



Angular
let's get started

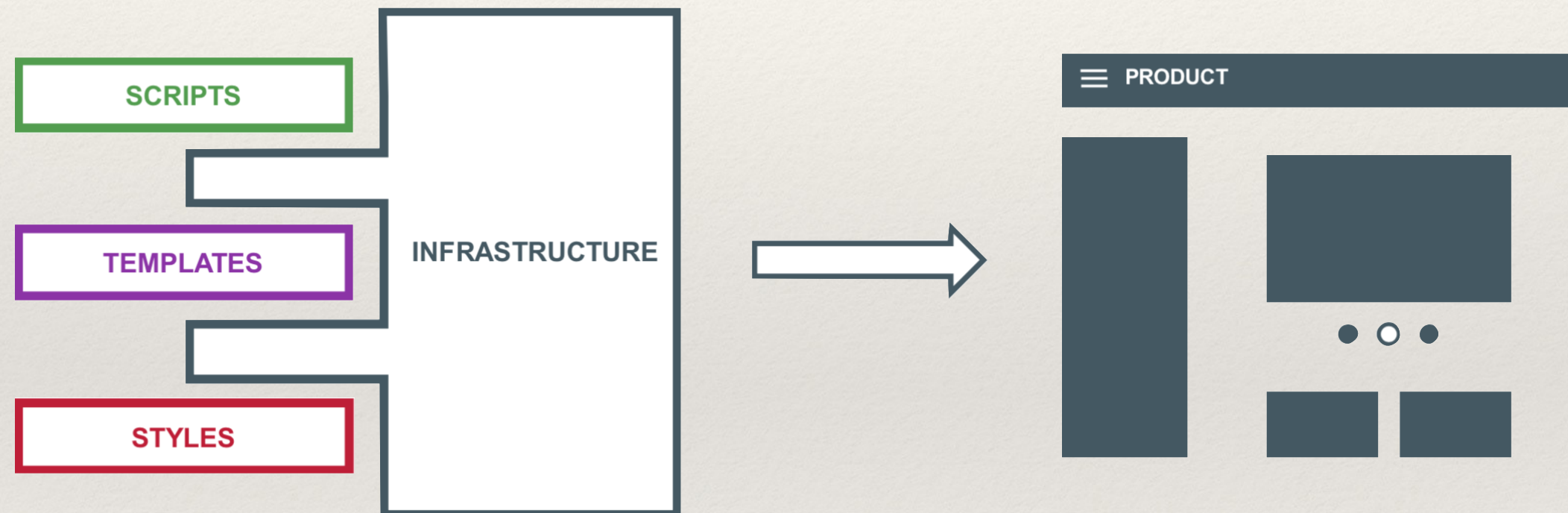


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- ❖ mike@boddin.net



Modern WEB



Modern WEB



SCRIPTS



TEMPLATES



STYLES

Modern WEB



INFRASTRUCTURE

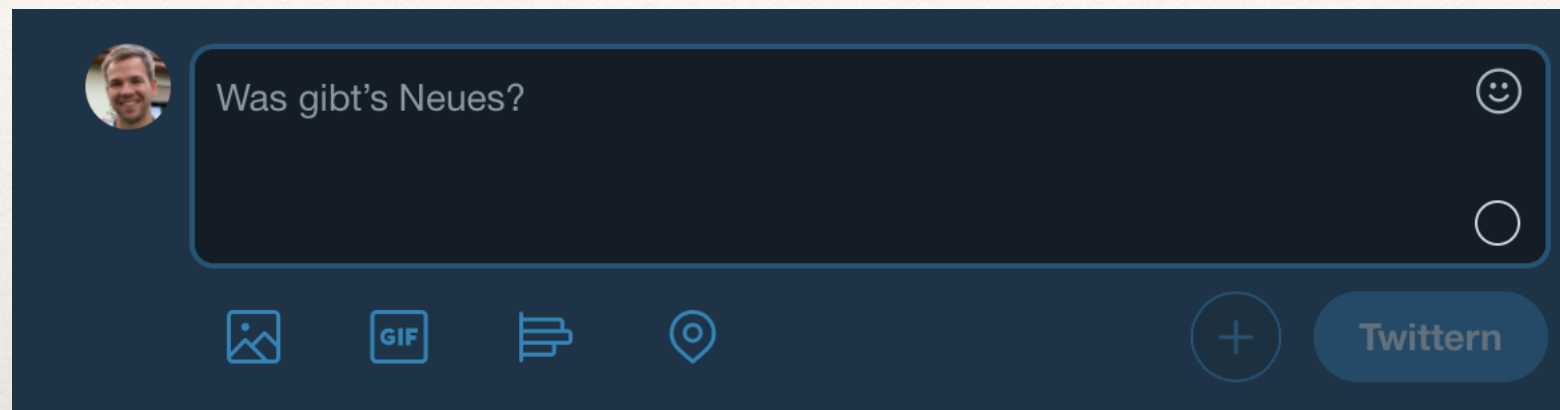
Modern WEB

- Integrate
- Adapt
- Correct
- Optimize



No
Businessvalue

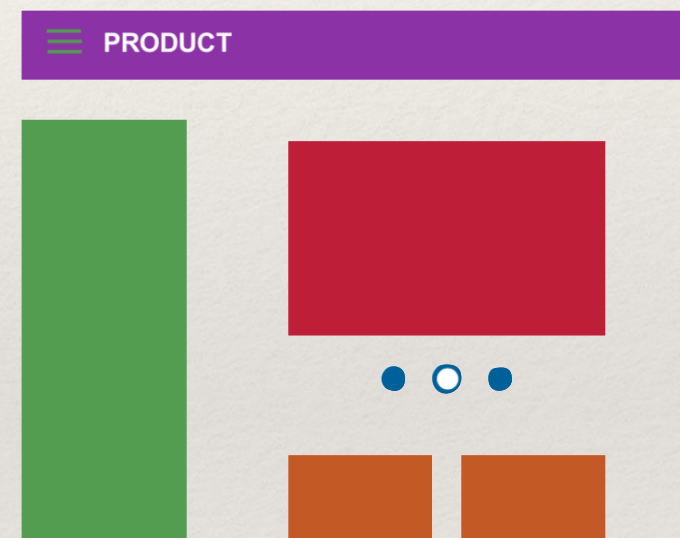
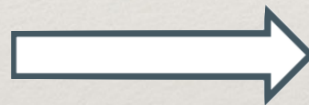
Components to the rescue



Components as abstractions of templates

```
<tweet-box  
  message="Great workshop today..."  
  location="Duesseldorf"  
  on-submit="addTweet()" />
```

