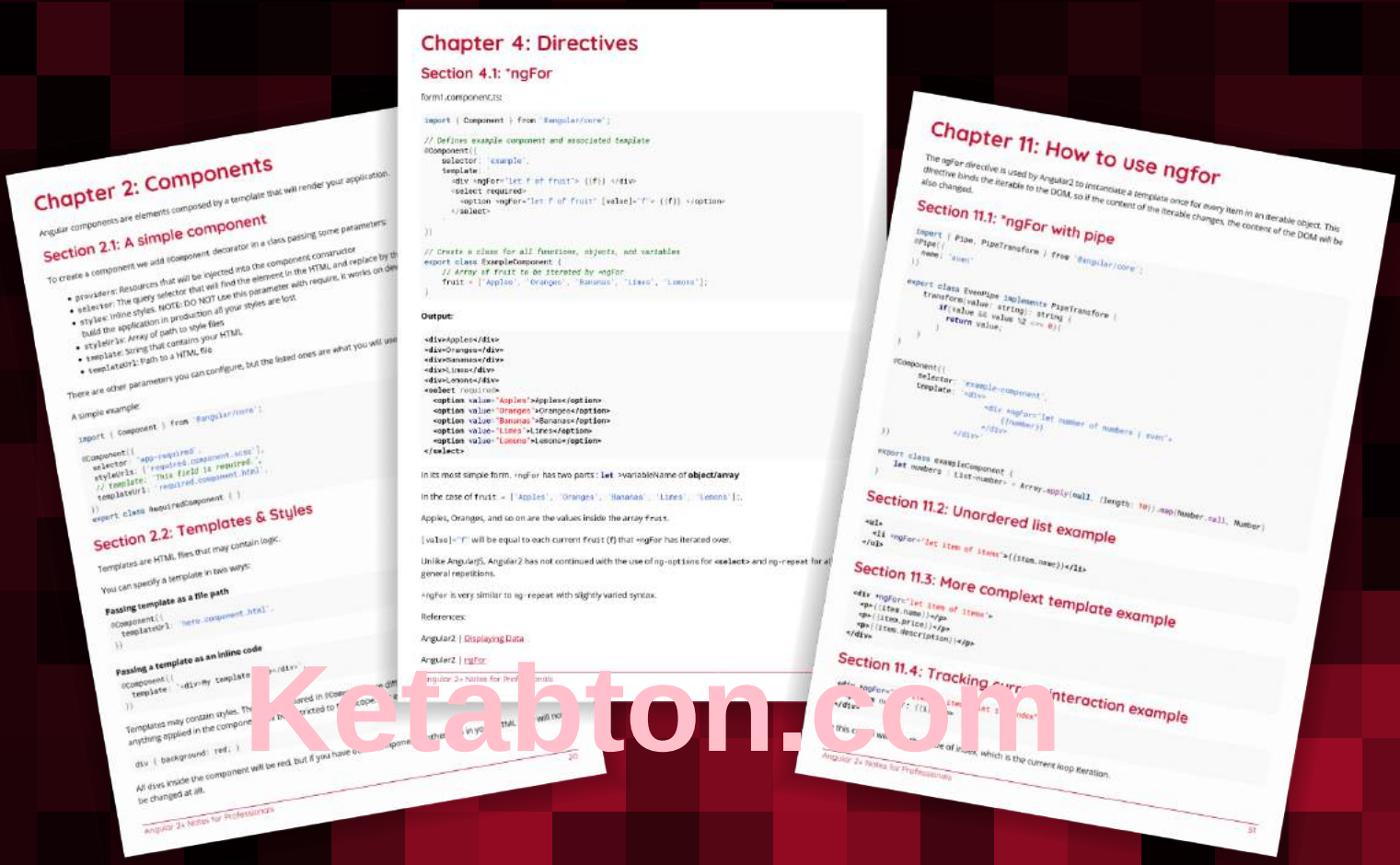
Angular 2+

Notes for Professionals



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Chapter 1: Getting started with Angular 2+

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2.0.0-rc.5	2016-08-09
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2.0.0-rc.3	2016-06-21
2.0.0-rc.2	2016-06-15
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2.0.0-rc.0	2016-05-02

Section 1.1: Getting started with Angular 2 with node.js/expressjs backend (http example included)

We will create a simple "Hello World!" app with Angular2 2.4.1 (`@NgModule` change) with a node.js (expressjs) backend.

Prerequisites

- Node.js v4.x.x or higher
- npm v3.x.x or higher or yarn

Then run `npm install -g typescript` or `yarn global add typescript`to install typescript globally

Roadmap
Step 1

Create a new folder (and the root dir of our back-end) for our app. Let's call it `Angular2-express`.

command line:

```
mkdir Angular2-express
cd Angular2-express
```

Step2

Create the `package.json` (for dependencies) and `app.js` (for bootstrapping) for our `node.js` app.

package.json:

```
{
  "name": "Angular2-express",
  "version": "1.0.0",
  "description": "",
  "scripts": {
    "start": "node app.js"
  },
  "author": "",
  "license": "ISC",
  "dependencies": {
    "body-parser": "^1.13.3",
    "express": "^4.13.3"
  }
}
```

app.js:

```
var express = require('express');
var app = express();
var server = require('http').Server(app);
var bodyParser = require('body-parser');

server.listen(process.env.PORT || 9999, function(){
    console.log("Server connected. Listening on port: " + (process.env.PORT || 9999));
});

app.use(bodyParser.json());
app.use(bodyParser.urlencoded({extended: true}) );

app.use( express.static(__dirname + '/front' ) );

app.get('/test', function(req,res){ //example http request receiver
  return res.send(myTestVar);
});

//send the index.html on every page refresh and let angular handle the routing
app.get('/*',  function(req, res, next) {
    console.log("Reloading");
    res.sendFile('index.html', { root: __dirname });
});
```

Then run an `npm install` or `yarn` to install the dependencies.

Now our back-end structure is complete. Let's move on to the front-end.

Step3

Our front-end should be in a folder named `front` inside our `Angular2-express` folder.

command line:

```
mkdir front
cd front
```

Just like we did with our back-end our front-end needs the dependency files too. Let's go ahead and create the following files: `package.json`, `systemjs.config.js`, `tsconfig.json`

package.json:

```
{
  "name": "Angular2-express",
  "version": "1.0.0",
  "scripts": {
    "tsc": "tsc",
    "tsc:w": "tsc -w"
  },
  "licenses": [
    {
      "type": "MIT",
      "url": "https://github.com/angular/angular.io/blob/master/LICENSE"
    }
  ],
  "dependencies": {
    "@angular/common": "~2.4.1",
    "@angular/compiler": "~2.4.1",
    "@angular/compiler-cli": "^2.4.1",
    "@angular/core": "~2.4.1",
    "@angular/forms": "~2.4.1",
    "@angular/http": "~2.4.1",
    "@angular/platform-browser": "~2.4.1",
    "@angular/platform-browser-dynamic": "~2.4.1",
    "@angular/platform-server": "^2.4.1",
    "@angular/router": "~3.4.0",
    "core-js": "^2.4.1",
    "reflect-metadata": "^0.1.8",
    "rxjs": "^5.0.2",
    "systemjs": "0.19.40",
    "zone.js": "^0.7.4"
  },
  "devDependencies": {
    "@types/core-js": "^0.9.34",
    "@types/node": "^6.0.45",
    "typescript": "2.0.2"
  }
}
```

systemjs.config.js:

```
/**
 * System configuration for Angular samples
 * Adjust as necessary for your application needs.
 */
(function (global) {
  System.config({
    defaultJSExtensions:true,
    paths: {
      // paths serve as alias
      'npm:': 'node_modules/'
    },
    // map tells the System loader where to look for things
    map: {
```

```
      // our app is within the app folder
      app: 'app',
      // angular bundles
      '@angular/core': 'npm:@angular/core/bundles/core.umd.js',
      '@angular/common': 'npm:@angular/common/bundles/common.umd.js',
      '@angular/compiler': 'npm:@angular/compiler/bundles/compiler.umd.js',
      '@angular/platform-browser': 'npm:@angular/platform-browser/bundles/platform-browser.umd.js',
      '@angular/platform-browser-dynamic': 'npm:@angular/platform-browser-dynamic/bundles/platform-
browser-dynamic.umd.js',
      '@angular/http': 'npm:@angular/http/bundles/http.umd.js',
      '@angular/router': 'npm:@angular/router/bundles/router.umd.js',
      '@angular/forms': 'npm:@angular/forms/bundles/forms.umd.js',
      // other libraries
      'rxjs':                      'npm:rxjs',
      'angular-in-memory-web-api': 'npm:angular-in-memory-web-api',
    },
    // packages tells the System loader how to load when no filename and/or no extension
    packages: {
      app: {
        main: './main.js',
        defaultExtension: 'js'
      },
      rxjs: {
        defaultExtension: 'js'
      }
    }
  });
})(this);
```

tsconfig.json:

```
{
  "compilerOptions": {
    "target": "es5",
    "module": "commonjs",
    "moduleResolution": "node",
    "sourceMap": true,
    "emitDecoratorMetadata": true,
    "experimentalDecorators": true,
    "removeComments": false,
    "noImplicitAny": false
  },
  "compileOnSave": true,
  "exclude": [
    "node_modules/*"
  ]
}
```

Then run an `npm install` or `yarn` to install the dependencies.

Now that our dependency files are complete. Let's move on to our `index.html`:

index.html:

```
<html>
  <head>
    <base href="/">
    <title>Angular2-express</title>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
```

```
    <!-- 1. Load libraries -->
     <!-- Polyfill(s) for older browsers -->
    <script src="node_modules/core-js/client/shim.min.js"></script>
    <script src="node_modules/zone.js/dist/zone.js"></script>
    <script src="node_modules/reflect-metadata/Reflect.js"></script>
    <script src="node_modules/systemjs/dist/system.src.js"></script>
    <!-- 2. Configure SystemJS -->
    <script src="systemjs.config.js"></script>
    <script>
      System.import('app').catch(function(err){ console.error(err); });
    </script>

  </head>
  <!-- 3. Display the application -->
  <body>
    <my-app>Loading...</my-app>
  </body>
</html>
```

Now we're ready to create our first component. Create a folder named `app` inside our `front` folder.

command line:

```
mkdir app
cd app
```

Let's make the following files named `main.ts`, `app.module.ts`, `app.component.ts`

main.ts:

```
import { platformBrowserDynamic } from '@angular/platform-browser-dynamic';

import { AppModule } from './app.module';

const platform = platformBrowserDynamic();
platform.bootstrapModule(AppModule);
```

app.module.ts:

```
import { NgModule }      from '@angular/core';
import { BrowserModule } from '@angular/platform-browser';
import { HttpModule } from "@angular/http";

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

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

app.component.ts:

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

@Component({
  selector: 'my-app',
  template: 'Hello World!',
  providers: []
})
export class AppComponent {
  constructor(private http: Http){
    //http get example
    this.http.get('/test')
     .subscribe((res)=>{
       console.log(res);
     });
  }
}
```

After this, compile the typescript files to javascript files. Go 2 levels up from the current dir (inside Angular2-express folder) and run the command below.

command line:

```
cd ..
cd ..
tsc -p front
```

Our folder structure should look like:

```
Angular2-express
├── app.js
├── node_modules
├── package.json
├── front
│   ├── package.json
│   ├── index.html
│   ├── node_modules
│   ├── systemjs.config.js
│   ├── tsconfig.json
│   ├── app
│   │   ├── app.component.ts
│   │   ├── app.component.js.map
│   │   ├── app.component.js
│   │   ├── app.module.ts
│   │   ├── app.module.js.map
│   │   ├── app.module.js
│   │   ├── main.ts
│   │   ├── main.js.map
│   │   ├── main.js
```

Finally, inside Angular2-express folder, run `node app.js` command in the command line. Open your favorite browser and check `localhost:9999` to see your app.

Section 1.2: Install angular2 with angular-cli

This example is a quick setup of Angular 2 and how to generate a quick example project.

Prerequisites:

- Node.js v4 or greater.
- npm v3 or greater or yarn.

Open a terminal and run the commands one by one:

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

or

```
yarn global add @angular/cli
```

depending on your choice of package manager.

The previous command installs **@angular/cli** globally, adding the executable `ng` to PATH.

To setup a new project

Navigate with the terminal to a folder where you want to set up the new project.

Run the commands:

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

That is it, you now have a simple example project made with Angular 2. You can now navigate to the link displayed in terminal and see what it is running.

To add to an existing project

Navigate to the root of your current project.

Run the command:

```
ng init
```

This will add the necessary scaffolding to your project. The files will be created in the current directory so be sure to run this in an empty directory.

Running The Project Locally

In order to see and interact with your application while it's running in the browser you must start a local development server hosting the files for your project.

```
ng serve
```

If the server started successfully it should display an address at which the server is running. Usually is this:

```
http://localhost:4200
```

Out of the box this local development server is hooked up with Hot Module Reloading, so any changes to the html, typescript, or css, will trigger the browser to be automatically reloaded (but can be disabled if desired).

Generating Components, Directives, Pipes and Services

The `ng generate <scaffold-type> <name>` (or simply `ng g <scaffold-type> <name>`) command allows you to automatically generate Angular components:

```
# The command below will generate a component in the folder you are currently at
ng generate component my-generated-component
# Using the alias (same outcome as above)
ng g component my-generated-component
```

There are several possible types of scaffolds angular-cli can generate:

Scaffold Type	Usage
Module	`ng g module my-new-module`
Component	`ng g component my-new-component`
Directive	`ng g directive my-new-directive`
Pipe	`ng g pipe my-new-pipe`
Service	`ng g service my-new-service`
Class	`ng g class my-new-class`
Interface	`ng g interface my-new-interface`
Enum	`ng g enum my-new-enum`

You can also replace the type name by its first letter. For example:

`ng g m my-new-module` to generate a new module or `ng g c my-new-component` to create a component.

Building/Bundling

When you are all finished building your Angular 2 web app and you would like to install it on a web server like Apache Tomcat, all you need to do is run the build command either with or without the production flag set. Production will minifiy the code and optimize for a production setting.

```
ng build
```

or

```
ng build --prod
```

Then look in the projects root directory for a `/dist` folder, which contains the build.

If you'd like the benefits of a smaller production bundle, you can also use Ahead-of-Time template compilation, which removes the template compiler from the final build:

```
ng build --prod --aot
```

Unit Testing

Angular 2 provides built-in unit testing, and every item created by angular-cli generates a basic unit test, that can be expanded. The unit tests are written using jasmine, and executed through Karma. In order to start testing execute the following command:

```
ng test
```

This command will execute all the tests in the project, and will re-execute them every time a source file changes, whether it is a test or code from the application.

For more info also visit: angular-cli github page

Section 1.3: Getting started with Angular 2 without angular-cli

Angular 2.0.0-rc.4

In this example we'll create a "Hello World!" app with only one root component (`AppComponent`) for the sake of simplicity.

Prerequisites:

- Node.js v5 or later
- npm v3 or later

> **Note:** You can check versions by running `node -v` and `npm -v` in the console/terminal.

Step 1

Create and enter a new folder for your project. Let's call it `angular2-example`.

```
mkdir angular2-example
cd angular2-example
```

Step 2

Before we start writing our app code, we'll add the 4 files provided below: `package.json`, `tsconfig.json`, `typings.json`, and `systemjs.config.js`.

> **Disclaimer:** The same files can be found in the Official 5 Minute Quickstart.

`package.json` - Allows us to download all dependencies with npm and provides simple script execution to make life easier for simple projects. (You should consider using something like Gulp in the future to automate tasks).

```
{
  "name": "angular2-example",
  "version": "1.0.0",
  "scripts": {
    "start": "tsc && concurrently \"npm run tsc:w\" \"npm run lite\" ",
    "lite": "lite-server",
    "postinstall": "typings install",
    "tsc": "tsc",
    "tsc:w": "tsc -w",
    "typings": "typings"
  },
  "license": "ISC",
  "dependencies": {
    "@angular/common": "2.0.0-rc.4",
    "@angular/compiler": "2.0.0-rc.4",
    "@angular/core": "2.0.0-rc.4",
    "@angular/forms": "0.2.0",
    "@angular/http": "2.0.0-rc.4",
```

```
    "@angular/platform-browser": "2.0.0-rc.4",
    "@angular/platform-browser-dynamic": "2.0.0-rc.4",
    "@angular/router": "3.0.0-beta.1",
    "@angular/router-deprecated": "2.0.0-rc.2",
    "@angular/upgrade": "2.0.0-rc.4",
    "systemjs": "0.19.27",
    "core-js": "^2.4.0",
    "reflect-metadata": "^0.1.3",
    "rxjs": "5.0.0-beta.6",
    "zone.js": "^0.6.12",
    "angular2-in-memory-web-api": "0.0.14",
    "bootstrap": "^3.3.6"
  },
  "devDependencies": {
    "concurrently": "^2.0.0",
    "lite-server": "^2.2.0",
    "typescript": "^1.8.10",
    "typings":"^1.0.4"
  }
}
```

`tsconfig.json` - Configures the TypeScript transpiler.

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

`typings.json` - Makes TypeScript recognize libraries we're using.

```
{
  "globalDependencies": {
    "core-js": "registry:dt/core-js#0.0.0+20160602141332",
    "jasmine": "registry:dt/jasmine#2.2.0+20160621224255",
    "node": "registry:dt/node#6.0.0+20160621231320"
  }
}
```

`systemjs.config.js` - Configures SystemJS (you can also use webpack).

```
/**
 * System configuration for Angular 2 samples
 * Adjust as necessary for your application's needs.
 */
(function(global) {
  // map tells the System loader where to look for things
  var map = {
    'app':                        'app', // 'dist',
    '@angular':                   'node_modules/@angular',
    'angular2-in-memory-web-api': 'node_modules/angular2-in-memory-web-api',
    'rxjs':                       'node_modules/rxjs'
  };
```

```
  // packages tells the System loader how to load when no filename and/or no extension
  var packages = {
    'app':                        { main: 'main.js',  defaultExtension: 'js' },
    'rxjs':                       { defaultExtension: 'js' },
    'angular2-in-memory-web-api': { main: 'index.js', defaultExtension: 'js' },
  };
  var ngPackageNames = [
    'common',
    'compiler',
    'core',
    'forms',
    'http',
    'platform-browser',
    'platform-browser-dynamic',
    'router',
    'router-deprecated',
    'upgrade',
  ];
  // Individual files (~300 requests):
  function packIndex(pkgName) {
    packages['@angular/'+pkgName] = { main: 'index.js', defaultExtension: 'js' };
  }
  // Bundled (~40 requests):
  function packUmd(pkgName) {
    packages['@angular/'+pkgName] = { main: '/bundles/' + pkgName + '.umd.js', defaultExtension:
'js' };
  }
  // Most environments should use UMD; some (Karma) need the individual index files
  var setPackageConfig = System.packageWithIndex ? packIndex : packUmd;
  // Add package entries for angular packages
  ngPackageNames.forEach(setPackageConfig);
  var config = {
    map: map,
    packages: packages
  };
  System.config(config);
})(this);
```

Step 3

Let's install the dependencies by typing

```
npm install
```

in the console/terminal.

Step 4

Create `index.html` inside of the `angular2-example` folder.

```
<html>
  <head>
    <title>Angular2 example</title>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <!-- 1. Load libraries -->
    <!-- Polyfill(s) for older browsers -->
    <script src="node_modules/core-js/client/shim.min.js"></script>
    <script src="node_modules/zone.js/dist/zone.js"></script>
    <script src="node_modules/reflect-metadata/Reflect.js"></script>
```

```
    <script src="node_modules/systemjs/dist/system.src.js"></script>
    <!-- 2. Configure SystemJS -->
    <script src="systemjs.config.js"></script>
    <script>
      System.import('app').catch(function(err){ console.error(err); });
    </script>
  </head>
  <!-- 3. Display the application -->
  <body>
    <my-app></my-app>
  </body>
</html>
```

Your application will be rendered between the `my-app` tags.

However, Angular still doesn't know *what* to render. To tell it that, we'll define `AppComponent`.

Step 5

Create a subfolder called `app` where we can define the components and services that make up our app. (In this case, it'll just contain the `AppComponent` code and `main.ts`.)

```
mkdir app
```

Step 6

Create the file `app/app.component.ts`

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

@Component({
  selector: 'my-app',
  template: `
    <h1>{{title}}</h1>
    <ul>
        <li *ngFor="let message of messages">
            {{message}}
        </li>
    </ul>
  `
})
export class AppComponent {
    title = "Angular2 example";
    messages = [
        "Hello World!",
        "Another string",
        "Another one"
    ];
}
```

What's happening? First, we're importing the `@Component` decorator which we use to give Angular the HTML tag and template for this component. Then, we're creating the class `AppComponent` with `title` and `messages` variables that we can use in the template.

Now let's look at that template:

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

```
    <li *ngFor="let message of messages">
        {{message}}
    </li>
</ul>
```

We're displaying the `title` variable in an `h1` tag and then making a list showing each element of the `messages` array by using the `*ngFor` directive. For each element in the array, `*ngFor` creates a `message` variable that we use within the `li` element. The result will be:

```
<h1>Angular 2 example</h1>
<ul>
    <li>Hello World!</li>
    <li>Another string</li>
    <li>Another one</li>
</ul>
```

Step 7

Now we create a `main.ts` file, which will be the first file that Angular looks at.

Create the file `app/main.ts`.

```
import { bootstrap }    from '@angular/platform-browser-dynamic';
import { AppComponent } from './app.component';

bootstrap(AppComponent);
```

We're importing the `bootstrap` function and `AppComponent` class, then using `bootstrap` to tell Angular which component to use as the root.

Step 8

It's time to fire up your first app. Type

```
npm start
```

in your console/terminal. This will run a prepared script from `package.json` that starts lite-server, opens your app in a browser window, and runs the TypeScript transpiler in watch mode (so `.ts` files will be transpiled and the browser will refresh when you save changes).

What now?

Check out the official Angular 2 guide and the other topics on StackOverflow's documentation.

You can also edit `AppComponent` to use external templates, styles or add/edit component variables. You should see your changes immediately after saving files.

Section 1.4: Getting through that pesky company proxy

If you are attempting to get an Angular2 site running on your Windows work computer at XYZ MegaCorp the chances are that you are having problems getting through the company proxy.

There are (at least) two package managers that need to get through the proxy:

1. NPM
2. Typings

For NPM you need to add the following lines to the `.npmrc` file:

```
proxy=http://[DOMAIN]%5C[USER]:[PASS]@[PROXY]:[PROXYPORT]/
https-proxy=http://[DOMAIN]%5C[USER]:[PASS]@[PROXY]:[PROXYPORT]/
```

For Typings you need to add the following lines to the `.typingsrc` file:

```
proxy=http://[DOMAIN]%5C[USER]:[PASS]@[PROXY]:[PROXYPORT]/
https-proxy=http://[DOMAIN]%5C[USER]:[PASS]@[PROXY]:[PROXYPORT]/
rejectUnauthorized=false
```

These files probably don't exist yet, so you can create them as blank text files. They can be added to the project root (same place as `package.json` or you can put them in `%HOMEPATH%` and they will be available to all your projects.

The bit that isn't obvious and is the main reason people think the proxy settings aren't working is the `%5C` which is the URL encode of the `\` to separate the domain and user names. Thanks to Steve Roberts for that one: Using npm behind corporate proxy .pac

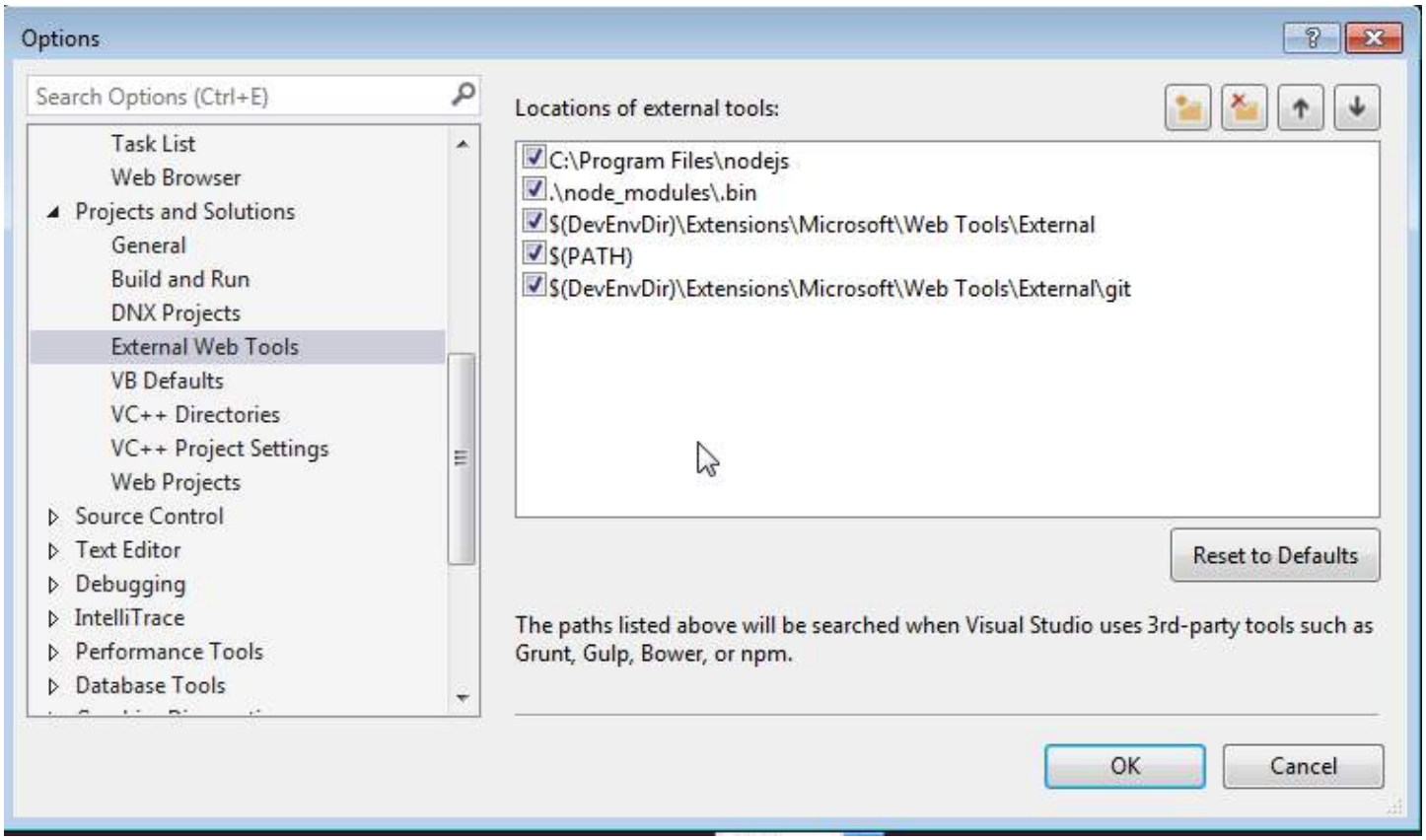
Section 1.5: Keeping Visual Studios in sync with NPM and NODE Updates

Step 1: Locate your download of Node.js, typically it is installed under C:/program files/nodejs

Step 2: Open Visual Studios and navigate to "Tools>Options"

Step 3: In the options window navigate to "Projects and Solutions>External Web Tools"

Step 4: Add new entry with you Node.js file location (C:/program files/nodejs), IMPORTANT use the arrow buttons on menu to move your reference to the top of the list.



Step 5: Restart Visual Studios and Run an npm install, against your project, from npm command window

Section 1.6: Let's dive into Angular 4!

Angular 4 is now available! Actually Angular uses semver since Angular 2, which requires the major number being increased when breaking changes were introduced. The Angular team postponed features that cause breaking changes, which will be released with Angular 4. Angular 3 was skipped to be able to align the version numbers of the core modules, because the Router already had version 3.

As per the Angular team, Angular 4 applications are going to be less space consuming and faster than before. They have separated animation package from @angular/core package. If anybody is not using animation package so extra space of code will not end up in the production. The template binding syntax now supports if/else style syntax. Angular 4 is now compatible with most recent version of Typescript 2.1 and 2.2. So, Angular 4 is going to be more exciting.

Now I'll show you how to do setup of Angular 4 in your project.

Let's start Angular setup with three different ways:

You can use Angular-CLI (Command Line Interface) , It will install all dependencies for you.

- You can migrate from Angular 2 to Angular 4.
- You can use github and clone the Angular4-boilerplate. (It is the easiest one.????)
- Angular Setup using Angular-CLI(command Line Interface).

Before You start using Angular-CLI , make sure You have node installed in your machine. Here, I am using node v7.8.0. Now, Open your terminal and type the following command for Angular-CLI.

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

or

```
yarn global add @angular/cli
```

depending on the package manager you use.

Let's install Angular 4 using Angular-CLI.

