Learn to Build Awesome Apps with Angular 2

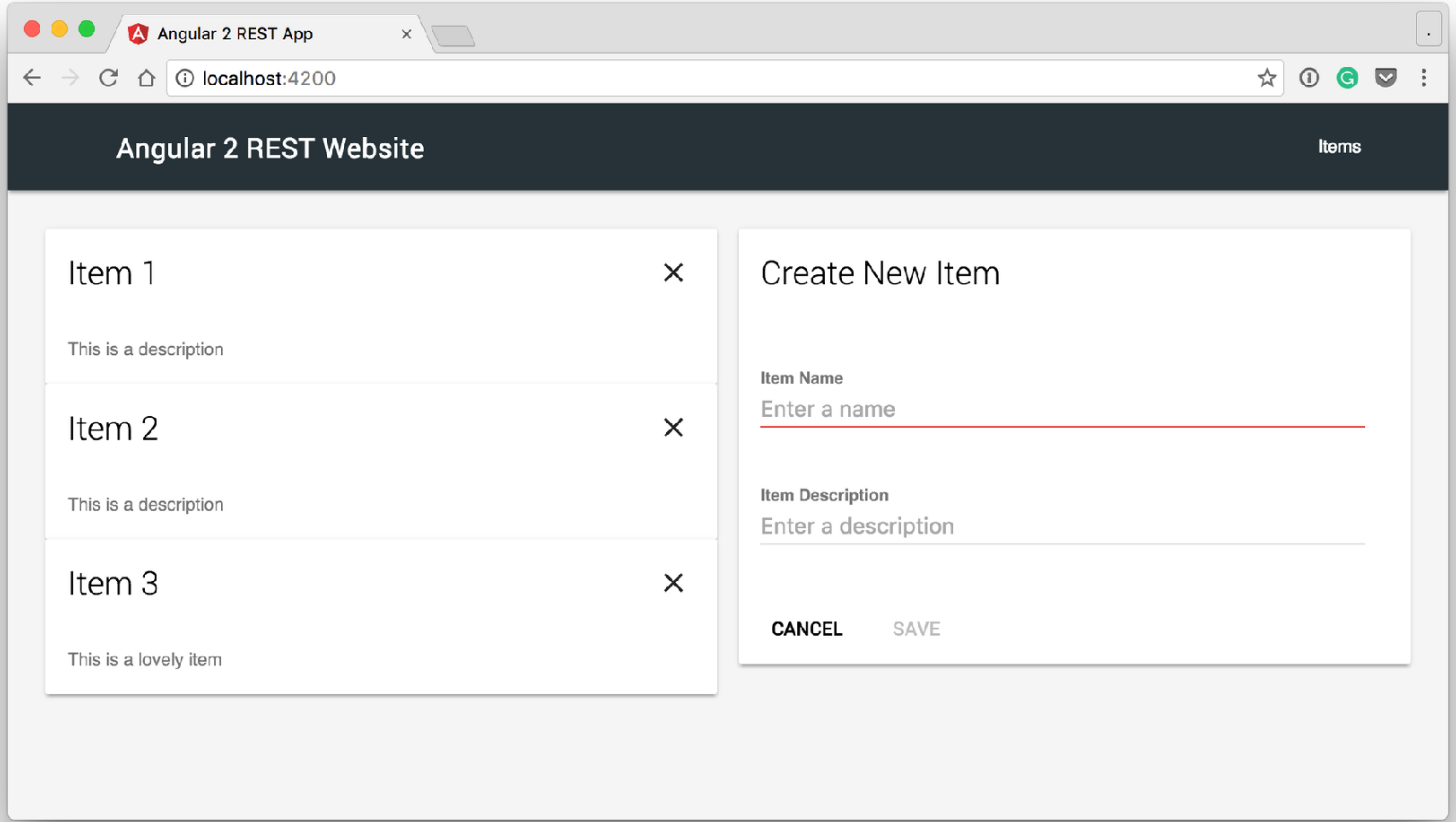
Strong grasp on how to **construct** a **single** feature in Angular 2

Agenda

- The Demo Application
- The Angular 2 Big Picture
- The Angular CLI
- Components
- Templates
- Services
- Routing

Getting **Started**

https://github.com/onehungrymind/ng2-rest-app



Item 1

This is a description

Item 2

This is a description

Item 3

This is a lovely item

Create New Item

Item Name

Enter a name

Item Description

Enter a description

The Demo Application

- A simple RESTful master-detail application built using Angular 2 and the Angular CLI
- We will be building out a new **widgets** feature
- Feel free to use the existing **items** feature as a reference point
- Please explore! Don't be afraid to try new things!

Challenges

- Make sure you can run the application

The Big Picture

Why **Angular?**

Best practices from Angular 1.x are the **default**

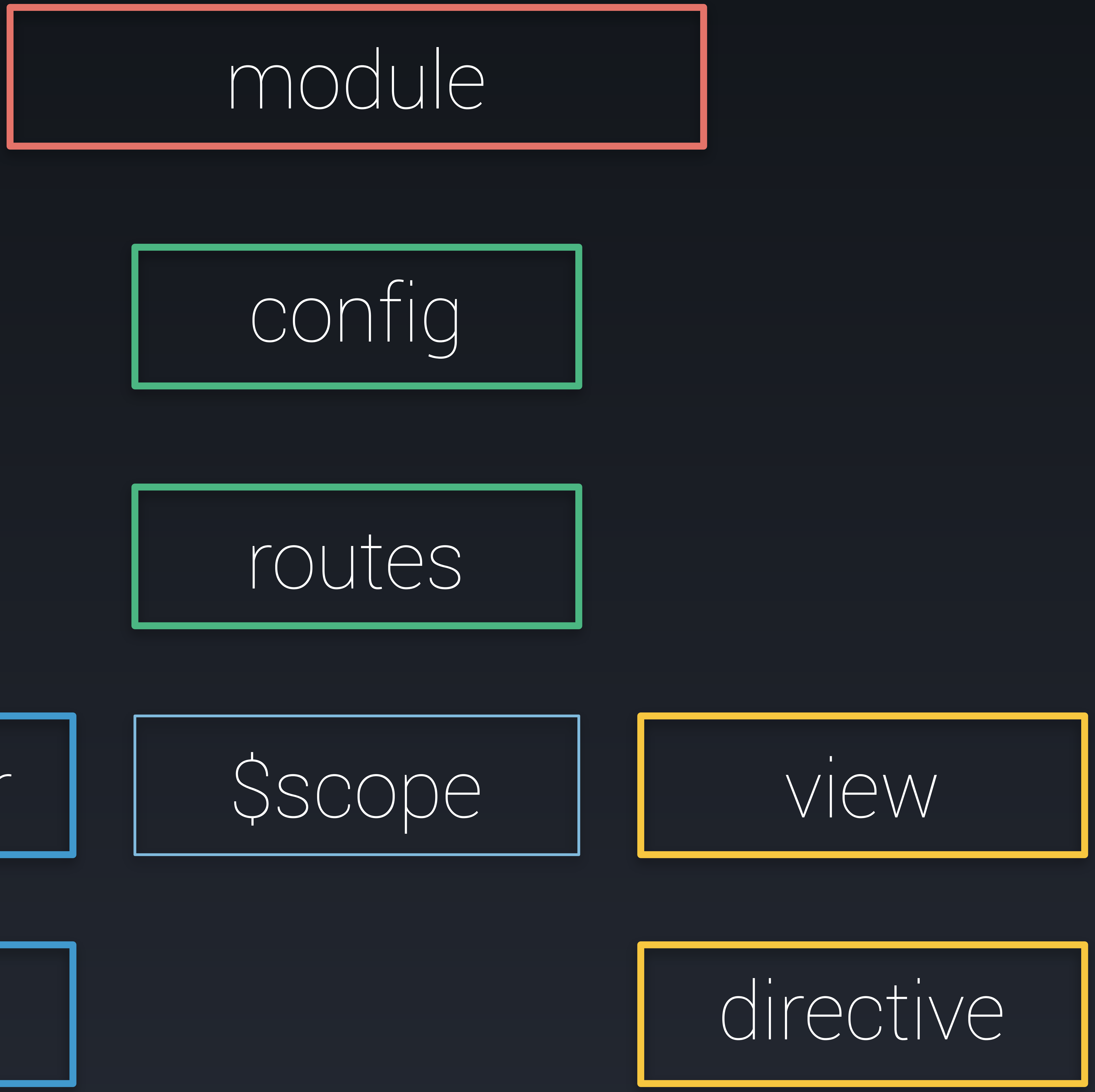
Standards gives us **twice** the power with **half** the framework

Dramatically improved
change detection

Reactive FTW! 😍

Teamwork FTW! 😍

The Angular 1.x Big Picture



The Angular 2 Big Picture

module

routes

component

service

The Angular 2 Big Picture

module

routes

component

service

ES6 Modules

- ES6 modules provide organization at a **language** level
- Uses ES6 module syntax
- Modules export things that other modules can import

```
import { Component, OnInit } from '@angular/core';
import { ItemsService, Item } from '../shared';

export class ItemsComponent implements OnInit {}
```

Modules

@NgModule

- Provides organization at a **framework** level
- **declarations** define *view classes* that are available to the module
- **imports** define a list of modules that the module needs
- **providers** define a list of services the module makes available
- **bootstrap** defines the component that should be bootstrapped

```
@NgModule({
  declarations: [
    AppComponent,
    ItemsComponent,
    ItemsListComponent,
    ItemDetailComponent
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule,
    Ng2RestAppRoutingModule
  ],
  providers: [ItemsService],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

@NgModule

```
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);
```

Bootstrapping

The Angular 2 Big Picture

module

routes

components

services

Routing

- Routes are defined in a route definition table that in its simplest form contains a **path** and **component** reference
- Components are loaded into the **router-outlet** component
- We can navigate to routes using the **routerLink** directive
- The router uses **history.pushState** which means we need to set a **base-ref** tag to our **index.html** file

```
import { NgModule } from '@angular/core';
import { Routes, RouterModule } from '@angular/router';
import { ItemsComponent } from './items/items.component';

const routes: Routes = [
  {path: '',       redirectTo: '/items', pathMatch: 'full' },
  {path: 'items', component: ItemsComponent},
  {path: '**',     redirectTo: '/items', pathMatch: 'full'}
];

@NgModule({
  imports: [RouterModule.forRoot(routes)],
  exports: [RouterModule],
  providers: []
})
export class Ng2RestAppRoutingModule { }
```

Routing

Components

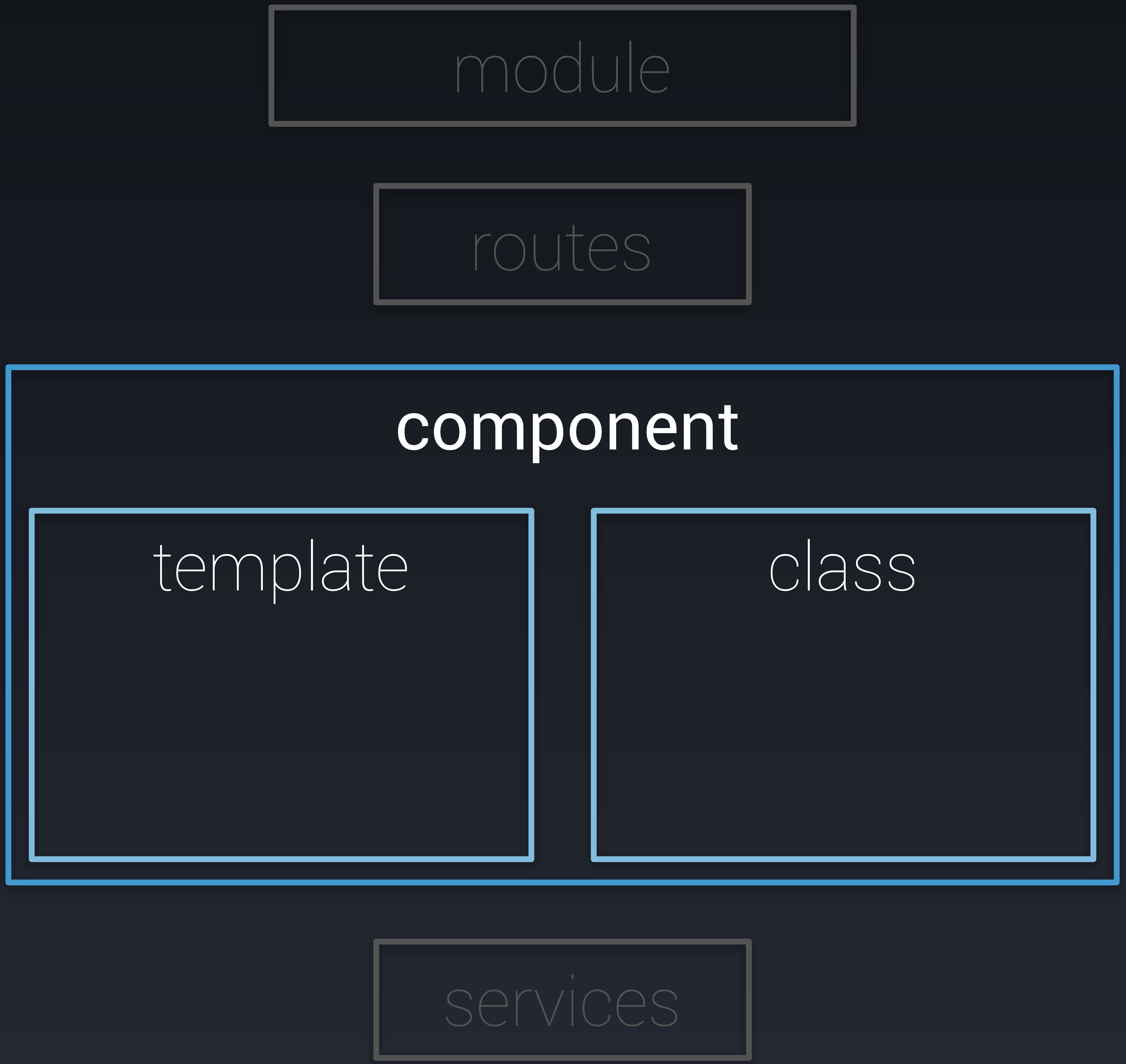
module

routes

components

services

Components



Component Classes

- Components are just ES6 classes
- Properties and methods of the component class are available to the template
- Providers (Services) are injected in the constructor
- The component lifecycle is exposed with hooks