Components to the rescue





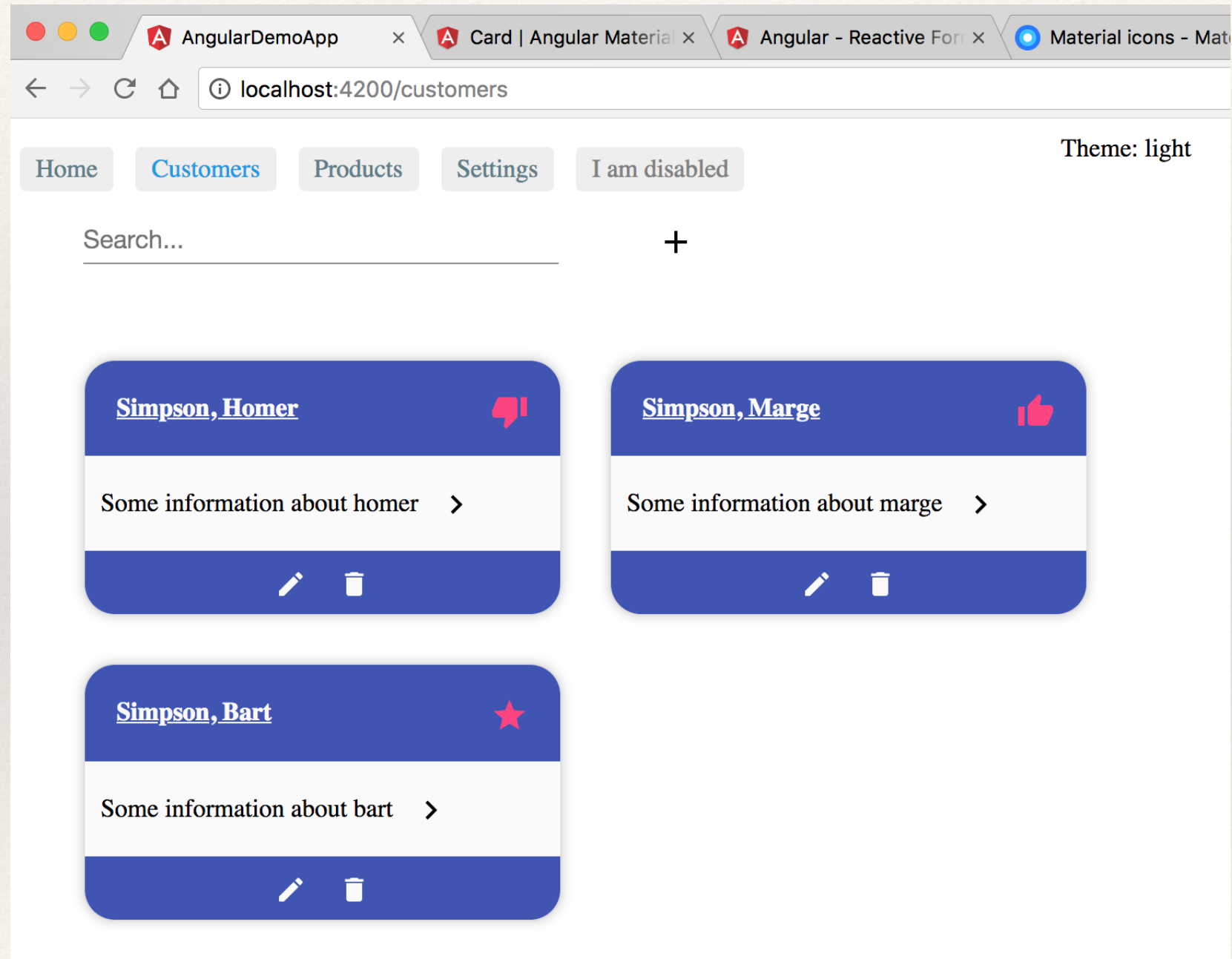
Welcome to Angular



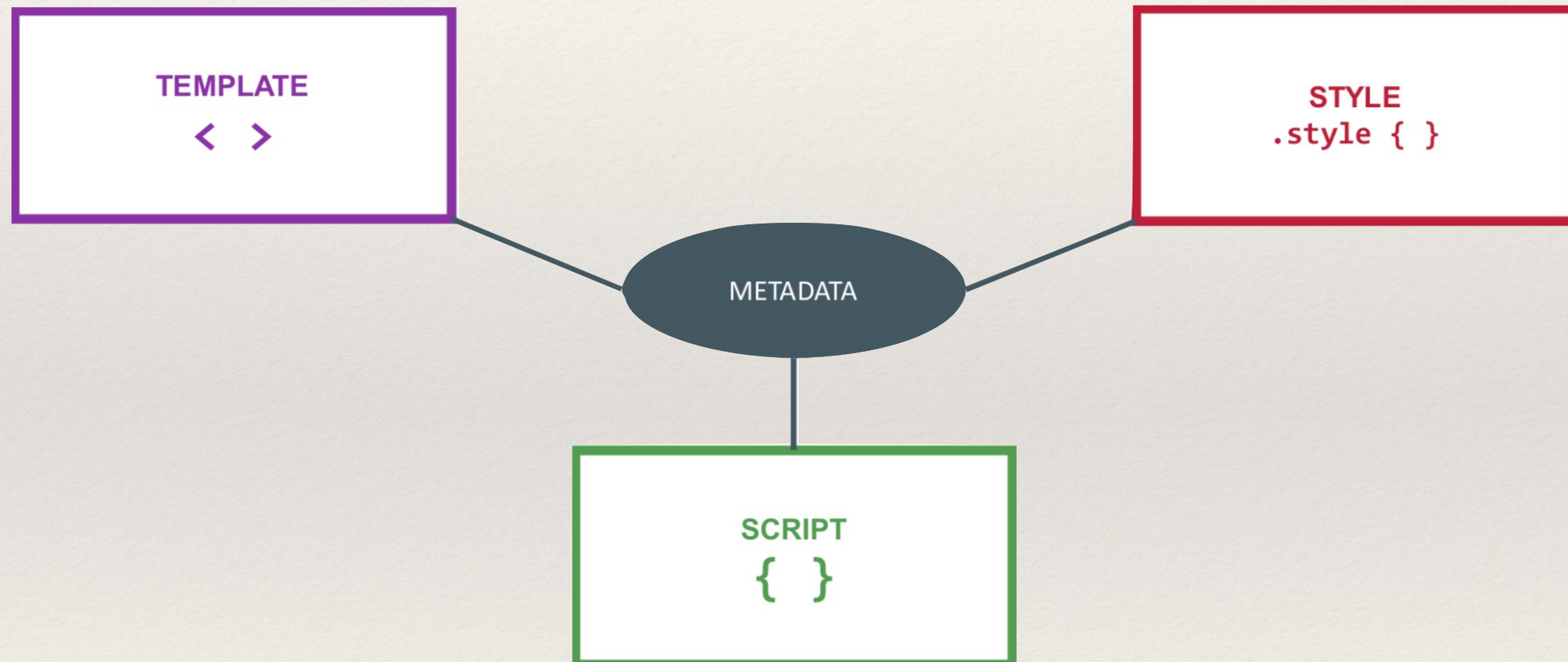
Why Angular ?

- ❖ Build reusable web components
- ❖ TypeScript
- ❖ Great tooling and IDE support
- ❖ Up to date documentation
- ❖ Great community and wide 3rd party support

Our final app...



Components - Structure



Components - Decorator

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


Components - Template syntax

Selecto
r

Input

Outpu
t

```
<app-customer [customer]="myCustomer" (deleteCustomer)="deleteCustomer($event)">
  {{ myCustomer.details }}
</app-customer>
```

Binding

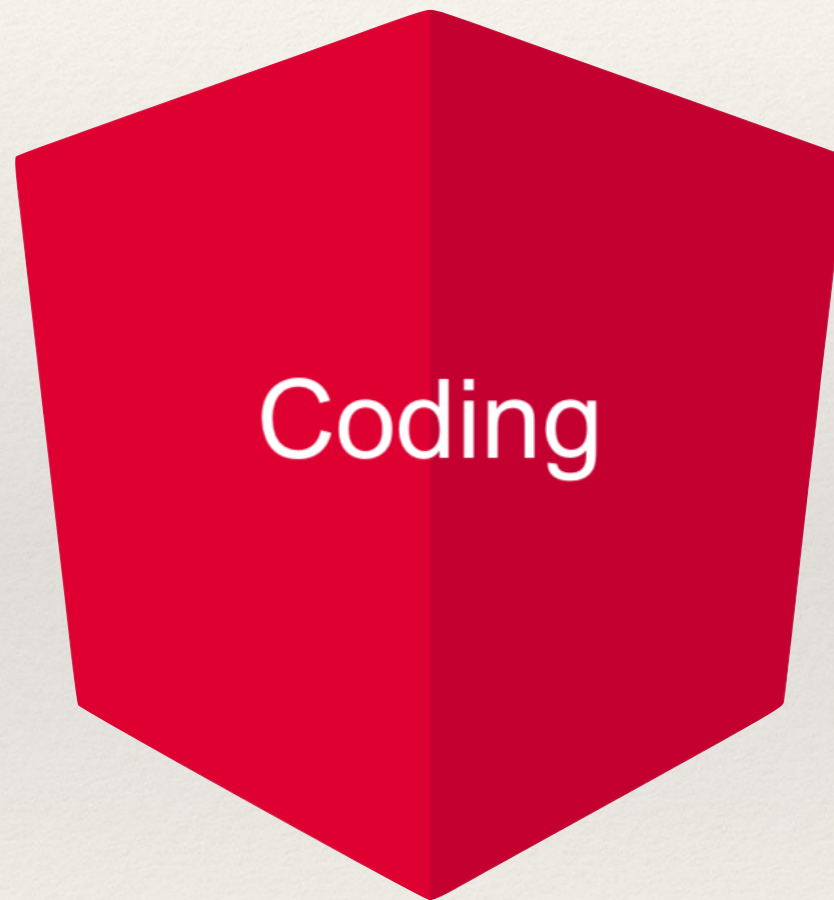
Components - All together

```
@Component({
  selector: 'app-customer',
  templateUrl: `
    <h1>{{ customer.name }}</h1>
    <button (click)="delete(customer.id)">Delete</button>
  `,
  styleUrls: ['./customer.component.scss']
})
export class CustomerComponent {
  @Input() customer: Customer;

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

  delete(id: number) {
    this.deleteCustomer.emit(id);
  }
}
```

Finally some code



Clone the starter-project

```
# clone
https://github.com/AngularBasic/demo-app-starter.git

# change dir
cd demo-app-starter

# install
npm install

# check
npm start
```


Template / Binding examples

```
<h1>Welcome to app!</h1>

<p>I am "{{customer.name | uppercase}},
    {{ customer.firstname }}"</p>

<span>These are my hobbies: </span>
<span *ngFor="let h of customer?.hobbies">{{h}} </span>

<p>I am god in math => 1 + 2 = {{ 1 + 2 }}</p>

<button (click)="showDetails = !showDetails">
    {{ showDetails ? 'Hide' : 'Show'}} the secret message
</button>
<span [hidden]="!showDetails">
    My phone number is 123 456 7890
</span>

<br />

<input #phone placeholder="phone number" />
<button
    [class.app-disabled]="!showDetails"
    [disabled]="!showDetails"
    (click)="callMe(phone.value)">
    Call me
</button>

<h5>DEBUG</h5>
<pre>user = <br/>{{ customer | json }}</pre>
```

