JS frameworks: Angular

some material adapted from https://www.tektutorialshub.com/

Single Page Applications

Single page apps typically have:

- “application-like” interaction
- dynamic data loading from the server-side API
- fluid transitions between page states
- more JavaScript than actual HTML

They typically do not have:

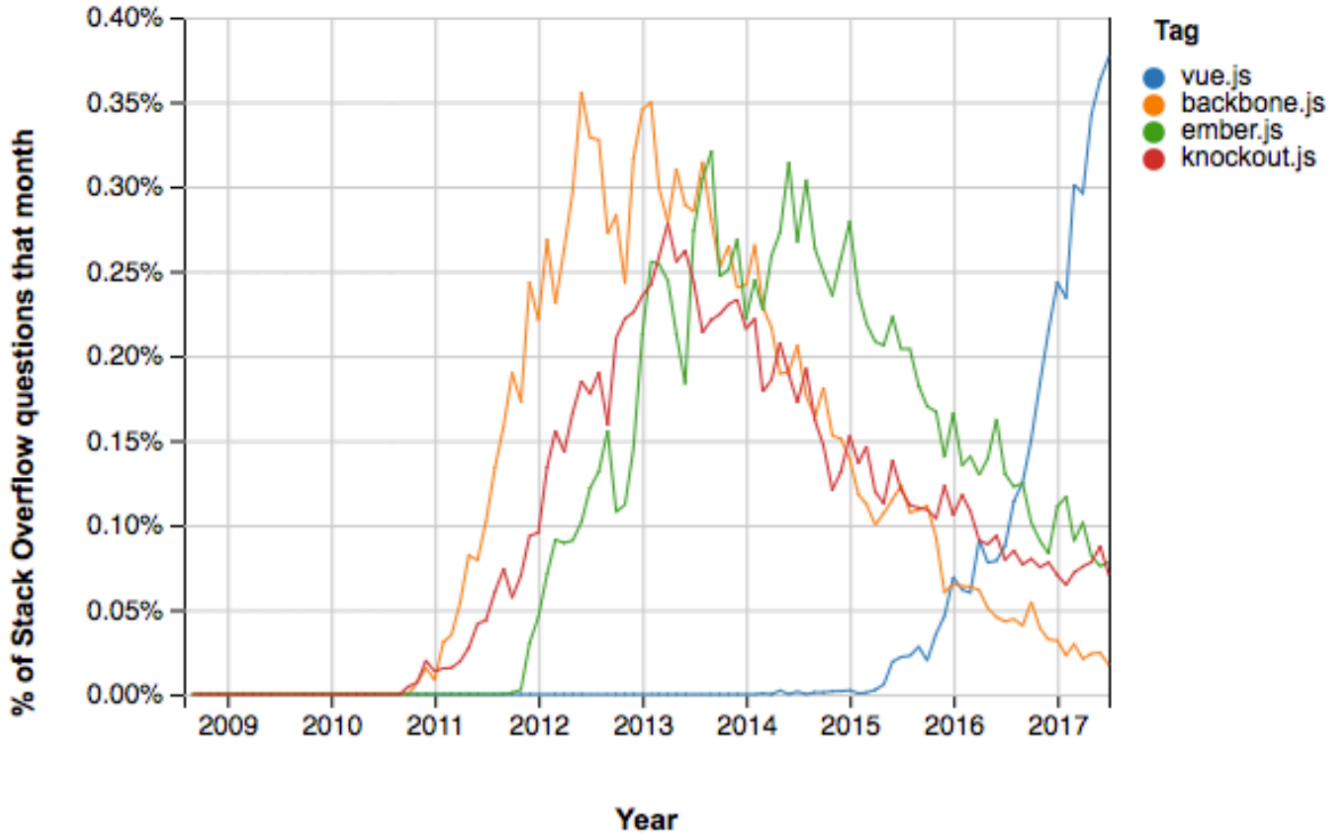
- support for crawlers (not for sites relying on search traffic) support for legacy browsers (IE7 or older, dumbphone browsers)

Problems with SPAs

- DOM Manipulation
  - How to manipulate the view efficiently?
- Data Binding
  - How bind data from model to view?
- View Loading
  - How to load the view?
- History
  - What happens when pressing back button?
- Routing
  - Readable URLs?
- SEO
  - How to make content available to Search Engines?

