
Develop
Intelligence
Learning Solutions to Attract, Retain,
and Grow your top technical talent.
http://bit.ly/kamrenz-spitfire
https://github.com/kamrenz/spitfire
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Who am I?!?

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About DI

Develop Intelligence

Company

- Highly-customized, role-based learning solutions
- ***Managed Learning Solutions*** include training design and development, and learning program delivery and management
- ***Technical learning offerings*** in software development, open source technologies, and technology leadership development
- Software development and engineering organizations benefit most from our Managed Learning Solution

Background

- Founded in 2003
- Headquartered in Boulder, Colorado
- Founder and CEO, Kelby Zorgdrager, has 20 years' experience in Technical Learning and Development industry
- More than **40,000 developers** trained in 30 countries since 2003
- Managed and delivered learning solutions to more than 4,000 developers globally in 2015

Course Offerings

Develop Intelligence

Overview

- Over ***200 different course*** offerings available in Java development, Mobile Application development, and more.
- Courses delivered by an ***expert practitioner*** – our instructors are passionate about doing and teaching.
- Consistently achieve ***98%*** or higher ***satisfaction*** rating from students.

Technologies we cover

Clients

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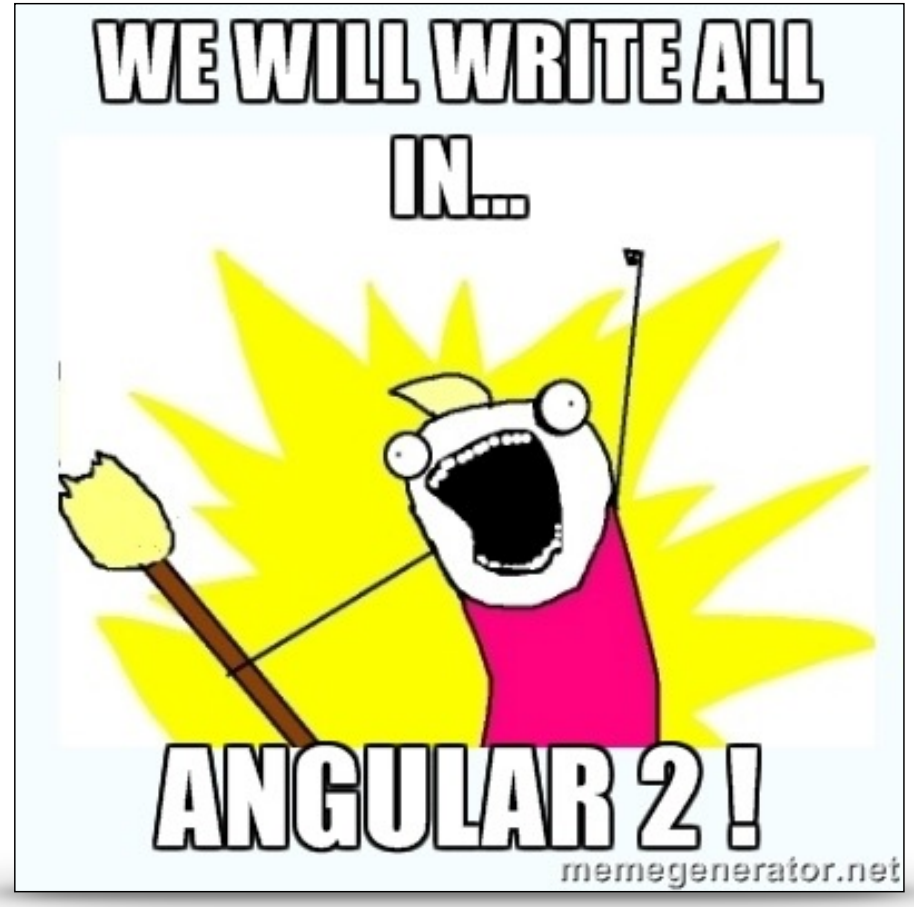
Angular 2

The component mental mind shift



"Today, at a special meetup at Google HQ, we announced the final release version of Angular 2, the full-platform successor to Angular 1."

- Jules Kremer @ Angular 2 development blog
September 14 2016

Is Google using it?

- AdWords
- GreenTea: Google's internal CRM
- Google Fiber

- Others besides Google
  - https://www.madewithangular.com/#/

What is it?

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"Angular 2 is the next generation web application framework from Google. It aims to fix some Angular 1 shortcomings and provide a foundation for JavaScript application development over the next few years."

- Kamren Zorgdrager
Today

Today's Outline

- Part 1
  - How'd we get here?
  - Componentization
  - New ES6 language foundation
  - TypeScript foundation
- Part 2
  - Angular component
  - Angular-CLI
  - Data bindings, Directives, Inputs & Outputs
  - Ajax & Services
  - Where to go from here

Today's Goals

- Understand the need for Angular 2
- Make a mental mind shift to components
- Learn the foundations of Angular 2
- Have reference material for more in-depth learning

How’d we get here

An evolutionary tale

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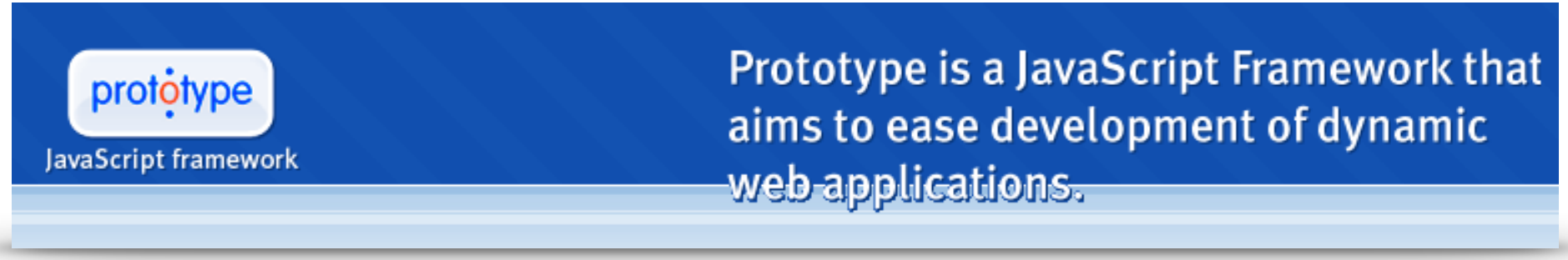
Not a revolution

