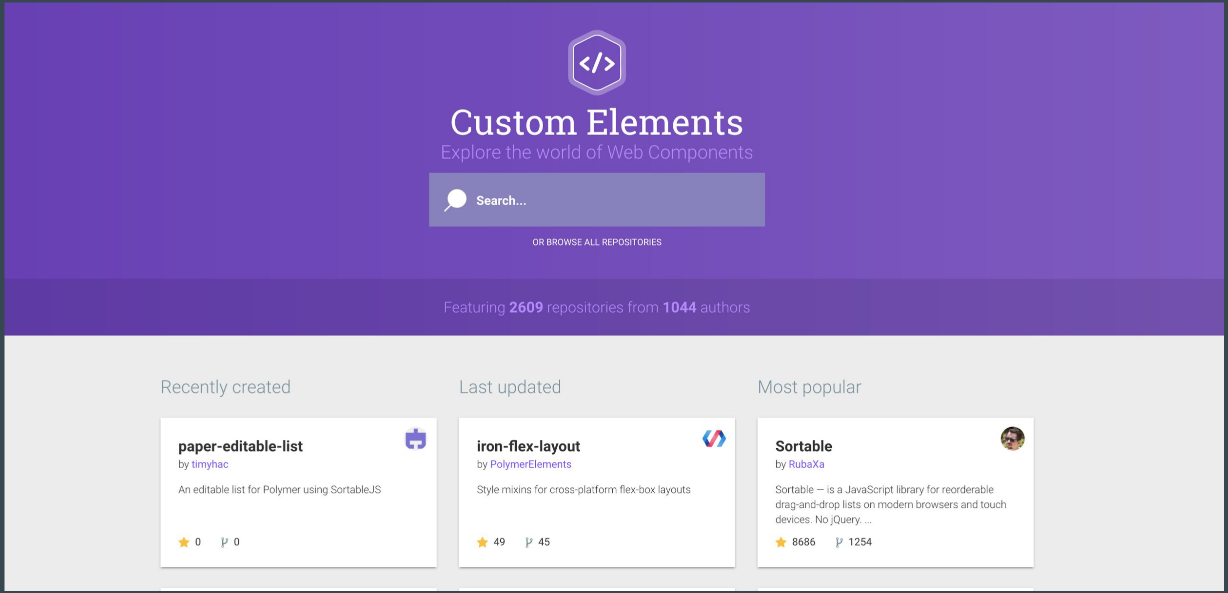
Flexbox layout with iron-flex-layout

Simple flexbox layout

Responsive Material Design layouts

How to create responsive Material Design layouts with Paper and Iron elements.

Open Source



Custom Elements

Explore the world of Web Components

Search...

OR BROWSE ALL REPOSITORIES

Featuring **2609** repositories from **1044** authors

Recently created

paper-editable-list
by timyhac
An editable list for Polymer using SortableJS
★ 0 ᚹ 0

Last updated

iron-flex-layout
by PolymerElements
Style mixins for cross-platform flex-box layouts
★ 49 ᚹ 45

Most popular

Sortable
by RubaXa
Sortable — is a JavaScript library for reorderable drag-and-drop lists on modern browsers and touch devices. No jQuery. ...
★ 8686 ᚹ 1254

https://customelements.io/

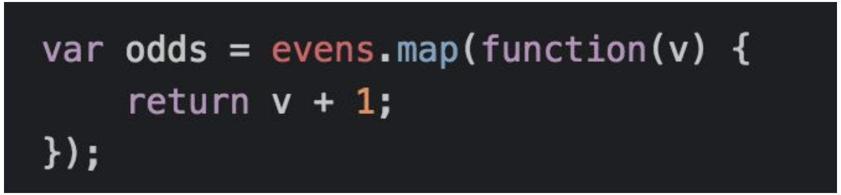
ECMAScript 2015 (ES6)

•••

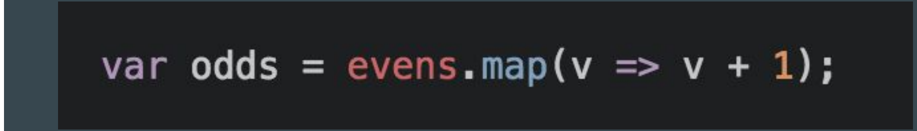
The future!

What is ES6?

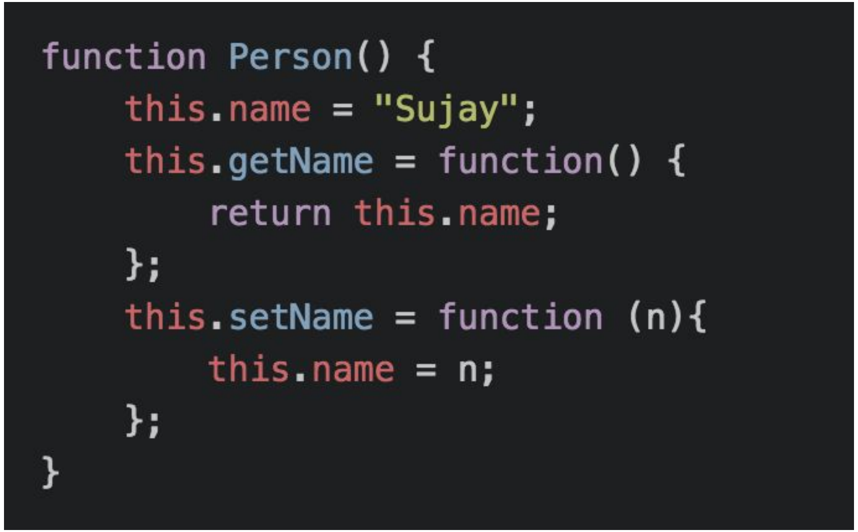
New Javascript features!



