Berner
Fachhochschule

Angular

Getting Started

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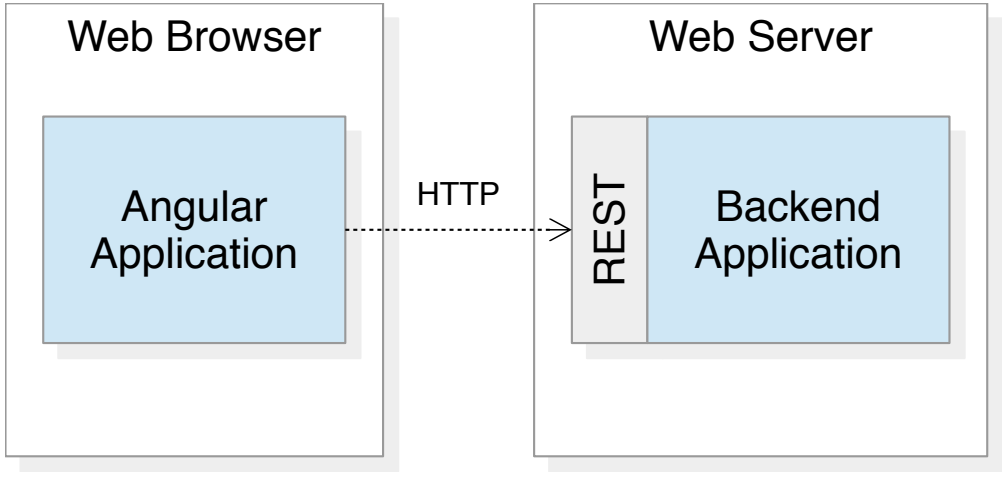
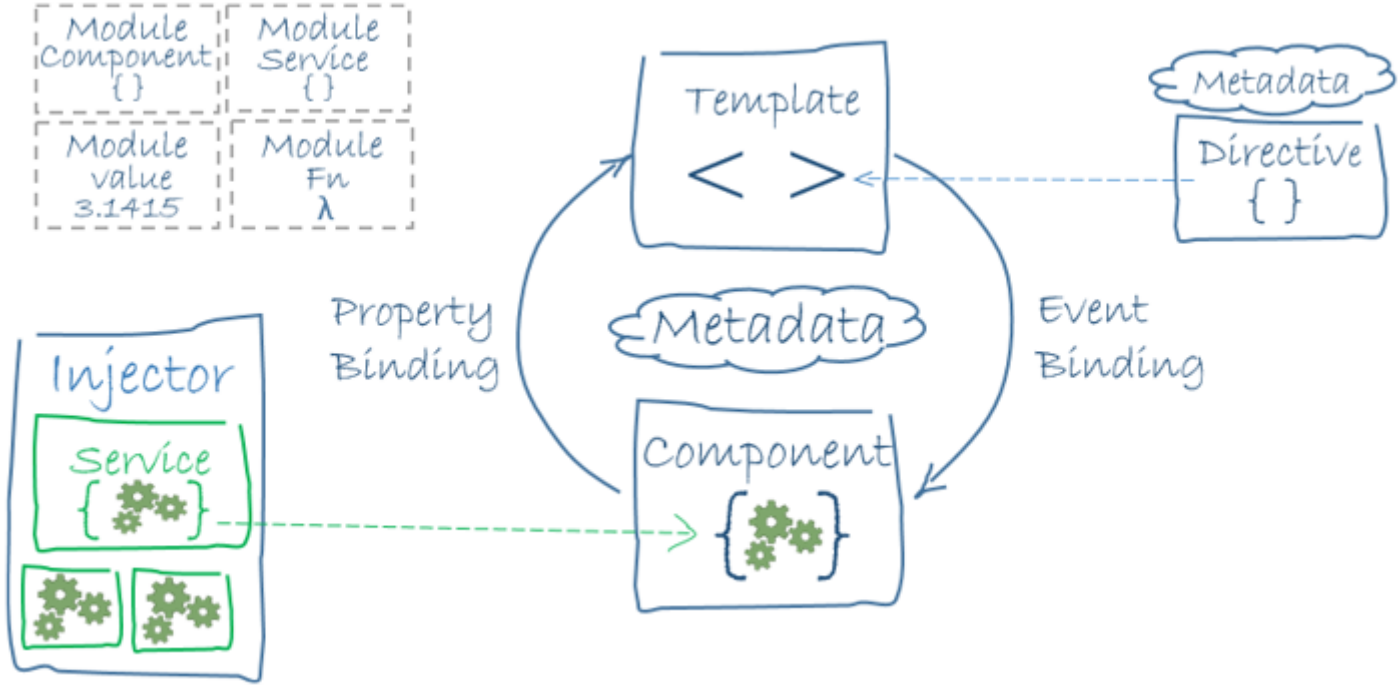
Introduction