```
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Components

Templates

- A template is HTML that tells Angular how to render a component
- Templates include data bindings as well as other components and directives
- Angular 2 leverages native DOM events and properties which dramatically reduces the need for a ton of built-in directives
- Angular 2 leverages shadow DOM to do some really interesting things with view encapsulation

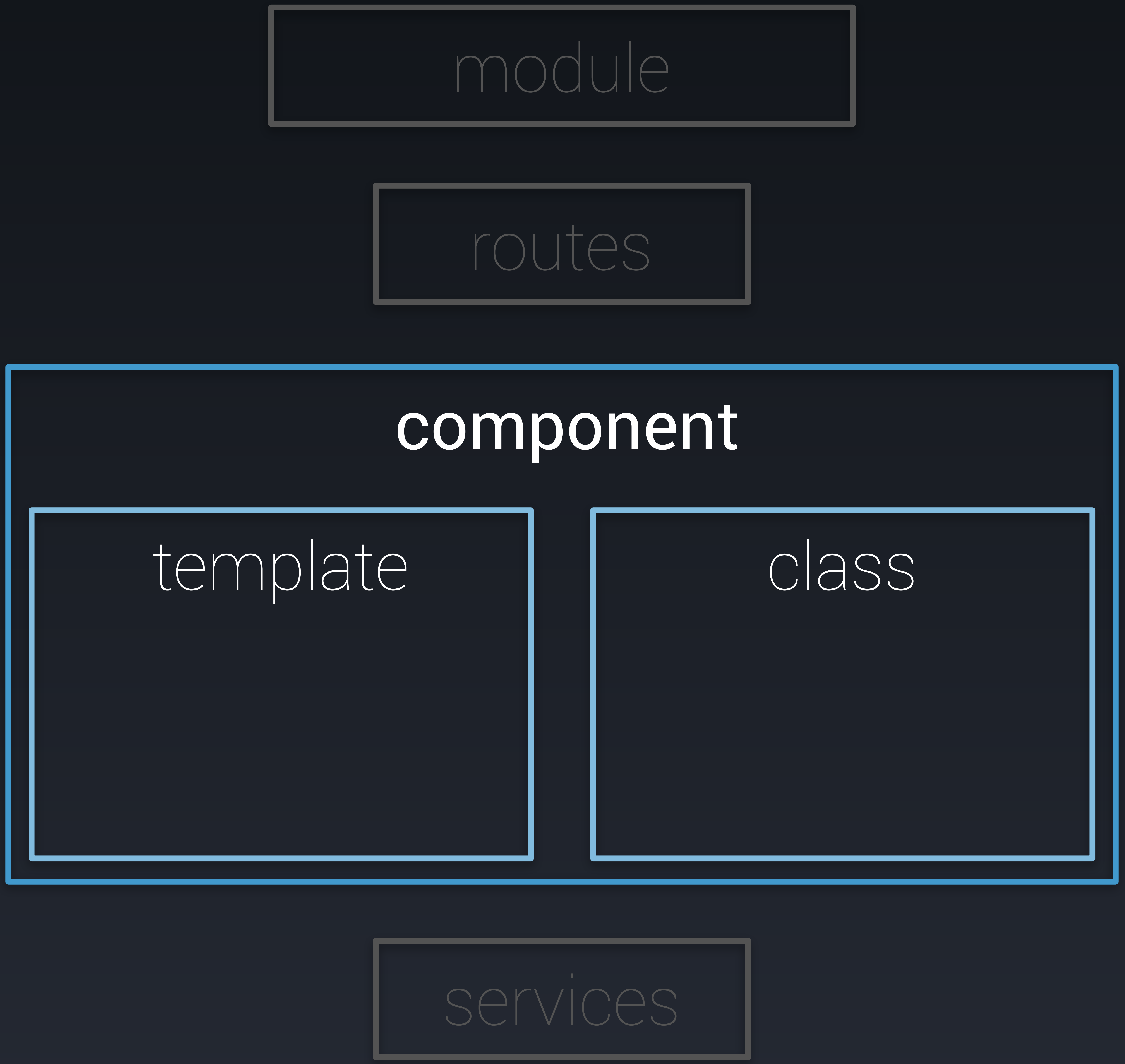
```
@Component({
  selector: 'app-items-list',
  templateUrl: './items-list.component.html',
  styleUrls: ['./items-list.component.css']
})
export class ItemsListComponent {
  @Input() items: Item[];
  @Output() selected = new EventEmitter();
  @Output() deleted = new EventEmitter();
}
```

Templates

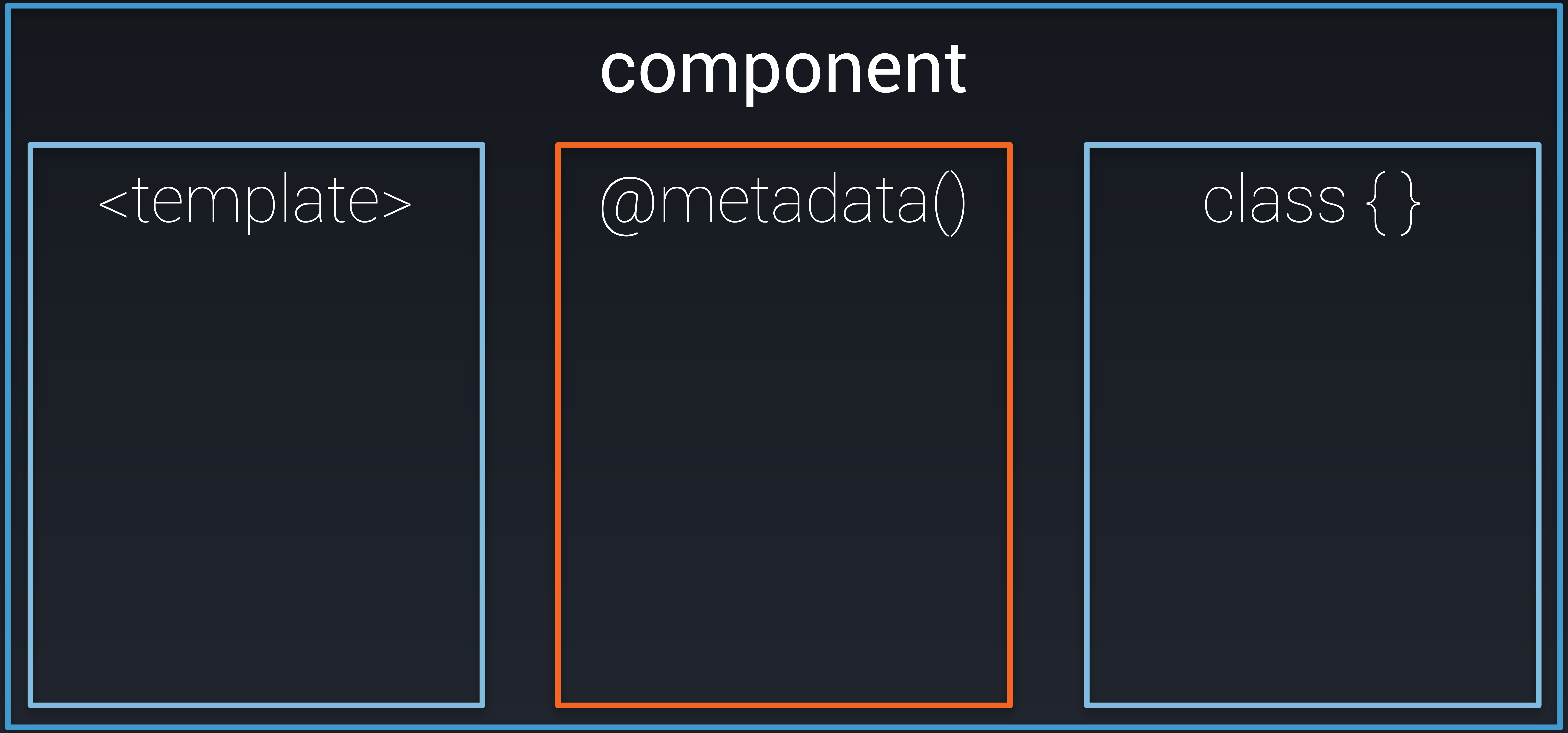
```
@Component({
  selector: 'app-items-list',
  template: `
  <div *ngFor="let item of items" (click)="selected.emit(item)">
    <div>
      <h2>{{item.name}}</h2>
    </div>
    <div>
      {{item.description}}
    </div>
    <div>
      <button (click)="deleted.emit(item); $event.stopPropagation();">
        <i class="material-icons">close</i>
      </button>
    </div>
  </div>
  `,
  styleUrls: ['./items-list.component.css']
})
export class ItemsListComponent {
  @Input() items: Item[];
  @Output() selected = new EventEmitter();
  @Output() deleted = new EventEmitter();
}
```

Templates

Components



Metadata



Metadata

- Metadata allows Angular to process a class
- We can attach metadata with TypeScript using decorators
- Decorators are just functions
- Most common is the **@Component()** decorator
- Takes a config option with the **selector**, **templateUrl**, **styles**, **styleUrls**, **animations**, etc

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

Metadata

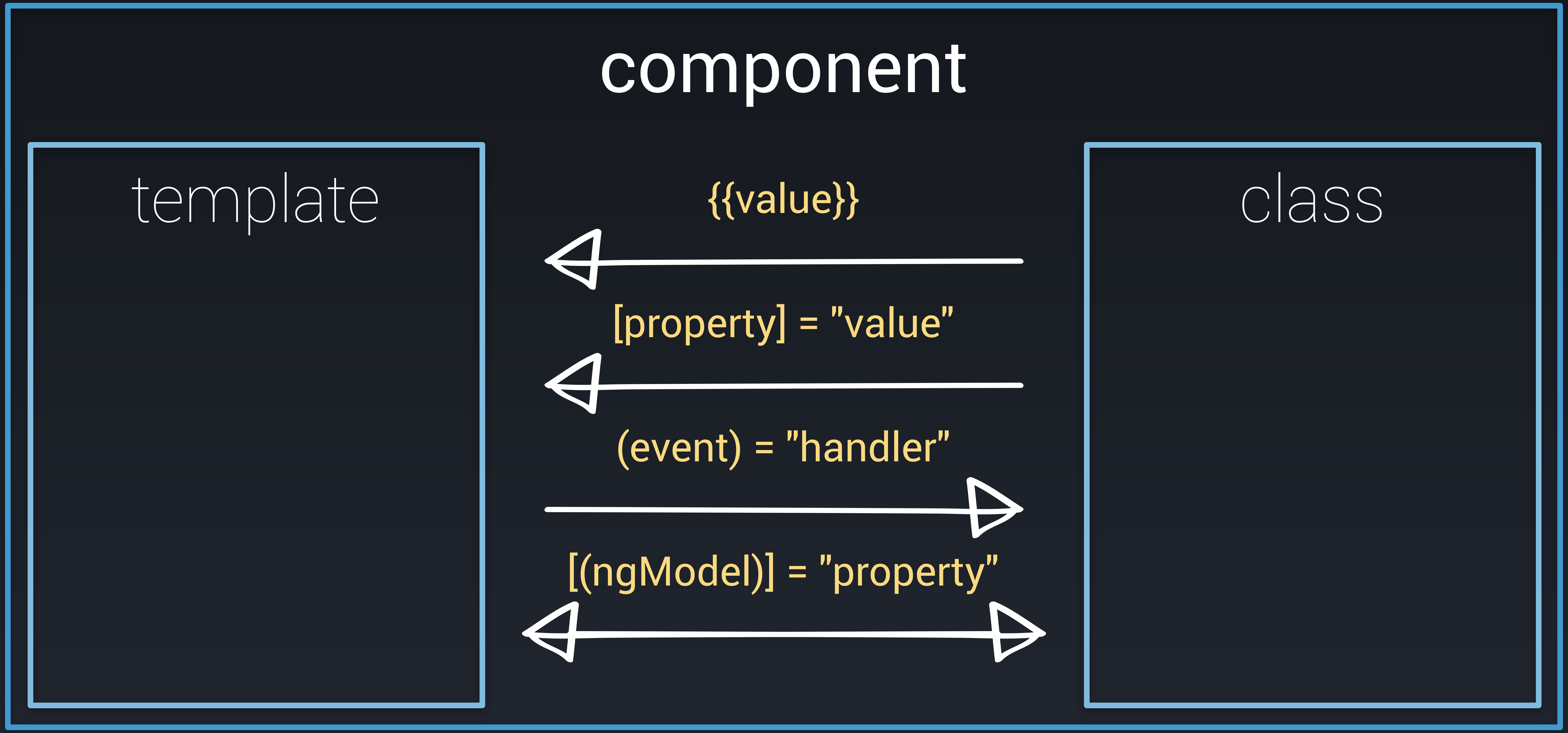
```
@Component({
  selector: 'app-items-list',
  templateUrl: './items-list.component.html',
  styleUrls: ['./items-list.component.css']
})
export class ItemsListComponent {
  @Input() items: Item[];
  @Output() selected = new EventEmitter();
  @Output() deleted = new EventEmitter();
}
```