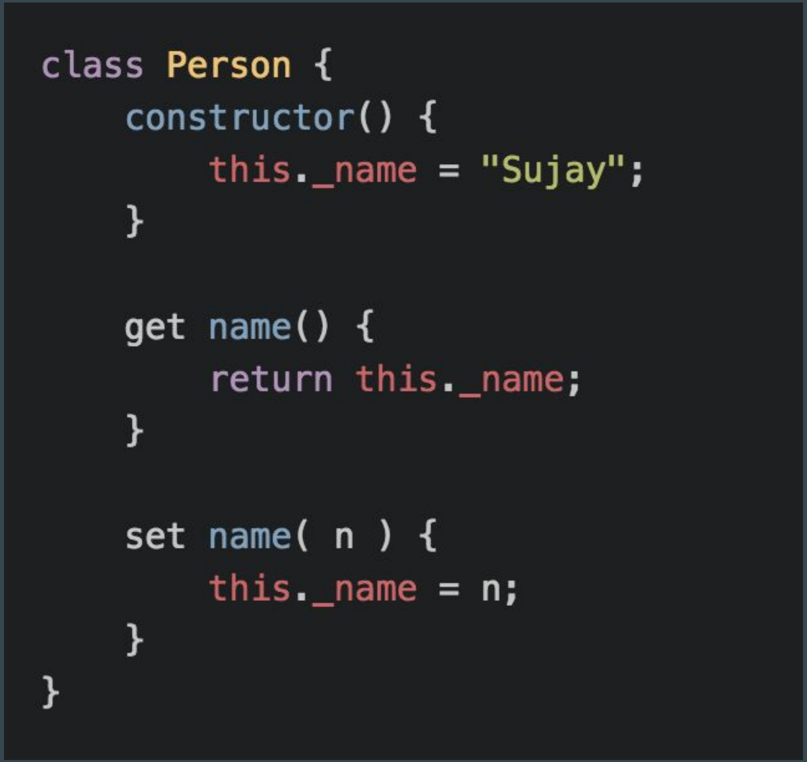
```
var odds = evens.map(function(v) {
    return v + 1;
});
```



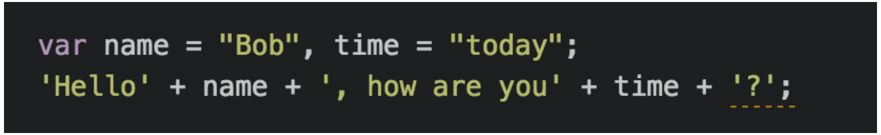
```
var odds = evens.map(v => v + 1);
```



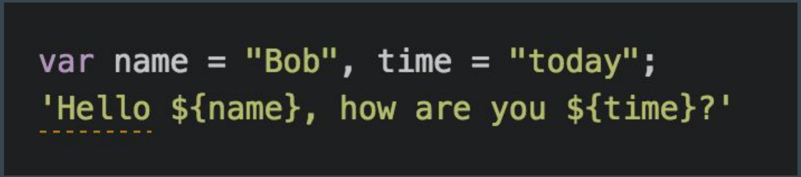
```
function Person() {
    this.name = "Sujay";
    this.getName = function() {
        return this.name;
    };
    this.setName = function (n){
        this.name = n;
    };
}
```



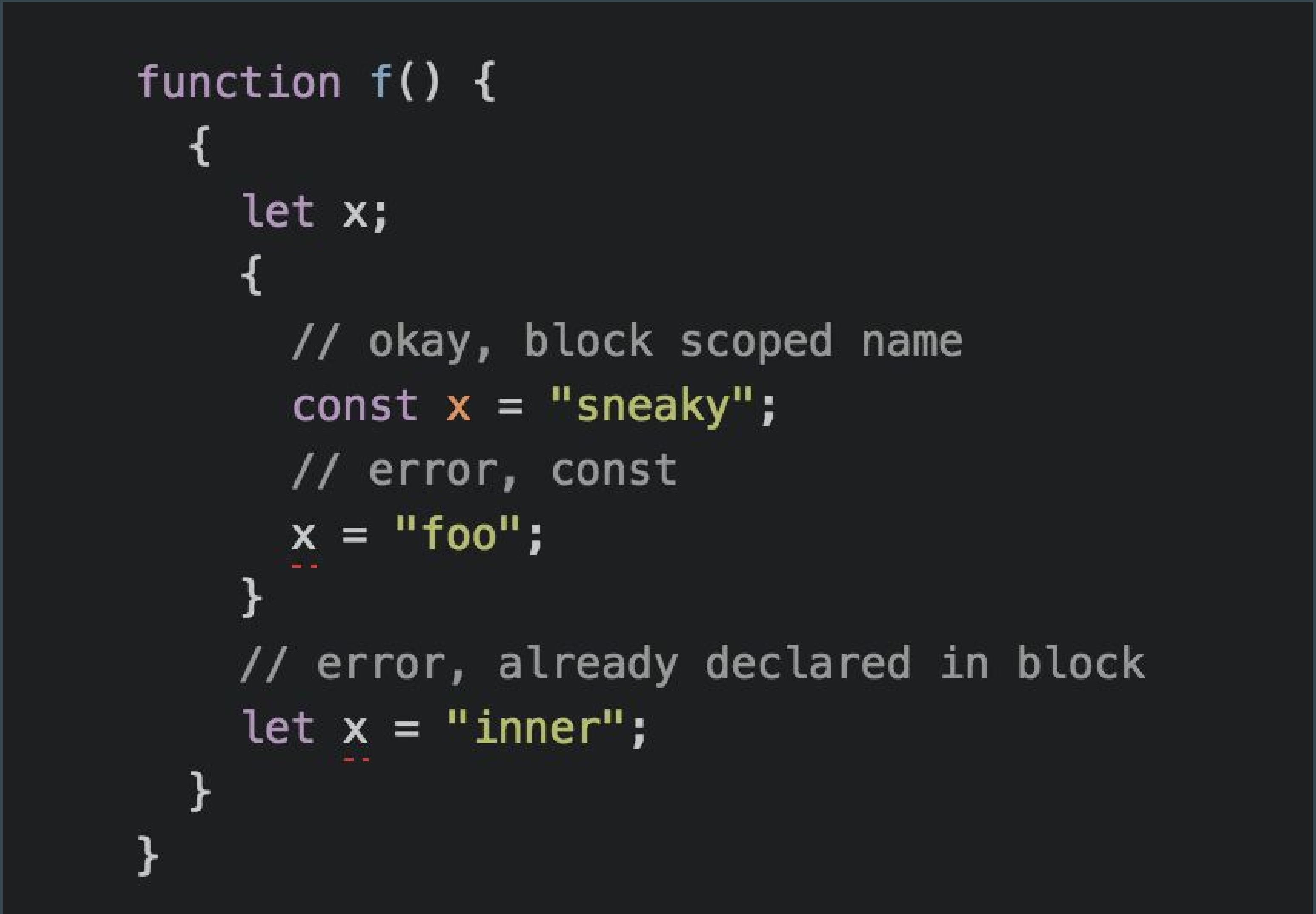
```
class Person {
    constructor() {
        this._name = "Sujay";
    }

    get name() {
        return this._name;
    }

    set name( n ) {
        this._name = n;
    }
}
```



```
var name = "Bob", time = "today";
'Hello' + name + ', how are you' + time + '?';
```