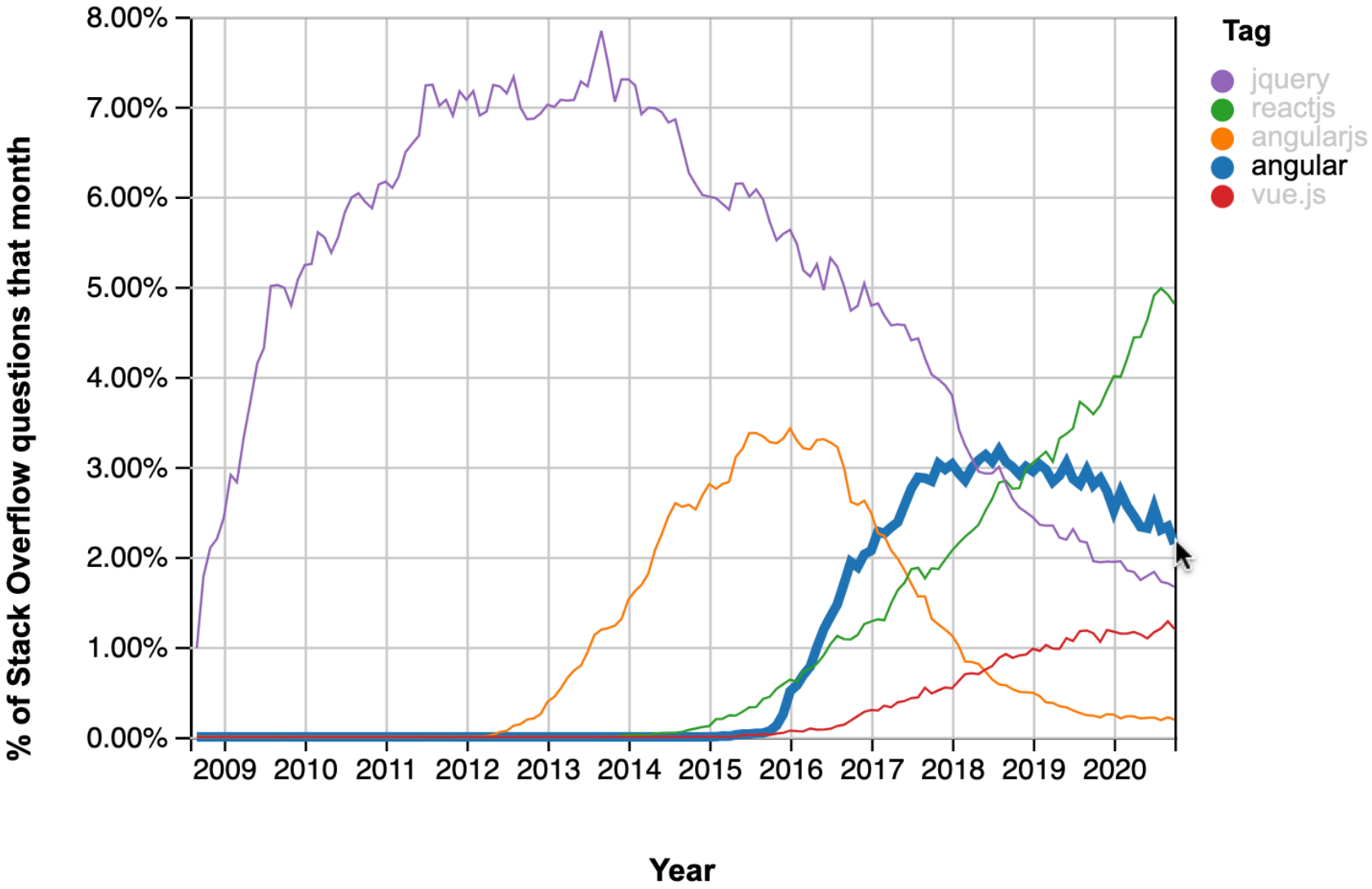
Lots of coding! You could use a framework instead ...

Lifecycle of new JS frameworks



There appears to be a quick ascent, as the framework gains popularity and then a slightly less quick but steady decline as developers adopt newer technologies. These lifecycles only last a couple of years.

Jquery, Angular JS, Angular, React



https://insights.stackoverflow.com/trends

Angular

Angular provides a framework for single-page apps, where **most of the logic and data resides on the client**. Most apps still need to access a server using the HttpClient to access and save data.

Server-side rendering: allows you to run your Angular app **on the server**.

Angular Universal

Angular Universal generates static application pages on the server through server-side rendering (SSR).

Enabling server-side rendering:

- Facilitate web crawlers through search engine optimization (SEO)
- Improve performance on mobile and low-powered devices
- Show the first page quickly with a first-contentful paint (FCP)

see https://angular.io/guide/universal

https://www.tektutorialshub.com/angular/server-side-rendering-using-angular-universal/

Writing Angular apps

Angular apps are written by using:

- HTML
- TypeScript (or JS)
- ng primitives

They can be deployed on any Web Server

TypeScript has to be transpiled

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How do I set up the needed environment?

Tools needed

Angular apps are written by using:

- HTML
- TypeScript (or JS)
- ng primitives

They can be deployed on any Web Server

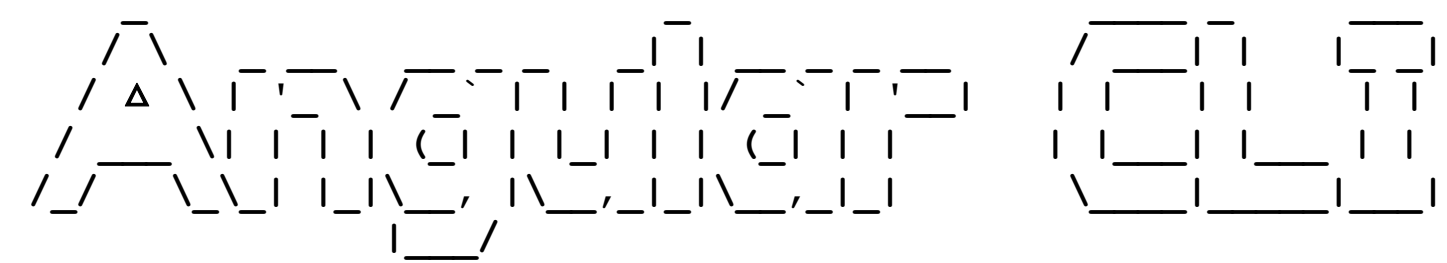
TypeScript has to be transpiled

You need Angular Client Line Interface https://cli.angular.io/

1. Install node
2. npm install -g @angular/cli

Checking installation

```
MR-MacBookPro:firstAngularProject ronchet$ ng --version
```



```
Angular CLI: 11.0.2
Node: 15.2.1
OS: darwin x64

Angular: 11.0.2
... animations, cli, common, compiler, compiler-cli, core, forms
... platform-browser, platform-browser-dynamic, router
Ivy Workspace: Yes

Package                            Version
------------------------------------------------------------
@angular-devkit/architect          0.1100.2
@angular-devkit/build-angular      0.1100.2
@angular-devkit/core               11.0.2
@angular-devkit/schematics         11.0.2
@schematics/angular                11.0.2
@schematics/update                 0.1100.2
rxjs                               6.6.3
typescript                         4.0.5
```

Creating a new Angular project

MR-MacBookPro:include ronchet$ **ng new firstAngularProject**

? **Do you want to enforce stricter type checking and stricter bundle budgets in the workspace?**

This setting helps improve maintainability and catch bugs ahead of time.

For more information, see https://angular.io/strict Yes

? **Would you like to add Angular routing? No**

? **Which stylesheet format would you like to use?**

❯ **CSS**

SCSS [https://sass-lang.com/documentation/syntax#scss]

Sass [https://sass-lang.com/documentation/syntax#the-indented-syntax]

Less [http://lesscss.org]

Stylus [https://stylus-lang.com]

CREATE firstAngularProject/README.md (1028 bytes)

CREATE firstAngularProject/.editorconfig (274 bytes)

...

CREATE firstAngularProject/e2e/src/app.e2e-spec.ts (670 bytes)

CREATE firstAngularProject/e2e/src/app.po.ts (274 bytes)

✔ Packages installed successfully.

Successfully initialized git.