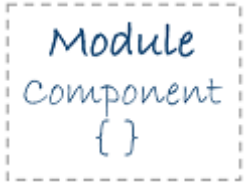
- Angular is a framework for building single page applications in HTML and JavaScript
- Angular consists of several core and optional JavaScript libraries
- Angular applications are often used as front-end of backend applications



Architecture

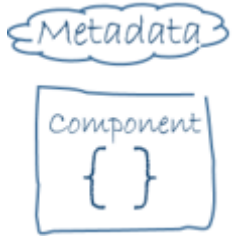


Modules



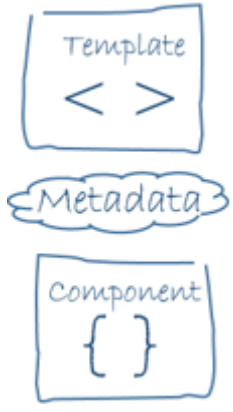
- Angular applications consist of one root module and possibly several feature modules
- Modules are dedicated to an application domain, a workflow, or a closely related set of capabilities
- Metadata is used to define a module's dependencies

Components



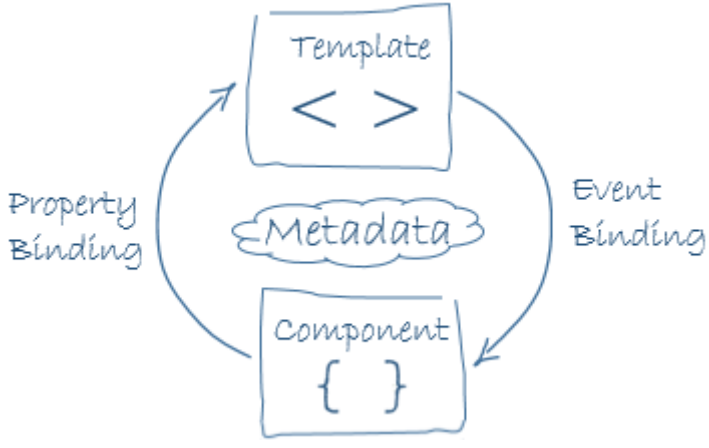
- Components are TypeScript classes that hold the data and control the behavior of their views
- Metadata tells Angular how to process the components

Templates



- Templates define the component's views
- A template is an HTML document containing Angular elements to render the component

Data Binding



Data binding synchronizes parts of a template with elements of the associated component:

- an *interpolation* displays a component's property
- a *property binding* sets the property of a view element to an expression value
- an *event binding* binds an event to a component's method
- a *two-way binding* combines property and event binding

Directives

Angular renders templates by transforming the DOM according to directives:

- components define elements and their behavior
- structural directives alter the layout by adding and removing elements
- attribute directives alter the appearance or behavior of existing elements

Services

Services implement data or logic that is used in different components, e.g.

- domain-specific calculations
- application-wide data cache
- communication with the backend application