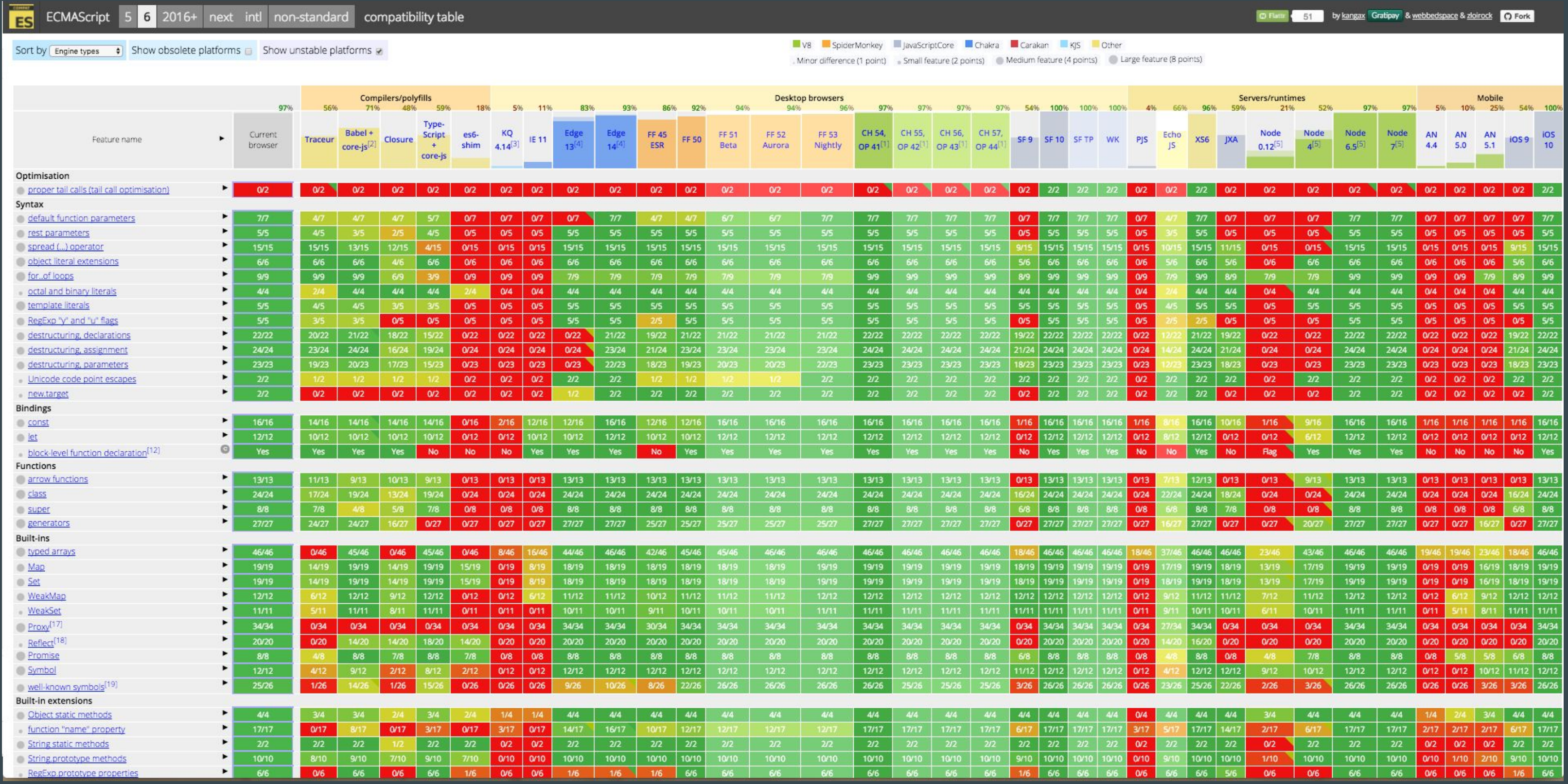
```
var name = "Bob", time = "today";
'Hello ${name}, how are you ${time}?'
```



```
function f() {
  {
    let x;
    {
      // okay, block scoped name
      const x = "sneaky";
      // error, const
      x = "foo";
    }
    // error, already declared in block
    let x = "inner";
  }
}
```

Problems?

