Global Knowledge®

Angular + TypeScript

Module 1 - Inleiding

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Peter Kassenaar

- Trainer, author, developer – since 1996
- Specialty: *"Everything JavaScript"*
- JavaScript, ES6, Angular, NodeJS, TypeScript, React, Vue, Phonegap

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VANDUUREN MEDIA

Twitter: @PeterKassenaar

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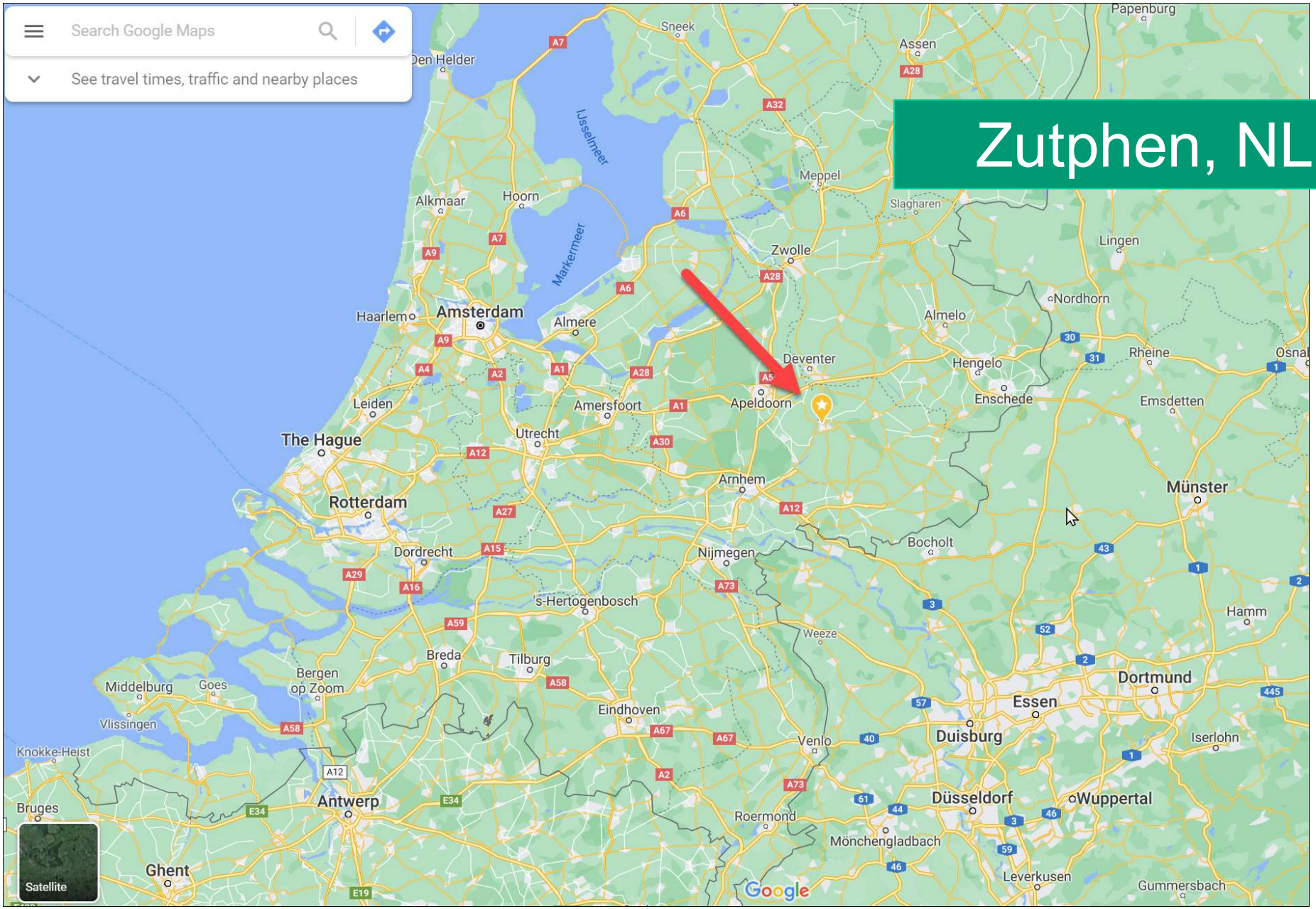
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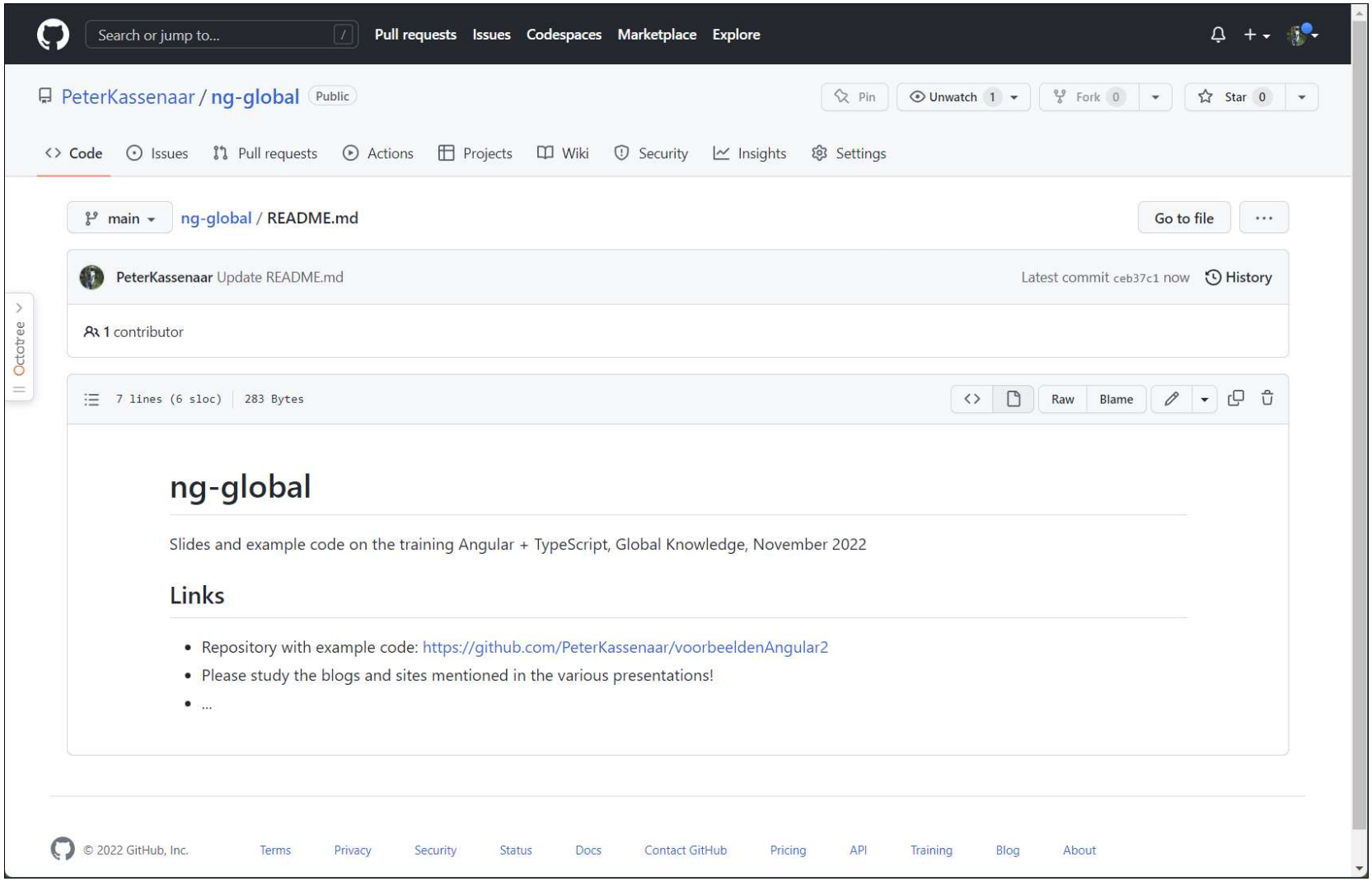
www.angulartraining.nl

github.com/PeterKassenaar/ng-global



Over jullie

Stel jezelf kort voor

Voorkennis webdevelopment, (mobile/web-) apps?

(Kennis AngularJS 1.x?)

Voorkennis andere (web)talen?

Verwachtingen van de cursus?

Concrete projecten?

Specifieke vragen of technieken die je wilt behandelen?

Agenda – globaal – 3 dagen

21 - 23 November 2022 – ma. – wo.

~ 9:00 start

~ 10:15 short break

~ 12:30 lunch

~ 13:15 middagsessie

~ 14:15 short break

~16:15 Einde

Doel van de training

*Je wordt **geen** Angular wizard in 3 dagen (sorry)*

maar….

Doelen

1. Je leert over de structuur en architectuur van Angular Apps. Van een kleine `hello-world` app tot een grote Enterprise applicatie.

2. Je bent bekend met de belangrijkste *Angular concepten* van het framework. Specifieke details kun je altijd Googelen.

3. Je hebt enige hands-on ervaring met het maken van apps en componenten, services, API's/backends, component communicatie.

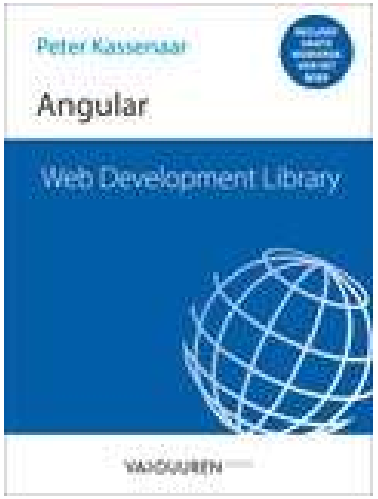
4. Je hebt een algemeen begrip van de manier waarop moderne web apps worden gemaakt met Angular, TypeScript en build tools.

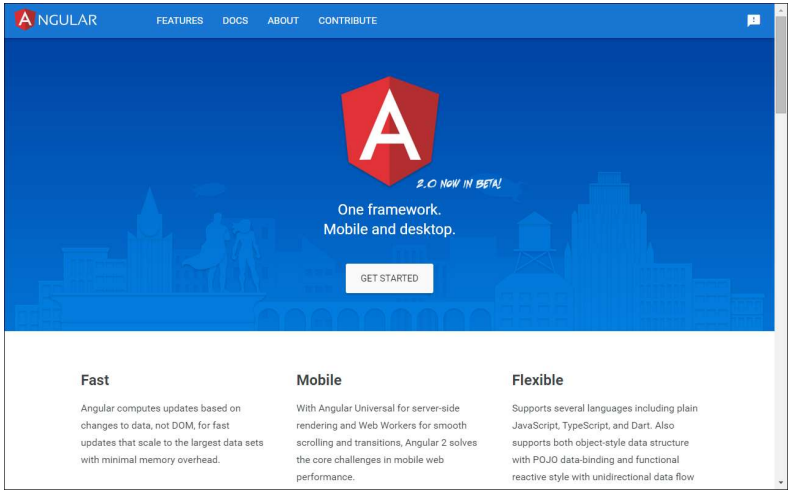
Agenda - 3 dagen

- Introductie & geschiedenis - waarom Angular, TypeScript?
- Kernbegrippen in Angular 2 – 14
- CLI, Hello World in Angular – inzicht in boilerplate-code
- Angular in depth (modules):
  - Components
  - ECMAScript 2015 + TypeScript
  - Data binding
  - Dependency Injection (DI) – more components
  - Services en http, Observables (RxJS), communicatie backend
  - Intercomponent communication

Materialen

Software	(Angular, NodeJS + NPM, editor, browser)
Handouts	(Github - PDF)
Oefeningen	(Github)
Websites	(online)





angular.io/

Vandaag

- Dag 1 – Intro & Data binding
  - Theorie - Introductie & geschiedenis – waarom Angular
  - Hello World in Angular –boilerplate-code
    - Components + Modules
  - Concepts, context & architecture
  - Angular CLI, TypeScript
  - Data binding

2 Richtlijnen

1. Oefeningen
    - Maar: neem ook vooral zijpaden, experimenteer, lees verder, maak een eigen project, app, website…

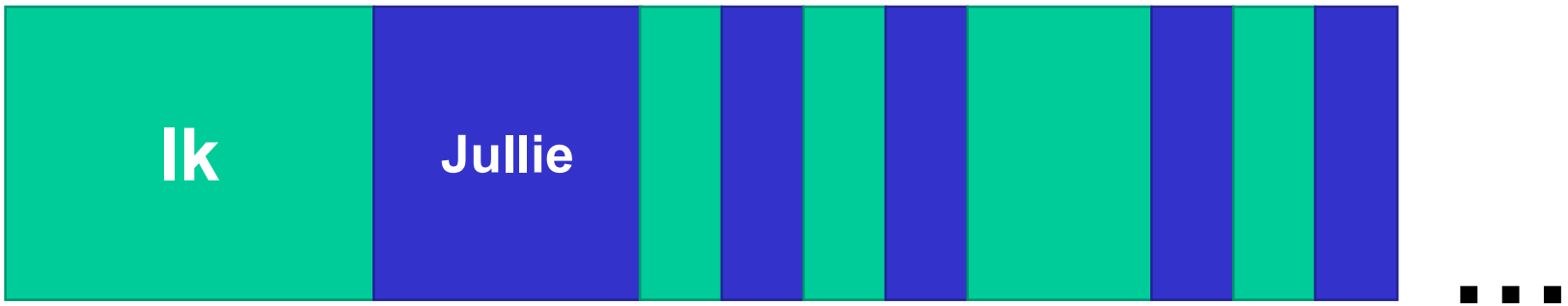
2. Voorbeeldcode
    - Als ondersteuning bij de oefeningen, zie boven
    - Work in progress – check de Angular-site!
    - github.com/PeterKassenaar/voorbeeldenAngular2

Advanced warning - First morning

Not so much code…

Concepts, architecture, structure

Globale werkwijze



Vragen?