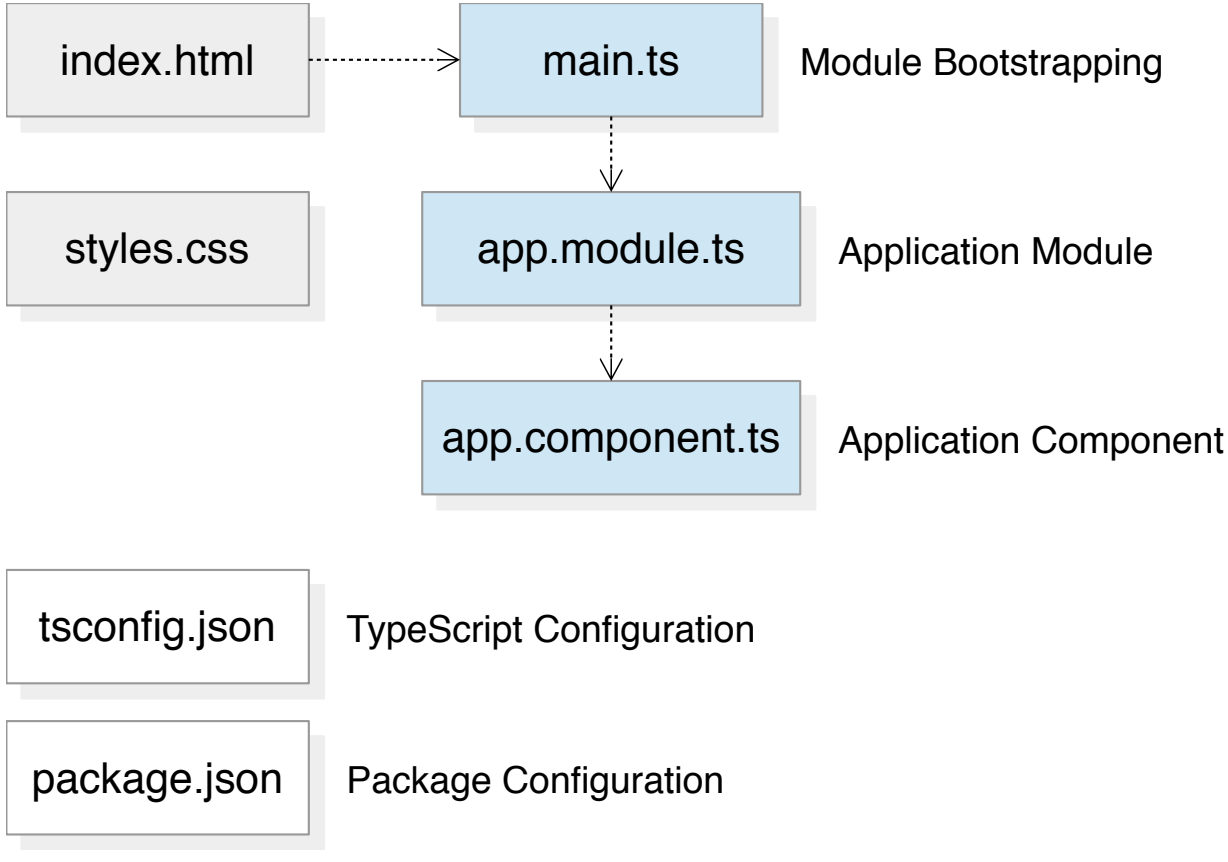
Services are made available to components through dependency injection

Angular CLI

Angular CLI is a command line utility to support application development

- Install Angular/CLI packages
  `npm install -g @angular/cli`
- Create Angular application
  `ng new hello --minimal`
- Change into application directory
  `cd hello`
- Build application and start light-weight web server
  `ng serve`
- Open web browser at
  `http://localhost:4200`

Application Artifacts



Host Web Page

hello/src/index.html

```
<!doctype html>
<html lang="en">
<head>
    <meta charset="utf-8">
    <title>Hello</title>
    <base href="/">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <link rel="icon" type="image/x-icon" href="favicon.ico">
</head>
<body>
<app-root></app-root>
</body>
</html>
```

- contains an element identified by the application component's selector
- will be complemented with script tags at build time

Module Bootstrapping

hello/src/main.ts

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

if (environment.production) {
    enableProdMode();
}
platformBrowserDynamic().bootstrapModule(AppModule)
    .catch(err => console.log(err));
```

- sets up the execution environment
- creates a browser platform and bootstraps the application module
- instantiates the application component and inserts it into the host web page

Application Module

hello/src/app/app.module.ts

```
import { BrowserModule } from '@angular/platform-browser';
import { NgModule } from '@angular/core';
import { AppComponent } from './app.component';

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

- declares the application components, directives and pipes
- imports supporting modules
- specifies service providers
- defines the application component to bootstrap