Compatibility



ES ECMAScript 5 6 2016+ next intl non-standard compatibility table

by kangax Gratipay & webbedspace & zloirock

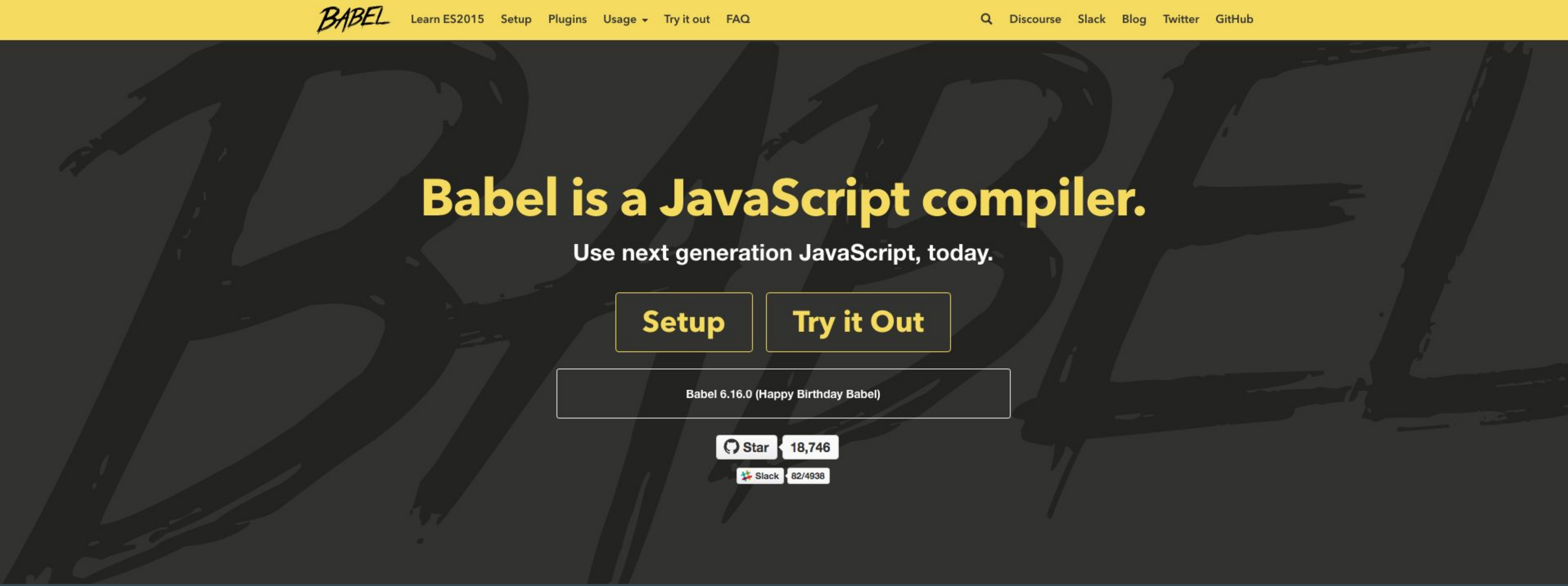
Sort by Engine types | Show obsolete platforms ☐ | Show unstable platforms ☑

🟩 V8 🟧 SpiderMonkey ▨ JavaScriptCore 🟦 Chakra 🟥 Carakan ▨ KJS 🟨 Other

Minor difference (1 point) · Small feature (2 points) ● Medium feature (4 points) ● Large feature (8 points)