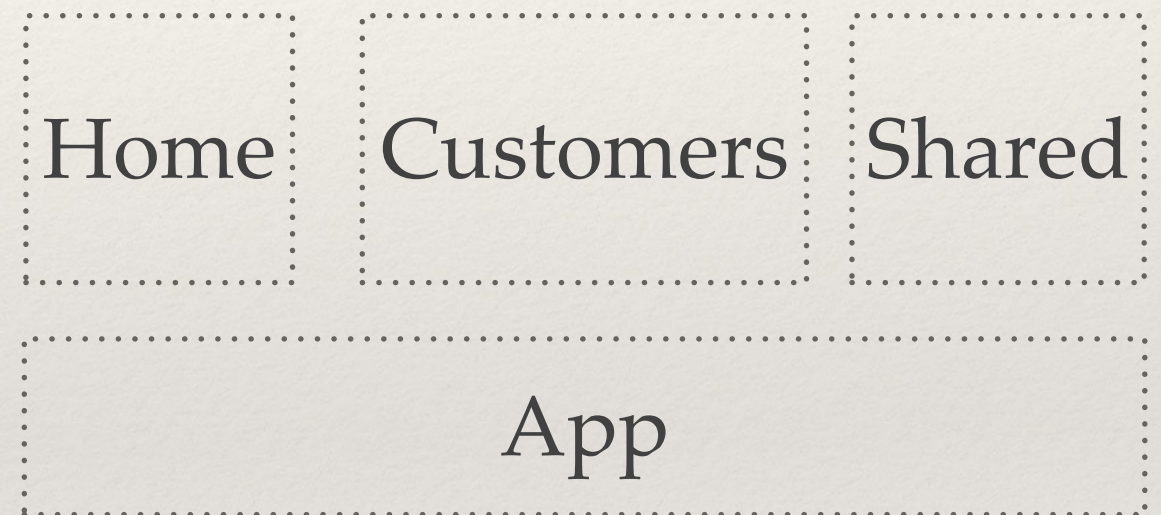



Modules



Angular Modules

- ❖ Structure of our app
- ❖ Controls the visibility of the components
- ❖ Separation of concerns
- ❖ Enables code-splitting behind the scenes



Angular Modules

```
@NgModule({  
  declarations: [  
    // Building blocks of the module  
    // Components, Pipes, Directives  
  ],  
  imports: [  
    // Other modules which are needed by this module  
  ],  
  exports: [  
    // Building blocks which could be used by other modules  
    // Components, Pipes, Directives  
  ],  
  providers: [  
    // Services which could be used by the application  
  ]  
})  
export class AppModule { }
```





Angular - CLI



Angular CLI

- ❖ Scaffolding of the app
- ❖ Code generation
- ❖ Dev server
- ❖ Testing
- ❖ Build



```
npm install -g angular-cli
ng new my-cool-app
cd my-cool-app

ng serve
ng test
ng create
ng ...
```

Angular CLI - Pros

- ❖ Huge time saver
- ❖ Easy to setup
- ❖ No configuration needed
- ❖ Enforces preferred code style
- ❖ Official support by the Angular team
- ❖ More to come (PWA, AOT for dev, Bazel)

Angular CLI - Cons

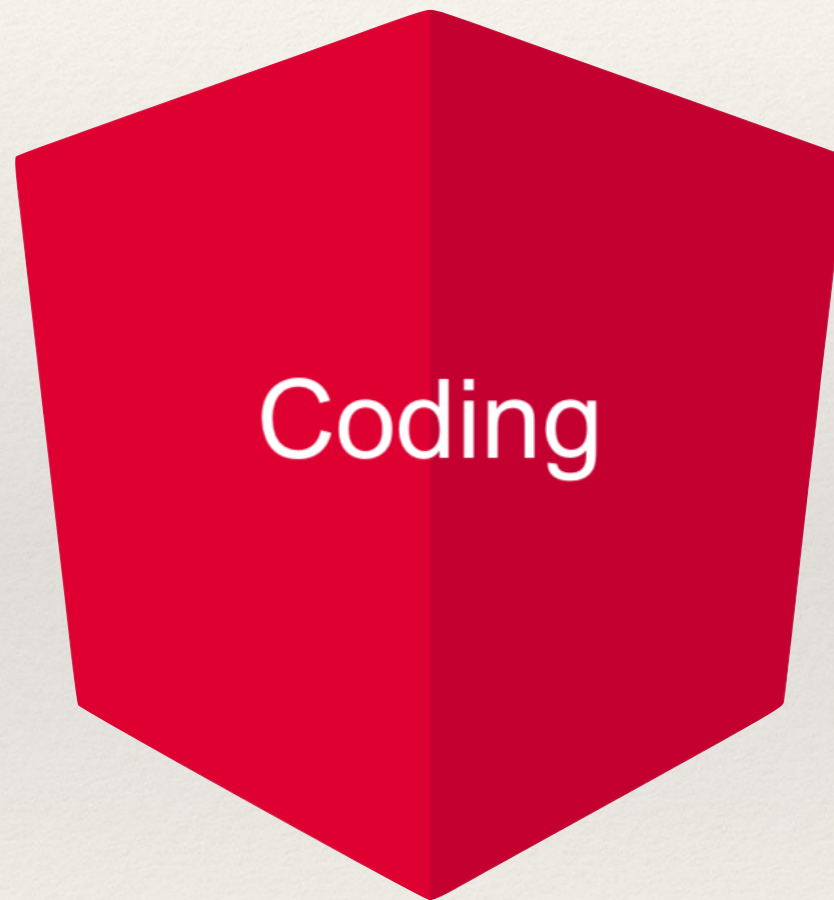
- ❖ Much magic behind the scenes
- ❖ Breaks sometimes
- ❖ Auto-reload get's stuck sometimes
- ❖ You could break out, but you shouldn't

Angular CLI - config

- ❖ „.angular-cli.json“
- ❖ prefix
- ❖ environments
- ❖ styles
- ❖ paths

```
{
  "$schema": "./node_modules/@angular/cli/lib/config/schema.json",
  "project": {
    "name": "angular-demo-app"
  },
  "apps": [
    {
      "root": "src",
      "outDir": "dist",
      "assets": [
        "assets",
        "favicon.ico"
      ],
      "index": "index.html",
      "main": "main.ts",
      "polyfills": "polyfills.ts",
      "test": "test.ts",
      "tsconfig": "tsconfig.app.json",
      "testTsconfig": "tsconfig.spec.json",
      "prefix": "app",
      "styles": [
        "styles.scss"
      ],
      "scripts": [],
      "environmentSource": "environments/environment.ts",
      "environments": {
        "dev": "environments/environment.ts",
        "hmr": "environments/environment.hmr.ts",
        "prod": "environments/environment.prod.ts"
      }
    }
  ],
  "e2e": {
    "protractor": {
      "config": "./protractor.conf.js"
    }
  },
  "lint": [
    {
      "project": "src/tsconfig.app.json",
      "exclude": "**/node_modules/**"
    },
    {
      "project": "src/tsconfig.spec.json",
      "exclude": "**/node_modules/**"
    },
    {
      "project": "e2e/tsconfig.e2e.json",
      "exclude": "**/node_modules/**"
    }
  ],
  "test": {
    "karma": {
      "config": "./karma.conf.js"
    }
  },
  "defaults": {
    "styleExt": "scss",
    "component": {}
  }
}
```

Finally more code



Components - Exercise

- ❖ Create the customer module
- ❖ Create the customer component
- ❖ Create the customer detail component
- ❖ Add a customer to the app
- ❖ Show some customer data

Angular CLI - generate a module



```
ng generate module customers
```

```
create src/app/customers/customers.module.ts (193 bytes)
```


Angular CLI - generate a component



```
ng generate component customers/customer
```

```
create src/app/customers/customer/customer.component.scss (0 bytes)
create src/app/customers/customer/customer.component.html (27 bytes)
create src/app/customers/customer/customer.component.spec.ts (642 bytes)
create src/app/customers/customer/customer.component.ts (278 bytes)
update src/app/customers/customers.module.ts (277 bytes)
```



```
ng generate component customers/customer-details
```

```
create src/app/customers/customer-details/customer-details.component.scss (0 bytes)
create src/app/customers/customer-details/customer-details.component.html (35 bytes)
create src/app/customers/customer-details/customer-details.component.spec.ts (692 bytes)
create src/app/customers/customer-details/customer-details.component.ts (309 bytes)
update src/app/customers/customers.module.ts (445 bytes)
```