Application Component

hello/src/app/app.component.ts

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

@Component({
    selector: 'app-root',
    template: `
        <h1>Welcome to {{title}}!</h1>
        ...
    `,
    styles: []
})
export class AppComponent {
    title = 'app';
}
```

- defines the component's
  - CSS selector
  - HTML template – inline or by location (`templateUrl`)
  - CSS styles – inline or by location (`styleUrls`)
- implements the component class

TypeScript Configuration

hello/src/tsconfig.json

```
{
    "compileOnSave": false,
    "compilerOptions": {
        "outDir": "./dist/out-tsc",
        "sourceMap": true,
        "declaration": false,
        "moduleResolution": "node",
        "emitDecoratorMetadata": true,
        "experimentalDecorators": true,
        "target": "es5",
        "typeRoots": [
            "node_modules/@types"
        ],
        "lib": [
            "es2017",
            "dom"
        ]
    }
}
```

- defines options of the TypeScript compiler

Package Configuration

hello/src/package.json

```
{
    "name": "hello",
    "version": "0.0.0",
    "license": "MIT",
    "scripts": {
        "ng": "ng",
        "start": "ng serve",
        "build": "ng build",
        "test": "ng test",
        "lint": "ng lint",
        "e2e": "ng e2e"
    },
    "private": true,
    "dependencies": {
        "@angular/animations": "^5.0.0",
        "@angular/common": "^5.0.0",
        "@angular/compiler": "^5.0.0",
        "@angular/core": "^5.0.0",
        "@angular/forms": "^5.0.0",
        "@angular/http": "^5.0.0",
        "@angular/platform-browser": "^5.0.0",
```

- defines lifecycle scripts and dependent packages

Action Plan

1. Component selector
2. Component template (interpolation)
3. External template
4. Input field (two-way binding)
5. Button (event binding)
6. Disabled button (property binding)

Task 1

- Change the application component's selector

hello/src/app/app.component.ts

```
@Component({
    selector: 'hello',
    ...
})
export class AppComponent { ... }
```

hello/src/index.html

```
<body>
<hello></hello>
</body>
```

Task 2

- Change the component's `title` property and display it in the component's template (interpolation)

hello/src/app/app.component.ts

```
@Component({
    selector: 'hello',
    template: `<h1>{{title}}</h1>`,
    styles: []
})
export class AppComponent {
    public title = 'Hello Application';
}
```

Task 3

- Move the component's template to an external file

hello/src/app/app.component.ts

```
@Component({
    selector: 'hello',
    templateUrl: 'app.component.html',
    styles: []
})
export class AppComponent {
    public title = 'Hello Application';
}
```

hello/src/app/app.component.html

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

Task 4

- Add the `FormsModule` to the imports of the application module
- Add a property `name` to the component that holds the user's name
- Add an input field and bind its value to the property (two-way binding)
- Display a greeting message in the template containing the user's name

hello/src/app/app.module.ts

```
@NgModule({ imports: [BrowserModule, FormsModule], ... })
export class AppModule {}
```

hello/src/app/app.component.ts

```
@Component({ ... })
export class AppComponent {
    public title = 'Hello Application';
    public name: string;
}
```

hello/src/app/app.component.html

```
<h1>{{title}}</h1>
Name: <input [(ngModel)]="name"><br><br>
Hello {{name}}!
```

Task 5

- Add a `sayHello` method which sets a property `greeting` depending on the user's name
- Add a button to the template and bind its click event to the method (event binding)
- Display the `greeting` property using an interpolation

hello/src/app/app.component.ts

```
@Component({ ... })
export class AppComponent {
    public title = 'Hello Application';
    public name: string;
    public greeting: string;

    public sayHello() {
        this.greeting = 'Hello ' + this.name + '!';
        this.name = '';
    }
}
```

hello/src/app/app.component.html

```
<h1>{{title}}</h1>
Name: <input [(ngModel)]="name">
<button (click)="sayHello()">Say Hello</button>
<br><br>
{{greeting}}
```

Task 6

- Add the attribute `disabled` to the button and bind its value such that the button is only enabled when the input field is not empty (property binding)

hello/src/app/app.component.html

```
<h1>{{title}}</h1>
Name: <input [(ngModel)]="name">
<button (click)="sayHello()" [disabled]="!name">Say Hello</button>
<br><br>
{{greeting}}
```

Summary

The following data bindings have been established between the template and the component