Angular 2.0
Router and DI Preview

Exciting, Flexible and Modern Routing and DI for 2.0

Presented by
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Introductions ...

- Peter Pavlovich
  - Front-End Evangelist and Technology Addict
  - Current: Principal Architect, EnerNOC, Inc. (Energy Intelligence Software)
    - Angular/Meteor/Polymer/Aurelia, Node, Scala/Java, OrientDB/Titan/MongoDB
- Entrepreneur, Open Source Contributor and Community Member
- Instructor, Mentor, Speaker and Leader.
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Session Plan

- Component Router
  - General Discussion
    - Using the new router!
      - in 2.0
      - in 1.X
- Dependency Injection

Component Router

Outline

- Brief History
- Current State of routing
- General
  - Basic Features
  - Dynamic Loading
  - Embedded Applications
  - Screen Activation
  - Auxiluary Routes
- Design principles
  - Construction via pipeline
  - How to customize for your app

History Lesson

History of the project

- Brian Ford + Rob Eisenberg (project leads)
- Researched Routers from other frameworks:
  - ngRoute 1.x
  - uiRouter
  - Ember.js's router
  - Durandal's router
  - Passport (express middleware)

History of the project

- Detailed design -> asked for feedback.
- Solicited Use cases from the community
- Ported to 1.3 -> 1.4 -> 1.5

Current Routing Options

NgRoute

Simple

No Nested Views

No Sibling Views

ui-router

Useful now

No migration path

Component Router inspired by it

Basic Features

Basic Features

- Configuration
- Default/missing route handling
- History Manipulation
- Configuration by convention
- Navigation Model
- Document Title Updates

Additional Features
(rumored/partial)