Metadata

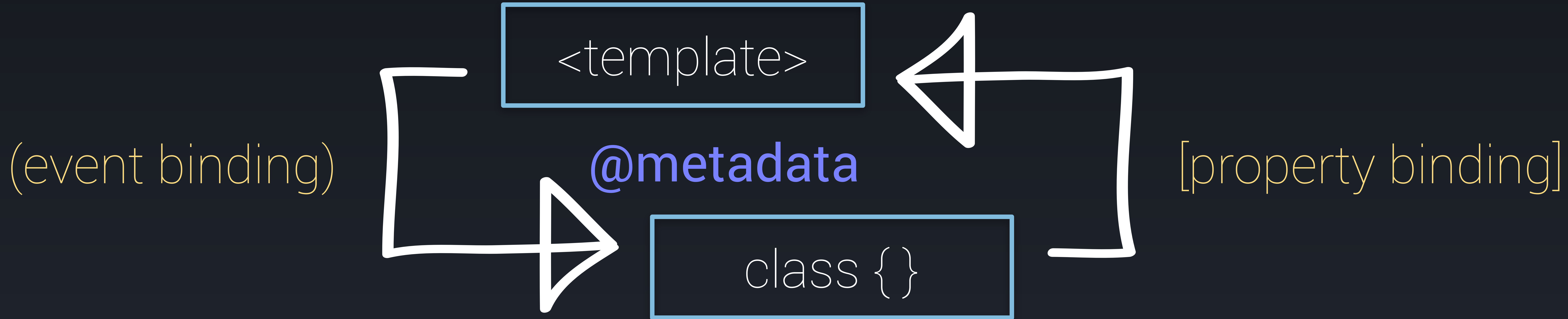
Data Binding

- Enables data to flow from the component to template and vice-versa
- Includes interpolation, property binding, event binding, and two-way binding (property binding and event binding combined)
- The binding syntax has expanded but the result is a much smaller framework footprint

Data Binding



Data Binding



```html
<h1>{{title}}</h1>
<p>{{body}}</p>
<hr/>
<experiment *ngFor="let e of experiments" [experiment]="e"></experiment>
<hr/>
<div>
 <h2 class="text-error">Experiments: {{message}}</h2>
  <form class="form-inline">
    <input type="text" [(ngModel)]="message" placeholder="Message">
    <button type="submit" class="btn" (click)="updateMessage(message)">Update Message</button>
  </form>
</div>
```

Data Binding

BUT! What about directives?

Directives

- A directive is a class decorated with **@Directive**
- A component is just a directive with added template features
- Built-in directives include structural directives and attribute directives

```
import { Directive, ElementRef } from '@angular/core';

@Directive({selector: 'blink'})
export class Blinker {
  constructor(element: ElementRef) {
    // All the magic happens!
  }
}
```

Directives

```
import { Directive, ElementRef } from '@angular/core';

@Directive({selector: 'blink'})
export class Blinker {
  constructor(element: ElementRef) {
    // All the magic happens!
  }
}
```

Directives

Services

module

routes

components

services

Services

- A service is *generally* just a class
- Should only do one specific thing
- Take the burden of business logic out of components
- It is considered best practice to always use **@Injectable** so that metadata is generated correctly

```
import { Injectable } from '@angular/core';
import 'rxjs/add/operator/map';
import 'rxjs/add/operator/toPromise';

const BASE_URL = 'http://localhost:3000/items/';

@Injectable()
export class ItemsService {
  constructor(private http: Http) {}

  loadItems() {
    return this.http.get(BASE_URL)
      .map(res => res.json())
      .toPromise();
  }
}
```

Services

BONUS! TypeScript Time!

```
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Component

```
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Types

```
export interface Item {
  id: number;
  name: string;
  description: string;
}
```

Interface

```
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Field Assignment

```
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Constructor Assignment

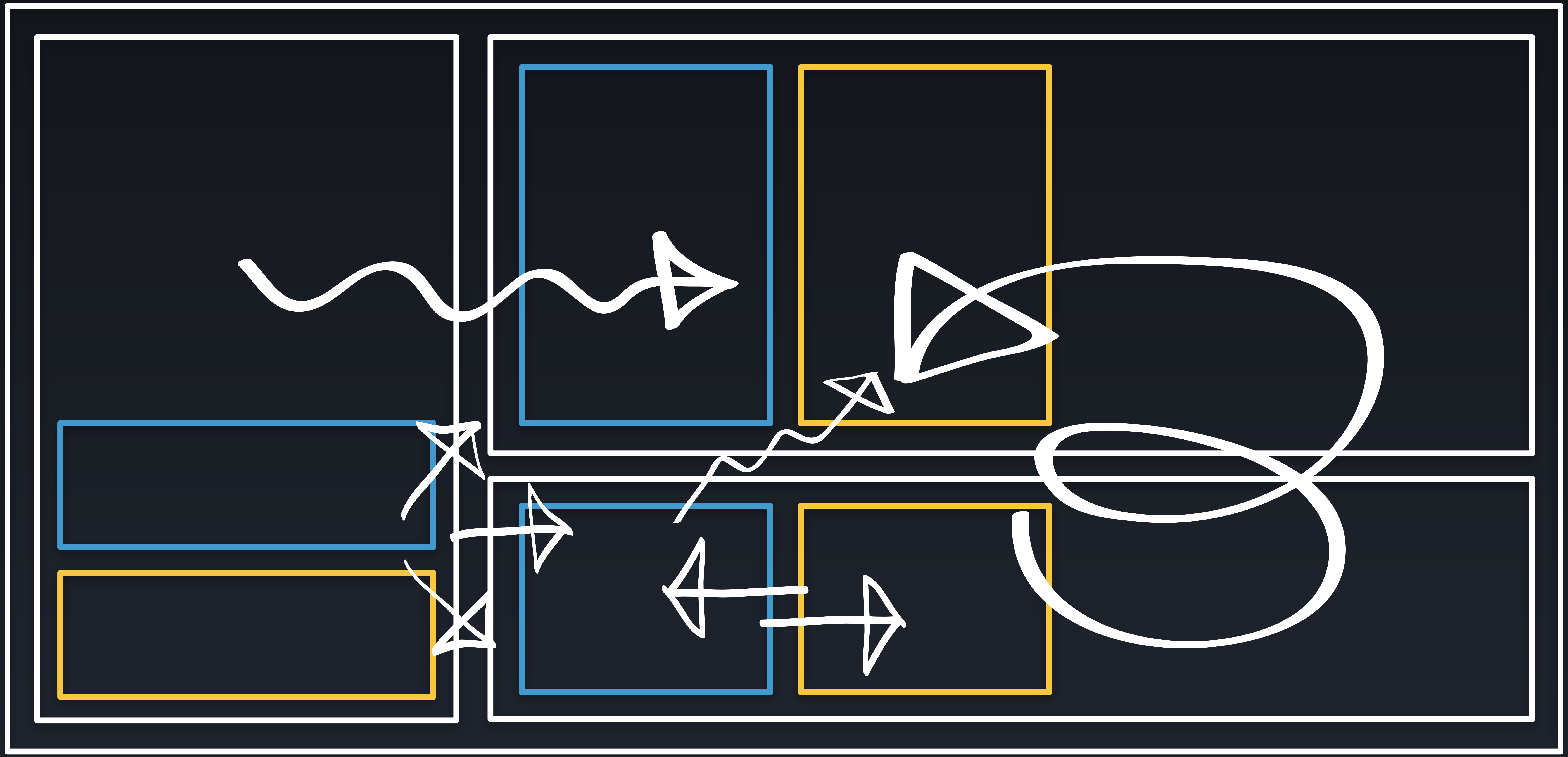
```
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

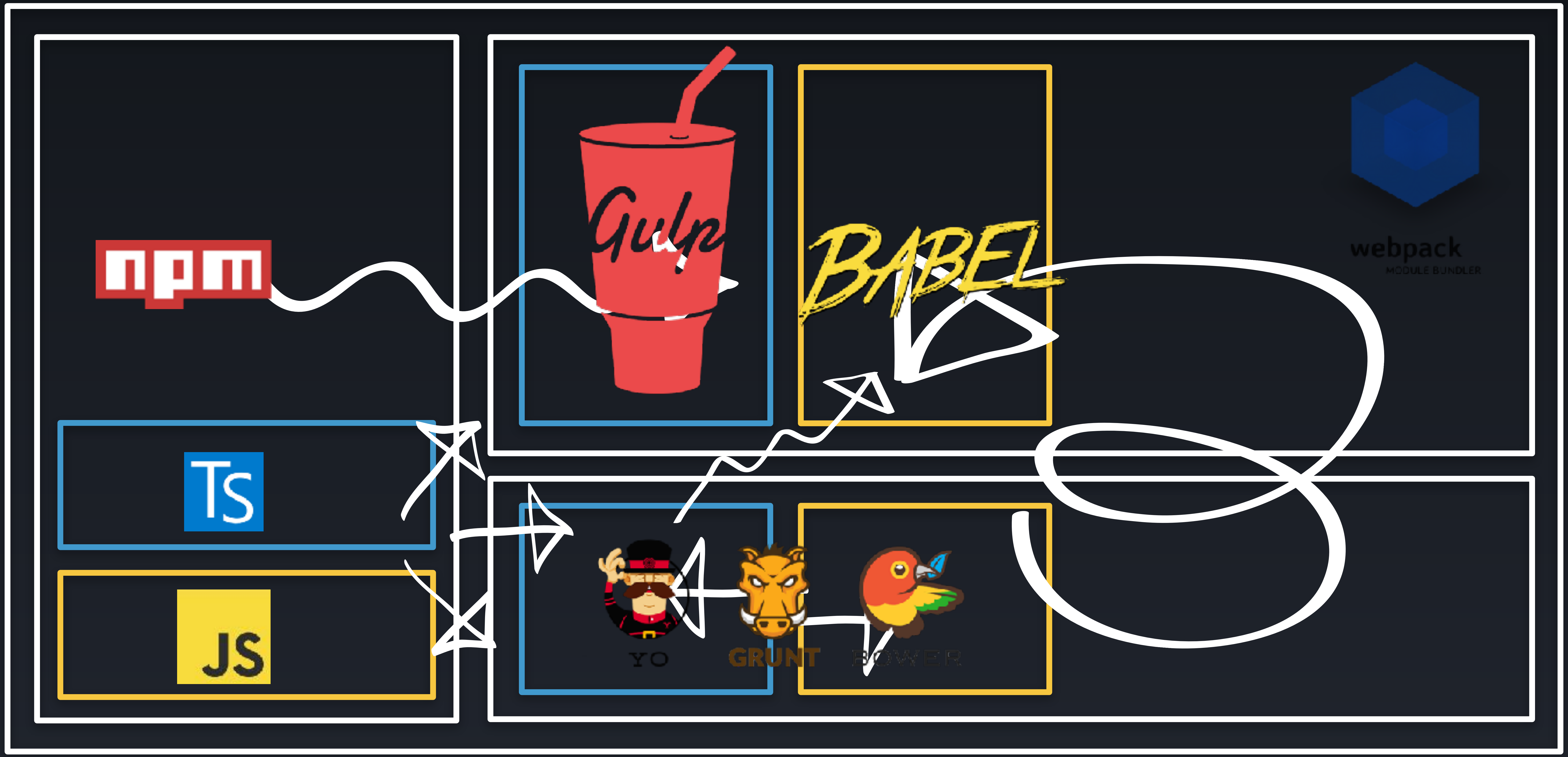
Implements Interface

Challenges

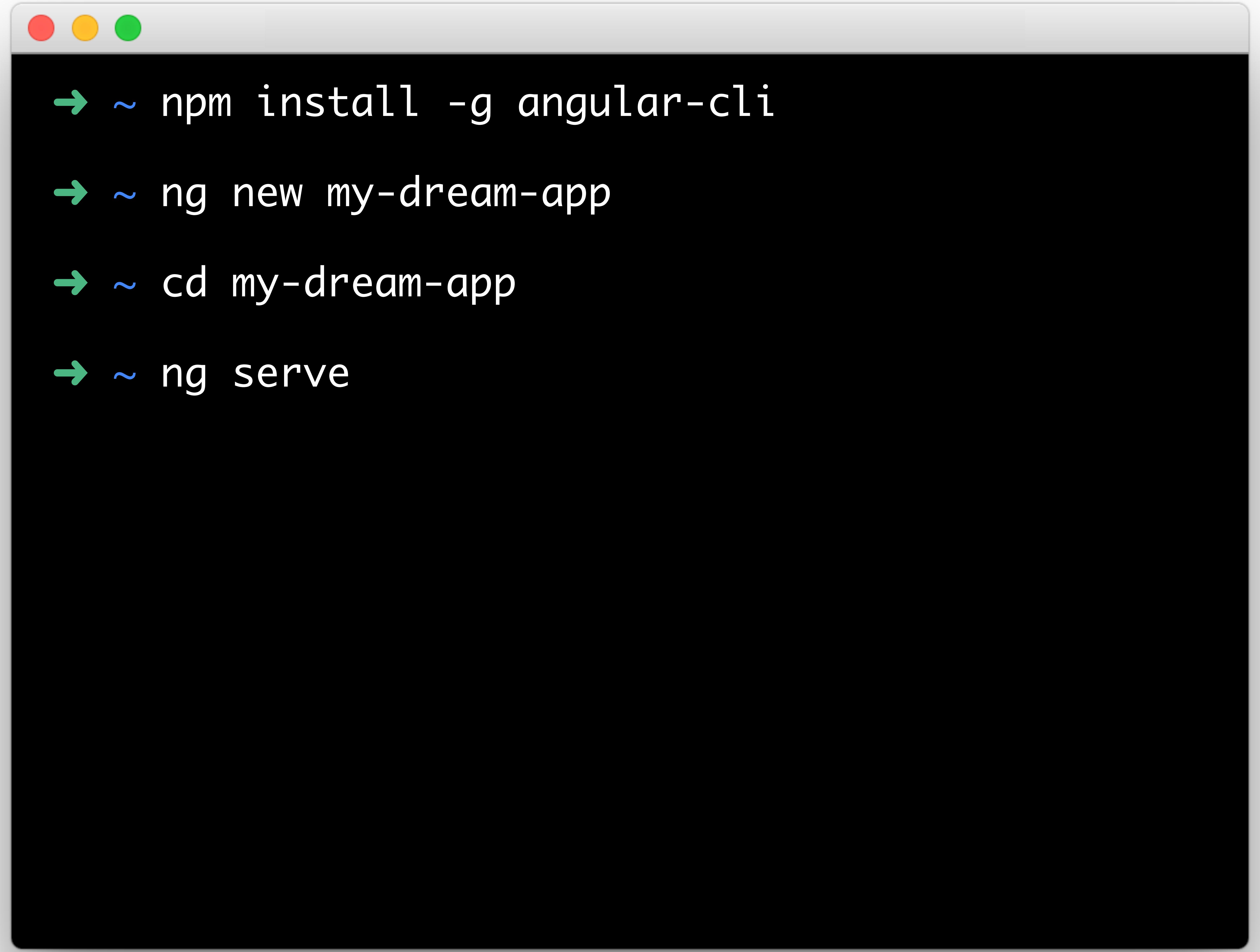
- Identify the major Angular 2 pieces in the sample application
- Add a new property to the **Items** component and bind to it in the view
- Add a new property to the **ItemsService** and consume it in a component

The Angular CLI




npm
TS
JS
Gulp
BABEL
webpack
MODULE BUNDLER
YO
GRUNT
BOWER

ANGULAR CLI