An evolution

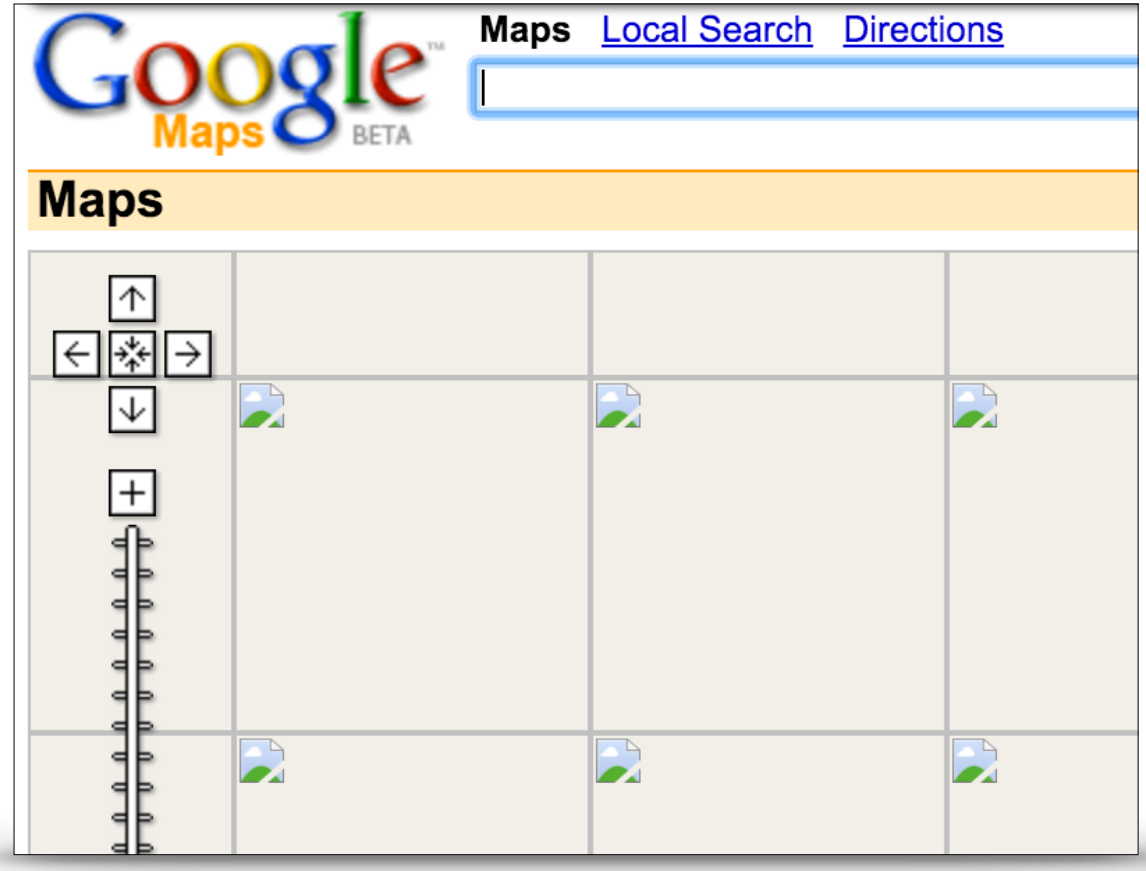
Ajax hit the masses: 2005-2006

August 26, 2006

February 2005



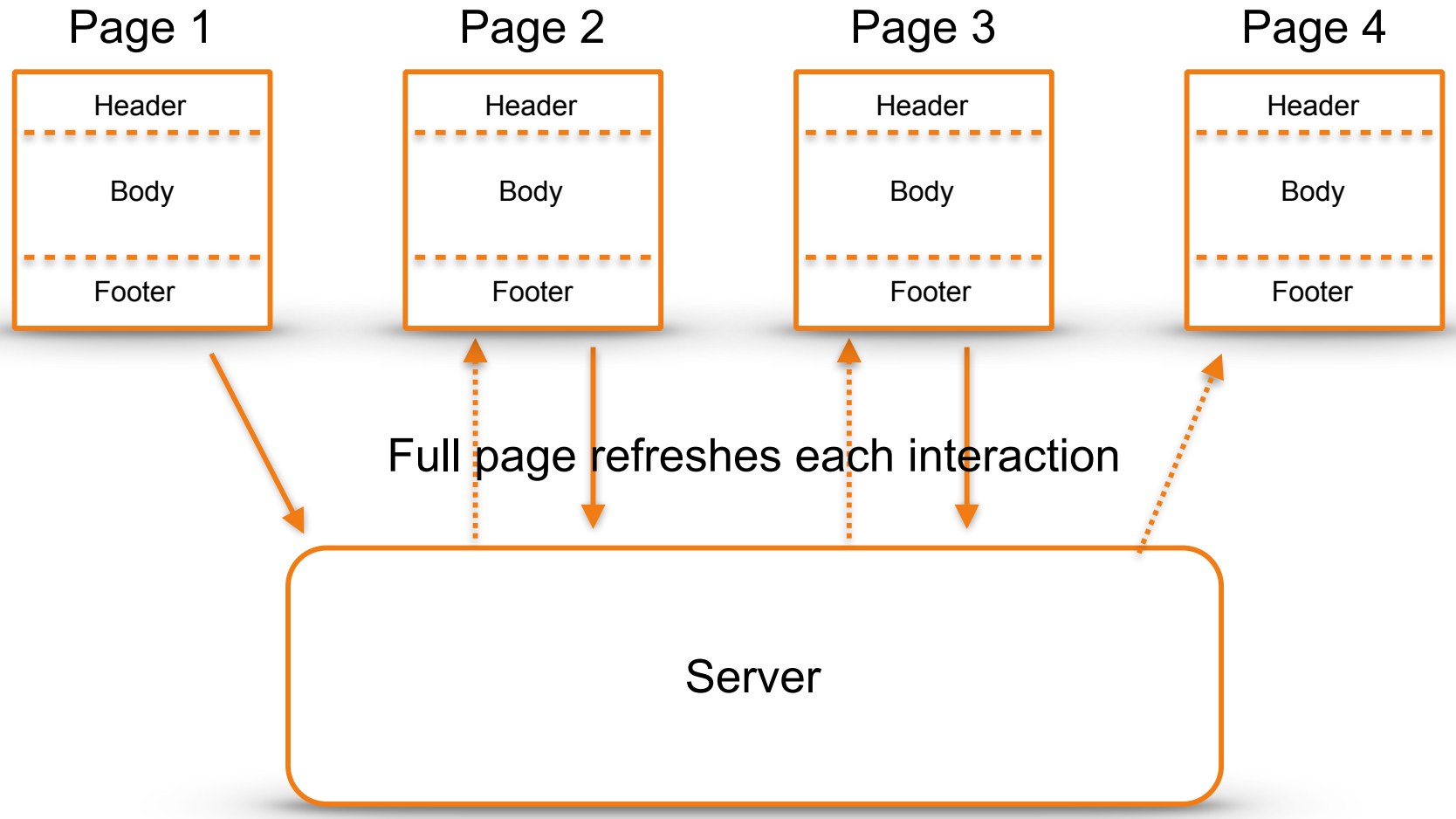
Ajax ups the game



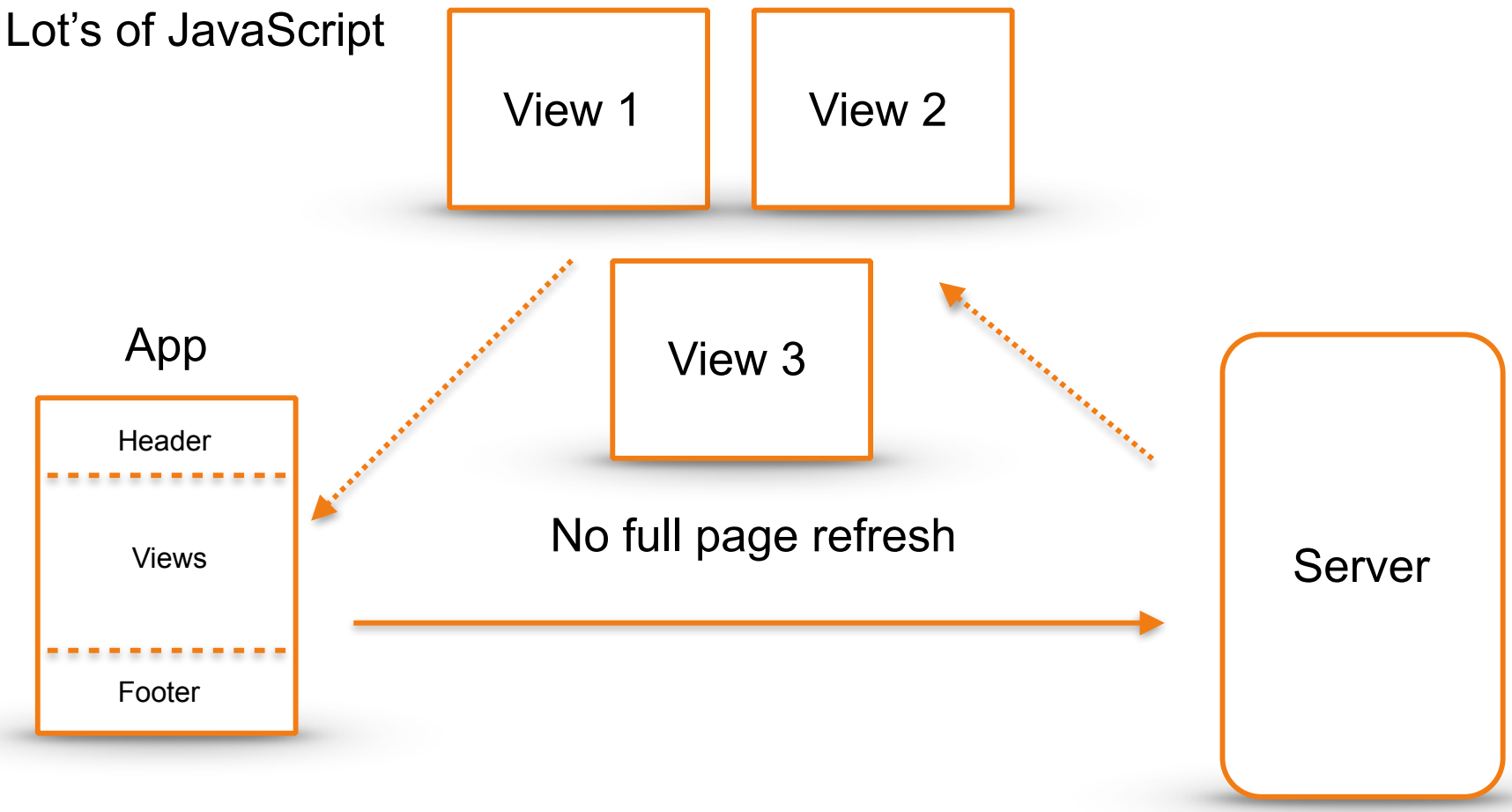
Problems

- Users wanted awesome experiences
- Users wanted web applications

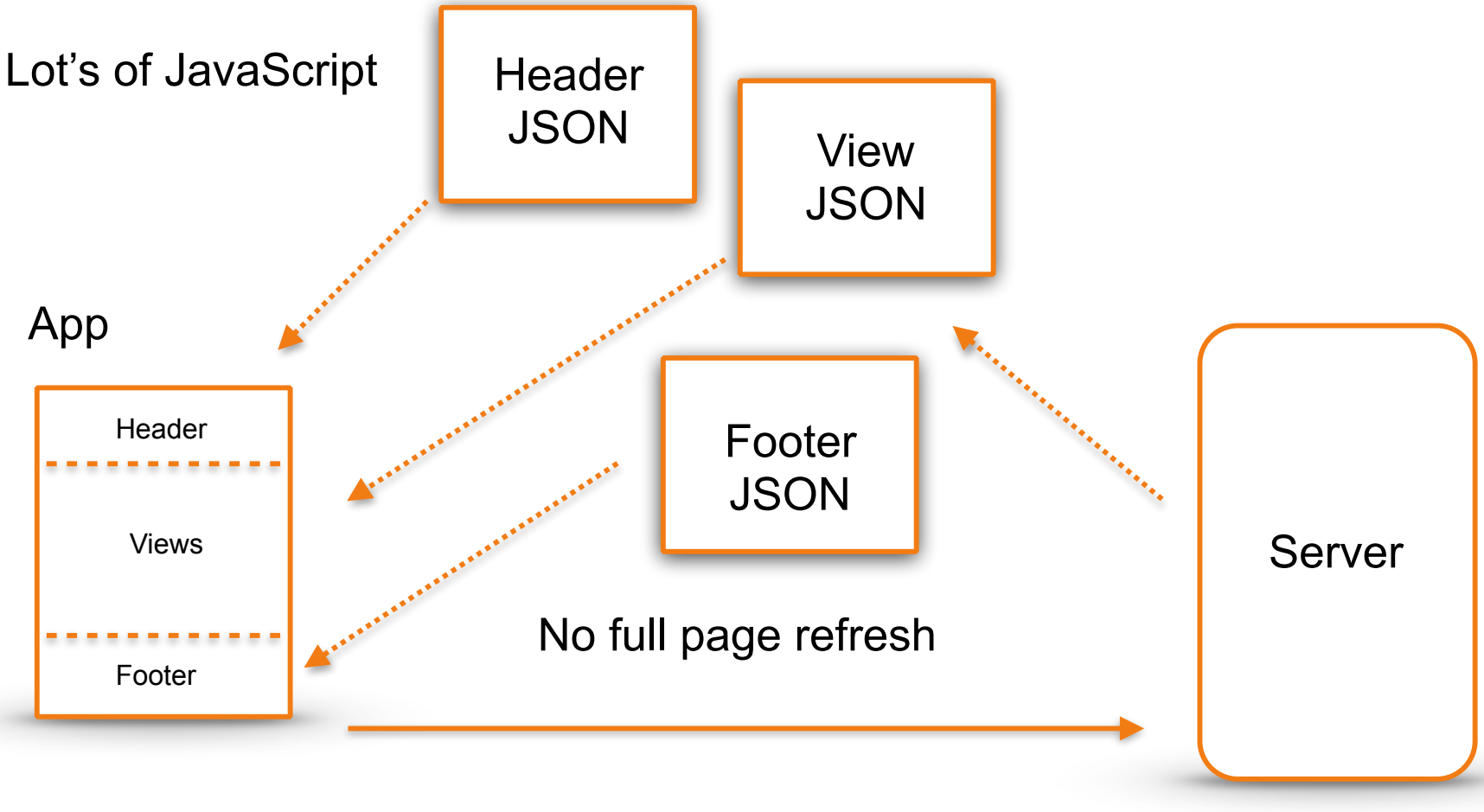
Complete page reloads



Swap view content



Swap data



Can you lift it?

Rollin' your own MVC

- Company after company began rolling home-brewed MVC concoctions
- Some companies swam
- Others began to sink

To the rescue

2010

2009

Angular 1 strengths

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- Dependency Injection
- Testing & Mocks
- Controllers, Services & Views for architecture
- Routing
- Directives with reusability
- 2-way Data Binding

Angular 1 limitations

- A stepping stone beyond jQuery
- Poor rendering performance on complex nested loops
  - Struggle with complex change management
- Steep learning curve
- Nesting directives was overly complicated

The web has evolved

- ES6 / ES7
- HTML5

Did I hear you say web components?

The pitch...

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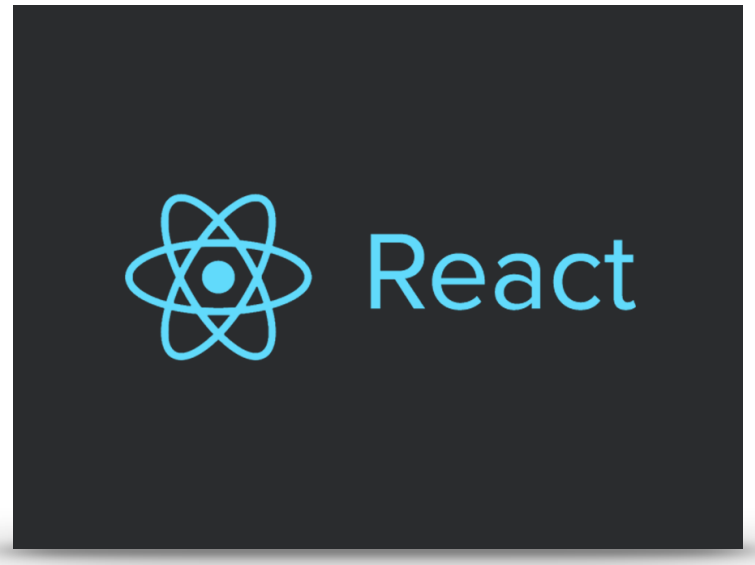
"What if HTML was expressive enough to allow us to extend HTML so we can fill in the gaps in functionality with our own tags? Well, Web Components enable that."

- Zeno Rocha & Addy Osmani @ WebComponents.org
April 16, 2015

The move to components

React



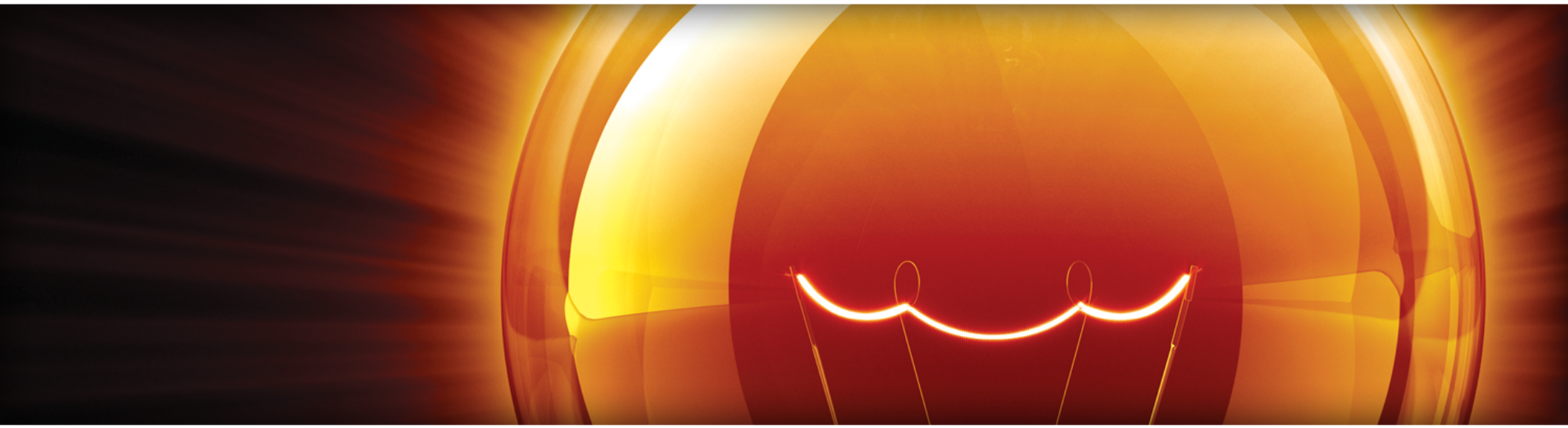
Ember 2

Angular 2

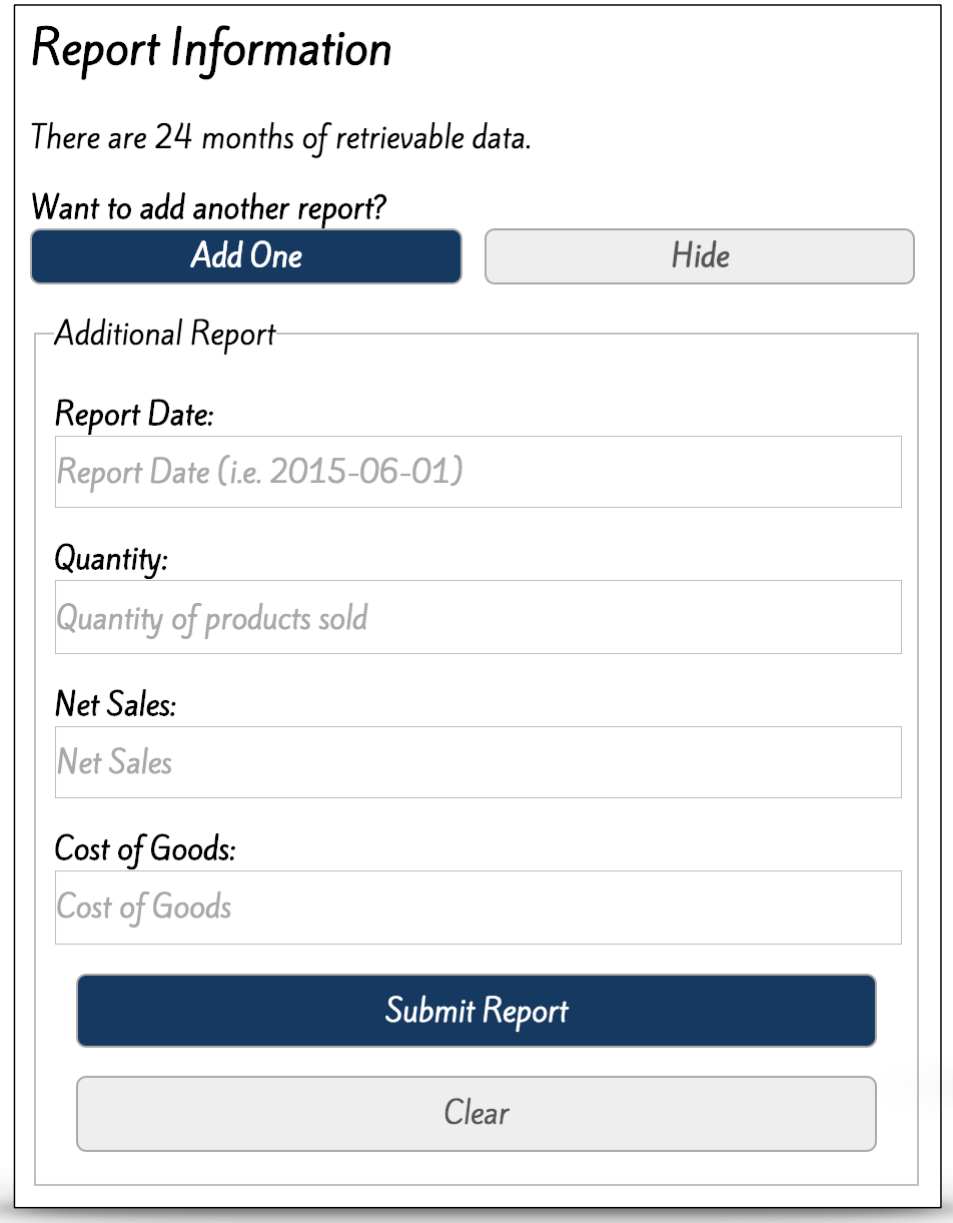
A component world view

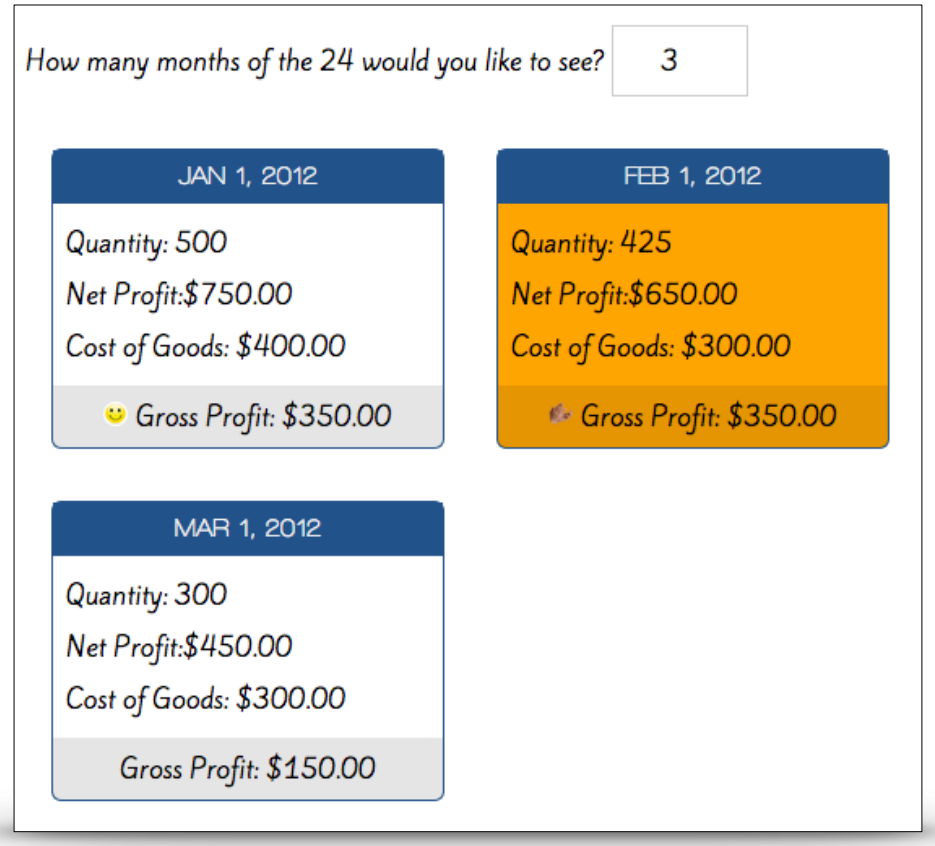
- Create application-specific HTML tags
- Encapsulated, User-Interface building blocks

Componentization

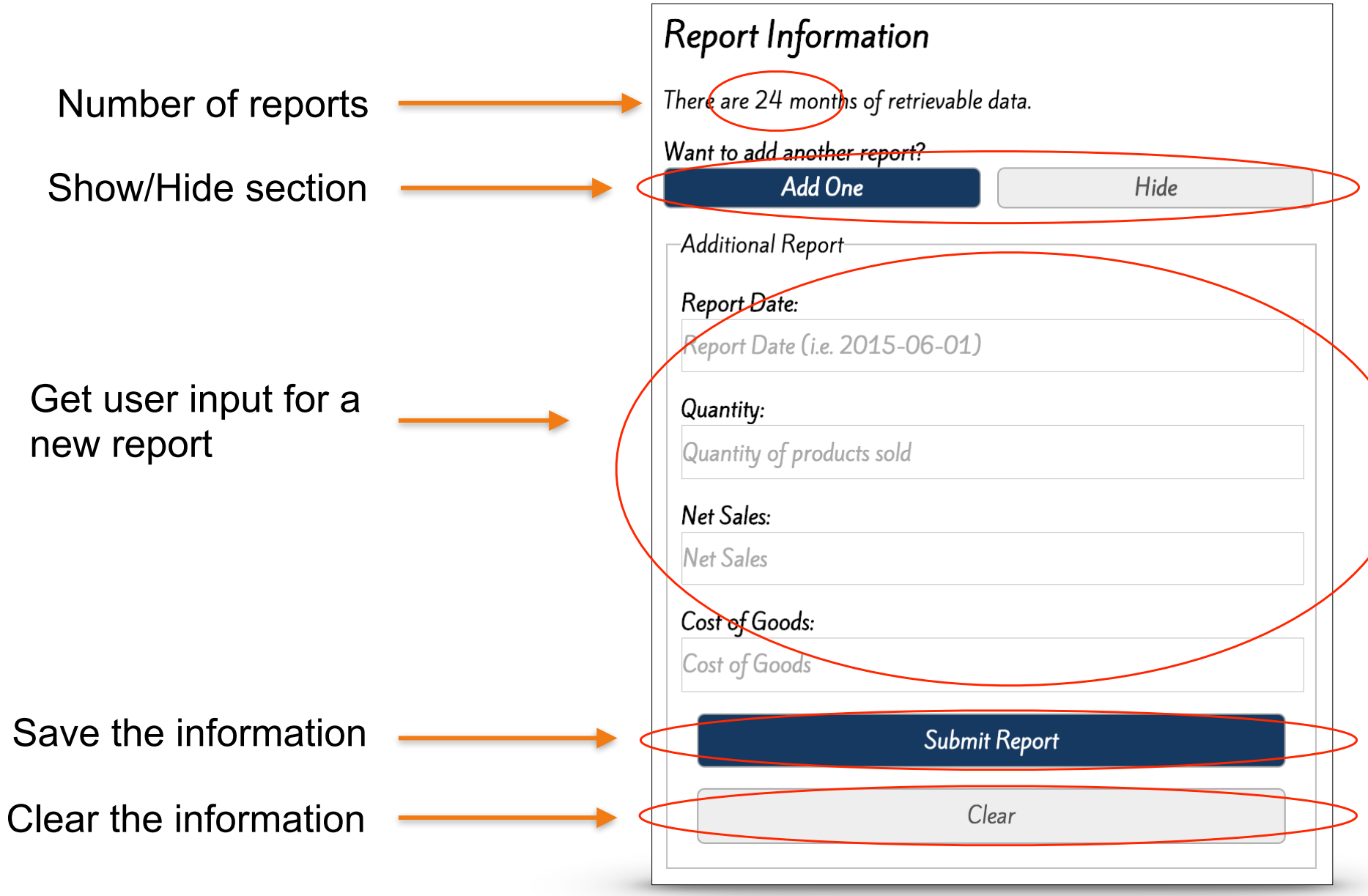


An application breakdown





An application breakdown [cont.]