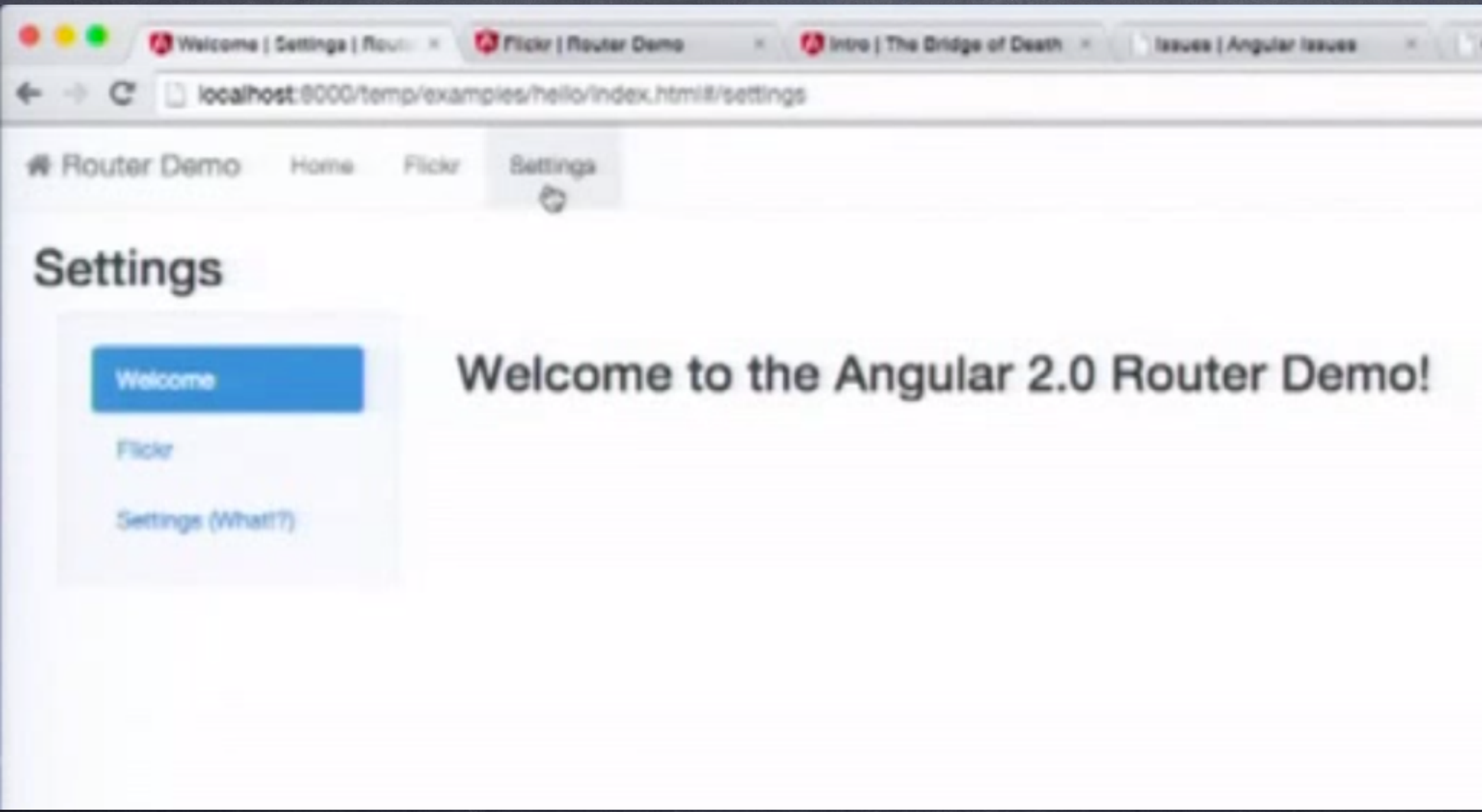
Dynamic Loading

Embedded Applications

Embedded (Child) Apps

- Top-level, App Router
- Child Routers
- State Management
- Component Reuse (optimization)
- Sibling Components/Controllers

Home | Router Demo
Flickr | Router Demo
Intro | The Bridge of Death
Issues | Angular Issues
localhost:8000/temp/examples/hello/index.html#/
Router Demo
Home
Flickr
Settings
Welcome to the Angular 2.0 Router Demo!


Welcome | Settings | Rout
Flickr | Router Demo
Intro | The Bridge of Death
Issues | Angular Issues
localhost:8000/temp/examples/hello/index.html#/settings
Router Demo
Home
Flickr
Settings
Settings
Welcome
Flickr
Settings (What!?)
Welcome to the Angular 2.0 Router Demo!

Welcome | Settings (What
Flickr | Router Demo
Intro | The Bridge of Death
Issues | Angular Issues
Comments | Issue 9742 |
localhost:8000/temp/examples/hello/index.html#/settings/settings/settings/settings/settings/settings
Router Demo
Home
Flickr
Settings
Settings
Welcome
Flickr
Settings (What!?)
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Settings (What!?)
Welcome to the Angular 2.0 Router Demo!

Welcome | Settings (Wha | Flickr | Router Demo | Intro | The Bridge of Death | Issues | Angular Issues

localhost:9000/#/issues/9742

Angular Issues

Number	Title
9743	docs(form.FormController): add 'date' token to FormController $error property
9742	$routeProvider - optional named group + trailing slash
9741	docs($templateCache): clarify inline template
9740	ngRepeat: $previous and $next
9738	docs(guide/Expressions): some punctuations are missing
9737	IE9 Angularjs not rendering the body and redirecting with hash # in url
9736	Docs: searching for $q only returns error/$q
9735	A scope question when transclude and isolate scope both exist
9733	Using a certain number of ng-src attributes on a page cause it to go blank
9732	(Performance) Array comprehensions - ish
9731	Route inherited param fix
9730	fix(location): throw a MinErr when base path has the wrong case #4082
9729	Add warning message when a module is reset/replaced

Welcome | Settings (What | Flickr | Router Demo | Intro | The Bridge of Death | Issues | Angular Issues

localhost:9000/#/issues/9742

Angular Issues

#9743 $routeProvider - optional named group + trailing slash

From ($routeProvider documentation)(https://docs.angularjs.org/api/ngRoute/provider/$routeProvider): > If $location.path conta
$location.path will be updated to add or drop the trailing slash to exactly match the route definition. It seems this does not work
~"/page/:name?"). In that case an encoded question mark will appear in the URL if you will navigate to ~"/page/index/ ~" (notice t
(http://plnkr.co/edit/hZ2pMLJuRCkkMc8Y!av0?p=preview).

Comments Events

Narretz

Seems to be the same issue as in https://github.com/angular/angular.js/pull/8200 But I'll keep it open in case the PR g

Screen Activation

Navigation lifecycle hooks

- canDeactivate: Allow deactivation?
  - deactivate: allows clean up after deactivation
  - canActivate: allow activation?
  - activate: component activated ... initialize?

Return values for hooks

- Hooks can return any of the following:
  - Boolean: true - allow, false - stop, revert.
  - NavigationCommand: take control of router
  - Promise: async return Boolean/Nav Command

Auxiliary Routes

AngularConnect: Routing in

Gmail

https://inbox.google.com

Inbox

Search

Today

Yesterday

This month

To

From briantford@gmail.com

Subject

Say something

SEND

Router as a Pipeline

Navigation Pipeline

- Navigation Instruction
- Navigation Context
- Pipeline

Customization

Customization Options

- Configuration/Conventions (use as you will)
- NavigationInstruction (steps: write your own!)
- NavigationCommand (write your own!)
- Pipeline (pull out / insert / replace steps)
- History (DI : pull it out and replace it!)
- Viewport

Using the Router!