```
➜ ~ npm install -g angular-cli
➜ ~ ng new my-dream-app
➜ ~ cd my-dream-app
➜ ~ ng serve
```

Angular CLI !== Crutch

Includes

- Fully functional project generation THAT JUST WORKS!
- Code generator for components, directives, pipes, enums, classes, modules and services
- Build generation
- Unit test runner
- End-to-end test runner
- App deployment GitHub pages
- Linting
- CSS preprocessor support
- AOT support
- Lazy routes
- **Extensible blueprints coming soon**

```
npm install -g angular-cli
```

Installing the CLI

```
ng new PROJECT_NAME
cd PROJECT_NAME
ng serve
```

Generating a project

```
ng generate component my-new-component
ng g component my-new-component # using the alias
```

Generating a component

```
ng generate service my-new-service
ng g service my-new-service # using the alias
```

Generating a service

```
ng build
```

Generating a build

```
ng test
ng e2e
```

Running tests

```
ng lint
```

Linting

```
ng github-pages:deploy --message "Optional
commit message"
```

Deploying the app

Challenges

- Scaffold out a **gizmo component**
- Scaffold out a **gizmo service**
- Run the tests
- Build the application
- **BONUS: Create a gizmo route**

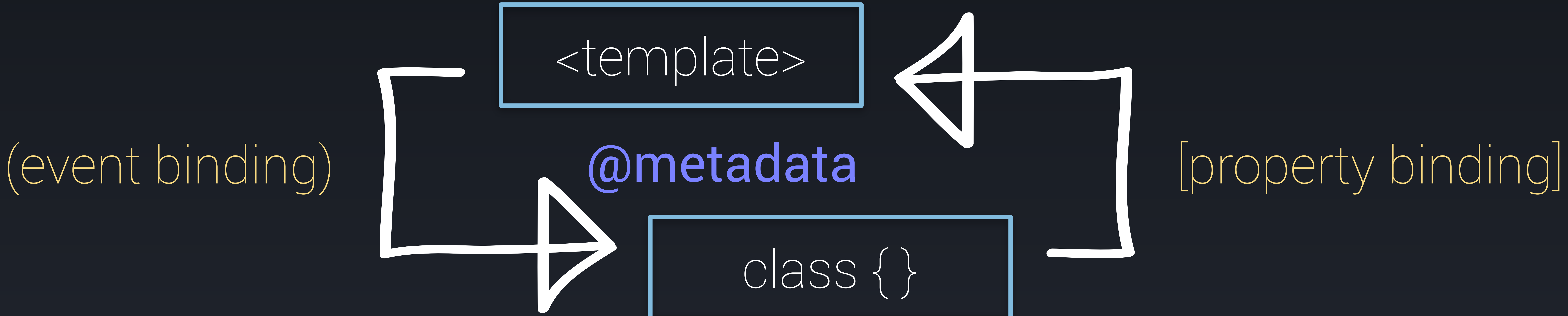
NOTE: Use the Angular CLI for ALMOST all of the tasks above

Component
Fundamentals

Component Fundamentals

- Anatomy of a Component
- **C**lass **I**mport **D**ecorate **E**nhance **R**epeat
- Enhance with properties and methods
- Enhance with injectables
- Lifecycle Hooks

Anatomy of a Component



Class !== Inheritance

Class Definition

- Create the component as an ES6 class
- Properties and methods on our component class will be available for binding in our template

```
export class ItemsComponent {}
```

Class

Import

- Import the core Angular dependencies
- Import 3rd party dependencies
- Import your custom dependencies
- This approach gives us a more fine-grained control over the managing our dependencies

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

Import

Class Decoration

- We turn our class into something Angular 2 can use by decorating it with a Angular specific metadata
- Use the **@Component** syntax to decorate your classes
- You can also decorate properties and methods within your class
- The two most common member decorators are **@Input** and **@Output**

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

@Component({
  selector: 'app-items',
  templateUrl: './items.component.html',
  styleUrls: ['./items.component.css']
})
export class ItemsComponent {}
```

Decorate

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

@Component({
  selector: 'app-items',
  templateUrl: './items.component.html',
  styleUrls: ['./items.component.css']
})
export class ItemsComponent {
  items: Array<Item>;
  selectedItem: Item;

  constructor() {}

  resetItem() {
    let emptyItem: Item = {id: null, name: '', description: ''};
    this.selectedItem = emptyItem;
  }

  selectItem(item: Item) {
    this.selectedItem = item;
  }
}
```

Properties and Methods

```
import { Component, OnInit } from '@angular/core';
import { ItemsService, Item } from '../shared';

@Component({
  selector: 'app-items',
  templateUrl: './items.component.html',
  styleUrls: ['./items.component.css']
})
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Injecting a Dependency

Lifecycle Hooks

- Allow us to perform custom logic at various stages of a component's life
- Data isn't always immediately available in the constructor
- The lifecycle interfaces are optional. We recommend adding them to benefit from TypeScript's strong typing and editor tooling
- Implemented as class methods on the component class

Lifecycle Hooks Continued

- **ngOnChanges** called when an input or output binding value changes
- **ngOnInit** called after the first ngOnChanges
- **ngDoCheck** handles developer's custom change detection
- **ngAfterContentInit** called after component content initialized
- **ngAfterContentChecked** called after every check of component content
- **ngAfterViewInit** called after component's view(s) are initialized
- **ngAfterViewChecked** called after every check of a component's view(s)
- **ngOnDestroy** called just before the directive is destroyed.

Lifecycle Hooks Continued

- **ngOnChanges** called when an input or output binding value changes
- **ngOnInit** called after the first ngOnChanges
- **ngDoCheck** handles developer's custom change detection
- **ngAfterContentInit** called after component content initialized
- **ngAfterContentChecked** called after every check of component content
- **ngAfterViewInit** called after component's view(s) are initialized
- **ngAfterViewChecked** called after every check of a component's view(s)
- **ngOnDestroy** called just before the directive is destroyed.

```
import { Component, OnInit } from '@angular/core';
import { ItemsService, Item } from '../shared';

@Component({
  selector: 'app-items',
  templateUrl: './items.component.html',
  styleUrls: ['./items.component.css']
})
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Lifecycle Hooks

Demonstration

Challenges

- Check out the **00-start** branch
- Create the file structure for a new **widgets** feature
- Create the ES6 class for the **widgets** component
- Import the appropriate modules into the **widgets** component
- Decorate the **widgets** component to use the **widgets** template
- Display the **widgets** component in the **app** component
- **BONUS Create a simple route to view the widgets component by itself**

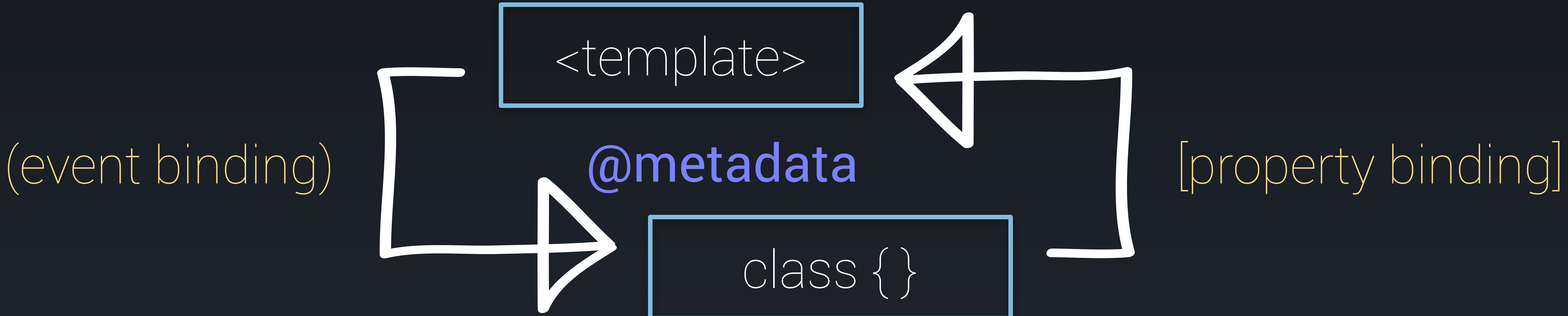
Template

Fundamentals

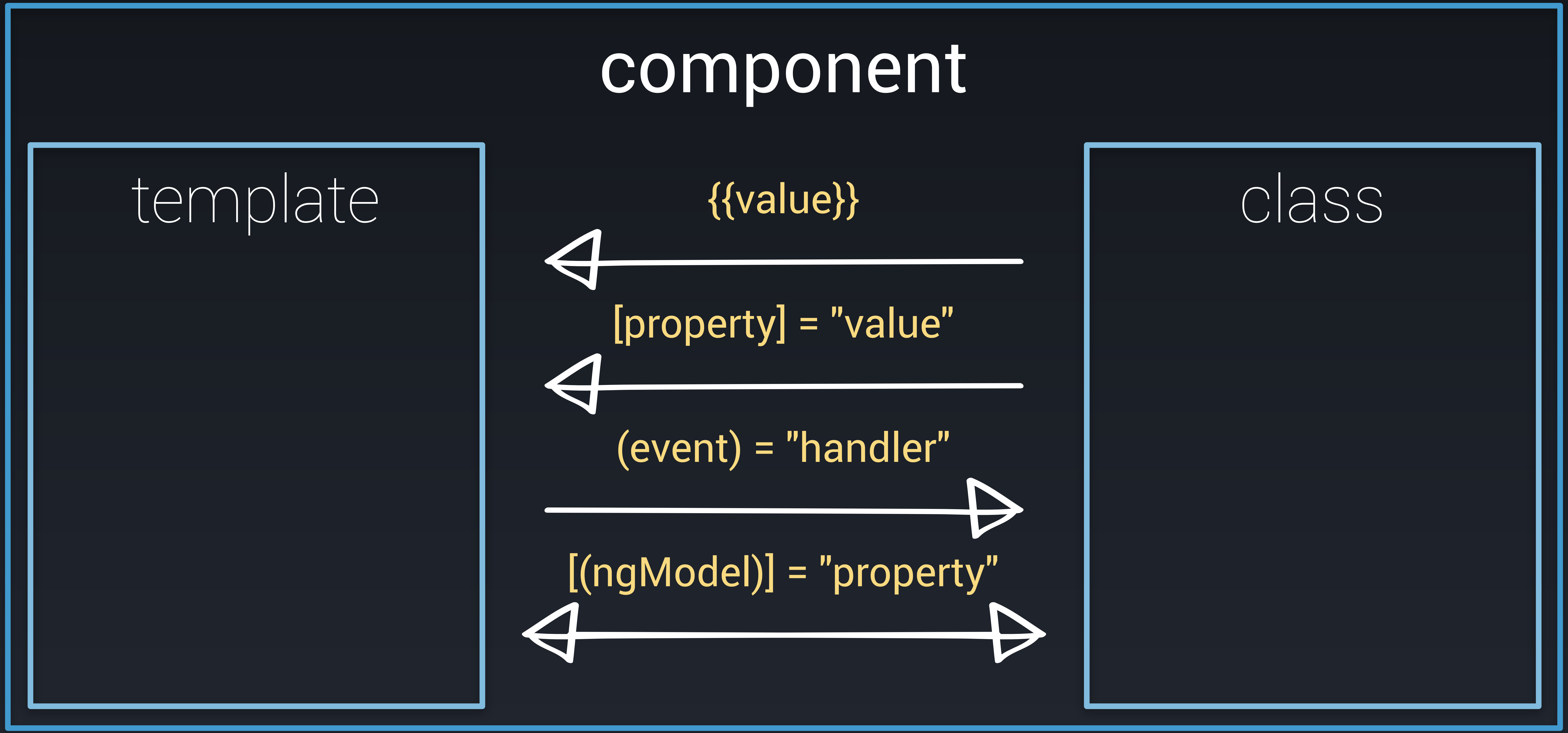
Template Fundamentals

- Property Binding
- Event Binding
- Two-way Binding
- Local Template Variables
- Attribute Directives
- Structural Directives
- Safe Navigation Operator

Templates



Data Binding



Property Binding

- Flows data from the component to an element
- Created with brackets **<img [src]=”image.src” />**
- The canonical form of **[property]** is **bind-property**
- There are special cases for binding to attributes, classes and styles that look like **[attr.property]**, **[class.className]**, and **[style.styleName]** respectively