An application breakdown [cont.]

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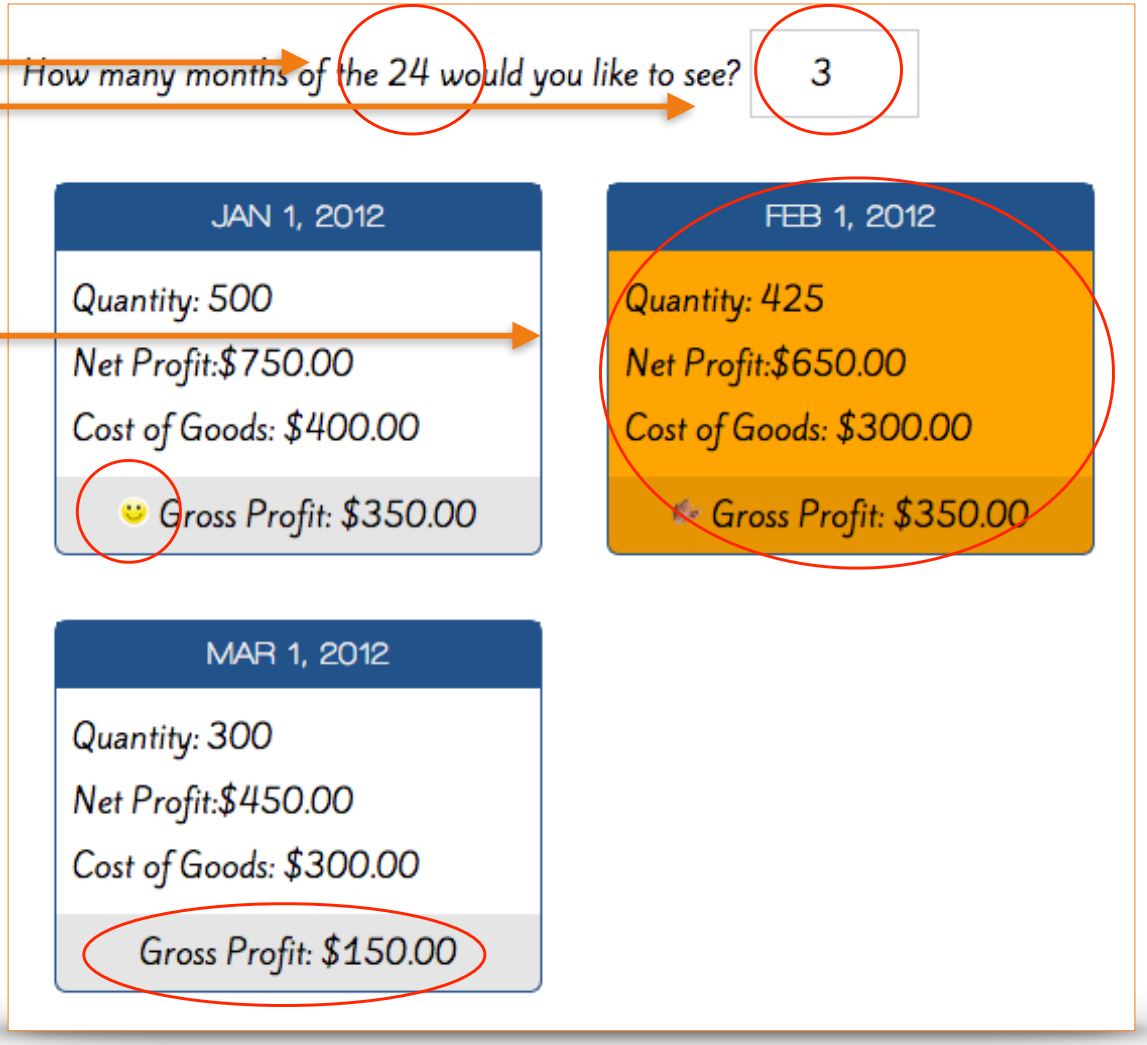
Number of reports

Filtered number of reports

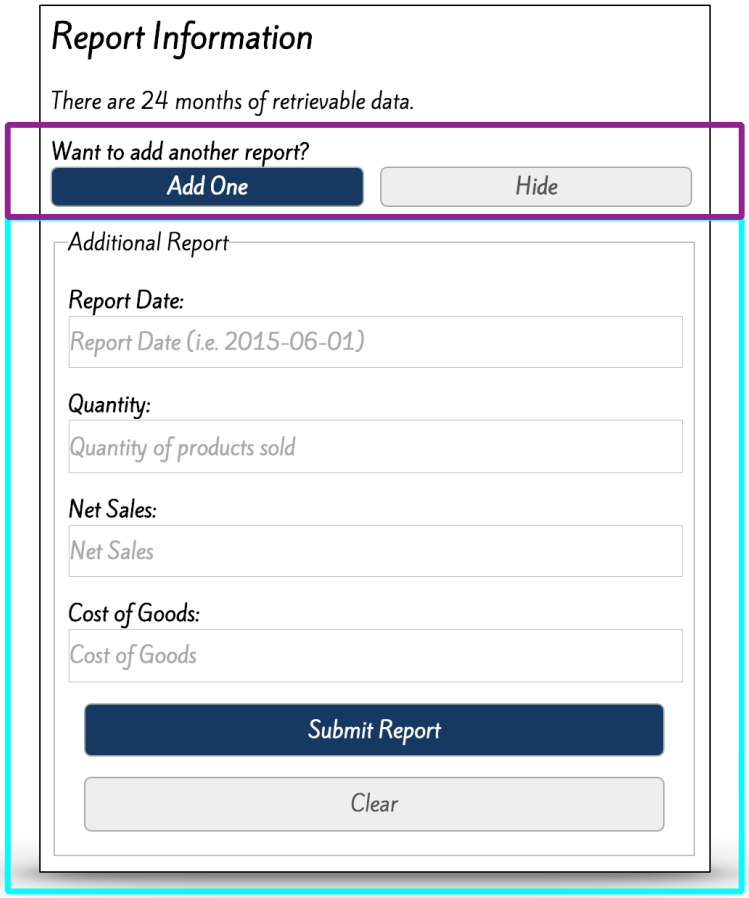
Individual report

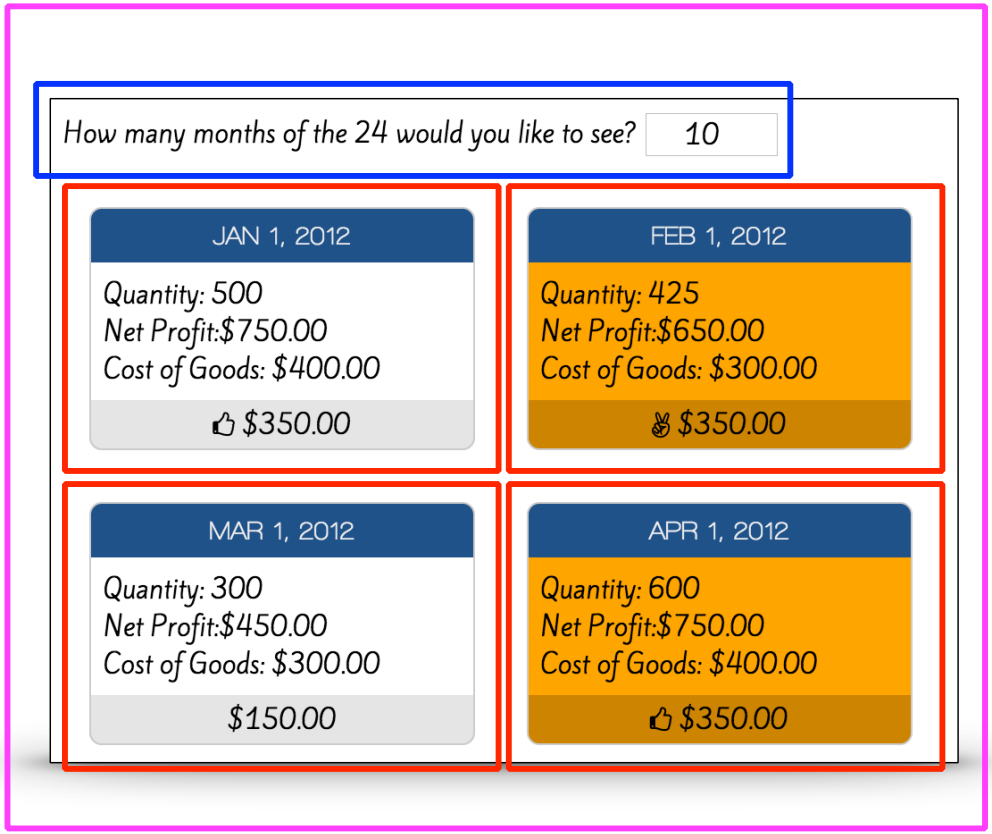
Change images when filtered number changes

Calculate gross profit and add a picture if it is over $200.00



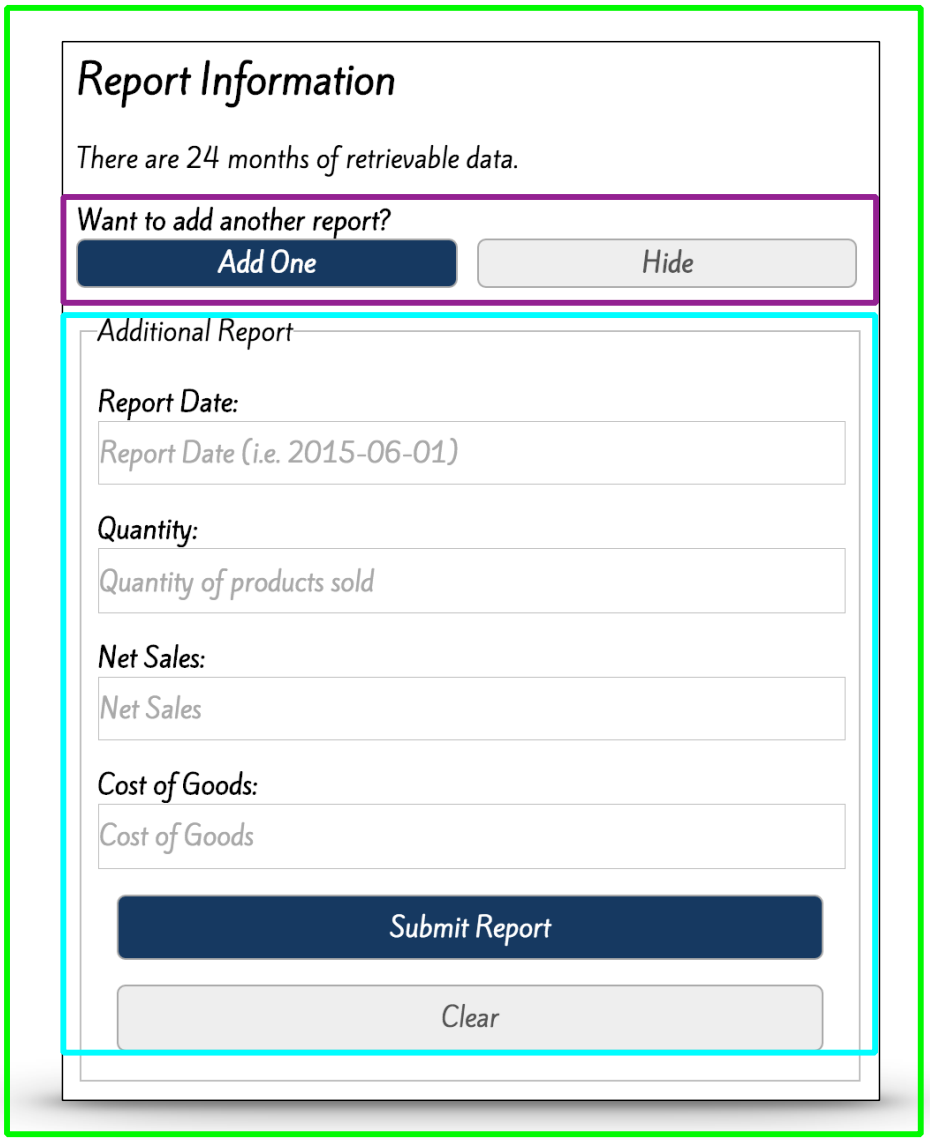
Composing components





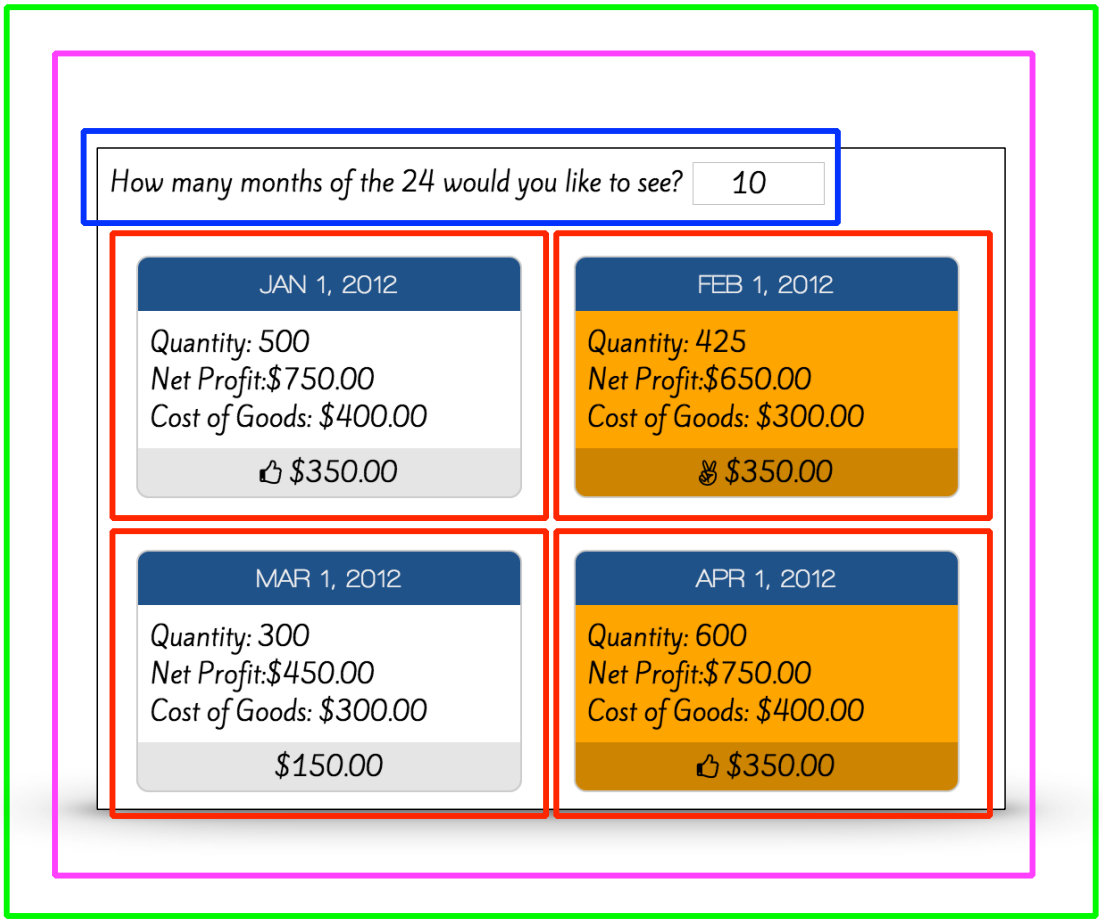
Composing components [cont.]

- Report application component
- Report form control component
- Report form component



Composing components [cont.]