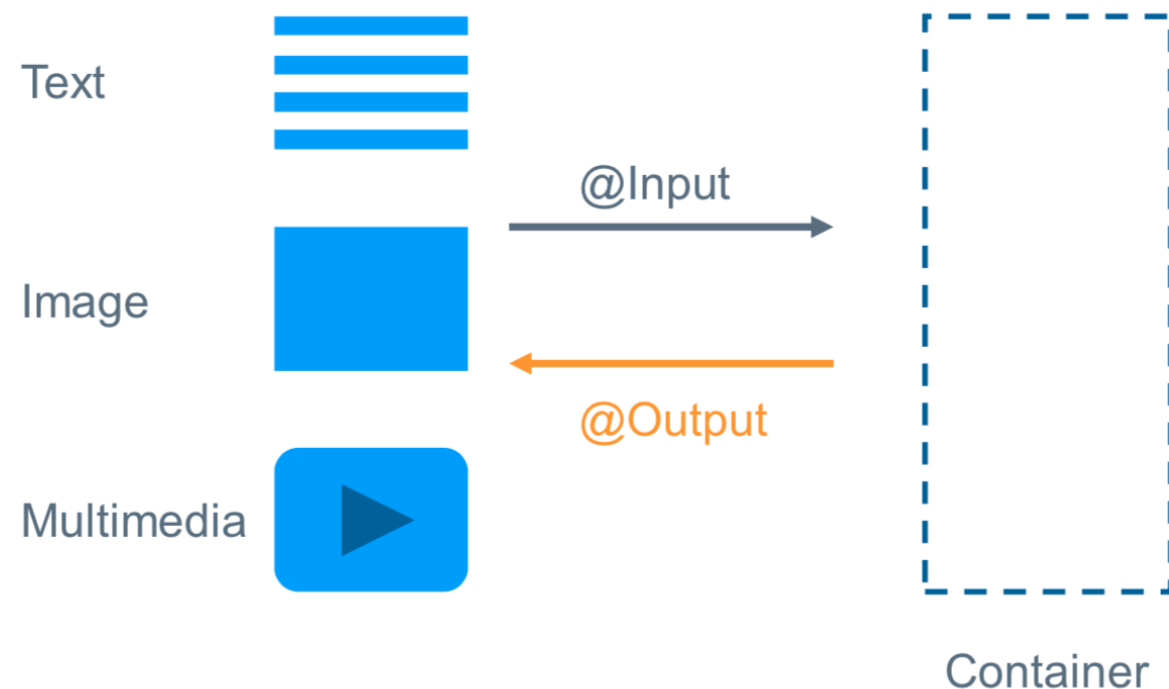



Components - Types



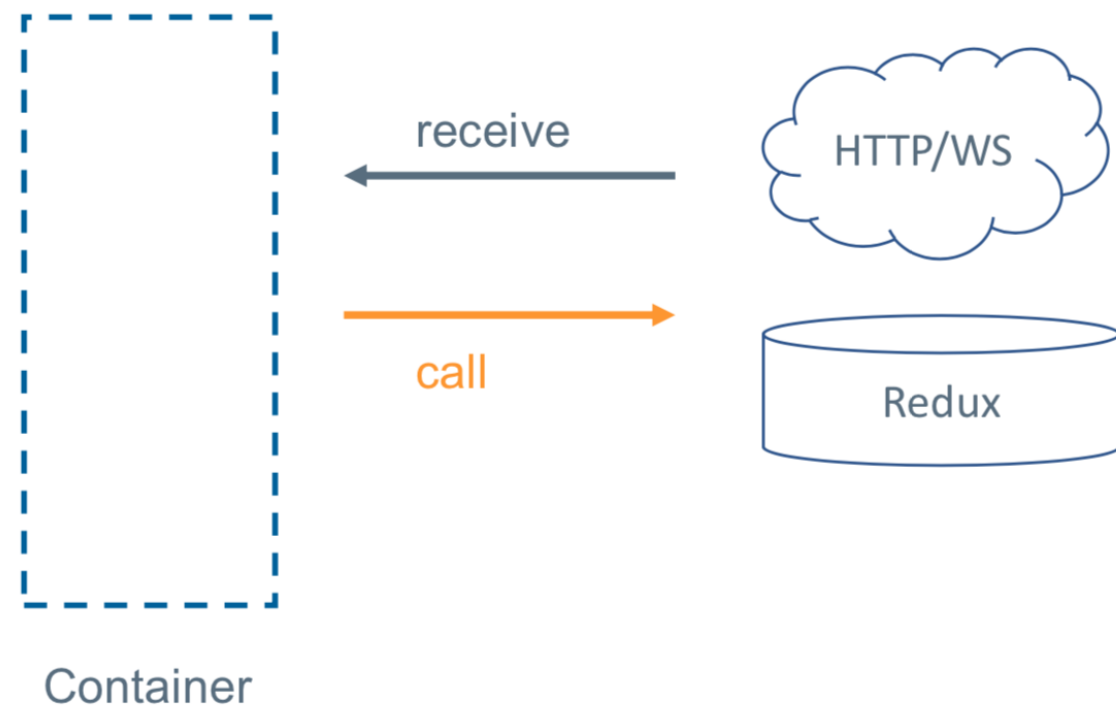
Components - Presentation

- Present Data
- Handle UI-Logic
 - Animations
 - Events
- Do not consume data services
- Are reusable building blocks



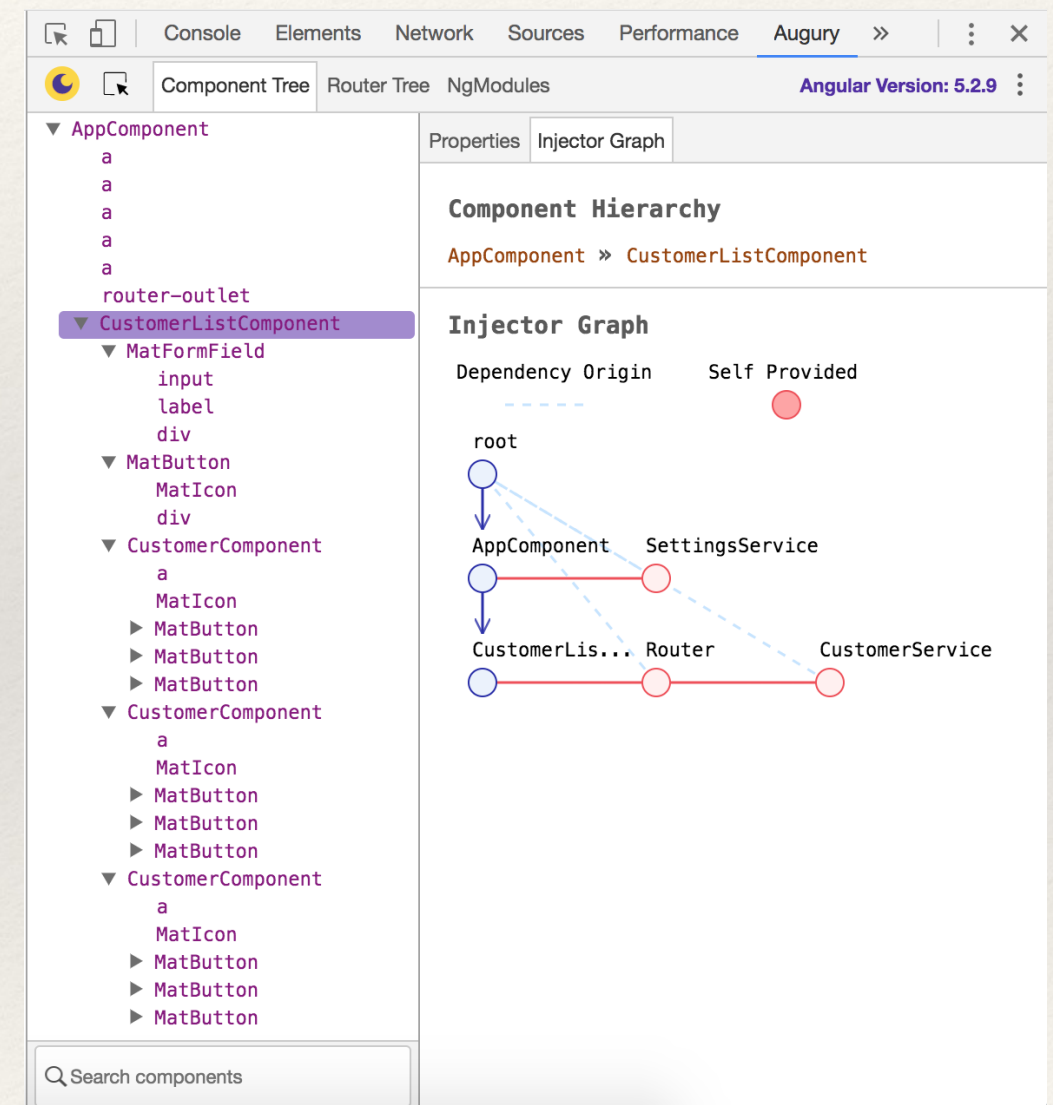
Components - Container

- Orchestrate components
 - Host Components
 - Setup Communication
- Provide data from APIs
- Made for a certain use case



Components - Tree

- ❖ „Augury“
- ❖ Chrome extension
- ❖ Visualizes the component tree
- ❖ Visualizes Dependency Injection Graph
- ❖ Allows live changes
- ❖ <https://augury.angular.io>





Forms



Forms - Status

- ❖ Form / control state is defined by CSS classes

```
<input class="form-control  
  ng-pristine  
  ng-invalid  
  ng-touched" />
```

Control	true	false
was served	ng-touched	ng-untouched
was changed	ng-dirty	ng-pristine
Is valid	ng-valid	ng-invalid

Form - Validators

- ❖ Build in Validators
- ❖ You can build your own validators
- ❖ sync and async

```
class Validators {  
  static min(min: number)  
  static max(max: number)  
  static required(control: AbstractControl)  
  static requiredTrue(control: AbstractControl)  
  static email(control: AbstractControl)  
  static minLength(minLength: number)  
  static maxLength(maxLength: number)  
  static pattern(pattern: string | RegExp)  
  static nullValidator(c: AbstractControl)  
}
```