```html
<span [style.color]="componentStyle">Some colored text!</span>
```

Property Bindings

Event Binding

- Flows data from an element to the component
- Created with parentheses **<button (click)=”foo($event)”></button>**
- The canonical form of **(event)** is **on-event**
- Information about the target event is carried in the **$event** parameter

```
<button (click)="alertTheWorld($event)">Click me!</button>
```

Event Bindings

Two-way Binding

- Really just a combination of property and event bindings
- Used in conjunction with **ngModel**
- Referred to as "banana in a box"

```html
<label>The awesome input</label>
<input [(ngModel)]="dynamicValue" placeholder="Watch the text update!" type="text">
<label>The awesome output</label>
<span>{{dynamicValue}}</span>
```

Two-way Binding

Local Template Variable

- The hashtag (#) defines a local variable inside our template
- We can refer to a local template variable *anywhere* in the current template
- To consume, simply use it as a variable without the hashtag
- The canonical form of **#variable** is **ref-variable**

```html
<form novalidate #formRef="ngForm">
  <label>Item Name</label>
  <input [(ngModel)]="selectedItem.name"
    type="text" name="name" required
    placeholder="Enter a name">

  <label>Item Description</label>
  <input [(ngModel)]="selectedItem.description"
    type="text" name="description"
    placeholder="Enter a description">

  <button type="submit"
    [disabled]="!formRef.valid"
    (click)="saved.emit(selectedItem)">Save</button>
</form>
```

Local Template Variable

Structural Directives

- A structural directive changes the DOM layout by adding and removing DOM elements.
- Asterisks indicate a directive that modifies the HTML
- It is syntactic sugar to avoid having to use template elements directly

```html
<div *ngIf="hero">{{hero}}</div>

<div *ngFor="let hero of heroes">{{hero}}</div>

<span [ngSwitch]="toeChoice">
  <span *ngSwitchCase="'Eenie'">Eenie</span>
  <span *ngSwitchCase="'Meanie'">Meanie</span>
  <span *ngSwitchCase="'Miney'">Miney</span>
  <span *ngSwitchCase="'Moe'">Moe</span>
  <span *ngSwitchDefault>other</span>
</span>
```

Structural Directives

```html
<span [ngSwitch]="toeChoice">
  <!-- with *NgSwitch -->
  <span *ngSwitchCase="'Eenie'">Eenie</span>
  <span *ngSwitchCase="'Meanie'">Meanie</span>
  <span *ngSwitchCase="'Miney'">Miney</span>
  <span *ngSwitchCase="'Moe'">Moe</span>
  <span *ngSwitchDefault>other</span>

  <!-- with <template> -->
  <template [ngSwitchCase]="'Eenie'"><span>Eenie</span></template>
  <template [ngSwitchCase]="'Meanie'"><span>Meanie</span></template>
  <template [ngSwitchCase]="'Miney'"><span>Miney</span></template>
  <template [ngSwitchCase]="'Moe'"><span>Moe</span></template>
  <template ngSwitchDefault><span>other</span></template>
</span>
```

Template Tag

Safe Navigation Operator

- Denoted by a question mark immediately followed by a period e.g. **?.**
- If you reference a property in your template that does not exist, you will throw an exception.
- The safe navigation operator is a simple, easy way to guard against null and undefined properties

```
<!-- No hero, no problem! -->
The null hero's name is {{nullHero?.firstName}}
```

Safe Navigation Operator

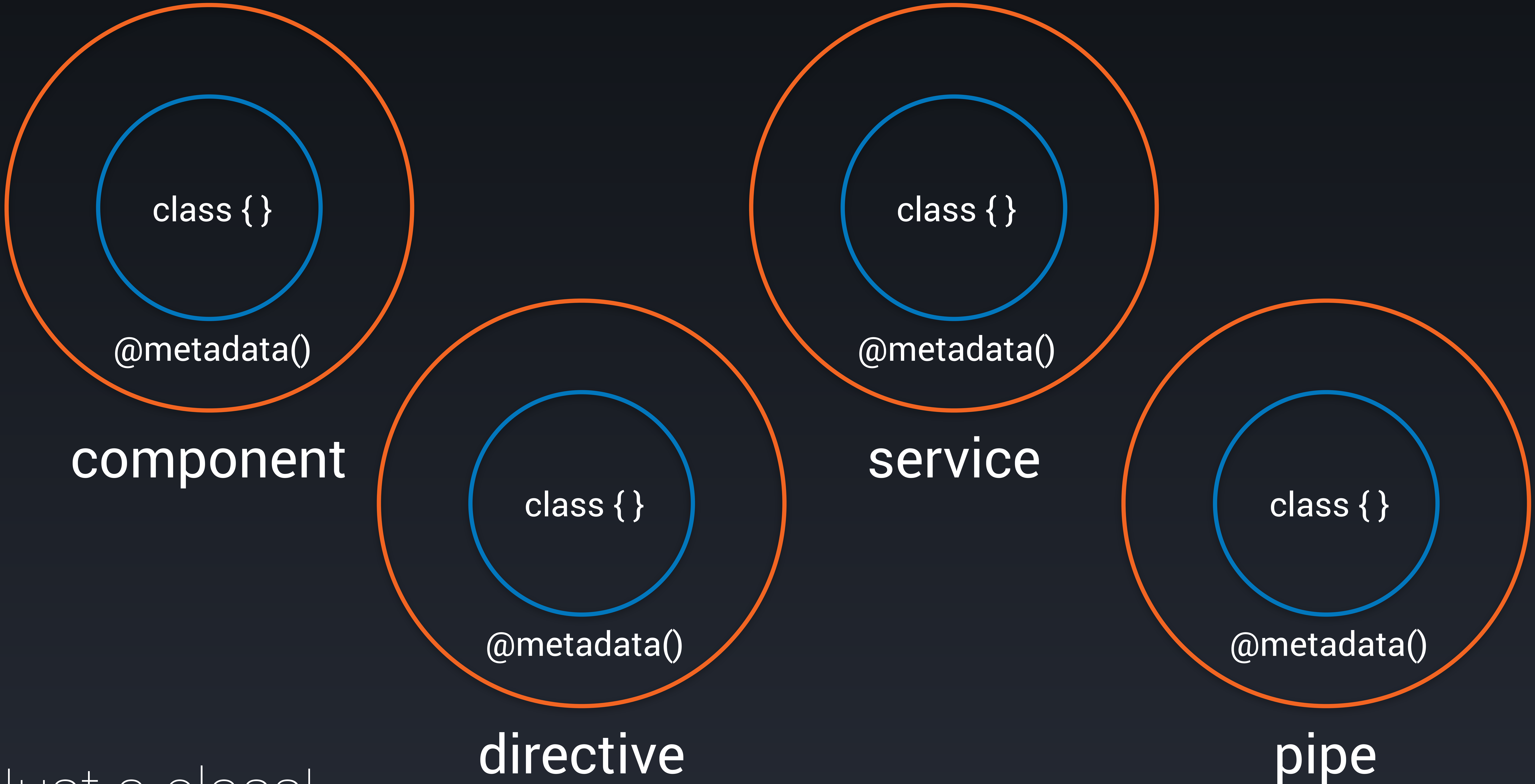
Demonstration

Challenges

- Create a **widgets** collection in the **widget** component with mock objects
- Create a **selectedWidget** property in the widget component
- Display the **widgets** collection in the template using **ngFor**
- Use an **event binding** to set a selected widget
- Display the **widget** properties using **property binding** and **interpolation binding**
- Use **ngIf** to show an alternate message if no widget is selected

ACTION ITEM! Go to http://bit.ly/workshop-snippets to save on typing

Services


class { }
@metadata()
component
class { }
@metadata()
directive
class { }
@metadata()
service
class { }
@metadata()
pipe

Just a class!

Services

- Defining a Service
- Exposing a Service
- Consuming a Service

```
@Injectable()
export class ItemsService {
  constructor(private http: Http) {}

  loadItems() { }

  loadItem(id) { }

  saveItem(item: Item) { }

  createItem(item: Item) { }

  updateItem(item: Item) { }

  deleteItem(item: Item) { }
}
```

Defining a Service

```
@NgModule({
  declarations: [
    AppComponent,
    ItemsComponent,
    ItemsListComponent,
    ItemDetailComponent
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule,
    Ng2RestAppRoutingModule
  ],
  providers: [ItemsService],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

Exposing a Service

```
import { Component, OnInit } from '@angular/core';
import { ItemsService, Item } from '../shared';

@Component({
  selector: 'app-items',
  templateUrl: './items.component.html',
  styleUrls: ['./items.component.css']
})
export class ItemsComponent implements OnInit {
  items: Array<Item>;
  selectedItem: Item;

  constructor(private itemsService: ItemsService) {}

  ngOnInit() {
    this.itemsService.loadItems()
      .then(items => this.items = items);
  }
}
```

Consuming a Service

Demonstration

Challenges

- Extract the **widgets collection** to a **widgets service**
- Add the **widgets service** to the **application module** so that it can be consumed
- Inject that **widgets service** into the **widgets component**
- Consume and display the new **widgets collection**

Routing

Routing

- Defining Routes
- Navigating Routes
- Route Params
- Child Routes
- **Named Routes**
- **Lazy Loading Routes**

Defining Routes

- Routes are defined as a a collection of **Route** objects
- The simplest configuration defines a **path** and a **component**
- We then pass our **routes** collection into **RouterModule.forRoot** which returns a configured **Router** module

```
const routes: Routes = [
  {path: '',       redirectTo: '/items', pathMatch: 'full' },
  {path: 'items', component: ItemsComponent },
  {path: 'widgets', component: WidgetsComponent},
  {path: '*',      component: ItemsComponent }
];

@NgModule({
  imports: [RouterModule.forRoot(routes)],
  exports: [RouterModule],
  providers: []
})
export class Ng2RestAppRoutingModule { }
```

Defining Routes

```
@NgModule({
  declarations: [
    AppComponent,
    ItemsComponent,
    ItemsListComponent,
    ItemDetailComponent
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule,
    Ng2RestAppRoutingModule
  ],
  providers: [ItemsService],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

Exposing Routes

