

hands on with  
**the modern  
front end stack**

# who am I?

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Front End Dev @  **envato**

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tomorrow @15:45

**The UI is an  
Application**

**today:**

meet the stack

build an app

explore the bleeding edge

hack!

**it's not a lecture!**

there are no stupid questions!

**no, really...** ask questions!

# the plan

- Meet the stack!
- npm
  - Managing dependencies
  - Running tasks
- JS Modules
- Webpack for JS
- Babel
  - ES6 & ES7
- React
- Webpack for CSS & images

# **the bonus plan (if we have time!)**

- Hot module reloading
- Isomorphic React
- Styling with JS



# **laptops armed & ready?**

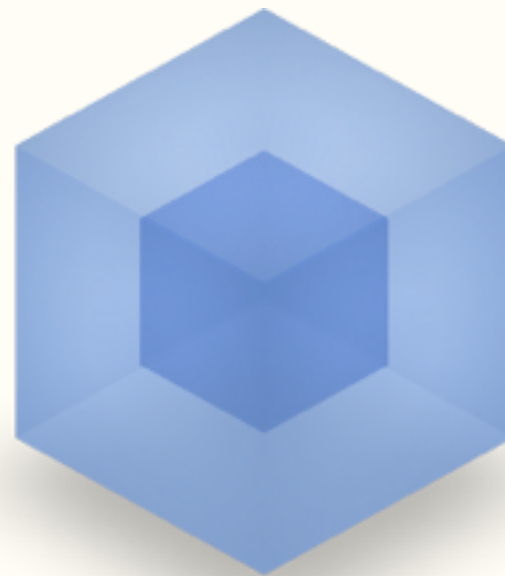
[github.com/bensmithett/dpcon-primer](https://github.com/bensmithett/dpcon-primer)

```
npm install
```

```
npm start
```