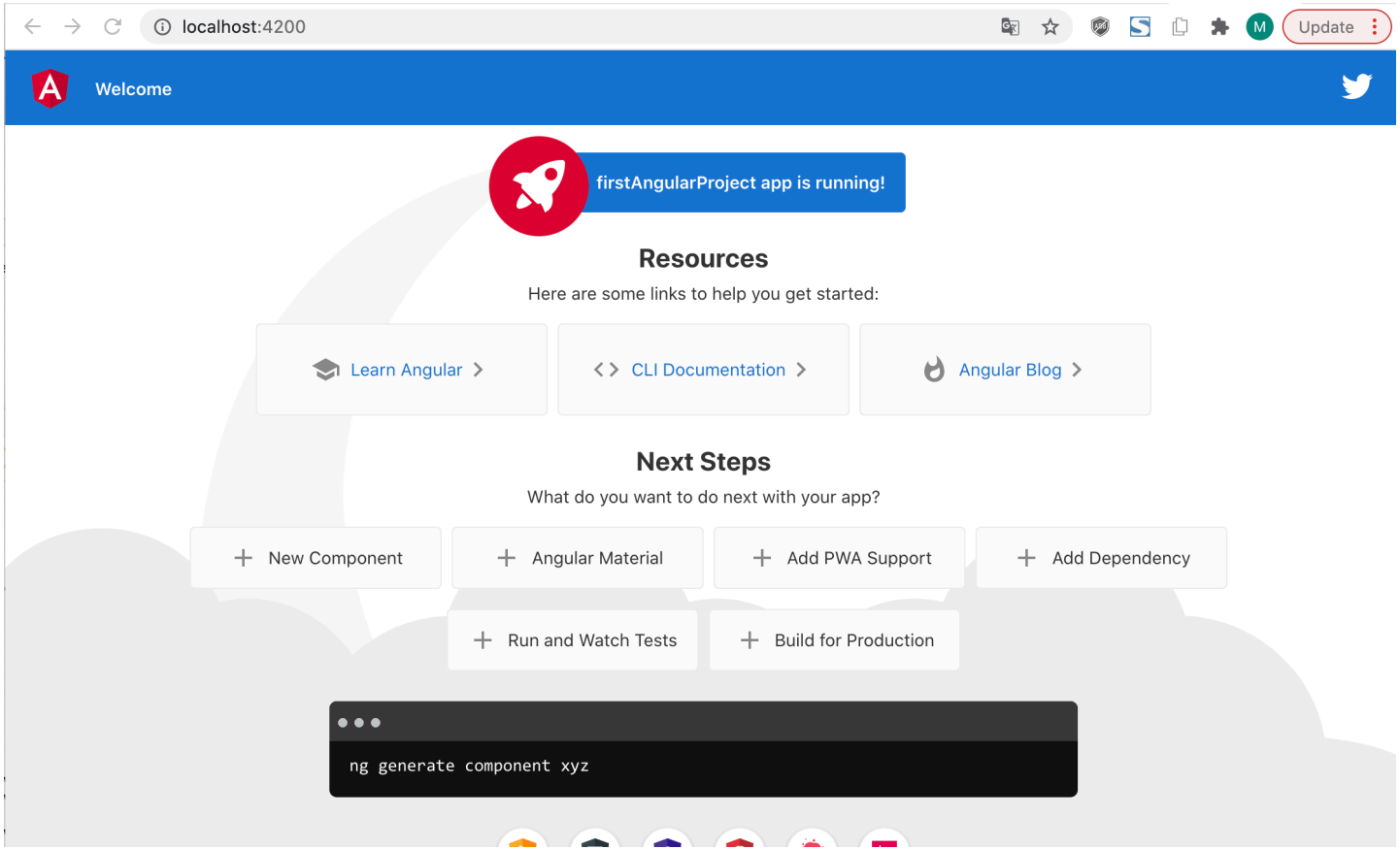
Running new Angular project with CLI

The Angular CLI includes a server, so that you can build and serve your app locally.

Navigate to the workspace folder, such as **firstAngularProject**.

Run the following command:

cd firstAngularProject
ng serve --open



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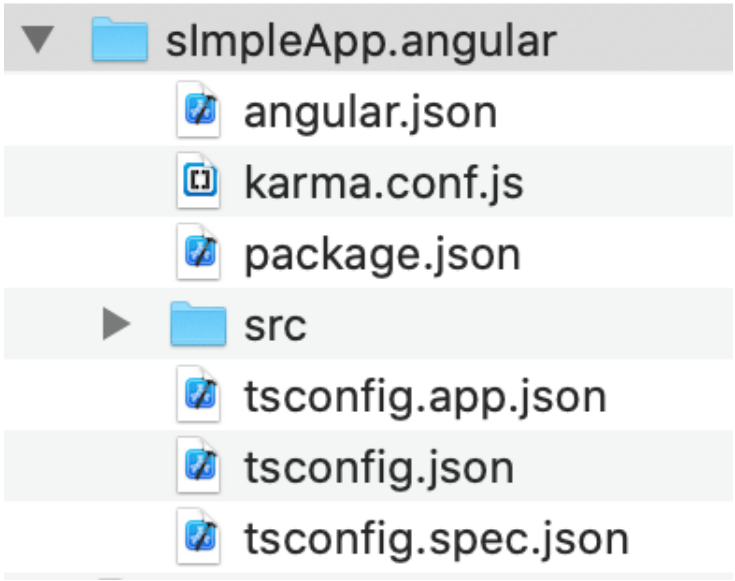
What is the structure of a basic app?

Package structure



angular.json: This is the configuration file for Angular CLI. The older versions of the Angular used the file angular-cli.json

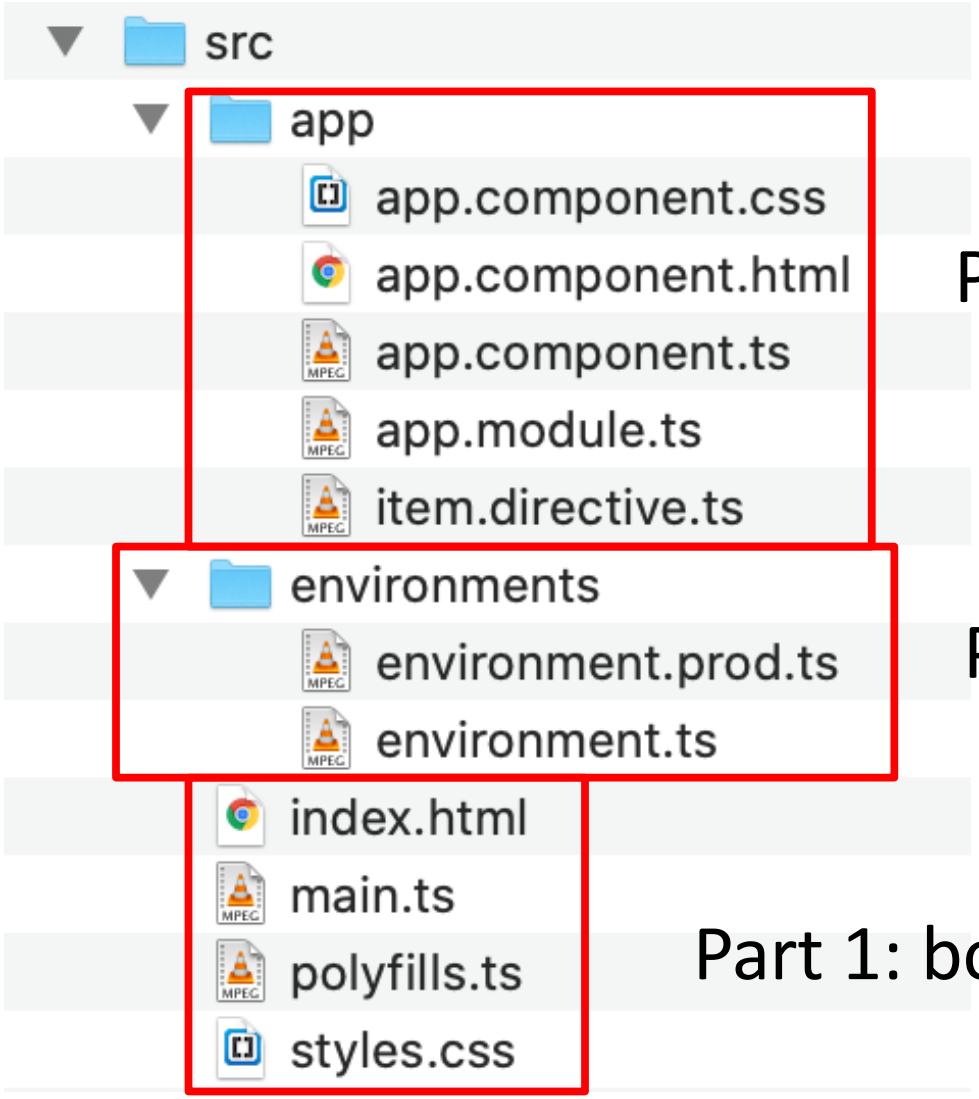
karma.conf.js: The Configuration file for the karma test runner.