```
ng new Angular4-boilerplate
```

cd Angular4-boilerplate We are all set for Angular 4. Its pretty easy and straightforward method.????

Angular Setup by migrating from Angular 2 to Angular 4

Now Let's see the second approach. I ll show you how to migrate Angular 2 to Angular 4. For that You need clone any Angular 2 project and update Angular 2 dependencies with the Angular 4 Dependency in your package.json as following:

```
"dependencies": {
    "@angular/animations": "^4.1.0",
    "@angular/common": "4.0.2",
    "@angular/compiler": "4.0.2",
    "@angular/core": "^4.0.1",
    "@angular/forms": "4.0.2",
    "@angular/http": "4.0.2",
    "@angular/material": "^2.0.0-beta.3",
```

```
    "@angular/platform-browser": "4.0.2",
    "@angular/platform-browser-dynamic": "4.0.2",
    "@angular/router": "4.0.2",
    "typescript": "2.2.2"
  }
```

These are the main dependencies for Angular 4. Now You can npm install and then npm start to run the application. For reference my package.json.

Angular setup from github project

Before starting this step make sure you have git installed in your machine. Open your terminal and clone the angular4-boilerplate using below command:

```
git@github.com:CypherTree/angular4-boilerplate.git
```

Then install all dependencies and run it.

```
npm install

npm start
```

And you are done with the Angular 4 setup. All the steps are very straightforward so you can opt any of them.

Directory Structure of the angular4-boilerplate

```
Angular4-boilerplate
-karma
-node_modules
-src
   -mocks
   -models
      -loginform.ts
      -index.ts
   -modules
      -app
        -app.component.ts
     -app.component.html
      -login
    -login.component.ts
    -login.component.html
    -login.component.css
      -widget
     -widget.component.ts
     -widget.component.html
     -widget.component.css
    ........
   -services
       -login.service.ts
    -rest.service.ts
   -app.routing.module.ts
   -app.module.ts
   -bootstrap.ts
   -index.html
   -vendor.ts
-typings
-webpack
-package.json
-tsconfig.json
```

```
-tslint.json
-typings.json
```

Basic understanding for Directory structure:

All the code resides in src folder.

mocks folder is for mock data that is used in testing purpose.

model folder contains the class and interface that used in component.

modules folder contains list of components such as app, login, widget etc. All component contains typescript, html and css file. index.ts is for exporting all the class.

services folder contains list of services used in application. I have separated rest service and different component service. In rest service contains different http methods. Login service works as mediator between login component and rest service.

app.routing.ts file describes all possible routes for the application.

app.module.ts describes app module as root component.

bootstrap.ts will run the whole application.

webpack folder contains webpack configuration file.

package.json file is for all list of dependencies.

karma contains karma configuration for unit test.

node_modules contains list of package bundles.

Lets start with Login component. In login.component.html

```
<form>Dreamfactory - Addressbook 2.0
 <label>Email</label> <input id="email" form="" name="email" type="email" />
 <label>Password</label> <input id="password" form="" name="password"
type="password" />
 <button form="">Login</button>
</form>
```

In login.component.ts

```
import { Component } from '@angular/core';
import { Router } from '@angular/router';
import { Form, FormGroup } from '@angular/forms';
import { LoginForm } from '../../models';
import { LoginService } from '../../services/login.service';

@Component({
    selector: 'login',
    template: require('./login.component.html'),
    styles: [require('./login.component.css')]
})
export class LoginComponent {

    constructor(private loginService: LoginService, private router: Router, form: LoginForm) { }
```

```
    getLogin(form: LoginForm): void {
      let username = form.email;
      let password = form.password;
      this.loginService.getAuthenticate(form).subscribe(() => {
          this.router.navigate(['/calender']);
      });
    }
}
```

We need to export this component to in index.ts.

```
export * from './login/login.component';
```

we need to set routes for login in app.routes.ts

```
const appRoutes: Routes = [
   {
       path: 'login',
       component: LoginComponent
   },
   ........
   {
       path: '',
       pathMatch: 'full',
       redirectTo: '/login'
   }
];
```

In root component, app.module.ts file you just need to import that component.

```
.....
import { LoginComponent } from './modules';
......
@NgModule({
    bootstrap: [AppComponent],
    declarations: [
       LoginComponent
       .....
       .....
       ]
      .....
  })
  export class AppModule { }
```

and after that npm install and npm start. Here, you go! You can check login screen in your localhost. In case of any difficulty, You can refer the angular4-boilerplate.

Basically I can feel less building package and more faster response with Angular 4 application and Although I found Exactly similar to Angular 2 in coding.

Chapter 2: Components

Angular components are elements composed by a template that will render your application.

Section 2.1: A simple component

To create a component we add `@Component` decorator in a class passing some parameters:

- `providers`: Resources that will be injected into the component constructor
- `selector`: The query selector that will find the element in the HTML and replace by the component
- `styles`: Inline styles. NOTE: DO NOT use this parameter with require, it works on development but when you build the application in production all your styles are lost
- `styleUrls`: Array of path to style files
- `template`: String that contains your HTML
- `templateUrl`: Path to a HTML file

There are other parameters you can configure, but the listed ones are what you will use the most.

A simple example:

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

@Component({
  selector: 'app-required',
  styleUrls: ['required.component.scss'],
  // template: `This field is required.`,
  templateUrl: 'required.component.html',
})
export class RequiredComponent { }
```

Section 2.2: Templates & Styles

Templates are HTML files that may contain logic.

You can specify a template in two ways:

Passing template as a file path

```
@Component({
  templateUrl: 'hero.component.html',
})
```

Passing a template as an inline code

```
@Component({
  template: `<div>My template here</div>`,
})
```

Templates may contain styles. The styles declared in `@Component` are different from your application style file, anything applied in the component will be restricted to this scope. For example, say you add:

```
div { background: red; }
```

All `divs` inside the component will be red, but if you have other components, other divs in your HTML they will not be changed at all.

The generated code will look like this:

```
<style>div[_ngcontent-c1] { background: red; }</style>
```

You can add styles to a component in two ways:

Passing an array of file paths

```
@Component({
  styleUrls: ['hero.component.css'],
})
```

Passing an array of inline codes

```
styles: [ `div { background: lime; }` ]
```

You shouldn't use `styles` with `require` as it will not work when you build your application to production.

Section 2.3: Testing a Component

hero.component.html

```
<form (ngSubmit)="submit($event)" [formGroup]="form" novalidate>
  <input type="text" formControlName="name" />
  <button type="submit">Show hero name</button>
</form>
```

hero.component.ts

```
import { FormControl, FormGroup, Validators } from '@angular/forms';

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

@Component({
  selector: 'app-hero',
  templateUrl: 'hero.component.html',
})
export class HeroComponent {
  public form = new FormGroup({
    name: new FormControl('', Validators.required),
  });

  submit(event) {
    console.log(event);
    console.log(this.form.controls.name.value);
  }
}
```

hero.component.spec.ts

```
import { ComponentFixture, TestBed, async } from '@angular/core/testing';

import { HeroComponent } from './hero.component';
import { ReactiveFormsModule } from '@angular/forms';

describe('HeroComponent', () => {
  let component: HeroComponent;
  let fixture: ComponentFixture<HeroComponent>;

  beforeEach(async(() => {
```

```
    TestBed.configureTestingModule({
      declarations: [HeroComponent],
      imports: [ReactiveFormsModule],
    }).compileComponents();

    fixture = TestBed.createComponent(HeroComponent);
    component = fixture.componentInstance;
    fixture.detectChanges();
  }));

  it('should be created', () => {
    expect(component).toBeTruthy();
  });

  it('should log hero name in the console when user submit form', async(() => {
    const heroName = 'Saitama';
    const element = <HTMLFormElement>fixture.debugElement.nativeElement.querySelector('form');

    spyOn(console, 'log').and.callThrough();

    component.form.controls['name'].setValue(heroName);

    element.querySelector('button').click();

    fixture.whenStable().then(() => {
      fixture.detectChanges();
      expect(console.log).toHaveBeenCalledWith(heroName);
    });
  }));

  it('should validate name field as required', () => {
    component.form.controls['name'].setValue('');
    expect(component.form.invalid).toBeTruthy();
  });
});
```

Section 2.4: Nesting components

Components will render in their respective `selector`, so you can use that to nest components.

If you have a component that shows a message:

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

@Component({
  selector: 'app-required',
  template: `{{name}} is required.`
})
export class RequiredComponent {
  @Input()
  public name: String = '';
}
```

You can use it inside another component using `app-required` (this component's selector):

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

@Component({
  selector: 'app-sample',
  template: `
```

```
    <input type="text" name="heroName" />
    <app-required name="Hero Name"></app-required>
  `
})
export class RequiredComponent {
  @Input()
  public name: String = '';
}
```

Chapter 3: Component interactions

Name	Value
pageCount	Used to tell number of pages to be created to the child component.
pageNumberClicked	Name of output variable in the child component.
pageChanged	Function at parent component that listening for child components output.

Section 3.1: Pass data from parent to child with input binding

HeroChildComponent has two input properties, typically adorned with @Input decorations.

```
import { Component, Input } from '@angular/core';
import { Hero } from './hero';
@Component({
  selector: 'hero-child',
  template: `
    <h3>{{hero.name}} says:</h3>
    <p>I, {{hero.name}}, am at your service, {{masterName}}.</p>
  `
})
export class HeroChildComponent {
  @Input() hero: Hero;
  @Input('master') masterName: string;
}
```

Intercept input property changes with a setter

Use an input property setter to intercept and act upon a value from the parent.

The setter of the name input property in the child NameChildComponent trims the whitespace from a name and replaces an empty value with default text.

```
import { Component, Input } from '@angular/core';
@Component({
  selector: 'name-child',
  template: '<h3>"{{name}}"</h3>'
})
export class NameChildComponent {
  private _name = '';
  @Input()
  set name(name: string) {
    this._name = (name && name.trim()) || '<no name set>';
  }
  get name(): string { return this._name; }
}
```

Here's the NameParentComponent demonstrating name variations including a name with all spaces:

```
import { Component } from '@angular/core';
@Component({
  selector: 'name-parent',
  template: `
  <h2>Master controls {{names.length}} names</h2>
  <name-child *ngFor="let name of names" [name]="name"></name-child>
  `
})
export class NameParentComponent {
```

```
  // Displays 'Mr. IQ', '<no name set>', 'Bombasto'
  names = ['Mr. IQ', '   ', '  Bombasto  '];
}
```

Parent listens for child event

The child component exposes an EventEmitter property with which it emits events when something happens. The parent binds to that event property and reacts to those events.

The child's EventEmitter property is an output property, typically adorned with an @Output decoration as seen in this VoterComponent:

```
import { Component, EventEmitter, Input, Output } from '@angular/core';
@Component({
  selector: 'my-voter',
  template: `
    <h4>{{name}}</h4>
    <button (click)="vote(true)"  [disabled]="voted">Agree</button>
    <button (click)="vote(false)" [disabled]="voted">Disagree</button>
  `
})
export class VoterComponent {
  @Input()  name: string;
  @Output() onVoted = new EventEmitter<boolean>();
  voted = false;
  vote(agreed: boolean) {
    this.onVoted.emit(agreed);
    this.voted = true;
  }
}
```

Clicking a button triggers emission of a true or false (the boolean payload).

The parent VoteTakerComponent binds an event handler (onVoted) that responds to the child event payload ($event) and updates a counter.

```
import { Component }      from '@angular/core';
@Component({
  selector: 'vote-taker',
  template: `
    <h2>Should mankind colonize the Universe?</h2>
    <h3>Agree: {{agreed}}, Disagree: {{disagreed}}</h3>
    <my-voter *ngFor="let voter of voters"
      [name]="voter"
      (onVoted)="onVoted($event)">
    </my-voter>
  `
})
export class VoteTakerComponent {
  agreed = 0;
  disagreed = 0;
  voters = ['Mr. IQ', 'Ms. Universe', 'Bombasto'];
  onVoted(agreed: boolean) {
    agreed ? this.agreed++ : this.disagreed++;
  }
}
```

Parent interacts with child via local variable

A parent component cannot use data binding to read child properties or invoke child methods. We can do both by creating a template reference variable for the child element and then reference that variable within the parent template as seen in the following example.

We have a child CountdownTimerComponent that repeatedly counts down to zero and launches a rocket. It has start and stop methods that control the clock and it displays a countdown status message in its own template.

```
import { Component, OnDestroy, OnInit } from '@angular/core';
@Component({
  selector: 'countdown-timer',
  template: '<p>{{message}}</p>'
})
export class CountdownTimerComponent implements OnInit, OnDestroy {
  intervalId = 0;
  message = '';
  seconds = 11;
  clearTimer() { clearInterval(this.intervalId); }
  ngOnInit()    { this.start(); }
  ngOnDestroy() { this.clearTimer(); }
  start() { this.countDown(); }
  stop()  {
    this.clearTimer();
    this.message = `Holding at T-${this.seconds} seconds`;
  }
  private countDown() {
    this.clearTimer();
    this.intervalId = window.setInterval(() => {
      this.seconds -= 1;
      if (this.seconds === 0) {
        this.message = 'Blast off!';
      } else {
        if (this.seconds < 0) { this.seconds = 10; } // reset
        this.message = `T-${this.seconds} seconds and counting`;
      }
    }, 1000);
  }
}
```

Let's see the CountdownLocalVarParentComponent that hosts the timer component.

```
import { Component }                from '@angular/core';
import { CountdownTimerComponent }  from './countdown-timer.component';
@Component({
  selector: 'countdown-parent-lv',
  template: `
  <h3>Countdown to Liftoff (via local variable)</h3>
  <button (click)="timer.start()">Start</button>
  <button (click)="timer.stop()">Stop</button>
  <div class="seconds">{{timer.seconds}}</div>
  <countdown-timer #timer></countdown-timer>
  `,
  styleUrls: ['demo.css']
})
export class CountdownLocalVarParentComponent { }
```

The parent component cannot data bind to the child's start and stop methods nor to its seconds property.

We can place a local variable (#timer) on the tag () representing the child component. That gives us a reference to the child component itself and the ability to access any of its properties or methods from within the parent

template.

In this example, we wire parent buttons to the child's start and stop and use interpolation to display the child's seconds property.

Here we see the parent and child working together.

Parent calls a ViewChild

The local variable approach is simple and easy. But it is limited because the parent-child wiring must be done entirely within the parent template. The parent component itself has no access to the child.

We can't use the local variable technique if an instance of the parent component class must read or write child component values or must call child component methods.

When the parent component class requires that kind of access, we inject the child component into the parent as a ViewChild.

We'll illustrate this technique with the same Countdown Timer example. We won't change its appearance or behavior. The child CountdownTimerComponent is the same as well.

We are switching from the local variable to the ViewChild technique solely for the purpose of demonstration. Here is the parent, CountdownViewChildParentComponent:

```
import { AfterViewInit, ViewChild } from '@angular/core';
import { Component }                from '@angular/core';
import { CountdownTimerComponent }  from './countdown-timer.component';
@Component({
  selector: 'countdown-parent-vc',
  template: `
  <h3>Countdown to Liftoff (via ViewChild)</h3>
  <button (click)="start()">Start</button>
  <button (click)="stop()">Stop</button>
  <div class="seconds">{{ seconds() }}</div>
  <countdown-timer></countdown-timer>
  `,
  styleUrls: ['demo.css']
})
export class CountdownViewChildParentComponent implements AfterViewInit {
  @ViewChild(CountdownTimerComponent)
  private timerComponent: CountdownTimerComponent;
  seconds() { return 0; }
  ngAfterViewInit() {
    // Redefine `seconds()` to get from the `CountdownTimerComponent.seconds` ...
    // but wait a tick first to avoid one-time devMode
    // unidirectional-data-flow-violation error
    setTimeout(() => this.seconds = () => this.timerComponent.seconds, 0);
  }
  start() { this.timerComponent.start(); }
  stop() { this.timerComponent.stop(); }
}
```

It takes a bit more work to get the child view into the parent component class.

We import references to the ViewChild decorator and the AfterViewInit lifecycle hook.

We inject the child CountdownTimerComponent into the private timerComponent property via the @ViewChild property decoration.

The #timer local variable is gone from the component metadata. Instead we bind the buttons to the parent component's own start and stop methods and present the ticking seconds in an interpolation around the parent component's seconds method.

These methods access the injected timer component directly.

The ngAfterViewInit lifecycle hook is an important wrinkle. The timer component isn't available until after Angular displays the parent view. So we display 0 seconds initially.

Then Angular calls the ngAfterViewInit lifecycle hook at which time it is too late to update the parent view's display of the countdown seconds. Angular's unidirectional data flow rule prevents us from updating the parent view's in the same cycle. We have to wait one turn before we can display the seconds.

We use setTimeout to wait one tick and then revise the seconds method so that it takes future values from the timer component.

Parent and children communicate via a service

A parent component and its children share a service whose interface enables bi-directional communication within the family.

The scope of the service instance is the parent component and its children. Components outside this component subtree have no access to the service or their communications.

This MissionService connects the MissionControlComponent to multiple AstronautComponent children.

```
import { Injectable } from '@angular/core';
import { Subject }    from 'rxjs/Subject';
@Injectable()
export class MissionService {
  // Observable string sources
  private missionAnnouncedSource = new Subject<string>();
  private missionConfirmedSource = new Subject<string>();
  // Observable string streams
  missionAnnounced$ = this.missionAnnouncedSource.asObservable();
  missionConfirmed$ = this.missionConfirmedSource.asObservable();
  // Service message commands
  announceMission(mission: string) {
    this.missionAnnouncedSource.next(mission);
  }
  confirmMission(astronaut: string) {
    this.missionConfirmedSource.next(astronaut);
  }
}
```

The MissionControlComponent both provides the instance of the service that it shares with its children (through the providers metadata array) and injects that instance into itself through its constructor:

```
import { Component }          from '@angular/core';
import { MissionService }     from './mission.service';
@Component({
  selector: 'mission-control',
  template: `
    <h2>Mission Control</h2>
    <button (click)="announce()">Announce mission</button>
    <my-astronaut *ngFor="let astronaut of astronauts"
      [astronaut]="astronaut">
    </my-astronaut>
```

```
    <h3>History</h3>
    <ul>
      <li *ngFor="let event of history">{{event}}</li>
    </ul>
  `,
  providers: [MissionService]
})
export class MissionControlComponent {
  astronauts = ['Lovell', 'Swigert', 'Haise'];
  history: string[] = [];
  missions = ['Fly to the moon!',
              'Fly to mars!',
              'Fly to Vegas!'];
  nextMission = 0;
  constructor(private missionService: MissionService) {
    missionService.missionConfirmed$.subscribe(
      astronaut => {
        this.history.push(`${astronaut} confirmed the mission`);
      });
  }
  announce() {
    let mission = this.missions[this.nextMission++];
    this.missionService.announceMission(mission);
    this.history.push(`Mission "${mission}" announced`);
    if (this.nextMission >= this.missions.length) { this.nextMission = 0; }
  }
}
```

The AstronautComponent also injects the service in its constructor. Each AstronautComponent is a child of the MissionControlComponent and therefore receives its parent's service instance:

```
import { Component, Input, OnDestroy } from '@angular/core';
import { MissionService } from './mission.service';
import { Subscription }   from 'rxjs/Subscription';
@Component({
  selector: 'my-astronaut',
  template: `
    <p>
      {{astronaut}}: <strong>{{mission}}</strong>
      <button
        (click)="confirm()"
        [disabled]="!announced || confirmed">
        Confirm
      </button>
    </p>
  `
})
export class AstronautComponent implements OnDestroy {
  @Input() astronaut: string;
  mission = '<no mission announced>';
  confirmed = false;
  announced = false;
  subscription: Subscription;
  constructor(private missionService: MissionService) {
    this.subscription = missionService.missionAnnounced$.subscribe(
      mission => {
        this.mission = mission;
        this.announced = true;
        this.confirmed = false;
    });
  }
```

```
  confirm() {
    this.confirmed = true;
    this.missionService.confirmMission(this.astronaut);
  }
  ngOnDestroy() {
    // prevent memory leak when component destroyed
    this.subscription.unsubscribe();
  }
}
```

Notice that we capture the subscription and unsubscribe when the AstronautComponent is destroyed. This is a memory-leak guard step. There is no actual risk in this app because the lifetime of a AstronautComponent is the same as the lifetime of the app itself. That would not always be true in a more complex application.

We do not add this guard to the MissionControlComponent because, as the parent, it controls the lifetime of the MissionService. The History log demonstrates that messages travel in both directions between the parent MissionControlComponent and the AstronautComponent children, facilitated by the service:

Section 3.2: Parent - Child interaction using @Input & @Output properties

We have a DataListComponent that shows a data we pull from a service. DataListComponent also has a PagerComponent as it's child.

PagerComponent creates page number list based on total number of pages it gets from the DataListComponent. PagerComponent also lets the DataListComponent know when user clicks any page number via Output property.

```
import { Component, NgModule } from '@angular/core';
import { CommonModule } from '@angular/common';
import { DataListService } from './dataList.service';
import { PagerComponent } from './pager.component';

@Component({
    selector: 'datalist',
    template: `
        <table>
        <tr *ngFor="let person of personsData">
            <td>{{person.name}}</td>
            <td>{{person.surname}}</td>
        </tr>
        </table>

        <pager [pageCount]="pageCount" (pageNumberClicked)="pageChanged($event)"></pager>
    `
})
export class DataListComponent {
    private personsData = null;
    private pageCount: number;

    constructor(private dataListService: DataListService) {
        var response = this.dataListService.getData(1); //Request first page from the service
        this.personsData = response.persons;
        this.pageCount = response.totalCount / 10;//We will show 10 records per page.
    }

    pageChanged(pageNumber: number){
        var response = this.dataListService.getData(pageNumber); //Request data from the service
with new page number
        this.personsData = response.persons;
```

```
    }
}

@NgModule({
    imports: [CommonModule],
    exports: [],
    declarations: [DataListComponent, PagerComponent],
    providers: [DataListService],
})
export class DataListModule { }
```

PagerComponent lists all the page numbers. We set click event on each of them so we can let the parent know about the clicked page number.

```
import { Component, Input, Output, EventEmitter } from '@angular/core';

@Component({
    selector: 'pager',
    template: `
    <div id="pager-wrapper">
        <span *ngFor="#page of pageCount" (click)="pageClicked(page)">{{page}}</span>
    </div>
    `
})
export class PagerComponent {
    @Input() pageCount: number;
    @Output() pageNumberClicked = new EventEmitter();
    constructor() { }

    pageClicked(pageNum){
        this.pageNumberClicked.emit(pageNum); //Send clicked page number as output
    }
}
```

Section 3.3: Parent - Child interaction using ViewChild

Viewchild offers one way interaction from parent to child. There is no feedback or output from child when ViewChild is used.

We have a DataListComponent that shows some information. DataListComponent has PagerComponent as it's child. When user makes a search on DataListComponent, it gets a data from a service and ask PagerComponent to refresh paging layout based on new number of pages.

```
import { Component, NgModule, ViewChild } from '@angular/core';
import { CommonModule } from '@angular/common';
import { DataListService } from './dataList.service';
import { PagerComponent } from './pager.component';

@Component({
    selector: 'datalist',
    template: `<input type='text' [(ngModel)]="searchText" />
               <button (click)="getData()">Search</button>
        <table>
        <tr *ngFor="let person of personsData">
            <td>{{person.name}}</td>
            <td>{{person.surname}}</td>
        </tr>
        </table>
```

```
        <pager></pager>
    `
})
export class DataListComponent {
    private personsData = null;
    private searchText: string;

    @ViewChild(PagerComponent)
    private pagerComponent: PagerComponent;

    constructor(private dataListService: DataListService) {}

    getData(){
        var response = this.dataListService.getData(this.searchText);
        this.personsData = response.data;
        this.pagerComponent.setPaging(this.personsData / 10); //Show 10 records per page
    }
}

@NgModule({
    imports: [CommonModule],
    exports: [],
    declarations: [DataListComponent, PagerComponent],
    providers: [DataListService],
})
export class DataListModule { }
```

In this way you can call functions defined at child components.

Child component is not available until parent component is rendered. Attempting to access to the child before parents `AfterViewInit` life cyle hook will cause exception.

Section 3.4: Bidirectional parent-child interaction through a service

Service that is used for communication:

```
import { Injectable } from '@angular/core';
import { Subject } from 'rxjs/Subject';

@Injectable()
export class ComponentCommunicationService {

    private componentChangeSource = new Subject();
    private newDateCreationSource = new Subject<Date>();

    componentChanged$ = this.componentChangeSource.asObservable();
    dateCreated$ = this.newDateCreationSource.asObservable();

    refresh() {
        this.componentChangeSource.next();
    }

    broadcastDate(date: Date) {
        this.newDateCreationSource.next(date);
    }
}
```

Parent component:

```
import { Component, Inject } from '@angular/core';
import { ComponentCommunicationService } from './component-refresh.service';

@Component({
    selector: 'parent',
    template: `
    <button (click)="refreshSubsribed()">Refresh</button>
    <h1>Last date from child received: {{lastDate}}</h1>
    <child-component></child-component>
    `
})
export class ParentComponent implements OnInit {

    lastDate: Date;
    constructor(private communicationService: ComponentCommunicationService) { }

    ngOnInit() {
        this.communicationService.dateCreated$.subscribe(newDate => {
            this.lastDate = newDate;
        });
    }

    refreshSubsribed() {
        this.communicationService.refresh();
    }
}
```

Child component:

```
import { Component, OnInit, Inject } from '@angular/core';
import { ComponentCommunicationService } from './component-refresh.service';

@Component({
    selector: 'child-component',
    template: `
    <h1>Last refresh from parent: {{lastRefreshed}}</h1>
    <button (click)="sendNewDate()">Send new date</button>
    `
})
export class ChildComponent implements OnInit {

    lastRefreshed: Date;
    constructor(private communicationService: ComponentCommunicationService) { }

    ngOnInit() {
        this.communicationService.componentChanged$.subscribe(event => {
            this.onRefresh();
        });
    }

    sendNewDate() {
        this.communicationService.broadcastDate(new Date());
    }

    onRefresh() {
        this.lastRefreshed = new Date();
    }
}
```

AppModule:

```
@NgModule({
    declarations: [
        ParentComponent,
        ChildComponent
    ],
    providers: [ComponentCommunicationService],
    bootstrap: [AppComponent] // not included in the example
})
export class AppModule {}
```

Chapter 4: Directives

Section 4.1: *ngFor

form1.component.ts:

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

// Defines example component and associated template
@Component({
    selector: 'example',
    template: `
      <div *ngFor="let f of fruit"> {{f}} </div>
      <select required>
        <option *ngFor="let f of fruit" [value]="f"> {{f}} </option>
      </select>
    `
})

// Create a class for all functions, objects, and variables
export class ExampleComponent {
    // Array of fruit to be iterated by *ngFor
    fruit = ['Apples', 'Oranges', 'Bananas', 'Limes', 'Lemons'];
}
```

Output:

```
<div>Apples</div>
<div>Oranges</div>
<div>Bananas</div>
<div>Limes</div>
<div>Lemons</div>
<select required>
  <option value="Apples">Apples</option>
  <option value="Oranges">Oranges</option>
  <option value="Bananas">Bananas</option>
  <option value="Limes">Limes</option>
  <option value="Lemons">Lemons</option>
</select>
```

In its most simple form, `*ngFor` has two parts : `let` >variableName of **object/array**

In the case of `fruit = ['Apples', 'Oranges', 'Bananas', 'Limes', 'Lemons'];`,

Apples, Oranges, and so on are the values inside the array `fruit`.

`[value]="f"` will be equal to each current `fruit` (`f`) that `*ngFor` has iterated over.

Unlike AngularJS, Angular2 has not continued with the use of `ng-options` for `<select>` and `ng-repeat` for all other general repetitions.

`*ngFor` is very similar to `ng-repeat` with slightly varied syntax.

References:

Angular2 | Displaying Data

Angular2 | ngFor

Section 4.2: Attribute directive

```
<div [class.active]="isActive"></div>

<span [style.color]="'red'"></span>

<p [attr.data-note]="'This is value for data-note attribute'">A lot of text here</p>
```

Section 4.3: Component is a directive with template

```
import { Component } from '@angular/core';
@Component({
  selector: 'my-app',
  template: `
    <h1>Angular 2 App</h1>
    <p>Component is directive with template</p>
  `
})
export class AppComponent {
}
```

Section 4.4: Structural directives

```
<div *ngFor="let item of items">{{ item.description }}</div>

<span *ngIf="isVisible"></span>
```

Section 4.5: Custom directive

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

@Directive({
  selector: '[green]',
})

class GreenDirective {
  constructor(private _elementRef: ElementRef,
              private _renderer: Renderer) {
    _renderer.setElementStyle(_elementRef.nativeElement, 'color', 'green');
  }
}
```