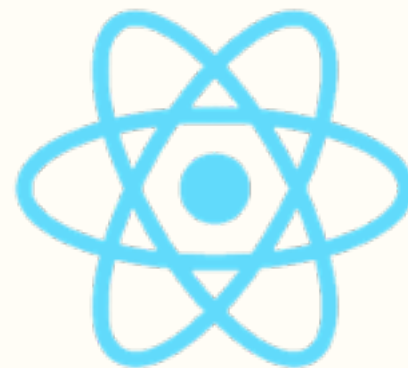
meet

# the modern front end stack



**webpack**  
MODULE BUNDLER

*BABEL*



**React**

this stack has

**united**

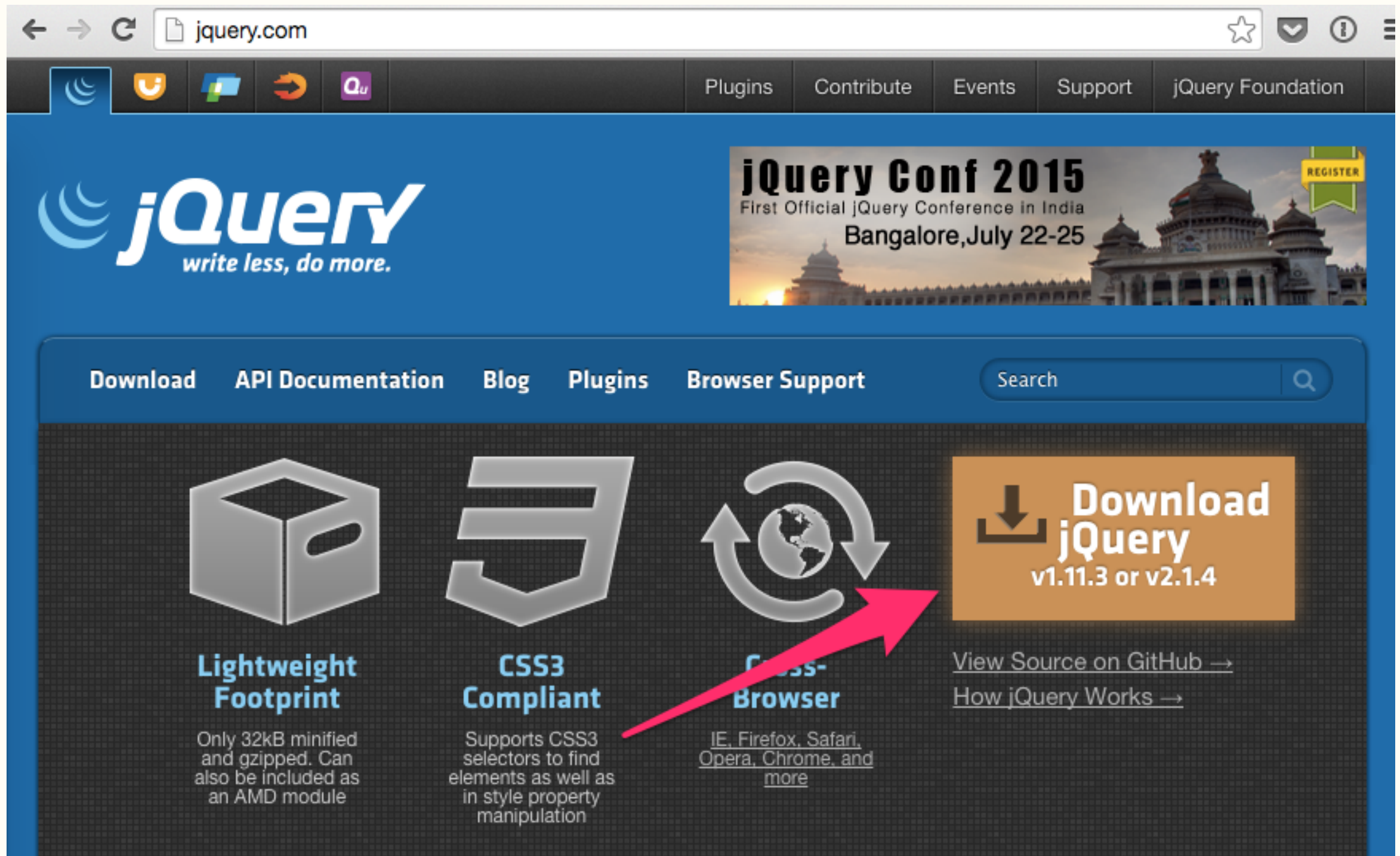
the front end community



*It is a recursive bacronymic abbreviation  
for "npm is not an acronym"*

<https://docs.npmjs.com/misc/faq>

# managing dependencies **with npm**



yay! now I can use `window.$`

views/

css/

js/

jquery.js

jquery.fancy-slider.js

backbone.min.js

underscore.js

video-player.min.js

...



enter

**dependency management**

मपम





**nested folder structure**

**by convention, JS packages are  
expected to export a module**



**flat folder structure**

**no expected module format**

***depends on npm***

# workshop tasks

- Create a new package.json with `npm init`
- Search npm for React using `npm search`
- Install & save React to your package.json with `npm install`

running tasks  
**with npm**



Grunt & Gulp require wrapper plugins

Just use the original command line tools  
directly!



## without npm scripts

```
node-sass --watch app.scss app.css
```

```
karma start ./config/karma.conf.js
```

```
http-server ./build -p 3000 --cors
```

## with npm scripts

```
npm run sass
```

```
npm test
```

```
npm start
```

# workshop tasks

- Run the existing `npm test` script
- Install `http-server` from `npm` & add a new `npm` script to start a local server on port 1337

# JavaScript **modules**

the old way: **expose global variables**

```
// jquery.js
```

```
window.$ = function () { /* ... */ }
```

```
// fancy_modal.js
```

```
window.fancyModal = function () { /* ... */ }
```

```
// my_app.js
```

```
window.MyApp = {  
  init: function () {  
    $(' .content' ).slideDown()  
    fancyModal( 'Hello!' )  
  }  
}
```

a better way: **modules**

```
// my_app.js
```

```
var $ = require('jquery')
```

```
var fancyModal = require('fancy_modal')
```

```
var init = function () {  
    $("content").slideDown()  
    fancyModal('Hello!')  
}
```

```
module.exports = {init: init}
```

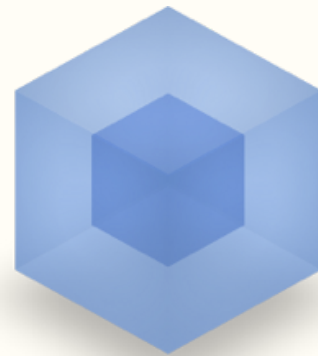
# module **formats**

---

## AMD



## CommonJS



webpack  
MODULE BUNDLER

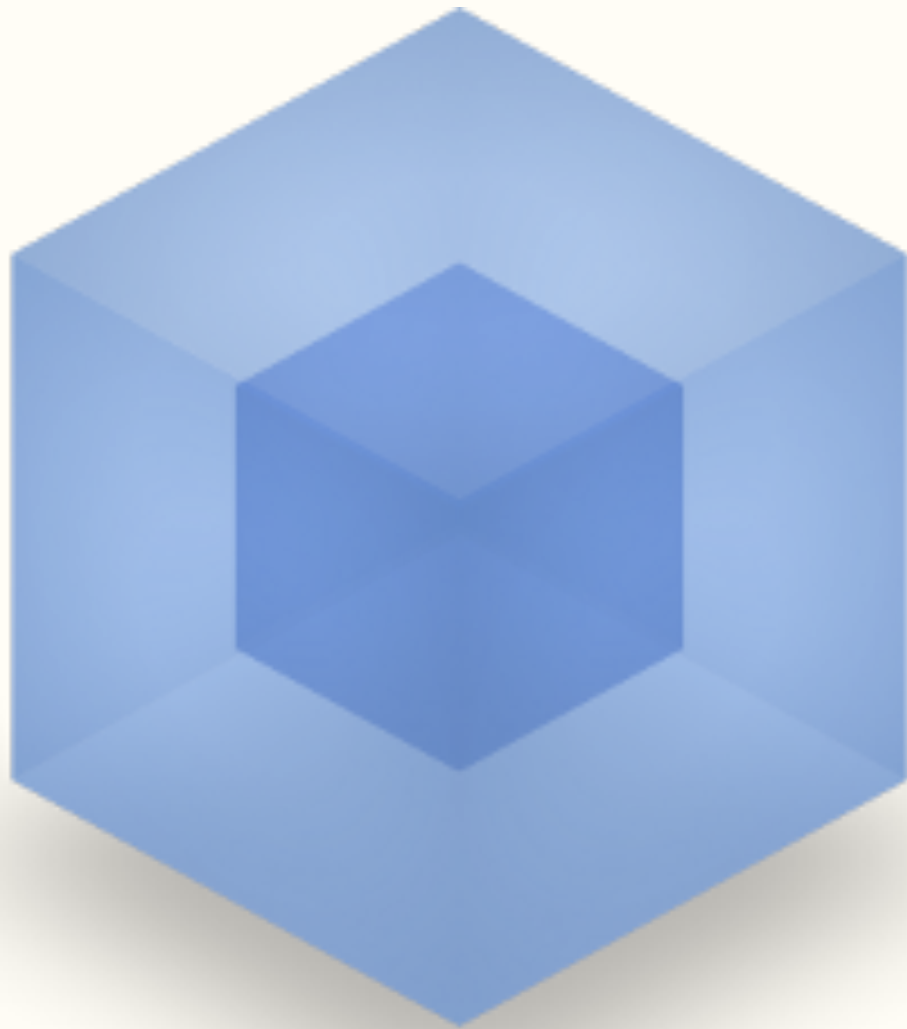


## ES6



# workshop tasks

- Using CommonJS format, use the `add()` function from the supplied `add.js` module to add two numbers together.  
`console.log` the result
- Run it with `node my_app.js`