		Compilers/polyfills					Desktop browsers																	Servers/runtimes								Mobile				
	97%	56%	71%	48%	59%	18%	5%	11%	83%	93%	86%	92%	94%	94%	96%	97%	97%	97%	97%	54%	100%	100%	100%	4%	66%	96%	59%	21%	52%	97%	97%	5%	10%	25%	54%	100%
Feature name ▸	Current browser	Traceur	Babel + core-js[2]	Closure	Type-Script + core-js	es6-shim	KQ 4.14[3]	IE 11	Edge 13[4]	Edge 14[4]	FF 45 ESR	FF 50	FF 51 Beta	FF 52 Aurora	FF 53 Nightly	CH 54, OP 41[1]	CH 55, OP 42[1]	CH 56, OP 43[1]	CH 57, OP 44[1]	SF 9	SF 10	SF TP	WK	PJS	Echo JS	XS6	JXA	Node 0.12[5]	Node 4[5]	Node 6.5[5]	Node 7[5]	AN 4.4	AN 5.0	AN 5.1	iOS 9	iOS 10
Optimisation																																				
proper tail calls (tail call optimisation) ▸	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	2/2	2/2	2/2	0/2	0/2	2/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	2/2
Syntax																																				
default function parameters ▸	7/7	4/7	4/7	4/7	5/7	0/7	0/7	0/7	0/7	7/7	4/7	4/7	6/7	6/7	7/7	7/7	7/7	7/7	7/7	0/7	7/7	7/7	7/7	0/7	4/7	7/7	0/7	0/7	0/7	7/7	7/7	0/7	0/7	0/7	0/7	7/7
rest parameters ▸	5/5	4/5	3/5	2/5	4/5	0/5	0/5	0/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	0/5	5/5	5/5	5/5	0/5	3/5	5/5	0/5	0/5	0/5	5/5	5/5	0/5	0/5	0/5	0/5	5/5
spread (...) operator ▸	15/15	15/15	13/15	12/15	4/15	0/15	0/15	0/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	9/15	15/15	15/15	15/15	0/15	10/15	15/15	11/15	0/15	0/15	15/15	15/15	0/15	0/15	0/15	9/15	15/15
object literal extensions ▸	6/6	6/6	6/6	4/6	6/6	0/6	0/6	0/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	5/6	6/6	6/6	6/6	0/6	5/6	6/6	5/6	0/6	6/6	6/6	6/6	0/6	0/6	0/6	5/6	6/6
for..of loops ▸	9/9	9/9	9/9	6/9	3/9	0/9	0/9	0/9	7/9	7/9	7/9	7/9	7/9	7/9	7/9	9/9	9/9	9/9	9/9	8/9	9/9	9/9	9/9	0/9	7/9	9/9	8/9	7/9	7/9	9/9	9/9	0/9	0/9	7/9	8/9	9/9
octal and binary literals ▸	4/4	2/4	4/4	4/4	4/4	2/4	0/4	0/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	0/4	2/4	4/4	4/4	0/4	4/4	4/4	4/4	0/4	0/4	0/4	4/4	4/4
template literals ▸	5/5	4/5	4/5	3/5	3/5	0/5	0/5	0/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	0/5	4/5	5/5	5/5	0/5	5/5	5/5	5/5	0/5	0/5	0/5	5/5	5/5
RegExp "y" and "u" flags ▸	5/5	3/5	3/5	0/5	0/5	0/5	0/5	0/5	5/5	5/5	2/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	0/5	5/5	5/5	5/5	0/5	2/5	2/5	0/5	0/5	0/5	5/5	5/5	0/5	0/5	0/5	0/5	5/5
destructuring, declarations ▸	22/22	20/22	21/22	18/22	15/22	0/22	0/22	0/22	0/22	21/22	19/22	21/22	21/22	21/22	21/22	22/22	22/22	22/22	22/22	19/22	22/22	22/22	22/22	0/22	12/22	21/22	19/22	0/22	0/22	22/22	22/22	0/22	0/22	0/22	19/22	22/22
destructuring, assignment ▸	24/24	23/24	24/24	16/24	19/24	0/24	0/24	0/24	0/24	23/24	21/24	23/24	23/24	23/24	23/24	24/24	24/24	24/24	24/24	21/24	24/24	24/24	24/24	0/24	14/24	24/24	21/24	0/24	0/24	24/24	24/24	0/24	0/24	0/24	21/24	24/24
destructuring, parameters ▸	23/23	19/23	20/23	17/23	15/23	0/23	0/23	0/23	0/23	22/23	18/23	19/23	20/23	20/23	22/23	23/23	23/23	23/23	23/23	18/23	23/23	23/23	23/23	0/23	12/23	23/23	18/23	0/23	0/23	23/23	23/23	0/23	0/23	0/23	18/23	23/23
Unicode code point escapes ▸	2/2	1/2	1/2	1/2	1/2	0/2	0/2	0/2	2/2	2/2	1/2	1/2	1/2	1/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	0/2	2/2	2/2	2/2	0/2	2/2	2/2	2/2	0/2	0/2	0/2	2/2	2/2
new.target ▸	2/2	0/2	0/2	0/2	0/2	0/2	0/2	0/2	1/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	0/2	2/2	2/2	2/2	0/2	2/2	2/2	0/2	0/2	0/2	2/2	2/2	0/2	0/2	0/2	0/2	2/2
Bindings																																				
const ▸	16/16	14/16	14/16	14/16	14/16	0/16	2/16	12/16	12/16	16/16	12/16	12/16	16/16	16/16	16/16	16/16	16/16	16/16	16/16	1/16	16/16	16/16	16/16	1/16	8/16	16/16	10/16	1/16	9/16	16/16	16/16	1/16	1/16	1/16	1/16	16/16
let ▸	12/12	10/12	10/12	10/12	10/12	0/12	0/12	10/12	10/12	12/12	10/12	10/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	0/12	12/12	12/12	12/12	0/12	8/12	12/12	0/12	0/12	6/12	12/12	12/12	0/12	0/12	0/12	0/12	12/12
block-level function declaration[12]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	No	Flag	Yes	Yes	Yes	No	No	No	No	Yes
Functions																																				
arrow functions ▸	13/13	11/13	9/13	10/13	9/13	0/13	0/13	0/13	13/13	13/13	13/13	13/13	13/13	13/13	13/13	13/13	13/13	13/13	13/13	0/13	13/13	13/13	13/13	0/13	7/13	12/13	0/13	0/13	9/13	13/13	13/13	0/13	0/13	0/13	0/13	13/13
class ▸	24/24	17/24	19/24	13/24	19/24	0/24	0/24	0/24	24/24	24/24	24/24	24/24	24/24	24/24	24/24	24/24	24/24	24/24	24/24	16/24	24/24	24/24	24/24	0/24	22/24	24/24	18/24	0/24	0/24	24/24	24/24	0/24	0/24	0/24	16/24	24/24
super ▸	8/8	7/8	4/8	5/8	7/8	0/8	0/8	0/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	6/8	8/8	8/8	8/8	0/8	6/8	8/8	7/8	0/8	0/8	8/8	8/8	0/8	0/8	0/8	6/8	8/8
generators ▸	27/27	24/27	24/27	16/27	0/27	0/27	0/27	0/27	27/27	27/27	25/27	25/27	25/27	25/27	25/27	27/27	27/27	27/27	27/27	0/27	27/27	27/27	27/27	0/27	16/27	27/27	0/27	0/27	20/27	27/27	27/27	0/27	0/27	16/27	0/27	27/27
Built-ins																																				
typed arrays ▸	46/46	0/46	45/46	0/46	45/46	0/46	8/46	16/46	44/46	46/46	42/46	45/46	45/46	46/46	46/46	46/46	46/46	46/46	46/46	18/46	46/46	46/46	46/46	18/46	37/46	46/46	46/46	23/46	43/46	46/46	46/46	19/46	19/46	23/46	18/46	46/46
Map ▸	19/19	14/19	19/19	14/19	19/19	15/19	0/19	8/19	18/19	18/19	18/19	18/19	18/19	18/19	19/19	19/19	19/19	19/19	19/19	18/19	19/19	19/19	19/19	0/19	17/19	19/19	18/19	13/19	17/19	19/19	19/19	0/19	0/19	16/19	18/19	19/19
Set ▸	19/19	14/19	19/19	14/19	19/19	15/19	0/19	8/19	18/19	18/19	18/19	18/19	18/19	18/19	19/19	19/19	19/19	19/19	19/19	18/19	19/19	19/19	19/19	0/19	18/19	19/19	18/19	13/19	17/19	19/19	19/19	0/19	0/19	16/19	18/19	19/19
WeakMap ▸	12/12	6/12	12/12	9/12	12/12	0/12	0/12	6/12	11/12	11/12	10/12	11/12	11/12	11/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	0/12	9/12	11/12	11/12	7/12	11/12	12/12	12/12	0/12	6/12	9/12	12/12	12/12
WeakSet ▸	11/11	5/11	11/11	8/11	11/11	0/11	0/11	0/11	10/11	10/11	9/11	10/11	10/11	10/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	0/11	9/11	10/11	10/11	6/11	10/11	11/11	11/11	0/11	5/11	8/11	11/11	11/11
Proxy[17] ▸	34/34	0/34	0/34	0/34	0/34	0/34	0/34	0/34	34/34	34/34	30/34	34/34	34/34	34/34	34/34	34/34	34/34	34/34	34/34	0/34	34/34	34/34	34/34	0/34	27/34	34/34	0/34	0/34	0/34	34/34	34/34	0/34	0/34	0/34	0/34	34/34
Reflect[18] ▸	20/20	0/20	14/20	14/20	18/20	14/20	0/20	0/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20	0/20	20/20	20/20	20/20	0/20	14/20	16/20	0/20	0/20	0/20	20/20	20/20	0/20	0/20	0/20	0/20	20/20
Promise ▸	8/8	4/8	8/8	7/8	8/8	7/8	0/8	0/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	6/8	8/8	8/8	8/8	0/8	4/8	8/8	0/8	4/8	7/8	8/8	8/8	0/8	5/8	5/8	6/8	8/8
Symbol ▸	12/12	4/12	9/12	2/12	8/12	2/12	0/12	0/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	12/12	11/12	12/12	12/12	12/12	0/12	4/12	12/12	12/12	9/12	10/12	12/12	12/12	0/12	0/12	10/12	11/12	12/12
well-known symbols[19] ▸	25/26	1/26	14/26	1/26	15/26	0/26	0/26	0/26	9/26	10/26	8/26	22/26	26/26	26/26	26/26	26/26	25/26	25/26	25/26	3/26	26/26	26/26	26/26	0/26	23/26	25/26	22/26	2/26	3/26	26/26	26/26	0/26	0/26	3/26	3/26	26/26
Built-in extensions																																				
Object static methods ▸	4/4	3/4	3/4	2/4	3/4	2/4	1/4	1/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	0/4	4/4	4/4	4/4	3/4	4/4	4/4	4/4	1/4	2/4	3/4	4/4	4/4
function "name" property ▸	17/17	0/17	8/17	0/17	3/17	0/17	3/17	0/17	14/17	16/17	10/17	12/17	12/17	12/17	12/17	17/17	17/17	17/17	17/17	6/17	17/17	17/17	17/17	3/17	5/17	17/17	14/17	2/17	6/17	17/17	17/17	2/17	2/17	2/17	6/17	17/17
String static methods ▸	2/2	2/2	2/2	1/2	2/2	2/2	0/2	0/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	0/2	2/2	2/2	2/2	0/2	2/2	2/2	2/2	0/2	0/2	0/2	2/2	2/2
String.prototype methods ▸	10/10	8/10	9/10	7/10	9/10	7/10	0/10	0/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10	9/10	10/10	10/10	10/10	0/10	9/10	10/10	10/10	1/10	10/10	10/10	10/10	0/10	1/10	2/10	9/10	10/10
RegExp.prototype properties ▸	6/6	0/6	6/6	0/6	6/6	1/6	0/6	0/6	1/6	1/6	1/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	6/6	1/6	6/6	6/6	6/6	0/6	6/6	6/6	5/6	0/6	0/6	6/6	6/6	0/6	0/6	0/6	1/6	6/6