Usage:

```
<p green>A lot of green text here</p>
```

Section 4.6: Copy to Clipboard directive

In this example we are going to create a directive to copy a text into the clipboard by clicking on an element

copy-text.directive.ts

```
import {
    Directive,
```

```
    Input,
    HostListener
} from "@angular/core";

@Directive({
    selector: '[text-copy]'
})
export class TextCopyDirective {

    // Parse attribute value into a 'text' variable
    @Input('text-copy') text:string;

    constructor() {
    }


    // The HostListener will listen to click events and run the below function, the HostListener
supports other standard events such as mouseenter, mouseleave etc.
    @HostListener('click') copyText() {

        // We need to create a dummy textarea with the text to be copied in the DOM
        var textArea = document.createElement("textarea");

        // Hide the textarea from actually showing
        textArea.style.position = 'fixed';
        textArea.style.top = '-999px';
        textArea.style.left = '-999px';
        textArea.style.width = '2em';
        textArea.style.height = '2em';
        textArea.style.padding = '0';
        textArea.style.border = 'none';
        textArea.style.outline = 'none';
        textArea.style.boxShadow = 'none';
        textArea.style.background = 'transparent';

        // Set the texarea's content to our value defined in our [text-copy] attribute
        textArea.value = this.text;
        document.body.appendChild(textArea);

        // This will select the textarea
        textArea.select();

        try {
            // Most modern browsers support execCommand('copy'|'cut'|'paste'), if it doesn't it
should throw an error
            var successful = document.execCommand('copy');
            var msg = successful ? 'successful' : 'unsuccessful';
            // Let the user know the text has been copied, e.g toast, alert etc.
            console.log(msg);
        } catch (err) {
            // Tell the user copying is not supported and give alternative, e.g alert window with
the text to copy
            console.log('unable to copy');
        }

        // Finally we remove the textarea from the DOM
        document.body.removeChild(textArea);
    }
}

export const TEXT_COPY_DIRECTIVES = [TextCopyDirective];
```

some-page.component.html

Remember to inject TEXT_COPY_DIRECTIVES into the directives array of your component

```
...
    <!-- Insert variable as the attribute's value, let textToBeCopied = 'http://facebook.com/' -->
    <button [text-copy]="textToBeCopied">Copy URL</button>
    <button [text-copy]="'https://www.google.com/'">Copy URL</button>
...
```

Section 4.7: Testing a custom directive

Given a directive that highlights text on mouse events

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

@Directive({ selector: '[appHighlight]' })
export class HighlightDirective {
  @Input('appHighlight') // tslint:disable-line no-input-rename
  highlightColor: string;

  constructor(private el: ElementRef) { }

  @HostListener('mouseenter')
  onMouseEnter() {
    this.highlight(this.highlightColor || 'red');
  }

  @HostListener('mouseleave')
  onMouseLeave() {
    this.highlight(null);
  }

  private highlight(color: string) {
    this.el.nativeElement.style.backgroundColor = color;
  }
}
```

It can be tested like this

```
import { ComponentFixture, ComponentFixtureAutoDetect, TestBed } from '@angular/core/testing';

import { Component } from '@angular/core';
import { HighlightDirective } from './highlight.directive';

@Component({
  selector: 'app-test-container',
  template: `
    <div>
      <span id="red" appHighlight>red text</span>
      <span id="green" [appHighlight]="'green'">green text</span>
      <span id="no">no color</span>
    </div>
  `
})
class ContainerComponent { }

const mouseEvents = {
  get enter() {
    const mouseenter = document.createEvent('MouseEvent');
```

```
    mouseenter.initEvent('mouseenter', true, true);
    return mouseenter;
  },
  get leave() {
    const mouseleave = document.createEvent('MouseEvent');
    mouseleave.initEvent('mouseleave', true, true);
    return mouseleave;
  },
};

describe('HighlightDirective', () => {
  let fixture: ComponentFixture<ContainerComponent>;
  let container: ContainerComponent;
  let element: HTMLElement;

  beforeEach(() => {
    TestBed.configureTestingModule({
      declarations: [ContainerComponent, HighlightDirective],
      providers: [
        { provide: ComponentFixtureAutoDetect, useValue: true },
      ],
    });

    fixture = TestBed.createComponent(ContainerComponent);
    // fixture.detectChanges(); // without the provider
    container = fixture.componentInstance;
    element = fixture.nativeElement;
  });

  it('should set background-color to empty when mouse leaves with directive without arguments', ()
=> {
    const targetElement = <HTMLSpanElement>element.querySelector('#red');

    targetElement.dispatchEvent(mouseEvents.leave);
    expect(targetElement.style.backgroundColor).toEqual('');
  });

  it('should set background-color to empty when mouse leaves with directive with arguments', () =>
{
    const targetElement = <HTMLSpanElement>element.querySelector('#green');

    targetElement.dispatchEvent(mouseEvents.leave);
    expect(targetElement.style.backgroundColor).toEqual('');
  });

  it('should set background-color red with no args passed', () => {
    const targetElement = <HTMLSpanElement>element.querySelector('#red');

    targetElement.dispatchEvent(mouseEvents.enter);
    expect(targetElement.style.backgroundColor).toEqual('red');
  });

  it('should set background-color green when passing green parameter', () => {
    const targetElement = <HTMLSpanElement>element.querySelector('#green');

    targetElement.dispatchEvent(mouseEvents.enter);
    expect(targetElement.style.backgroundColor).toEqual('green');
  });
});
```

Chapter 5: Page title

How can you change the title of the page

Section 5.1: changing the page title

1. First we need to provide Title service.
2. Using setTitle

```
import {Title} from "@angular/platform-browser";
@Component({
  selector: 'app',
  templateUrl: './app.component.html',
  providers : [Title]
})

export class AppComponent implements {
   constructor( private title: Title) {
     this.title.setTitle('page title changed');
   }
}
```

Chapter 6: Templates

Templates are very similar to templates in Angular 1, though there are many small syntactical changes that make it more clear what is happening.

Section 6.1: Angular 2 Templates

A SIMPLE TEMPLATE

Let's start with a very simple template that shows our name and our favorite thing:

```
<div>
  Hello my name is {{name}} and I like {{thing}} quite a lot.
</div>
```

`{}`: RENDERING

To render a value, we can use the standard double-curly syntax:

```
My name is {{name}}
```

Pipes, previously known as "Filters," transform a value into a new value, like localizing a string or converting a floating point value into a currency representation:

`[]`: BINDING PROPERTIES

To resolve and bind a variable to a component, use the [] syntax. If we have this.currentVolume in our component, we will pass this through to our component and the values will stay in sync:

```
<video-control [volume]="currentVolume"></video-control>
(): HANDLING EVENTS
```

`()`: HANDLING EVENTS To listen for an event on a component, we use the () syntax

```
<my-component (click)="onClick($event)"></my-component>
```

`[()]`: TWO-WAY DATA BINDING

To keep a binding up to date given user input and other events, use the [()] syntax. Think of it as a combination of handling an event and binding a property:

<input [(ngModel)]="myName"> The this.myName value of your component will stay in sync with the input value.

`*`: THE ASTERISK

Indicates that this directive treats this component as a template and will not draw it as-is. For example, ngFor takes our and stamps it out for each item in items, but it never renders our initial since it's a template:

```
<my-component *ngFor="#item of items">
</my-component>
```

Other similar directives that work on templates rather than rendered components are *ngIf and *ngSwitch.

Chapter 7: Commonly built-in directives and services

@angular/common - commonly needed directives and services @angular/core - the angular core framework

Section 7.1: Location Class

Location is a service that applications can use to interact with a browser's URL. Depending on which LocationStrategy is used, Location will either persist to the URL's path or the URL's hash segment.

Location is responsible for normalizing the URL against the application's base href.

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

@Component({
    selector: 'app-component'
})
class AppCmp {

  constructor(_location: Location) {

    //Changes the browsers URL to the normalized version of the given URL,
    //and pushes a new item onto the platform's history.
    _location.go('/foo');

  }

  backClicked() {
    //Navigates back in the platform's history.
    this._location.back();
  }

  forwardClicked() {
    //Navigates forward in the platform's history.
    this._location.back();
  }
}
```

Section 7.2: AsyncPipe

The async pipe subscribes to an Observable or Promise and returns the latest value it has emitted. When a new value is emitted, the async pipe marks the component to be checked for changes. When the component gets destroyed, the async pipe unsubscribes automatically to avoid potential memory leaks.

```
@Component({
  selector: 'async-observable-pipe',
  template: '<div><code>observable|async</code>: Time: {{ time | async }}</div>'
})
export class AsyncObservablePipeComponent {
  time = new Observable<string>((observer: Subscriber<string>) => {
    setInterval(() => observer.next(new Date().toString()), 1000);
  });
}
```

Section 7.3: Displaying current Angular 2 version used in your project

To display current version, we can use **VERSION** from @angular/core package.

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

@Component({
  selector: 'my-app',
  template: `<h1>Hello {{name}}</h1>
  <h2>Current Version: {{ver}}</h2>
  `,
})
export class AppComponent  {
   name = 'Angular2';
   ver = VERSION.full;
}
```

Section 7.4: Currency Pipe

The currency pipe allows you to work with you data as regular numbers but display it with standard currency formatting (currency symbol, decimal places, etc.) in the view.

```
@Component({
  selector: 'currency-pipe',
  template: `<div>
    <p>A: {{myMoney | currency:'USD':false}}</p>
    <p>B: {{yourMoney | currency:'USD':true:'4.2-2'}}</p>
  </div>`
})
export class CurrencyPipeComponent {
  myMoney: number = 100000.653;
  yourMoney: number = 5.3495;
}
```

The pipe takes three optional parameters:

- **currencyCode**: Allows you to specify the ISO 4217 currency code.
- **symbolDisplay**: Boolean indicating whether to use the currency symbol
- **digitInfo**: Allows you to specify how the decimal places should be displayed.

More documentation on the currency pipe:
https://angular.io/docs/ts/latest/api/common/index/CurrencyPipe-pipe.html

Chapter 8: Directives & components : @Input @Output

Section 8.1: Angular 2 @Input and @Output in a nested component

A Button directive which accepts an `@Input()` to specify a click limit until the button gets disabled. The parent component can listen to an event which will be emitted when the click limit is reached via `@Output`:

```
import { Component, Input, Output, EventEmitter } from '@angular/core';

@Component({
    selector: 'limited-button',
    template: `<button (click)="onClick()"
                       [disabled]="disabled">
                   <ng-content></ng-content>
               </button>`,
    directives: []
})

export class LimitedButton {
    @Input() clickLimit: number;
    @Output() limitReached: EventEmitter<number> = new EventEmitter();

    disabled: boolean = false;

    private clickCount: number = 0;

    onClick() {
        this.clickCount++;
        if (this.clickCount === this.clickLimit) {
            this.disabled = true;
            this.limitReached.emit(this.clickCount);
        }
    }
}
```

Parent component which uses the Button directive and alerts a message when the click limit is reached:

```
import { Component } from '@angular/core';
import { LimitedButton } from './limited-button.component';

@Component({
    selector: 'my-parent-component',
    template: `<limited-button [clickLimit]="2"
                               (limitReached)="onLimitReached($event)">
                   You can only click me twice
               </limited-button>`,
    directives: [LimitedButton]
})

export class MyParentComponent {
    onLimitReached(clickCount: number) {
        alert('Button disabled after ' + clickCount + ' clicks.');
    }
}
```

Section 8.2: Input example

@input is useful to bind data between components

First, import it in your component

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

Then, add the input as a property of your component class

```
@Input() car: any;
```

Let's say that the selector of your component is 'car-component', when you call the component, add the attribute 'car'

```
<car-component [car]="car"></car-component>
```

Now your car is accessible as an attribute in your object (this.car)

Full Example :

1. car.entity.ts

```
export class CarEntity {
   constructor(public brand : string, public color : string) {
   }
}
```

2. car.component.ts

```
import { Component, Input } from '@angular/core';
import {CarEntity} from "./car.entity";

@Component({
    selector: 'car-component',
    template: require('./templates/car.html'),
})

export class CarComponent {
    @Input() car: CarEntity;

    constructor() {
        console.log('gros');
    }
}
```

3. garage.component.ts

```
import { Component } from '@angular/core';
import {CarEntity} from "./car.entity";
import {CarComponent} from "./car.component";

@Component({
    selector: 'garage',
    template: require('./templates/garage.html'),
    directives: [CarComponent]
})

export class GarageComponent {
```

```
        public cars : Array<CarEntity>;

        constructor() {
            var carOne : CarEntity = new CarEntity('renault', 'blue');
            var carTwo : CarEntity = new CarEntity('fiat', 'green');
            var carThree : CarEntity = new CarEntity('citroen', 'yellow');
            this.cars = [carOne, carTwo, carThree];
        }
    }
```

4. garage.html

```
<div *ngFor="let car of cars">
<car-component [car]="car"></car-component>
</div>
```

5. car.html

```
<div>
    <span>{{ car.brand }}</span> |
    <span>{{ car.color }}</span>
</div>
```

Section 8.3: Angular 2 @Input with asynchronous data

Sometimes you need to fetch data asynchronously before passing it to a child component to use. If the child component tries to use the data before it has been received, it will throw an error. You can use `ngOnChanges` to detect changes in a components' `@Inputs` and wait until they are defined before acting upon them.

Parent component with async call to an endpoint

```
import { Component, OnChanges, OnInit } from '@angular/core';
import { Http, Response } from '@angular/http';
import { ChildComponent } from './child.component';

@Component ({
    selector : 'parent-component',
    template : `
        <child-component [data]="asyncData"></child-component>
    `
})
export class ParentComponent {

    asyncData : any;

    constructor(
        private _http : Http
    ){}

    ngOnInit () {
        this._http.get('some.url')
            .map(this.extractData)
            .subscribe(this.handleData)
            .catch(this.handleError);
    }

    extractData (res:Response) {
        let body = res.json();
        return body.data || { };
    }
```

```
    handleData (data:any) {
        this.asyncData = data;
    }

    handleError (error:any) {
        console.error(error);
    }
}
```

Child component which has async data as input

This child component takes the async data as input. Therefore it must wait for the data to exist before Using it. We use ngOnChanges which fires whenever a component's input changes, check if the data exists and use it if it does. Notice that the template for the child will not show if a property that relies on the data being passed in is not true.

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

@Component ({
    selector : 'child-component',
    template : `
        <p *ngIf="doesDataExist">Hello child</p>
    `
})
export class ChildComponent {

    doesDataExist: boolean = false;

    @Input('data') data : any;

    // Runs whenever component @Inputs change
    ngOnChanges () {
        // Check if the data exists before using it
        if (this.data) {
            this.useData(data);
        {
    }

    // contrived example to assign data to reliesOnData
    useData (data) {
        this.doesDataExist = true;
    }
}
```

Chapter 9: Attribute directives to affect the value of properties on the host node by using the @HostBinding decorator.

Section 9.1: @HostBinding

The @HostBinding decorator allows us to programmatically set a property value on the directive's host element. It works similarly to a property binding defined in a template, except it specifically targets the host element. The binding is checked for every change detection cycle, so it can change dynamically if desired. For example, lets say that we want to create a directive for buttons that dynamically adds a class when we press on it. That could look something like:

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

@Directive({
  selector: '[appButtonPress]'
})
export class ButtonPressDirective {
  @HostBinding('attr.role') role = 'button';
  @HostBinding('class.pressed') isPressed: boolean;

  @HostListener('mousedown') hasPressed() {
    this.isPressed = true;
  }
  @HostListener('mouseup') hasReleased() {
    this.isPressed = false;
  }
}
```

Notice that for both use cases of @HostBinding we are passing in a string value for which property we want to affect. If we don't supply a string to the decorator, then the name of the class member will be used instead. In the first @HostBinding, we are statically setting the role attribute to button. For the second example, the pressed class will be applied when isPressed is true

Chapter 10: How to Use ngif

***NgIf**: It removes or recreates a part of DOM tree depending on an expression evaluation. It is a structural directive and structural directives alter the layout of the DOM by adding, replacing and removing its elements.

Section 10.1: To run a function at the start or end of *ngFor loop Using *ngIf

NgFor provides Some values that can be aliased to local variables

- **index** -(variable) position of the current item in the iterable starting at 0
- **first** -(boolean) true if the current item is the first item in the iterable
- **last** -(boolean) true if the current item is the last item in the iterable
- **even** -(boolean) true if the current index is an even number
- **odd** -(boolean) true if the current index is an odd number

```
<div *ngFor="let note of csvdata; let i=index; let lastcall=last">
      <h3>{{i}}</h3> <-- to show index position
     <h3>{{note}}</h3>
      <span *ngIf="lastcall">{{anyfunction()}} </span><-- this lastcall boolean value will be true
only if this is last in loop
     // anyfunction() will run at the end of loop same way we can do at start
   </div>
```

Section 10.2: Display a loading message

If our component is not ready and waiting for data from server, then we can add loader using *ngIf. **Steps:**

First declare a boolean:

```
loading: boolean = false;
```

Next, in your component add a lifecycle hook called `ngOnInit`

```
ngOnInit() {
   this.loading = true;
}
```

and after you get complete data from server set you loading boolean to false.

```
 this.loading=false;
```

In your html template use *ngIf with the `loading` property:

```
<div *ngIf="loading" class="progress">
   <div class="progress-bar info" style="width: 125%;"></div>
</div>
```

Section 10.3: Show Alert Message on a condition

```
<p class="alert alert-success" *ngIf="names.length > 2">Currently there are more than 2 names!</p>
```

Section 10.4: Use *ngIf with*ngFor

While you are not allowed to use `*ngIf` and `*ngFor` in the same div (it will gives an error in the runtime) you can nest the `*ngIf` in the `*ngFor` to get the desired behavior.

Example 1: General syntax

```
<div *ngFor="let item of items; let i = index">
  <div *ngIf="<your condition here>">

   <!-- Execute code here if statement true -->

  </div>
</div>
```

Example 2: Display elements with even index

```
<div *ngFor="let item of items; let i = index">
  <div *ngIf="i % 2 == 0">
    {{ item }}
  </div>
</div>
```

The downside is that an additional outer `div` element needs to be added.

But consider this use case where a `div` element needs to be iterated (using *ngFor) and also includes a check whether the element need to be removed or not (using *ngIf), but adding an additional `div` is not preferred. In this case you can use the `template` tag for the *ngFor:

```
<template ngFor let-item [ngForOf]="items">
    <div *ngIf="item.price > 100">
    </div>
</template>
```

This way adding an additional outer `div` is not needed and furthermore the **`<template>`** element won't be added to the DOM. The only elements added in the DOM from the above example are the iterated `div` elements.

Note: In Angular v4 **`<template>`** has been deprecated in favour of **`<ng-template>`** and will be removed in v5. In Angular v2.x releases **`<template>`** is still valid.

Chapter 11: How to use ngfor

The `ngFor` directive is used by Angular2 to instantiate a template once for every item in an iterable object. This directive binds the iterable to the DOM, so if the content of the iterable changes, the content of the DOM will be also changed.

Section 11.1: *ngFor with pipe

```
import { Pipe, PipeTransform } from '@angular/core';
@Pipe({
  name: 'even'
})

export class EvenPipe implements PipeTransform {
    transform(value: string): string {
        if(value && value %2 === 0){
          return value;
        }
    }
}

@Component({
      selector: 'example-component',
      template: '<div>
                      <div *ngFor="let number of numbers | even">
                          {{number}}
                      </div>
                </div>'
})

export class exampleComponent {
    let numbers : List<number> = Array.apply(null, {length: 10}).map(Number.call, Number)
}
```

Section 11.2: Unordered list example

```
<ul>
  <li *ngFor="let item of items">{{item.name}}</li>
</ul>
```

Section 11.3: More complext template example

```
<div *ngFor="let item of items">
  <p>{{item.name}}</p>
  <p>{{item.price}}</p>
  <p>{{item.description}}</p>
</div>
```

Section 11.4: Tracking current interaction example

```
<div *ngFor="let item of items; let i = index">
  <p>Item number: {{i}}</p>
</div>
```

In this case, i will take the value of index, which is the current loop iteration.

Section 11.5: Angular 2 aliased exported values

Angular2 provides several exported values that can be aliased to local variables. These are:

- index
- first
- last
- even
- odd

Except `index`, the other ones take a `Boolean` value. As the previous example using index, it can be used any of these exported values:

```
<div *ngFor="let item of items; let firstItem = first; let lastItem = last">
  <p *ngIf="firstItem">I am the first item and I am gonna be showed</p>
  <p *ngIf="firstItem">I am not the first item and I will not show up :(</p>
  <p *ngIf="lastItem">But I'm gonna be showed as I am the last item :)</p>
</div>
```

Chapter 12: Angular - ForLoop

Section 12.1: NgFor - Markup For Loop

The **NgFor** directive instantiates a template once per item from an iterable. The context for each instantiated template inherits from the outer context with the given loop variable set to the current item from the iterable.

To customize the default tracking algorithm, NgFor supports **trackBy** option. **trackBy** takes a function which has two arguments: index and item. If **trackBy** is given, Angular tracks changes by the return value of the function.

```
<li *ngFor="let item of items; let i = index; trackBy: trackByFn">
    {{i}} - {{item.name}}
</li>
```

Additional Options: NgFor provides several exported values that can be aliased to local variables:

- **index** will be set to the current loop iteration for each template context.
- **first** will be set to a boolean value indicating whether the item is the first one in the iteration.
- **last** will be set to a boolean value indicating whether the item is the last one in the iteration.
- **even** will be set to a boolean value indicating whether this item has an even index.
- **odd** will be set to a boolean value indicating whether this item has an odd index.

Section 12.2: *ngFor with component

```
@Component({
  selector: 'main-component',
  template: '<example-component
              *ngFor="let hero of heroes"
              [hero]="hero"></example-component>'
})


@Component({
   selector: 'example-component',
   template: '<div>{{hero?.name}}</div>'
})

export class ExampleComponent {
  @Input() hero : Hero = null;
}
```

Section 12.3: Angular 2 for-loop

For live plnkr click...

```
<!doctype html>
<html>
<head>
    <title>ng for loop in angular 2 with ES5.</title>
    <script type="text/javascript"
src="https://code.angularjs.org/2.0.0-alpha.28/angular2.sfx.dev.js"></script>
    <script>
        var ngForLoop = function () {
            this.msg = "ng for loop in angular 2 with ES5.";
            this.users = ["Anil Singh", "Sunil Singh", "Sushil Singh", "Aradhya", 'Reena'];
        };
```

```
        ngForLoop.annotations = [
                new angular.Component({
                    selector: 'ngforloop'
                }),
                new angular.View({
                    template: '<H1>{{msg}}</H1>' +
                            '<p> User List : </p>' +
                            '<ul>' +
                            '<li *ng-for="let user of users">' +
                            '{{user}}' +
                            '</li>' +
                            '</ul>',
                    directives: [angular.NgFor]
                })
        ];

        document.addEventListener("DOMContentLoaded", function () {
            angular.bootstrap(ngForLoop);
        });
    </script>
</head>
<body>
    <ngforloop></ngforloop>
    <h2>
      <a href="http://www.code-sample.com/" target="_blank">For more detail...</a>
    </h2>
</body>
</html>
```

Section 12.4: *ngFor X amount of items per row

Example shows 5 items per row:

```
<div *ngFor="let item of items; let i = index">
  <div *ngIf="i % 5 == 0" class="row">
    {{ item }}
    <div *ngIf="i + 1 < items.length">{{ items[i + 1] }}</div>
    <div *ngIf="i + 2 < items.length">{{ items[i + 2] }}</div>
    <div *ngIf="i + 3 < items.length">{{ items[i + 3] }}</div>
    <div *ngIf="i + 4 < items.length">{{ items[i + 4] }}</div>
  </div>
</div>
```

Section 12.5: *ngFor in the Table Rows

```
<table>
    <thead>
        <th>Name</th>
        <th>Index</th>
    </thead>
    <tbody>
        <tr *ngFor="let hero of heroes">
            <td>{{hero.name}}</td>
        </tr>
    </tbody>
</table>
```

Chapter 13: Modules

Angular modules are containers for different parts of your app.

You can have nested modules, your `app.module` is already actually nesting other modules such as `BrowserModule` and you can add `RouterModule` and so on.

Section 13.1: A simple module

A module is a class with the `@NgModule` decorator. To create a module we add `@NgModule` passing some parameters:

- `bootstrap`: The component that will be the root of your application. This configuration is only present on your root module
- `declarations`: Resources the module declares. When you add a new component you have to update the declarations (`ng generate component` does it automatically)
- `exports`: Resources the module exports that can be used in other modules
- `imports`: Resources the module uses from other modules (only module classes are accepted)
- `providers`: Resources that can be injected (di) in a component

A simple example:

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

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

Section 13.2: Nesting modules

Modules can be nested by using the `imports` parameter of `@NgModule` decorator.

We can create a `core.module` in our application that will contain generic things, like a `ReservePipe` (a pipe that reverse a string) and bundle those in this module:

```
import { CommonModule } from '@angular/common';
import { NgModule } from '@angular/core';
import { ReversePipe } from '../reverse.pipe';

@NgModule({
  imports: [
    CommonModule
  ],
  exports: [ReversePipe], // export things to be imported in another module
  declarations: [ReversePipe],
})
export class CoreModule { }
```

Then in the `app.module`:

```
import { CoreModule } from 'app/core/core.module';

@NgModule({
  declarations: [...], // ReversePipe is available without declaring here
                       // because CoreModule exports it
  imports: [
    CoreModule,        // import things from CoreModule
    ...
  ],
  providers: [],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

Chapter 14: Pipes

Function/Parameter	Explanation
@Pipe({name, pure})	metadata for pipe, must immediately precede pipe class
name: *string*	what you will use inside the template
pure: *boolean*	defaults to true, mark this as false to have your pipe re-evaluated more often
transform(value, args[]?)	the function that is called to transform the values in the template
value: *any*	the value that you want to transform
args: *any[]*	the arguments that you may need included in your transform. Mark optional args with the ? operator like so transform(value, arg1, arg2?)

The pipe | character is used to apply pipes in Angular 2. Pipes are very similar to filters in AngularJS in that they both help to transform the data into a specified format.

Section 14.1: Custom Pipes

my.pipe.ts

```
import { Pipe, PipeTransform } from '@angular/core';

@Pipe({name: 'myPipe'})
export class MyPipe implements PipeTransform {

  transform(value:any, args?: any):string {
    let transformedValue = value; // implement your transformation logic here
    return transformedValue;
  }

}
```

my.component.ts

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

@Component({
  selector: 'my-component',
  template: `{{ value | myPipe }}`
})
export class MyComponent {

    public value:any;

}
```

my.module.ts

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

import { MyComponent } from './my.component';
import { MyPipe } from './my.pipe';

@NgModule({
  imports: [
    BrowserModule,
  ],
```

```
  declarations: [
    MyComponent,
    MyPipe
  ],
})
export class MyModule { }
```

Section 14.2: Built-in Pipes

Angular2 comes with a few built-in pipes:

Pipe	Usage	Example
DatePipe	date	`{{ dateObj | date }} // output is 'Jun 15, 2015'`
UpperCasePipe	uppercase	`{{ value | uppercase }} // output is 'SOMETEXT'`
LowerCasePipe	lowercase	`{{ value | lowercase }} // output is 'sometext'`
CurrencyPipe	currency	`{{ 31.00 | currency:'USD':true }} // output is '$31'`
PercentPipe	percent	`{{ 0.03 | percent }} //output is %3`

There are others. Look here for their documentation.

Example

hotel-reservation.component.ts

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

@Component({
    moduleId: module.id,
    selector: 'hotel-reservation',
    templateUrl: './hotel-reservation.template.html'
})
export class HotelReservationComponent {
    public fName: string =  'Joe';
    public lName: string = 'SCHMO';
    public reservationMade: string = '2016-06-22T07:18-08:00'
    public reservationFor: string = '2025-11-14';
    public cost: number = 99.99;
}
```

hotel-reservation.template.html

```
<div>
    <h1>Welcome back {{fName | uppercase}} {{lName | lowercase}}</h1>
    <p>
        On {reservationMade | date} at {reservationMade | date:'shortTime'} you
        reserved room 205 for {reservationDate | date} for a total cost of
        {cost | currency}.
    </p>
</div>
```

Output

```
Welcome back JOE schmo
On Jun 26, 2016 at 7:18 you reserved room 205 for Nov 14, 2025 for a total cost of
$99.99.
```

Section 14.3: Chaining Pipes

Pipes may be chained.

```
<p>Today is {{ today | date:'fullDate' | uppercase}}.</p>
```

Section 14.4: Debugging With JsonPipe

The JsonPipe can be used for debugging the state of any given internal.

Code

```
@Component({
  selector: 'json-example',
  template: `<div>
    <p>Without JSON pipe:</p>
    <pre>{{object}}</pre>
    <p>With JSON pipe:</p>
    <pre>{{object | json}}</pre>
  </div>`
})
export class JsonPipeExample {
  object: Object = {foo: 'bar', baz: 'qux', nested: {xyz: 3, numbers: [1, 2, 3, 4, 5]}};
}
```

Output

```
Without JSON Pipe:
object
With JSON pipe:
{object:{foo: 'bar', baz: 'qux', nested: {xyz: 3, numbers: [1, 2, 3, 4, 5]}}
```

Section 14.5: Dynamic Pipe

Use case scenario: A table view consists of different columns with different data format that needs to be transformed with different pipes.

table.component.ts

```
...
import { DYNAMIC_PIPES } from '../pipes/dynamic.pipe.ts';

@Component({
    ...
    pipes: [DYNAMIC_PIPES]
})
export class TableComponent {
    ...