Components in General

- consist of:
  - View
  - Controller
  - Router (optional)

Use in 1.4+

<script src="https://code.angularjs.org/1.5.0-beta.1/angular-route.js"></script>

ui-router vs comp router

ui.router	ngComponentRouter
$stateProvider.state()	$router.config()
<ui-view>	<ng-outlet>
ui-sref	ng-link

ui-router config

```
$stateProvider
  .state({
    url          : '/articles',
    templateUrl : 'components/articles/articles.html',
    controller   : 'ArticlesController',
    controllerAs: 'articles'
});
```

Component Router Conventions

```
|-- components/
    |-- articles/
        |-- articles.js
        |-- articles.html
|-- app.js
```

Component Router configuration.

```
$router.config([
  { path: '/articles', component: 'articles' }
]);
```

Convention

Template

```
./components/<component_name>/<component_name>.html
```

Controller

```
<Component_name>Controller
```

Controller As

```
<component_name>
```

Example 1.4 'component'

Template

```
./components/articles/articles.html
```

Controller

```
ArticlesController
```

Controller As

```
articles
```

Migration strategies

- What if my app doesn't match this convention?

This is my app structure

```
|-- controllers/
    |-- articles.js
|-- views/
    |-- articles.html
|-- app.js
```

Custom Controller Name

```
$componentMapper
  .setCtrlNameMapping(function(name) {
    return name + 'Ctrl';
  });
```

Custom Template Location

```
$componentMapper
  .setTemplateMapping(function(name) {
    return './views/' + name + '.html';
  });
```

Controller configures where to find its view

Module

```
ArticlesCtrl.$templateUrl = 'views/articles.html';
function ArticlesCtrl {}
```

Component Mapper Config

```
$componentMapper
  .setTemplateMapping(function(comp) {
    var ctrl = $componentMapper.controller(comp);
    var template = $controllerIntrospector(name, '$templateUrl');

    return template;
  });
```

Upgrade options

- Move/rename the files to match conventions
- Change the conventions globally
- Use $controllerIntrospector to have the controller define where its view is.

Use in 2.0

http://goo.gl/DFSq5o

Components in 2.0

```
@Component({
  selector: 'articles'
})
```

```
@View({
  inline: "<div>Look! I'm at {{ confName }}!</div>"
})

class ArticlesComponent {}
```

Angular 1 with $controllerIntrospector

```
ArticlesCtrl.$templateUrl = 'views/articles.html';
function ArticlesCtrl {}
```

Angular 2 Component

```
@View({ templateUrl: 'views/articles.html' })
class ArticlesComp {}
```

UI router -> Component Router

- Add new dependencies to our module def
- Set routing configuration
- Change the directives we use in our template

Angular 1.5 Component

```
angular
  .module(...)
  .component('articles', {
    selector: 'articles',
    controller: 'ArticlesController',
    templateUrl: 'views/articles.html'
  });
```

Using the Router now

Basic Configuration

- <base href>
  - Added as an HTML element below <head>
    - Tells the router how to compose navigation URLs.
- Optional service == not part of Angular core
  - part of @angular/router

Basic Configuration

- Configure using @RouteConfig decorator
  - apply to the router's host component.

```
@Component({ ... })
@Routes([
  {path: '/crisis-center', component: CrisisListComponent},
  {path: '/heroes',        component: HeroListComponent},
  {path: '/hero/:id',      component: HeroDetailComponent}
])
export class AppComponent  implements OnInit {
  constructor(private router: Router) {}

  ngOnInit() {
    this.router.navigate(['/crisis-center']);
  }
}
```

```
}
  }
```