package.json: The package.json is an npm configuration file, that lists the third-party packages that your project depends on.

tsconfig.json, tsconfig.app.json & tsconfig.spec.json are Typescript configuration files.

- tsconfig.json is the Typescript compiler configuration file. This file specifies the compiler options required for the Typescript to compile (transpile) the project.
- tsconfig.app.json is used for compiling the code
- tsconfig.spec.json for compiling the tests

Let's expand src



Part 3: the app

Part 2: deployment properties

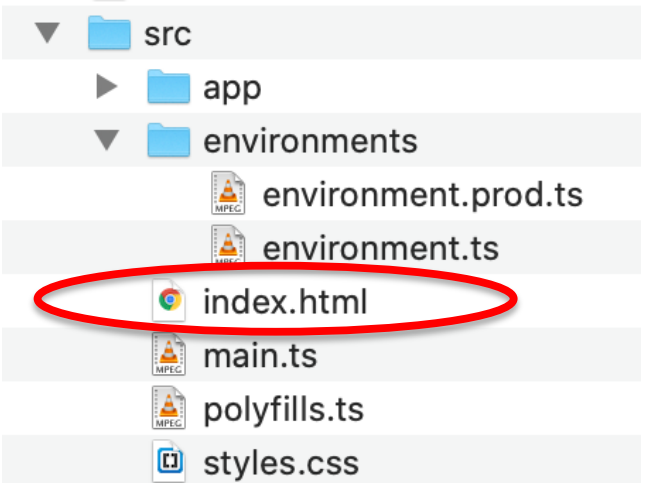
Part 1: boot Section

index.html

```
<!doctype html>
<html>
<head>
  <meta charset="utf-8">
  <title>NgmoduleDemo</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>Loading...</app-root>
</body>
</html>
```

There are neither javascript files nor css files in the index.html.

The body of the files has a special HTML tag.



Part 1: boot Section

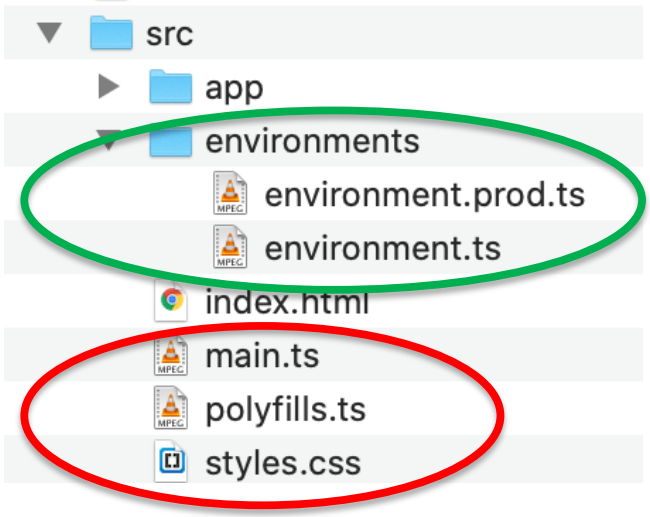
main.ts

```
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);
```

polyfill.ts: *obvious*
style.css: *obvious*

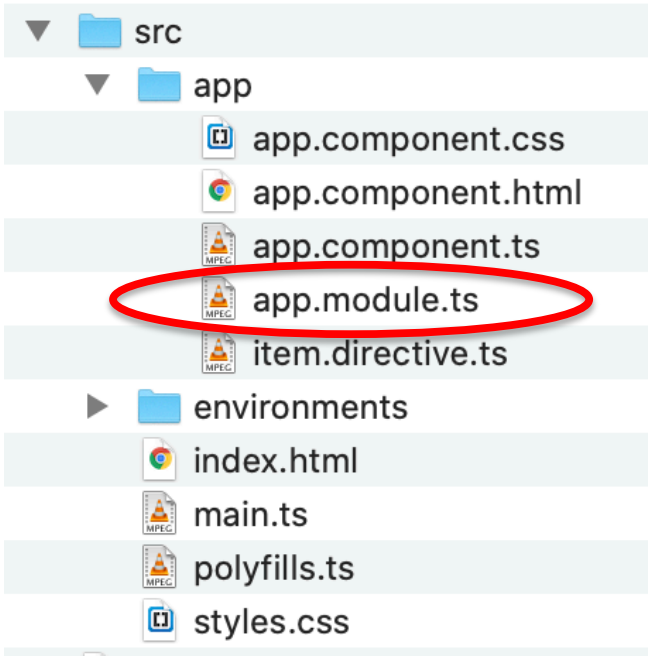
Part 2: deployment properties

environment.ts can be replaced during build by using the `fileReplacements` array.
`**ng build --prod**` replaces `environment.ts` with `environment.prod.ts`.
The production build optimizes, minimize and uglify the code.