    // pipes to be used for each column
    table.pipes = [ null, null, null, 'humanizeDate', 'statusFromBoolean' ],
    table.header = [ 'id', 'title', 'url', 'created', 'status' ],
    table.rows = [
        [ 1, 'Home', 'home', '2016-08-27T17:48:32', true ],
        [ 2, 'About Us', 'about', '2016-08-28T08:42:09', true ],
        [ 4, 'Contact Us', 'contact', '2016-08-28T13:28:18', false ],
        ...
    ]
    ...

}
```

dynamic.pipe.ts

```
import {
    Pipe,
```

```
    PipeTransform
} from '@angular/core';
// Library used to humanize a date in this example
import * as moment from 'moment';

@Pipe({name: 'dynamic'})
export class DynamicPipe implements PipeTransform {

    transform(value:string, modifier:string) {
        if (!modifier) return value;
        // Evaluate pipe string
        return eval('this.' + modifier + '(\'' + value + '\')')
    }

    // Returns 'enabled' or 'disabled' based on input value
    statusFromBoolean(value:string):string {
        switch (value) {
            case 'true':
            case '1':
                return 'enabled';
            default:
                return 'disabled';
        }
    }

    // Returns a human friendly time format e.g: '14 minutes ago', 'yesterday'
    humanizeDate(value:string):string {
        // Humanize if date difference is within a week from now else returns 'December 20, 2016'
format
        if (moment().diff(moment(value), 'days') < 8) return moment(value).fromNow();
        return moment(value).format('MMMM Do YYYY');
    }
}

export const DYNAMIC_PIPES = [DynamicPipe];
```

table.component.html

```
<table>
    <thead>
        <td *ngFor="let head of data.header">{{ head }}</td>
    </thead>
    <tr *ngFor="let row of table.rows; let i = index">
        <td *ngFor="let column of row">{{ column | dynamic:table.pipes[i] }}</td>
    </tr>
</table>
```

Result

```
| ID | Page Title     | Page URL    | Created          | Status     |
-----------------------------------------------------------------------
|  1 | Home           | home        | 4 minutes ago    | Enabled    |
|  2 | About Us       | about       | Yesterday        | Enabled    |
|  4 | Contact Us     | contact     | Yesterday        | Disabled   |
-----------------------------------------------------------------------
```

Section 14.6: Unwrap async values with async pipe

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

```
import { Observable } from 'rxjs/Observable';
import 'rxjs/add/observable/of';

@Component({
  selector: 'async-stuff',
  template: `
    <h1>Hello, {{ name | async }}</h1>
    Your Friends are:
    <ul>
      <li *ngFor="let friend of friends | async">
        {{friend}}
      </li>
    </ul>
  `
})
class AsyncStuffComponent {
  name = Promise.resolve('Misko');
  friends = Observable.of(['Igor']);
}
```

Becomes:

```
<h1>Hello, Misko</h1>
Your Friends are:
<ul>
  <li>
    Igor
  </li>
</ul>
```

Section 14.7: Stateful Pipes

Angular 2 offers two different types of pipes - stateless and stateful. Pipes are stateless by default. However, we can implement stateful pipes by setting the `pure` property to **`false`**. As you can see in the parameter section, you can specify a `name` and declare whether the pipe should be pure or not, meaning stateful or stateless. While data flows through a stateless pipe (which is a pure function) that **does not** remember anything, data can be managed and remembered by stateful pipes. A good example of a stateful pipe is the `AsyncPipe` that is provided by Angular 2.

Important

Notice that most pipes should fall into the category of stateless pipes. That's important for performance reasons since Angular can optimize stateless pipes for the change detector. So use stateful pipes cautiously. In general, the optimization of pipes in Angular 2 have a major performance enhancement over filters in Angular 1.x. In Angular 1 the digest cycle always had to re-run all filters even though the data hasn't changed at all. In Angular 2, once a pipe's value has been computed, the change detector knows not to run this pipe again unless the input changes.

Implementation of a stateful pipe

```
import {Pipe, PipeTransform, OnDestroy} from '@angular/core';

@Pipe({
  name: 'countdown',
  pure: false
})
export class CountdownPipe implements PipeTransform, OnDestroy  {
  private interval: any;
  private remainingTime: number;
```

```
  transform(value: number, interval: number = 1000): number {
    if (!parseInt(value, 10)) {
      return null;
    }

    if (typeof this.remainingTime !== 'number') {
      this.remainingTime = parseInt(value, 10);
    }

    if (!this.interval) {
      this.interval = setInterval(() => {
        this.remainingTime--;

        if (this.remainingTime <= 0) {
          this.remainingTime = 0;
          clearInterval(this.interval);
          delete this.interval;
        }
      }, interval);
    }

    return this.remainingTime;
  }

  ngOnDestroy(): void {
    if (this.interval) {
      clearInterval(this.interval);
    }
  }
}
```

You can then use the pipe as usual:

```
{{ 1000 | countdown:50 }}
{{ 300 | countdown }}
```

It's important that your pipe also implements the `OnDestroy` interface so you can clean up once your pipe gets destroyed. In the example above, it's necessary to clear the interval to avoid memory leaks.

Section 14.8: Creating Custom Pipe

app/pipes.pipe.ts

```
import { Pipe, PipeTransform } from '@angular/core';

@Pipe({name: 'truthy'})
export class Truthy implements PipeTransform {
  transform(value: any, truthy: string, falsey: string): any {
    if (typeof value === 'boolean'){return value ? truthy : falsey;}
    else return value
  }
}
```

app/my-component.component.ts

```
import { Truthy} from './pipes.pipe';

@Component({
  selector: 'my-component',
```

```
  template: `
    <p>{{value | truthy:'enabled':'disabled' }}</p>
  `,
  pipes: [Truthy]
})
export class MyComponent{ }
```

Section 14.9: Globally Available Custom Pipe

To make a custom pipe available application wide, During application bootstrap, extending PLATFORM_PIPES.

```
import { bootstrap }    from '@angular/platform-browser-dynamic';
import { provide, PLATFORM_PIPES } from '@angular/core';

import { AppComponent } from './app.component';
import { MyPipe } from './my.pipe'; // your custom pipe

bootstrap(AppComponent, [
  provide(PLATFORM_PIPES, {
            useValue: [
                MyPipe
            ],
            multi: true
        })
]);
```

Tutorial here: https://scotch.io/tutorials/create-a-globally-available-custom-pipe-in-angular-2

Section 14.10: Extending an Existing Pipe

```
import { Pipe, PipeTransform } from '@angular/core';
import { DatePipe } from '@angular/common'


@Pipe({name: 'ifDate'})
export class IfDate implements PipeTransform {
  private datePipe: DatePipe = new DatePipe();

  transform(value: any, pattern?:string) : any {
    if (typeof value === 'number') {return value}
    try {
      return this.datePipe.transform(value, pattern)
    } catch(err) {
      return value
    }
  }
}
```

Section 14.11: Testing a pipe

Given a pipe that reverse a string

```
import { Pipe, PipeTransform } from '@angular/core';

@Pipe({ name: 'reverse' })
export class ReversePipe implements PipeTransform {
  transform(value: string): string {
    return value.split('').reverse().join('');
```

```
  }
}
```

It can be tested configuring the spec file like this

```
import { TestBed, inject } from '@angular/core/testing';

import { ReversePipe } from './reverse.pipe';

describe('ReversePipe', () => {
  beforeEach(() => {
    TestBed.configureTestingModule({
      providers: [ReversePipe],
    });
  });

  it('should be created', inject([ReversePipe], (reversePipe: ReversePipe) => {
    expect(reversePipe).toBeTruthy();
  }));

  it('should reverse a string', inject([ReversePipe], (reversePipe: ReversePipe) => {
    expect(reversePipe.transform('abc')).toEqual('cba');
  }));
});
```

Chapter 15: OrderBy Pipe

How to write order pipe and use it.

Section 15.1: The Pipe

The Pipe implementation

```
import {Pipe, PipeTransform} from '@angular/core';

@Pipe({
  name: 'orderBy',
  pure: false
})
export class OrderBy implements PipeTransform {

  value:string[] =[];

  static _orderByComparator(a:any, b:any):number{

    if(a === null || typeof a === 'undefined') a = 0;
    if(b === null || typeof b === 'undefined') b = 0;

    if((isNaN(parseFloat(a)) || !isFinite(a)) || (isNaN(parseFloat(b)) || !isFinite(b))){
      //Isn't a number so lowercase the string to properly compare
      if(a.toLowerCase() < b.toLowerCase()) return -1;
      if(a.toLowerCase() > b.toLowerCase()) return 1;
    }else{
      //Parse strings as numbers to compare properly
      if(parseFloat(a) < parseFloat(b)) return -1;
      if(parseFloat(a) > parseFloat(b)) return 1;
    }

    return 0; //equal each other
  }

  transform(input:any, config:string = '+'): any{

    //make a copy of the input's reference
    this.value = [...input];
    let value = this.value;

    if(!Array.isArray(value)) return value;

    if(!Array.isArray(config) || (Array.isArray(config) && config.length === 1)){
      let propertyToCheck:string = !Array.isArray(config) ? config : config[0];
      let desc = propertyToCheck.substr(0, 1) === '-';

      //Basic array
      if(!propertyToCheck || propertyToCheck === '-' || propertyToCheck === '+'){
        return !desc ? value.sort() : value.sort().reverse();
      }else {
        let property:string = propertyToCheck.substr(0, 1) === '+' || propertyToCheck.substr(0, 1)
=== '-'
          ? propertyToCheck.substr(1)
          : propertyToCheck;

        return value.sort(function(a:any,b:any){
```

```
          return !desc
            ? OrderBy._orderByComparator(a[property], b[property])
            : -OrderBy._orderByComparator(a[property], b[property]);
        });
      }
    } else {
      //Loop over property of the array in order and sort
      return value.sort(function(a:any,b:any){
        for(let i:number = 0; i < config.length; i++){
          let desc = config[i].substr(0, 1) === '-';
          let property = config[i].substr(0, 1) === '+' || config[i].substr(0, 1) === '-'
            ? config[i].substr(1)
            : config[i];

          let comparison = !desc
            ? OrderBy._orderByComparator(a[property], b[property])
            : -OrderBy._orderByComparator(a[property], b[property]);

          //Don't return 0 yet in case of needing to sort by next property
          if(comparison !== 0) return comparison;
        }

        return 0; //equal each other
      });
    }
  }
}
```

How to use the pipe in the HTML - order ascending by first name

```
<table>
   <thead>
    <tr>
     <th>First Name</th>
     <th>Last Name</th>
    <th>Age</th>
    </tr>
</thead>
<tbody>
   <tr *ngFor="let user of users | orderBy : ['firstName']>
       <td>{{user.firstName}}</td>
       <td>{{user.lastName}}</td>
       <td>{{user.age}}</td>
   </tr>
</tbody>
</table>
```

How to use the pipe in the HTML - order descending by first name

```
<table>
   <thead>
    <tr>
     <th>First Name</th>
     <th>Last Name</th>
    <th>Age</th>
    </tr>
</thead>
<tbody>
```

```
    <tr *ngFor="let user of users | orderBy : ['-firstName']>
        <td>{{user.firstName}}</td>
        <td>{{user.lastName}}</td>
        <td>{{user.age}}</td>
    </tr>
</tbody>
</table>
```

Chapter 16: Angular 2 Custom Validations

parameter	description
control	This is the control that is being validated. Typically you will want to see if control.value meets some criteria.

Section 16.1: get/set formBuilder controls parameters

There are 2 ways to set formBuilder controls parameters.

1. On initialize:

```
exampleForm : FormGroup;
constructor(fb: FormBuilder){
  this.exampleForm = fb.group({
      name : new FormControl({value: 'default name'}, Validators.compose([Validators.required,
Validators.maxLength(15)]))
   });
}
```

2.After initialize:

```
this.exampleForm.controls['name'].setValue('default name');
```

Get formBuilder control value:

```
let name = this.exampleForm.controls['name'].value();
```

Section 16.2: Custom validator examples:

Angular 2 has two kinds of custom validators. Synchronous validators as in the first example that will run directly on the client and asynchronous validators (the second example) that you can use to call a remote service to do the validation for you. In this example the validator should call the server to see if a value is unique.

```
export class CustomValidators {

static cannotContainSpace(control: Control) {
    if (control.value.indexOf(' ') >= 0)
        return { cannotContainSpace: true };

    return null;
}

static shouldBeUnique(control: Control) {
    return new Promise((resolve, reject) => {
        // Fake a remote validator.
        setTimeout(function () {
            if (control.value == "exisitingUser")
                resolve({ shouldBeUnique: true });
            else
                resolve(null);
        }, 1000);
    });
}}
```

If your control value is valid you simply return null to the caller. Otherwise you can return an object which describes

the error.

Section 16.3: Using validators in the Formbuilder

```
   constructor(fb: FormBuilder) {
    this.form = fb.group({
        firstInput: ['', Validators.compose([Validators.required,
CustomValidators.cannotContainSpace]), CustomValidators.shouldBeUnique],
        secondInput: ['', Validators.required]
    });
}
```

Here we use the FormBuilder to create a very basic form with two input boxes. The FromBuilder takes an array for three arguments for each input control.

1. The default value of the control.
2. The validators that will run on the client. You can use Validators.compose([arrayOfValidators]) to apply multiple validators on your control.
3. One or more async validators in a similar fashion as the second argument.

Chapter 17: Routing

Section 17.1: ResolveData

This example will show you how you can resolve data fetched from a service before rendering your application's view.

Uses angular/router 3.0.0-beta.2 at the time of writing

users.service.ts

```
...
import { Http, Response } from '@angular/http';
import { Observable } from 'rxjs/Rx';
import { User } from './user.ts';



@Injectable()
export class UsersService {

    constructor(public http:Http) {}

    /**
     * Returns all users
     * @returns {Observable<User[]>}
     */
    index():Observable<User[]> {

        return this.http.get('http://mywebsite.com/api/v1/users')
            .map((res:Response) => res.json());
    }

    /**
     * Returns a user by ID
     * @param id
     * @returns {Observable<User>}
     */
    get(id:number|string):Observable<User> {

        return this.http.get('http://mywebsite.com/api/v1/users/' + id)
            .map((res:Response) => res.json());
    }
}
```

users.resolver.ts

```
...
import { UsersService } from './users.service.ts';
import { Observable } from 'rxjs/Rx';
import {
    Resolve,
    ActivatedRouteSnapshot,
    RouterStateSnapshot
} from "@angular/router";
```

```
@Injectable()
export class UsersResolver implements Resolve<User[] | User> {

    // Inject UsersService into the resolver
    constructor(private service:UsersService) {}

    resolve(route:ActivatedRouteSnapshot, state:RouterStateSnapshot):Observable<User[] | User> {
        // If userId param exists in current URL, return a single user, else return all users
        // Uses brackets notation to access `id` to suppress editor warning, may use dot notation if
you create an interface extending ActivatedRoute with an optional id? attribute
        if (route.params['id']) return this.service.get(route.params['id']);
        return this.service.index();
    }
}
```

users.component.ts

This is a page component with a list of all users. It will work similarly for User detail page component, replace `data.users` with `data.user` or whatever key defined in *app.routes.ts*(see below)

```
...
import { ActivatedRoute} from "@angular/router";



@Component(...)
export class UsersComponent {

    users:User[];


    constructor(route: ActivatedRoute) {
        route.data.subscribe(data => {
            // data['Match key defined in RouterConfig, see below']
            this.users = data.users;
        });
    }

    /**
     * It is not required to unsubscribe from the resolver as Angular's HTTP
     * automatically completes the subscription when data is received from the server
     */
}
```

app.routes.ts

```
...
import { UsersResolver } from './resolvers/users.resolver';



export const routes:RouterConfig = <RouterConfig>[
    ...
    {
        path: 'user/:id',
        component: UserComponent,
        resolve: {
            // hence data.user in UserComponent
            user: UsersResolver
        }
```

```
    },
    {
        path: 'users',
        component: UsersComponent,
        resolve: {
            // hence data.users in UsersComponent, note the pluralisation
            users: UsersResolver
        }
    },
    ...
]
...
```

app.resolver.ts

Optionally bundle multiple resolvers together.

IMPORTANT: *Services used in resolver must be imported first or you will get a 'No provider for ..Resolver error'. Remember that these services will be available globally and you will not need to declare them in any component's* `providers` *anymore. Be sure to unsubscribe from any subscription to prevent memory leak*

```
...
import { UsersService } from './users.service';
import { UsersResolver } from './users.resolver';

export const ROUTE_RESOLVERS = [
    ...,
    UsersService,
    UsersResolver
]
```

main.browser.ts

Resolvers have to be injected during bootstrapping.

```
...
import {bootstrap} from '@angular/platform-browser-dynamic';
import { ROUTE_RESOLVERS } from './app.resolver';

bootstrap(<Type>App, [
    ...
    ...ROUTE_RESOLVERS
])
.catch(err => console.error(err));
```

Section 17.2: Routing with Children

Contrary to original documentation, I found this to be the way to properly nest children routes inside the app.routing.ts or app.module.ts file (depending on your preference). This approach works when using either WebPack or SystemJS.

The example below shows routes for home, home/counter, and home/counter/fetch-data. The first and last routes being examples of redirects. Finally at the end of the example is a proper way to export the Route to be imported in a separate file. For ex. app.module.ts

To further explain, Angular requires that you have a pathless route in the children array that includes the parent component, to represent the parent route. It's a little confusing but if you think about a blank URL for a child route,

it would essentially equal the same URL as the parent route.

```
import { NgModule } from "@angular/core";
import { RouterModule, Routes } from "@angular/router";

import { HomeComponent } from "./components/home/home.component";
import { FetchDataComponent } from "./components/fetchdata/fetchdata.component";
import { CounterComponent } from "./components/counter/counter.component";

const appRoutes: Routes = [
    {
        path: "",
        redirectTo: "home",
        pathMatch: "full"
    },
    {
        path: "home",
        children: [
            {
                path: "",
                component: HomeComponent
            },
            {
                path: "counter",
                children: [
                    {
                        path: "",
                        component: CounterComponent
                    },
                    {
                        path: "fetch-data",
                        component: FetchDataComponent
                    }
                ]
            }
        ]
    },
    {
        path: "**",
        redirectTo: "home"
    }
];

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

Great Example and Description via Siraj

Section 17.3: Basic Routing

Router enables navigation from one view to another based on user interactions with the application.

Following are the steps in implementing basic routing in Angular 2 -

Basic precaution: Ensure you have the tag

```
    <base href='/'>
```

as the first child under your head tag in your index.html file. This tag tells that your app folder is the application root. Angular 2 would then know to organize your links.

First step is to check if you are pointing to correct/latest routing dependencies in package.json -

```
"dependencies": {
  ......
  "@angular/router": "3.0.0-beta.1",
  ......
}
```

Second step is to define the route as per it's class definition -

```
class Route {
  path : string
  pathMatch : 'full'|'prefix'
  component : Type|string
  .........
}
```

In a routes file (`route/routes.ts`), import all the components which you need to configure for different routing paths. Empty path means that view is loaded by default. ":" in the path indicates dynamic parameter passed to the loaded component.

Routes are made available to application via dependency injection. ProviderRouter method is called with RouterConfig as parameter so that it can be injected to the components for calling routing specific tasks.

```
import { provideRouter, RouterConfig } from '@angular/router';
import { BarDetailComponent } from '../components/bar-detail.component';
import { DashboardComponent } from '../components/dashboard.component';
import { LoginComponent } from '../components/login.component';
import { SignupComponent } from '../components/signup.component';

export const appRoutes: RouterConfig = [
  { path: '', pathMatch: 'full', redirectTo: 'login' },
  { path: 'dashboard', component: DashboardComponent },
  { path: 'bars/:id', component: BarDetailComponent },
  { path: 'login', component: LoginComponent },
  { path: 'signup',   component: SignupComponent }
];

export const APP_ROUTER_PROVIDER = [provideRouter(appRoutes)];
```

Third step is to bootstrap the route provider.

In your `main.ts` (It can be any name. basically, it should your main file defined in systemjs.config)

```
import { bootstrap } from '@angular/platform-browser-dynamic';
import { AppComponent } from './components/app.component';
import { APP_ROUTER_PROVIDER } from "./routes/routes";

bootstrap(AppComponent, [ APP_ROUTER_PROVIDER ]).catch(err => console.error(err));
```

Fourth step is to load/display the router components based on path accessed. directive is used to tell angular where to load the component. To use import the ROUTER_DIRECTIVES.

```
import { ROUTER_DIRECTIVES } from '@angular/router';

@Component({
  selector: 'demo-app',
  template: `
    .....................................
    <div>
      <router-outlet></router-outlet>
    </div>
    .....................................
  `,
  // Add our router directives we will be using
  directives: [ROUTER_DIRECTIVES]
})
```

Fifth step is to link the other routes. By default, RouterOutlet will load the component for which empty path is specified in the RouterConfig. RouterLink directive is used with html anchor tag to load the components attached to routes. RouterLink generates the href attribute which is used to generate links. For Ex:

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

@Component({
  selector: 'demo-app',
  template: `
    <a [routerLink]="['/login']">Login</a>
    <a [routerLink]="['/signup']">Signup</a>
    <a [routerLink]="['/dashboard']">Dashboard</a>
    <div>
      <router-outlet></router-outlet>
    </div>
  `,
  // Add our router directives we will be using
  directives: [ROUTER_DIRECTIVES]
})
export class AppComponent { }
```

Now, we are good with routing to static path. RouterLink support dynamic path also by passing extra parameters along with the path.

import { Component } from '@angular/core'; import { ROUTER_DIRECTIVES } from '@angular/router';

```
@Component({
  selector: 'demo-app',
  template: `
        <ul>
          <li *ngFor="let bar of bars | async">
            <a [routerLink]="['/bars', bar.id]">
              {{bar.name}}
            </a>
          </li>
        </ul>
    <div>
      <router-outlet></router-outlet>
    </div>
  `,
```

```
  // Add our router directives we will be using
  directives: [ROUTER_DIRECTIVES]
})
export class AppComponent { }
```

RouterLink takes an array where first element is the path for routing and subsequent elements are for the dynamic routing parameters.

Section 17.4: Child Routes

Sometimes it makes sense to nest view's or routes within one another. For example on the dashboard you want several sub views, similar to tabs but implemented via the routing system, to show the users' projects, contacts, messages ets. In order to support such scenarios the router allows us to define child routes.

First we adjust our `RouterConfig` from above and add the child routes:

```
import { ProjectsComponent } from '../components/projects.component';
import { MessagesComponent} from '../components/messages.component';

export const appRoutes: RouterConfig = [
  { path: '', pathMatch: 'full', redirectTo: 'login' },
  { path: 'dashboard', component: DashboardComponent,
    children: [
      { path: '', redirectTo: 'projects', pathMatch: 'full' },
      { path: 'projects', component: 'ProjectsComponent' },
      { path: 'messages', component: 'MessagesComponent' }
    ] },
  { path: 'bars/:id', component: BarDetailComponent },
  { path: 'login', component: LoginComponent },
  { path: 'signup',   component: SignupComponent }
];
```

Now that we have our child routes defined we have to make sure those child routes can be displayed within our `DashboardComponent`, since that's where we have added the childs to. Previously we have learned that the components are displayed in a **`<router-outlet></router-outlet>`** tag. Similar we declare another `RouterOutlet` in the `DashboardComponent`:

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

@Component({
  selector: 'dashboard',
  template: `
    <a [routerLink]="['projects']">Projects</a>
    <a [routerLink]="['messages']">Messages</a>
    <div>
      <router-outlet></router-outlet>
    </div>
  `
})
export class DashboardComponent { }
```

As you can see, we have added another `RouterOutlet` in which the child routes will be displayed. Usually the route with an empty path will be shown, however, we set up a redirect to the `projects` route, because we want that to be shown immediately when the `dashboard` route is loaded. That being said, we need an empty route, otherwise you'll get an error like this:

```
Cannot match any routes: 'dashboard'
```

So by adding the *empty* route, meaning a route with an empty path, we have defined an entry point for the router.

Chapter 18: Routing (3.0.0+)

Section 18.1: Controlling Access to or from a Route

The default Angular router allows navigation to and from any route unconditionally. This is not always the desired behavior.

In a scenario where a user may conditionally be allowed to navigate to or from a route, a **Route Guard** may be used to restrict this behavior.

If your scenario fits one of the following, consider using a Route Guard,

- User is required to be authenticated to navigate to the target component.
- User is required to be authorized to navigate to the target component.
- Component requires asynchronous request before initialization.
- Component requires user input before navigated away from.

How Route Guards work

Route Guards work by returning a boolean value to control the behavior of router navigation. If *true* is returned, the router will continue with navigation to the target component. If *false* is returned, the router will deny navigation to the target component.

Route Guard Interfaces

The router supports multiple guard interfaces:

- *CanActivate*: occurs between route navigation.
- *CanActivateChild*: occurs between route navigation to a child route.
- *CanDeactivate*: occurs when navigating away from the current route.
- *CanLoad*: occurs between route navigation to a feature module loaded asynchronously.
- *Resolve*: used to perform data retrieval before route activation.

These interfaces can be implemented in your guard to grant or remove access to certain processes of the navigation.

Synchronous vs. Asynchronous Route Guards

Route Guards allow synchronous and asynchronous operations to conditionally control navigation.

Synchronous Route Guard

A synchronous route guard returns a boolean, such as by computing an immediate result, in order to conditionally control navigation.

```
import { Injectable }     from '@angular/core';
import { CanActivate }    from '@angular/router';

@Injectable()
export class SynchronousGuard implements CanActivate {
  canActivate() {
```

```
    console.log('SynchronousGuard#canActivate called');
    return true;
  }
}
```

Asynchronous Route Guard

For more complex behavior, a route guard can asynchronously block navigation. An asynchronous route guard can return an Observable or Promise.

This is useful for situations like waiting for user input to answer a question, waiting to successfully save changes to the server, or waiting to receive data fetched from a remote server.

```
import { Injectable }     from '@angular/core';
import { CanActivate, Router, ActivatedRouteSnapshot, RouterStateSnapshot } from '@angular/router';
import { Observable }     from 'rxjs/Rx';
import { MockAuthenticationService } from './authentication/authentication.service';

@Injectable()
export class AsynchronousGuard implements CanActivate {
    constructor(private router: Router, private auth: MockAuthenticationService) {}

    canActivate(route:ActivatedRouteSnapshot,
state:RouterStateSnapshot):Observable<boolean>|boolean {
        this.auth.subscribe((authenticated) => {
            if (authenticated) {
                return true;
            }
            this.router.navigateByUrl('/login');
            return false;
        });
    }
}
```

Section 18.2: Add guard to route configuration

File *app.routes*

Protected routes have `canActivate` binded to `Guard`

```
import { provideRouter, Router, RouterConfig, CanActivate } from '@angular/router';

//components
import { LoginComponent } from './login/login.component';
import { DashboardComponent } from './dashboard/dashboard.component';

export const routes: RouterConfig = [
    { path: 'login', component: LoginComponent },
    { path: 'dashboard', component: DashboardComponent, canActivate: [AuthGuard] }
}
```

Export the **APP_ROUTER_PROVIDERS** to be used in app bootstrap

```
export const APP_ROUTER_PROVIDERS = [
    AuthGuard,
    provideRouter(routes)
];
```

Section 18.3: Using Resolvers and Guards

We're using a toplevel guard in our route config to catch the current user on first page load, and a resolver to store the value of the `currentUser`, which is our authenticated user from the backend.

A simplified version of our implementation looks as follows:

Here is our top level route:

```
export const routes = [
{
  path: 'Dash',
  pathMatch : 'prefix',
  component: DashCmp,
  canActivate: [AuthGuard],
  resolve: {
      currentUser: CurrentUserResolver
  },
  children: [...[
    path: '',
    component: ProfileCmp,
    resolve: {
        currentUser: currentUser
    }
  ]]
  }
];
```

Here is our `AuthService`

```
import { Injectable } from '@angular/core';
import { Http, Headers, RequestOptions } from '@angular/http';
import { Observable } from 'rxjs/Rx';
import 'rxjs/add/operator/do';

@Injectable()
export class AuthService {
  constructor(http: Http) {
    this.http = http;

    let headers = new Headers({ 'Content-Type': 'application/json' });
    this.options = new RequestOptions({ headers: headers });
  }
  fetchCurrentUser() {
    return this.http.get('/api/users/me')
      .map(res => res.json())
      .do(val => this.currentUser = val);
 }
}
```

Here is our `AuthGuard`:

```
import { Injectable } from '@angular/core';
import { CanActivate } from "@angular/router";
import { Observable } from 'rxjs/Rx';

import { AuthService } from '../services/AuthService';

@Injectable()
```

```
export class AuthGuard implements CanActivate {
  constructor(auth: AuthService) {
    this.auth = auth;
  }
  canActivate(route, state) {
    return Observable
      .merge(this.auth.fetchCurrentUser(), Observable.of(true))
      .filter(x => x == true);
  }
}
```

Here is our `CurrentUserResolver`:

```
import { Injectable } from '@angular/core';
import { Resolve } from "@angular/router";
import { Observable } from 'rxjs/Rx';

import { AuthService } from '../services/AuthService';

@Injectable()
export class CurrentUserResolver implements Resolve {
  constructor(auth: AuthService) {
    this.auth = auth;
  }
  resolve(route, state) {
    return this.auth.currentUser;
  }
}
```

Section 18.4: Use Guard in app bootstrap

File *main.ts* (or *boot.ts*)

Consider the examples above:

1. **Create the guard** (where the Guard is created) and
2. **Add guard to route configuration**, (where the Guard is configured for route, then **APP_ROUTER_PROVIDERS** is exported),
   we can couple the bootstrap to Guard as follows

```
import { bootstrap } from '@angular/platform-browser-dynamic';
import { provide } from '@angular/core';

import { APP_ROUTER_PROVIDERS } from './app.routes';
import { AppComponent } from './app.component';

bootstrap(AppComponent, [
    APP_ROUTER_PROVIDERS
])
.then(success => console.log(`Bootstrap success`))
.catch(error => console.log(error));
```

Section 18.5: Bootstrapping

Now that the routes are defined, we need to let our application know about the routes. To do this, bootstrap the provider we exported in the previous example.