Transpiling



Babel is a JavaScript compiler.

Use next generation JavaScript, today.

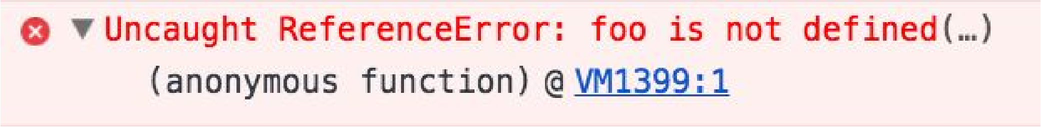
TypeScript

JavaScript that scales

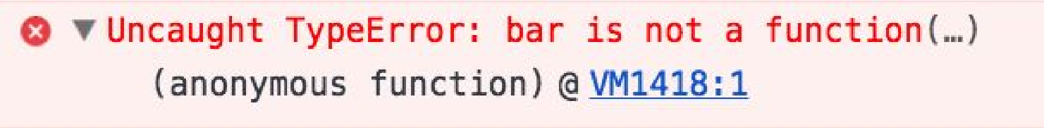
What's good about JavaScript?

- Easy to prototype
- Hybrid imperative/functional language
- First-class functions
- Natural fit for real-time, event-driven applications
- Great open source community

What's bad about JavaScript?



```
▼ Uncaught ReferenceError: foo is not defined(…)
      (anonymous function) @ VM1399:1
```



```
▼ Uncaught TypeError: bar is not a function(…)
      (anonymous function) @ VM1418:1
```

(well, one thing that's bad anyway...)