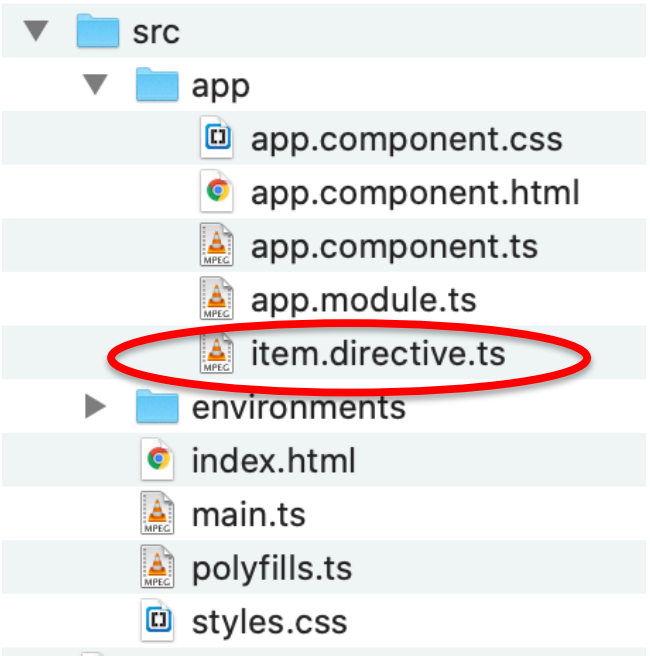
app.module.ts

```
import { BrowserModule } from '@angular/platform-browser';
import { NgModule } from '@angular/core';
import { FormsModule } from '@angular/forms';
import { HttpClientModule } from '@angular/common/http';
import { AppComponent } from './app.component';
import { ItemDirective } from './item.directive';
// @NgModule decorator with its metadata
@NgModule({
  declarations: [
    AppComponent,
    ItemDirective
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpClientModule
  ],
  providers: [],
  bootstrap: [AppComponent]
})
export class AppModule { }
```



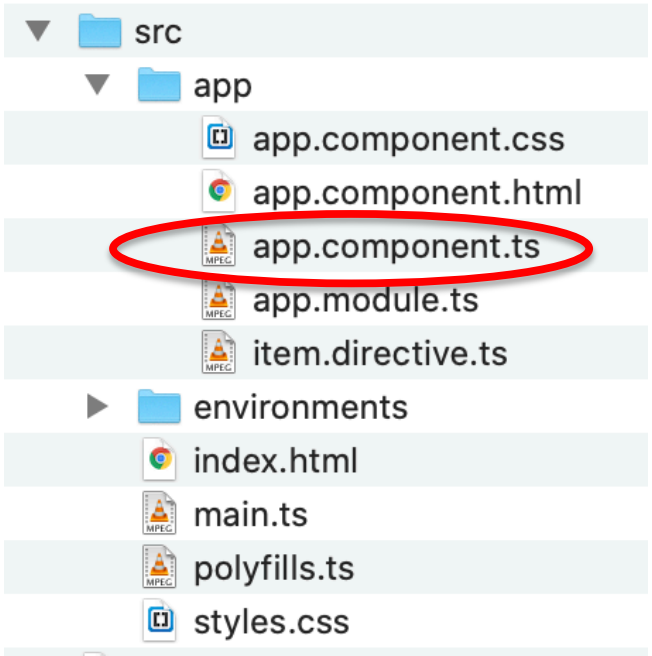
item.directive.ts

```
import { Directive } from '@angular/core';
@Directive({
  selector: '[appItem]'
})
export class ItemDirective {
// code goes here
  constructor() { }
}
```