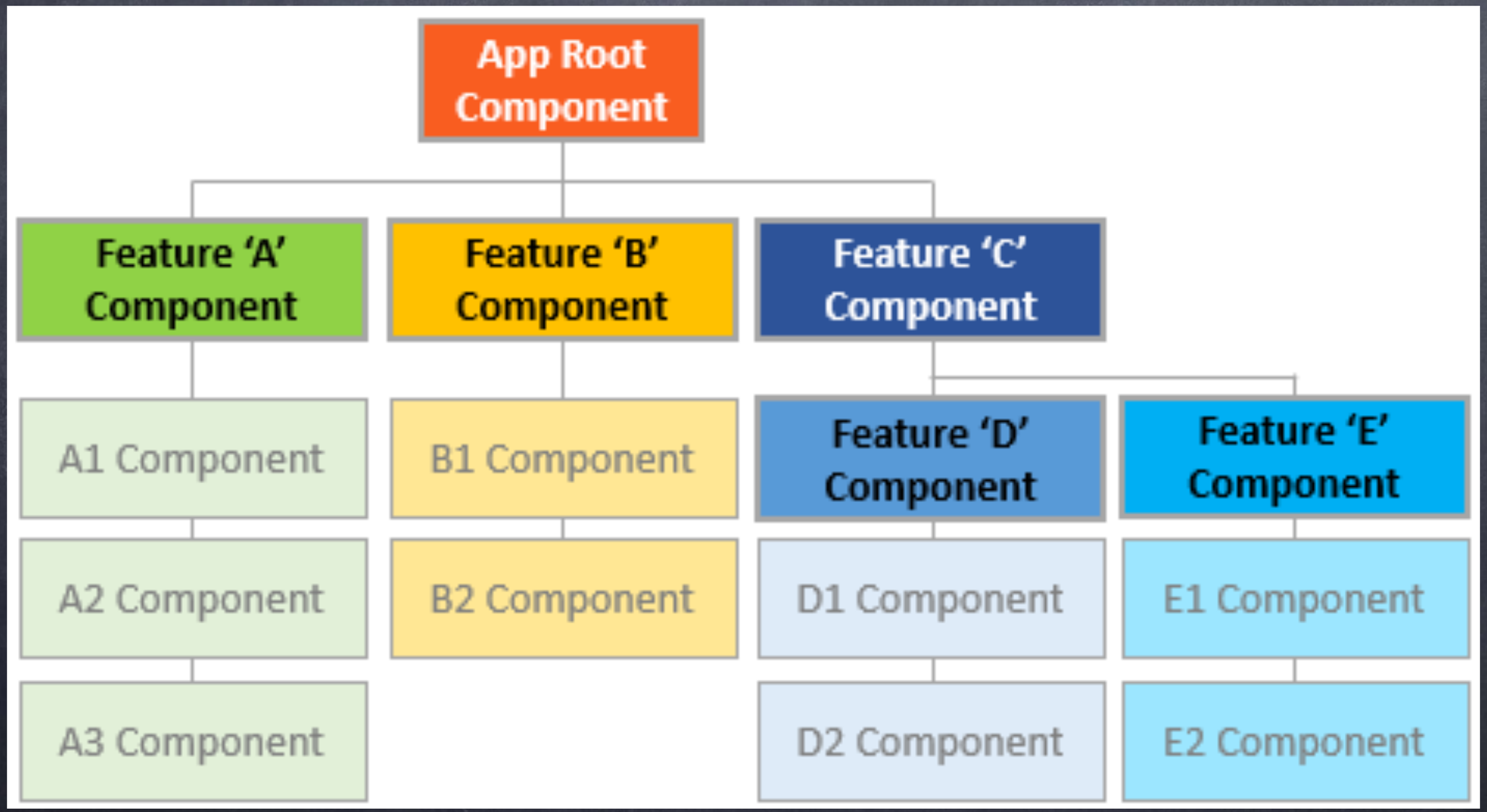
Route or Query params?

- There is no hard-and-fast rule.
  - Prefer a route parameter when:
    - the value is required.
    - the value is necessary to distinguish one route path from another.
- Prefer a query parameter when
  - the value is optional.
  - the value is complex and/or multi-variate.

Basic Use

- Set up a <router-outlet></router-outlet> in your main component's template to receive the route-specific content.
- Set up some basic routes using the Routes decorator.
- Navigate either in HTML or JS
  - <a [routerLink]="['/heroes']">Heroes
  - onSelect(hero: Hero) {this.router.navigate(['/hero', hero.id]);}

More advance structure



Router Terminology

Router Part	Meaning
`Router`	Displays the application component for the active URL. Manages navigation from one component to the next.
`@RouteConfig`	Configures a router with `RouteDefinitions`, each mapping a URL path to a component.
`RouteDefinition`	Defines how the router should navigate to a component based on a URL pattern.
`Route`	The most common form of `RouteDefinition` consisting of a path, a route name, and a component type.
`RouterOutlet`	The directive (`<router-outlet>`) that marks where the router should display a view.
`RouterLink`	The directive for binding a clickable HTML element to a route. Clicking an anchor tag with a `routerLink` directive that is bound to a *Link Parameters Array* triggers a navigation.
Link Parameters Array	An array that the router inteprets into a routing instruction. We can bind a `RouterLink` to that array or pass the array as an argument to the `Router.navigate` method.
Routing Component	An Angular component with an attached router.

Dependency Injection

What is DI?