```html
<main>
  <router-outlet></router-outlet>
</main>
```

Loading Routes

Navigating Routes

- We can use the **routerLink** directive to navigate to routes within our template
- We can use **router.navigate** to navigate to routes programmatically

```
<header>
  <div>
    <span>{{title}}</span>
    <nav>
      <a [routerLink]="links.items">Items</a>
      <a [routerLink]="links.widgets">Widgets</a>
    </nav>
  </div>
</header>
```

Navigating Routes

```
setItemAsFeatured(item: Item) {
  this.unsetFeaturedItem();

  this.saveItem(Object.assign({}, item, {featured: true}));

  this.router.navigate(['featured', item.id], {relativeTo: this.route});
}
```

Navigating Routes Programmatically

Route Params

- We use a colon to indicate a route parameter such as **/items/:id** which will resolve to something like **/items/4**
- We can then use the **ActivatedRoute** service to get information about the current route
- The **ActivatedRoute.params** returns an observable with the **required** and **optional** parameters for the route
- We can also use **ActivatedRoute.snapshot.params** if we only need the *initial* value of the parameter

```
import { NgModule } from '@angular/core';
import { Routes, RouterModule } from '@angular/router';
import { ItemsComponent } from './items/items.component';
import { FeaturedItemComponent } from './items/featured-item/featured-item.component';

const routes: Routes = [
  {path: '',      redirectTo: '/items', pathMatch: 'full' },
  {path: 'items', component: ItemsComponent, children: [
    {path: ''},
    {path: 'featured/:id', component: FeaturedItemComponent}
  ]},
  {path: '*',     component: ItemsComponent }
];

@NgModule({
  imports: [RouterModule.forRoot(routes)],
  exports: [RouterModule],
  providers: []
})
export class Ng2RestAppRoutingModule { }
```

Route Params

```
diffFeaturedItems(items: Item[]) {
  const supposedlyFeaturedID = this.route.snapshot.firstChild.params['id'];

  if (supposedlyFeaturedID) {
    let supposedlyFeaturedItem =
      items.find(item => item.id === +supposedlyFeaturedID);

    if (!supposedlyFeaturedItem.featured) {
      this.setItemAsFeatured(supposedlyFeaturedItem);
    }
  }
}
```

Route Params

Child Routes

- To define a child route, we add the **children** property to our **routes** collection
- Child routes will be loaded within the **router-outlet** of its parent component
- For relative navigation to a child route programmatically, use **relativeTo** within the **router.navigate** method call

```
import { NgModule } from '@angular/core';
import { Routes, RouterModule } from '@angular/router';
import { ItemsComponent } from './items/items.component';
import { FeaturedItemComponent } from './items/featured-item/featured-item.component';

const routes: Routes = [
  {path: '',      redirectTo: '/items', pathMatch: 'full' },
  {path: 'items', component: ItemsComponent, children: [
    {path: ''},
    {path: 'featured/:id', component: FeaturedItemComponent}
  ]},
  {path: '*',     component: ItemsComponent }
];

@NgModule({
  imports: [RouterModule.forRoot(routes)],
  exports: [RouterModule],
  providers: []
})
export class Ng2RestAppRoutingModule { }
```

Child Routes

```
<div>
  <div>
    <router-outlet></router-outlet>
  </div>
  <div>
    <app-items-list [items]="items"
      (selected)="selectItem($event)"
      (deleted)="deleteItem($event)"
      (featured)="setItemAsFeatured($event)">
    </app-items-list>
  </div>
  <div>
    <app-item-detail (saved)="saveItem($event)"
      (cancelled)="resetItem($event)"
      [item]="selectedItem">
      Select an Item
    </app-item-detail>
  </div>
</div>
```

Child Routes

Demonstration

Challenges

- Add a method to the **widgets service** to select a **widget** by **id**
- Define a **route** with an **id** parameter that we can use to pre-populate the **widgets component**
- Navigate to the parameterized widgets route using **routerLink**
- Navigate to parameterized widgets route using **router.navigate**

BONUS! View Encapsulation

Unfortunately the **"C"** in CSS is **"cascade"**

Ideally the **"C"** in CSS would be **"component"**

Shadow DOM fixes CSS and DOM. It introduces **scoped styles** to the web platform.

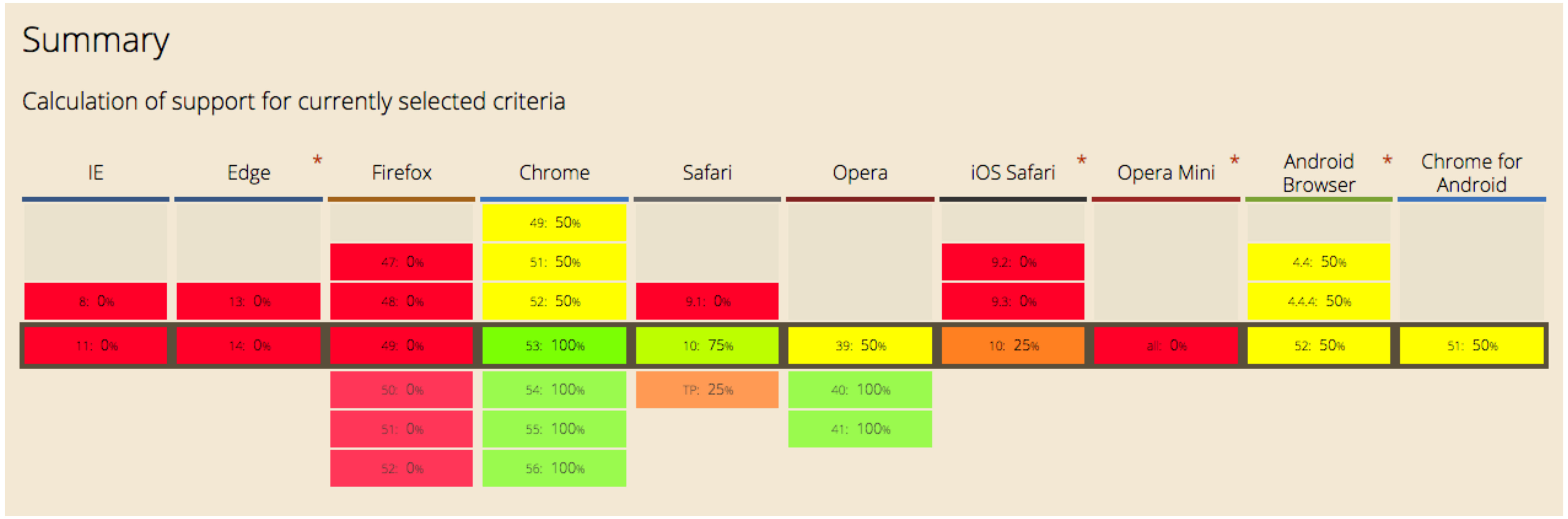
Native View Encapsulation

Set with **ViewEncapsulation.Native**

Uses the browser's native shadow DOM

The component's styles are included within the shadow DOM

YOLO!



Summary

Calculation of support for currently selected criteria

IE	Edge *	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
			49: 50%						
		47: 0%	51: 50%			9.2: 0%		4.4: 50%	
8: 0%	13: 0%	48: 0%	52: 50%	9.1: 0%		9.3: 0%		4.4.4: 50%	
11: 0%	14: 0%	49: 0%	53: 100%	10: 75%	39: 50%	10: 25%	all: 0%	52: 50%	51: 50%
		50: 0%	54: 100%	TP: 25%	40: 100%				
		51: 0%	55: 100%		41: 100%				
		52: 0%	56: 100%						

About that shadow DOM...

Emulated View Encapsulation

Set with **ViewEncapsulation.Emulated**

This is the default mode

Emulates shadow DOM by preprocessing and renaming CSS

This is cash money!

```
<!-- original dom -->
<hero-details>
  <h2>Mister Fantastic</h2>
  <hero-team>
    <h3>Team</h3>
  </hero-team>
</hero-detail>

<!-- rendered dom -->
<hero-details _nghost-pmm-5>
  <h2 _ngcontent-pmm-5>Mister Fantastic</h2>
  <hero-team _ngcontent-pmm-5 _nghost-pmm-6>
    <h3 _ngcontent-pmm-6>Team</h3>
  </hero-team>
</hero-detail>