**webpack**  
MODULE BUNDLER



# webpack is a **module bundler**

```
// my_app.js
```

```
var add = require("./add")
```

```
console.log(add(4, 6))
```

webpack is a **module bundler**

```
// my_app.js
```

```
var add = require("./add")
```

```
console.log(add(4, 6))
```

- Browsers don't have access to your local filesystem
- Even if you can require individual files from the server (i.e. AMD modules) the request is *asynchronous*

a module bundler lets you  
**author as if you have access to  
multiple files on a filesystem**  
but outputs a single JS file for  
end users

# workshop tasks

- Build a simple bundle with webpack

```
npm run 03
```

- Open up the generated file & look at it!

```
03_webpack/build/bundle.js
```

webpack **config**

# workshop tasks

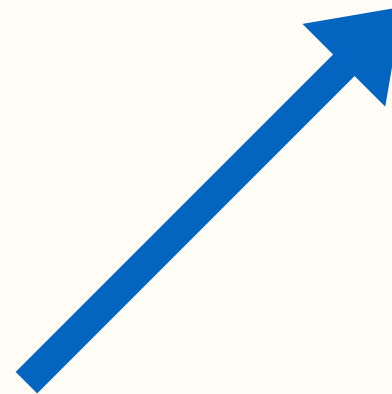
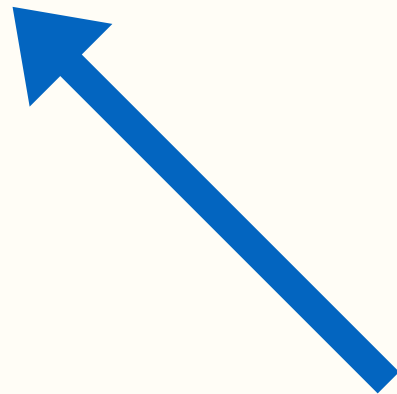
- Check out the webpack configuration in  
`03_webpack/webpack.config.js`