Forms - Template Driven

- ❖ ngModel
- ❖ Two-way-binding
- ❖ Template reference variables
- ❖ Provides information about status and validation

```
<input
  name="name"
  type="text"
  [(ngModel)]="customer.name"
  required
  #customerName="ngModel"
/>
<span *ngIf="customerName.invalid">
  Name is required!
</span>
```

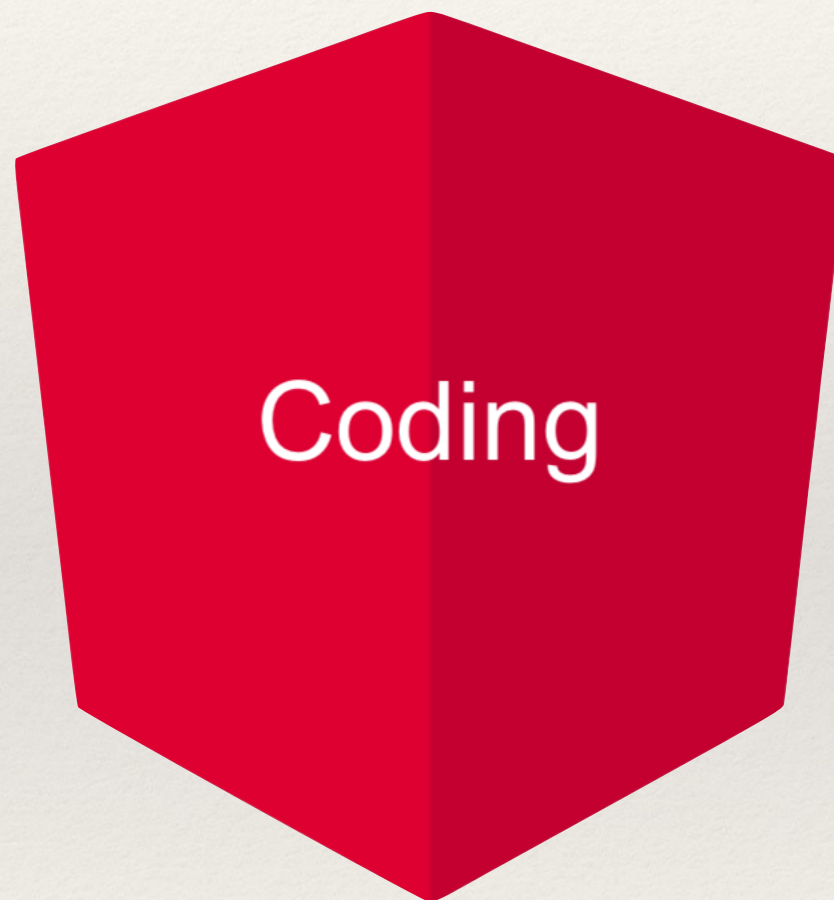
Forms - Reactive

- ❖ Form is build in code
- ❖ Reactive event handling
- ❖ Easier to test
- ❖ Better for complex forms

```
// HTML template
<input
  name="name"
  type="text"
  [formControl]="name"
  required
/>
<span *ngIf="name.invalid">
  Name is required!
</span>

// Component
export class CustomerEditComponent1 {
  name = new FormControl();
}
```

Forms



Forms - Exercise

- ❖ Create a customer class
- ❖ Create the customer form component

Forms - Generate class / component



```
ng generate class customers/customer  
create src/app/customers/customer.ts (26 bytes)
```



```
ng generate component customers/customer-form  
  
create src/app/customers/customer-form/customer-form.component.scss (0 bytes)  
create src/app/customers/customer-form/customer-form.component.html (32 bytes)  
create src/app/customers/customer-form/customer-form.component.spec.ts (671 bytes)  
create src/app/customers/customer-form/customer-form.component.ts (297 bytes)  
update src/app/customers/customers.module.ts (744 bytes)
```



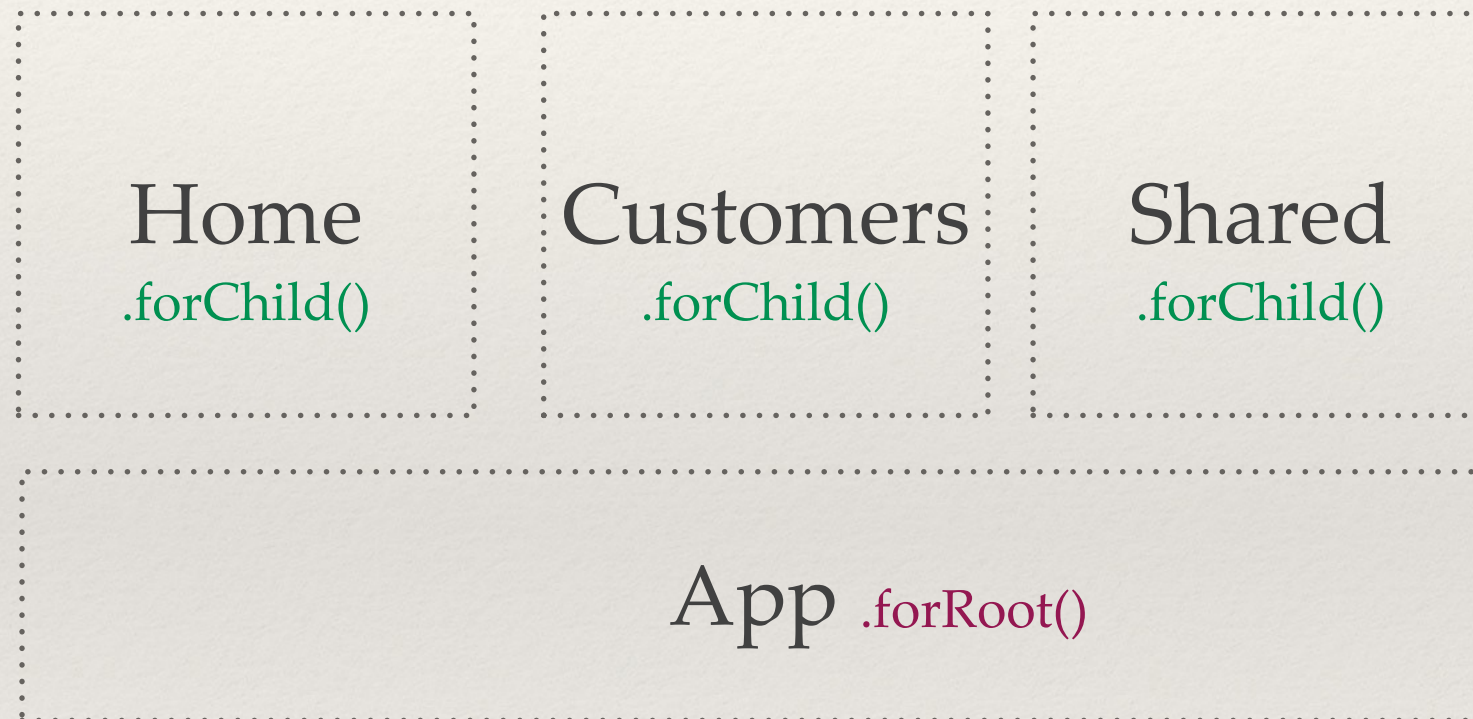

Routing



Routing - Features

- ❖ Can be encapsulated in a module
- ❖ Child Routes
- ❖ Routes States
- ❖ Router outlets
- ❖ Lazy loading
- ❖ Preload
- ❖ Guards / Resolver

Routing - Configuration



Routing - Configuration

```
import { NgModule } from '@angular/core';
import { Routes, RouterModule } from '@angular/router';
import { HomeComponent } from '../home/home.component';
import { ProductsComponent } from '../products/products.component';
import { CanDeactivateGuard } from '../core/can-deactivate/can-deactivate-guard.service';

export const routes: Routes = [
  { path: '', redirectTo: 'home', pathMatch: 'full' },
  { path: 'home', component: HomeComponent, data: { myData: 'test' } },
  { path: 'settings', loadChildren: 'app/settings/settings.module#SettingsModule' },
  { path: '**', component: HomeComponent }
];

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

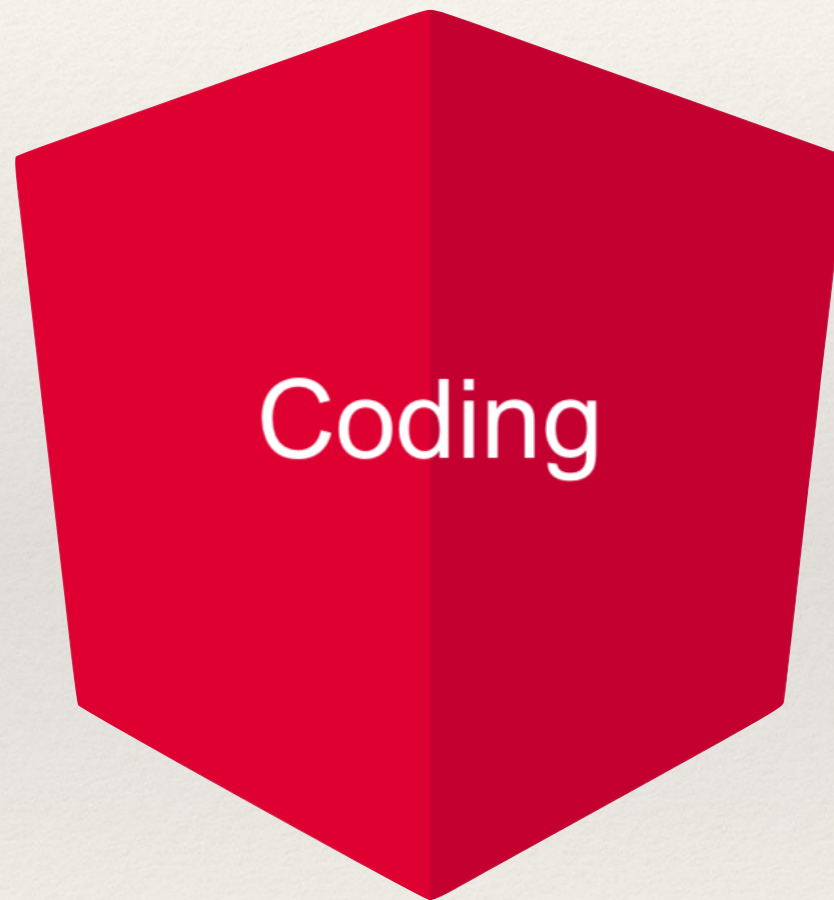

Routing - Template