<!-- rendered css -->
[_nghost-pmm-5] {
  display: block;
  border: 1px solid black;
}
h3[_ngcontent-pmm-6] {
  background-color: white;
  border: 1px solid #777;
}
```

Emulated Shadow DOM

No View Encapsulation

Set with **ViewEncapsulation.None**

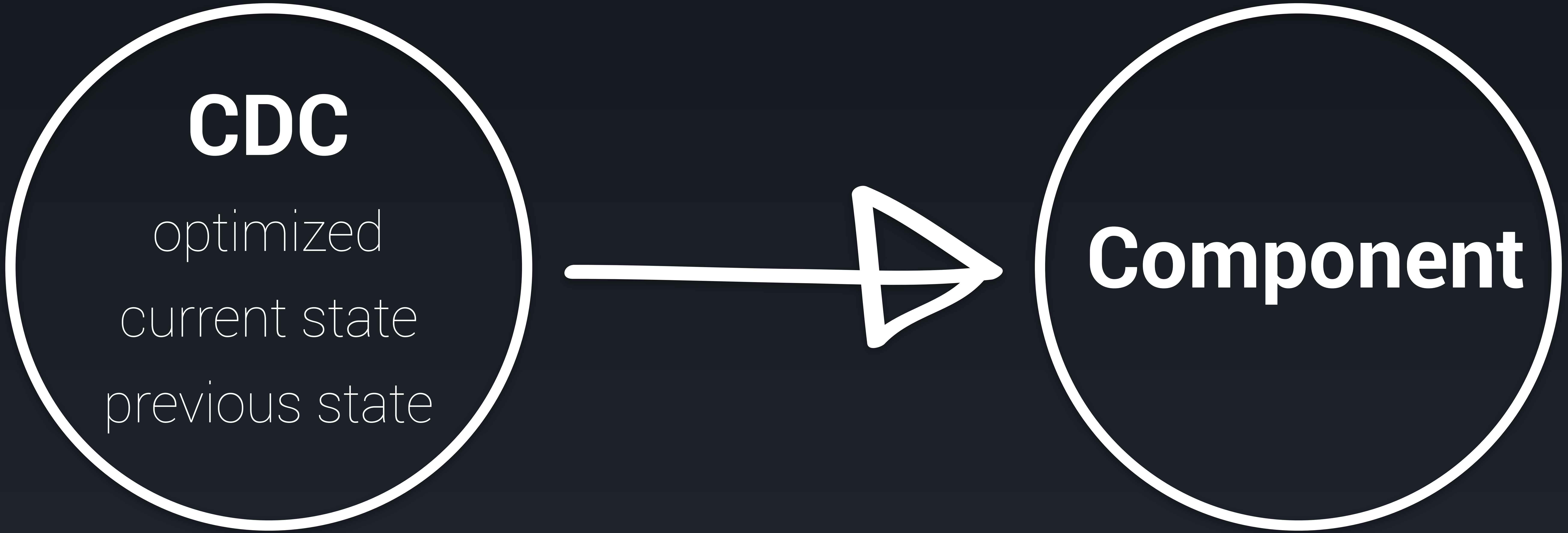
This offers no view encapsulation

The equivalent of pasting your styles directly into the HTML

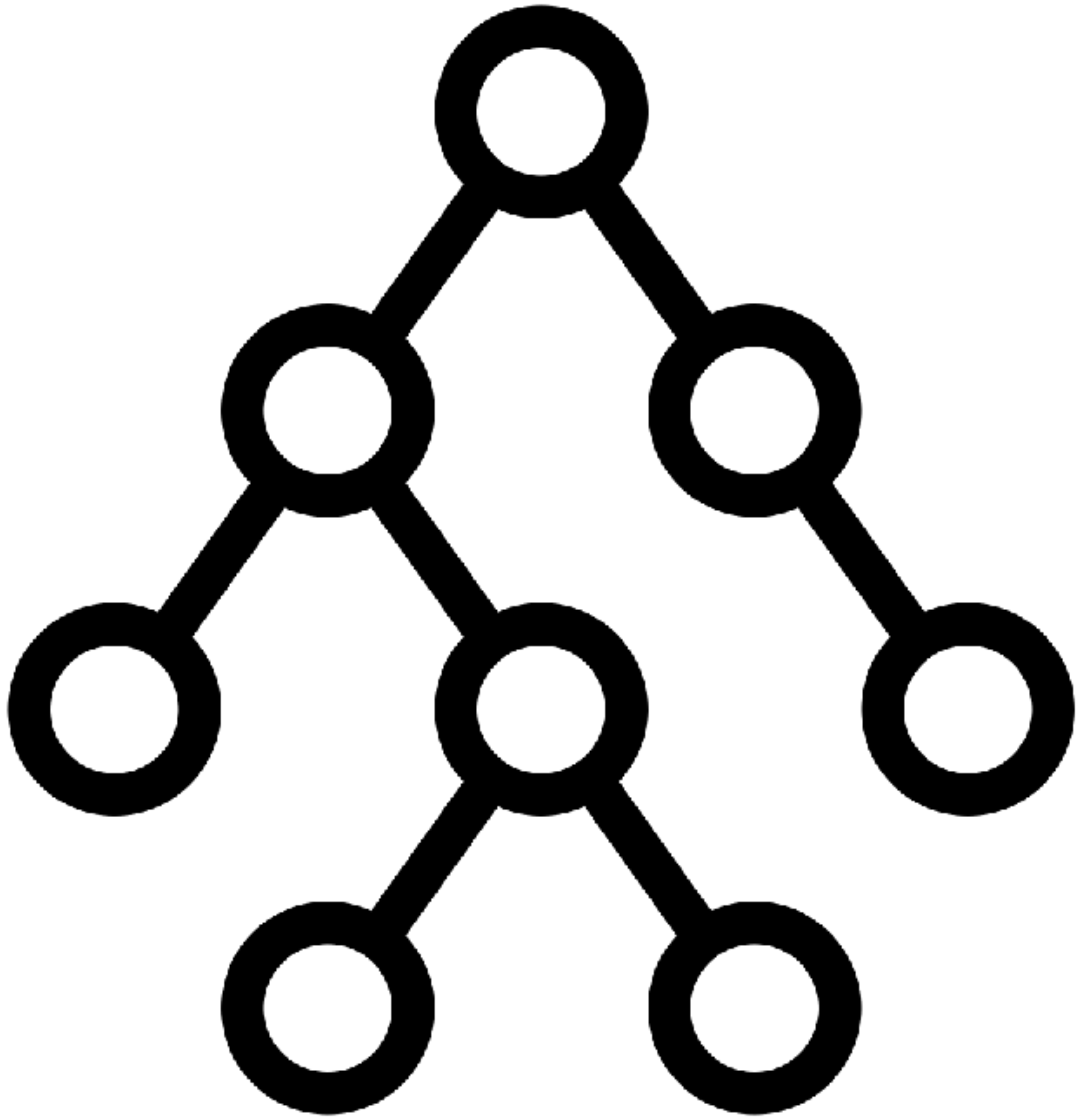
Sad panda!

BONUS! Change Detection

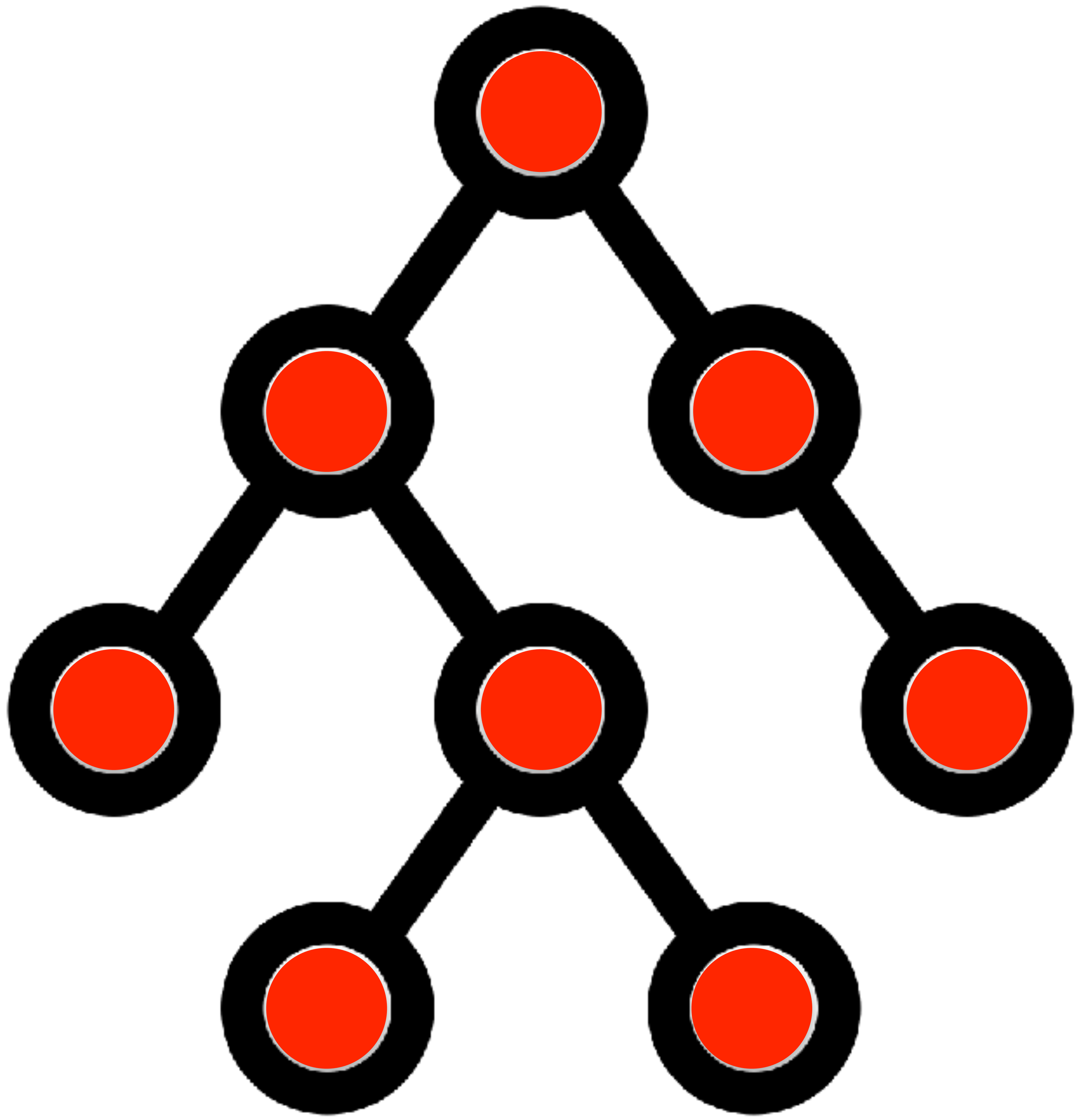
Zone.js



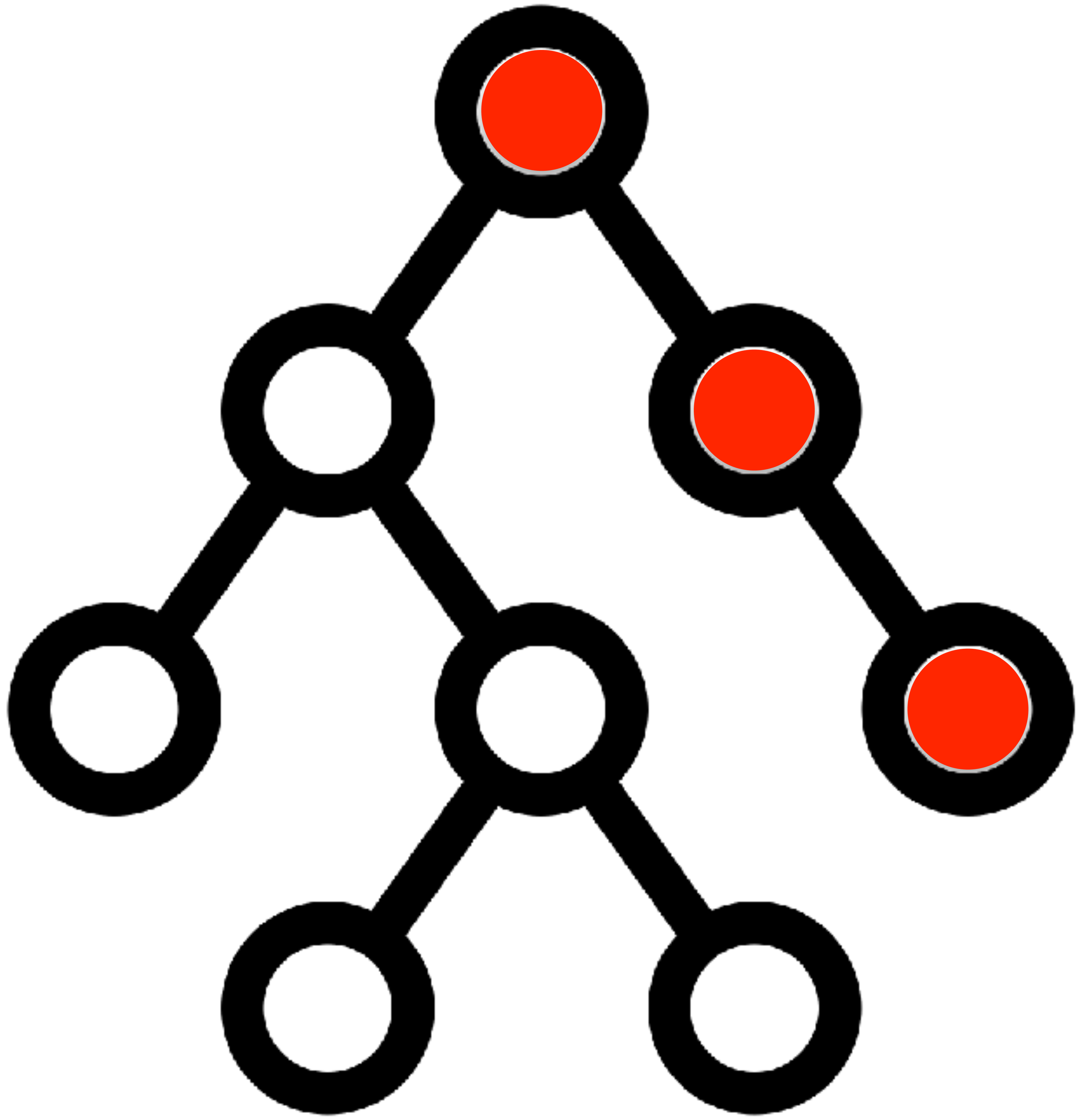
Change Detection Classes



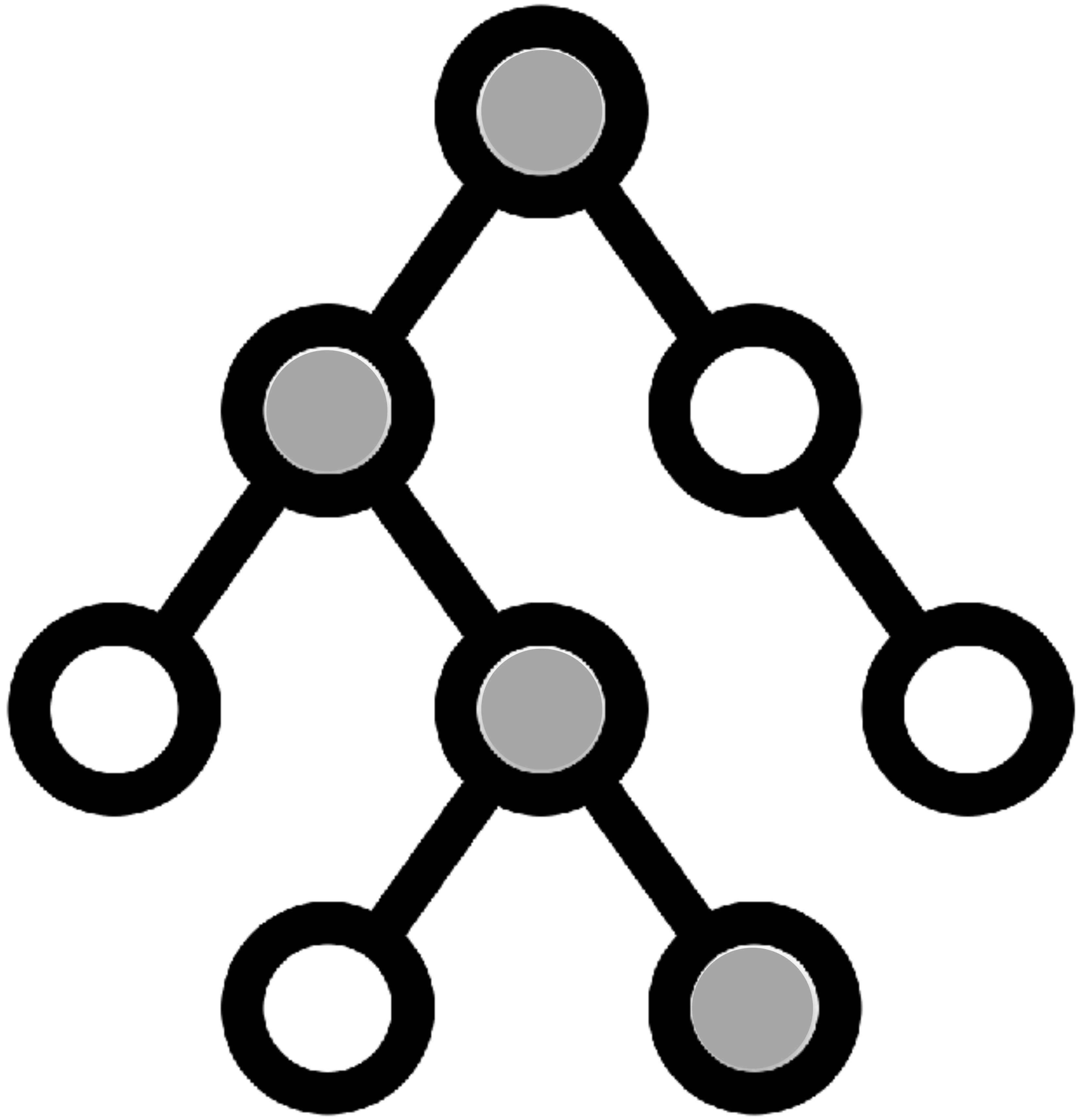
Detecting Change



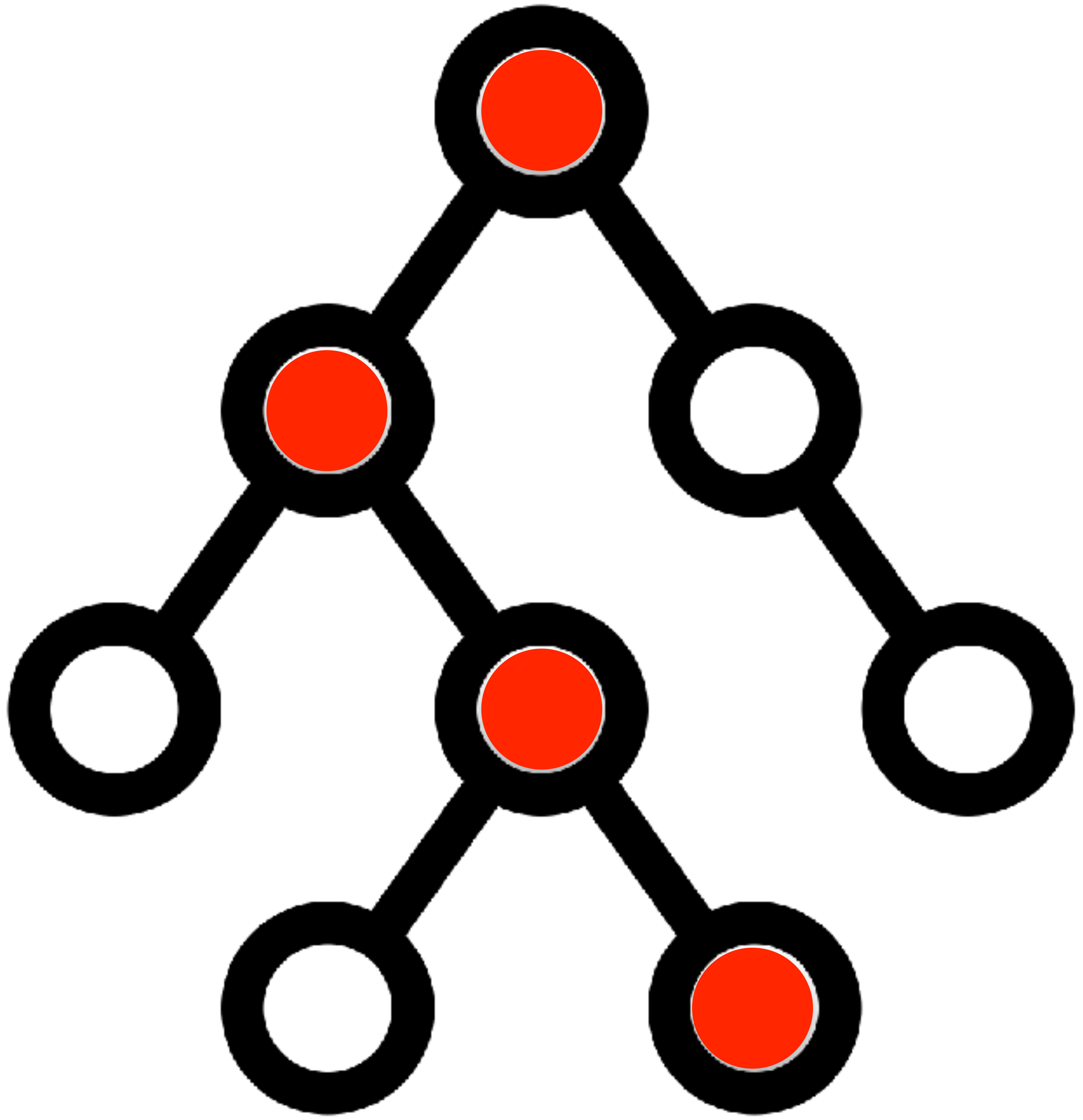
Default Change Detection



OnPush Change Detection



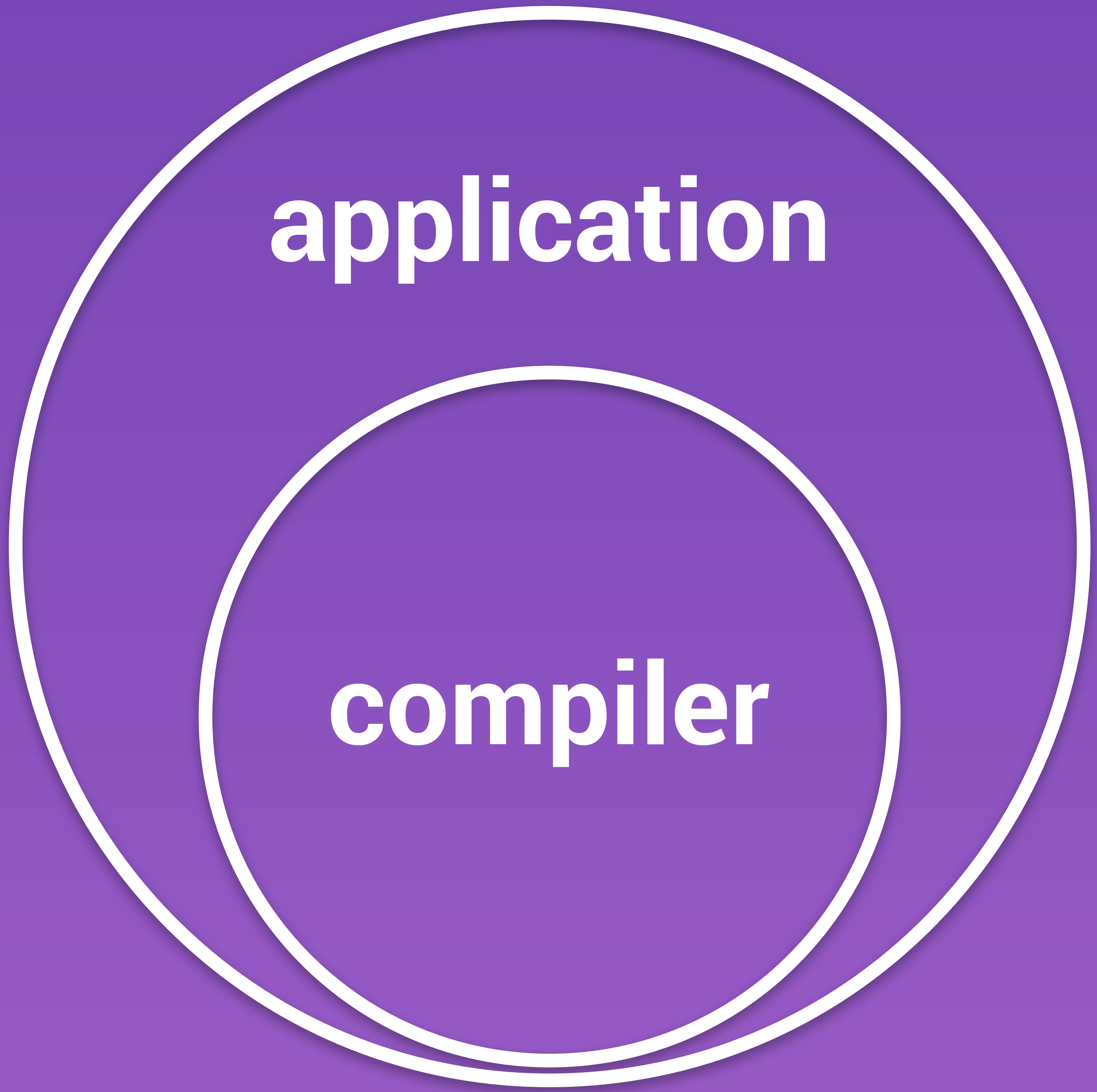
Observables



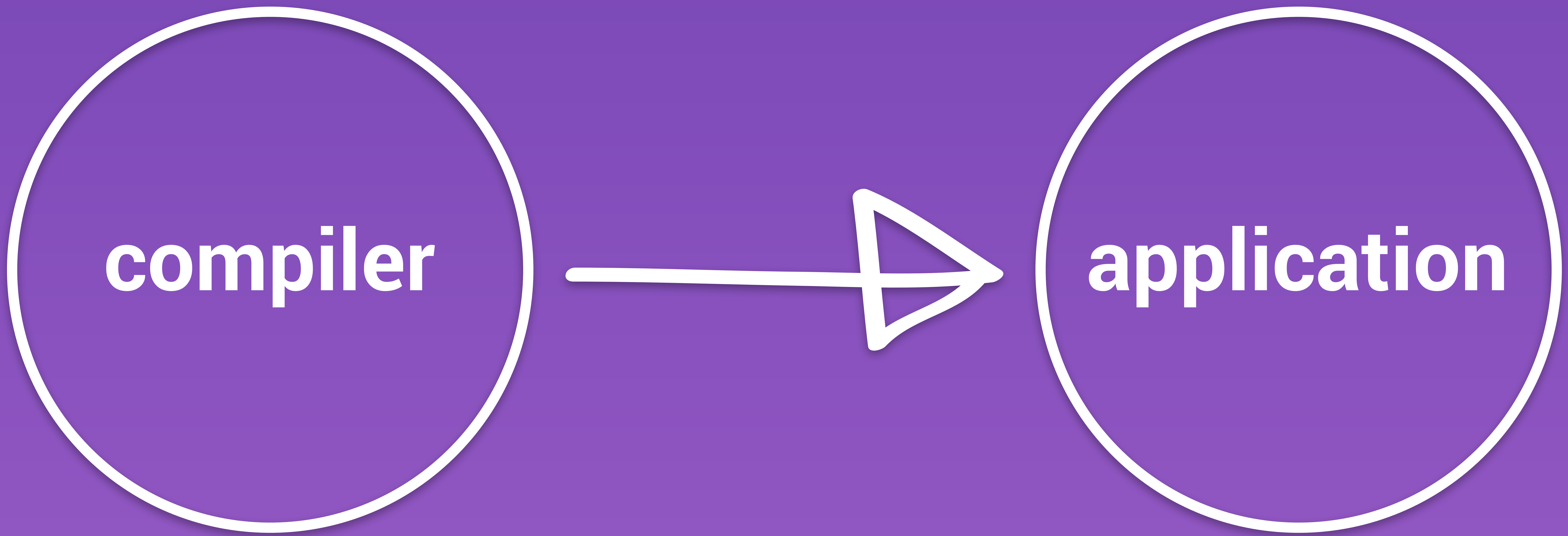
Observables

3 -10x Faster

BONUS! AOT Compilation



JIT Compilation



AOT Compilation

application

smaller payload

fewer async requests

faster rendering

Benefits of AOT