webpack **code splitting**

# webpack **code splitting**

**myapp.com/home**

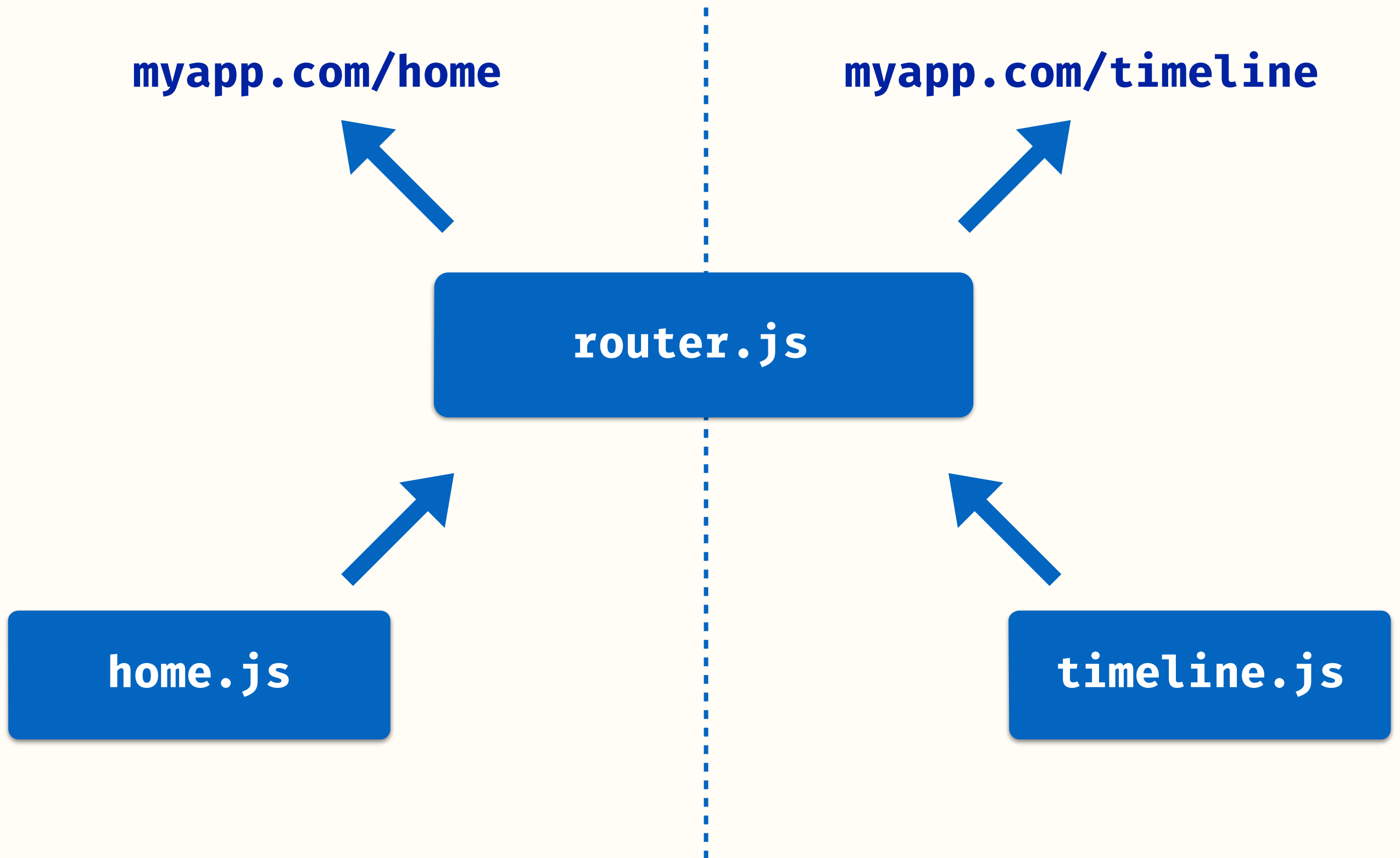
**myapp.com/timeline**



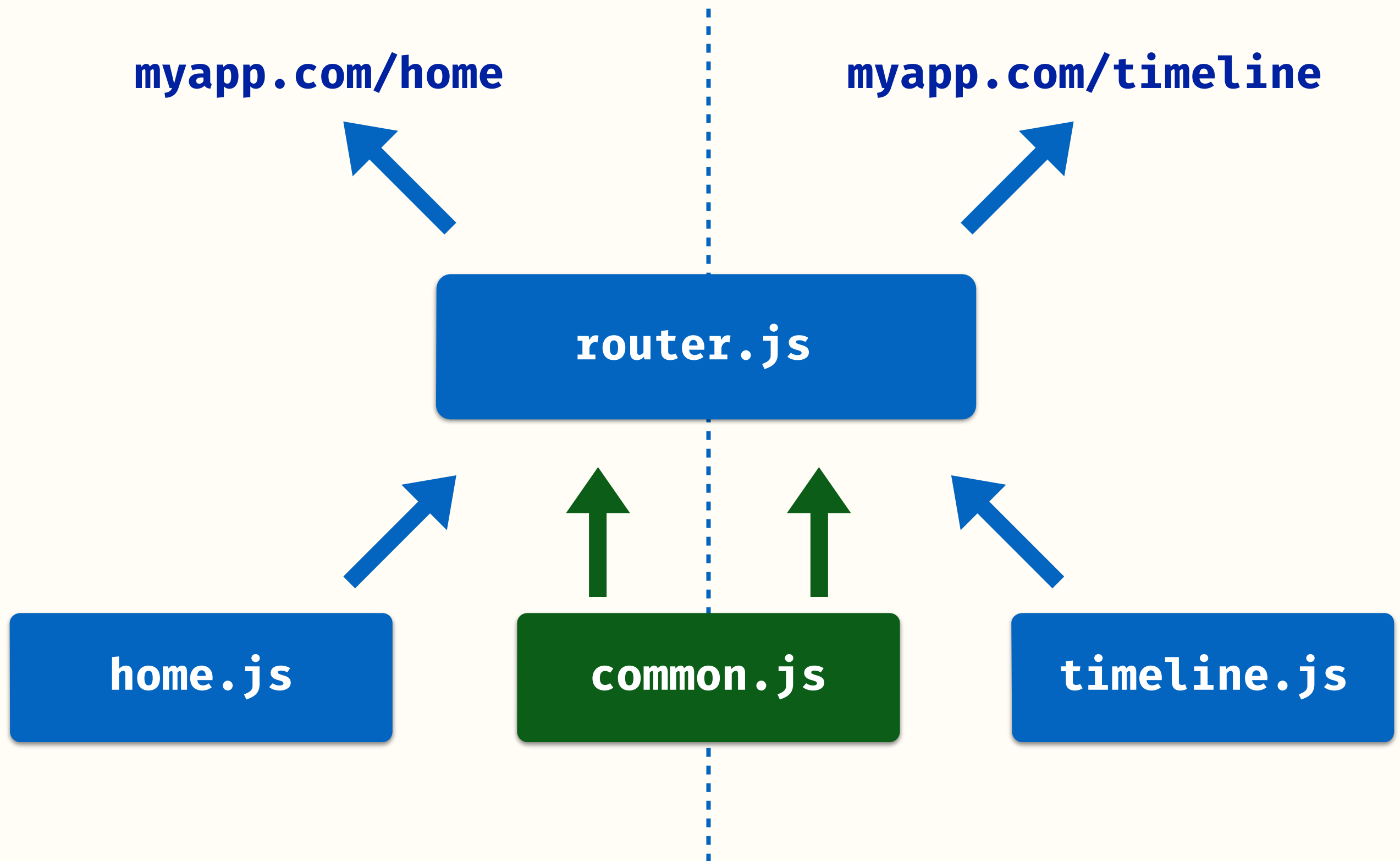
**my\_app.js**



# webpack **code splitting**



# webpack **common chunk extraction**



webpack gives you  
**powerful optimisation tools**

what you do with them is  
**up to you**

# BABEL

(previously known as **6to5**)