```
<nav>
  <a routerLink="home" routerLinkActive="active">Home</a>
  <a routerLink="customers" routerLinkActive="active">Customers</a>
  <a routerLink="customers/new" routerLinkActive="active">New Customer</a>
</nav>

<router-outlet></router-outlet>
```

<router-outlet> is used as a placeholder for the activated component

Routing



Routing - Exercise

- ❖ Create the home component
- ❖ Refactor code from app component to home component
- ❖ Create the app routing module
- ❖ Add routes
- ❖ Add navigation

Routing - Component / Module

<https://github.com/AngularBasic/demo-app-starter.git>



```
ng generate module home
```

```
create src/app/home/home.module.ts (188 bytes)
```

```
ng generate component home
```

```
create src/app/home/home.component.scss (0 bytes)
```

```
create src/app/home/home.component.html (23 bytes)
```

```
create src/app/home/home.component.spec.ts (614 bytes)
```

```
create src/app/home/home.component.ts (262 bytes)
```

```
update src/app/home/home.module.ts (251 bytes)
```



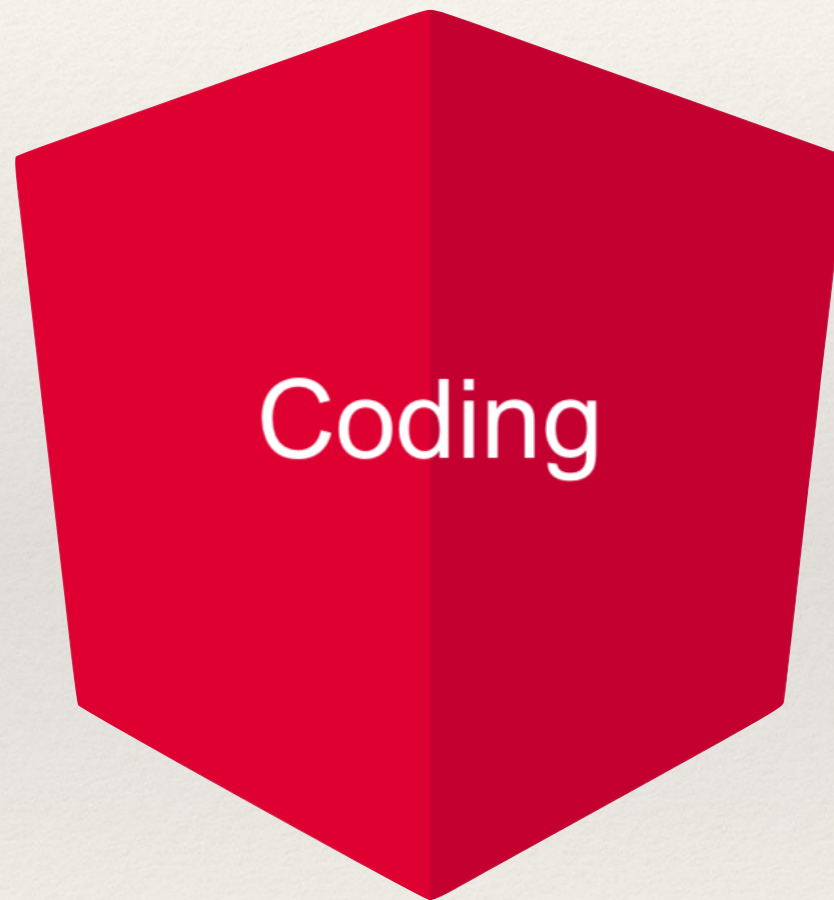

Services



Services

- ❖ Dependency injection
- ❖ Separation of concerns
- ❖ Load and transform data
- ❖ Share information within a module or the app
- ❖ Allow communication between components

Services



Services - Exercise

- ❖ Provide a service for customers
- ❖ Move customer to customer service
- ❖ Create the customers list component

Services - Exercise



```
ng generate service customers/customer
```

```
create src/app/customers/customer.service.spec.ts (386 bytes)  
create src/app/customers/customer.service.ts (114 bytes)
```



```
ng generate component customers/customer-list
```

```
create src/app/customers/customer-list/customer-list.component.scss (0 bytes)  
create src/app/customers/customer-list/customer-list.component.html (32 bytes)  
create src/app/customers/customer-list/customer-list.component.spec.ts (671 bytes)  
create src/app/customers/customer-list/customer-list.component.ts (297 bytes)  
update src/app/customers/customers.module.ts (1208 bytes)
```




Reactive Programming



Observables - RxJS

- ❖ Stream of events over time
- ❖ Declarative
- ❖ Can be cancelled
- ❖ Multiple Operators, which can be chained
- ❖ Deeply integrated in Angular (Routing, Forms, HTTP, Events)

RxJS - Example

```
const rate = 1000;
let count = 0;
let lastClick = Date.now() - rate;

const button = document.querySelector('button');

button.addEventListener('click', () => {
  if (Date.now() - lastClick >= rate) {
    console.log(`Clicked ${++count} times`);
    lastClick = Date.now();
  }
});
```

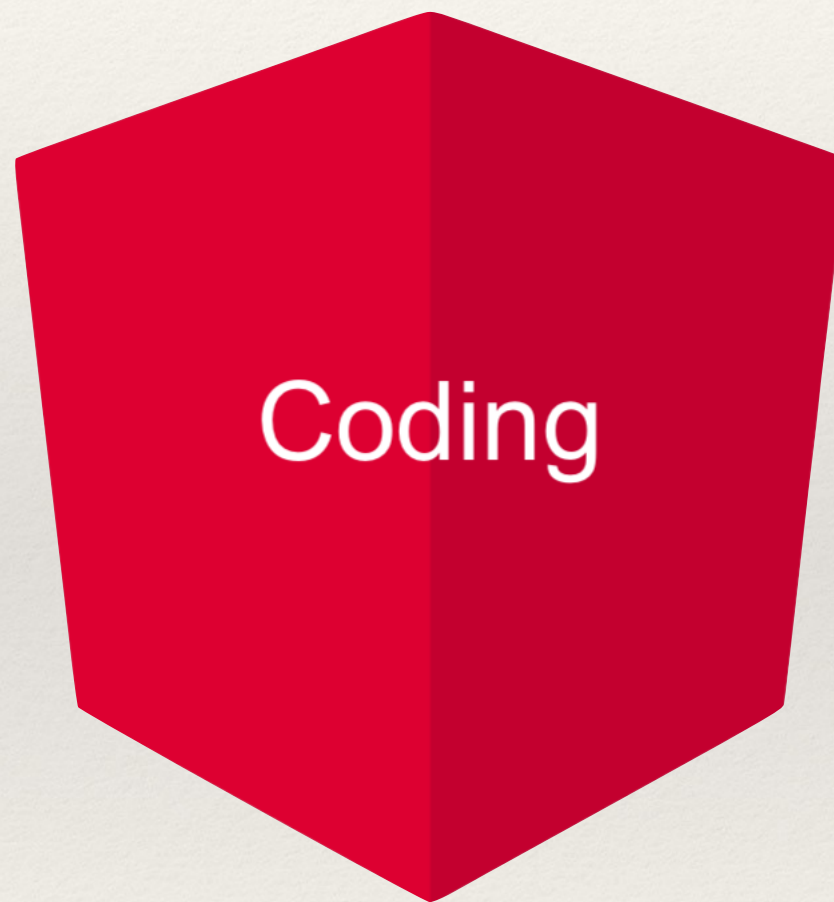
JS Style

RxJS
Style

```
const button = document.querySelector('button');