- Report application Component
- Report list component
- Report filter card component
- Report card component



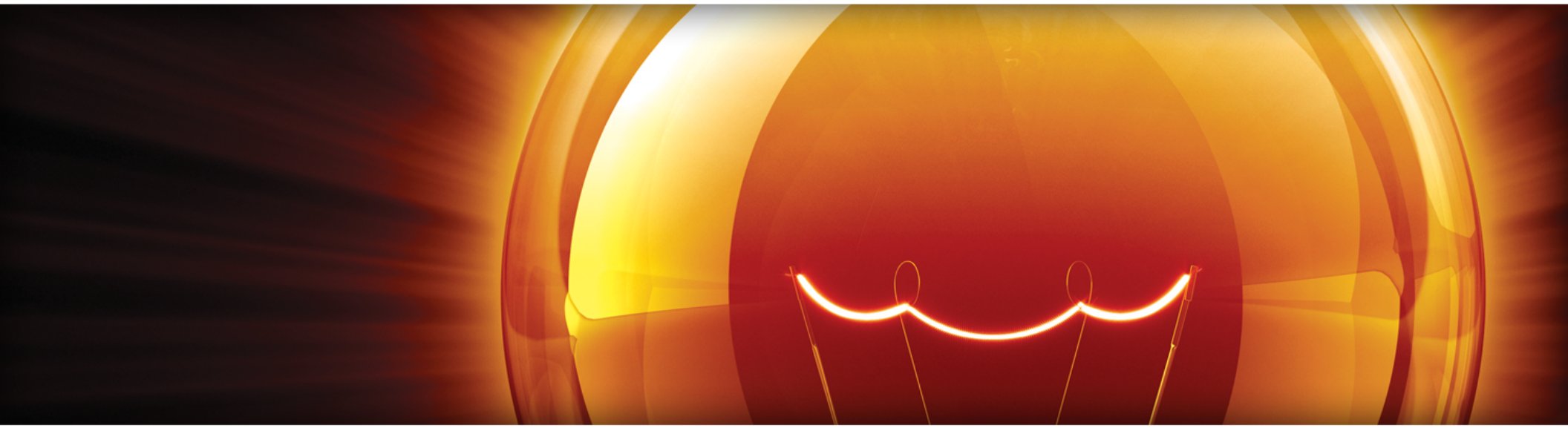
A first component

- https://angular.io/
- Let’s explore the Angular 2 QuickStart on Plunker
- What do you observe about this basic application?

Lab 1

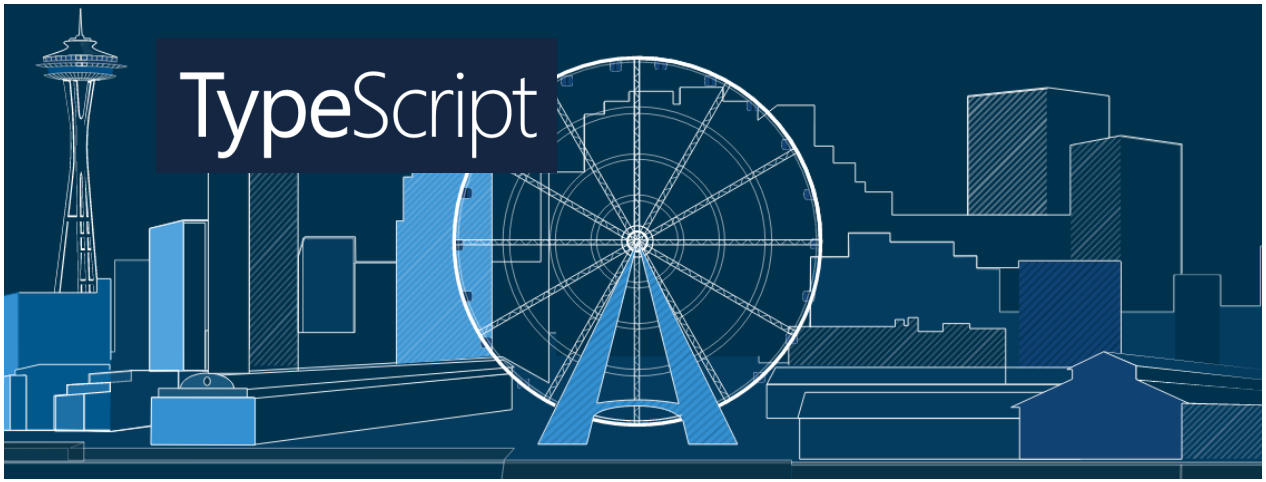
- Make the app say “Hello Angular”
- Change from initially saying “Loading…” to “Launching…”
- Change the HTML tag to <di-app> from <my-app>

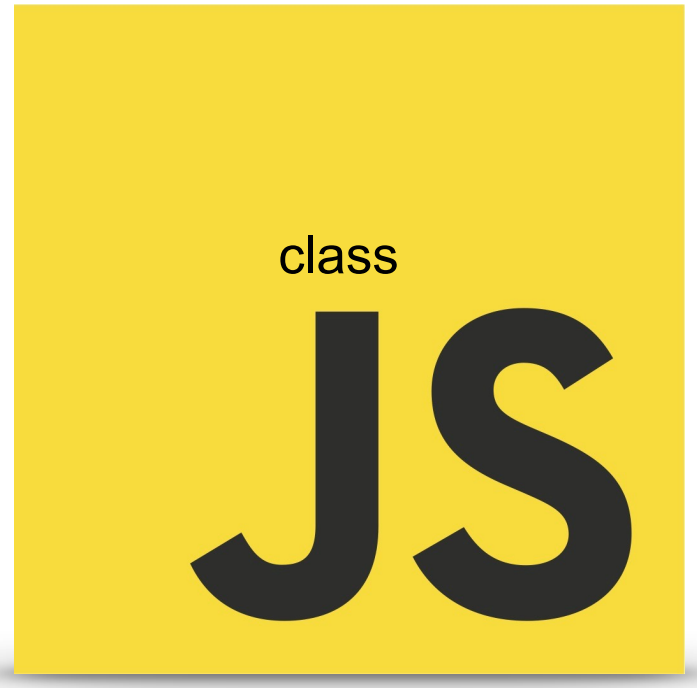
Language Foundations



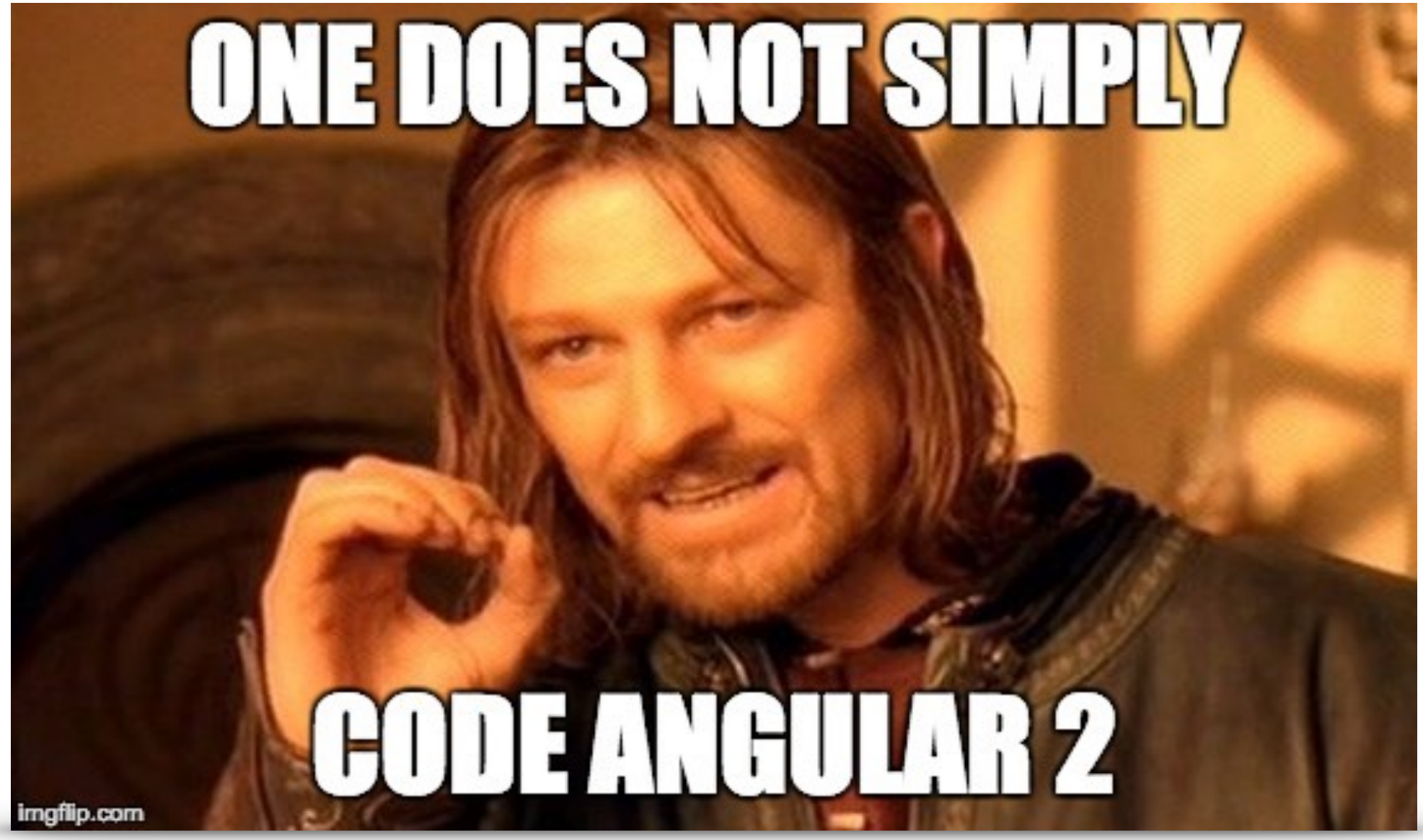
Component alchemy

- Component annotation
- Classes
- Modules

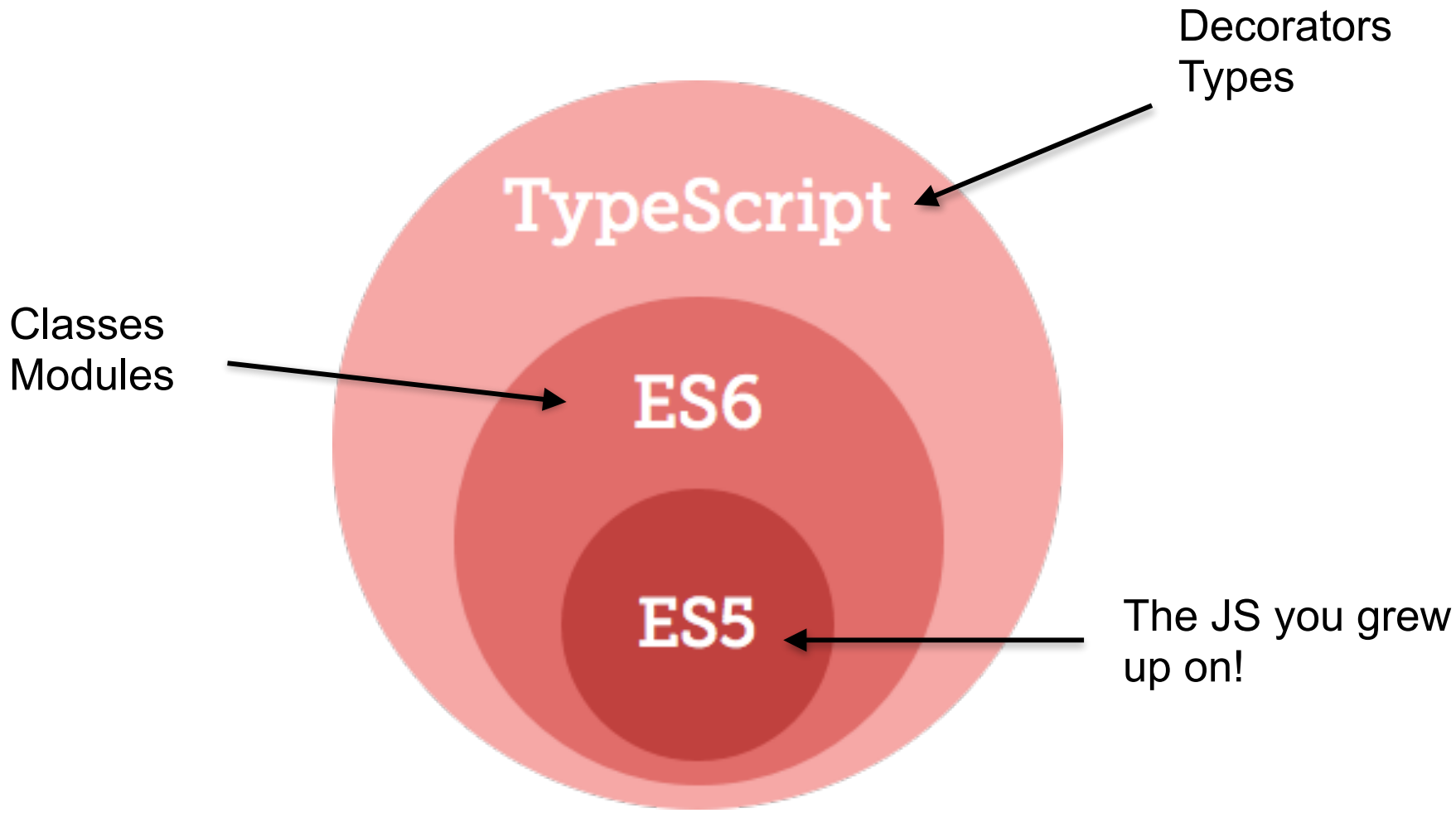




Ummm... Really?!?



Component alchemy



- The new standard in JavaScript development

- Why?
  - Because not much has changed in 6 years
  - ES5 was released in 2009 for IE9+ browsers

ES6 primer topics

- Scope
- Arrow Functions
- Back Ticks
- Classes

- More functionality
  - https://kangax.github.io/compat-table/es6/

Scope: ES5

- JS has function based scope
- No other structures in JS have scope

```
//var i is function scoped
for (var i=0; i<10; i++) {
  console.log("hello");
}

//var aNumber is function scoped
if (aVariable) {
  var aNumber = 42;
}
```

Scope: ES6

- ES6 gives block-level scoping
  - New keywords **let** and **const**

- let

```
//var i is function scoped
var aBoolean = true;

if (aBoolean) {
  let aNumber = 42;
  console.log('Inside block:' + aNumber);
}

console.log('Outside block:' + aNumber);
```

https://jsbin.com/hesuleluri/edit?html,js,console

const

- Identify a variable as a constant
  - Variable itself isn't a constant
  - Reference to the variable is a constant (i.e. the assignment)

```
//Constants are great for identifiers
const PRODUCT_KEY = '42TY889RR';

//Constants help us get rid of magic numbers
//const APR = 0.06;
```

https://jsbin.com/filure/5/edit?html,js,console

- Object properties can change with **const**

```
//Constants are great for identifiers
const config = {
  PRODUCT_KEY: '42TY889RR',
  API: '/data/product/42'
};

//Change reference: Doable
config.PRODUCT_KEY = 'hat';

//Change reference to constant object: Error thrown
config = 'something';
```

When to use what?

- **const**
  - Use const as much as possible
- **let**
  - Use when an actual variable is needed
- **var**
  - Use when all else won't do

Arrow functions

- Originated from CoffeeScript
  - Brings a more concise syntax to anonymous functions

```
// ES5 syntax
var multiply5 = function(x, y) {
  return x * y;
};

// ES6 syntax
var multiply6 = (x, y) => { return x * y; };

multiply5(3, 4);
multiply6(3, 4);
```

http://jsbin.com/meveda/3/edit?html,js,console

- Syntax for 1 parameter

```
// ES5 syntax
var splitIt5 = function(phrase) {
  return phrase.split(' ');
};

// ES6 syntax
var splitIt6 = phrase => { return phrase.split(' '); };
var splitIt6Alt = (phrase) => { return phrase.split(' '); };

splitIt5('Hello World');
splitIt6('Hello World');
splitIt6Alt('Hello World');
```

http://jsbin.com/mugavu/3/edit?html,js,console

- Syntax for 0 parameters

```
// ES5 syntax
var noArgs5 = function() {
  console.log('Hello 5');
};

// ES6 syntax
var noArgs6 = () => { console.log('Hello 6'); };
var noArgs6Alt = _ => { console.log('Hello 6 alt'); };

noArgs5('Hello World');
noArgs6('Hello World');
noArgs6Alt('Hello World');
```

http://jsbin.com/foyuke/2/edit?html,js,console

- Returning an Object Literal
  - Body needs to be parenthesized

```
// ES5 syntax
var setItem5 = function(id, name) {
  return { id: id, name: name };
};

// ES6 syntax
var setItem6 = (id, name) => ({
  id:id, name:name
});

setItem5(42, 'Bill');
setItem6(31, 'Jim');
```

http://jsbin.com/loboro/1/edit?html,js,console

- Simplifying Array functions

```
var lengths = [1, 3, 5];

// ES5 syntax
var areas5 = lengths.map(function areaOfASquare(length) {
  return length * length;
});

//ES6 syntax
var areas6 = lengths.map(lengths => length * length);

console.log("Areas ES5 " + areas5);
console.log(“Areas ES6 “ + areas6);
```

http://jsbin.com/fidobexaci/2/edit?html,js,console

Back Ticks

- Typically creating multi-line strings can be a pain
  - The **+** operator is cumbersome
  - Having a new string on each line is hard to read

```
var NEGATION = 'not';
var element = $('<section><p>This is ' + NEGATION +
  ' such a nice thing</p></section>');
```

Back Ticks [cont.]