```
npm install @angular/compiler-cli @angular/platform-server --save
```

Compile with AOT

```
{
  "compilerOptions": {
    "target": "es5",
    "module": "es2015",
    "moduleResolution": "node",
    "sourceMap": true,
    "emitDecoratorMetadata": true,
    "experimentalDecorators": true,
    "removeComments": false,
    "noImplicitAny": true,
    "suppressImplicitAnyIndexErrors": true
  },

  "files": [
    "app/app.module.ts",
    "app/main.ts",
    "./typings/index.d.ts"
  ],

  "angularCompilerOptions": {
    "genDir": "aot",
    "skipMetadataEmit" : true
  }
}
```

Compile with AOT

```
node_modules/.bin/ngc -p tsconfig-aot.json
```

Compile with AOT

```
import { platformBrowserDynamic } from '@angular/platform-browser-dynamic';
import { AppModule }              from './app.module';

platformBrowserDynamic().bootstrapModule(AppModule);

// Becomes
import { platformBrowser }    from '@angular/platform-browser';
import { AppModuleNgFactory } from '../aot/app/app.module.ngfactory';

platformBrowser().bootstrapModuleFactory(AppModuleNgFactory);
```

Compile with AOT

```
import rollup      from 'rollup'
import nodeResolve from 'rollup-plugin-node-resolve'
import commonjs    from 'rollup-plugin-commonjs';
import uglify      from 'rollup-plugin-uglify'

export default {
  entry: 'app/main.js',
  dest: 'dist/build.js', // output a single application bundle
  sourceMap: false,
  format: 'iife',
  plugins: [
    nodeResolve({jsnext: true, module: true}),
    commonjs({
      include: 'node_modules/rxjs/**',
    }),
    uglify()
  ]
}
```

Tree Shaking and Rollups

```
npm install rollup rollup-plugin-node-resolve rollup-plugin-
commonjs rollup-plugin-uglify --save-dev
```

```html
<body>
  <my-app>Loading...</my-app>
</body>

<script src="dist/build.js"></script>
```

@simpulton

Thanks!