Angular vs. The Rest

Differences, similarities, new features

Addressing the "WHY" question!

WHY, would we want to use a frontend framework.

It is all HTML, CSS and JavaScript right?

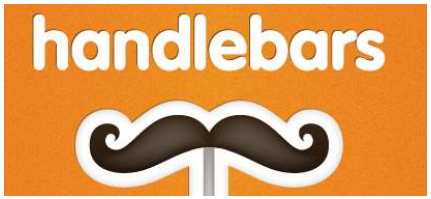
Rethorical question:

speed, consistency, not re-inventing the wheel, community, performance, testing….

"Do we want to go back to the jQuery days?"

Old school web apps

HTML + templates



Data Binding

Routing

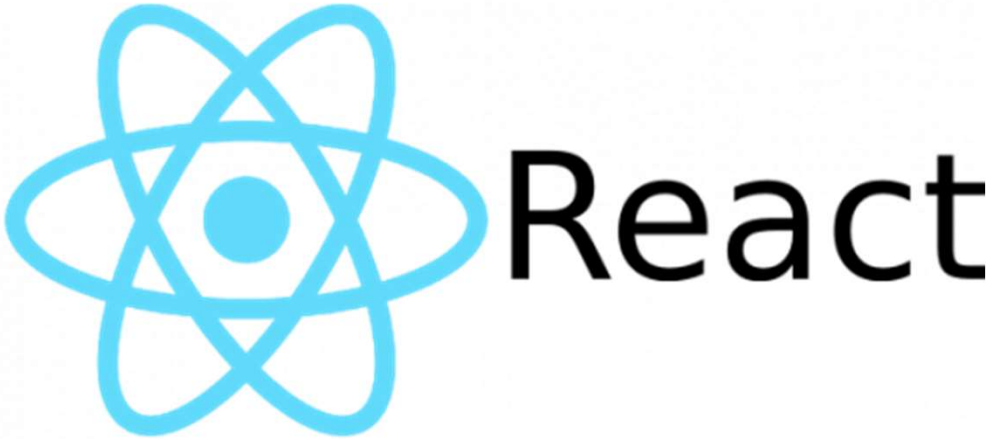
DOM-manipulation

Mobile development

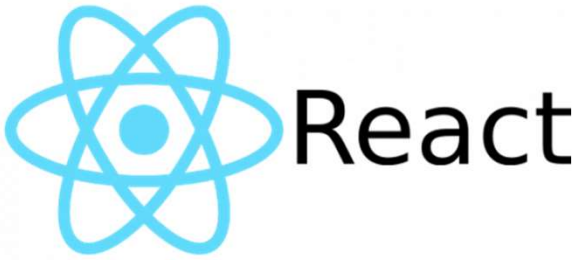
...

“The Frankenstein Framework”

Front-end Frameworks – the big four



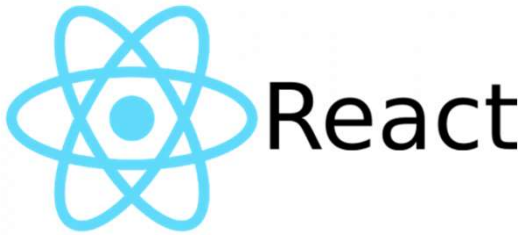
Similarities



- Creating Single Page Applications
- Based on components
- Data binding, props, events, routing, state management, …
- Huge ecosystem
- Huge community
- High adaptation rate

Differences (apart from syntax)

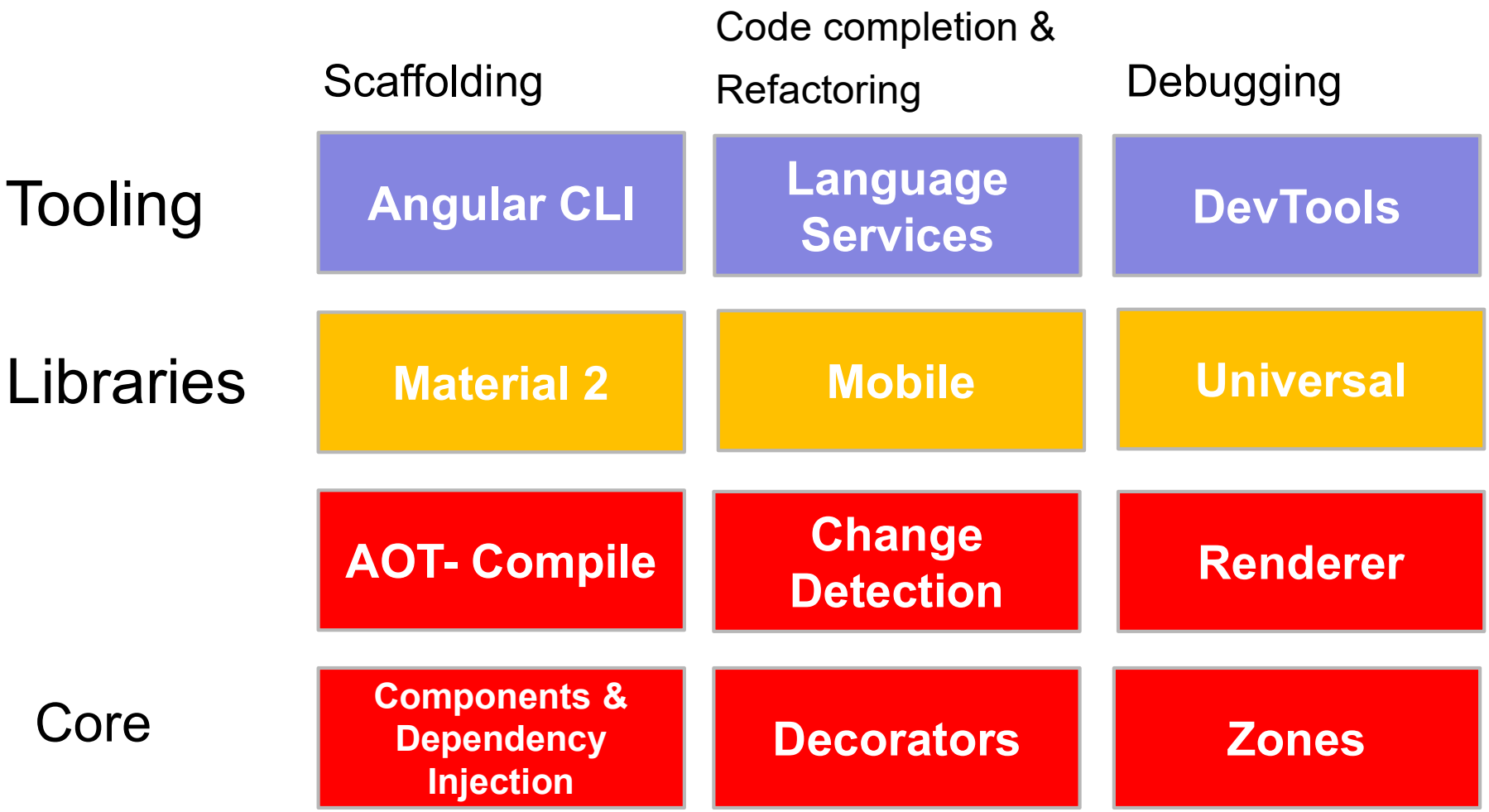
- Point of departure: HTML template, enhanced with framework specific tags and attributes
- One-stop-shop / solution

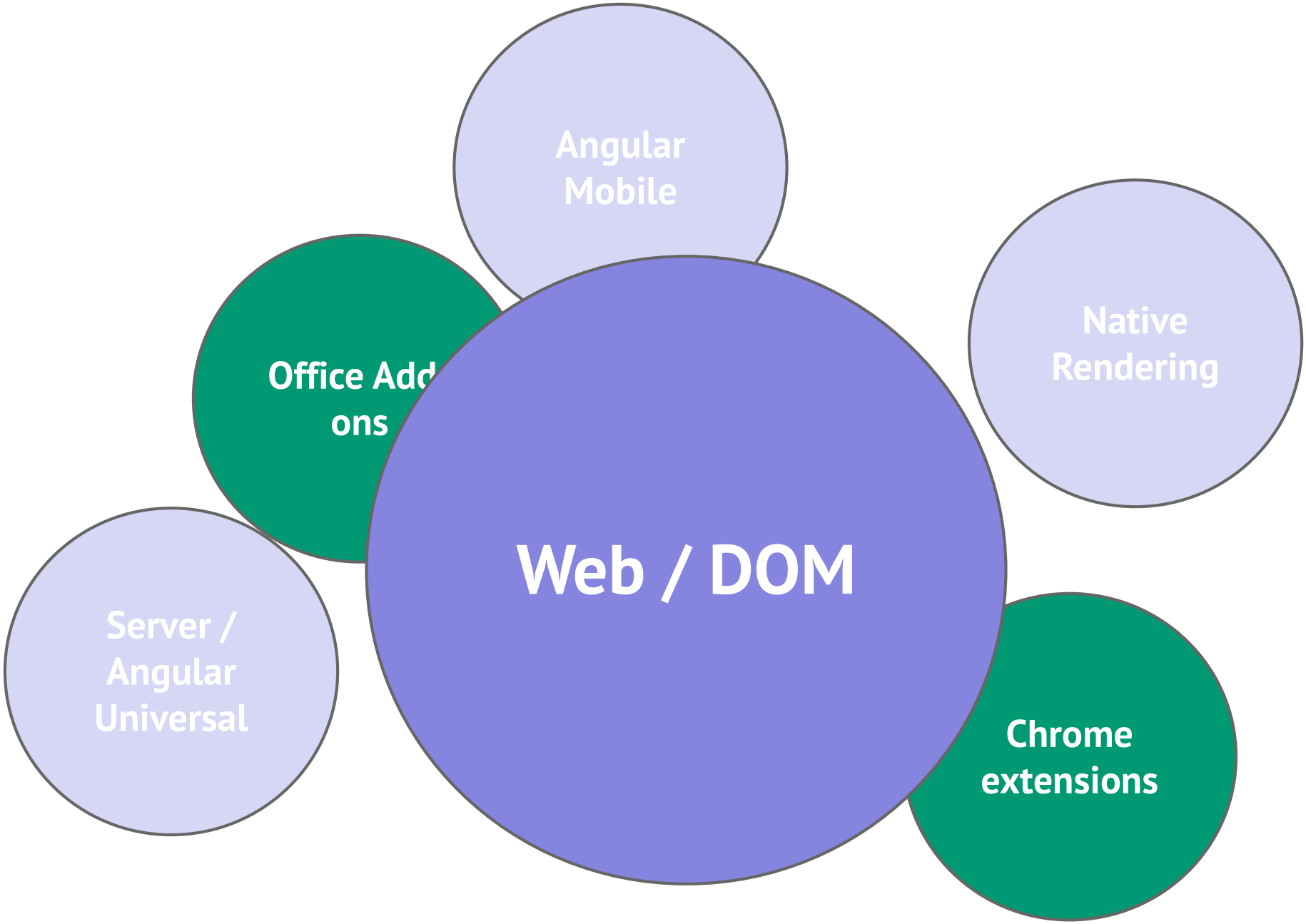


- Point of departure: JavaScript, JavaScript, JavaScript (JSX)
- Build-all-yourself / choice anxiety