javascript is evolving

**not all browsers are keeping up**

| Feature name                    |   | Current browser | es5-shim | IE 7 | IE 8               | IE 9 | IE 10+ | FF 3 | FF 3.5, 3.6 | FF 4-20 | FF 21+ |
|---------------------------------|---|-----------------|----------|------|--------------------|------|--------|------|-------------|---------|--------|
| Object.create                   | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.defineProperty           | Ⓒ | Yes             | No       | No   | Yes <sup>[1]</sup> | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.defineProperties         | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.getPrototypeOf           | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | Yes         | Yes     | Yes    |
| Object.keys                     | Ⓒ | Yes             | Yes      | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.seal                     | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.freeze                   | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.preventExtensions        | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.isSealed                 | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.isFrozen                 | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.isExtensible             | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.getOwnPropertyDescriptor | Ⓒ | Yes             | No       | No   | Yes <sup>[3]</sup> | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Object.getOwnPropertyNames      | Ⓒ | Yes             | No       | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| Date.prototype.toISOString      | Ⓒ | Yes             | Yes      | No   | No                 | Yes  | Yes    | No   | Yes         | Yes     | Yes    |
| Date.now                        | Ⓒ | Yes             | Yes      | No   | No                 | Yes  | Yes    | Yes  | Yes         | Yes     | Yes    |
| Array.isArray                   | Ⓒ | Yes             | Yes      | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| JSON                            | Ⓒ | Yes             | No       | No   | Yes                | Yes  | Yes    | No   | Yes         | Yes     | Yes    |
| Function.prototype.bind         | Ⓒ | Yes             | Yes      | No   | No                 | Yes  | Yes    | No   | No          | Yes     | Yes    |
| String.prototype.trim           | Ⓒ | Yes             | Yes      | No   | No                 | Yes  | Yes    | No   | Yes         | Yes     | Yes    |

<http://kangax.github.io/compat-table/es5/>

| Feature name   | Current browser | Compilers/polyfills |                                |         |                    |            |          |       | Desktop browsers |       |                     |           |       |       |       |                             |                             |                             |              |              |
|--|-----------------|---------------------|--------------------------------|---------|--------------------|------------|----------|-------|------------------|-------|---------------------|-----------|-------|-------|-------|-----------------------------|-----------------------------|-----------------------------|--------------|--------------|
|  |                 | 41%                 | 59%                            | 71%     | 31%                | 18%        | 25%      | 17%   | 4%               | 14%   | 63%                 | 34%       | 60%   | 65%   | 66%   | 41%                         | 45%                         | 45%                         | 6%           | 16%          |
|  |                 | Traceur             | Babel + core-js <sup>[1]</sup> | Closure | JSX <sup>[2]</sup> | TypeScript | es6-shim |       | IE 10            | IE 11 | Edge <sup>[3]</sup> | FF 31 ESR | FF 38 | FF 39 | FF 40 | CH 43, OP 30 <sup>[4]</sup> | CH 44, OP 31 <sup>[4]</sup> | CH 45, OP 32 <sup>[4]</sup> | SF 6.1, SF 7 | SF 7.1, SF 8 |
| <b>Optimisation</b>  |                 |                     |                                |         |                    |            |          |       |                  |       |                     |           |       |       |       |                             |                             |                             |              |              |
| • <a href="#">proper tail calls (tail call optimisation)</a>       | ▶               | 0/2                 | 0/2                            | 1/2     | 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          |
| <b>Syntax</b>  |                 |                     |                                |         |                    |            |          |       |                  |       |                     |           |       |       |       |                             |                             |                             |              |              |
| • <a href="#">default function parameters</a>                      | ▶               | 0/6                 | 3/6                            | 5/6     | 4/6                | 0/6        | 3/6      | 0/6   | 0/6              | 0/6   | 0/6                 | 3/6       | 3/6   | 3/6   | 3/6   | 0/6                         | 0/6                         | 0/6                         | 0/6          | 0/6          |
| • <a href="#">rest parameters</a>                                  | ▶               | 0/5                 | 4/5                            | 4/5     | 2/5                | 3/5        | 3/5      | 0/5   | 0/5              | 0/5   | 5/5                 | 3/5       | 4/5   | 4/5   | 4/5   | 0/5                         | 0/5                         | 0/5                         | 0/5          | 0/5          |
| • <a href="#">spread (...) operator</a>                            | ▶               | 0/12                | 12/12                          | 12/12   | 2/12               | 1/12       | 2/12     | 0/12  | 0/12             | 0/12  | 10/12               | 8/12      | 12/12 | 12/12 | 12/12 | 0/12                        | 0/12                        | 0/12                        | 0/12         | 2/12         |
| • <a href="#">object literal extensions</a>                        | ▶               | 3/6                 | 6/6                            | 6/6     | 4/6                | 5/6        | 5/6      | 0/6   | 0/6              | 0/6   | 6/6                 | 0/6       | 6/6   | 6/6   | 6/6   | 3/6                         | 6/6                         | 6/6                         | 0/6          | 1/6          |
| • <a href="#">for..of loops</a>                                    | ▶               | 6/8                 | 8/8                            | 8/8     | 5/8                | 1/8        | 2/8      | 0/8   | 0/8              | 0/8   | 5/8                 | 4/8       | 6/8   | 6/8   | 6/8   | 6/8                         | 6/8                         | 6/8                         | 0/8          | 1/8          |
| • <a href="#">octal and binary literals</a>                        | ▶               | 4/4                 | 2/4                            | 4/4     | 2/4                | 0/4        | 2/4      | 0/4   | 0/4              | 0/4   | 4/4                 | 2/4       | 4/4   | 4/4   | 4/4   | 4/4                         | 4/4                         | 4/4                         | 0/4          | 0/4          |
| • <a href="#">template strings</a>                                 | ▶               | 3/3                 | 3/3                            | 3/3     | 3/3                | 3/3        | 3/3      | 0/3   | 0/3              | 0/3   | 2/3                 | 0/3       | 3/3   | 3/3   | 3/3   | 3/3                         | 3/3                         | 3/3                         | 0/3          | 0/3          |
| • <a href="#">RegExp "y" and "u" flags</a>                         | ▶               | 0/2                 | 1/2                            | 1/2     | 0/2                | 0/2        | 0/2      | 0/2   | 0/2              | 0/2   | 1/2                 | 1/2       | 1/2   | 1/2   | 1/2   | 0/2                         | 0/2                         | 0/2                         | 0/2          | 0/2          |
| • <a href="#">destructuring</a>                                    | ▶               | 0/31                | 25/31                          | 28/31   | 16/31              | 12/31      | 20/31    | 0/31  | 0/31             | 0/31  | 0/31                | 17/31     | 23/31 | 23/31 | 23/31 | 0/31                        | 0/31                        | 0/31                        | 0/31         | 15/31        |
| • <a href="#">Unicode code point escapes</a>                       | ▶               | 0/2                 | 1/2                            | 1/2     | 1/2                | 0/2        | 1/2      | 0/2   | 0/2              | 0/2   | 2/2                 | 0/2       | 0/2   | 0/2   | 1/2   | 0/2                         | 2/2                         | 2/2                         | 0/2          | 0/2          |
| • <a href="#">new.target</a>                                       | ▶               | 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          |
| <b>Bindings</b>  |                 |                     |                                |         |                    |            |          |       |                  |       |                     |           |       |       |       |                             |                             |                             |              |              |
| • <a href="#">const</a>  | ▶               | 5/8                 | 6/8                            | 6/8     | 6/8                | 0/8        | 4/8      | 0/8   | 0/8              | 8/8   | 8/8                 | 3/8       | 8/8   | 8/8   | 8/8   | 5/8                         | 5/8                         | 5/8                         | 1/8          | 1/8          |
| • <a href="#">let</a>  | ▶               | 5/10                | 8/10                           | 8/10    | 8/10               | 0/10       | 6/10     | 0/10  | 0/10             | 8/10  | 8/10                | 0/10      | 0/10  | 0/10  | 0/10  | 5/10                        | 5/10                        | 5/10                        | 0/10         | 0/10         |
| • <a href="#">block-level function declaration</a> <sup>[13]</sup> | ◉               | Yes                 | Yes                            | Yes     | Yes                | No         | No       | No    | No               | Yes   | Yes                 | No        | No    | No    | No    | Yes                         | Yes                         | Yes                         | No           | No           |
| <b>Functions</b>   |                 |                     |                                |         |                    |            |          |       |                  |       |                     |           |       |       |       |                             |                             |                             |              |              |
| • <a href="#">arrow functions</a>                                  | ▶               | 0/11                | 9/11                           | 9/11    | 8/11               | 7/11       | 8/11     | 0/11  | 0/11             | 0/11  | 9/11                | 7/11      | 7/11  | 8/11  | 8/11  | 0/11                        | 0/11                        | 0/11                        | 0/11         | 0/11         |
| • <a href="#">class</a>  | ▶               | 0/23                | 16/23                          | 19/23   | 7/23               | 15/23      | 14/23    | 0/23  | 0/23             | 0/23  | 0/23                | 0/23      | 0/23  | 20/23 | 20/23 | 0/23                        | 0/23                        | 0/23                        | 0/23         | 0/23         |
| • <a href="#">super</a>  | ▶               | 0/7                 | 6/7                            | 6/7     | 4/7                | 6/7        | 5/7      | 0/7   | 0/7              | 0/7   | 0/7                 | 0/7       | 0/7   | 0/7   | 0/7   | 0/7                         | 0/7                         | 0/7                         | 0/7          | 0/7          |
| • <a href="#">generators</a>                                       | ▶               | 15/22               | 20/22                          | 21/22   | 15/22              | 0/22       | 0/22     | 0/22  | 0/22             | 0/22  | 0/22                | 11/22     | 17/22 | 19/22 | 19/22 | 15/22                       | 16/22                       | 16/22                       | 0/22         | 0/22         |
| <b>Built-ins</b>   |                 |                     |                                |         |                    |            |          |       |                  |       |                     |           |       |       |       |                             |                             |                             |              |              |
| • <a href="#">typed arrays</a>                                     | ▶               | 22/43               | 0/43                           | 0/43    | 0/43               | 0/43       | 0/43     | 0/43  | 16/43            | 16/43 | 41/43               | 18/43     | 40/43 | 40/43 | 40/43 | 22/43                       | 22/43                       | 22/43                       | 18/43        | 18/43        |
| • <a href="#">Map</a>  | ▶               | 12/15               | 12/15                          | 15/15   | 0/15               | 0/15       | 0/15     | 11/15 | 0/15             | 5/15  | 12/15               | 10/15     | 12/15 | 12/15 | 12/15 | 12/15                       | 12/15                       | 12/15                       | 0/15         | 9/15         |