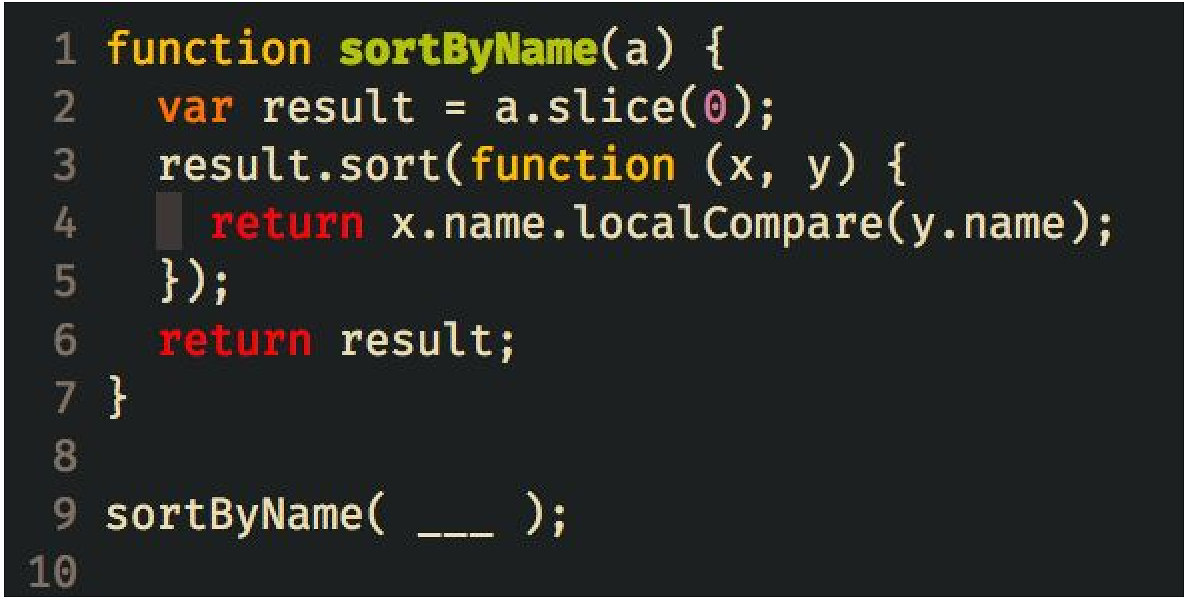
Enter TypeScript

- Static typing is actually **a super good thing**
  - Let the compiler do as much of the debugging work for you as possible.
  - You’re probably thinking of types in your head already anyway.
- **TypeScript** – a superset of JavaScript with a static type system
  - Developed by Microsoft in 2012, now at version 2.1
  - All your JavaScript code is technically TypeScript code too.
  - Transpiles to JavaScript and does awesome typechecking stuff.

Getting Started

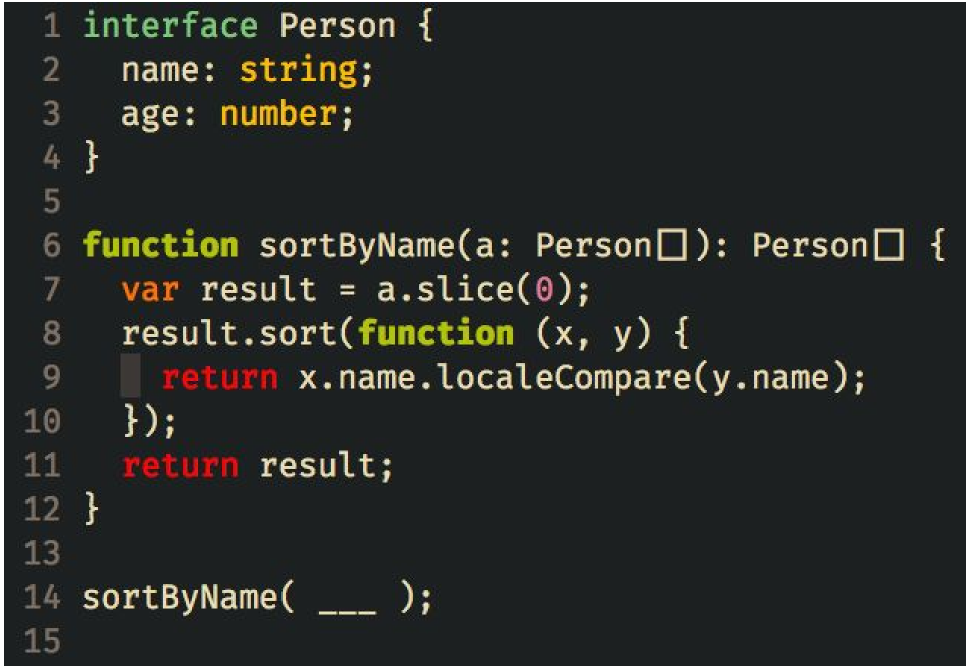
1. npm install -g typescript
2. tsc -w <file.ts>
3. (optional) find a TypeScript plugin for your favorite editor

What is a valid input for sortByName?



```
function sortByName(a) {
  var result = a.slice(0);
  result.sort(function (x, y) {
    return x.name.localCompare(y.name);
  });
  return result;
}

sortByName( ___ );