Platform

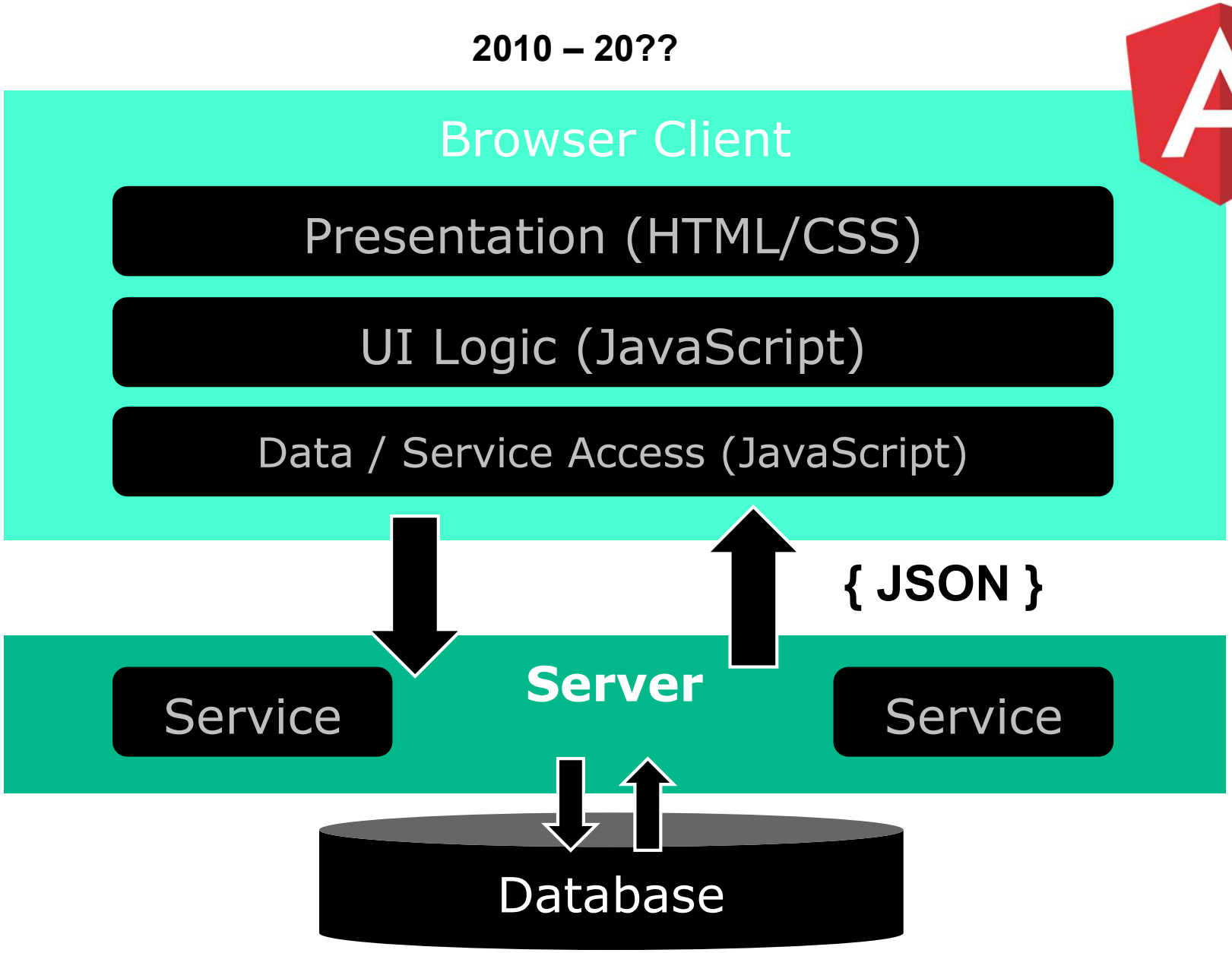
Platform Features



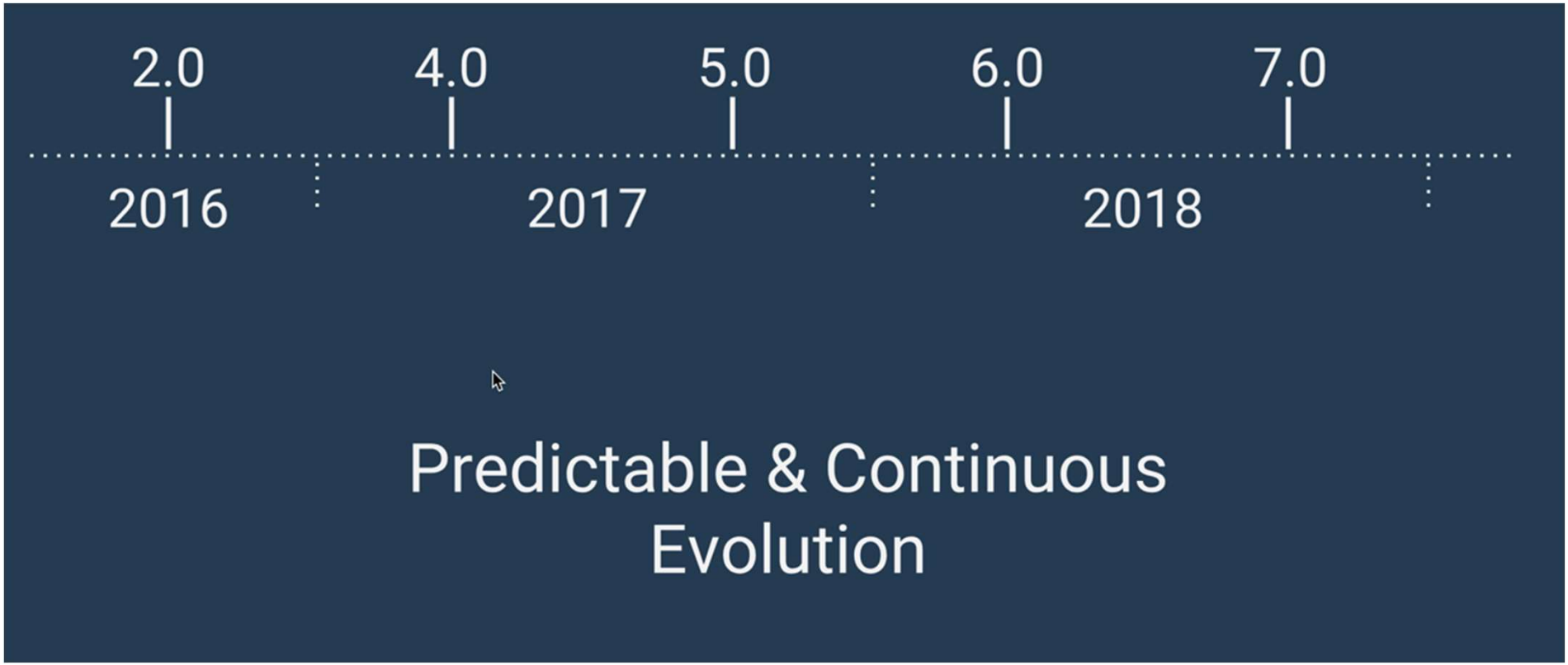

Angular
Mobile
Native
Rendering
Office Add
ons
Web / DOM
Server /
Angular
Universal
Chrome
extensions

Single Page Application

2010 – 20??



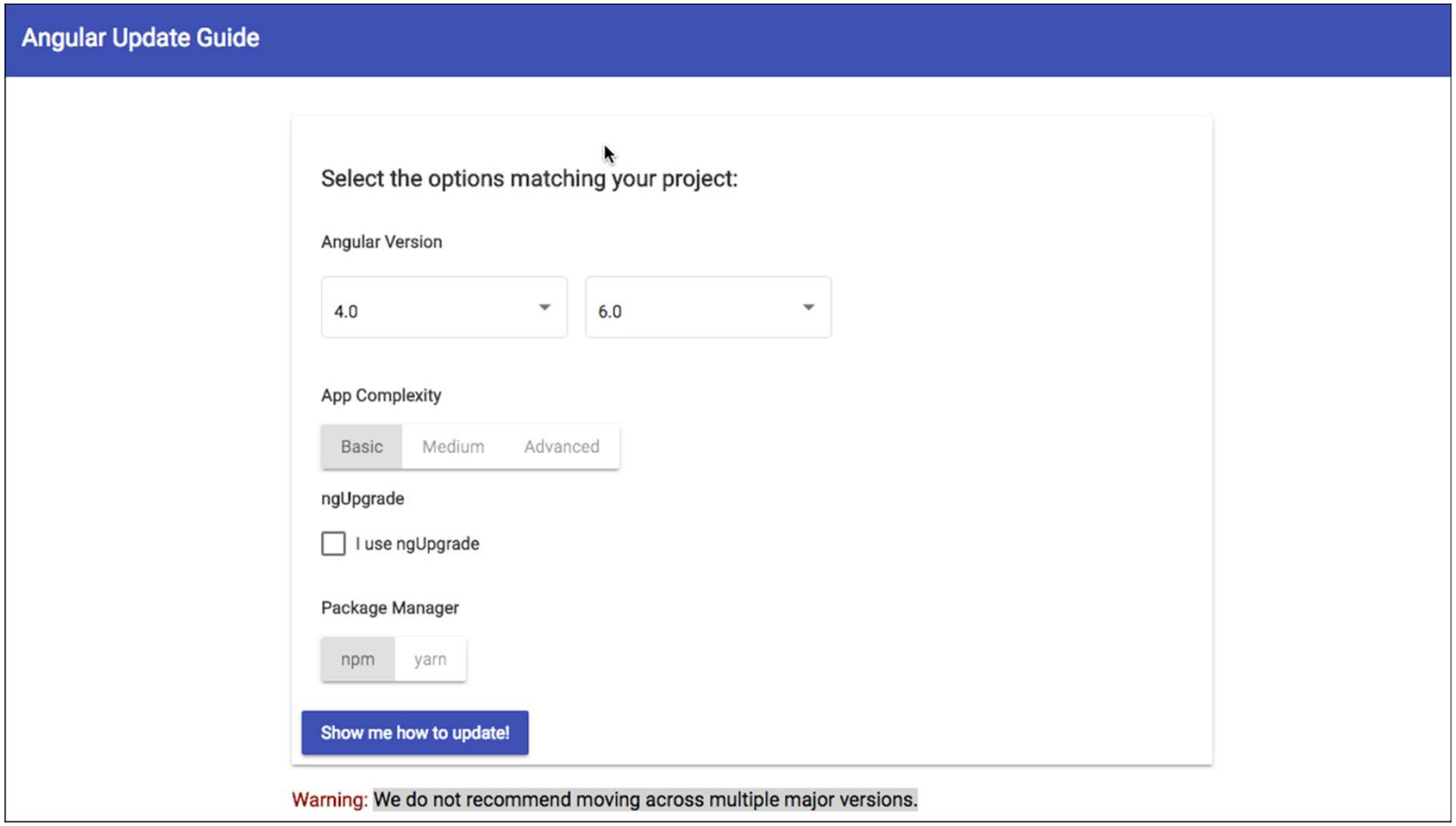
@IgorMinar, Nov. 9, 2018


2.0
4.0
5.0
6.0
7.0
2016
2017
2018
Predictable & Continuous
Evolution

Angular updates

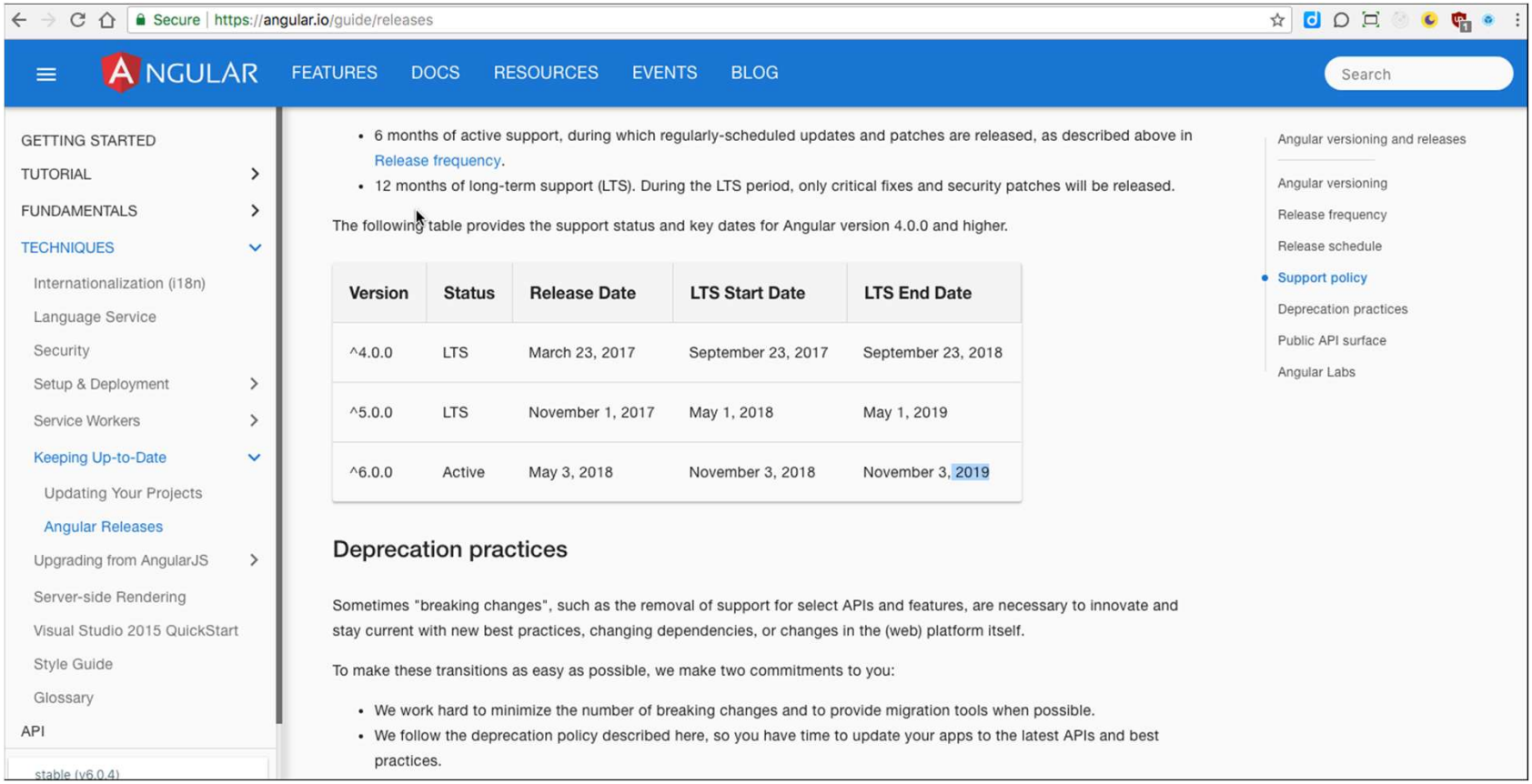
- Angular 2 – 14 **Grotendeels 'meer van hetzelfde'**
  - Soms zijn er breaking changes
  - Zelf checken: https://update.angular.io/
  - Updates van verwante libraries (RxJS, Angular Material)
- Belangrijke milestones
  - Angular 2 – breekt met structuur en architectuur van Angular JS (1.x)
  - Angular 6 – Introductie modern Angular CLI
  - Angular 9 – Ivy Compiler
  - Angular 14 – Standalone components