<http://kangax.github.io/compat-table/es6/>

treat ES5 as a compile target

**author in bleeding edge syntax**



# babel: **transforms ES6 to equivalent ES5**

---

```
`Hi ${name}. Welcome to ${city}!`
```

---

```
"Hi " + name + ". Welcome to " + city + "!";
```

# babel: polyfills missing features

---

```
class Australian {  
  sayHello () { return "G'day" }  
}
```

---

```
var _createClass = (function () { /* Babel polyfill... */ })();  
function _classCallCheck(instance, Constructor) { /* Babel polyfill... */ }  
  
var Australian = (function () {  
  function Australian() {  
    _classCallCheck(this, Australian);  
  }  
  _createClass(Australian, [{  
    key: "sayHello",  
    value: function sayHello() {  
      return "G'day";  
    }  
  }]);  
  return Australian;  
})();
```

# babel: **checks your code at compile time**

---

```
const speedOfLight = 299792458  
speedOfLight = 17
```

---

**COMPILE ERROR**

**Line 2: "speedOfLight" is read-only**

# workshop tasks

- Open **babeljs.io/repl** & play around with some new ES6 features!
  - class
  - const
  - destructuring
  - default function arguments
  - arrow functions

# BABEL



**webpack**  
MODULE BUNDLER

# webpack **loaders**

*Loaders allow you to preprocess files  
as you **require()** or “load” them.*

# webpack loaders

```
module.exports = {  
  module: {  
    loaders: [  
      {  
        test: /\.js$/,  
        loaders: ["babel"]  
      }  
    ]  
  }  
};
```

# workshop tasks

Let's build a real app!