```

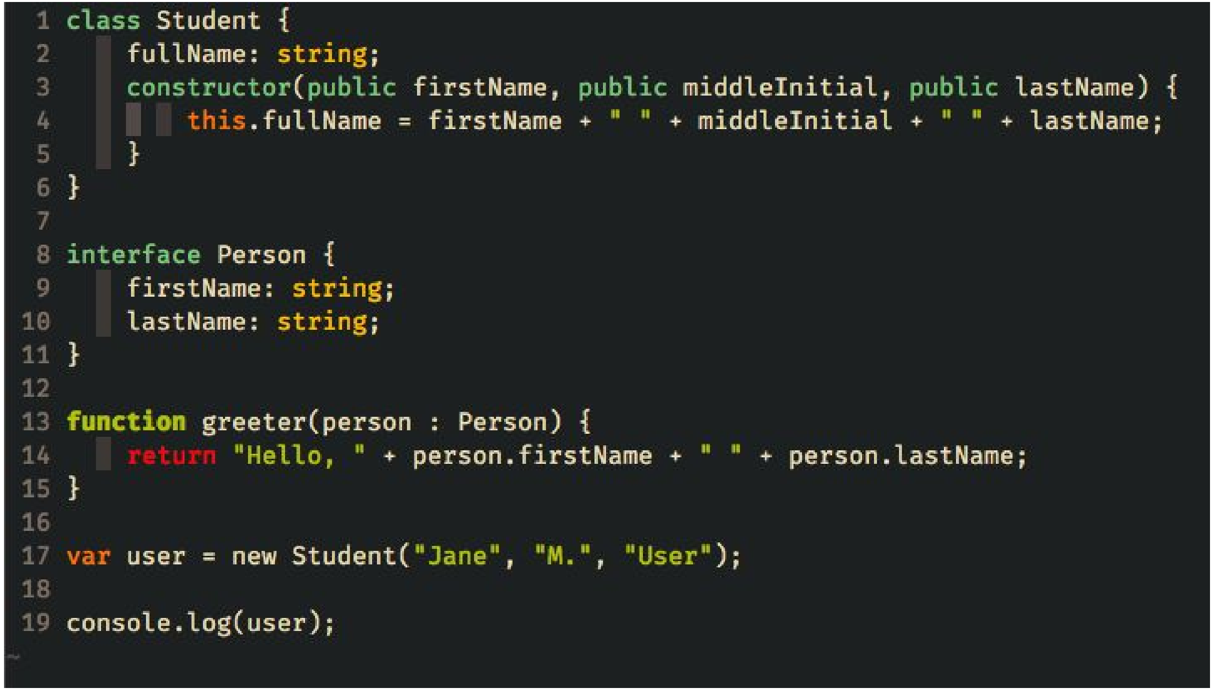
The same thing in TypeScript



```
interface Person {
  name: string;
  age: number;
}

function sortByName(a: Person□): Person□ {
  var result = a.slice(0);
  result.sort(function (x, y) {
    return x.name.localeCompare(y.name);
  });
  return result;
}

sortByName( ___ );
```

Now do you know what a valid input is?

It also works with ES6 out of the box.



```
class Student {
    fullName: string;
    constructor(public firstName, public middleInitial, public lastName) {
        this.fullName = firstName + " " + middleInitial + " " + lastName;
    }
}

interface Person {
    firstName: string;
    lastName: string;
}

function greeter(person : Person) {
    return "Hello, " + person.firstName + " " + person.lastName;
}

var user = new Student("Jane", "M.", "User");

console.log(user);
```

Type Annotations

Basic Types

```
●   let x: number = 6;
●   let color: string = “blue”;
●   let list: number[] = [1, 2, 3];
```

Tuples

```
●   let x: [string, number] =
    [“hello”, 10];
```

Enums

```
●   enum Color = {Red, Green, Blue};
    let c: Color = Color.Green;
```

Interfaces

```
●   interface myType = {
      width: number;
      color?: string;
      readonly x: number;
    }
●   interface SearchFunc = {
      (source: string, subString:
       string): boolean;
    }
```

Declarations

- Let TypeScript generate a declaration file with the flag --declaration
- Like a C++ header file!

```
declare class Student {
    firstName: any;
    middleInitial: any;
    lastName: any;
    fullName: string;
    constructor(firstName: any,
middleInitial: any, lastName: any);
}
interface Person {
    firstName: string;
    lastName: string;
}
declare function greeter(person:
Person): string;
```

Configuration

Add a tsconfig.json file to the top-level directory of your project.

Then just run **tsc** to build.

```
{
  “compilerOptions”: {
    “outFile”: “public/js/script.js”,
    “watch”: true
  },
  “files”: {
    “source_js/*”
  }
}
```

New in TypeScript 2.0

- `--strictNullChecks`

  `null and undefined values are completely disallowed, unless you specifically define the type to say it’s okay`

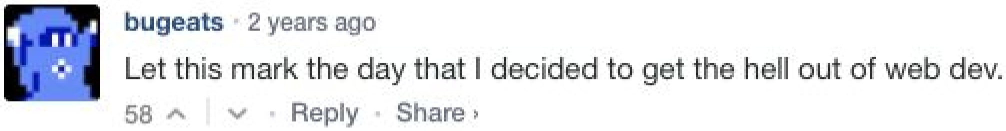
“**I call it my billion-dollar mistake…** My goal was to ensure that all use of references should be absolutely safe, with checking performed automatically by the compiler. But **I couldn’t resist the temptation to put in a null reference, simply because it was so easy to implement.** This has led to innumerable errors, vulnerabilities, and system crashes, which have probably caused a billion dollars of pain and damage in the last forty years.”

Tony Hoare, inventor of ALGOL W

Angular 2.0

So what, it’s just more Angular, right?

- It’s actually **“drastically different”** from Angular 1.x
- Announced in Oct. 2014, released in Sept. 2016
- **Not backwards compatible** with Angular 1.x. At all.
    - (web devs did not much care for this bit…)
- Core goals:
    - Focus on encapsulated Web Components
    - More elegant API with less feature creep
    - Improve performance across all kinds of devices



bugeats · 2 years ago

Let this mark the day that I decided to get the hell out of web dev.

What's Different?

- Improved performance
- Uses TypeScript
- New Component system

- Better dependency injection
- No more $scope or controllers
- Simpler routing

Getting Started

```
git clone https://github.com/angular/quickstart.git quickstart

cd quickstart

npm install

npm start
```

Demo