- Look at DI as a design pattern
- Look at DI as a framework

As a design pattern

```
function CoffeeMaker() {
  var grinder = new Grinder();
  var pump = Pump.getInstance();
  var heater = app.get('Heater');

  this.brew = function() {
    grinder.grind();
    heater.on();
    pump.pump();
  };
}
```

As a design pattern

```
function CoffeeMaker(grinder, pump, heater) {
  this.brew = function() {
    grinder.grind();
    heater.on();
    pump.pump();
  };
}
```

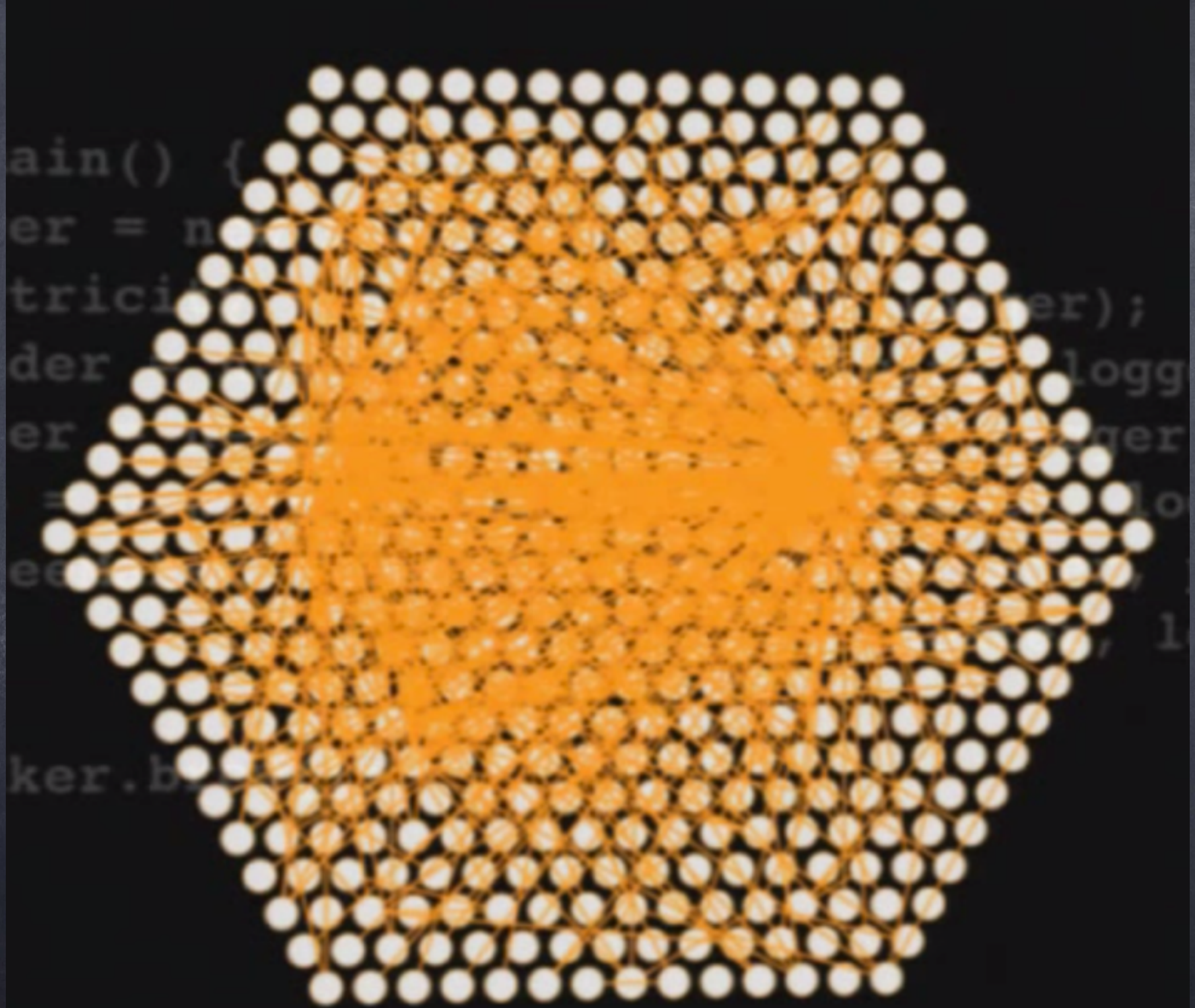
As a design pattern

```
function main() {
  var electricity = new Electricity();
  var grinder = new Grinder(electricity);
  var heater = new Heater(electricity);
  var pump = new Pump(heater, electricity);
  var coffeeMaker = new CoffeeMaker(grinder, pump,
                                    heater);

  coffeeMaker.brew();
}
```

As a design pattern

```
function main() {
  var logger = new Logger();
  var electricity = new Electricity(logger);
  var grinder = new Grinder(electricity, logger);
  var heater = new Heater(electricity, logger);
  var pump = new Pump(heater, electricity, logger);
  var coffeeMaker = new CoffeeMaker(grinder, pump,
                                    heater, logger);

  coffeeMaker.brew();
}
```

Dependency map of e.g.