Rx.Observable.fromEvent(button, 'click')
  .throttleTime(1000)
  .scan(count => count + 1, 0)
  .subscribe(count => console.log(`Clicked ${count} times`
));
```

RxJS



RxJS - Exercise

- ❖ Navigate to edit form from customer
- ❖ Fill form with customer data
- ❖ Navigate back to customer list



HTTP



HTTP

- ❖ Reactive HTTP API
- ❖ Based on RxJS
- ❖ Provide Interceptors to transform request/response
- ❖ Progress events

HTTP - Interface

```
import { HttpClient } from '@angular/common/http';
```

```
this.http
```

```
  .get<T> (url: string, options)
```

```
  .delete<T>(url: string, options)
```

```
  .post<T> (url: string, body: any, options)
```

```
  .put<T>   (url: string, body: any, options)
```

```
  .patch    (url: string, body: any, options)
```

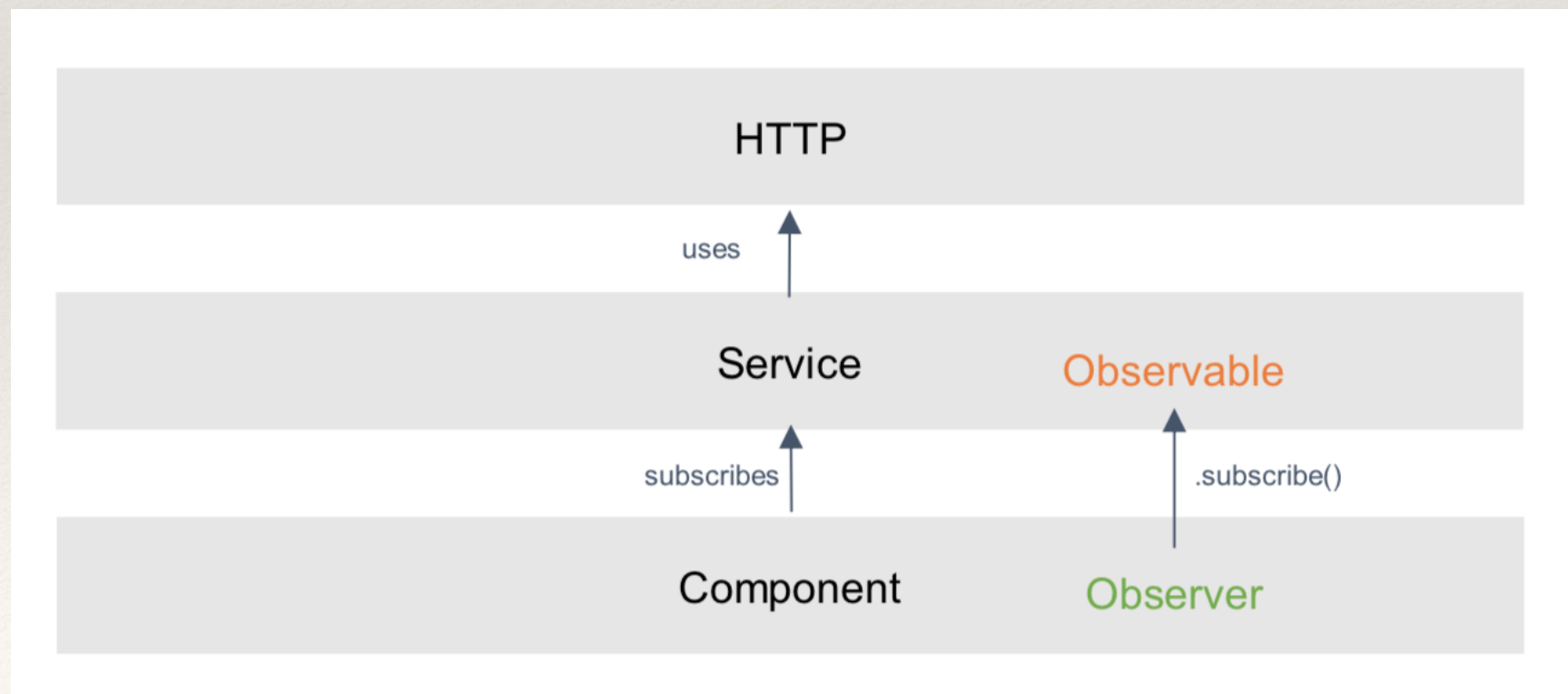
```
  .head     (url: string, options)
```

```
  .options  (url: string, options)
```

```
  .request  (url: string | Request, options)
```


HTTP - Tips

- ❖ Do not use HttpClient directly in components
- ❖ Only services should talk to the HTTP-APIs
- ❖ Do not forget to subscribe() to the HttpClient methods



HTTP



Coding

HTTP - Exercise

- ❖ Use the local node.js backend to load customers
- ❖ Add create / update functions in customer service
- ❖ Add search for customers

HTTP - Start the backend



```
# Start the backend server
```

```
npm run start:server
```

```
# Start the frontend
```

```
npm start
```




Testing



Testing

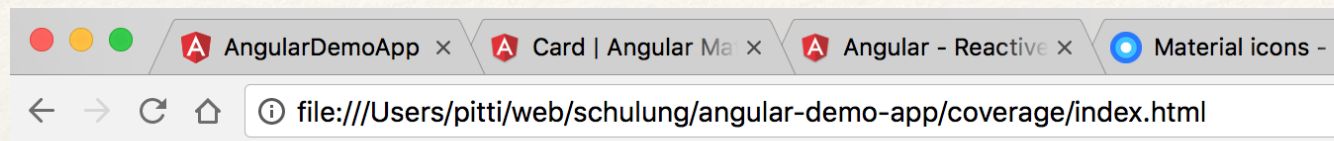
- ❖ Run by the angular-cli
- ❖ Unit Tests
- ❖ Component Tests
- ❖ e2e Tests
- ❖ Code coverage

Testing - Syntax

```
import { TestBed, async } from '@angular/core/testing';
import { AppComponent } from './app.component';
import { NO_ERRORS_SCHEMA } from '@angular/core';
import { SettingsService } from '../features/settings/settings.service';
import { HttpClient } from '@angular/common/http';
import { NoopAnimationsModule } from '@angular/platform-browser/animations';