- They simplify multi-line strings
  - They allow for templating dynamic content into strings

```
var NEGATION = 'not';
var elementContents = `
   <section>
     <p>This is ${NEGATION} such a nice thing</p>
   </section>`;
var element = $(elementContents);
```

http://jsbin.com/pikayu/1/edit?html,js,console

Classes

- The class keyword has been finally utilized within ES6
- Don’t be fooled we are still dealing with objects and prototypal inheritance
  - Constructor
  - Instance properties/methods
  - Prototype properties/methods

- Basic JavaScript constructor

```
function City() {
  //Stuff in here to construct
}

var lansing = new City();

console.log("instanceof: " + (lansing instanceof City));
console.log("constructor check: " +
  (lansing.constructor === City));
```

- ES6 constructor

```
class City {
  //Stuff in here to construct
  constructor() {
    //Set any instance variables/methods here
  }
}

var lansing = new City();

console.log("instanceof: " + (lansing instanceof City));
console.log("constructor check: " +
  (lansing.constructor === City));
```

- Basic JavaScript instance properties / methods

```
//We need to create a new City to use instance properties
function City(numOfPeople) {
  //Instance Property
  //  Every City object instance will have this property
  this.numOfPeople = numOfPeople;
}
```

- ES6 instance properties / methods

```
class City {
  //Stuff in here to construct
  constructor(numOfPeople) {
    //Instance Property
    //  Every City object instance will have this property
    this.numOfPeople = numOfPeople;
  }
}
```

- Basic JavaScript static properties / methods

```
//We could just say var City = {} if we are doing utilities
//  instead of a Constructor function
function City(numOfPeople) {
  this.numOfPeople = numOfPeople;
}

//Class/Utility method
//  This method exists only on the City object not on the
instances
City.moreHouseHolds = function (cityA, cityB) {
  if (cityA.numOfPeople > cityB.numOfPeople) {
    return cityA;
  } else {
    return cityB;
  }
}
```

- ES6 static properties / methods

```
class City {
  constructor(numOfPeople) {
    this.numOfPeople = numOfPeople;
  }

  //Class/Utility/Static method called off of Object
  static moreHouseHolds(cityA, cityB) {
    if (cityA.numOfPeople > cityB.numOfPeople) {
      return cityA;
    } else {
      return cityB;
    }
  }
}
```

- Basic JavaScript prototype methods

```
function City(numOfPeople) {
  this.numOfPeople = numOfPeople;
}

//Method on the shared Object Prototype
//  Only 1 copy exists on City.prototype property
City.prototype = {
  getNumOfPeople: function () { return this.numOfPeople; },
}

var boulder = new City(101808);
console.log('Population:' + boulder.population());
```

- ES6 prototype methods

```
class City {
  constructor(numOfPeople) {
    this.numOfPeople = numOfPeople;
  }

  //Method on the shared Object Prototype
  getNumOfPeople() {
    return this.numOfPeople;
  }
}
var lansing = new City(110000);
console.log("Number of people: " + lansing.getNumOfPeople());
```

Loosing our reference

- ES5 uses **bind()** to save “this” reference

```
function City(numOfPeople) {
  //var that = this
  this.numOfPeople = numOfPeople;
  var divisor = 3;

  var calcHouseHolds = function() {
    //return that.numOfPeople / divisor;
    return this.numOfPeople / divisor;
  }.bind(this);

  this.getHouseHolds = function () {
    return calcHouseHolds();
  };
}

var lansing = new City(110000);
console.log(lansing.getHouseHolds());
```

https://jsbin.com/ceyoce/edit?js,console

Loosing our reference [cont.]

- ES6 uses Fat Arrow to save “this” reference

```
function City(numOfPeople) {
  this.numOfPeople = numOfPeople;
  var divisor = 3;

  //Captures the “this” value of the enclosing context
  var calcHouseHolds = () => {
      return this.numOfPeople / divisor;
  };

  this.getHouseHolds = function () {
    return calcHouseHolds();
  };
}

var lansing = new City(110000);
console.log(lansing.getHouseHolds());
```

https://jsbin.com/lucasi/edit?js,console

Lab 2

- Change code from ES5 to ES6

- Start with the code @ JSBin
  - http://jsbin.com/bupehaz/edit?js,console

- Class
- Fat Arrow
- Back ticks
- let / const

Why Modules?

- JavaScript applications grow in complexity
- Need reusable functionality
- Want encapsulation

Module types

- IIFE
- Module/Revealing Module Pattern
- AMD & CommonJS
- ES6

- Pattern used to build modules

```
//Douglas Crockford's suggestion
(function () {
  var speak = 'yelp';
  console.log(speak);
}());

//This works fine also
(function () {
  var speak = 'yelp';
  console.log(speak);
})();
```

```
//Syntax error: a declaration
function () {
  console.log("yelp");
}();

//You meant: an expression
var aFunction = function () {
  console.log("yelp");
}();
```

Revealing Module Pattern

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```
var aModule = (function () {
  var time = 8;
  var doWork = function doWork() {
    console.log("working " + time + " hours");
  };
  var doMoreWork = function doMoreWork() {
      time += 2;
      console.log("working more " + time + " hours");
  };
  return {
    doWork: doWork,
    doMoreWork: doMoreWork
  };
}());

console.log("time: " + aModule.time);  //Will this work?
aModule.doWork();
aModule.doMoreWork();
aModule.doMoreWork();
```

http://jsbin.com/gaxinuc/edit?html,js,console

AMD and CommonJS

- Module syntax
- Need a module loader
  - RequireJS, Browserify, SystemJS or Webpack

- AMD
  - **define**, **require**
- CommonJS
  - **require, exports**

ES6 Modules

- Module syntax built into JavaScript

- Currently no browsers support these :(
- We need a transpiler & module loader

ES6 Modules [cont.]

- export
  - Defines the API of application module
- import
  - Imports dependencies (i.e. required modules)
  - Every time we need a module we will require it

import

- Requiring modules
  - https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Statements/import

```
//lemonade.js file
//  Importing the 'insert' method from the 'date' module
import {insert} from './date';
//import * as date from './date';

//Main functionality
//  Use the imported 'insert' method
//    without the 'date' namespace
insert('header h1');
//date.insert('header h1');
```

- Creating modules
  - https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Statements/export

```
//Date module: date.js file

//Including the NPM package jquery for this Date module
import $ from 'jquery';

export function insert(elementSelector) {
    //DO stuff
}
```

- Why?
  - Developing large scale applications in JavaScript can be a mess
  - Static typing aides in IDE support and cleaner language syntax

- No browser support
  - Need Typescript compiler

TypeScript primer topics

- Typing
- Decorators

- Other Typescript functionality
  - Interfaces, mixins, generics, namespaces, enum

- API
  - https://www.typescriptlang.org/docs/handbook/basic-types.html
- Playground
  - https://www.typescriptlang.org/play/

Typing

```
//TypeScript
let aDecimal: number = 6;
//JS
//  var aDecimal = 6;

//TS
let isFormVisible: boolean = true;
//JS
//  var isFormVisible = true;

//TS
let aName: string = “Kamren";
//JS
//  var aName = “Kamren";

//TS
let ages: number[] = [3, 8, 10];
//JS
//  var ages = [3, 8, 10];
```

Typing [cont.]


```
//TypeScript
let notSure: any = 4;
notSure = "maybe a string instead”;
//JS
//  var notSure = 4;
//  notSure = "maybe a string instead”;

//TS
function warnUser(): void {
    alert("This is my warning message");
}
//JS
function warnUser() {
    alert("This is my warning message");
}
```

Decorators

- Decorators allow for annotations
  - https://www.typescriptlang.org/docs/handbook/decorators.html
  - Currently in the process of being adopted by JavaScript:

- Angular 2 uses annotations to decorate classes as components

```
import { Component } from '@angular/core';

@Component({
  selector: 'my-app',
  template: '<h1>My First Angular 2 App</h1>'
})
export class AppComponent { }
```

SystemJS

- Module loader
  - https://github.com/systemjs/systemjs
  - Allows for browsers to be able to consume modules
  - Similar to RequireJS

- How to install?
  - **npm install systemjs --save-dev**

- Install
  - **npm install -g typescript@rc**
  - check version with **tsc -v**

- Install Angular 2 TypeScript Snippets for VS Code
  - Angular 2 TypeScript Snippets from John Pappa
  - type **ext install Angular2** into the Command Palette
  - Don’t forget to enable it

Using Typescript & ES6 in the Browser

- Install Typescript and SystemJS plugin
  - npm install plugin-typescript@4.0.16 --save-dev
  - Automatically installs Typescript for app use
  - Allow the transpiring to happen real-time with SystemJS

- Install typings
  - https://github.com/typings/typings
  - **npm install typings -g**
- Install jQuery typing globally
  - **typings install dt~jquery --global —save**
  - Do this is within the folder

Lab 3

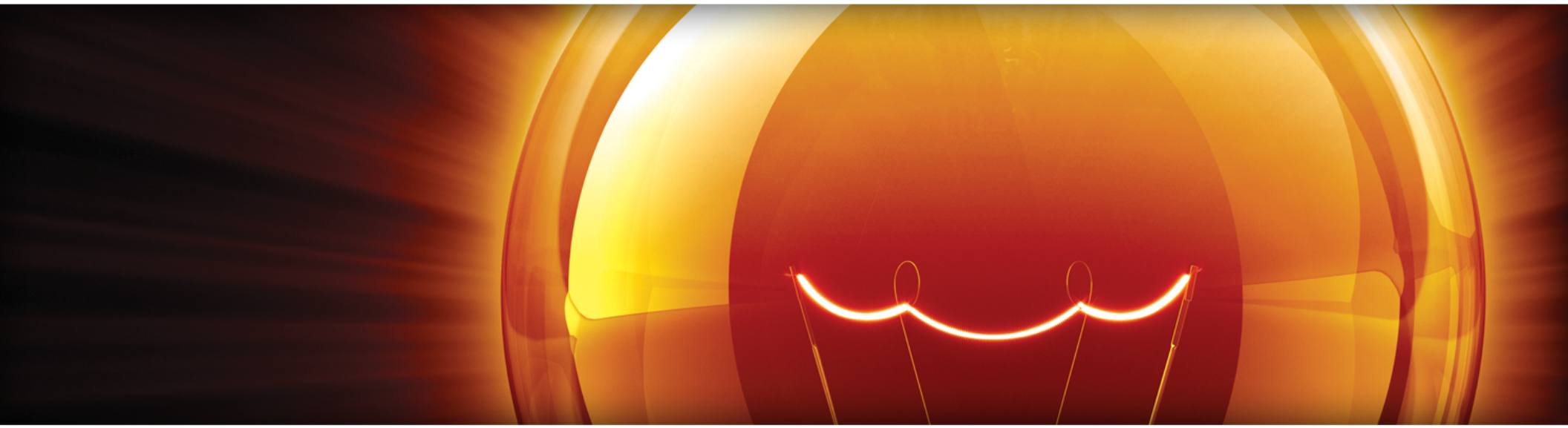
- Create ES6 modules w/ Typescript & SystemJS
  - Start with Lab 3 starter
  - Code into ES6 modules
  - Use **npm install** to get your dependencies

- Get index.html to load the proper JavaScript files
- Create a main.ts file
- Create a productKey.ts

Lab 3b

- Add typing to ES6 class
  - Go to previous JSBin and make the changes

Angular 2 componentization



- API
  - https://angular.io/docs/ts/latest/api/
- Browser Support
  - https://angular.io/docs/ts/latest/guide/browser-support.html
- Polyfills
  - Angular provides suggestions about what polyfills are needed to get IE9+ working

A component world view

- Simple … cohesive … composable … components

Demo

- Remember our Hello Angular on Plunker
  - http://plnkr.co/edit/6sP5NfiXWejhY414fKQR

A cohesive component

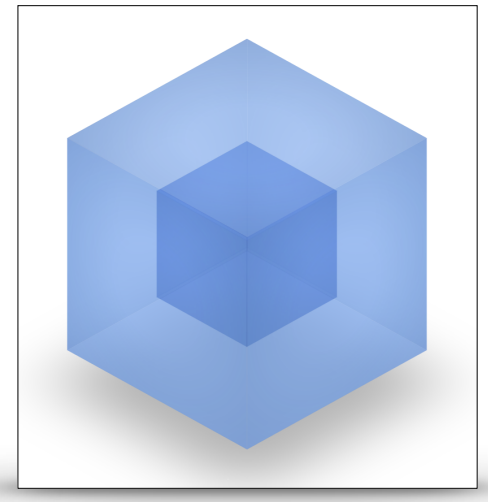
TypeScript
Component annotation

```
import { Component } from '@angular/core';

@Component({
  selector: 'di-app',
  template: '<h1>Hello Angular</h1>'
})
export class AppComponent { }
```

ES6 class definition

Angular CLI

- We could build all the configuration for Angular 2… buy why?
- A command line interface for Angular
  - Built off of Ember's CLI
  - Now uses Webpack rather than SystemJS



- Install
  - **npm install angular-cli@latest -g**

Our 2nd Angular App

- Create a project
  - **ng new demo_spitfire**

- Make sure it works
  - **ng serve**
  - Go to http://localhost:4200/

Using model data

- How do we get dynamic data into our application?

```
import { Component } from '@angular/core';

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'app works!';
}
```

```
<h1>
  {{title}}
</h1>
```

Model data

Generating a component

- Use Angular CLI to generate a component
  - **ng generate component hello-world**

- What the CLI gives us
  - **hello-world.component.css**
  - **hello-world.component.html**
  - **hello-world.component.ts**
  - **hello-world.component.spec.ts**

More on model data

- How do we change to “Hello World,” with **World** being model data?

hello-world.component.html

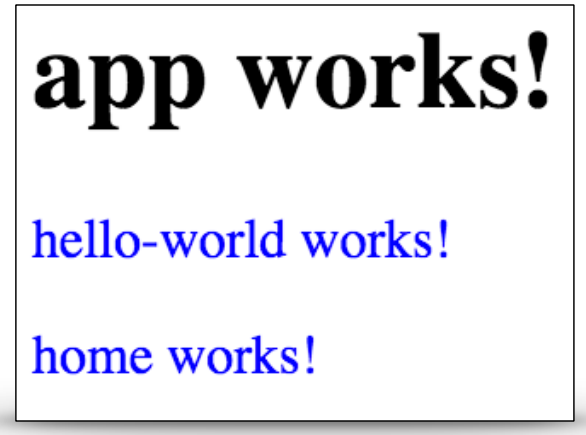
```
<p>
  hello-world works
</p>
```

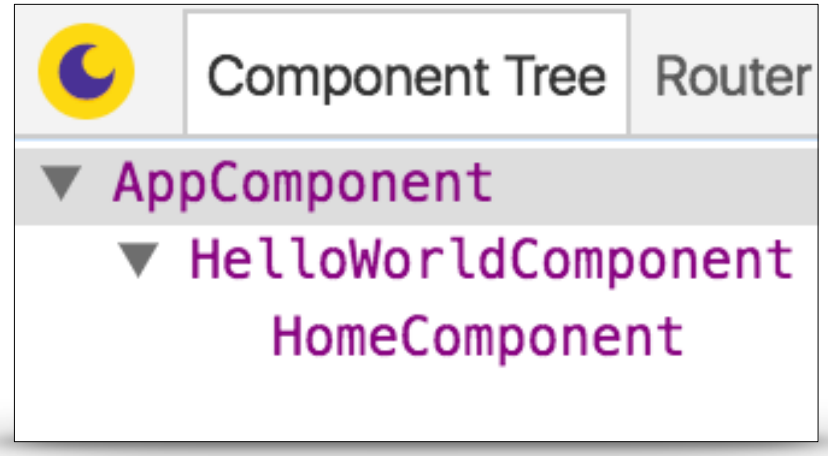
hello-world.component.ts

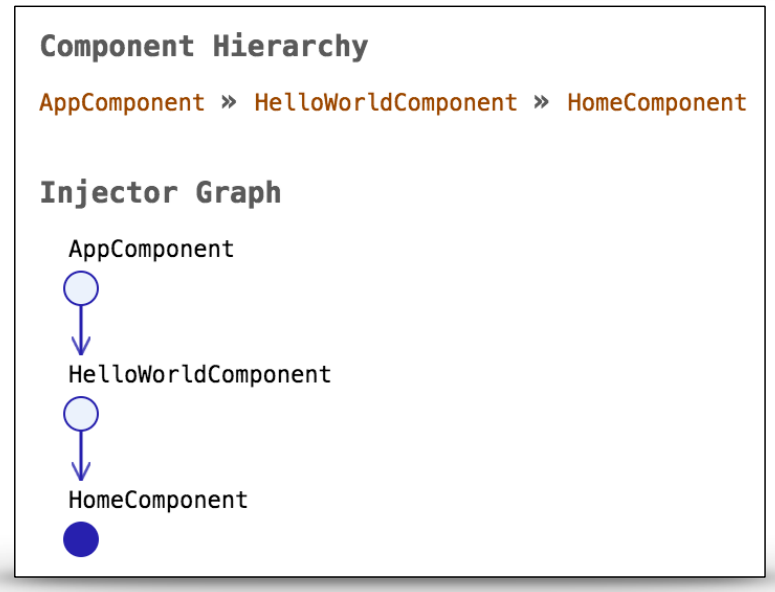
```
export class HelloWorldComponent implements OnInit {

  constructor() { }

  ngOnInit() {
  }

}
```

- Angular 2 Chrome Dev Extension
  - https://augury.angular.io/

- Give visibility into the component tree







Inspect the browser

- Where does the CSS get placed from the build?
- What JavaScript files are created?
- Where can we actually see the code we wrote?

The module

- What do you observe

app.module.ts

Decorator for a module

Components within module

Modules needed for this module

Root component