So, what's wrong with 1.X's DI?

- Uses an internal cache
  - Dependencies are served as singletons.
- Requests for dependencies are synchronous
- Limited Namespace: all keys are strings
- Integrated in framework

DI in V2

```
import {Inject} from 'di/annotations';

import {Grinder} from './grinder';
import {Pump} from './pump';
import {Heater} from './heater';

@Inject(Grinder, Pump, Heater)
export class CoffeeMaker {
  constructor(grinder, pump, heater) {
    // ...
  }

  brew() {
    console.log('Brewing a coffee...');
  }
}
```

DI in V2

```
import {Injector} from 'di/injector';
import {CoffeeMaker} from './coffee_maker';

function main() {
  var injector = new Injector();
  var coffeeMaker = injector.get(CoffeeMaker);

  coffeeMaker.brew();
}
```

No need for angular.module

- We used angular.module to group 'stuff' to inject as dependencies into other modules.
- New framework can inject anything that is a component. Period.
- If you want coarser granularity, create a module that declares dependencies (through injection) on other modules and inject that.

What about mocks?

```
import {Provide} from 'di/annotations';
import {Heater} from './coffee_maker/heater';

@Provide(Heater)
class MockHeater {
  on() {
    console.log('Doing nothing...');
  }
}
```

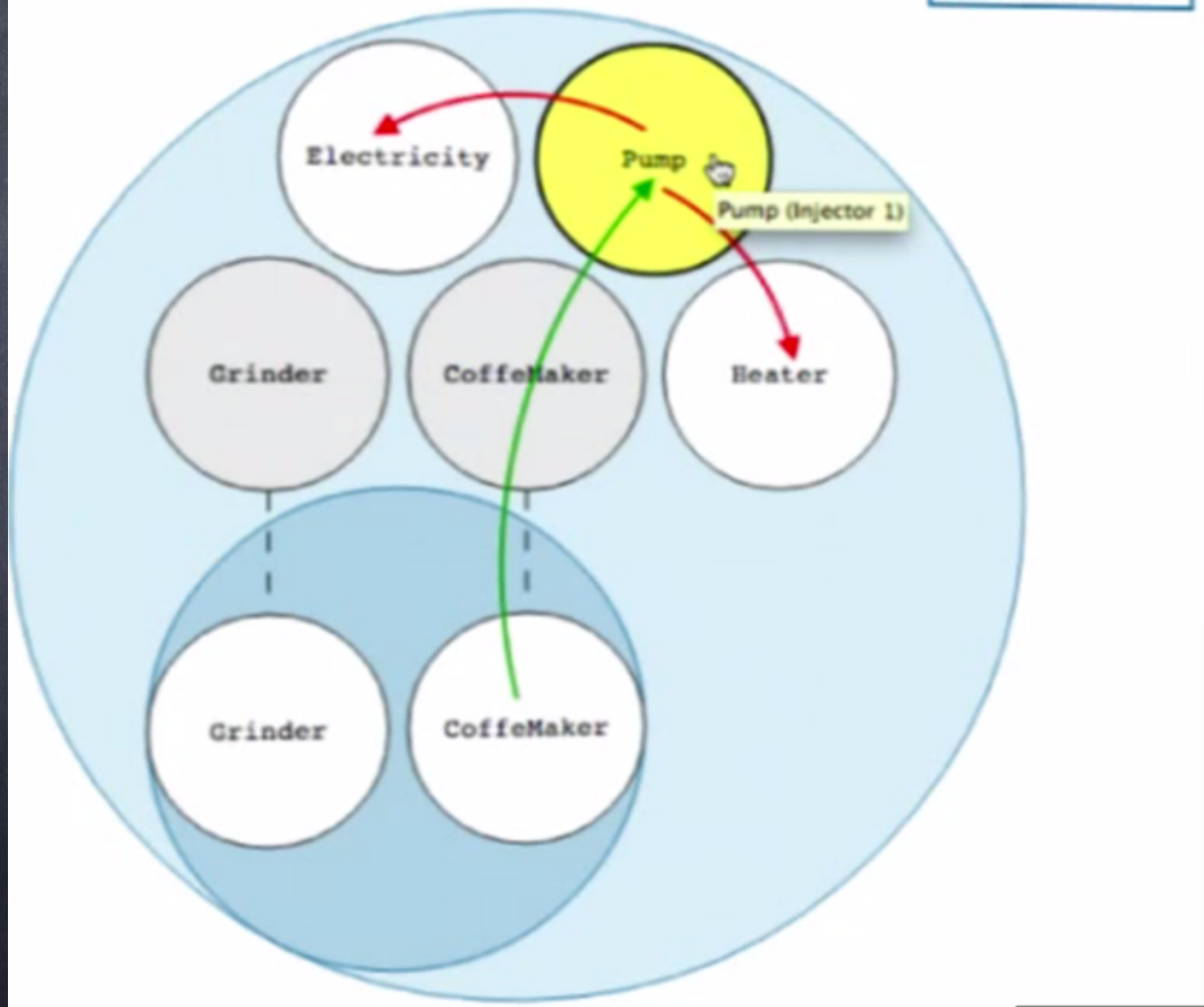
'Main' function for mocks

```
import {Injector} from 'di/injector';
import {CoffeeMaker} from './coffee_maker';
import {MockHeater} from './mocks/heater';

function main() {
  var injector = new Injector([MockHeater]);
  var coffeeMaker = injector.get(CoffeeMaker);

  coffeeMaker.brew();
}
```