Find your bootstrap configuration (should be in `main.ts`, but **your mileage may vary**).

```
//main.ts

import {bootstrap} from '@angular/platform-browser-dynamic';

//Import the App component (root component)
import { App } from './app/app';

//Also import the app routes
import { APP_ROUTES_PROVIDER } from './app/app.routes';

bootstrap(App, [
  APP_ROUTES_PROVIDER,
])
.catch(err => console.error(err));
```

Section 18.6: Configuring router-outlet

Now that the router is configured and our app knows how to handle the routes, we need to show the actual components that we configured.

To do so, configure your HTML template/file for your **top-level (app)** component like so:

```
//app.ts

import {Component} from '@angular/core';
import {Router, ROUTER_DIRECTIVES} from '@angular/router';

@Component({
    selector: 'app',
    templateUrl: 'app.html',
    styleUrls: ['app.css'],
    directives: [
        ROUTER_DIRECTIVES,
    ]
})
export class App {
    constructor() {
    }
}

<!-- app.html -->

<!-- All of your 'views' will go here -->
<router-outlet></router-outlet>
```

The `<router-outlet></router-outlet>` element will switch the content given the route. Another good aspect about this element is that it *does not* have to be the only element in your HTML.

For example: Lets say you wanted a a toolbar on every page that stays constant between routes, similar to how Stack Overflow looks. You can nest the `<router-outlet>` under elements so that only certain parts of the page change.

Section 18.7: Changing routes (using templates & directives)

Now that the routes are set up, we need some way to actually change routes.

This example will show how to change routes using the template, but it is possible to change routes in TypeScript.

Here is one example (without binding):

```
<a routerLink="/home">Home</a>
```

If the user clicks on that link, it will route to `/home`. The router knows how to handle `/home`, so it will display the `Home` Component.

Here is an example with data binding:

```
<a *ngFor="let link of links" [routerLink]="link">{{link}}</a>
```

Which would require an array called `links` to exist, so add this to `app.ts`:

```
public links[] = [
    'home',
    'login'
]
```

This will loop through the array and add an `<a>` element with the `routerLink` directive = the value of the current element in the array, creating this:

```
<a routerLink="home">home</a>
<a routerLink="login">login</a>
```

This is particularly helpful if you have a lot of links, or maybe the links need to be constantly changed. We let Angular handle the busy work of adding links by just feeding it the info it requires.

Right now, `links[]` is static, but it is possible to feed it data from another source.

Section 18.8: Setting the Routes

NOTE: This example is based on the 3.0.0.-beta.2 release of the @angular/router. At the time of writing, this is the latest version of the router.

To use the router, define routes in a new TypeScript file like such

```
//app.routes.ts

import {provideRouter} from '@angular/router';

import {Home} from './routes/home/home';
import {Profile} from './routes/profile/profile';

export const routes = [
    {path: '', redirectTo: 'home'},
    {path: 'home', component: Home},
    {path: 'login', component: Login},
];

export const APP_ROUTES_PROVIDER = provideRouter(routes);
```

In the first line, we import `provideRouter` so we can let our application know what the routes are during the bootstrap phase.

`Home` and `Profile` are just two components as an example. You will need to import each `Component` you need as a route.

Then, export the array of routes.

`path`: The path to the component. **YOU DO NOT NEED TO USE '/.....'** Angular will do this automatically

`component`: The component to load when the route is accessed

`redirectTo`: *Optional*. If you need to automatically redirect a user when they access a particular route, supply this.

Finally, we export the configured router. `provideRouter` will return a provider that we can boostrap so our application knows how to handle each route.

Chapter 19: Dynamically add components using ViewContainerRef.createComponent

Section 19.1: A wrapper component that adds dynamic components declaratively

A custom component that takes the type of a component as input and creates an instance of that component type inside itself. When the input is updated, the previously added dynamic component is removed and the new one added instead.

```
@Component({
  selector: 'dcl-wrapper',
  template: `<div #target></div>`
})
export class DclWrapper {
  @ViewChild('target', {
    read: ViewContainerRef
  }) target;
  @Input() type;
  cmpRef: ComponentRef;
  private isViewInitialized: boolean = false;

  constructor(private resolver: ComponentResolver) {}

  updateComponent() {
    if (!this.isViewInitialized) {
      return;
    }
    if (this.cmpRef) {
      this.cmpRef.destroy();
    }
    this.resolver.resolveComponent(this.type).then((factory: ComponentFactory < any > ) => {
      this.cmpRef = this.target.createComponent(factory)
        // to access the created instance use
        // this.cmpRef.instance.someProperty = 'someValue';
        // this.cmpRef.instance.someOutput.subscribe(val => doSomething());
    });
  }

  ngOnChanges() {
    this.updateComponent();
  }

  ngAfterViewInit() {
    this.isViewInitialized = true;
    this.updateComponent();
  }

  ngOnDestroy() {
    if (this.cmpRef) {
      this.cmpRef.destroy();
    }
  }
}
```

This allows you to create dynamic components like

```
<dcl-wrapper [type]="someComponentType"></dcl-wrapper>
```

[Plunker example]

Section 19.2: Dynamically add component on specific event(click)

Main Component File:

```
//our root app component
import {Component, NgModule, ViewChild, ViewContainerRef, ComponentFactoryResolver, ComponentRef}
from '@angular/core'
import {BrowserModule} from '@angular/platform-browser'
import {ChildComponent} from './childComp.ts'

@Component({
  selector: 'my-app',
  template: `
    <div>
      <h2>Hello {{name}}</h2>
      <input type="button" value="Click me to add element" (click) = addElement()> // call the
function on click of the button
      <div #parent> </div> // Dynamic component will be loaded here
    </div>
  `,
})
export class App {
  name:string;

  @ViewChild('parent', {read: ViewContainerRef}) target: ViewContainerRef;
  private componentRef: ComponentRef<any>;

  constructor(private componentFactoryResolver: ComponentFactoryResolver) {
    this.name = 'Angular2'
  }

  addElement(){
    let childComponent = this.componentFactoryResolver.resolveComponentFactory(ChildComponent);
    this.componentRef = this.target.createComponent(childComponent);
  }
}
```

childComp.ts :

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

@Component({
  selector: 'child',
  template: `
    <p>This is Child</p>
  `,
})
export class ChildComponent {
  constructor(){

  }
}
```

app.module.ts :

```
@NgModule({
  imports: [ BrowserModule ],
  declarations: [ App, ChildComponent ],
  bootstrap: [ App ],
  entryComponents: [ChildComponent] // define the dynamic component here in module.ts
})
export class AppModule {}
```

Plunker example

Section 19.3: Rendered dynamically created component array on template HTML in Angular 2

We can create dynamic component and get the instances of component into an array and finally rendered it on template.

For example, we can can consider two widget component, ChartWidget and PatientWidget which extended the class WidgetComponent that I wanted to add in the container.

ChartWidget.ts

```
@Component({
selector: 'chart-widget',
templateUrl: 'chart-widget.component.html',
providers: [{provide: WidgetComponent, useExisting: forwardRef(() => ChartWidget) }]
})

export class ChartWidget extends WidgetComponent implements OnInit {
       constructor(ngEl: ElementRef, renderer: Renderer) {
    super(ngEl, renderer);
    }
    ngOnInit() {}
     close(){
      console.log('close');
    }
    refresh(){
      console.log('refresh');
    }
    ...
}
```

chart-widget.compoment.html (using primeng Panel)

```
<p-panel [style]="{'margin-bottom':'20px'}">
    <p-header>
        <div class="ui-helper-clearfix">
           <span class="ui-panel-title" style="font-size:14px;display:inline-block;margin-
top:2px">Chart Widget</span>
            <div class="ui-toolbar-group-right">
               <button pButton type="button" icon="fa-window-minimize"
(click)="minimize()"></button>
              <button pButton type="button" icon="fa-refresh" (click)="refresh()"></button>
              <button pButton type="button"  icon="fa-expand" (click)="expand()" ></button>
             <button pButton type="button" (click)="close()" icon="fa-window-close"></button>
                   </div>
               </div>
    </p-header>
      some data
```

```
</p-panel>
```

DataWidget.ts

```
@Component({
    selector: 'data-widget',
    templateUrl: 'data-widget.component.html',
    providers: [{provide: WidgetComponent, useExisting: forwardRef(() =>DataWidget) }]
    })

export class DataWidget extends WidgetComponent implements OnInit {
       constructor(ngEl: ElementRef, renderer: Renderer) {
    super(ngEl, renderer);
    }
    ngOnInit() {}
    close(){
      console.log('close');
    }
    refresh(){
      console.log('refresh');
    }
    ...
}
```

data-widget.compoment.html (same as chart-widget using primeng Panel)

WidgetComponent.ts

```
@Component({
  selector: 'widget',
  template: '<ng-content></ng-content>'
})
export  class WidgetComponent{
}
```

we can creat dynamic component instances by selecting the pre-existing components. For example,

```
@Component({

    selector: 'dynamic-component',
    template: `<div #container><ng-content></ng-content></div>`

})
export class DynamicComponent {
@ViewChild('container', {read: ViewContainerRef}) container: ViewContainerRef;

    public addComponent(ngItem: Type<WidgetComponent>): WidgetComponent {
    let factory = this.compFactoryResolver.resolveComponentFactory(ngItem);
    const ref = this.container.createComponent(factory);
    const newItem: WidgetComponent = ref.instance;
    this._elements.push(newItem);
    return newItem;
  }
}
```

Finally we use it in app component. app.component.ts

```
@Component({
  selector: 'app-root',
```

```
  templateUrl: './app/app.component.html',
  styleUrls: ['./app/app.component.css'],
  entryComponents: [ChartWidget,  DataWidget],
})

export class AppComponent {
   private elements: Array<WidgetComponent>=[];
   private WidgetClasses = {
      'ChartWidget': ChartWidget,
      'DataWidget': DataWidget
  }
  @ViewChild(DynamicComponent) dynamicComponent:DynamicComponent;

   addComponent(widget: string ): void{
     let ref= this.dynamicComponent.addComponent(this.WidgetClasses[widget]);
     this.elements.push(ref);
     console.log(this.elements);

     this.dynamicComponent.resetContainer();
  }
}
```

app.component.html

```
<button (click)="addComponent('ChartWidget')">Add ChartWidget</button>
<button (click)="addComponent('DataWidget')">Add DataWidget</button>

<dynamic-component [hidden]="true" ></dynamic-component>

<hr>
Dynamic Components
<hr>
<widget *ngFor="let item of elements">
    <div>{{item}}</div>
   <div [innerHTML]="item._ngEl.nativeElement.innerHTML | sanitizeHtml">
   </div>
</widget>
```

https://plnkr.co/edit/lugU2pPsSBd3XhPHiUP1?p=preview

Some modification by @yurzui to use mouse event on the widgets

view.directive.ts

import { ViewRef, Directive, Input, ViewContainerRef } from '@angular/core';

```
@Directive({
    selector: '[view]'
})
export class ViewDirective {
  constructor(private vcRef: ViewContainerRef) {}

  @Input()
  set view(view: ViewRef) {
    this.vcRef.clear();
    this.vcRef.insert(view);
  }

  ngOnDestroy() {
    this.vcRef.clear()
```

```
  }
}
```

app.component.ts

```
private elements: Array<{ view: ViewRef, component: WidgetComponent}> = [];

...
addComponent(widget: string ): void{
  let component = this.dynamicComponent.addComponent(this.WidgetClasses[widget]);
  let view: ViewRef = this.dynamicComponent.container.detach(0);
  this.elements.push({view,component});

  this.dynamicComponent.resetContainer();
}
```

app.component.html

```
<widget *ngFor="let item of elements">
  <ng-container *view="item.view"></ng-container>
</widget>
```

https://plnkr.co/edit/JHpIHR43SvJd0OxJVMfV?p=preview

Chapter 20: Installing 3rd party plugins with angular-cli@1.0.0-beta.10

Section 20.1: Add 3rd party library that does not have typings

> Notice, this is only for angular-cli up to 1.0.0-beta.10 version !

Some libraries or plugins may not have typings. Without these, TypeScript can't type check them and therefore causes compilation errors. These libraries can still be used but differently than imported modules.

1. Include a script reference to the library on your page (`index.html`)

```
<script src="//cdn.somewhe.re/lib.min.js" type="text/javascript"></script>
<script src="/local/path/to/lib.min.js" type="text/javascript"></script>
```

   - These scripts should add a global (eg. `THREE`, `mapbox`, `$`, etc.) or attach to a global

2. In the component that requires these, use `declare` to initialize a variable matching the global name used by the lib. This lets TypeScript know that it has already been initialized. 1

```
declare var <globalname>: any;
```

   Some libs attach to `window`, which would need to be extended in order to be accessible in the app.

```
interface WindowIntercom extends Window { Intercom: any; }
declare var window: WindowIntercom;
```

3. Use the lib in your components as needed.

```
@Component { ... }
export class AppComponent implements AfterViewInit {
    ...
    ngAfterViewInit() {
        var geometry = new THREE.BoxGeometry( 1, 1, 1 );
        window.Intercom('boot', { ... }
    }
}
```

   - NOTE: Some libs may interact with the DOM and should be used in the appropriate component lifecycle method.

Section 20.2: Adding jquery library in angular-cli project

1. Install jquery via npm :

```
npm install jquery --save
```

> Install typings for the library:

To add typings for a library, do the following:

```
typings install jquery --global --save
```

2. Add jquery to angular-cli-build.js file to vendorNpmFiles array:

   This is required so the build system will pick up the file. After setup the angular-cli-build.js should look like this:

> Browse the `node_modules` and look for files and folders you want to add to the vendor folder.

```
var Angular2App = require('angular-cli/lib/broccoli/angular2-app');

module.exports = function(defaults) {
  return new Angular2App(defaults, {
    vendorNpmFiles: [
      // ...
      'jquery/dist/*.js'


    ]
  });
};
```

3. Configure SystemJS mappings to know where to look for jquery :

   SystemJS configuration is located in system-config.ts and after the custom configuration is done the related section should look like:

```
/** Map relative paths to URLs. */
const map: any = {
  'jquery': 'vendor/jquery'
};

/** User packages configuration. */
const packages: any = {

// no need to add anything here for jquery

};
```

4. In your src/index.html add this line

```
<script src="vendor/jquery/dist/jquery.min.js" type="text/javascript"></script>
```

> Your other options are:

```
<script src="vendor/jquery/dist/jquery.js" type="text/javascript"></script>
```

or

```
<script src="/vendor/jquery/dist/jquery.slim.js" type="text/javascript"></script>
```

and

```
<script src="/vendor/jquery/dist/jquery.slim.min.js" type="text/javascript"></script>
```

5. Importing and using jquery library in your project source files:

   Import jquery library in your source .ts files like this:

```
declare var $:any;

@Component({
})
export class YourComponent {
  ngOnInit() {
    $.("button").click(function(){
       // now you can DO, what ever you want
     });
     console.log();
  }
}
```

If you followed the steps correctly you should now have jquery library working in your project. Enjoy!

Chapter 21: Lifecycle Hooks

Section 21.1: OnChanges

Fired when one or more of the component or directive properties have been changed.

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

@Component({
    selector: 'so-onchanges-component',
    templateUrl: 'onchanges-component.html',
    styleUrls: ['onchanges-component.']
})
class OnChangesComponent implements OnChanges {
    @Input() name: string;
    message: string;

    ngOnChanges(changes: SimpleChanges): void {
        console.log(changes);
    }
}
```

On change event will log

```
name: {
    currentValue: 'new name value',
    previousValue: 'old name value'
},
message: {
    currentValue: 'new message value',
    previousValue: 'old message value'
}
```

Section 21.2: OnInit

Fired when component or directive properties have been initialized.

(Before those of the child directives)

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

@Component({
    selector: 'so-oninit-component',
    templateUrl: 'oninit-component.html',
    styleUrls: ['oninit-component.']
})
class OnInitComponent implements OnInit {

    ngOnInit(): void {
        console.log('Component is ready !');
    }
}
```

Section 21.3: OnDestroy

Fired when the component or directive instance is destroyed.

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

@Component({
    selector: 'so-ondestroy-component',
    templateUrl: 'ondestroy-component.html',
    styleUrls: ['ondestroy-component.']
})
class OnDestroyComponent implements OnDestroy {

    ngOnDestroy(): void {
        console.log('Component was destroyed !');
    }
}
```

Section 21.4: AfterContentInit

Fire after the initialization of the content of the component or directive has finished.

(Right after OnInit)

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

@Component({
    selector: 'so-aftercontentinit-component',
    templateUrl: 'aftercontentinit-component.html',
    styleUrls: ['aftercontentinit-component.']
})
class AfterContentInitComponent implements AfterContentInit {

    ngAfterContentInit(): void {
        console.log('Component content have been loaded!');
    }
}
```

Section 21.5: AfterContentChecked

Fire after the view has been fully initialized.

(Only available for components)

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

@Component({
    selector: 'so-aftercontentchecked-component',
    templateUrl: 'aftercontentchecked-component.html',
    styleUrls: ['aftercontentchecked-component.']
})
class AfterContentCheckedComponent implements AfterContentChecked {

    ngAfterContentChecked(): void {
        console.log('Component content have been checked!');
    }
}
```

Section 21.6: AfterViewInit

Fires after initializing both the component view and any of its child views. This is a useful lifecycle hook for plugins outside of the Angular 2 ecosystem. For example, you could use this method to initialize a jQuery date picker based

on the markup that Angular 2 has rendered.

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

@Component({
    selector: 'so-afterviewinit-component',
    templateUrl: 'afterviewinit-component.html',
    styleUrls: ['afterviewinit-component.']
})
class AfterViewInitComponent implements AfterViewInit {

    ngAfterViewInit(): void {
        console.log('This event fire after the content init have been loaded!');
    }
}
```

Section 21.7: AfterViewChecked

Fire after the check of the view, of the component, has finished.

(Only available for components)

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

@Component({
    selector: 'so-afterviewchecked-component',
    templateUrl: 'afterviewchecked-component.html',
    styleUrls: ['afterviewchecked-component.']
})
class AfterViewCheckedComponent implements AfterViewChecked {

    ngAfterViewChecked(): void {
        console.log('This event fire after the content have been checked!');
    }
}
```

Section 21.8: DoCheck

Allows to listen for changes only on specified properties

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

@Component({
    selector: 'so-docheck-component',
    templateUrl: 'docheck-component.html',
    styleUrls: ['docheck-component.']
})
class DoCheckComponent implements DoCheck {
    @Input() elements: string[];
    differ: any;
    ngDoCheck(): void {
        // get value for elements property
        const changes = this.differ.diff(this.elements);

        if (changes) {
            changes.forEachAddedItem(res => console.log('Added', r.item));
            changes.forEachRemovedItem(r => console.log('Removed', r.item));
        }
    }
```

```
}
```

Chapter 22: Angular RXJS Subjects and Observables with API requests

Section 22.1: Wait for multiple requests

One common scenario is to wait for a number of requests to finish before continuing. This can be accomplished using the `forkJoin` method.

In the following example, `forkJoin` is used to call two methods that return `Observables`. The callback specified in the `.subscribe` method will be called when both Observables complete. The parameters supplied by `.subscribe` match the order given in the call to `.forkJoin`. In this case, first `posts` then `tags`.

```
loadData() : void {
    Observable.forkJoin(
        this.blogApi.getPosts(),
        this.blogApi.getTags()
    ).subscribe((([posts, tags]: [Post[], Tag[]]) => {
        this.posts = posts;
        this.tags = tags;
    }));
}
```

Section 22.2: Basic request

The following example demonstrates a simple HTTP GET request. `http.get()` returns an `Observable` which has the method `subscribe`. This one appends the returned data to the `posts` array.

```
var posts = []

getPosts(http: Http):void {
    this.http.get(`https://jsonplaceholder.typicode.com/posts`)
        .map(response => response.json())
        .subscribe(post => posts.push(post));
}
```

Section 22.3: Encapsulating API requests

It may be a good idea to encapsulate the HTTP handling logic in its own class. The following class exposes a method for getting Posts. It calls the `http.get()` method and calls `.map` on the returned `Observable` to convert the `Response` object to a `Post` object.

```
import {Injectable} from "@angular/core";
import {Http, Response} from "@angular/http";

@Injectable()
export class BlogApi {

  constructor(private http: Http) {
  }

  getPost(id: number): Observable<Post> {
    return this.http.get(`https://jsonplaceholder.typicode.com/posts/${id}`)
      .map((response: Response) => {
        const srcData = response.json();
        return new Post(srcData)
```

```
      });
  }
}
```

The previous example uses a `Post` class to hold the returned data, which could look as follows:

```
export class Post {
  userId: number;
  id: number;
  title: string;
  body: string;

  constructor(src: any) {
      this.userId = src && src.userId;
      this.id = src && src.id;
      this.title = src && src.title;
      this.body = src && src.body;
  }
}
```

A component now can use the `BlogApi` class to easily retrieve `Post` data without concerning itself with the workings of the `Http` class.

Chapter 23: Services and Dependency Injection

Section 23.1: Example service

services/my.service.ts

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

@Injectable()
export class MyService {
  data: any = [1, 2, 3];

  getData() {
    return this.data;
  }
}
```

The service provider registration in the bootstrap method will make the service available globally.

main.ts

```
import { bootstrap } from '@angular/platform-browser-dynamic';
import { AppComponent } from 'app.component.ts';
import { MyService } from 'services/my.service';

bootstrap(AppComponent, [MyService]);
```

In version RC5 global service provider registration can be done inside the module file. In order to get a single instance of your service for your whole application the service should be declared in the providers list in the ngmodule of your application. *app_module.ts*

```
import { NgModule }       from '@angular/core';
import { BrowserModule  } from '@angular/platform-browser';
import { routing, appRoutingProviders } from './app-routes/app.routes';
import { HttpModule} from '@angular/http';

import { AppComponent }   from './app.component';
import { MyService } from 'services/my.service';

import { routing } from './app-resources/app-routes/app.routes';

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

Usage in `MyComponent`

components/my.component.ts

Alternative approach to register application providers in application components. If we add providers at component level whenever the component is rendered it will create a new instance of the service.

```
import { Component, OnInit } from '@angular/core';
import { MyService } from '../services/my.service';

@Component({
    ...
    ...
    providers:[MyService] //
 })
export class MyComponent implements OnInit {
    data: any[];
    // Creates private variable myService to use, of type MyService
    constructor(private myService: MyService) { }

    ngOnInit() {
        this.data = this.myService.getData();
    }
}
```

Section 23.2: Example with Promise.resolve

services/my.service.ts

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

@Injectable()
export class MyService {
    data: any = [1, 2, 3];

    getData() {
        return Promise.resolve(this.data);
    }
}
```

`getData()` now acts likes a REST call that creates a Promise, which gets resolved immediately. The results can be handheld inside `.then()` and errors can also be detected. This is good practice and convention for asynchronous methods.

components/my.component.ts

```
import { Component, OnInit } from '@angular/core';
import { MyService } from '../services/my.service';

@Component({...})
export class MyComponent implements OnInit {
    data: any[];
    // Creates private variable myService to use, of type MyService
    constructor(private myService: MyService) { }

    ngOnInit() {
        // Uses an "arrow" function to set data
        this.myService.getData().then(data => this.data = data);
    }
}
```

Section 23.3: Testing a Service

Given a service that can login a user:

```
import 'rxjs/add/operator/toPromise';

import { Http } from '@angular/http';
import { Injectable } from '@angular/core';

interface LoginCredentials {
  password: string;
  user: string;
}

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

  async signIn({ user, password }: LoginCredentials) {
    const response = await this.http.post('/login', {
      password,
      user,
    }).toPromise();

    return response.json();
  }
}
```

It can be tested like this:

```
import { ConnectionBackend, Http, HttpModule, Response, ResponseOptions } from '@angular/http';
import { TestBed, async, inject } from '@angular/core/testing';

import { AuthService } from './auth.service';
import { MockBackend } from '@angular/http/testing';
import { MockConnection } from '@angular/http/testing';

describe('AuthService', () => {
  beforeEach(() => {
    TestBed.configureTestingModule({
      imports: [HttpModule],
      providers: [
        AuthService,
        Http,
        { provide: ConnectionBackend, useClass: MockBackend },
      ]
    });
  });

  it('should be created', inject([AuthService], (service: AuthService) => {
    expect(service).toBeTruthy();
  }));

  // Alternative 1
  it('should login user if right credentials are passed', async(
    inject([AuthService], async (authService) => {
      const backend: MockBackend = TestBed.get(ConnectionBackend);
      const http: Http = TestBed.get(Http);

      backend.connections.subscribe((c: MockConnection) => {
        c.mockRespond(
```

```
          new Response(
            new ResponseOptions({
              body: {
                accessToken: 'abcdef',
              },
            }),
          ),
        );
      });

      const result = await authService.signIn({ password: 'ok', user: 'bruno' });

      expect(result).toEqual({
        accessToken: 'abcdef',
      });
    }))
  );

  // Alternative 2
  it('should login user if right credentials are passed', async () => {
    const backend: MockBackend = TestBed.get(ConnectionBackend);
    const http: Http = TestBed.get(Http);

    backend.connections.subscribe((c: MockConnection) => {
      c.mockRespond(
        new Response(
          new ResponseOptions({
            body: {
              accessToken: 'abcdef',
            },
          }),
        ),
      );
    });

    const authService: AuthService = TestBed.get(AuthService);

    const result = await authService.signIn({ password: 'ok', user: 'bruno' });

    expect(result).toEqual({
      accessToken: 'abcdef',
    });
  });

  // Alternative 3
  it('should login user if right credentials are passed', async (done) => {
    const authService: AuthService = TestBed.get(AuthService);

    const backend: MockBackend = TestBed.get(ConnectionBackend);
    const http: Http = TestBed.get(Http);

    backend.connections.subscribe((c: MockConnection) => {
      c.mockRespond(
        new Response(
          new ResponseOptions({
            body: {
              accessToken: 'abcdef',
            },
          }),
        ),
      );
    });
```

```
    try {
      const result = await authService.signIn({ password: 'ok', user: 'bruno' });

      expect(result).toEqual({
        accessToken: 'abcdef',
      });

      done();
    } catch (err) {
      fail(err);
      done();
    }
  });
});
```

Chapter 24: Service Worker

We will see how to set up a service working on angular, to allow our web app to have offline capabilities.

A Service worker is a special script which runs in the background in the browser and manages network requests to a given origin. It's originally installed by an app and stays resident on the user's machine/device. It's activated by the browser when a page from its origin is loaded and has the option to respond to HTTP requests during the page loading

Section 24.1: Add Service Worker to our app

First in case you are consulting mobile.angular.io the flag --mobile doesn't work anymore.

So to start , we can create a normal project with angular cli.

```
ng new serviceWorking-example
cd serviceWorking-example
```

Now the important thing, to said to angular cli that we want to use service worker we need to do:

ng set apps.0.serviceWorker=true

If for some reason you don't have @angular/service-worker installed, you will see a message:

> Your project is configured with serviceWorker = true, but @angular/service-worker is not installed. Run `npm install --save-dev @angular/service-worker` and try again, or run `ng set apps.0.serviceWorker=false` in your .angular-cli.json.

Check the .angular-cli.json and you now should see this: "serviceWorker": true

When this flag is true, production builds will be set up with a service worker.

A ngsw-manifest.json file will be generated (or augmented in case we have create a ngsw-manifest.json in the root of the project, usually this is done to specify the routing ,in a future this will probably be done automatic) in the dist/ root, and the service worker script will be copied there. A short script will be added to index.html to register the service worker.

Now if we build the app in production mode ng build --prod

And check dist/ folder.