https://update.angular.io/



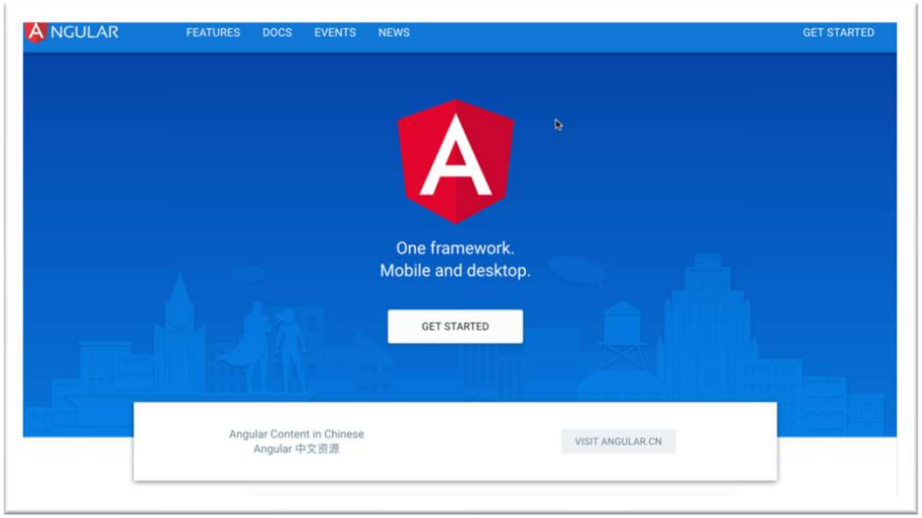
Angular Versies en -Long Time Support

→ https://angular.io/guide/releases

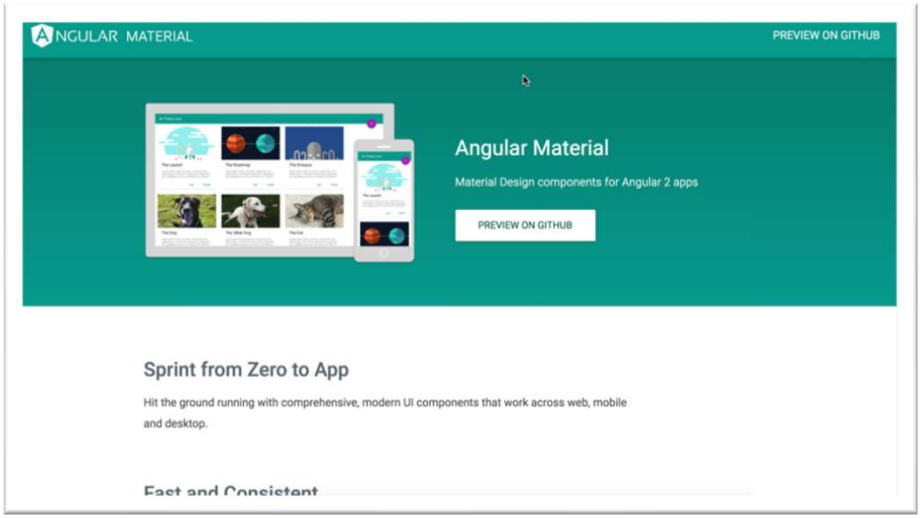


“It's just *Angular*”