```
@NgModule({
  declarations: [
    AppComponent,
    HelloWorldComponent,
    HomeComponent
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule
  ],
  providers: [],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

The module

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Manual import of modules

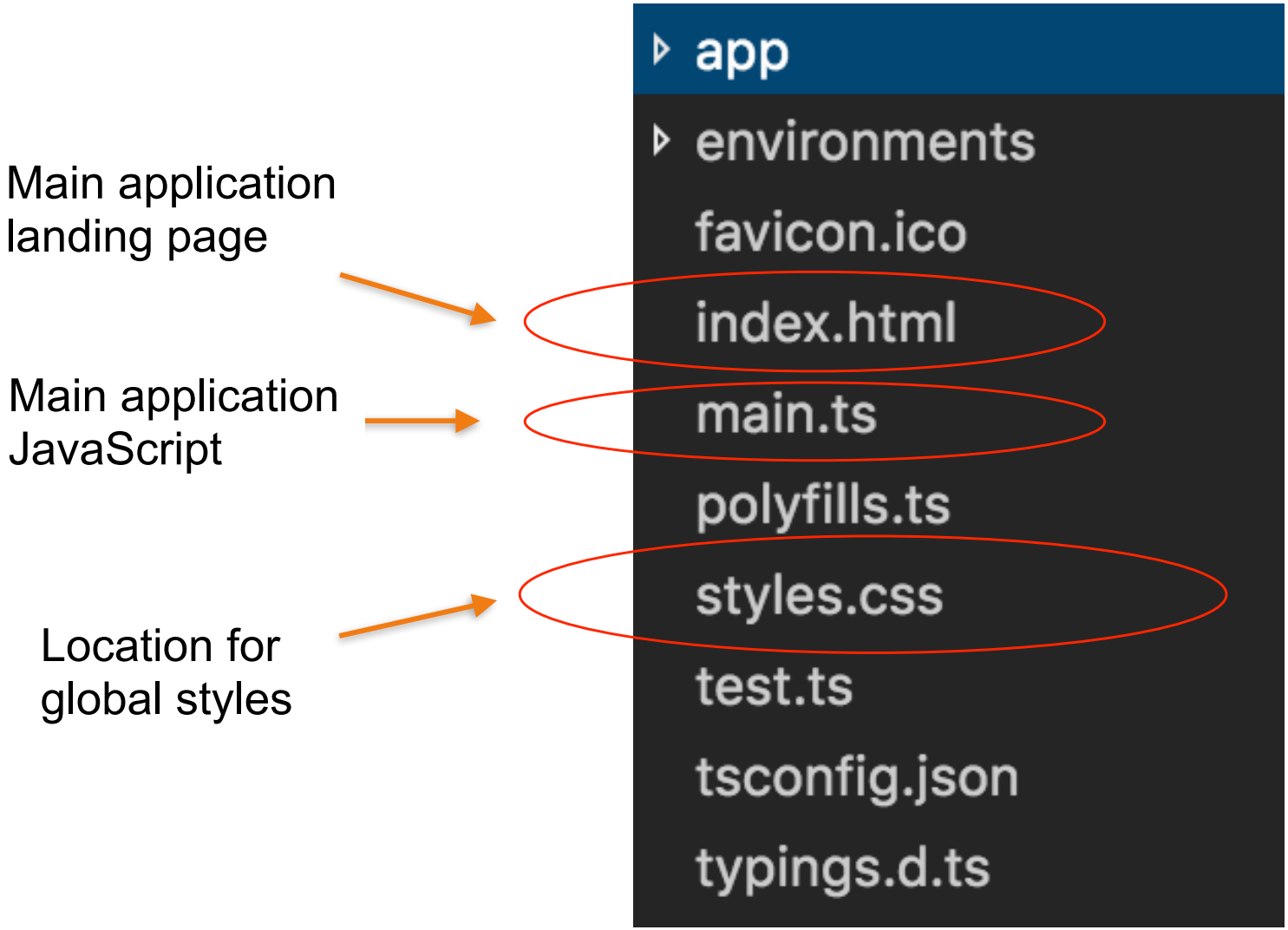
app.module.ts

```
import { BrowserModule } from '@angular/platform-browser';
import { NgModule } from '@angular/core';
import { FormsModule } from '@angular/forms';
import { HttpModule } from '@angular/http';

import { AppComponent } from './app.component';
import { HelloWorldComponent } from './hello-world/hello-world.component';
import { HomeComponent } from './home/home.component';
```

Manual import of components

Additional bootstrapping



The main

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main.ts

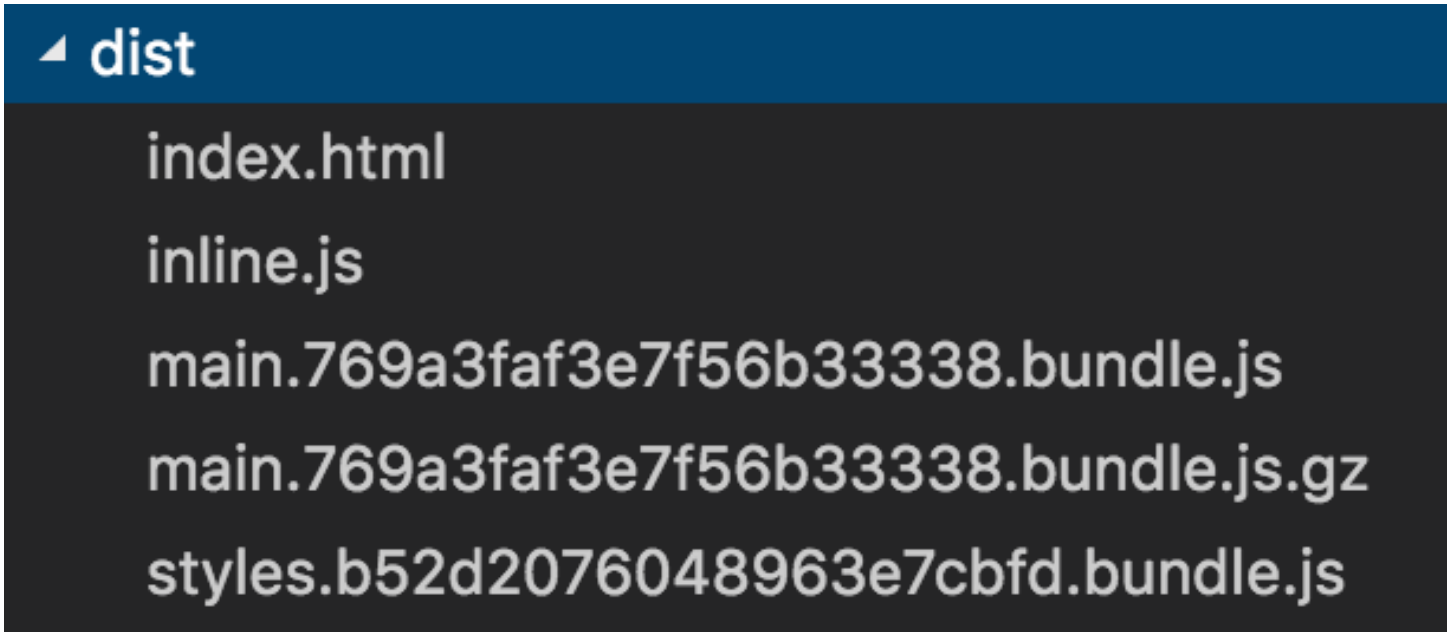
```
import './polyfills.ts';

import { platformBrowserDynamic } from '@angular/platform-browser-dynamic';
import { enableProdMode } from '@angular/core';
import { environment } from './environments/environment';
import { AppModule } from './app/';

if (environment.production) {
  enableProdMode();
}

platformBrowserDynamic().bootstrapModule(AppModule);
```

Kicking off the application

Quick production build

- Build for production
  - **ng serve --prod**

- Uglify code
- Tree shaking



More configuration

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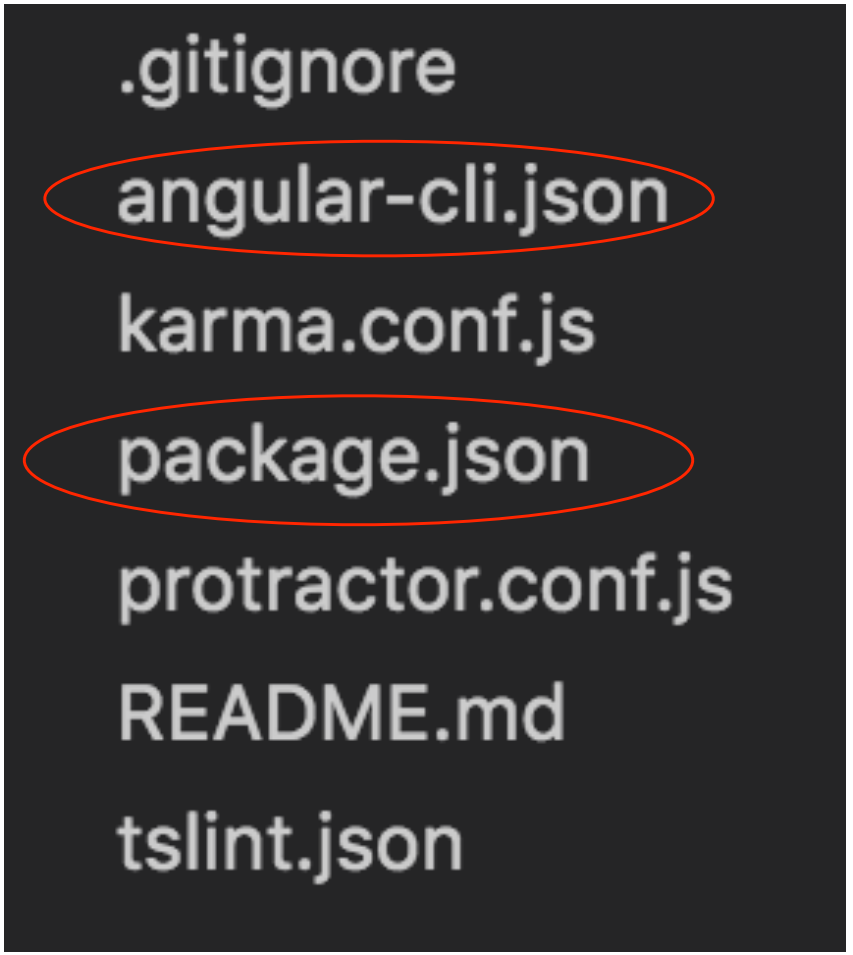
Configuration for Angular CLI

Configuration for Node



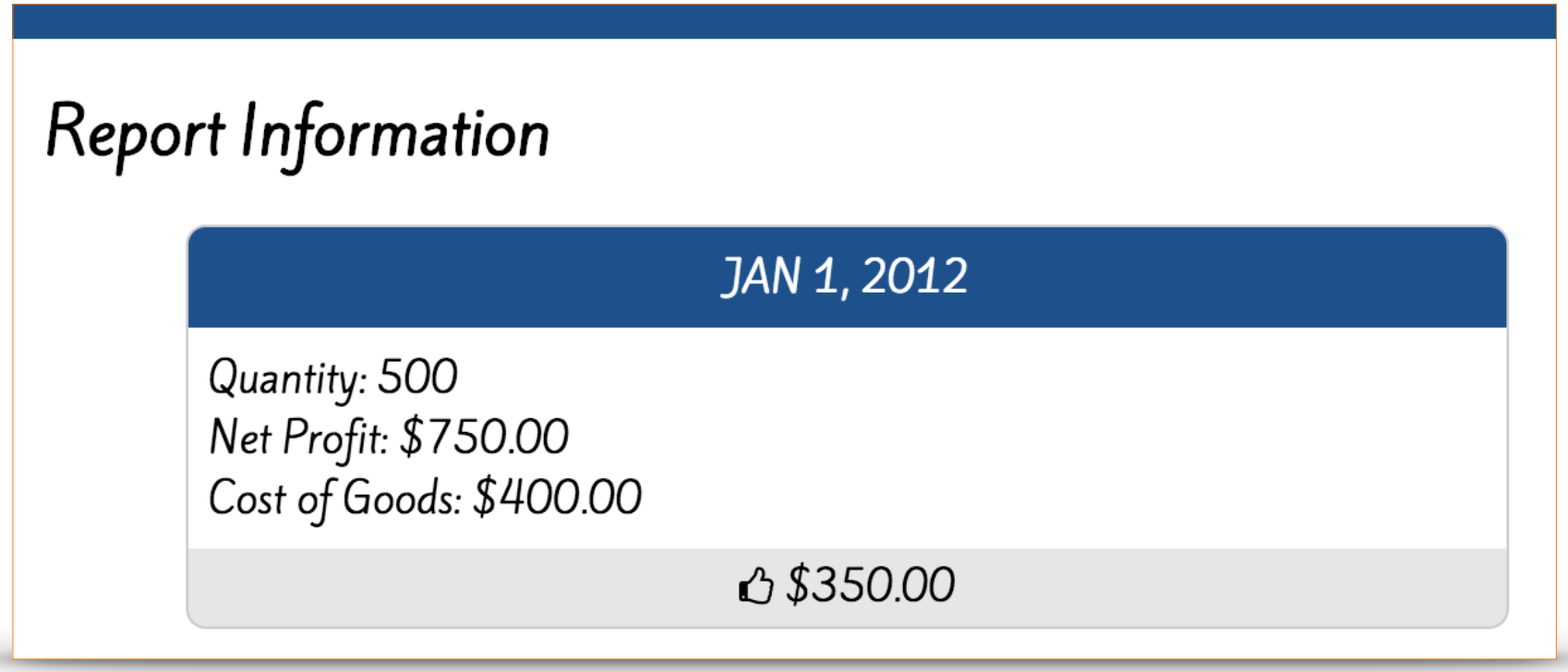
Lab 4

- Start building a report

- Create a header component
- Utilize component specific CSS

- Use the provided CSS as a start
  - Specific the **.title** classes
  - General CSS: @font-face, #content, body

- Add a component



- Use the provided CSS as a start
  - Specifically the **.report** classes
  - Use font-awesome for the graphic:
    - http://fontawesome.io/icons/

Pipes

- Pipes are filters from Angular 1
- Allow model data to have a different look in the view

- A few different built-in pipes
  - Date
  - LowerCase
  - UpperCase

- Pipes
  - https://angular.io/docs/ts/latest/api/
  - https://angular.io/docs/ts/latest/guide/pipes.html

Pipes [cont.]

- How could we remove the **W** in World?

- How could we only show **orl** in World?

Data Binding

- We have seen data binding…

- Other data binding?

Data Binding [cont.]

- Binding an attribute
  - [target]="expression"

home.component.html

```
<p [style.background]="'orange'">
  home works!
</p>
```

- View to model
  - (target) = “statement”

hello-world.component.html

```
<p>
  Hello World
  <button
    (click)="removeMe()"
  >Remove</button>
<p>
```

Directives

- Angular 1 had lots of directives
- Angular 2 removes most of those with its data binding

- Directive categories
  - Component
  - Structural
  - Attribute

Structural Directive

- ngIf … remove / add DOM elements

```
<p>
  Hello World
  <button
    (click)="removeMe()"
  >Remove</button>
  <app-home
    *ngIf="isRemoved"
  ></app-home>
</p>
```

Structural Directive [cont.]

- ngFor … the ng-repeat alternative

```
<ul>
  <li *ngFor="let city of cities">{{city.name}} </li>
</ul>
```

```
export class HelloWorldComponent implements OnInit {
  cities: any[];

  constructor() {
    this.cities = [
      { name: 'Boulder', population: 103000 },
      { name: 'Colorado Springs', population: 439886 },
      { name: 'Denver', population: 649495 },
      { name: 'Fort Collins', population: 152061}
    ];
  }

}
```

Attribute Directive

- ngStyle … adding styles to an element
- How do we set one style?