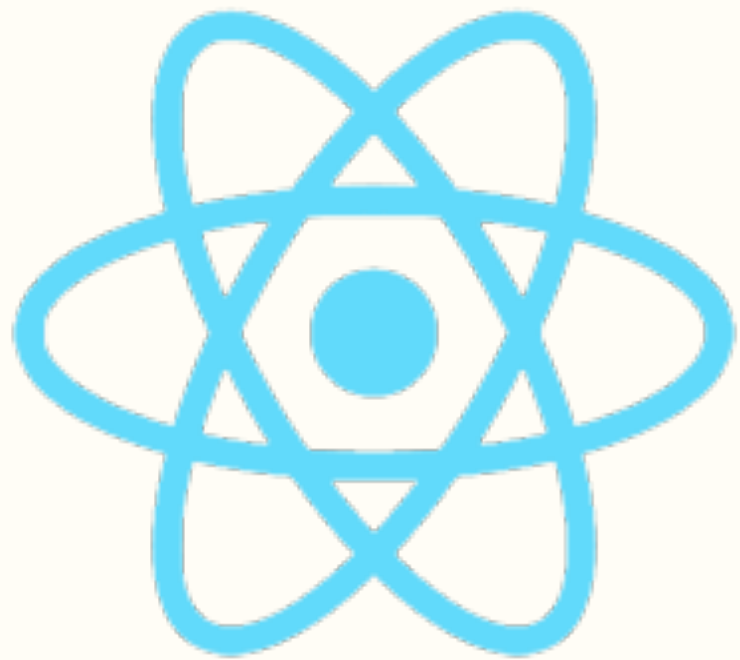
- From the root folder, run **npm run app**
  - If you haven't installed Webpack, start a static web server instead
- Try changing the language in entry.js

---

**congratulations!**

you now have a modular JS app written in ES6 syntax,  
compiled by Babel & bundled by Webpack!





# React

react **fast facts**

built (& battle tested in prod) by  
**the Facebook & Instagram team**

a JavaScript library for  
**building user interfaces**

**uses virtual DOM diffing**

to make the minimum possible set  
of DOM operations

react **important facts**

**re-render the entire app**  
whenever data changes

describe what your UI looks like  
**at a given point in time**



# workshop tasks

- Demo the simple **PhotoApp** React component
- Add a click event handler to **PhotoApp**

react components can be  
**composed**

```
const Child = React.createClass({  
  render () {  
    return <div className='child' />  
  }  
})
```

```
const Parent = React.createClass({  
  render () {  
    return (  
      <div className='parent'>  
        <Child />  
        <Child />  
        <Child />  
      </div>  
    )  
  }  
})
```

**every React component has**  
props & state

# props

- Passed down from parent to child
- Cannot be directly changed

```
const Child = React.createClass({  
  render () {  
    return <div className='child' />  
  }  
})
```

```
const Parent = React.createClass({  
  render () {  
    return (  
      <div className='parent'>  
        <Child />  
        <Child />  
        <Child />  
      </div>  
    )  
  }  
})
```

```
const Child = React.createClass({  
  render () {  
    return <div className='child'>Name: {this.props.name}</div>  
  }  
})
```

```
const Parent = React.createClass({  
  render () {  
    return (  
      <div className='parent'>  
        <Child name='Abe' />  
        <Child name='Cleo' />  
        <Child name='Gandhi' />  
      </div>  
    )  
  }  
})
```

# state

- Local data for each component
- Can be changed via **this.setState**
- Every state change causes a new **render()**



```
const Counter = React.createClass({  
  getInitialState () {  
    return {count: 0}  
  },  
  
  increment () {  
    this.setState({  
      count: this.state.count + 1  
    })  
  },  
  
  render () {  
    return (  
      <button onClick={ this.increment }>  
        Count: { this.state.count }  
      </button>  
    )  
  }  
})
```

# workshop tasks

- Build the **PhotoThumb** component
- Render a **PhotoThumb** for each photo in the supplied data
- When a **PhotoThumb** is clicked, store that photo in **PhotoApp**'s state
- Build a **PhotoDetail** component
- Pass the currently selected photo into **PhotoDetail** as a prop

building a CSS bundle with  
**webpack**

```
import React from 'react'

const FancyButton = React.createClass({
  render () {
    return <button className='fancy-btn'>Hi</button>
  }
})
```

```
import React from 'react'
import 'css/components/fancy-btn'

const FancyButton = React.createClass({
  render () {
    return <button className='fancy-btn'>Hi</button>
  }
})
```

# workshop tasks

- Configure webpack so that it can require CSS
- Style the app, requiring each component's CSS dependencies

**hot** module replacement

Hot Module Replacement **exchanges, adds, or removes modules** while an application is running **without a page reload.**



## **Reminder**

Webpack bundles all of your individual modules into a giant array and looks a module up in that array whenever another module requires it

# **Hot Module Replacement**

Small client runtime polls dev server

When a file changes, client runtime loads  
new version

Module stored in array is updated

## **Advantages**

Real time updates as you edit JS views &  
CSS

Client state is maintained (even if you had  
to click 5 things to get it in that state)

# demo

- CSS
- JS
- JS with state (i.e. an input)

# workshop tasks

- Configure your app to use hot module reloading
- Experiment!

**isomorphic** javascript

Reusing the same JavaScript on the  
server & client.