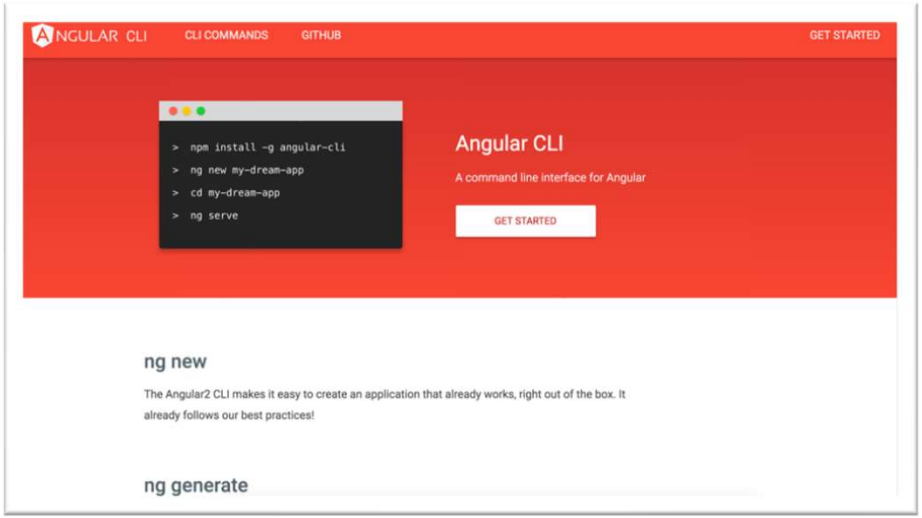
Angular as a Platform



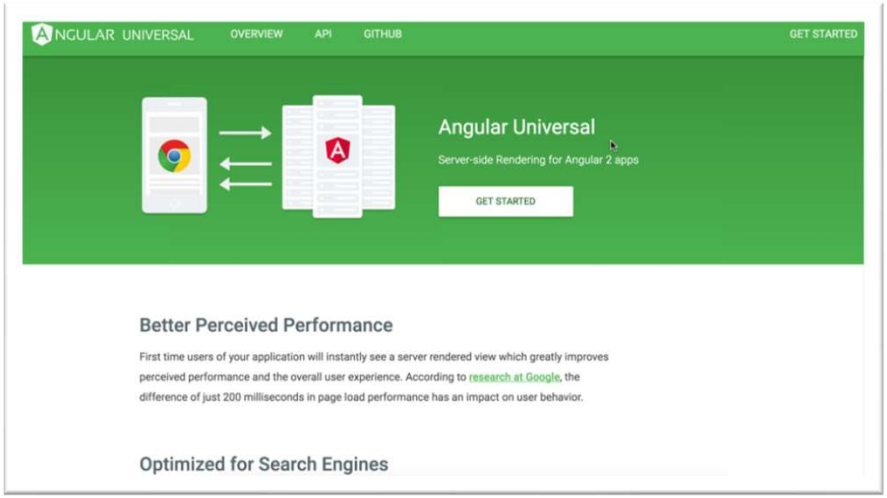
https://angular.io/



https://material.angular.io/

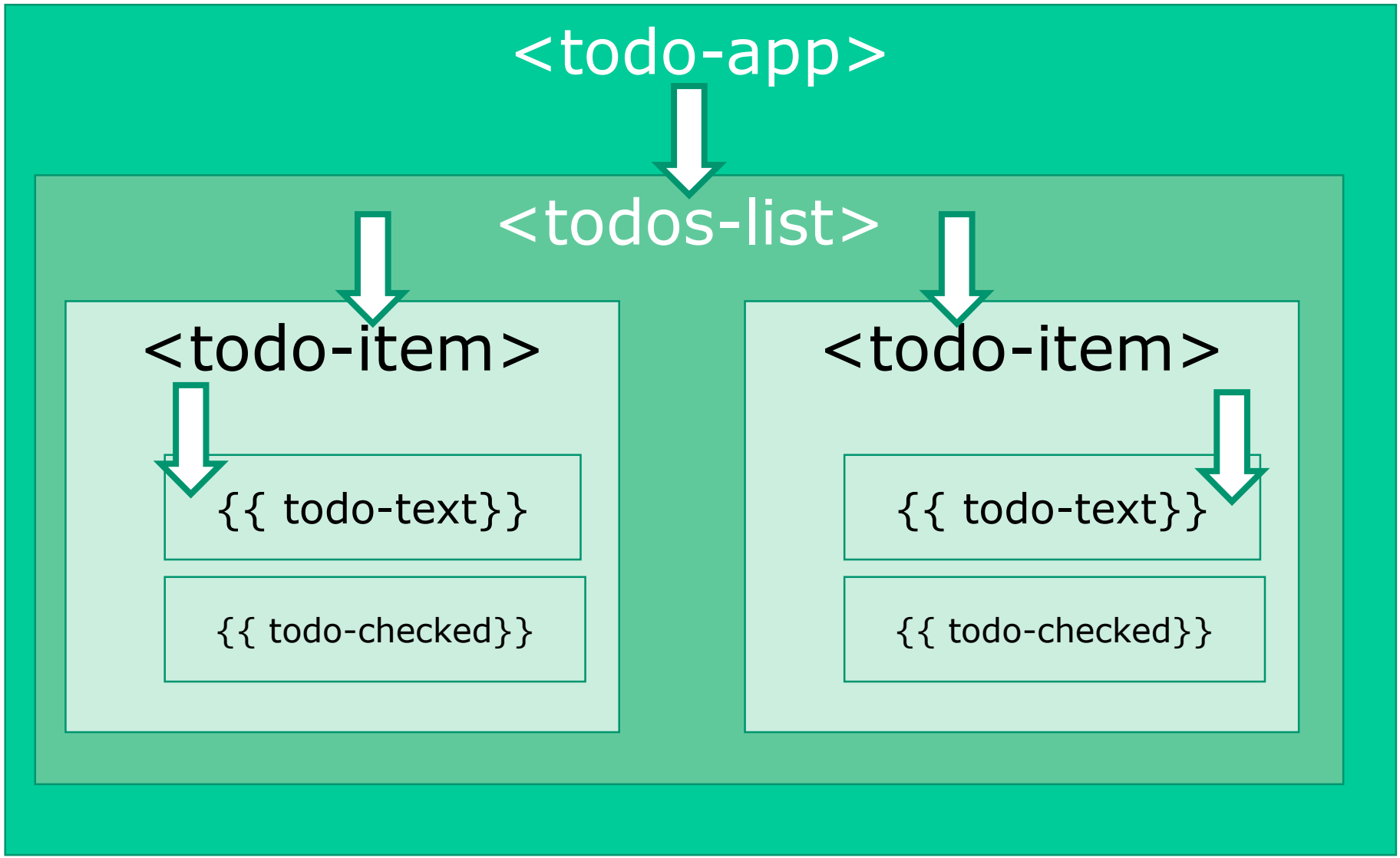


https://cli.angular.io/



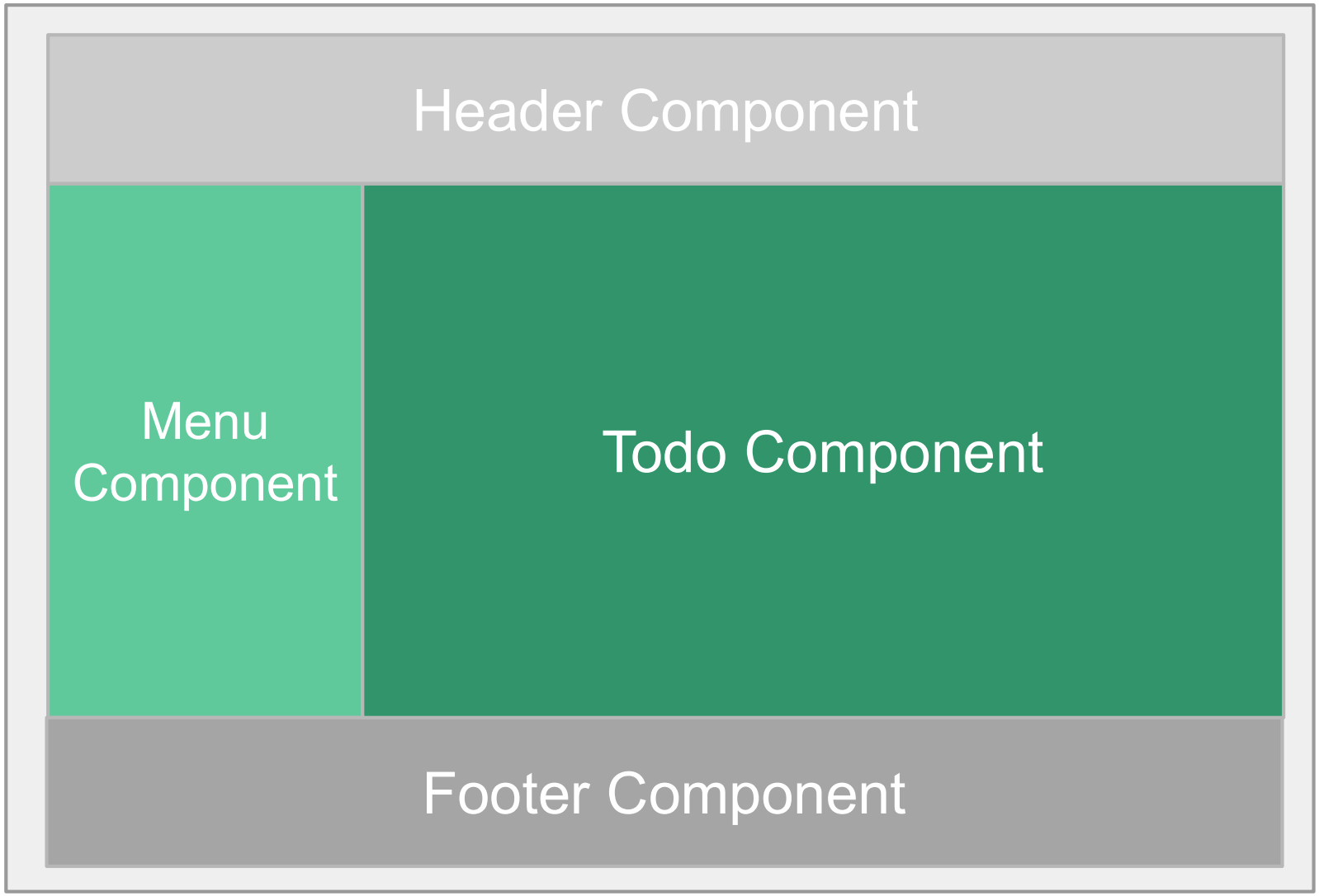
https://universal.angular.io/

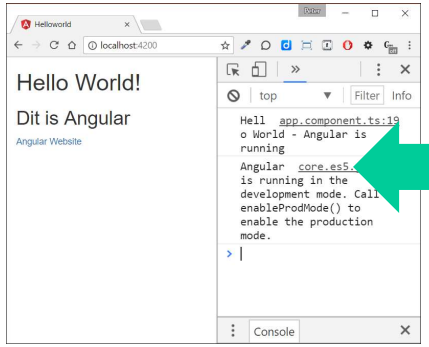
Angular 2 - components



"An Angular-app is a tree of components"