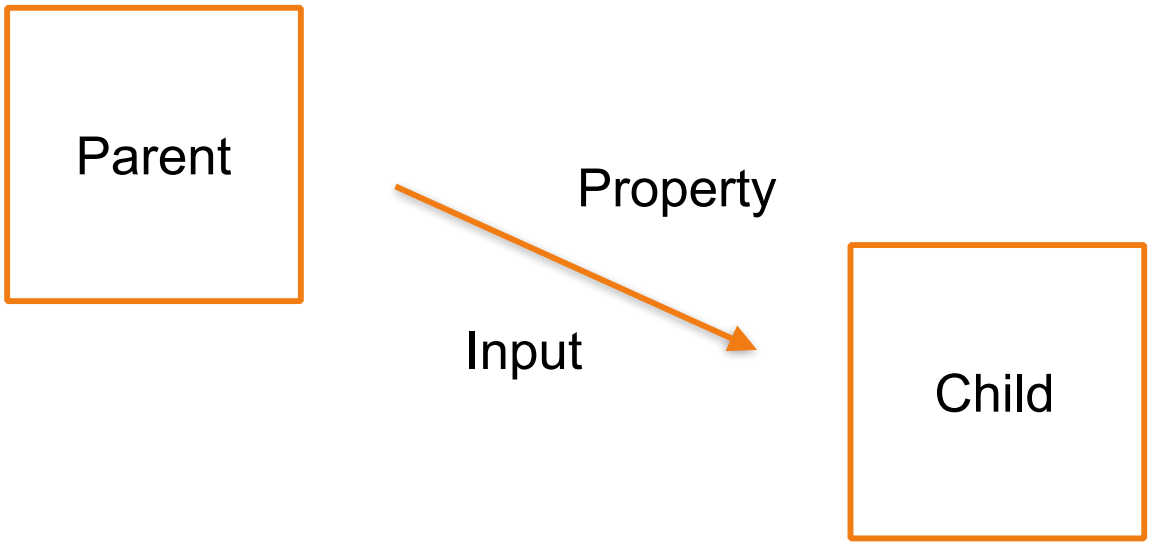
- **ngStyle**s let's us set multiple styles at once

```
<mark [ngStyle]="setStyles()">Read only :(</mark>
```

```
setStyles() {
  return {
    'font-style': this.isReadOnly ? 'bold' : 'normal',
    'color': this.isReadOnly ? 'gray' : 'black'
  };
}
```

Inputs

- We are going to need to pass data from parent to child
- Think of it as parent to child communication
- A one-way data flow



- Parent has a property the child needs

```
export class HelloWorldComponent implements OnInit {

  meaningOfLife: number;

  constructor() {
    this.meaningOfLife = 42;
  }

}
```

Passing **meaningOfLife** from parent to child

```
<p>
  Hello World
  <app-home
    [mOL] = "meaningOfLife"
  ></app-home>
</p>
```

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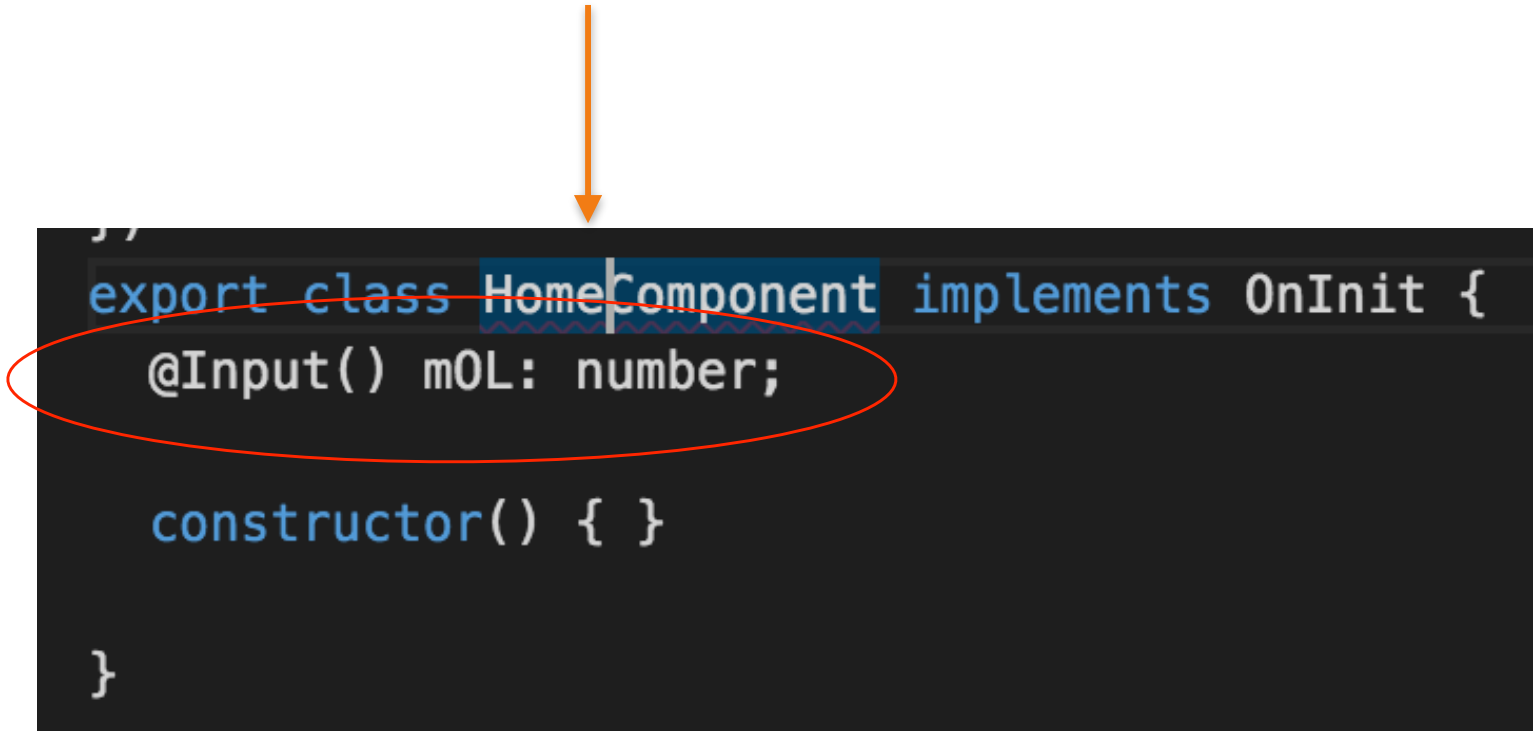
- Parent has a property the child needs

Specifying expected inputs into the component



- It’s now time to build multiple reports

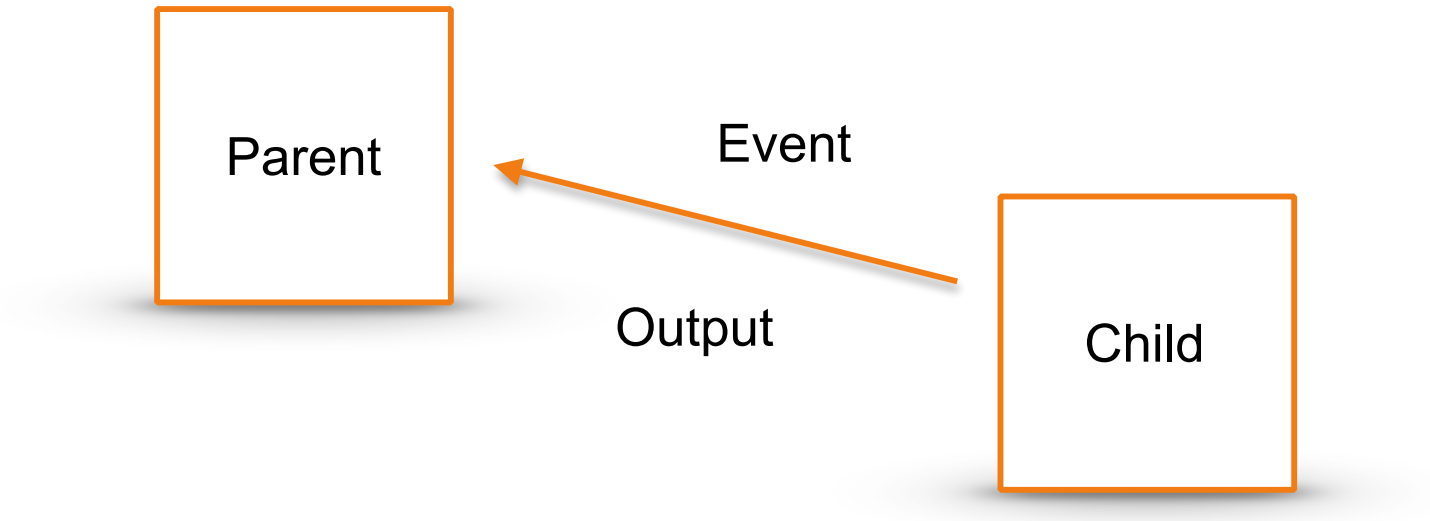
Lab 5b

- Grab report data and make a list of cards from:
  - http://lemon-aide-api.azurewebsites.net/data/reports
  - Create a card list component

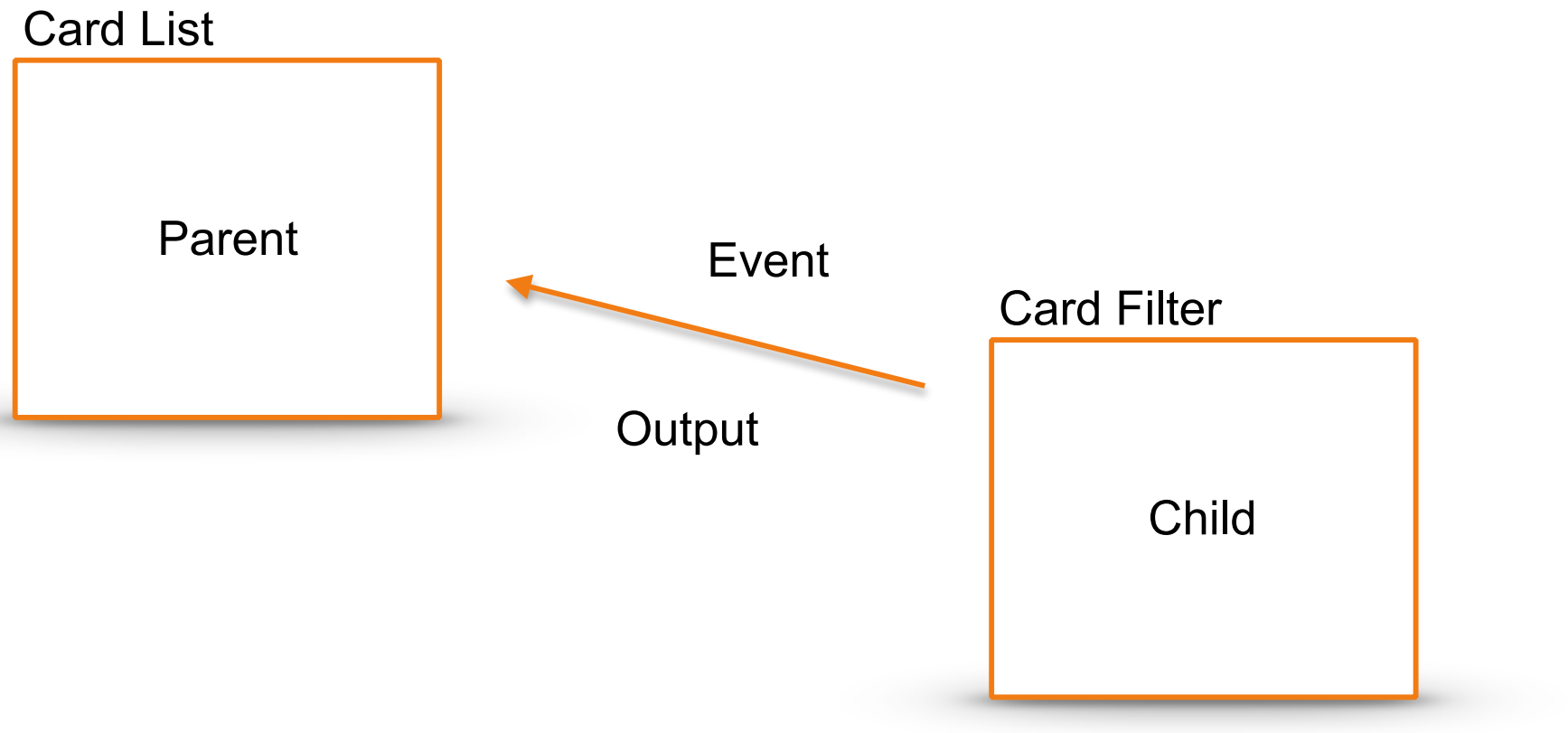
- Get that report object from earlier
  - Create a new report object for each chard
  - Use pipes to filter the strings into a nice look
  - Only show an image if report is profitable (i.e. Gross Profit over $200)
  - Show odd cards with an different color background

Outputs

- We are going to need to send data from child to parent
- We want a one-way data flow so we will use events to send data up from child to parent
  - Properties flow down
  - Events bring data up



Outputs [cont.]



Child to parent communication

- Report application Component
- Report list component
- Report filter card component
- Report card component

Outputs [cont.]

- Let's look at this in our report list?

card-filter.component.html

```
<section class="report-filter">
  <button (click)="showCards(2)">Show 2 months</button>
</section>
```

Non-semantic child event

card-list.component.html

```
<section>
    <app-card-filter
        (onShowCards)="onShowCards($event)"
        ></app-card-filter>
    <ul class="report-listing">
        <app-card
            *ngFor="let report of reports, let i=index"
            [report] = "report"
            [index] = "i">
        </app-card>
    </ul>
</section>
```

Semantic custom event output

Develop Intelligence

- Coding the event emitter

card-filter.component.ts

```
import { Component, EventEmitter, OnInit, Output } from '@angular/core';

@Component({
  selector: 'app-card-filter',
  templateUrl: './card-filter.component.html',
  styleUrls: ['./card-filter.component.css']
})
export class CardFilterComponent implements OnInit {

  @Output() onShowCards = new EventEmitter<number>();

  constructor() { }

  showCards(amount: number): void {
    this.onShowCards.emit(amount);
  }

}
```