app.component.ts

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

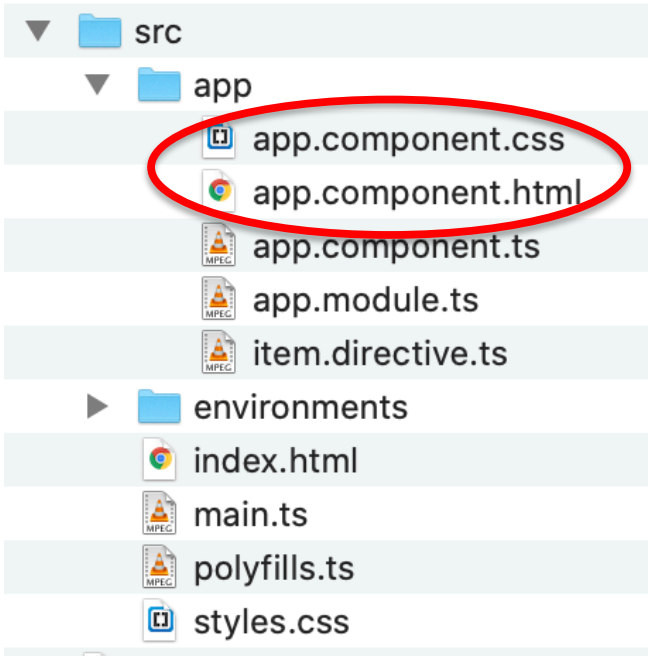


app.component.html

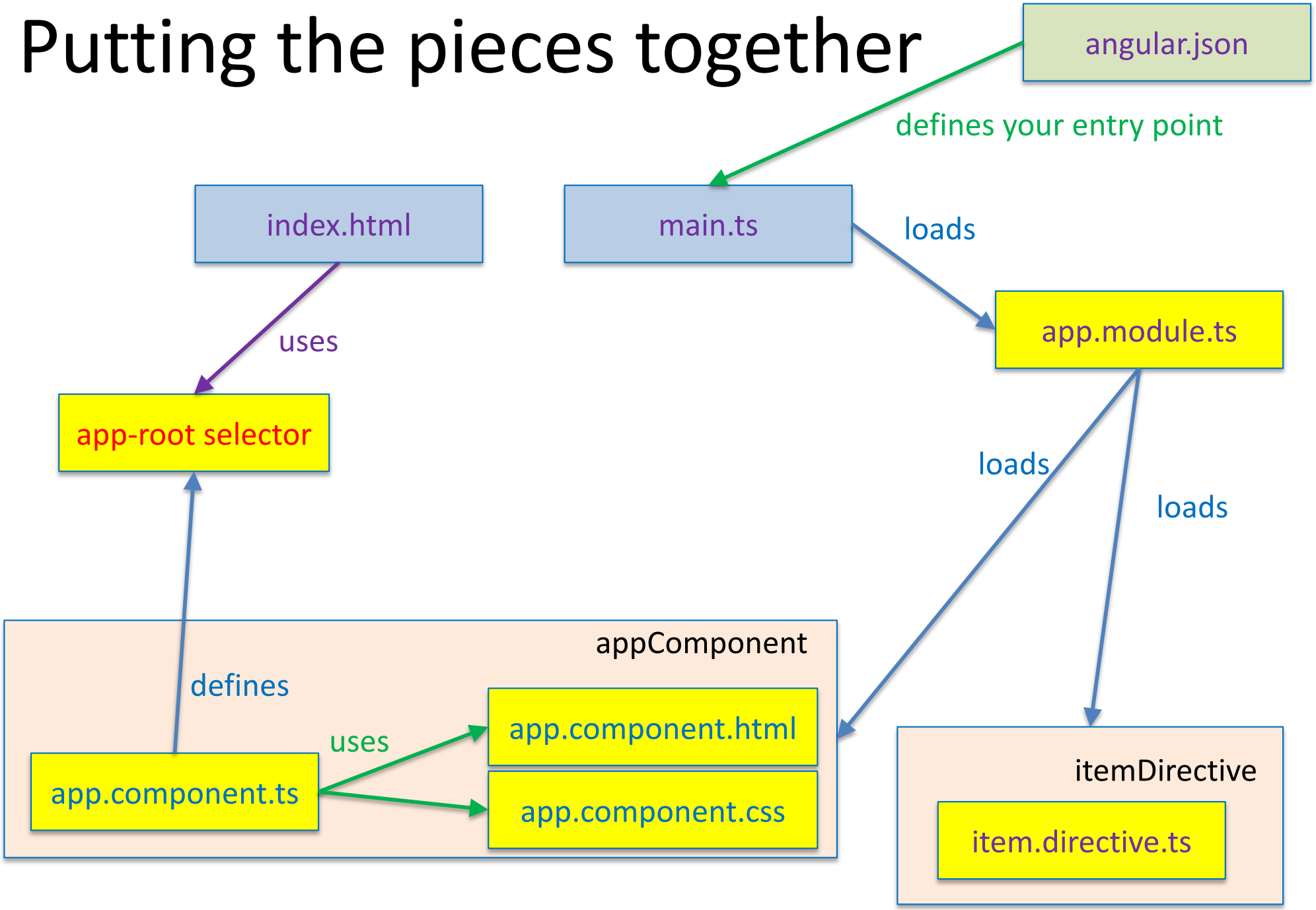
```
<h1>
  {{title}}
</h1>
```

app.component.css

```
empty
```



Putting the pieces together



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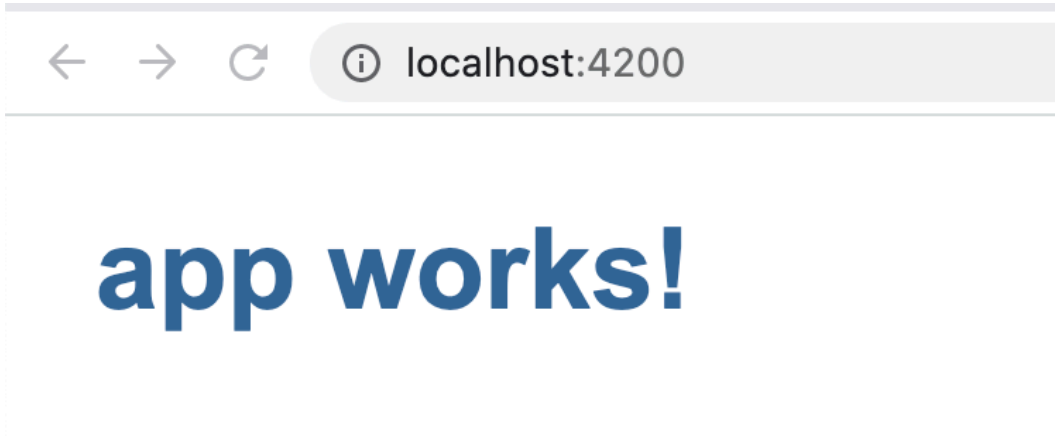
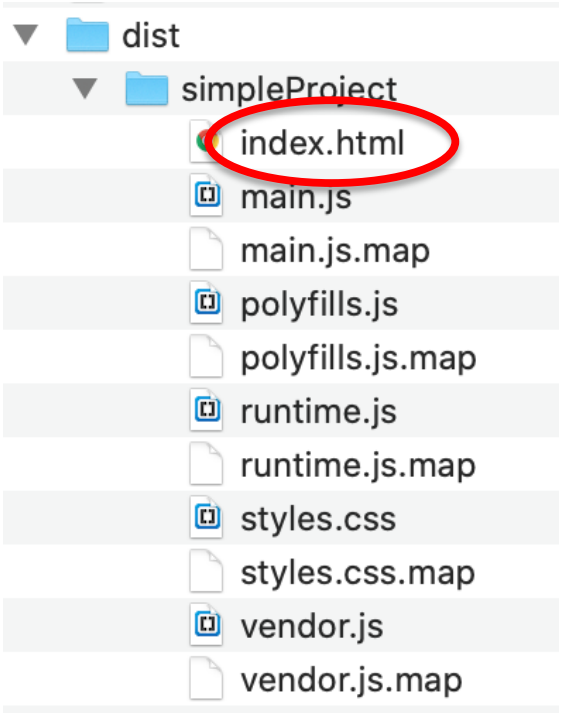
How do I customize my first app?

Building and running the project

mkdir **simpleProject**.
cd simpleProject
// replace the src directory with the src directory available from the web site of the course
ng build
ng serve --open

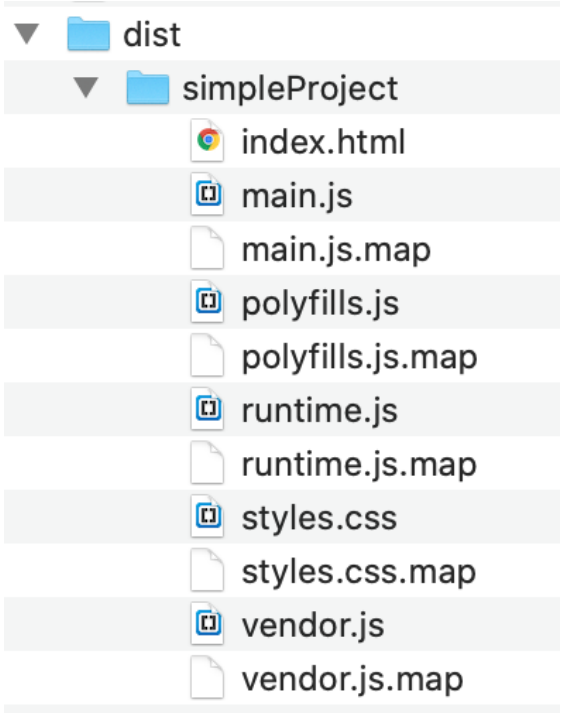


The distribution




```
<!doctype html>
<html>
<head>
  <meta charset="utf-8">
  <title>NgmoduleDemo</title>
  <base href="/">
  <meta name="viewport" content="width=device-width,
      initial-scale=1">
  <link rel="icon" type="image/x-icon" href="favicon.ico">
  <link rel="stylesheet" href="styles.css">
</head>
<body>
  <app-root>Loading...</app-root>
  <script src="runtime.js" defer></script>
  <script src="polyfills.js" defer></script>
  <script src="vendor.js" defer></script>
  <script src="main.js" defer></script></body>
</html>
```

The distribution



`runtime.js:` Webpack runtime file

`polyfills.js` – Polyfill scripts for supporting the variety of the latest modern browsers

`styles.js` – This file contains the global style rules bundled as javascript file.

`vendor.js` – contains the scripts from the Angular core library and any other 3rd party library.

`main.js` – code of the application.

webpack is a module bundler. it scans our application looking for javascript files and merges them into one (or more) big file. Webpack has the ability to bundle any kind of file like JavaScript, CSS, SASS, LESS, images, HTML, & fonts, etc.

https://webpack.js.org/

if you want to know more…

The inner working of Angular is well described in

https://www.tektutorialshub.com/angular/angular-bootstrapping-application/

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How can I do quick practice?

Quick development and testing

You can use stackblitz:
https://stackblitz.com/angular/glkadjjjbdq?file=src%2Fapp%2Fapp.component.html