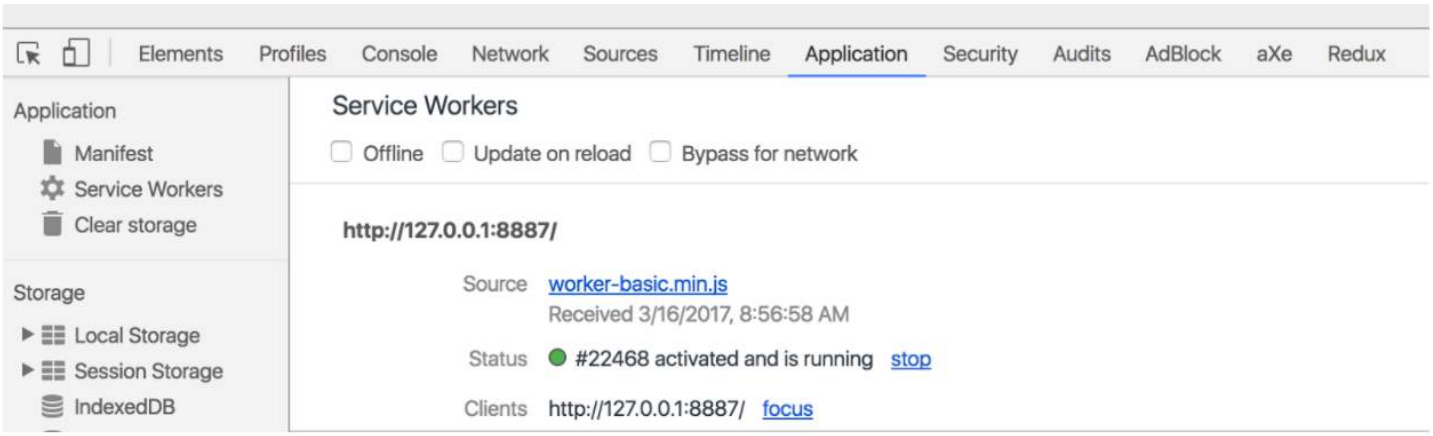
You will see three new files there :

- worker-basic.min.js
- sw-register.HASH.bundle.js
- ngsw-manifest.json

Also, index.html now includes this sw-register script, which registers a Angular Service Worker (ASW) for us.

Refresh the page in your browser (served by the Web Server for Chrome)

Open Developer Tools. Go to the Application -> Service Workers



Good now the Service Worker is up and running!

Now our application, should load faster and we should be able to use the app offline.

Now if you enable the offline mode in the chrome console , you should see that our app in http://localhost:4200/index.html is working without connection to internet.

But in http://localhost:4200/ we have a problem and it doesn't load, this is due to the static content cache only serves files listed in the manifest.

For example, if the manifest declares a URL of /index.html, requests to /index.html will be answered by the cache, but a request to / or /some/route will go to the network.

That's where the route redirection plugin comes in. It reads a routing config from the manifest and redirects configured routes to a specified index route.

Currently, this section of configuration must be hand-written (19-7-2017). Eventually, it will be generated from the route configuration present in the application source.

So if now we create or ngsw-manifest.json in the root of the project

```
{
  "routing": {
    "routes": {
      "/": {
        "prefix": false
      }
    },
    "index": "/index.html"
  }
}
```

And we build again our app, now when we go to http://localhost:4200/, we should be redirected to http://localhost:4200/index.html.

For further information about routing read the official documentation here

Here you can find more documentation about service workers:

https://developers.google.com/web/fundamentals/getting-started/primers/service-workers

https://docs.google.com/document/d/19S5ozevWighny788nI99worpcIMDnwWVmaJDGf_RoDY/edit#

And here you can see an alternative way to implement the service working using SW precache library :

https://coryrylan.com/blog/fast-offline-angular-apps-with-service-workers

Chapter 25: EventEmitter Service

Section 25.1: Catching the event

Create a service-

```
import {EventEmitter} from 'angular2/core';
export class NavService {
    navchange: EventEmitter<number> = new EventEmitter();
    constructor() {}
    emitNavChangeEvent(number) {
        this.navchange.emit(number);
    }
    getNavChangeEmitter() {
        return this.navchange;
    }
}
```

Create a component to use the service-

```
import {Component} from 'angular2/core';
import {NavService} from '../services/NavService';

@Component({
    selector: 'obs-comp',
    template: `obs component, item: {{item}}`
    })
    export class ObservingComponent {
    item: number = 0;
    subscription: any;
    constructor(private navService:NavService) {}
    ngOnInit() {
        this.subscription = this.navService.getNavChangeEmitter()
        .subscribe(item => this.selectedNavItem(item));
    }
    selectedNavItem(item: number) {
        this.item = item;
    }
    ngOnDestroy() {
        this.subscription.unsubscribe();
    }
}

@Component({
    selector: 'my-nav',
    template:`
        <div class="nav-item" (click)="selectedNavItem(1)">nav 1 (click me)</div>
        <div class="nav-item" (click)="selectedNavItem(2)">nav 2 (click me)</div>
    `,
})
export class Navigation {
    item = 1;
    constructor(private navService:NavService) {}
    selectedNavItem(item: number) {
        console.log('selected nav item ' + item);
        this.navService.emitNavChangeEvent(item);
    }
}
```

Section 25.2: Live example

A live example for this can be found here.

Section 25.3: Class Component

```
@Component({
  selector: 'zippy',
  template: `
  <div class="zippy">
    <div (click)="toggle()">Toggle</div>
    <div [hidden]="!visible">
      <ng-content></ng-content>
    </div>
 </div>`})
export class Zippy {
  visible: boolean = true;
  @Output() open: EventEmitter<any> = new EventEmitter();
  @Output() close: EventEmitter<any> = new EventEmitter();
  toggle() {
    this.visible = !this.visible;
    if (this.visible) {
      this.open.emit(null);
    } else {
      this.close.emit(null);
    }
  }
}
```

Section 25.4: Class Overview

```
class EventEmitter extends Subject {
    constructor(isAsync?: boolean)
    emit(value?: T)
    subscribe(generatorOrNext?: any, error?: any, complete?: any) : any
}
```

Section 25.5: Emmiting Events

```
<zippy (open)="onOpen($event)" (close)="onClose($event)"></zippy>
```

Chapter 26: Optimizing rendering using ChangeDetectionStrategy

Section 26.1: Default vs OnPush

Consider the following component with one input `myInput` and an internal value called `someInternalValue`. Both of them are used in a component's template.

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

@Component({
  template:`
  <div>
    <p>{{myInput}}</p>
    <p>{{someInternalValue}}</p>
  </div>
  `
})
class MyComponent {
  @Input() myInput: any;

  someInternalValue: any;

  // ...
}
```

By default, the `changeDetection:` property in the component decorator will be set to `ChangeDetectionStrategy.Default`; implicit in the example. In this situation, any changes to any of the values in the template will trigger a re-render of `MyComponent`. In other words, if I change `myInput` or `someInternalValue` angular 2 will exert energy and re-render the component.

Suppose, however, that we only want to re-render when the inputs change. Consider the following component with `changeDetection:` set to `ChangeDetectionStrategy.OnPush`

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

@Component({
  changeDetection: ChangeDetectionStrategy.OnPush
  template:`
  <div>
    <p>{{myInput}}</p>
    <p>{{someInternalValue}}</p>
  </div>
  `
})
class MyComponent {
  @Input() myInput: any;

  someInternalValue: any;

  // ...
}
```

By setting `changeDetection:` to `ChangeDetectionStrategy.OnPush`, `MyComponent` will only re-render when its inputs change. In this case, `myInput` will need to receive a new value from its parent to trigger a re-render.

Chapter 27: Angular 2 Forms Update

Section 27.1: Angular 2 : Template Driven Forms

```
import { Component } from '@angular/core';
import { Router , ROUTER_DIRECTIVES} from '@angular/router';
import { NgForm }    from '@angular/forms';

@Component({
    selector: 'login',
    template: `
<h2>Login</h2>
<form #f="ngForm" (ngSubmit)="login(f.value,f.valid)" novalidate>
    <div>
        <label>Username</label>
        <input type="text" [(ngModel)]="username" placeholder="enter username" required>
    </div>
    <div>
        <label>Password</label>
        <input type="password" name="password" [(ngModel)]="password" placeholder="enter password"
required>
    </div>
    <input class="btn-primary" type="submit" value="Login">
</form>`
   //For long form we can use **templateUrl** instead of template
})

export class LoginComponent{

    constructor(private router : Router){ }

    login (formValue: any, valid: boolean){
        console.log(formValue);

        if(valid){
            console.log(valid);
        }
    }
}
```

Section 27.2: Angular 2 Form - Custom Email/Password Validation

For live demo click..

App index ts

```
import {bootstrap} from '@angular/platform-browser-dynamic';
import {MyForm} from './my-form.component.ts';

bootstrap(MyForm);
```

Custom validator

```
import {Control} from @'angular/common';

export class CustomValidators {
  static emailFormat(control: Control): [[key: string]: boolean] {
```

```
    let pattern:RegExp = /\S+@\S+\.\S+/;
    return pattern.test(control.value) ? null : {"emailFormat": true};
  }
}
```

Form Components ts

```
import {Component} from '@angular/core';
import {FORM_DIRECTIVES, NgForm, FormBuilder, Control, ControlGroup, Validators} from
'@angular/common';
import {CustomValidators} from './custom-validators';

@Component({
  selector: 'my-form',
  templateUrl: 'app/my-form.component.html',
  directives: [FORM_DIRECTIVES],
  styleUrls: ['styles.css']
})
export class MyForm {
  email: Control;
  password: Control;
  group: ControlGroup;

  constructor(builder: FormBuilder) {
    this.email = new Control('',
      Validators.compose([Validators.required, CustomValidators.emailFormat])
    );

    this.password = new Control('',
      Validators.compose([Validators.required, Validators.minLength(4)])
    );

    this.group = builder.group({
      email: this.email,
      password: this.password
    });
  }

  onSubmit() {
    console.log(this.group.value);
  }
}
```

Form Components HTML

```
<form [ngFormModel]="group" (ngSubmit)="onSubmit()" novalidate>

  <div>
    <label for="email">Email:</label>
    <input type="email" id="email" [ngFormControl]="email">

    <ul *ngIf="email.dirty && !email.valid">
      <li *ngIf="email.hasError('required')">An email is required</li>
    </ul>
  </div>

  <div>
    <label for="password">Password:</label>
    <input type="password" id="password" [ngFormControl]="password">

    <ul *ngIf="password.dirty && !password.valid">
```

```
      <li *ngIf="password.hasError('required')">A password is required</li>
      <li *ngIf="password.hasError('minlength')">A password needs to have at least 4
characterss</li>
    </ul>
  </div>

  <button type="submit">Register</button>

</form>
```

Section 27.3: Simple Password Change Form with Multi Control Validation

The below examples use the new form API introduced in RC3.

pw-change.template.html

```
<form class="container" [formGroup]="pwChangeForm">
    <label for="current">Current Password</label>
    <input id="current" formControlName="current" type="password" required><br />

    <label for="newPW">New Password</label>
    <input id="newPW" formControlName="newPW" type="password" required><br/>
    <div *ngIf="newPW.touched && newPW.newIsNotOld">
        New password can't be the same as current password.
    </div>

    <label for="confirm">Confirm new password</label>
    <input id="confirm" formControlName="confirm" type="password" required><br />
    <div *ngIf="confirm.touched && confirm.errors.newMatchesConfirm">
        The confirmation does not match.
    </div>

    <button type="submit">Submit</button>
</form>
```

pw-change.component.ts

```
import {Component} from '@angular/core'
import {REACTIVE_FORM_DIRECTIVES, FormBuilder, AbstractControl, FormGroup,
    Validators} from '@angular/forms'
import {PWChangeValidators} from './pw-validators'

@Component({
    moduleId: module.id
    selector: 'pw-change-form',
    templateUrl: `./pw-change.template.html`,
    directives: [REACTIVE_FORM_DIRECTIVES]
})

export class PWChangeFormComponent {
    pwChangeForm: FormGroup;

    // Properties that store paths to FormControls makes our template less verbose
    current: AbstractControl;
    newPW: AbstractControl;
    confirm: AbstractControl;

    constructor(private fb: FormBuilder) { }
    ngOnInit() {
        this.pwChangeForm = this.fb.group({
```

```
            current: ['', Validators.required],
            newPW: ['', Validators.required],
            confirm: ['', Validators.required]
        }, {
            // Here we create validators to be used for the group as a whole
            validator: Validators.compose([
                PWChangeValidators.newIsNotOld,
                PWChangeValidators.newMatchesConfirm
            ])
        });
        this.current = this.pwChangeForm.controls['current'];
        this.newPW = this.pwChangeForm.controls['newPW'];
        this.confirm = this.pwChangeForm.controls['confirm'];
    }
}
```

pw-validators.ts

```
import {FormControl, FormGroup} from '@angular/forms'
export class PWChangeValidators {

    static OldPasswordMustBeCorrect(control: FormControl) {
        var invalid = false;
        if (control.value != PWChangeValidators.oldPW)
            return { oldPasswordMustBeCorrect: true }
        return null;
    }

    // Our cross control validators are below
    // NOTE: They take in type FormGroup rather than FormControl
    static newIsNotOld(group: FormGroup){
        var newPW = group.controls['newPW'];
        if(group.controls['current'].value == newPW.value)
            newPW.setErrors({ newIsNotOld: true });
        return null;
    }

    static newMatchesConfirm(group: FormGroup){
        var confirm = group.controls['confirm'];
        if(group.controls['newPW'].value !== confirm.value)
            confirm.setErrors({ newMatchesConfirm: true });
        return null;
    }
}
```

A gist including some bootstrap classes can be found here.

Section 27.4: Angular 2 Forms (Reactive Forms) with registration form and confirm password validation

app.module.ts

Add these into your app.module.ts file to use reactive forms

```
import { NgModule } from '@angular/core';
    import { BrowserModule } from '@angular/platform-browser';
    import { FormsModule, ReactiveFormsModule } from '@angular/forms';
    import { AppComponent } from './app.component';
    @NgModule({
      imports: [
```

```
        BrowserModule,
        FormsModule,
        ReactiveFormsModule,
     ],
    declarations: [
    AppComponent
     ]
  providers: [],
  bootstrap: [
    AppComponent
   ]
  })
export class AppModule {}
```

app.component.ts

```
import { Component,OnInit } from '@angular/core';
import template from './add.component.html';
import { FormGroup,FormBuilder,Validators } from '@angular/forms';
import { matchingPasswords } from './validators';
@Component({
    selector: 'app',
    template
})
export class AppComponent implements OnInit {
    addForm: FormGroup;
    constructor(private formBuilder: FormBuilder) {
    }
    ngOnInit() {

    this.addForm = this.formBuilder.group({
            username: ['', Validators.required],
            email: ['', Validators.required],
            role: ['', Validators.required],
            password: ['', Validators.required],
            password2: ['', Validators.required] },
          { validator: matchingPasswords('password', 'password2')
        })
    };

addUser() {
        if (this.addForm.valid) {
            var adduser = {
                username: this.addForm.controls['username'].value,
                email: this.addForm.controls['email'].value,
                password: this.addForm.controls['password'].value,
                profile: {
                    role: this.addForm.controls['role'].value,
                    name: this.addForm.controls['username'].value,
                    email: this.addForm.controls['email'].value
                }
            };
          console.log(adduser);// adduser var contains all our form values. store it where you want
            this.addForm.reset();// this will reset our form values to null
        }
    }
}
```

app.component.html

```
<div>
  <form [formGroup]="addForm">
```

```
   <input type="text" placeholder="Enter username" formControlName="username" />
   <input type="text" placeholder="Enter Email Address" formControlName="email"/>
   <input type="password" placeholder="Enter Password" formControlName="password" />
   <input type="password" placeholder="Confirm Password" name="password2"
formControlName="password2"/>
   <div class='error' *ngIf="addForm.controls.password2.touched">
    <div class="alert-danger errormessageadduser" *ngIf="addForm.hasError('mismatchedPasswords')">
                                Passwords do not match
  </div>
</div>
<select name="Role" formControlName="role">
    <option value="admin" >Admin</option>
    <option value="Accounts">Accounts</option>
    <option value="guest">Guest</option>
</select>
<br/>
<br/>
<button type="submit" (click)="addUser()"><span><i class="fa fa-user-plus" aria-
hidden="true"></i></span> Add User </button>
</form>
</div>
```

validators.ts

```
export function matchingPasswords(passwordKey: string, confirmPasswordKey: string) {
    return (group: ControlGroup): {
        [key: string]: any
    } => {
        let password = group.controls[passwordKey];
        let confirmPassword = group.controls[confirmPasswordKey];

        if (password.value !== confirmPassword.value) {
            return {
                mismatchedPasswords: true
            };
        }
    }
}
```

Section 27.5: Angular 2: Reactive Forms (a.k.a Model-driven Forms)

This example uses Angular 2.0.0 Final Release

registration-form.component.ts

```
import { FormGroup,
    FormControl,
    FormBuilder,
    Validators }              from '@angular/forms';

@Component({
    templateUrl: "./registration-form.html"
})
export class ExampleComponent {
    constructor(private _fb: FormBuilder) { }

exampleForm = this._fb.group({
    name: ['DefaultValue', [<any>Validators.required, <any>Validators.minLength(2)]],
    email: ['default@defa.ult', [<any>Validators.required, <any>Validators.minLength(2)]]
})
```

registration-form.html

```
<form [formGroup]="exampleForm" novalidate (ngSubmit)="submit(exampleForm)">
    <label>Name: </label>
    <input type="text" formControlName="name"/>
    <label>Email: </label>
    <input type="email" formControlName="email"/>
    <button type="submit">Submit</button>
</form>
```

Section 27.6: Angular 2 - Form Builder

FormComponent.ts

```
import {Component} from "@angular/core";
import {FormBuilder} from "@angular/forms";

@Component({
 selector: 'app-form',
 templateUrl: './form.component.html',
 styleUrls: ['./form.component.scss'],
 providers : [FormBuilder]
})

export class FormComponent{
  form : FormGroup;
  emailRegex = /^\w+([\.-]?\w+)*@\w+([\.-]?\w+)*(\.\w{2,3})+$/;

  constructor(fb: FormBuilder) {

    this.form = fb.group({
      FirstName : new FormControl({value: null}, Validators.compose([Validators.required,
Validators.maxLength(15)])),
      LastName : new FormControl({value: null}, Validators.compose([Validators.required,
Validators.maxLength(15)])),
      Email : new FormControl({value: null}, Validators.compose([
        Validators.required,
        Validators.maxLength(15),
        Validators.pattern(this.emailRegex)]))
    });
  }
}
```

form.component.html

```
<form class="form-details" role="form" [formGroup]="form">
    <div class="row input-label">
      <label class="form-label" for="FirstName">First name</label>
      <input
       [formControl]="form.controls['FirstName']"
       type="text"
       class="form-control"
       id="FirstName"
       name="FirstName">
    </div>
    <div class="row input-label">
      <label class="form-label" for="LastName">Last name</label>
      <input
       [formControl]="form.controls['LastName']"
       type="text"
       class="form-control"
```

```
        id="LastName"
        name="LastName">
    </div>
    <div class="row">
      <label class="form-label" for="Email">Email</label>
      <input
       [formControl]="form.controls['Email']"
       type="email"
       class="form-control"
       id="Email"
       name="Email">
    </div>
    <div class="row">
      <button
       (click)="submit()"
       role="button"
       class="btn btn-primary submit-btn"
       type="button"
       [disabled]="!form.valid">Submit</button>
    </div>
  </div>
</form>
```

Chapter 28: Detecting resize events

Section 28.1: A component listening in on the window resize event

Suppose we have a component which will hide at a certain window width.

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

@Component({
  ...
  template: `
    <div>
      <p [hidden]="!visible" (window:resize)="onResize($event)" >Now you see me...</p>
      <p>now you don't!</p>
    </div>
  `
  ...
})
export class MyComponent {
  visible: boolean = false;
  breakpoint: number = 768;

  constructor() {
  }

  onResize(event) {
    const w = event.target.innerWidth;
    if (w >= this.breakpoint) {
      this.visible = true;
    } else {
      // whenever the window is less than 768, hide this component.
      this.visible = false;
    }
  }
}
```

A p tag in our template will hide whenever `visible` is false. `visible` will change value whenever the `onResize` event handler is invoked. Its call occurs every time `window:resize` fires an event.

Chapter 29: Testing ngModel

Is a example for how you can test a component in Angular2 that have a ngModel.

Section 29.1: Basic test

```
import { BrowserModule } from '@angular/platform-browser';
import { CommonModule } from '@angular/common';
import { FormsModule } from '@angular/forms';
import { HttpModule } from '@angular/http';

import { Component, DebugElement } from '@angular/core';
import { dispatchEvent } from "@angular/platform-browser/testing/browser_util";
import { TestBed, ComponentFixture} from '@angular/core/testing';
import {By} from "@angular/platform-browser";

import { MyComponentModule } from 'ng2-my-component';
import { MyComponent } from './my-component';

describe('MyComponent:',()=> {

  const template = `
    <div>
       <my-component type="text" [(ngModel)]="value" name="TestName" size="9" min="3" max="8"
placeholder="testPlaceholder" disabled=false required=false></my-component>
    </div>
  `;

  let fixture:any;
  let element:any;
  let context:any;

  beforeEach(() => {

      TestBed.configureTestingModule({
          declarations: [InlineEditorComponent],
          imports: [
            FormsModule,
            InlineEditorModule]
      });
      fixture = TestBed.overrideComponent(InlineEditorComponent, {
      set: {
        selector:"inline-editor-test",
        template: template
      }})
      .createComponent(InlineEditorComponent);
      context = fixture.componentInstance;
      fixture.detectChanges();
  });

  it('should change value of the component', () => {
        let input = fixture.nativeElement.querySelector("input");
        input.value = "Username";
        dispatchEvent(input, 'input');
        fixture.detectChanges();

        fixture.whenStable().then(() => {
            //this button dispatch event for save the text in component.value
            fixture.nativeElement.querySelectorAll('button')[0].click();
            expect(context.value).toBe("Username");
```

```
        });
    });
});
```

Chapter 30: Feature Modules

Section 30.1: A Feature Module

```
// my-feature.module.ts
import { CommonModule } from '@angular/common';
import { NgModule }     from '@angular/core';

import { MyComponent } from './my.component';
import { MyDirective } from './my.directive';
import { MyPipe }      from './my.pipe';
import { MyService }   from './my.service';

@NgModule({
  imports:      [ CommonModule ],
  declarations: [ MyComponent, MyDirective, MyPipe ],
  exports:      [ MyComponent ],
  providers:    [ MyService ]
})
export class MyFeatureModule { }
```

Now, in your root (usually `app.module.ts`):

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

import { AppComponent }    from './app.component';
import { MyFeatureModule } from './my-feature.module';

@NgModule({
  // import MyFeatureModule in root module
  imports:      [ BrowserModule, MyFeatureModule ],
  declarations: [ AppComponent ],
  bootstrap:    [ AppComponent ]
})
export class AppModule { }
```

Chapter 31: Bootstrap Empty module in angular 2

Section 31.1: An empty module

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

@NgModule({
  declarations: [], // components your module owns.
  imports: [], // other modules your module needs.
  providers: [], // providers available to your module.
  bootstrap: [] // bootstrap this root component.
})
export class MyModule {}
```

This is an empty module containing no declarations, imports, providers, or components to bootstrap. Use this a reference.

Section 31.2: Application Root Module

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

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

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

Section 31.3: Bootstrapping your module

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

platformBrowserDynamic().bootstrapModule( MyModule );
```

In this example, `MyModule` is the module containing your root component. By bootstrapping `MyModule` your Angular 2 app is ready to go.

Section 31.4: A module with networking on the web browser

```
// app.module.ts

import { NgModule } from '@angular/core';
import { BrowserModule } from '@angular/platform-browser';
import { HttpModule } from '@angular/http';
import { MyRootComponent } from './app.component';

@NgModule({
  declarations: [MyRootComponent],
  imports: [BrowserModule, HttpModule],
  bootstrap: [MyRootComponent]
```

```
})
export class MyModule {}
```

`MyRootComponent` is the root component packaged in `MyModule`. It is the entry point to your Angular 2 application.

Section 31.5: Static bootstrapping with factory classes

We can statically bootstrap an application by taking the plain ES5 Javascript output of the generated factory classes. Then we can use that output to bootstrap the application:

```
import { platformBrowser } from '@angular/platform-browser';
import { AppModuleNgFactory } from './main.ngfactory';

// Launch with the app module factory.
platformBrowser().bootstrapModuleFactory(AppModuleNgFactory);
```

This will cause the application bundle to be much smaller, because all the template compilation was already done in a build step, using either ngc or calling its internals directly.

Chapter 32: Lazy loading a module

Section 32.1: Lazy loading example

Lazy loading modules helps us decrease the startup time. With lazy loading our application does not need to load everything at once, it only needs to load what the user expects to see when the app first loads. Modules that are lazily loaded will only be loaded when the user navigates to their routes.

app/app.module.ts

```
import { NgModule } from '@angular/core';
import { BrowserModule  } from '@angular/platform-browser';
import { AppComponent } from './app.component';
import { EagerComponent } from './eager.component';
import { routing } from './app.routing';
@NgModule({
  imports: [
    BrowserModule,
    routing
  ],
  declarations: [
    AppComponent,
    EagerComponent
  ],
  bootstrap: [AppComponent]
})
export class AppModule {}
```

app/app.component.ts

```
import { Component } from '@angular/core';
@Component({
  selector: 'my-app',
  template: `<h1>My App</h1>    <nav>
      <a routerLink="eager">Eager</a>
      <a routerLink="lazy">Lazy</a>
    </nav>
    <router-outlet></router-outlet>
  `
})
export class AppComponent {}
```

app/app.routing.ts

```
import { ModuleWithProviders } from '@angular/core';
import { Routes, RouterModule } from '@angular/router';
import { EagerComponent } from './eager.component';
const routes: Routes = [
  { path: '', redirectTo: 'eager', pathMatch: 'full' },
  { path: 'eager', component: EagerComponent },
  { path: 'lazy', loadChildren: './lazy.module' }
];
export const routing: ModuleWithProviders = RouterModule.forRoot(routes);
```

app/eager.component.ts

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

```
@Component({
  template: ``<p>Eager Component</p>``
})
export class EagerComponent {}
```

There's nothing special about LazyModule other than it has its own routing and a component called LazyComponent (but it's not necessary to name your module or simliar so).

app/lazy.module.ts

```
import { NgModule } from '@angular/core';
import { LazyComponent }   from './lazy.component';
import { routing } from './lazy.routing';
@NgModule({
  imports: [routing],
  declarations: [LazyComponent]
})
export class LazyModule {}
```

app/lazy.routing.ts

```
import { ModuleWithProviders } from '@angular/core';
import { Routes, RouterModule } from '@angular/router';
import { LazyComponent } from './lazy.component';
const routes: Routes = [
  { path: '', component: LazyComponent }
];
export const routing: ModuleWithProviders = RouterModule.forChild(routes);
```

app/lazy.component.ts

```
import { Component } from '@angular/core';
@Component({
  template: `<p>Lazy Component</p>`
})
export class LazyComponent {}
```

Chapter 33: Advanced Component Examples

Section 33.1: Image Picker with Preview

In this example, we are going to create an image picker that previews your picture before uploading. The previewer also supports drag and dropping files into the input. In this example, I am only going to cover uploading single files, but you can tinker a bit to get multi file upload working.

image-preview.html

This is the html layout of our image preview

```
<!-- Icon as placeholder when no file picked -->
<i class="material-icons">cloud_upload</i>

<!-- file input, accepts images only. Detect when file has been picked/changed with Angular's native
(change) event listener -->
<input type="file" accept="image/*" (change)="updateSource($event)">

<!-- img placeholder when a file has been picked. shows only when 'source' is not empty -->
<img *ngIf="source" [src]="source" src="">
```

image-preview.ts

This is the main file for our **`<image-preview>`** component

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

@Component({
    selector: 'image-preview',
    styleUrls: [ './image-preview.css' ],
    templateUrl: './image-preview.html'
})
export class MtImagePreviewComponent {

    // Emit an event when a file has been picked. Here we return the file itself
    @Output() onChange: EventEmitter<File> = new EventEmitter<File>();

    constructor() {}

    // If the input has changed(file picked) we project the file into the img previewer
    updateSource($event: Event) {
        // We access he file with $event.target['files'][0]
        this.projectImage($event.target['files'][0]);
    }

    // Uses FileReader to read the file from the input
    source:string = '';
    projectImage(file: File) {
        let reader = new FileReader;
        // TODO: Define type of 'e'
        reader.onload = (e: any) => {
            // Simply set e.target.result as our <img> src in the layout
```

```
            this.source = e.target.result;
            this.onChange.emit(file);
        };
        // This will process our file and get it's attributes/data
        reader.readAsDataURL(file);
    }
}
```

another.component.html

```
<form (ngSubmit)="submitPhoto()">
    <image-preview (onChange)="getFile($event)"></image-preview>
    <button type="submit">Upload</button>
</form>
```

And that's it. Way more easier than it was in AngularJS 1.x. I actually made this component based on an older version I made in AngularJS 1.5.5.

Section 33.2: Filter out table values by the input

Import `ReactiveFormsModule`, and then

```
import { Component, OnInit, OnDestroy } from '@angular/core';
import { FormControl } from '@angular/forms';
import { Subscription } from 'rxjs';

@Component({
  selector: 'component',
  template: `
    <input [formControl]="control" />
    <div *ngFor="let item of content">
      {{item.id}} - {{item.name}}
    </div>
  `
})
export class MyComponent implements OnInit, OnDestroy {

  public control = new FormControl('');

  public content: { id: number; name: string; }[];

  private originalContent = [
    { id: 1, name: 'abc' },
    { id: 2, name: 'abce' },
    { id: 3, name: 'ced' }
  ];

  private subscription: Subscription;

  public ngOnInit() {
    this.subscription = this.control.valueChanges.subscribe(value => {
      this.content = this.originalContent.filter(item => item.name.startsWith(value));
    });
  }

  public ngOnDestroy() {
    this.subscription.unsubscribe();
  }
```

```
}
```

Chapter 34: Bypassing Sanitizing for trusted values

Params	Details
selector	tag name you reference your component by in the html
template(templateUrl)	a string that represents html which will be inserted wherever the **<selector>** tag is. templateUrl is a path to an html file with the same behavior
pipes	an array of pipes that are used by this component.

Section 34.1: Bypassing Sanitizing with pipes (for code re-use)

Project is following the structure from the Angular2 Quickstart guide here.