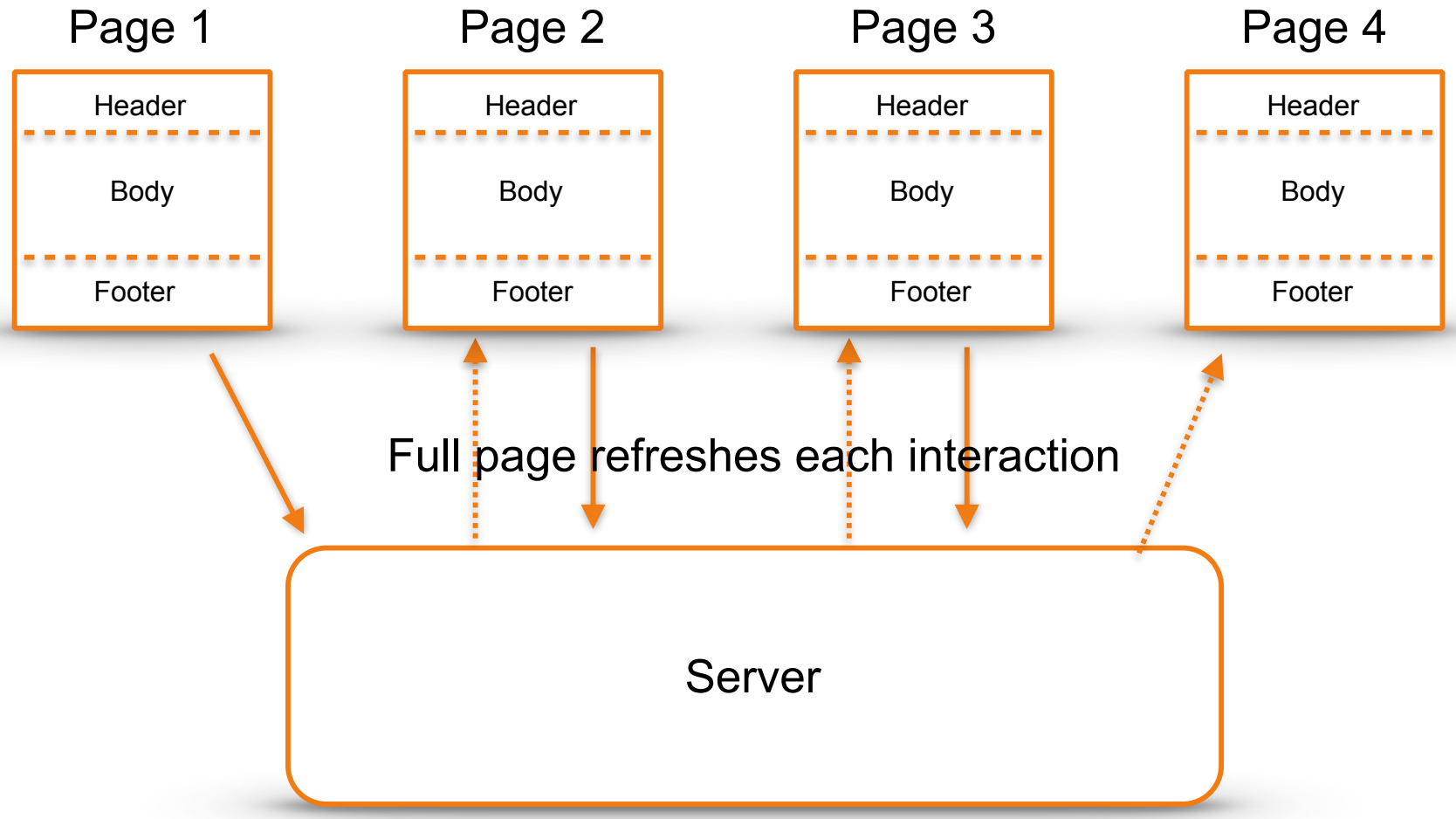
Develop Intelligence

- Receiving the event and using the data

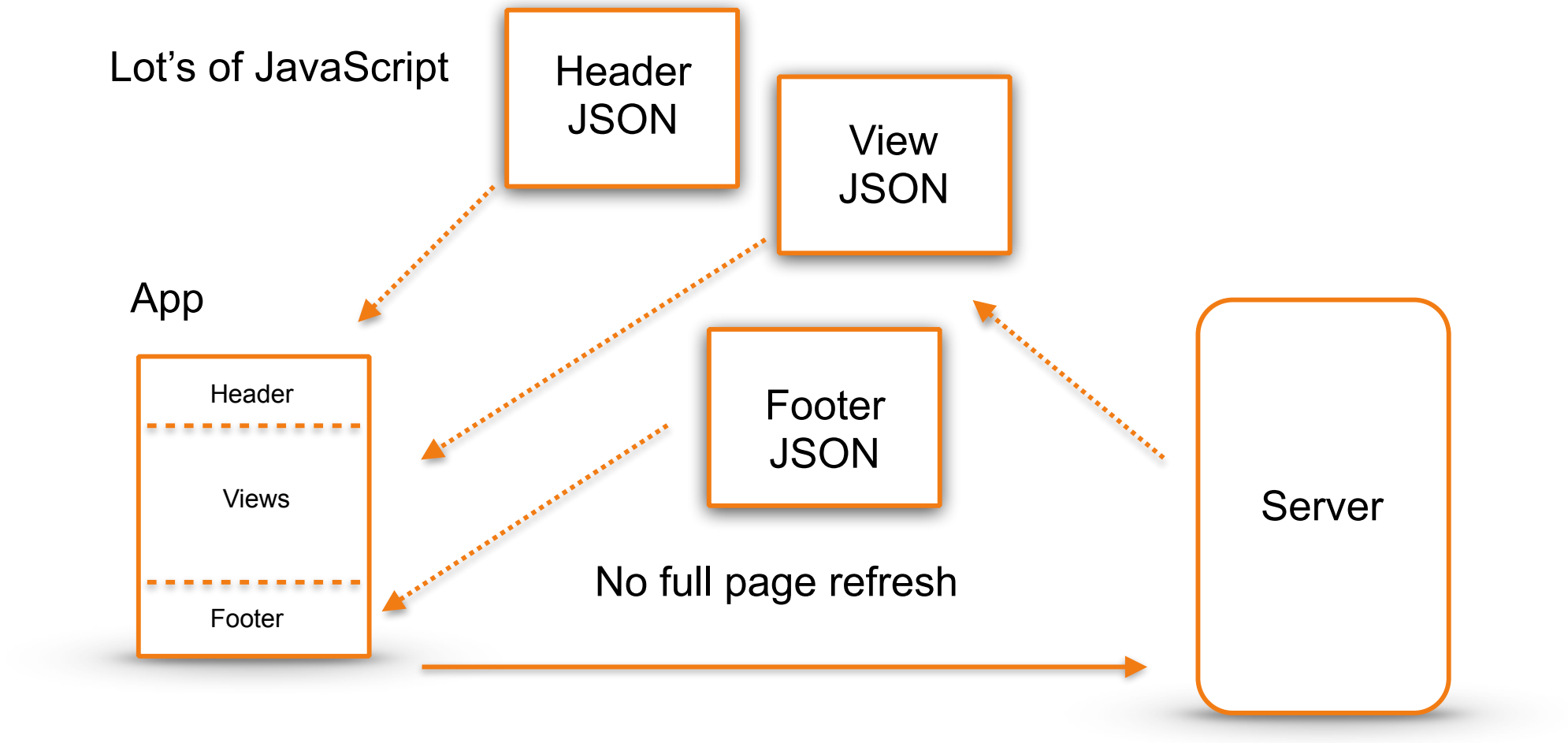
card-list.component.ts

```
export class CardListComponent implements OnInit {
  reports: Report[];

  constructor() {
    this.reports = [
      new Report('0', '1-1-2012', '500', '750', '400'
      new Report('1', '2-1-2012', '425', '650', '300'
      new Report('2', '3-1-2012', '300', '450', '300'
      new Report('3', '4-1-2012', '300', '450', '300'
    ]
  }

  onShowCards(reportsShown: number): void {
    console.log('on show parent');
    this.reports.length = reportsShown;
  }
```

Remember no complete page reloads



Swap data via Ajax



Moving to Ajax

- We want to move from hard coded data to fetching it from a server

- REST
  - POST – Create
  - **GET – Read**
  - PUT – Update
  - DELETE – Delete

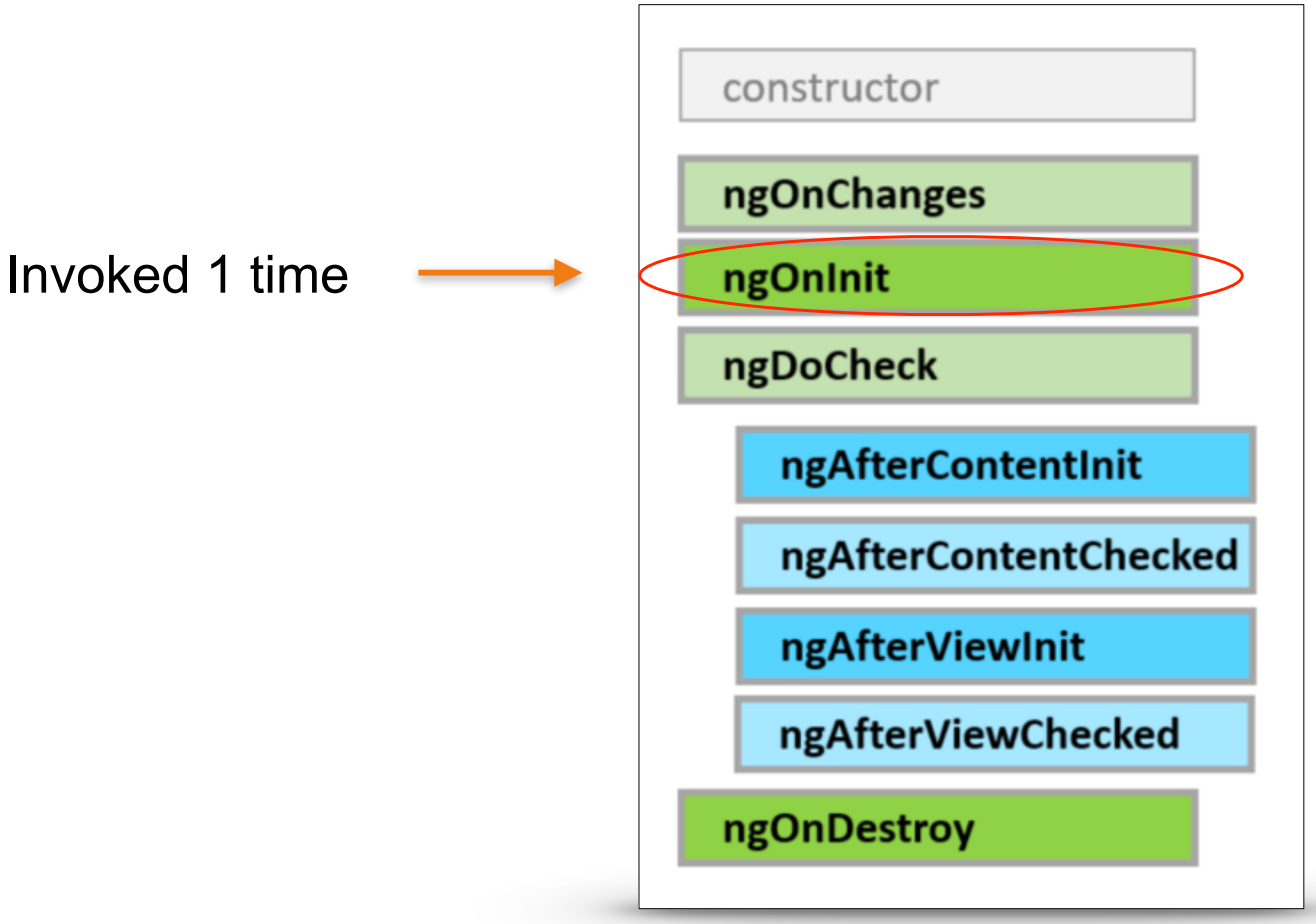
Http Module

- Angular 2 gives an HTTP module that is not part of the **core**
  - Import and Register in ngModule
  - Import in component
    - import { Http } from '@angular/http';

- We want our report data to load before the page is draw. How can we do that?

Component life-cycle events

- Angular provides hooks during creation of a component
  - https://angular.io/docs/ts/latest/guide/lifecycle-hooks.html



Use Http Module

- To use the Http Module it needs to be dependency injected into our code base

card-list.component.ts

```
})
export class CardListComponent implements OnInit {
  reports: Report[];

  constructor(private http: Http) {
    this.reports = [];
  }
```

Use Http Module [cont.]

- The Http module has a **get** method to retrieve data

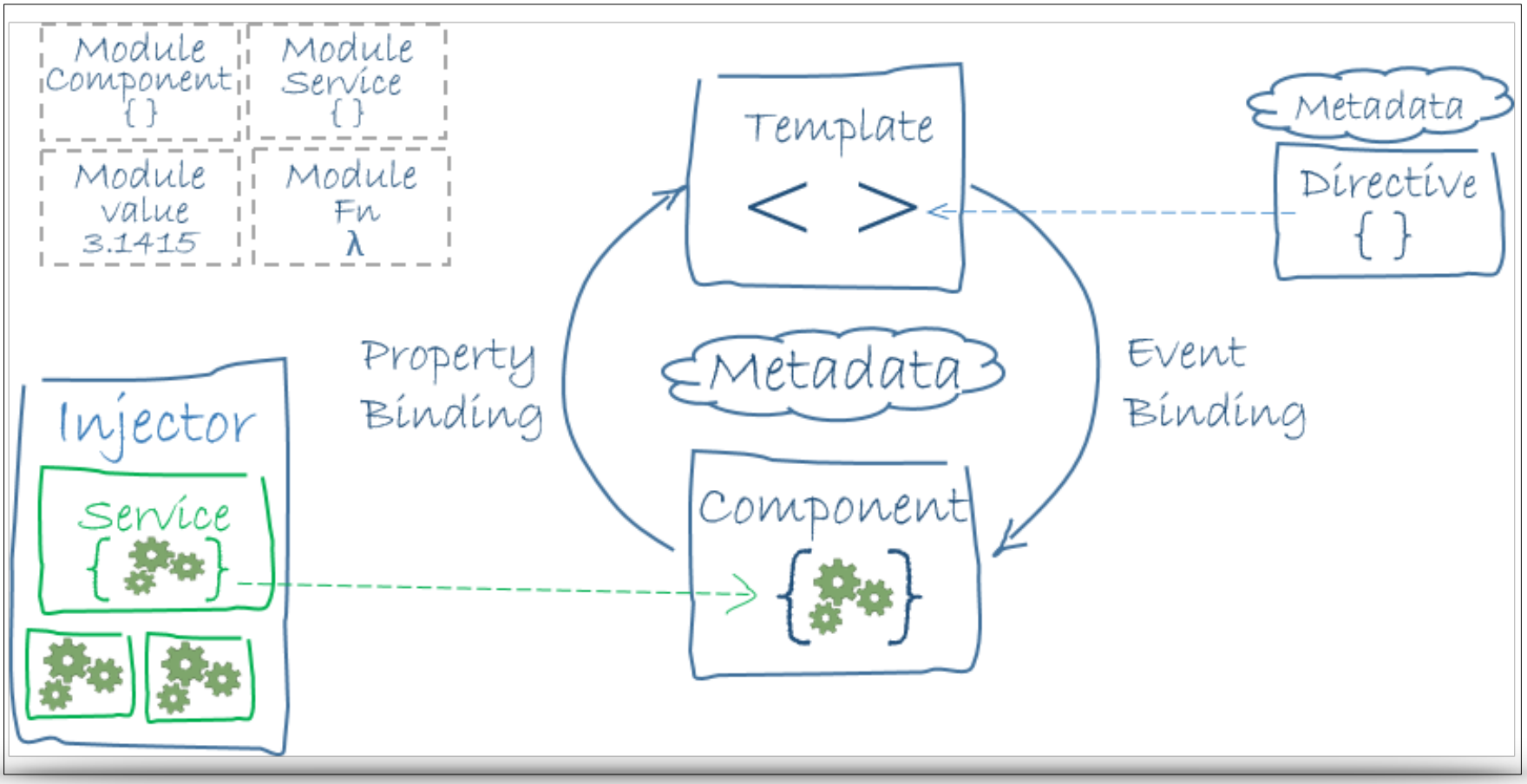
card-list.component.ts

```
ngOnInit() {
  const URL = 'http://lemon-aide-api.azurewebsites.net/data/reports';
  //Observervable based implementation
  this.http.get(URL)
    .subscribe((response) => {
      console.log('made it');
      let data = response.json();
      this.reports = data.map((report: any) => {
        return new Report(report.id,
          report.date,
          report.quantity,
          report.netSale,
          report.costOfGoods);
      });
      console.log(data);
    });
```

Services

- Services are reusable pieces of code
- The could be used to provide a communication avenue between grandparents and children
- They can be used to abstract Ajax calls

- Angular's ideas of how services fit in



Services [cont.]

- Let’s create a service to handle our call for report data

- **ng generate service card-list/card-list**

Generated code

Allows for
Dependency Injection

card-list.service.ts

```
import { Injectable } from '@angular/core';

@Injectable()
export class CardListService {

  constructor() { }

}
```

Injecting the service

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Import the Service

Specify in Providers List

Specify in Providers List

card-list.component.ts

```
import { Component, OnInit } from '@angular/core';
import { NgFor } from '@angular/common';
import { Report } from '../shared/report';
import { CardListService } from "./card-list.service";

@Component({
  selector: 'app-card-list',
  templateUrl: './card-list.component.html',
  styleUrls: ['./card-list.component.css'],
  providers: [CardListService],
})
export class CardListComponent implements OnInit {
  reports: Report[];

  constructor(private cardListService: CardListService) {
    this.reports = [];
  }

  onShowCards(reportsShown: number): void {
    this.reports.length = reportsShown;
  }
```

Abstract Http to Service

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Configure the data

card-list.service.ts

```
init() {
  const URL = 'http://lemon-aide-api.azurewebsites.net/data/reports';
  return this.http.get(URL)
    .map((response) => {
      let data = response.json();
      this.reports = data.map((report: any) => {
        return new Report(report.id,
            report.date,
            report.quantity,
            report.netSale,
            report.costOfGoods);
      });
      console.log(data);
    });

}
```

Using the service

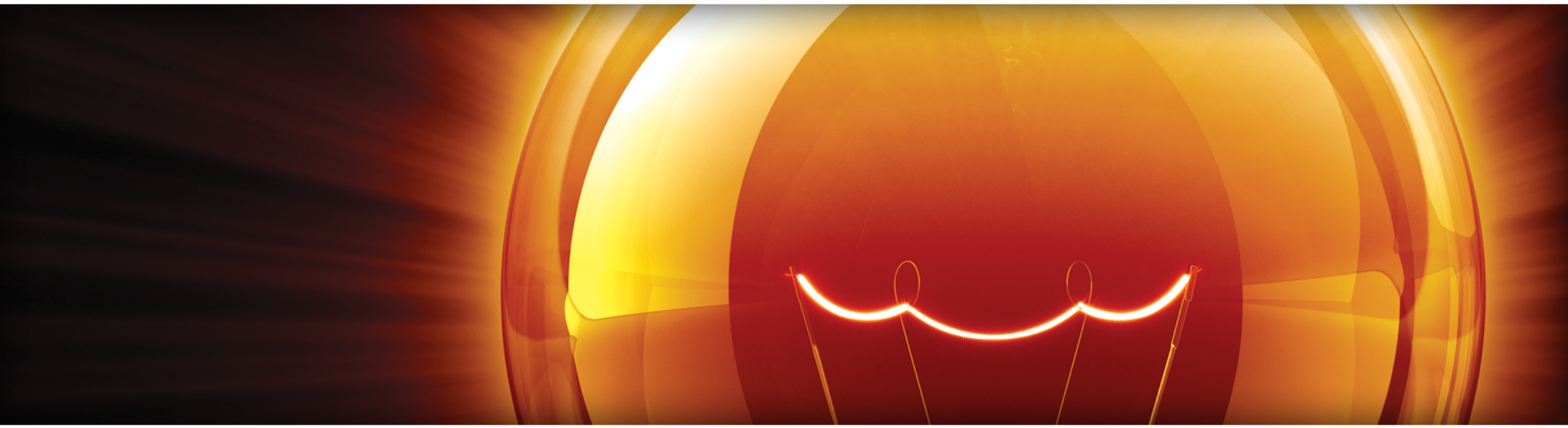
Develop Intelligence

Configure the data

card-list.service.ts

```
ngOnInit() {
  //Observervable based implementation
  this.cardListService.init()
    .subscribe(()=>{
        this.reports = this.cardListService.getReports();
    });
}
```

Where to go from here



Areas to research…

- Ionic 2: Mobile apps for Angular 2
- Angular Universal: Isomorphic Angular 2 support
- Angular Material 2: Material Design for Angular 2
- Migrating to Angular 2
- Style Guide
- System JS: Module loader
- RxJS: Reactive programming library in JS
- Zone.js: No need for $scope.$apply()
- Angular Router
- Protractor: Testing End-to-End

Today's Goals

- Understand the need for Angular 2?
- Make a mental mind shift to components
- Learn the foundations of Angular 2
- Have reference material for more in-depth learning

Develop Intelligence

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September, 2016

Confidential