And … we can nest them!

localhost:8000/visualize/injectors/

CoffeMaker
Heater
Pump
Electricity
Grinder



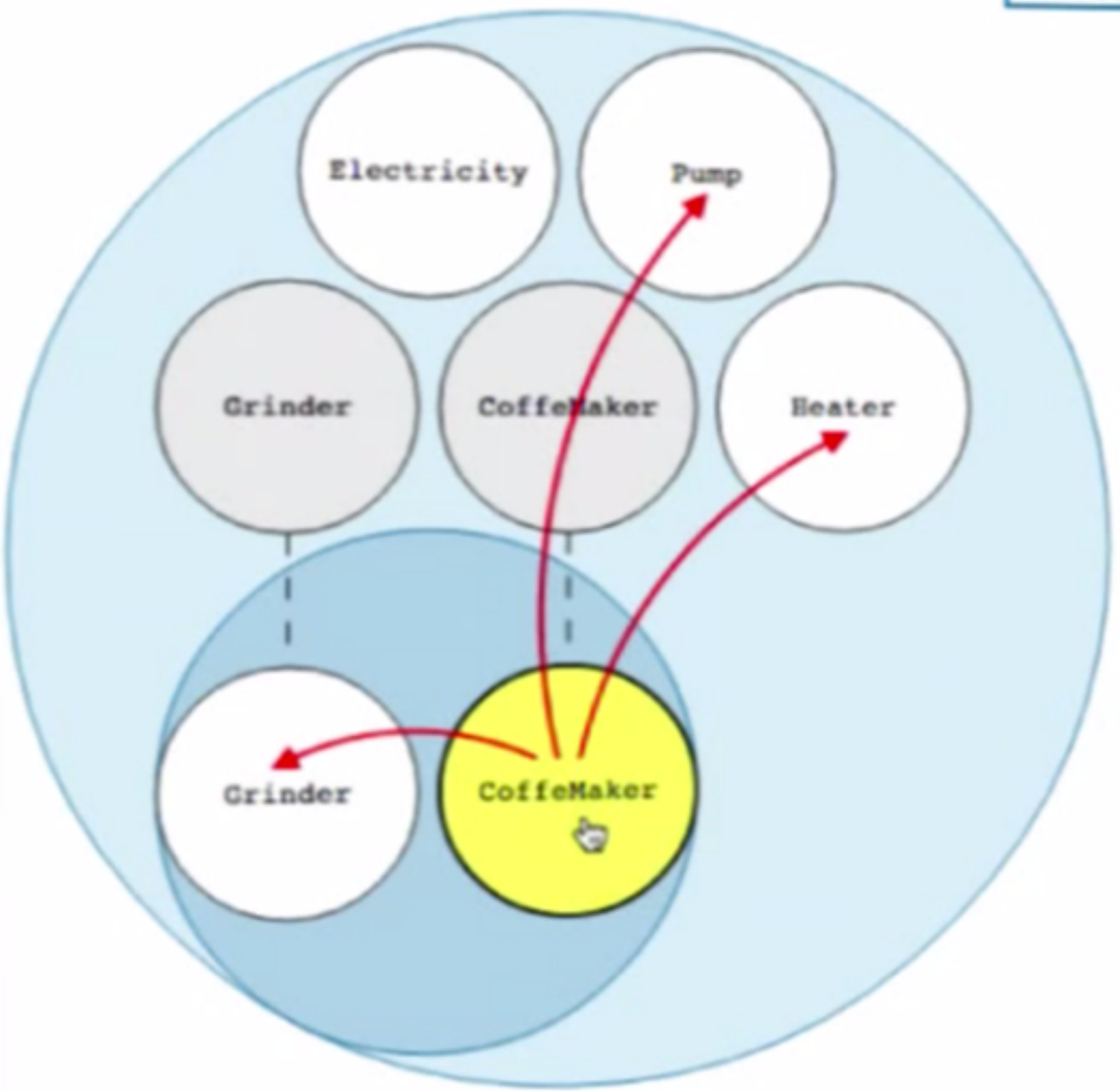
localhost:8000/visualization/injectors/

Visualization of injectors

Thu 4:55 PM

localhost:8000/visualization/injectors/

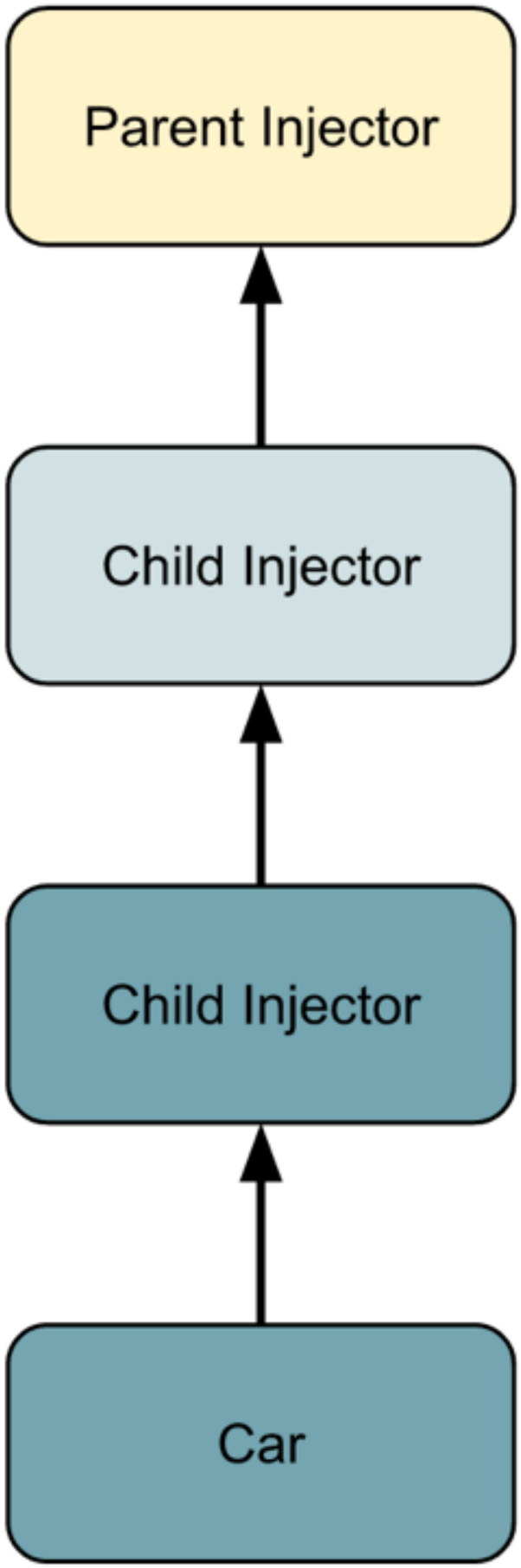
CoffeMaker
Heater
Pump
Electricity
Grinder



<top frame>

▶ Object {name: "Coffe
dependencies: Array[
instance: true, type
ider", title: "Coffe
Injector 2)"…}
app.js:501

>



Injector.resolveAndCreate([Car, Engine, Tires, Doors]);

Injector.resolveAndCreateChild([Car, Engine]);

Injector.resolveAndCreateChild([Car]);

Engine

Tires

Doors

This allows memory management by route

- As you change routes, the router can work with the component injectors as well as its own (each gets one)
- You can load/unload/reuse injected components depending on how you define things.
- No longer needed components can be unloaded from memory!

Questions?

Materials Sources and References/Thanks!

Component Router:

Angular 2 Weekly meeting notes: https://goo.gl/JKeMe5
Rob Eisenberg: New Router Talk @ ng-europe: https://goo.gl/zGatYQ
Chris Sevilleja's ng-vegas presentation on the new router: https://goo.gl/Ua9aJJ
Good blog entry on the new router: http://goo.gl/dd8922
Good slide deck on the router: http://goo.gl/zZcVRq

Dependency Injection

Vojta Jina's talk on DI in 1.X: http://goo.gl/KLlzNO
Great article on DI in 2.0: http://goo.gl/9Ca02H