Components – visual representation





main.ts / bootstrapper

ngModule / root module

AppComponent

Other components

Other components

Other components

Services

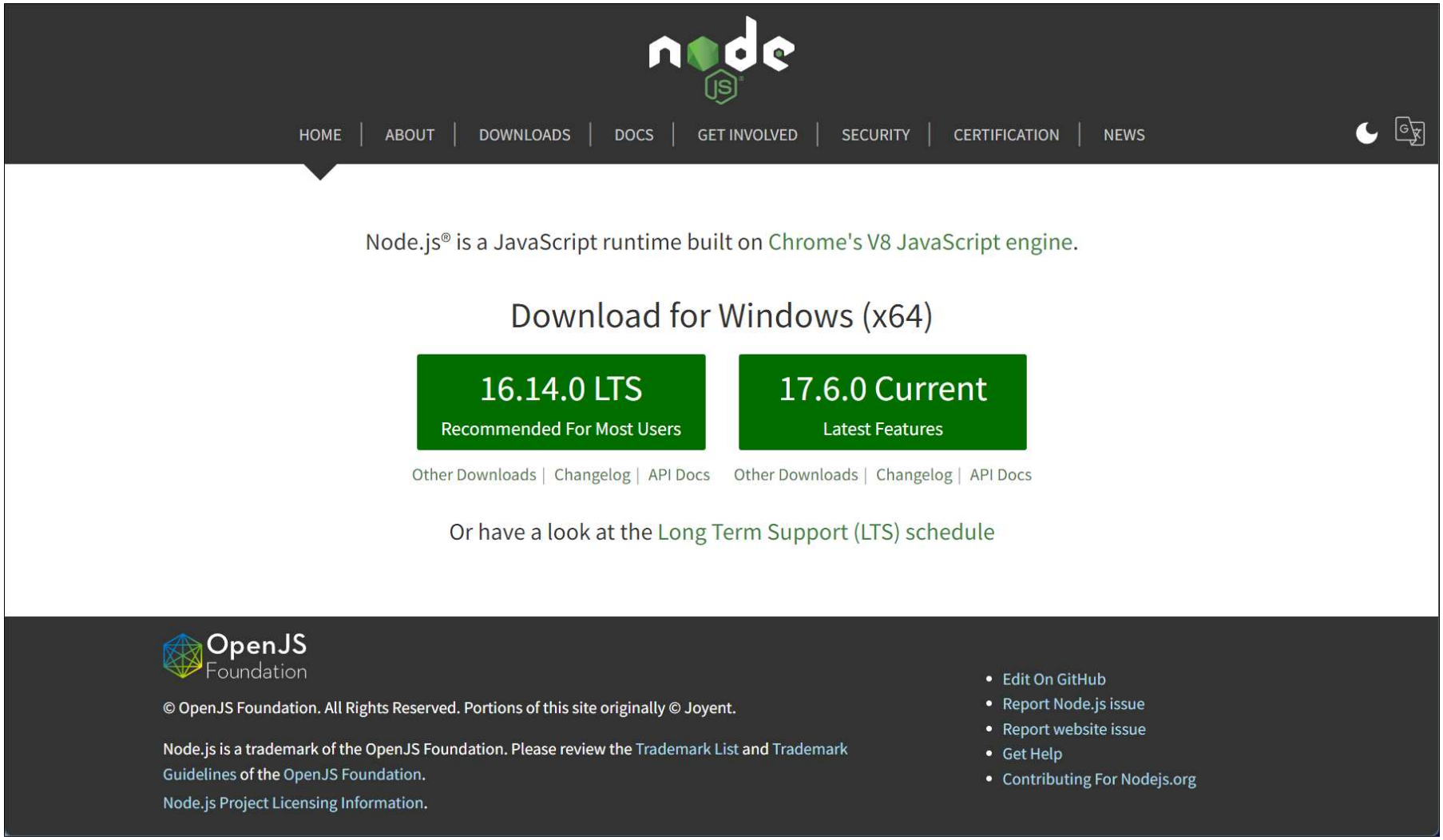
3rd party libs

Other modules

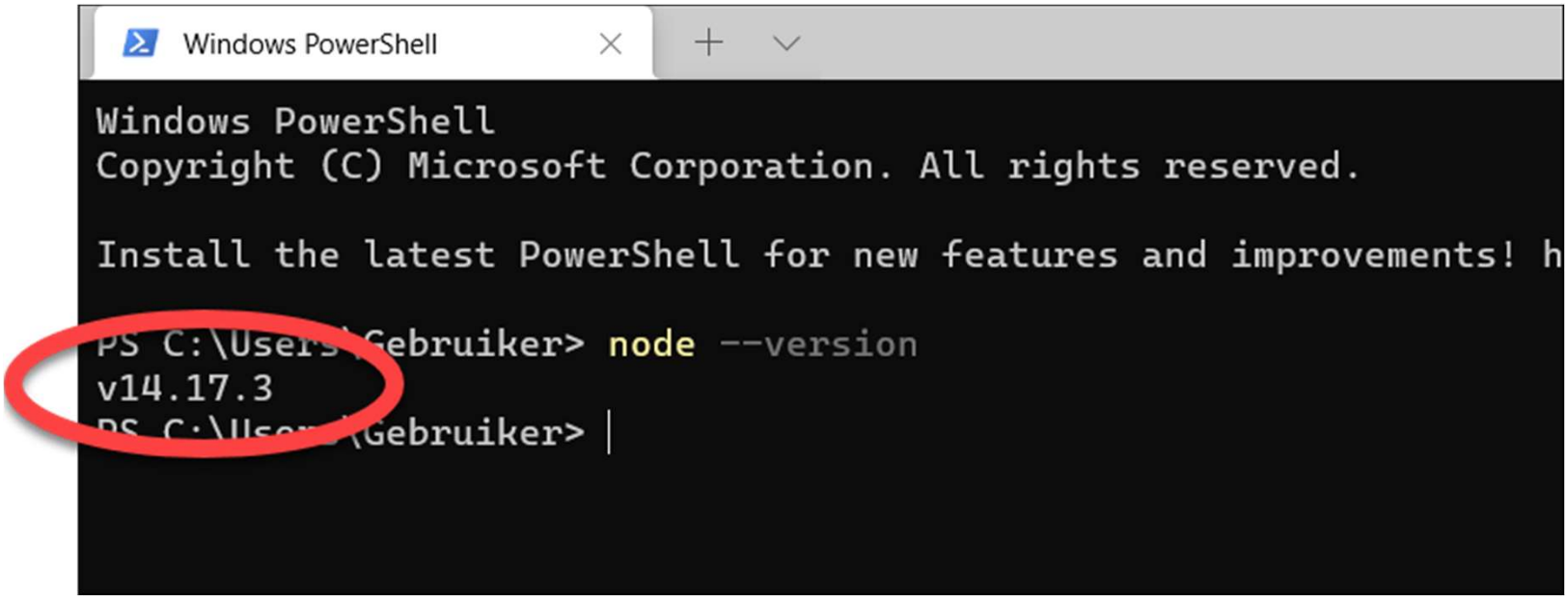
Let’s write some code

Hello World in Angular

Angular development dependency: NodeJS 12.20+



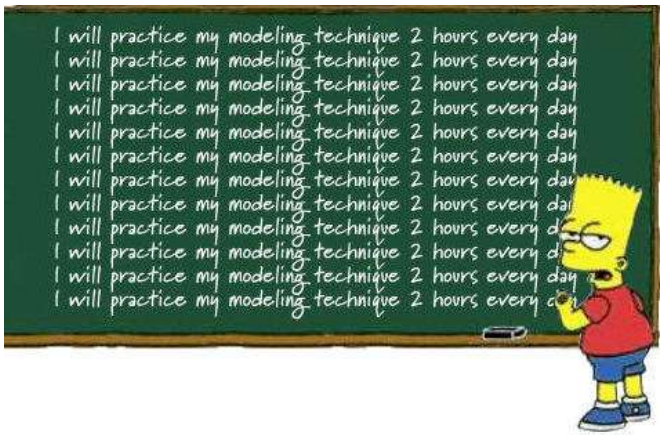
Node – check your version



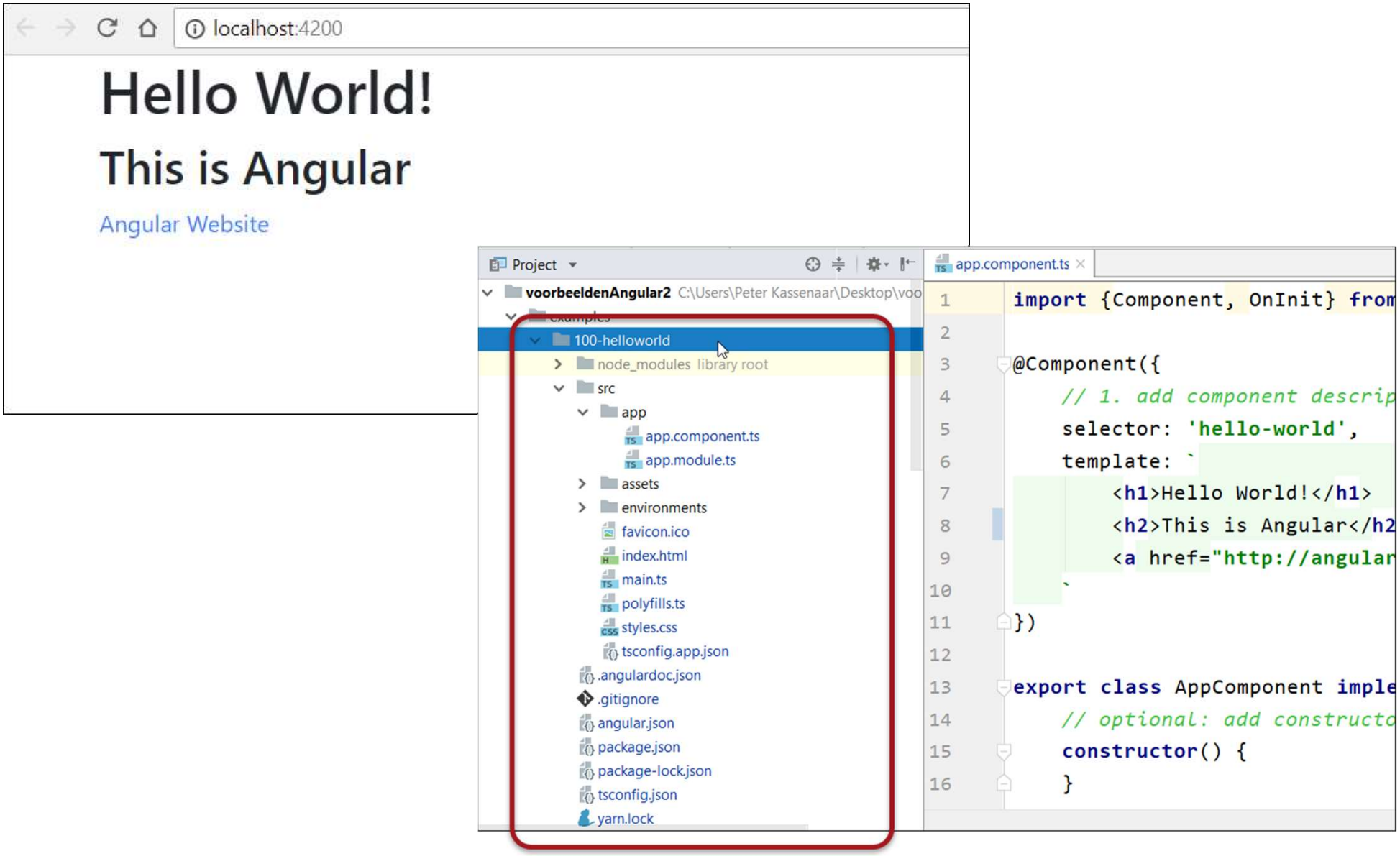
Mini workshop

- Download or clone https://github.com/PeterKassenaar/voorbeeldenAngular2

```
cd examples

cd 100-helloworld

npm install

npm start
```



- Go to browser: http://localhost:4200


localhost:4200
Hello World!
This is Angular
Angular Website
Project
voorbeeldenAngular2 C:\Users\Peter Kassenaar\Desktop\voo
100-helloworld
node_modules library root
src
app
app.component.ts
app.module.ts
assets
environments
favicon.ico
index.html
main.ts
polyfills.ts
styles.css
tsconfig.app.json
.angulardoc.json
.gitignore
angular.json
package.json
package-lock.json
tsconfig.json
yarn.lock
app.component.ts
import {Component, OnInit} from
@Component({
// 1. add component descrip
selector: 'hello-world',
template: `
<h1>Hello World!</h1>
<h2>This is Angular</h2
<a href="http://angular
`
})
export class AppComponent imple
// optional: add constructo
constructor() {
}

Boilerplate code for Hello World

Steps

1. Set up environment, boilerplate & libraries
    - Important configuration files
2. Angular Component(s)
3. Angular Module(s): @ngModule()
4. Bootstrap our module
5. Write HTML-pagina (`index.html`)

Boilerplate files #1/3 - `package.json`

```
{
  "name": "hello-angular",
  "description": "Voorbeeldproject bij de training Angular (C) - info@kassenaar.com",
  "version": "0.0.1",
  "license": "MIT",
  "scripts": {
    "ng": "ng",
    "start": "ng serve",
    "build": "ng build",
  },
  "private": true,
  "dependencies": {
    "@angular/animations": "6.0.0",
    "@angular/common": "6.0.0",
    "@angular/compiler": "6.0.0",
    "@angular/core": "6.0.0",
    "@angular/forms": "6.0.0",
    "rxjs": "^6.1.0",
    "zone.js": "^0.8.26"
  },
  "devDependencies": {
    "@angular-devkit/build-angular": "~0.6.0",
    "@angular/cli": "6.0.0",
    "typescript": "2.7.2"
  },
  "author": "Peter Kassenaar <info@kassenaar.com>"
}
```

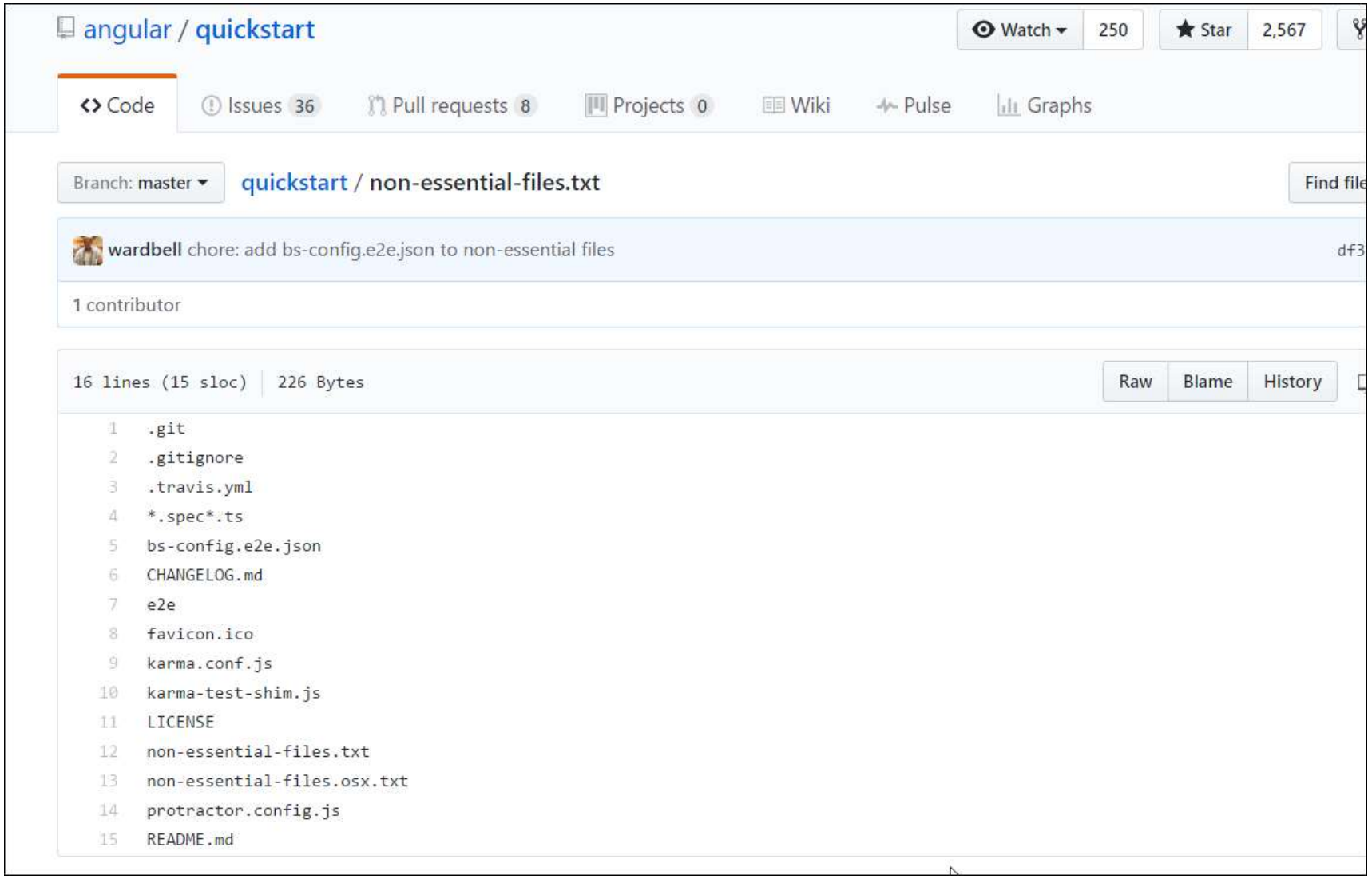
Boilerplate files #2/3 - **`tsconfig.json`**

```
{
  "compileOnSave"  : false,
  "compilerOptions": {
   "outDir"                 : "./dist/out-tsc",
   "baseUrl"                : "src",
   "sourceMap"              : true,
   "declaration"            : false,
   "moduleResolution"       : "node",
   "emitDecoratorMetadata" : true,
   "experimentalDecorators": true,
   "target"                 : "es5",
   "typeRoots"              : [
     "node_modules/@types"
   ],
   "lib"                    : [
     "es2016",
     "dom"
   ]
  }
}
```

Boilerplate files #3/3 – **angular.json**

```
{
  "$schema": "./node_modules/@angular/cli/lib/config/schema.json",
  "version": 1,
  "newProjectRoot": "projects",
  "projects": {
    "helloworld": {
      "root": "",
      "sourceRoot": "src",
      "projectType": "application",
      "architect": {
        "build": {
          "builder": "@angular-devkit/build-angular:browser",
          "options": {
            "outputPath": "dist",
            "index": "src/index.html",
            "main": "src/main.ts",
            "tsConfig": "src/tsconfig.app.json",
      …
}
```

"Nice to have" - non-essential files



https://github.com/angular/quickstart/blob/master/non-essential-files.txt

Step 2 – Component

Convention - components in directory `/src/app`

Or: edit in `angular.json`

Filename: `src/app/app.component.ts`

```
import {Component} from ‘@angular/core';
@Component({
   selector: 'hello-world',
   template: '<h1>Hello Angular</h1>'
})
export class AppComponent {

}
```

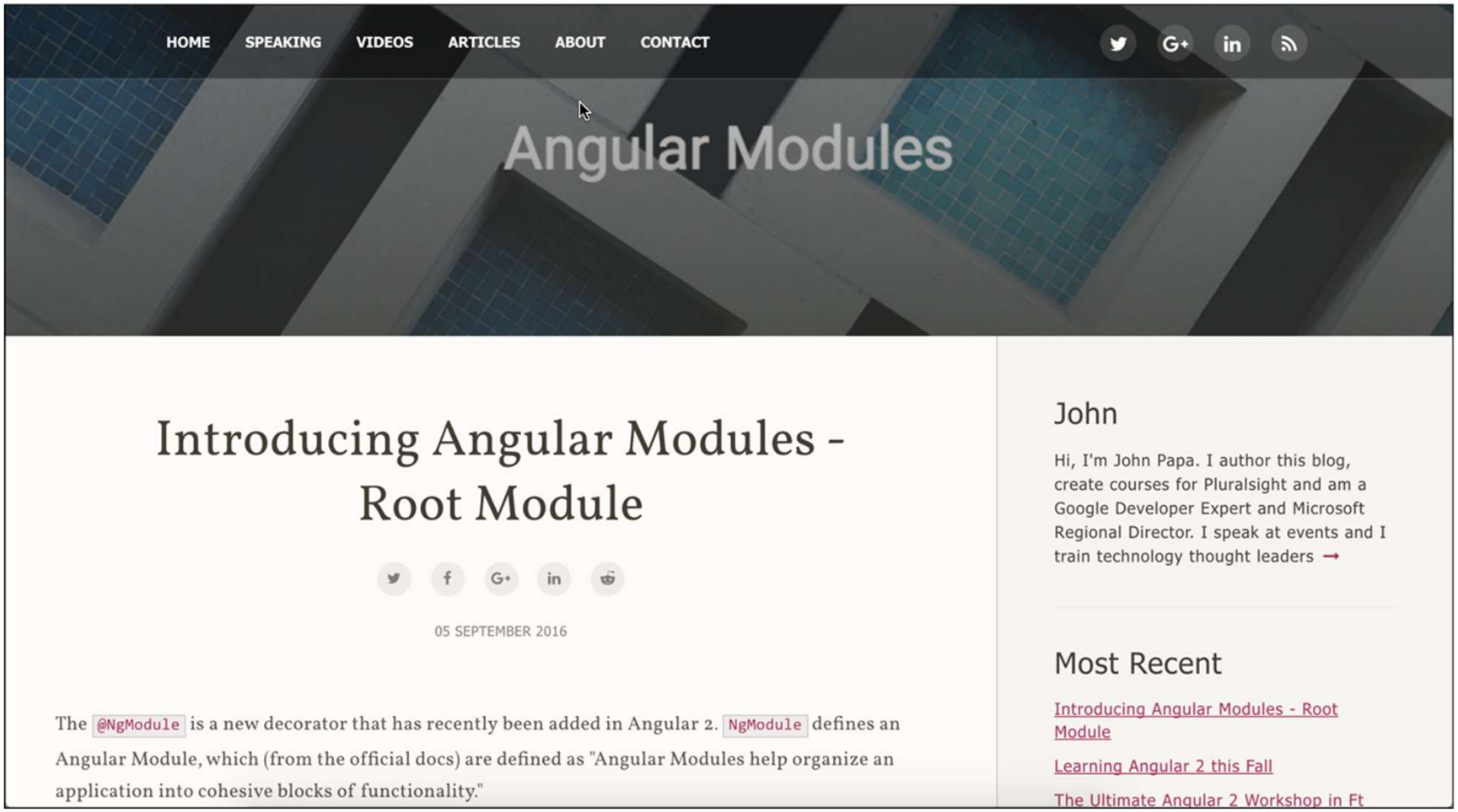
Step 3 – @ngModule

Convention - filename: `/src/app.module.ts`

```
// Angular Modules
import {NgModule}      from '@angular/core';
import {BrowserModule} from '@angular/platform-browser';

// Custom Components
import {AppComponent} from './app.component';

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

Root Module of the application

Some background info on Root Module



https://johnpapa.net/introducing-angular-modules-root-module/

Step 4 - bootstrap component

Best practice: bootstrap app in separate component

Convention: `main.ts`, of `app.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);
```