```
RootOfProject
|
+-- app
|   |-- app.component.ts
|   |-- main.ts
|   |-- pipeUser.component.ts
|   \-- sanitize.pipe.ts
|
|-- index.html
|-- main.html
|-- pipe.html
```

> main.ts

```
import { bootstrap } from '@angular/platform-browser-dynamic';
import { AppComponent } from './app.component';

bootstrap(AppComponent);
```

This finds the index.html file in the root of the project, and builds off of that.

> app.component.ts

```
import { Component } from '@angular/core';
import { PipeUserComponent } from './pipeUser.component';

@Component({
    selector: 'main-app',
    templateUrl: 'main.html',
    directives: [PipeUserComponent]
})

export class AppComponent { }
```

This is the top level component that groups other components that are used.

> pipeUser.component.ts

```
import { Component } from '@angular/core';
import { IgnoreSanitize } from "./sanitize.pipe";

@Component({
    selector: 'pipe-example',
    templateUrl: "pipe.html",
    pipes: [IgnoreSanitize]
})

export class PipeUserComponent{
    constructor () { }
    unsafeValue: string = "unsafe/picUrl?id=";
    docNum: string;

    getUrl(input: string): any {
        if(input !== undefined) {
            return this.unsafeValue.concat(input);
            // returns : "unsafe/picUrl?id=input"
        } else {
            return "fallback/to/something";
        }
    }
}
```

This component provides the view for the Pipe to work with.

> sanitize.pipe.ts

```
import { Pipe, PipeTransform } from '@angular/core';
import { DomSanitizationService } from '@angular/platform-browser';

@Pipe({
    name: 'sanitaryPipe'
})
export class IgnoreSanitize implements PipeTransform {

   constructor(private sanitizer: DomSanitizationService){}

   transform(input: string) : any {
       return this.sanitizer.bypassSecurityTrustUrl(input);
   }

}
```

This is the logic that describes what the pipe formats.

> index.html

```
<head>
    Stuff goes here...
</head>
<body>
    <main-app>
        main.html will load inside here.
    </main-app>
</body>
```

> main.html

```
<othertags>
</othertags>

<pipe-example>
    pipe.html will load inside here.
</pipe-example>

<moretags>
</moretags>
```

> pipe.html

```
<img [src]="getUrl('1234') | sanitaryPipe">
<embed [src]="getUrl() | sanitaryPipe">
```

If you were to inspect the html while the app is running you would see that it looks like this:

```
<head>
    Stuff goes here...
</head>

<body>

    <othertags>
    </othertags>

    <img [src]="getUrl('1234') | sanitaryPipe">
    <embed [src]="getUrl() | sanitaryPipe">

    <moretags>
    </moretags>

</body>
```

Chapter 35: Angular 2 Data Driven Forms

Section 35.1: Data driven form

Component

```
    import {Component, OnInit} from '@angular/core';
import {
    FormGroup,
    FormControl,
    FORM_DIRECTIVES,
    REACTIVE_FORM_DIRECTIVES,
    Validators,
    FormBuilder,
    FormArray
} from "@angular/forms";
import {Control} from "@angular/common";

@Component({
  moduleId: module.id,
  selector: 'app-data-driven-form',
  templateUrl: 'data-driven-form.component.html',
  styleUrls: ['data-driven-form.component.css'],
  directives: [FORM_DIRECTIVES, REACTIVE_FORM_DIRECTIVES]
})
export class DataDrivenFormComponent  implements OnInit {
  myForm: FormGroup;

  constructor(private formBuilder: FormBuilder) {}

  ngOnInit() {
    this.myForm = this.formBuilder.group({
      'loginCredentials': this.formBuilder.group({
        'login': ['', Validators.required],
        'email': ['',  [Validators.required, customValidator]],
        'password': ['',  Validators.required]
      }),
      'hobbies': this.formBuilder.array([
        this.formBuilder.group({
          'hobby': ['', Validators.required]
        })
      ])
    });
  }

  removeHobby(index: number){
    (<FormArray>this.myForm.find('hobbies')).removeAt(index);
  }

  onAddHobby() {
    (<FormArray>this.myForm.find('hobbies')).push(new FormGroup({
      'hobby': new FormControl('', Validators.required)
    }))
  }

  onSubmit() {
    console.log(this.myForm.value);
  }
}
```

```
function customValidator(control: Control): {[s: string]: boolean} {
  if(!control.value.match("[a-z0-9!#$%&'*+/=?^_`{|}~-]+(?:\.[a-z0-9!#$%&'*+/=?^_`{|}~-]+)*@(?:[a-z0-9](?:[a-z0-9-]*[a-z0-9])?\.)+[a-z0-9](?:[a-z0-9-]*[a-z0-9])?")) {
    return {error: true}
  }
}
```

HTML Markup

```
<h3>Register page</h3>
<form [formGroup]="myForm" (ngSubmit)="onSubmit()">
  <div formGroupName="loginCredentials">
    <div class="form-group">
      <div>
        <label for="login">Login</label>
        <input  id="login" type="text" class="form-control" formControlName="login">
      </div>
      <div>
        <label for="email">Email</label>
        <input  id="email" type="text" class="form-control"  formControlName="email">
      </div>
      <div>
        <label for="password">Password</label>
        <input  id="password" type="text" class="form-control"  formControlName="password">
      </div>
    </div>
  </div>
  <div class="row" >
    <div  formGroupName="hobbies">
      <div class="form-group">
        <label>Hobbies array:</label>
        <div  *ngFor="let hobby of myForm.find('hobbies').controls; let i = index">
          <div formGroupName="{{i}}">
            <input id="hobby_{{i}}" type="text" class="form-control"  formControlName="hobby">
            <button *ngIf="myForm.find('hobbies').length > 1" (click)="removeHobby(i)">x</button>
          </div>
        </div>
        <button (click)="onAddHobby()">Add hobby</button>
      </div>
    </div>
  </div>
  <button type="submit" [disabled]="!myForm.valid">Submit</button>
</form>
```

Chapter 36: Angular 2 In Memory Web API

Section 36.1: Setting Up Multiple Test API Routes

mock-data.ts

```
export class MockData {
    createDb() {
        let mock = [
            { id: '1', name: 'Object A' },
            { id: '2', name: 'Object B' },
            { id: '3', name: 'Object C' }
        ];

        let data = [
            { id: '1', name: 'Data A' },
            { id: '2', name: 'Data B' },
            { id: '3', name: 'Data C' }
        ];

        return { mock, data };
    }
}
```

Now, you can interact with both app/mock and app/data to extract their corresponding data.

Section 36.2: Basic Setup

mock-data.ts

Create the mock api data

```
export class MockData {
  createDb() {
    let mock = [
      { id: '1', name: 'Object A' },
      { id: '2', name: 'Object B' },
      { id: '3', name: 'Object C' },
      { id: '4', name: 'Object D' }
    ];

    return {mock};
  }
}
```

main.ts

Have the dependency injector provide the InMemoryBackendService for XHRBackend requests. Also, provide a class that includes a createDb() function (in this case, MockData) specifying the mocked API routes for SEED_DATA requests.

```
import { XHRBackend, HTTP_PROVIDERS } from '@angular/http';
import { InMemoryBackendService, SEED_DATA } from 'angular2-in-memory-web-api';
import { MockData } from './mock-data';
import { bootstrap } from '@angular/platform-browser-dynamic';

import { AppComponent } from './app.component';
```

```
bootstrap(AppComponent, [
    HTTP_PROVIDERS,
    { provide: XHRBackend, useClass: InMemoryBackendService },
    { provide: SEED_DATA,  useClass: MockData }
]);
```

mock.service.ts

Example of calling a get request for the created API route

```
import { Injectable }     from '@angular/core';
import { Http, Response } from '@angular/http';
import { Mock } from './mock';

@Injectable()
export class MockService {
  // URL to web api
  private mockUrl = 'app/mock';

  constructor (private http: Http) {}

  getData(): Promise<Mock[]> {
    return this.http.get(this.mockUrl)
                    .toPromise()
                    .then(this.extractData)
                    .catch(this.handleError);
  }

  private extractData(res: Response) {
    let body = res.json();
    return body.data || { };
  }

  private handleError (error: any) {
    let errMsg = (error.message) ? error.message :
      error.status ? `${error.status} - ${error.statusText}` : 'Server error';
    console.error(errMsg);
    return Promise.reject(errMsg);
  }
}
```

Chapter 37: Ahead-of-time (AOT) compilation with Angular 2

Section 37.1: Why we need compilation, Flow of events compilation and example?

Q. Why we need compilation? Ans. We need compilation for achieving higher level of efficiency of our Angular applications.

Take a look at the following example,

```
// ...
compile: function (el, scope) {
  var dirs = this._getElDirectives(el);
  var dir;
  var scopeCreated;
  dirs.forEach(function (d) {
    dir = Provider.get(d.name + Provider.DIRECTIVES_SUFFIX);
    if (dir.scope && !scopeCreated) {
      scope = scope.$new();
      scopeCreated = true;
    }
    dir.link(el, scope, d.value);
  });
  Array.prototype.slice.call(el.children).forEach(function (c) {
    this.compile(c, scope);
  }, this);
},
// ...
```

Using the code above to render the template,

```
<ul>
  <li *ngFor="let name of names"></li>
</ul>
```

Is much slower compared to:

```
// ...
this._text_9 = this.renderer.createText(this._el_3, '\n', null);
this._text_10 = this.renderer.createText(parentRenderNode, '\n\n', null);
this._el_11 = this.renderer.createElement(parentRenderNode, 'ul', null);
this._text_12 = this.renderer.createText(this._el_11, '\n  ', null);
this._anchor_13 = this.renderer.createTemplateAnchor(this._el_11, null);
this._appEl_13 = new import2.AppElement(13, 11, this, this._anchor_13);
this._TemplateRef_13_5 = new import17.TemplateRef_(this._appEl_13, viewFactory_HomeComponent1);
this._NgFor_13_6 = new import15.NgFor(this._appEl_13.vcRef, this._TemplateRef_13_5,
this.parentInjector.get(import18.IterableDiffers), this.ref);
// ...
```

Flow of events with Ahead-of-Time Compilation

In contrast, with AoT we get through the following steps:

1. Development of Angular 2 application with TypeScript.
2. Compilation of the application with ngc.

3. Performs compilation of the templates with the Angular compiler to TypeScript.
4. Compilation of the TypeScript code to JavaScript.
5. Bundling.
6. Minification.
7. Deployment.

Although the above process seems lightly more complicated the user goes only through the steps:

1. Download all the assets.
2. Angular bootstraps.
3. The application gets rendered.

As you can see the third step is missing which means faster/better UX and on top of that tools like angular2-seed and angular-cli will automate the build process dramatically.

I hope it might help you! Thank you!

Section 37.2: Using AoT Compilation with Angular CLI

The Angular CLI command-line interface has AoT compilation support since beta 17.

To build your app with AoT compilation, simply run:

```
ng build --prod --aot
```

Section 37.3: Install Angular 2 dependencies with compiler

NOTE: for best results, make sure your project was created using the Angular-CLI.

```
npm install angular/{core,common,compiler,platform-browser,platform-browser-
dynamic,http,router,forms,compiler-cli,tsc-wrapped,platform-server}
```

You don't have to do this step if you project already has angular 2 and all of these dependencies installed. Just make sure that the `compiler` is in there.

Section 37.4: Add `angularCompilerOptions` to your `tsconfig.json` file

```
...
"angularCompilerOptions": {
    "genDir": "./ngfactory"
}
...
```

This is the output folder of the compiler.

Section 37.5: Run ngc, the angular compiler

from the root of your project `./node_modules/.bin/ngc -p src` where `src` is where all your angular 2 code lives. This will generate a folder called `ngfactory` where all your compiled code will live.

`"node_modules/.bin/ngc" -p src` for windows

Section 37.6: Modify `main.ts` file to use NgFactory and static platform browser

```
// this is the static platform browser, the usual counterpart is @angular/platform-browser-dynamic.
import { platformBrowser } from '@angular/platform-browser';

// this is generated by the angular compiler
import { AppModuleNgFactory } from './ngfactory/app/app.module.ngfactory';

// note the use of `bootstrapModuleFactory`, as opposed to `bootstrapModule`.
platformBrowser().bootstrapModuleFactory(AppModuleNgFactory);
```

At this point you should be able to run your project. In this case, my project was created using the Angular-CLI.

```
> ng serve
```

Chapter 38: CRUD in Angular 2 with Restful API

Section 38.1: Read from an Restful API in Angular 2

To separate API logic from the component, we are creating the API client as a separate class. This example class makes a request to Wikipedia API to get random wiki articles.

```
    import { Http, Response } from '@angular/http';
    import { Injectable } from '@angular/core';
    import { Observable }     from 'rxjs/Observable';
    import 'rxjs/Rx';

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

        getRandomArticles(numberOfArticles: number)
        {
            var request =
this.http.get("https://en.wikipedia.org/w/api.php?action=query&list=random&format=json&rnlimit=" +
numberOfArticles);
            return request.map((response: Response) => {
                return response.json();
            },(error) => {
                console.log(error);
                //your want to implement your own error handling here.
            });
        }
    }
```

And have a component to consume our new API client.

```
import { Component, OnInit } from '@angular/core';
import { WikipediaService } from './wikipedia.Service';

@Component({
    selector: 'wikipedia',
    templateUrl: 'wikipedia.component.html'
})
export class WikipediaComponent implements OnInit {
    constructor(private wikiService: WikipediaService) { }

    private articles: any[] = null;
    ngOnInit() {
        var request = this.wikiService.getRandomArticles(5);
        request.subscribe((res) => {
            this.articles = res.query.random;
        });
    }
}
```

Chapter 39: Use native webcomponents in Angular 2

Section 39.1: Include custom elements schema in your module

```
import { NgModule, CUSTOM_ELEMENTS_SCHEMA } from '@angular/core';
import { CommonModule } from '@angular/common';
import { AboutComponent } from './about.component';

@NgModule({
    imports: [ CommonModule ],
    declarations: [ AboutComponent ],
    exports: [ AboutComponent ],
    schemas: [ CUSTOM_ELEMENTS_SCHEMA ]
})

export class AboutModule { }
```

Section 39.2: Use your webcomponent in a template

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

@Component({
  selector: 'myapp-about',
  template: `<my-webcomponent></my-webcomponent>`
})
export class AboutComponent { }
```

Chapter 40: Update typings

Section 40.1: Update typings when: typings WARN deprecated

Warning message:

```
typings WARN deprecated 10/25/2016: "registry:dt/jasmine#2.5.0+20161003201800" is deprecated
(updated, replaced or removed)
```

Update the reference with:

```
npm run typings -- install dt~jasmine --save --global
```

Replace [jazmine] for any library that is throwing warning

Chapter 41: Mocking @ngrx/Store

name	description
value	next value to be observed
error	description
err	error to be thrown
super	description
action$	mock Observer that does nothing unless defined to do so in the mock class
actionReducer$	mock Observer that does nothing unless defined to do so in the mock class
obs$	mock Observable

@ngrx/Store is becoming more widely used in Angular 2 projects. As such, the Store is required to be injected into the constructor of any Component or Service that wishes to use it. Unit testing Store isn't as easy as testing a simple service though. As with many problems, there are a myriad of ways to implement solutions. However, the basic recipe is to write a mock class for the Observer interface and to write a mock class for Store. Then you can inject Store as a provider in your TestBed.

Section 41.1: Unit Test For Component With Mock Store

This is a unit test of a component that has *Store* as a dependency. Here, we are creating a new class called *MockStore* that is injected into our component instead of the usual Store.

```
import { Injectable } from '@angular/core';
import { TestBed, async} from '@angular/core/testing';
import { AppComponent } from './app.component';
import {DumbComponentComponent} from "./dumb-component/dumb-component.component";
import {SmartComponentComponent} from "./smart-component/smart-component.component";
import {mainReducer} from "./state-management/reducers/main-reducer";
import { StoreModule } from "@ngrx/store";
import { Store } from "@ngrx/store";
import {Observable} from "rxjs";


class MockStore {
  public dispatch(obj) {
    console.log('dispatching from the mock store!')
  }

  public select(obj) {
    console.log('selecting from the mock store!');

    return Observable.of({})
  }
}


describe('AppComponent', () => {
  beforeEach(() => {
    TestBed.configureTestingModule({
      declarations: [
        AppComponent,
        SmartComponentComponent,
        DumbComponentComponent,
      ],
      imports: [
        StoreModule.provideStore({mainReducer})
      ],
```

```
      providers: [
        {provide: Store, useClass: MockStore}
      ]
    });
  });

  it('should create the app', async(() => {

    let fixture = TestBed.createComponent(AppComponent);
    let app = fixture.debugElement.componentInstance;
    expect(app).toBeTruthy();
  }));
```

Section 41.2: Angular 2 - Mock Observable (service + component)

service

- I created post service with postRequest method.

```
import {Injectable} from '@angular/core';
import {Http, Headers, Response} from "@angular/http";
import {PostModel} from "./PostModel";
import 'rxjs/add/operator/map';
import {Observable} from "rxjs";

@Injectable()
export class PostService {

  constructor(private _http: Http) {
  }

  postRequest(postModel: PostModel) : Observable<Response> {
      let headers = new Headers();
      headers.append('Content-Type', 'application/json');
    return this._http.post("/postUrl", postModel, {headers})
      .map(res => res.json());
  }
}
```

Component

- I created component with result parameter and postExample function that call to postService.
- when the post resquest successed than result parameter should be 'Success' else 'Fail'

```
import {Component} from '@angular/core';
import {PostService} from "./PostService";
import {PostModel} from "./PostModel";

@Component({
  selector: 'app-post',
  templateUrl: './post.component.html',
  styleUrls: ['./post.component.scss'],
  providers : [PostService]
})
export class PostComponent{


  constructor(private _postService : PostService) {
```

```
  let postModel = new PostModel();
  result : string = null;
  postExample(){
    this._postService.postRequest(this.postModel)
      .subscribe(
        () =>  {
          this.result = 'Success';
        },
        err =>  this.result = 'Fail'
      )
  }
}
```

test service

- when you want to test service that using http you should use mockBackend. and inject it to it.
- you need also to inject postService.

```
describe('Test PostService', () => {
  beforeEach(() => {
    TestBed.configureTestingModule({
      imports: [HttpModule],
      providers: [
        PostService,
        MockBackend,
        BaseRequestOptions,
        {
          provide: Http,
          deps: [MockBackend, BaseRequestOptions],
          useFactory: (backend: XHRBackend, defaultOptions: BaseRequestOptions) => {
            return new Http(backend, defaultOptions);
          }
        }
      ]
    });
  });



  it('sendPostRequest function return Observable', inject([PostService, MockBackend], (service:
PostService, mockBackend: MockBackend) => {
    let mockPostModel = PostModel();

    mockBackend.connections.subscribe((connection: MockConnection) => {
      expect(connection.request.method).toEqual(RequestMethod.Post);
      expect(connection.request.url.indexOf('postUrl')).not.toEqual(-1);
      expect(connection.request.headers.get('Content-Type')).toEqual('application/json');
    });

    service
      .postRequest(PostModel)
      .subscribe((response) => {
        expect(response).toBeDefined();
      });
  }));
});
```

test component

```
describe('testing post component', () => {
  let component: PostComponent;
```

```
  let fixture: ComponentFixture<postComponent>;


  let mockRouter = {
    navigate: jasmine.createSpy('navigate')
  };

  beforeEach(async(() => {
    TestBed.configureTestingModule({
      declarations: [PostComponent],
      imports: [RouterTestingModule.withRoutes([]),ModalModule.forRoot() ],
      providers: [PostService ,MockBackend,BaseRequestOptions,
        {provide: Http, deps: [MockBackend, BaseRequestOptions],
          useFactory: (backend: XHRBackend, defaultOptions: BaseRequestOptions) => {
            return new Http(backend, defaultOptions);
          }
        },
        {provide: Router, useValue: mockRouter}
      ],
      schemas: [ CUSTOM_ELEMENTS_SCHEMA ]
    }).compileComponents();
  }));

  beforeEach(() => {
    fixture = TestBed.createComponent(PostComponent);
    component = fixture.componentInstance;
    fixture.detectChanges();
  });




  it('test postRequest success', inject([PostService, MockBackend], (service: PostService,
mockBackend: MockBackend) => {
    fixturePostComponent = TestBed.createComponent(PostComponent);
    componentPostComponent = fixturePostComponent.componentInstance;
    fixturePostComponent.detectChanges();


    component.postExample();
    let postModel = new PostModel();
    let response = {
      'message' : 'message',
      'ok'      : true
    };
    mockBackend.connections.subscribe((connection: MockConnection) => {
      postComponent.result = 'Success'
      connection.mockRespond(new Response(
        new ResponseOptions({
          body: response
        })
      ))
    });
    service.postRequest(postModel)
      .subscribe((data) => {
        expect(component.result).toBeDefined();
        expect(PostComponent.result).toEqual('Success');
        expect(data).toEqual(response);
      });
  }));
});
```

Section 41.3: Observer Mock

```
class ObserverMock implements Observer<any> {
  closed?: boolean = false; // inherited from Observer
  nextVal: any = ''; // variable I made up

  constructor() {}

  next = (value: any): void => { this.nextVal = value; };
  error = (err: any): void => { console.error(err); };
  complete = (): void => { this.closed = true; }
}

let actionReducer$: ObserverMock = new ObserverMock();
let action$: ObserverMock = new ObserverMock();
let obs$: Observable<any> = new Observable<any>();

class StoreMock extends Store<any> {
  constructor() {
    super(action$, actionReducer$, obs$);
  }
}

describe('Component:Typeahead', () => {
    beforeEach(() => {
        TestBed.configureTestingModule({
            imports: [...],
            declarations: [Typeahead],
            providers: [
                {provide: Store, useClass: StoreMock} // NOTICE useClass instead of useValue
            ]
        }).compileComponents();
    });
});
```

Section 41.4: Unit Test For Component Spying On Store

This is a unit test of a component that has *Store* as a dependency. Here, we are able to use a store with the default "initial state" while preventing it from actually dispatching actions when *store.dispatch()* is called.

```
import {TestBed, async} from '@angular/core/testing';
import {AppComponent} from './app.component';
import {DumbComponentComponent} from "./dumb-component/dumb-component.component";
import {SmartComponentComponent} from "./smart-component/smart-component.component";
import {mainReducer} from "./state-management/reducers/main-reducer";
import {StoreModule} from "@ngrx/store";
import {Store} from "@ngrx/store";
import {Observable} from "rxjs";

describe('AppComponent', () => {
  beforeEach(() => {
    TestBed.configureTestingModule({
      declarations: [
        AppComponent,
        SmartComponentComponent,
        DumbComponentComponent,
      ],
      imports: [
        StoreModule.provideStore({mainReducer})
      ]
```

```
    });

  });


  it('should create the app', async(() => {
    let fixture = TestBed.createComponent(AppComponent);
    let app = fixture.debugElement.componentInstance;

  var mockStore = fixture.debugElement.injector.get(Store);
  var storeSpy = spyOn(mockStore, 'dispatch').and.callFake(function () {
  console.log('dispatching from the spy!');
});


}));


});
```

Section 41.5: Simple Store

simple.action.ts

```
import { Action } from '@ngrx/store';

export enum simpleActionTpye {
    add = "simpleAction_Add",
    add_Success = "simpleAction_Add_Success"
}

export class simpleAction {
    type: simpleActionTpye
    constructor(public payload: number) { }
}
```

simple.efficts.ts

```
import { Effect, Actions } from '@ngrx/effects';
import { Injectable } from '@angular/core';
import { Action } from '@ngrx/store';
import { Observable } from 'rxjs';

import { simpleAction, simpleActionTpye } from './simple.action';


@Injectable()
export class simpleEffects {

    @Effect()
    addAction$: Observable<simpleAction> = this.actions$
        .ofType(simpleActionTpye.add)
        .switchMap((action: simpleAction) => {
            console.log(action);

            return Observable.of({ type: simpleActionTpye.add_Success, payload: action.payload })
            //   if you have an api use this code
            // return this.http.post(url).catch().map(res=>{ type: simpleAction.add_Success,
payload:res})
        });
```

```
    constructor(private actions$: Actions) { }
}
```

simple.reducer.ts

```
import { Action, ActionReducer } from '@ngrx/store';

import { simpleAction, simpleActionTpye } from './simple.action';

export const simpleReducer: ActionReducer<number> = (state: number = 0, action: simpleAction):
number => {
    switch (action.type) {
        case simpleActionTpye.add_Success:
            console.log(action);
            return state + action.payload;
        default:
            return state;
    }
}
```

store/index.ts

```
import { combineReducers, ActionReducer, Action, StoreModule } from '@ngrx/store';
import { EffectsModule } from '@ngrx/effects';
import { ModuleWithProviders } from '@angular/core';
import { compose } from '@ngrx/core';

import { simpleReducer } from "./simple/simple.reducer";
import { simpleEffects } from "./simple/simple.efficts";


export interface IAppState {
    sum: number;
}

// all new reducers should be define here
const reducers = {
    sum: simpleReducer
};

export const store: ModuleWithProviders = StoreModule.forRoot(reducers);
export const effects: ModuleWithProviders[] = [
    EffectsModule.forRoot([simpleEffects])
];
```

app.module.ts

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

import { effects, store } from "./Store/index";
import { AppComponent } from './app.component';

@NgModule({
  declarations: [
    AppComponent
  ],
  imports: [
    BrowserModule,
    // store
```

```
    store,
    effects
  ],
  providers: [],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

app.component.ts

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

import { Store } from '@ngrx/store';
import { Observable } from 'rxjs';

import { IAppState } from './Store/index';
import { simpleActionTpye } from './Store/simple/simple.action';

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

  constructor(private store: Store<IAppState>) {
    store.select(s => s.sum).subscribe((res) => {
      console.log(res);
    })
    this.store.dispatch({
      type: simpleActionTpye.add,
      payload: 1
    })
    this.store.dispatch({
      type: simpleActionTpye.add,
      payload: 2
    })
    this.store.dispatch({
      type: simpleActionTpye.add,
      payload: 3
    })
  }
}
```

result 0 1 3 6

Chapter 42: ngrx

Ngrx is a powerful library that you can use with **Angular2**. The idea behind is to merge two concepts that plays well together to have a **reactive app** with a predictable **state container** : - [Redux][1] - [RxJs][2] The main advantages : - Sharing data in your app between your components is going to easier - Testing your app core logic consists to test pure functions, without any dependency on Angular2 (very easy so !) [1]: http://redux.js.org [2]: http://reactivex.io/rxjs

Section 42.1: Complete example : Login/logout a user

Prerequisites

This topic is **not** about Redux and/or Ngrx :

- You need to be comfortable with Redux
- At least understand the basics of RxJs and Observable pattern

First, let's define an example from the very beginning and play with some code :

As a developer, I want to :

1. Have an `IUser` interface that defines the properties of a `User`
2. Declare the actions that we'll use later to manipulate the `User` in the `Store`
3. Define the initial state of the `UserReducer`
4. Create the reducer `UserReducer`
5. Import our `UserReducer` into our main module to build the `Store`
6. Use data from the `Store` to display information in our view

Spoiler alert : If you want to try the demo right away or read the code before we even get started, here's a Plunkr (embed view or run view).

1) Define `IUser` interface

I like to split my interfaces in two parts :

- The properties we'll get from a server
- The properties we define only for the UI (should a button be spinning for example)

And here's the interface `IUser` we'll be using :

`user.interface.ts`

```
export interface IUser {
  // from server
  username: string;
  email: string;

  // for UI
  isConnecting: boolean;
  isConnected: boolean;
};
```

2) Declare the actions to manipulate the `User`

Now we've got to think about what kind of actions our ***reducers*** are supposed to handle.
Let say here :

`user.actions.ts`

```
export const UserActions = {
  // when the user clicks on login button, before we launch the HTTP request
  // this will allow us to disable the login button during the request
  USR_IS_CONNECTING: 'USR_IS_CONNECTING',
  // this allows us to save the username and email of the user
  // we assume those data were fetched in the previous request
  USR_IS_CONNECTED: 'USR_IS_CONNECTED',

  // same pattern for disconnecting the user
  USR_IS_DISCONNECTING: 'USR_IS_DISCONNECTING',
  USR_IS_DISCONNECTED: 'USR_IS_DISCONNECTED'
};
```

But before we use those actions, let me explain why we're going to need a service to dispatch **some** of those actions for us :

Let say that we want to connect a user. So we'll be clicking on a login button and here's what's going to happen :

- Click on the button
- The component catch the event and call `userService.login`
- `userService.login` method `dispatch` an event to update our store property : `user.isConnecting`
- An HTTP call is fired (we'll use a `setTimeout` in the demo to simulate the **async behaviour**)
- Once the `HTTP` call is finished, we'll dispatch another action to warn our store that a user is logged

`user.service.ts`

```
@Injectable()
export class UserService {
  constructor(public store$: Store<AppState>) { }

  login(username: string) {
    // first, dispatch an action saying that the user's tyring to connect
    // so we can lock the button until the HTTP request finish
    this.store$.dispatch({ type: UserActions.USR_IS_CONNECTING });

    // simulate some delay like we would have with an HTTP request
    // by using a timeout
    setTimeout(() => {
      // some email (or data) that you'd have get as HTTP response
      let email = `${username}@email.com`;

      this.store$.dispatch({ type: UserActions.USR_IS_CONNECTED, payload: { username, email } });
    }, 2000);
  }

  logout() {
    // first, dispatch an action saying that the user's tyring to connect
    // so we can lock the button until the HTTP request finish
    this.store$.dispatch({ type: UserActions.USR_IS_DISCONNECTING });

    // simulate some delay like we would have with an HTTP request
    // by using a timeout
    setTimeout(() => {
      this.store$.dispatch({ type: UserActions.USR_IS_DISCONNECTED });
    }, 2000);
```

```
  }
}
```

3) Define the initial state of the `UserReducer`

`user.state.ts`

```
export const UserFactory: IUser = () => {
  return {
    // from server
    username: null,
    email: null,

    // for UI
    isConnecting: false,
    isConnected: false,
    isDisconnecting: false
  };
};
```

4) Create the reducer `UserReducer`

A reducer takes 2 arguments :

- The current state
- An `Action` of type `Action<{type: string, payload: any}>`

Reminder : A reducer needs to be initialized at some point

As we defined the default state of our reducer in part 3), we'll be able to use it like that :

`user.reducer.ts`

```
export const UserReducer: ActionReducer<IUser> = (user: IUser, action: Action) => {
  if (user === null) {
    return userFactory();
  }

  // ...
}
```

Hopefully, there's an easier way to write that by using our `factory` function to return an object and within the reducer use an (ES6) default parameters value :

```
export const UserReducer: ActionReducer<IUser> = (user: IUser = UserFactory(), action: Action) => {
  // ...
}
```

Then, we need to handle every actions in our reducer : ***TIP***: Use ES6 `Object.assign` function to keep our state immutable

```
export const UserReducer: ActionReducer<IUser> = (user: IUser = UserFactory(), action: Action) => {
  switch (action.type) {
    case UserActions.USR_IS_CONNECTING:
      return Object.assign({}, user, { isConnecting: true });

    case UserActions.USR_IS_CONNECTED:
      return Object.assign({}, user, { isConnecting: false, isConnected: true, username:
```

```
action.payload.username });

    case UserActions.USR_IS_DISCONNECTING:
      return Object.assign({}, user, { isDisconnecting: true });

    case UserActions.USR_IS_DISCONNECTED:
      return Object.assign({}, user, { isDisconnecting: false, isConnected: false });

    default:
      return user;
  }
};
```

5) Import our `UserReducer` into our main module to build the `Store`

`app.module.ts`

```
@NgModule({
    declarations: [
    AppComponent
    ],
    imports: [
    // angular modules
    // ...