describe('AppComponent', () => {
  beforeEach(async(() => {
    TestBed.configureTestingModule({
      imports: [NoopAnimationsModule],
      declarations: [
        AppComponent
      ],
      providers: [
        SettingsService,
        { provide: HttpClient, useValue: {} }
      ],
      schemas: [NO_ERRORS_SCHEMA]
    }).compileComponents();
  }));
  it('should create the app', async(() => {
    const fixture = TestBed.createComponent(AppComponent);
    const app = fixture.debugElement.componentInstance;
    expect(app).toBeTruthy();
  }));
  it(`should have as title 'app'`, async(() => {
    const fixture = TestBed.createComponent(AppComponent);
    const app = fixture.debugElement.componentInstance;
    expect(app.title).toEqual('app');
  }));
  it('should render the nav', async(() => {
    const fixture = TestBed.createComponent(AppComponent);
    fixture.detectChanges();
    const compiled = fixture.debugElement.nativeElement;
    expect(compiled.querySelector('nav').children.length).toBe(5);
  }));
});
```


Testing - Code coverage



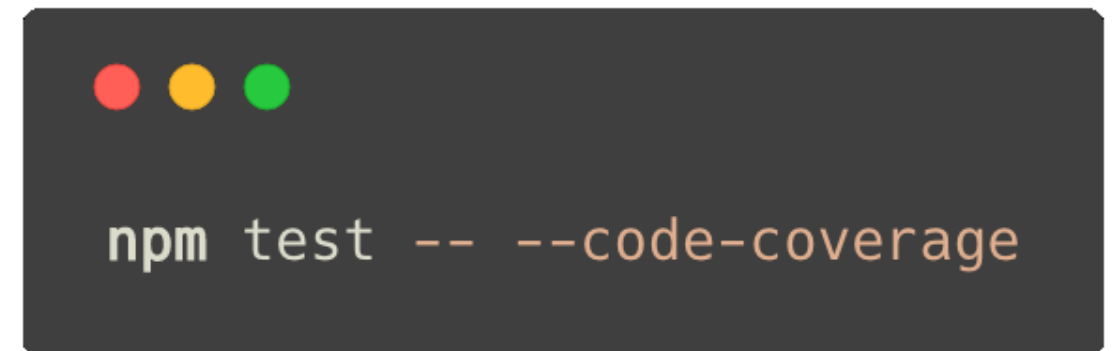
All files

79.53% Statements 202/254 10% Branches 2/20 53.25% Functions 41/77 79.43% Lines 166/209

Press *n* or *j* to go to the next uncovered block, *b*, *p* or *k* for the previous block.

File ▲ Statements ▼

src	<div><div></div></div>	100%	8/8	100%	0/0	100%	0/0	100%	8/8
src/app	<div><div></div></div>	93.75%	15/16	100%	0/0	80%	4/5	100%	12/12
src/app/core/animations	<div><div></div></div>	100%	2/2	100%	0/0	100%	0/0	100%	2/2
src/app/features/customers	<div><div></div></div>	79.49%	31/39	20%	2/10	54.55%	6/11	78.13%	25/32
src/app/features/customers/customer	<div><div></div></div>	84.21%	16/19	100%	0/0	50%	3/6	82.35%	14/17
src/app/features/customers/customer-details	<div><div></div></div>	100%	6/6	100%	0/0	100%	3/3	100%	4/4
src/app/features/customers/customer-form	<div><div></div></div>	66.67%	20/30	0%	0/2	33.33%	3/9	65.38%	17/26
src/app/features/customers/customer-list	<div><div></div></div>	85.19%	23/27	100%	0/0	62.5%	5/8	90.91%	20/22
src/app/features/home	<div><div></div></div>	100%	5/5	100%	0/0	100%	1/1	100%	2/2
src/app/features/products	<div><div></div></div>	76%	19/25	0%	0/4	55.56%	5/9	75%	15/20
src/app/features/products/product-details	<div><div></div></div>	70.83%	17/24	0%	0/2	37.5%	3/8	73.68%	14/19
src/app/features/products/product-empty	<div><div></div></div>	100%	6/6	100%	0/0	100%	3/3	100%	4/4



Testing - Pro Tips

- ❖ Use code coverage to find untested code
- ❖ Try out Jest (<https://github.com/thymikee/jest-preset-angular>)
- ❖ Try out cypress.io (<https://www.cypress.io>)

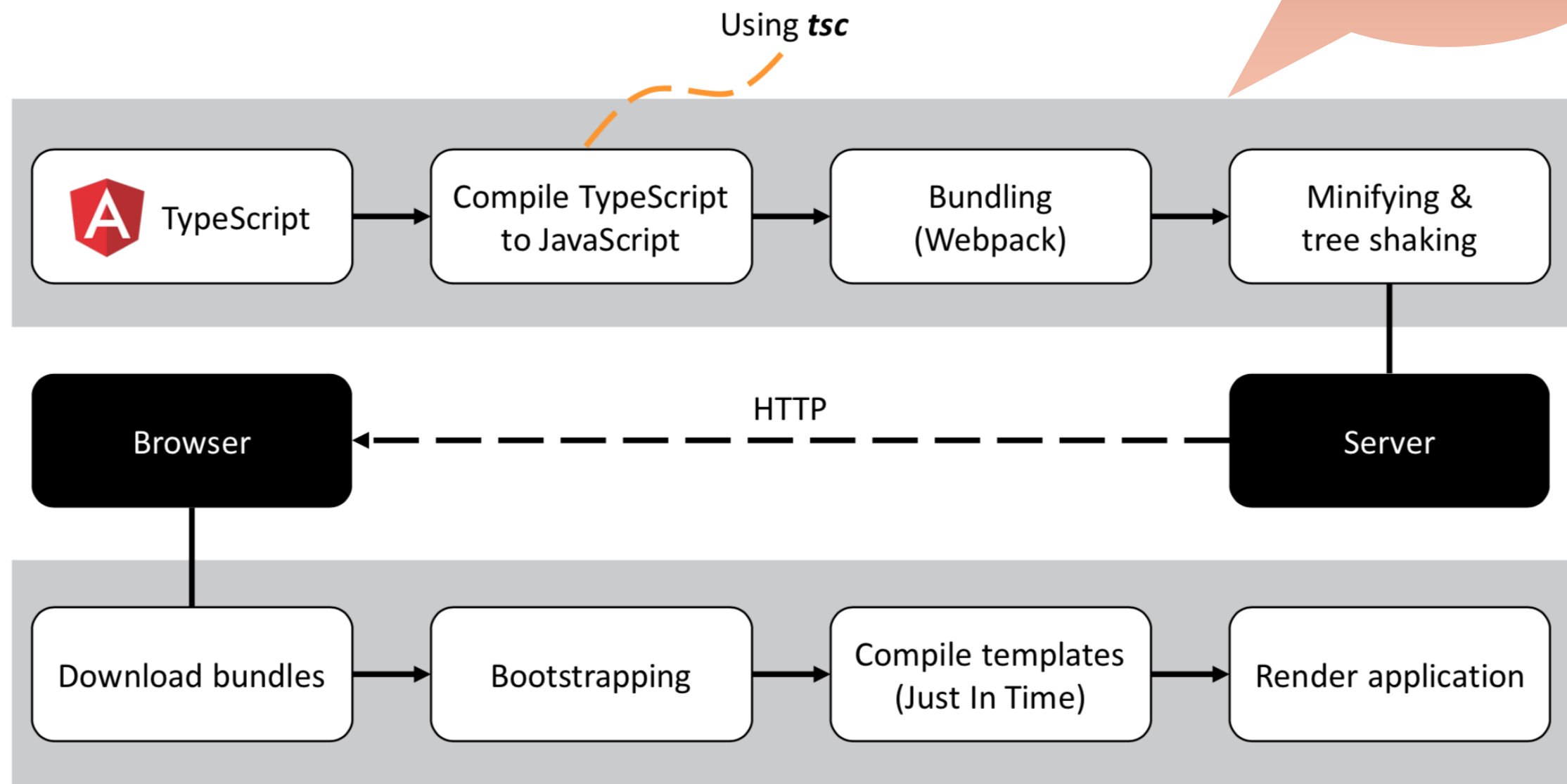


Deployment



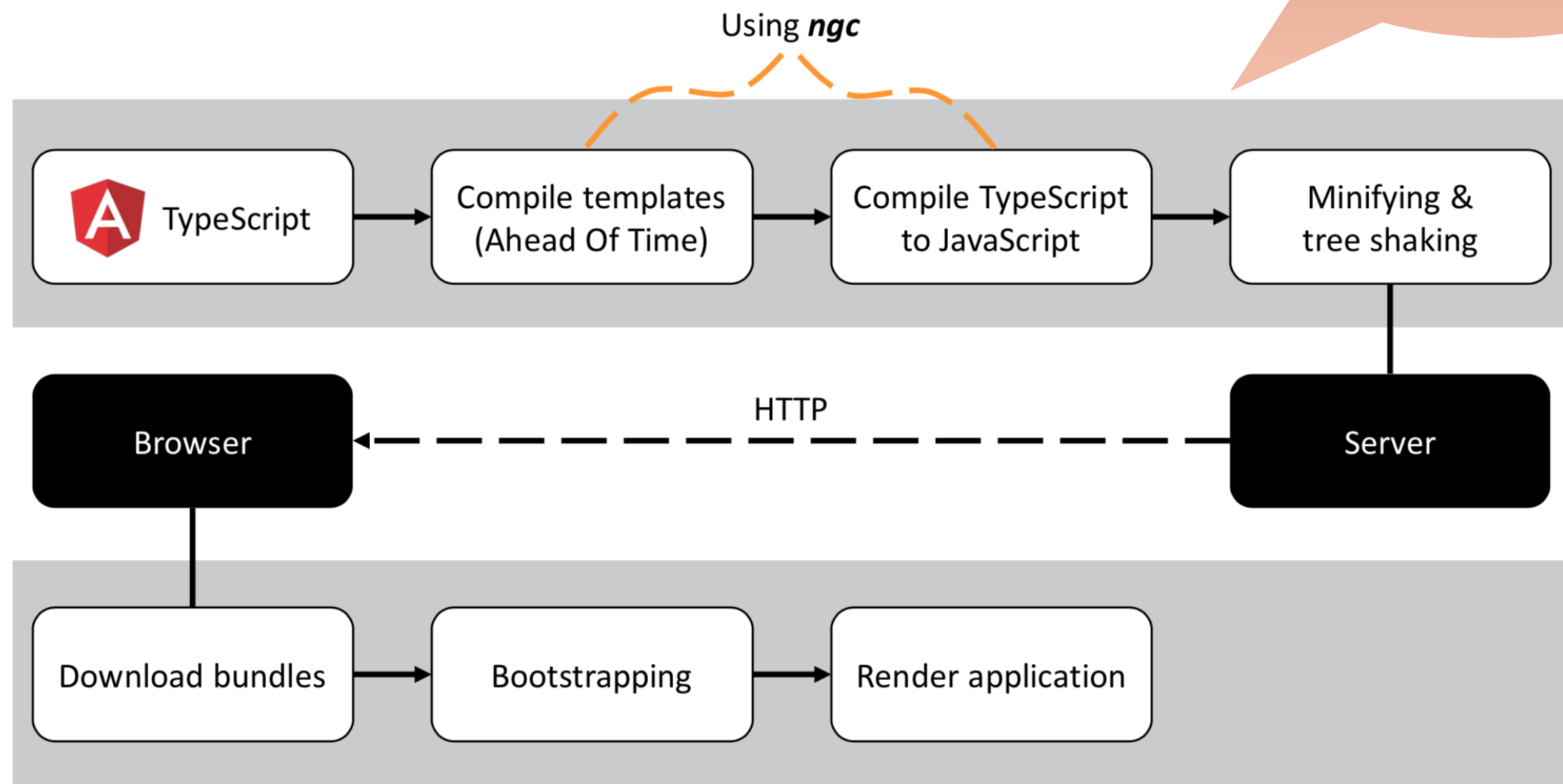
Deployment - Dev

ng build



Deployment - Prod

ng build --prod



Feedback would be nice

- ❖ <https://grossweber.com/zertifikat>
- ❖ <https://grossweber.com/feedback>
- ❖ Thank you :-)