Step 5 – index.html

`index.html` - simple HTML file - expanded at runtime by WebPack

Header:

```
<html>


<head>
  <meta charset="utf-8">
  <title>Helloworld</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 van index.html

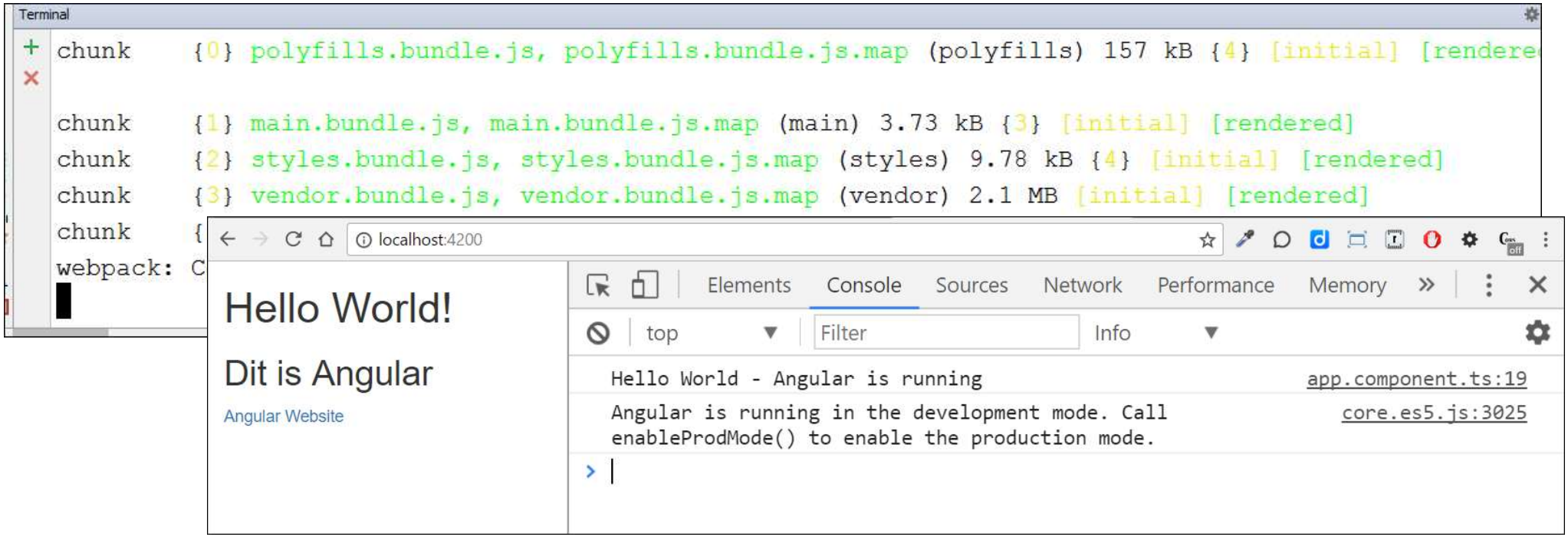
Verwijzing naar de root-component:

```
<body>
  <hello-world>
    Bezig met laden...
  </hello-world>
</body>
```

App draaien

`npm start` – draait de scriptopdracht start uit `package.json`.

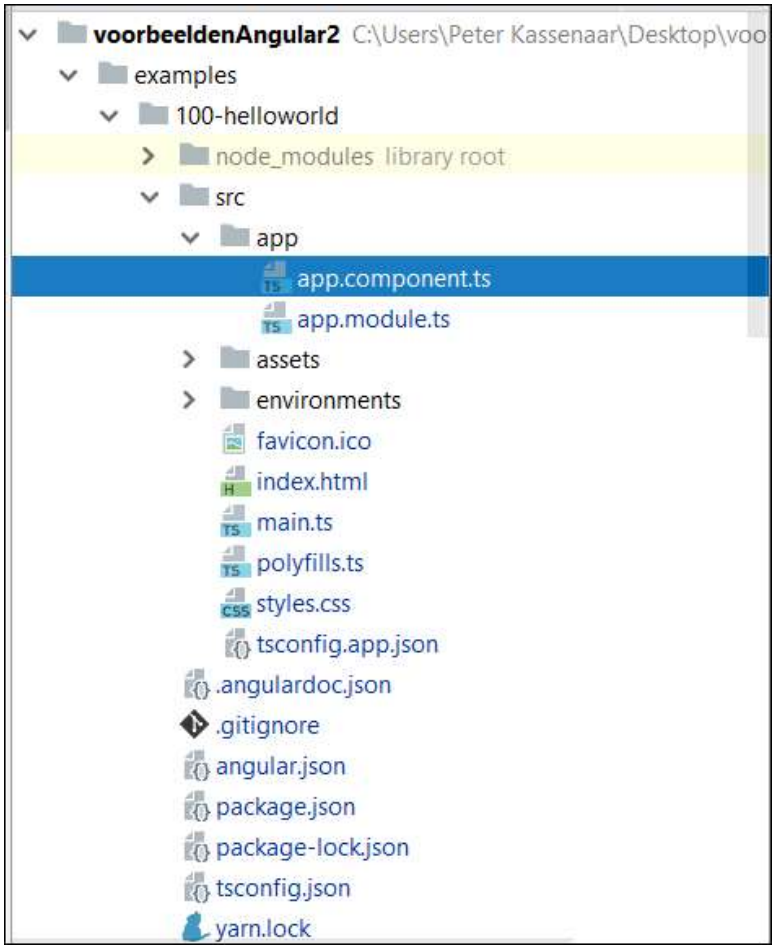
`ng serve` - start globale angular-cli instantie

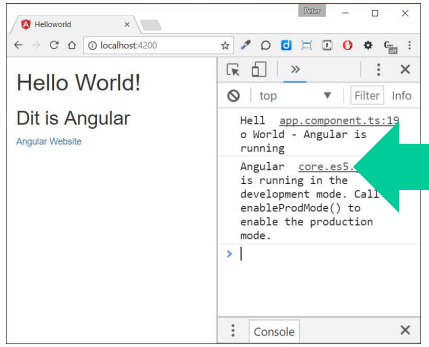


Daarna: wijzigingen aanbrengen in `app.component.ts`

– worden opgepikt door Live Reload

Basic Project Structure





main.ts / bootstrapper

ngModule / root module

AppComponent

Other components

Other components

Other components

Services

3rd party modules

Other modules

Assets

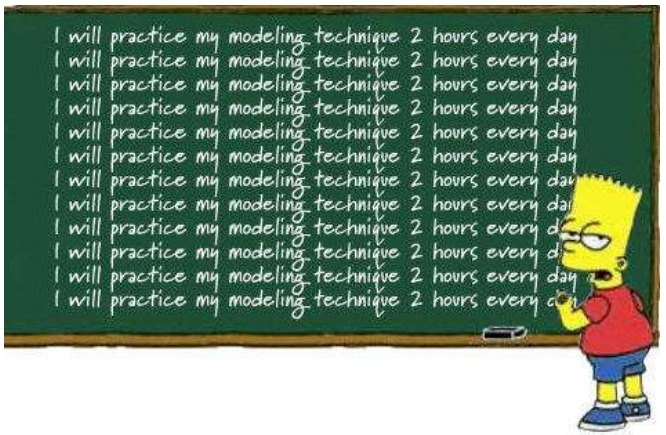
github.com/PeterKassenaar/voorbeeldenAngular2

Oefeningen en meer voorbeeldcode

Checkpoint

- Er is aardig wat boilerplate code nodig om een Angular-app te starten
- Vier stappen
    1. Set up environment, boilerplate & libraries
    2. Schrijf Angular Root Component voor de app
    3. Bootstrap de component
    4. Schrijf HTML-pagina (`index.html`)
- Daarna: app gaan uitbreiden
- Oefening `1a), 1b), 1c), 1d)`

Workshop….



Angular CLI

Snel nieuwe projecten instellen via de command line

Angular-CLI to the rescue

- Het *is* mogelijk nieuwe Angular-projecten from scratch te starten.
- Met de CLI is eenvoudiger.
- CLI-options:
  - Scaffolding
  - Generating
  - Testing
  - Building
  - AOT-Compiling
  - …

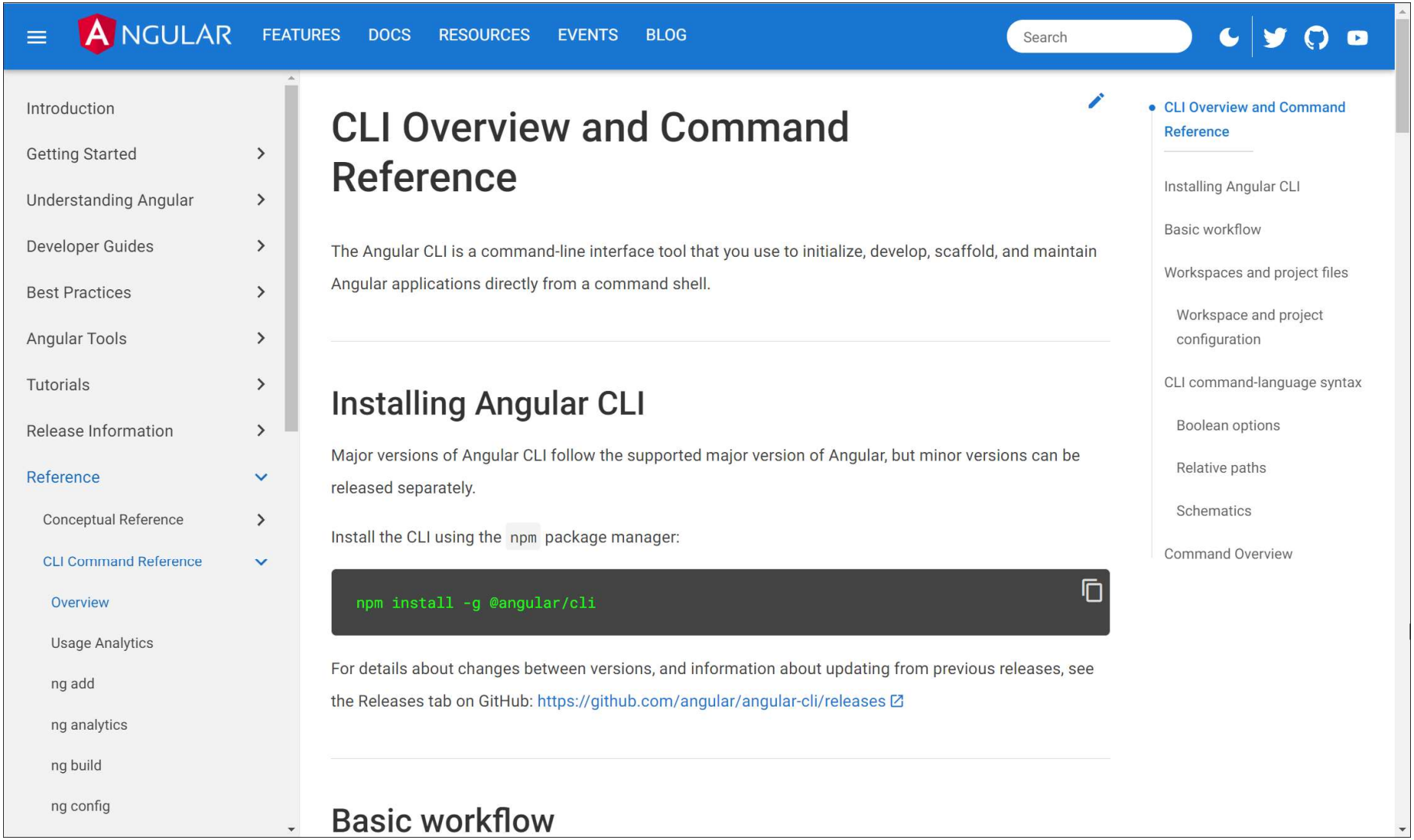
Scaffolding - Angular CLI

Projecten, componenten, routes en meer definiëren vanaf de command line

https://github.com/angular/angular-cli

en

https://cli.angular.io/

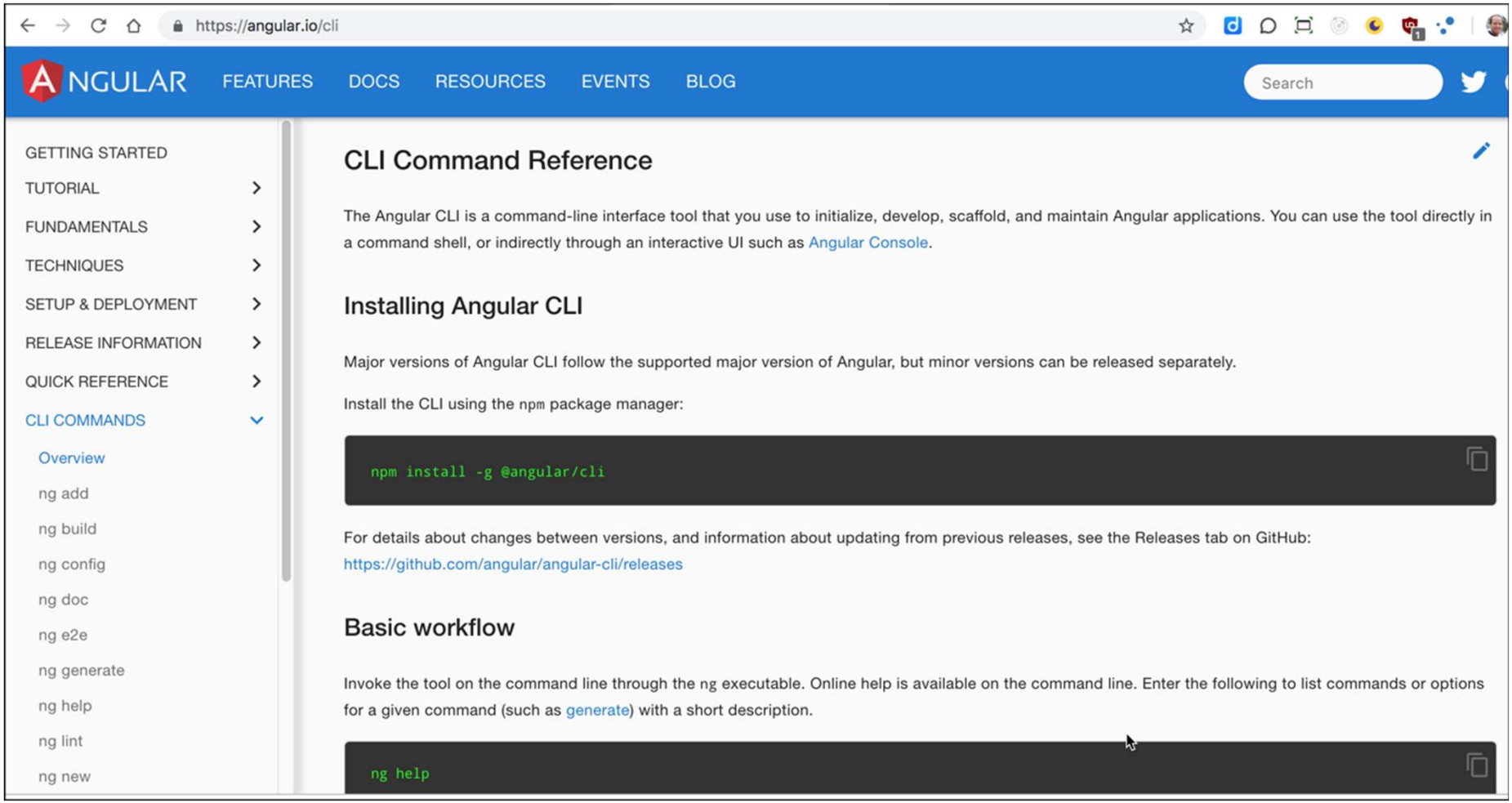