<http://bensmithett.github.io/going-isomorphic-with-react>



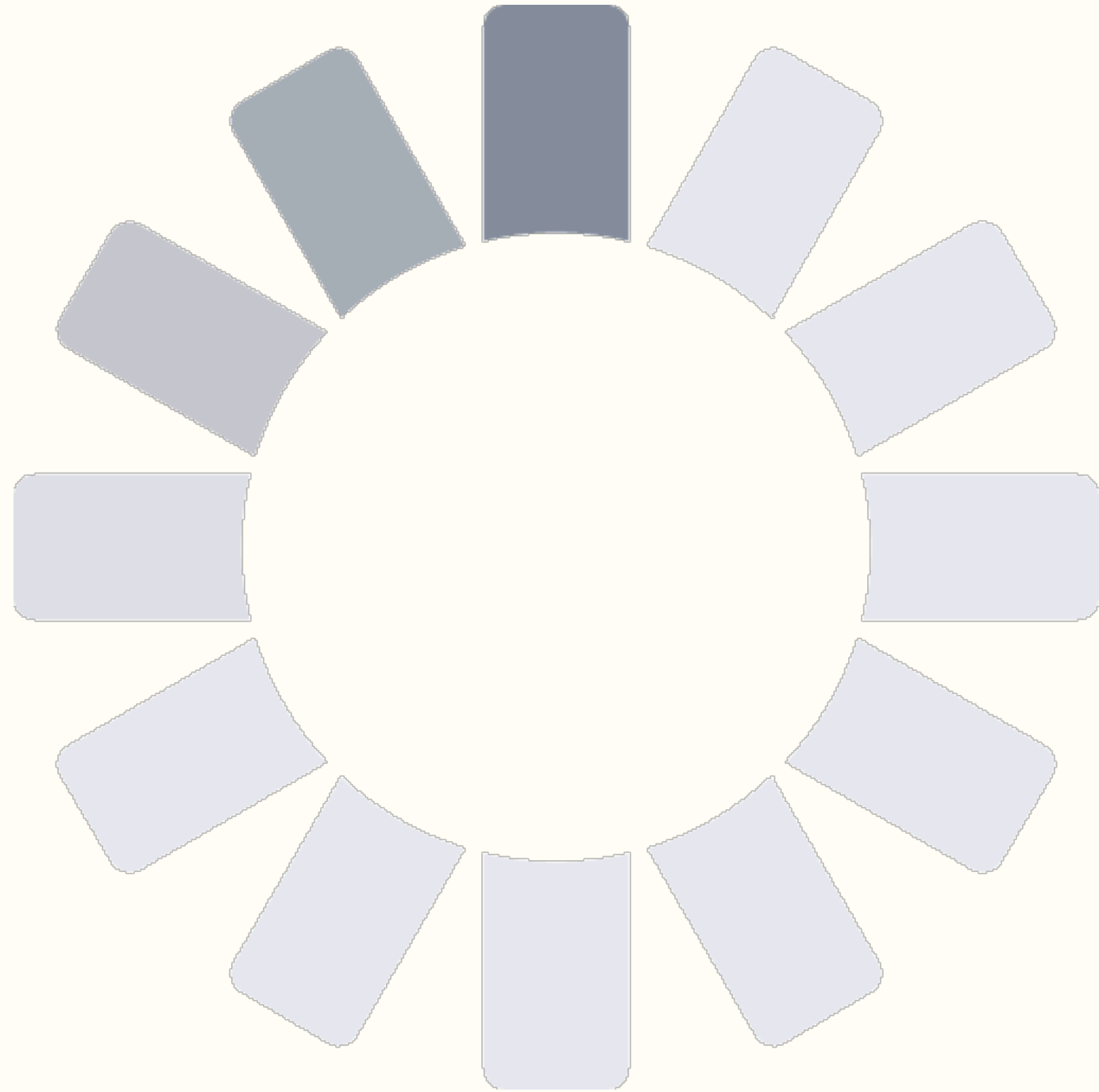
**universal**

**~~isomorphic~~** javascript

**progressive**

**~~universal~~**

**~~isomorphic~~** javascript



```
React.renderToString(<MyApp />)
```

```
<div data-reactid=".2hellvcz5s" data-react-checksum="1403786291">  
  This is my photo app  
</div>
```

Generate real HTML on the server

When client JS loads, mount onto server-rendered HTML, adding event listeners

Reuse the same React components on the client & server!

# demo

- <http://sample-react-rails-app.herokuapp.com/>

# workshop tasks

- `npm run isomorphic`

styling with  
**javascript**



Who uses a CSS Preprocessor?

**EVERYONE!**

Why?

variables  
functions  
loops  
conditionals

... real programming language things!

**javascript already has all those things!**

```
var myStyles = {  
  color: colors.red,  
  backgroundColor: signedInUser ? colors.green : colors.grey,  
  backgroundImage: CDNPathFor('forest_bg.png'),  
  width: Math.round(viewportSize / 2) + 'px'  
}
```

```
var totalCols = 12
var gridColClasses = {}

for (var i = 1; i <= totalCols; i++) {
  gridColClasses['col-' + i] = {
    width: ((100 / totalCols) * i) + '%'
  }
}
```

```
var styles = {  
  border: '2px solid #0f0',  
  height: '100px',  
  width: '100px',  
  float: left  
}
```

```
var PhotoThumb = React.createClass({  
  render () {  
    return (  
      <div style={styles}>  
        <img src={this.props.src} />  
      </div>  
    )  
  }  
})
```



<https://github.com/js-next/react-style>

<https://github.com/jsstyles/jss>

# workshop tasks

- Convert your app's styles to JavaScript!

# extras!

- React component lifecycle
- CSS Modules