```
npm install -g @angular/cli
```

Achtergrondinformatie – Mike Brocchi

https://www.youtube.com/watch?v=wHZe6gGI5RY

Documentatie - in de Angular Docs



https://angular.io/cli

Angular 2 Code - Backend

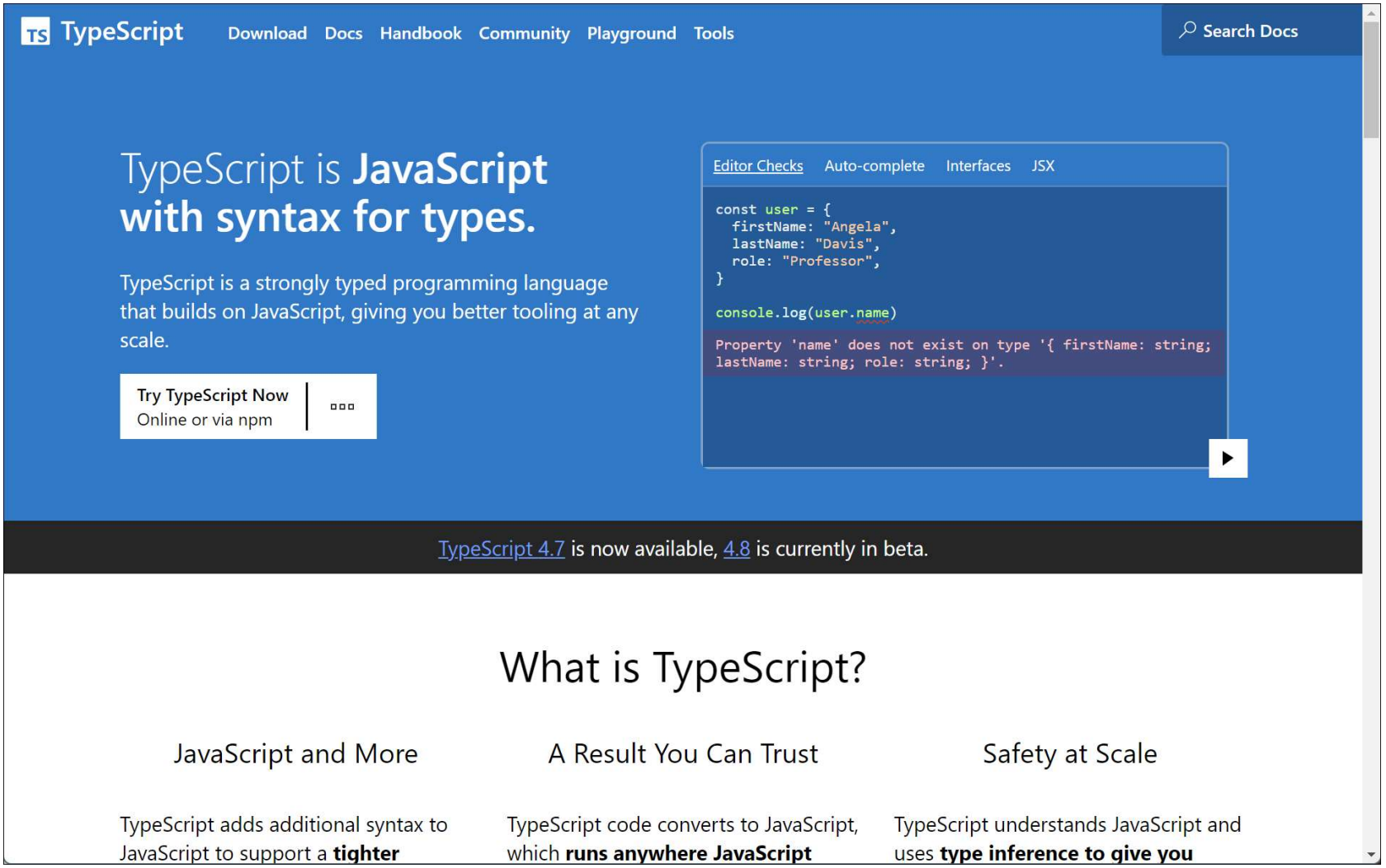
Kort over TypeScript en ES6

Programmeertalen

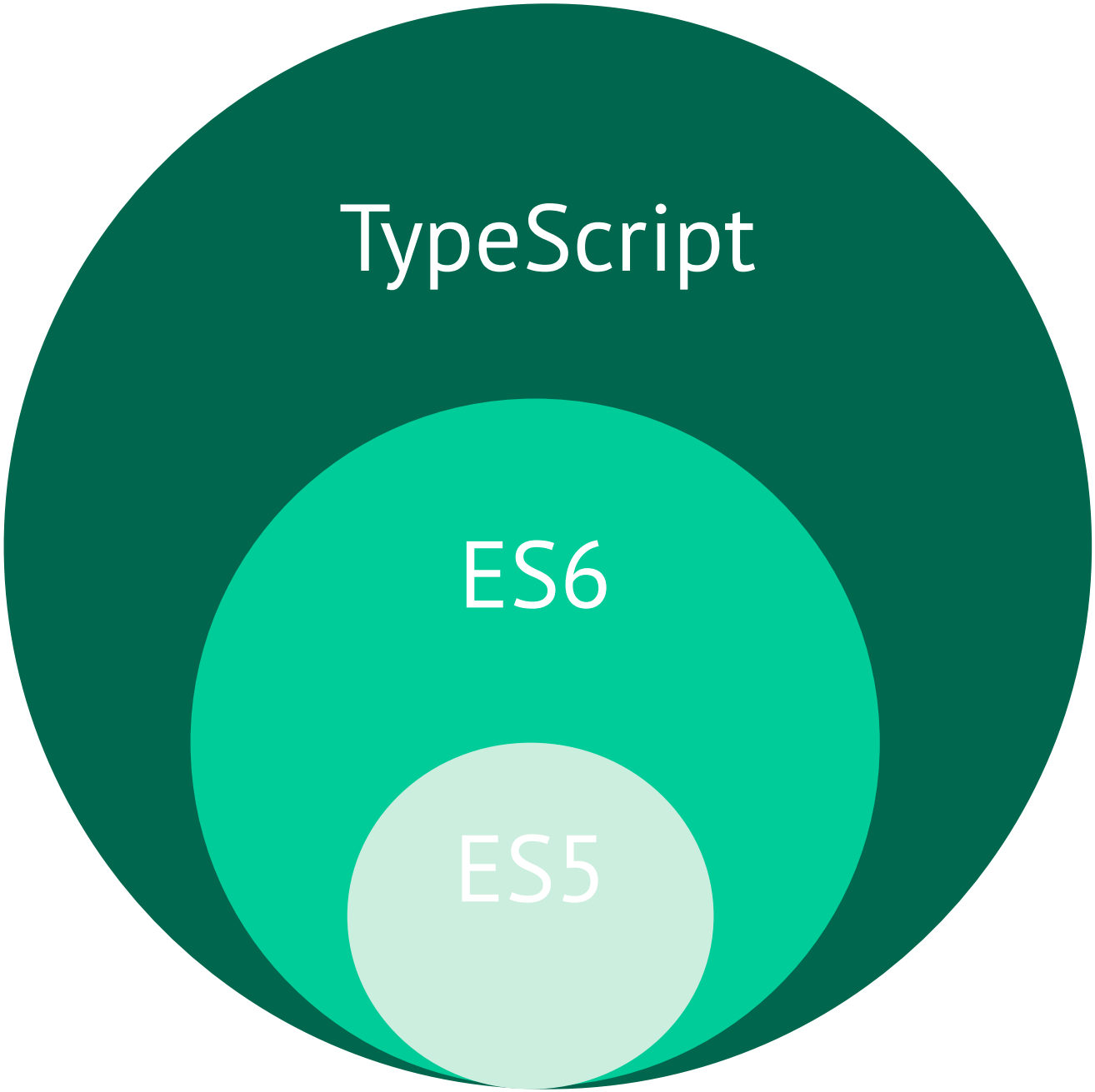
TypeScript

- Beperkt in deze module
- Voor zover nodig om Angular te gebruiken.
- Maar, TypeScript is niet beperkt tot Angular!
- Algemene superset van JavaScript
- Compileert plain JavaScript, dat browsers begrijpen
- Twee taken
    1. Compiling/Transpiling
    2. Type Safety

TypeScript website



www.typescriptlang.org


TypeScript
ES6
ES5

ES6 en TypeScript

De toekomst van JavaScript is ES6/ES2015

Major update van JavaScript als programmeertaal

Modules, classes en meer

Verplicht in Angular, optioneel in JavaScript, Vue, React, …

TypeScript breidt ES6 verder uit

Annotaties & types

Interfaces

Compiler,

…

TypeScript – tooling support

Types, Autocompletion.

Compile-time checking in editors.

Alles is optioneel. Je kunt altijd nog gewoon JavaScript gebruiken.

Onderdelen van een Component Class

imports

```
import { Component } from '@angular/core';
import { DataService } from './services/data-service';
```

annotations

```
@Component({
  selector: 'orders',
  directives: [DataService],
  templateUrl: 'orders-component.html',
})
```

class

```
export class OrdersComponent {
          …
}
```

Checkpoint

- Angular 2 is een totaal ander framework dan Angular 1
- Component-based vs. Page-based
- Nieuwe syntaxis
- Nieuwe programmeertalen en andere nieuwe kenmerken
- Concepten komen – grotendeels – overeen
- Veel boilerplate-code nodig voor een Quickstart
- Daarna: niet meer naar omkijken. Concentreren op de componenten