    // declare your store by providing your reducers
    // (every reducer should return a default state)
    StoreModule.provideStore({
        user: UserReducer,
        // of course, you can put as many reducers here as you want
        // ...
    }),

    // other modules to import
    // ...
    ]
});
```

6) Use data from the `Store` to display information in our view

Everything is now ready on logic side and we just have to display what we want in two components :

- `UserComponent`: **[Dumb component]** We'll just pass the user object from the store using `@Input` property and `async` pipe. This way, the component will receive the user only once it's available (and the `user` will be of type `IUser` and not of type `Observable<IUser>` !)
- `LoginComponent` **[Smart component]** We'll directly inject the `Store` into this component and work only on `user` as an `Observable`.

`user.component.ts`

```
@Component({
  selector: 'user',
  styles: [
    '.table { max-width: 250px; }',
    '.truthy { color: green; font-weight: bold; }',
    '.falsy { color: red; }'
  ],
  template: `
    <h2>User information :</h2>
```

```
    <table class="table">
      <tr>
        <th>Property</th>
        <th>Value</th>
      </tr>

      <tr>
        <td>username</td>
        <td [class.truthy]="user.username" [class.falsy]="!user.username">
          {{ user.username ? user.username : 'null' }}
        </td>
      </tr>

      <tr>
        <td>email</td>
        <td [class.truthy]="user.email" [class.falsy]="!user.email">
          {{ user.email ? user.email : 'null' }}
        </td>
      </tr>

      <tr>
        <td>isConnecting</td>
        <td [class.truthy]="user.isConnecting" [class.falsy]="!user.isConnecting">
          {{ user.isConnecting }}
        </td>
      </tr>

      <tr>
        <td>isConnected</td>
        <td [class.truthy]="user.isConnected" [class.falsy]="!user.isConnected">
          {{ user.isConnected }}
        </td>
      </tr>

      <tr>
        <td>isDisconnecting</td>
        <td [class.truthy]="user.isDisconnecting" [class.falsy]="!user.isDisconnecting">
          {{ user.isDisconnecting }}
        </td>
      </tr>
    </table>
  `
})
export class UserComponent {
  @Input() user;

  constructor() { }
}
```

login.component.ts

```
@Component({
  selector: 'login',
  template: `
    <form
      *ngIf="!(user | async).isConnected"
      #loginForm="ngForm"
      (ngSubmit)="login(loginForm.value.username)"
    >
      <input
        type="text"
        name="username"
```

```
        placeholder="Username"
        [disabled]="(user | async).isConnecting"
        ngModel
      >

      <button
        type="submit"
        [disabled]="(user | async).isConnecting || (user | async).isConnected"
      >Log me in</button>
    </form>

    <button
      *ngIf="(user | async).isConnected"
      (click)="logout()"
      [disabled]="(user | async).isDisconnecting"
    >Log me out</button>
  `
})
export class LoginComponent {
  public user: Observable<IUser>;

  constructor(public store$: Store<AppState>, private userService: UserService) {
      this.user = store$.select('user');
  }

  login(username: string) {
    this.userService.login(username);
  }

  logout() {
    this.userService.logout();
  }
}
```

As `Ngrx` is a merge of `Redux` and `RxJs` concepts, it can be quite hard to understand the ins an outs at the beginning. But this is a powerful pattern that allows you as we've seen in this example to have a *reactive app* and were you can easily share your data. Don't forget that there's a Plunkr available and you can fork it to make your own tests !

I hope it was helpful even tho the topic is quite long, cheers !

Chapter 43: Http Interceptor

Section 43.1: Using our class instead of Angular's Http

After extending the Http class, we need to tell angular to use this class instead of Http class.

In order to do this, in our main module(or depending on the needs, just a particular module), we need to write in the providers section:

```
export function httpServiceFactory(xhrBackend: XHRBackend, requestOptions: RequestOptions, router:
Router, appConfig: ApplicationConfiguration) {
  return  new HttpServiceLayer(xhrBackend, requestOptions, router, appConfig);
}

import { HttpModule, Http, Request, RequestOptionsArgs, Response, XHRBackend, RequestOptions,
ConnectionBackend, Headers } from '@angular/http';
import { Router } from '@angular/router';

@NgModule({
  declarations: [ ... ],
  imports: [ ... ],
  exports: [ ... ],
  providers: [
    ApplicationConfiguration,
    {
      provide: Http,
      useFactory: httpServiceFactory,
      deps: [XHRBackend, RequestOptions, Router, ApplicationConfiguration]
}
  ],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

Note: ApplicationConfiguration is just a service I use to hold some values for the duration of the application

Section 43.2: Simple Class Extending angular's Http class

```
import { Http, Request, RequestOptionsArgs, Response, RequestOptions, ConnectionBackend, Headers }
from '@angular/http';
import { Router } from '@angular/router';
import { Observable } from 'rxjs/Observable';
import 'rxjs/add/observable/empty';
import 'rxjs/add/observable/throw';
import 'rxjs/add/operator/catch';
import { ApplicationConfiguration } from '../application-configuration/application-configuration';

/**
* This class extends the Http class from angular and adds automaticaly the server URL(if in
development mode) and 2 headers by default:
* Headers added: 'Content-Type' and 'X-AUTH-TOKEN'.
* 'Content-Type' can be set in any othe service, and if set, it will NOT be overwritten in this class
any more.
*/
export class HttpServiceLayer extends Http {

  constructor(backend: ConnectionBackend, defaultOptions: RequestOptions, private _router: Router,
private appConfig: ApplicationConfiguration) {
```

```
    super(backend, defaultOptions);
  }

  request(url: string | Request, options?: RequestOptionsArgs): Observable<Response> {
    this.getRequestOptionArgs(options);
    return this.intercept(super.request(this.appConfig.getServerAdress() + url, options));
  }

  /**
  * This method checks if there are any headers added and if not created the headers map and ads
'Content-Type' and 'X-AUTH-TOKEN'
  * 'Content-Type' is not overwritten if it is allready available in the headers map
  */
  getRequestOptionArgs(options?: RequestOptionsArgs): RequestOptionsArgs {
    if (options == null) {
      options = new RequestOptions();
    }
    if (options.headers == null) {
      options.headers = new Headers();
    }

    if (!options.headers.get('Content-Type')) {
      options.headers.append('Content-Type', 'application/json');
    }

    if (this.appConfig.getAuthToken() != null) {
      options.headers.append('X-AUTH-TOKEN', this.appConfig.getAuthToken());
    }

    return options;
  }

  /**
  * This method as the name sugests intercepts the request and checks if there are any errors.
  * If an error is present it will be checked what error there is and if it is a general one then it
will be handled here, otherwise, will be
  * thrown up in the service layers
  */
  intercept(observable: Observable<Response>): Observable<Response> {

    //  return observable;
    return observable.catch((err, source) => {
      if (err.status == 401) {
        this._router.navigate(['/login']);
        //return observable;
        return Observable.empty();
      } else {
        //return observable;
        return Observable.throw(err);
      }
    });
  }
}
```

Section 43.3: Simple HttpClient AuthToken Interceptor (Angular 4.3+)

```
import { Injectable } from '@angular/core';
import { HttpEvent, HttpHandler, HttpInterceptor, HttpRequest } from '@angular/common/http';
import { UserService } from '../services/user.service';
import { Observable } from 'rxjs/Observable';
```

```
@Injectable()
export class AuthHeaderInterceptor implements HttpInterceptor {

  constructor(private userService: UserService) {
  }

  intercept(req: HttpRequest<any>, next: HttpHandler): Observable<HttpEvent<any>> {
    if (this.userService.isAuthenticated()) {
      req = req.clone({
        setHeaders: {
          Authorization:  `Bearer ${this.userService.token}`
        }
      });
    }
    return next.handle(req);
  }
}
```

Providing Interceptor (some-module.module.ts)

```
{provide: HTTP_INTERCEPTORS, useClass: AuthHeaderInterceptor, multi: true},
```

Chapter 44: Animation

Section 44.1: Transition between null states

```
    @Component({
        ...
        animations: [
            trigger('appear', [
                transition(':enter', [
                    style({
                      //style applied at the start of animation
                    }),
                animate('300ms ease-in', style({
                    //style applied at the end of animation
                }))
                ])
            ])
        ]
    })
    class AnimComponent {

    }
]
```

Section 44.2: Animating between multiple states

The `<div>` in this template grows to `50px` and then `100px` and then shrinks back to `20px` when you click the button.

Each `state` has an associated style described in the `@Component` metadata.

The logic for whichever `state` is active can be managed in the component logic. In this case, the component variable `size` holds the string value "small", "medium" or "large".

The `<div>` element respond to that value through the `trigger` specified in the `@Component` metadata: `[@size]="size"`.

```
@Component({
  template: '<div [@size]="size">Some Text</div><button (click)="toggleSize()">TOGGLE</button>',
  animations: [
    trigger('size', [
      state('small', style({
        height: '20px'
      })),
      state('medium', style({
        height: '50px'
      })),
      state('large', style({
        height: '100px'
      })),
      transition('small => medium', animate('100ms')),
      transition('medium => large', animate('200ms')),
      transition('large => small', animate('300ms'))
    ])
  ]
})
export class TestComponent {

    size: string;
```

```
    constructor(){
        this.size = 'small';
    }
    toggleSize(){
        switch(this.size) {
            case 'small':
                this.size = 'medium';
                break;
            case 'medium':
                this.size = 'large';
                break;
            case 'large':
                this.size = 'small';
        }
    }
}
```

Chapter 45: Zone.js

Section 45.1: Getting reference to NgZone

`NgZone` reference can be injected via the Dependency Injection (DI).

my.component.ts

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

@Component({...})
export class Mycomponent implements NgOnInit {
  constructor(private _ngZone: NgZone) { }
  ngOnInit() {
    this._ngZone.runOutsideAngular(() => {
      // Do something outside Angular so it won't get noticed
    });
  }
}
```

Section 45.2: Using NgZone to do multiple HTTP requests before showing the data

`runOutsideAngular` can be used to run code outside Angular 2 so that it does not trigger change detection unnecessarily. This can be used to for example run multiple HTTP request to get all the data before rendering it. To execute code again inside Angular 2, `run` method of `NgZone` can be used.

my.component.ts

```
import { Component, OnInit, NgZone } from '@angular/core';
import { Http } from '@angular/http';

@Component({...})
export class Mycomponent implements OnInit {
  private data: any[];
  constructor(private http: Http, private _ngZone: NgZone) { }
  ngOnInit() {
    this._ngZone.runOutsideAngular(() => {
      this.http.get('resource1').subscribe((data1:any) => {
        // First response came back, so its data can be used in consecutive request
        this.http.get(`resource2?id=${data1['id']}`).subscribe((data2:any) => {
          this.http.get(`resource3?id1=${data1['id']}&id2=${data2}`).subscribe((data3:any) => {
            this._ngZone.run(() => {
              this.data = [data1, data2, data3];
            });
          });
        });
      });
    });
  }
}
```

Chapter 46: Angular 2 Animations

Angular's animation system lets you build animations that run with the same kind of native performance found in pure CSS animations. You can also tightly integrate your animation logic with the rest of your application code, for ease of control.

Section 46.1: Basic Animation - Transitions an element between two states driven by a model attribute

app.component.html

```
<div>
  <div>
    <div *ngFor="let user of users">
      <button
       class="btn"
       [@buttonState]="user.active"
       (click)="user.changeButtonState()">{{user.firstName}}</button>
    </div>
  </div>
</div>
```

app.component.ts

```
import {Component, trigger, state, transition, animate, style} from '@angular/core';

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styles: [`
     .btn {
      height: 30px;
      width: 100px;
      border: 1px solid rgba(0, 0, 0, 0.33);
      border-radius: 3px;
      margin-bottom: 5px;
     }

  `],
  animations: [
    trigger('buttonState', [
      state('true', style({
        background: '#04b104',
        transform: 'scale(1)'
      })),
      state('false',   style({
        background: '#e40202',
        transform: 'scale(1.1)'
      })),
      transition('true => false', animate('100ms ease-in')),
      transition('false => true', animate('100ms ease-out'))
    ])
  ]
})
export class AppComponent {
  users : Array<User> = [];
```

```
  constructor(){
    this.users.push(new User('Narco', false));
    this.users.push(new User('Bombasto',false));
    this.users.push(new User('Celeritas', false));
    this.users.push(new User('Magneta', false));
  }
}


export class User {
  firstName : string;
  active : boolean;

  changeButtonState(){
    this.active = !this.active;
  }
  constructor(_firstName :string, _active : boolean){
    this.firstName = _firstName;
    this.active = _active;
  }

}
```

Chapter 47: Create an Angular 2+ NPM package

Sometimes we need to share some component between some apps and publishing it in npm is one of the best ways of doing this.

There are some tricks that we need to know to be able to use a normal component as npm package without changing the structure as inlining external styles.

You can see a minimal example here

Section 47.1: Simplest package

Here we are sharing some minimal workflow to build and publish an Angular 2+ npm package.

Configuration files

We need some config files to tell `git`, `npm`, `gulp` and `typescript` how to act.

.gitignore

First we create a `.gitignore` file to avoid versioning unwanted files and folders. The content is:

```
npm-debug.log
node_modules
jspm_packages
.idea
build
```

.npmignore

Second we create a `.npmignore` file to avoid publishing unwanted files and folders. The content is:

```
examples
node_modules
src
```

gulpfile.js

We need to create a `gulpfile.js` to tell Gulp how to compile our application. This part is necessary because we need to minimize and inline all the external templates and styles before publishing our package. The content is:

```
var gulp = require('gulp');
var embedTemplates = require('gulp-angular-embed-templates');
var inlineNg2Styles = require('gulp-inline-ng2-styles');

gulp.task('js:build', function () {
    gulp.src('src/*.ts') // also can use *.js files
        .pipe(embedTemplates({sourceType:'ts'}))
        .pipe(inlineNg2Styles({ base: '/src' }))
        .pipe(gulp.dest('./dist'));
});
```

index.d.ts

The `index.d.ts` file is used by typescript when importing an external module. It helps editor with auto-completion and function tips.

```
export * from './lib';
```

index.js

This is the package entry point. When you install this package using NPM and import in your application, you just need to pass the package name and your application will learn where to find any EXPORTED component of your package.

```
exports.AngularXMinimalNpmPackageModule = require('./lib').AngularXMinimalNpmPackageModule;
```

We used `lib` folder because when we compile our code, the output is placed inside `/lib` folder.

package.json

This file is used to configure your npm publication and defines the necessary packages to it to work.

```
{
  "name": "angular-x-minimal-npm-package",
  "version": "0.0.18",
  "description": "An Angular 2+ Data Table that uses HTTP to create, read, update and delete data
from an external API such REST.",
  "main": "index.js",
  "scripts": {
    "watch": "tsc -p src -w",
    "build": "gulp js:build && rm -rf lib && tsc -p dist"
  },
  "repository": {
    "type": "git",
    "url": "git+https://github.com/vinagreti/angular-x-minimal-npm-package.git"
  },
  "keywords": [
    "Angular",
    "Angular2",
    "Datatable",
    "Rest"
  ],
  "author": "bruno@tzadi.com",
  "license": "MIT",
  "bugs": {
    "url": "https://github.com/vinagreti/angular-x-minimal-npm-package/issues"
  },
  "homepage": "https://github.com/vinagreti/angular-x-minimal-npm-package#readme",
  "devDependencies": {
    "gulp": "3.9.1",
    "gulp-angular-embed-templates": "2.3.0",
    "gulp-inline-ng2-styles": "0.0.1",
    "typescript": "2.0.0"
  },
  "dependencies": {
    "@angular/common": "2.4.1",
    "@angular/compiler": "2.4.1",
    "@angular/core": "2.4.1",
    "@angular/http": "2.4.1",
    "@angular/platform-browser": "2.4.1",
    "@angular/platform-browser-dynamic": "2.4.1",
    "rxjs": "5.0.2",
    "zone.js": "0.7.4"
  }
}
```

dist/tsconfig.json

Create a dist folder and place this file inside. This file is used to tell Typescript how to compile your application. Where to to get the typescript folder and where to put the compiled files.

```
{
  "compilerOptions": {
    "emitDecoratorMetadata": true,
    "experimentalDecorators": true,
    "mapRoot": "",
    "rootDir": ".",
    "target": "es5",
    "lib": ["es6", "es2015", "dom"],
    "inlineSources": true,
    "stripInternal": true,
    "module": "commonjs",
    "moduleResolution": "node",
    "removeComments": true,
    "sourceMap": true,
    "outDir": "../lib",
    "declaration": true
  }
}
```

After create the configuration files, we must create our component and module. This component receives a click and displays a message. It is used like a html tag **`<angular-x-minimal-npm-package></angular-x-minimal-npm-package>`**. Just instal this npm package and load its module in the model you want to use it.

src/angular-x-minimal-npm-package.component.ts

```
import {Component} from '@angular/core';
@Component({
    selector: 'angular-x-minimal-npm-package',
    styleUrls: ['./angular-x-minimal-npm-package.component.scss'],
    templateUrl: './angular-x-minimal-npm-package.component.html'
})
export class AngularXMinimalNpmPackageComponent {
    message = "Click Me ...";
    onClick() {
        this.message = "Angular 2+ Minimal NPM Package. With external scss and html!";
    }
}
```

src/angular-x-minimal-npm-package.component.html

```
<div>
  <h1 (click)="onClick()">{{message}}</h1>
</div>
```

src/angular-x-data-table.component.css

```
h1{
    color: red;
}
```

src/angular-x-minimal-npm-package.module.ts

```
import { NgModule } from '@angular/core';
import { CommonModule  } from '@angular/common';

import { AngularXMinimalNpmPackageComponent } from './angular-x-minimal-npm-package.component';

@NgModule({
  imports: [ CommonModule ],
  declarations: [ AngularXMinimalNpmPackageComponent ],
  exports:  [ AngularXMinimalNpmPackageComponent ],
  entryComponents: [ AngularXMinimalNpmPackageComponent ],
```

```
})
export class AngularXMinimalNpmPackageModule {}
```

After that, you must compile, build and publish your package.

Build and compile

For build we use `gulp` and for compiling we use `tsc`. The command are set in package.json file, at `scripts.build` option. We have this set `gulp js:build && rm -rf lib && tsc -p dist`. This is our chain tasks that will do the job for us.

To build and compile, run the following command at the root of your package:

```
npm run build
```

This will trigger the chain and you will end up with your build in `/dist` folder and the compiled package in your `/lib` folder. This is why in `index.js` we exported the code from `/lib` folder and not from `/src`.

Publish

Now we just need to publish our package so we can install it through npm. For that, just run the command:

```
npm publish
```

That is all!!!

Chapter 48: Angular 2 CanActivate

Section 48.1: Angular 2 CanActivate

Implemented in a router:

```
export const MainRoutes: Route[] = [{
   path: '',
   children: [ {
      path: 'main',
      component: MainComponent ,
      canActivate : [CanActivateRoute]
   }]
}];
```

The `canActivateRoute` file:

```
@Injectable()
  export class  CanActivateRoute implements CanActivate{
  constructor(){}
  canActivate(next: ActivatedRouteSnapshot, state: RouterStateSnapshot): boolean {
     return true;
  }
}
```

Chapter 49: Angular 2 - Protractor

Section 49.1: Angular 2 Protractor - Installation

> run the follows commands at cmd

- `npm install -g protractor`
- `webdriver-manager update`
- `webdriver-manager start`

> **create protractor.conf.js file in the main app root.

very important to decleare useAllAngular2AppRoots: true

```
  const config = {
  baseUrl: 'http://localhost:3000/',

  specs: [
      './dev/**/*.e2e-spec.js'
  ],

  exclude: [],
  framework: 'jasmine',

  jasmineNodeOpts: {
    showColors: true,
    isVerbose: false,
    includeStackTrace: false
  },

  directConnect: true,

  capabilities: {
    browserName: 'chrome',
    shardTestFiles: false,
    chromeOptions: {
      'args': ['--disable-web-security ','--no-sandbox', 'disable-extensions', 'start-maximized',
'enable-crash-reporter-for-testing']
    }
  },

  onPrepare: function() {
    const SpecReporter = require('jasmine-spec-reporter');
    // add jasmine spec reporter
    jasmine.getEnv().addReporter(new SpecReporter({ displayStacktrace: true }));

    browser.ignoreSynchronization = false;
  },
  useAllAngular2AppRoots: true
};

if (process.env.TRAVIS) {
  config.capabilities = {
    browserName: 'firefox'
  };
```

```
}

exports.config = config;
```

> **create basic test at dev directory.**

```
describe('basic test', () => {

  beforeEach(() => {
    browser.get('http://google.com');
  });

  it('testing basic test', () => {
    browser.sleep(2000).then(function(){
      browser.getCurrentUrl().then(function(actualUrl){
        expect(actualUrl.indexOf('google') !== -1).toBeTruthy();
      });
    });
  });
});
```

> **run in cmd**

```
protractor conf.js
```

Section 49.2: Testing Navbar routing with Protractor

First lets create basic navbar.html with 3 options. (Home, List , Create)

```
<nav class="navbar navbar-default" role="navigation">
<ul class="nav navbar-nav">
  <li>
    <a id="home-navbar" routerLink="/home">Home</a>
  </li>
  <li>
    <a id="list-navbar" routerLink="/create" >List</a>
  </li>
  <li>
    <a id="create-navbar" routerLink="/create">Create</a>
  </li>
</ul>
```

second lets create navbar.e2e-spec.ts

```
describe('Navbar', () => {

  beforeEach(() => {
    browser.get('home'); // before each test navigate to home page.
  });

  it('testing Navbar', () => {
    browser.sleep(2000).then(function(){
      checkNavbarTexts();
      navigateToListPage();
    });
```

```
  });

  function checkNavbarTexts(){
    element(by.id('home-navbar')).getText().then(function(text){ // Promise
      expect(text).toEqual('Home');
    });

    element(by.id('list-navbar')).getText().then(function(text){ // Promise
      expect(text).toEqual('List');
    });

    element(by.id('create-navbar')).getText().then(function(text){ // Promise
      expect(text).toEqual('Create');
    });
  }

  function navigateToListPage(){
    element(by.id('list-home')).click().then(function(){ // first find list-home a tag and than
click
        browser.sleep(2000).then(function(){
          browser.getCurrentUrl().then(function(actualUrl){ // promise
            expect(actualUrl.indexOf('list') !== -1).toBeTruthy(); // check the current url is list
          });
        });

    });
  }
});
```

Chapter 50: Example for routes such as /route/subroute for static urls

Section 50.1: Basic route example with sub routes tree

app.module.ts

```
import {routes} from "./app.routes";

@NgModule({
   declarations: [AppComponent],
   imports: [BrowserModule, mainModule.forRoot(), RouterModule.forRoot(routes)],
   providers: [],
   bootstrap: [AppComponent]
})

export class AppModule { }
```

app.routes.ts

```
import { Routes } from '@angular/router';
import {SubTreeRoutes} from "./subTree/subTreeRoutes.routes";

export const routes: Routes = [
  ...SubTreeRoutes,
  { path: '',  redirectTo: 'home', pathMatch: 'full'}
];
```

subTreeRoutes.ts

```
import {Route} from '@angular/router';
import {exampleComponent} from "./example.component";

export const SubTreeRoutes: Route[] = [
  {
    path: 'subTree',
    children: [
      {path: '',component: exampleComponent}
    ]
  }
];
```

Chapter 51: Angular 2 Input() output()

Section 51.1: Input()

Parent Component : Initialize users lists.

```
@Component({
  selector: 'parent-component',
  template: '<div>
               <child-component [users]="users"></child-component>
             </div>'
})
export class ParentComponent implements OnInit{
  let users : List<User> = null;

  ngOnInit() {
    users.push(new User('A', 'A', 'A@gmail.com');
    users.push(new User('B', 'B', 'B@gmail.com');
    users.push(new User('C', 'C', 'C@gmail.com');
  }
}
```

Child component get user from parent component with Input()

```
@Component({
selector: 'child-component',
  template: '<div>
                 <table *ngIf="users !== null">
                   <thead>
                        <th>Name</th>
                        <th>FName</th>
                        <th>Email</th>
                   </thead>
                   <tbody>
                       <tr *ngFor="let user of users">
                           <td>{{user.name}}</td>
                           <td>{{user.fname}}</td>
                           <td>{{user.email}}</td>
                       </tr>
                   </tbody>
                 </table>

             </div>',
})
export class ChildComponent {
  @Input() users : List<User> = null;
}


export class User {
  name : string;
  fname : string;
  email : string;

  constructor(_name : string, _fname : string, _email : string){
     this.name = _name;
     this.fname = _fname;
     this.email = _email;
  }
```

```
}
```

Section 51.2: Simple example of Input Properties

Parent element html

```
<child-component [isSelected]="inputPropValue"></child-component>
```

Parent element ts

```
export class AppComponent {
     inputPropValue: true
}
```

Child component ts:

```
export class ChildComponent {
    @Input() inputPropValue = false;
}
```

Child component html:

```
<div [class.simpleCssClass]="inputPropValue"></div>
```

This code will send the inputPropValue from the parent component to the child and it will have the value we have set in the parent component when it arrives there - false in our case. We can then use that value in the child component to, for example add a class to an element.

Chapter 52: Angular-cli

Here you will find how to start with angular-cli , generating new component/service/pipe/module with angular-cli , add 3 party like bootstrap , build angular project.

Section 52.1: New project with scss/sass as stylesheet

The default style files generated and compiled by `@angular/cli` are **css**.

If you want to use **scss** instead, generate your project with:

```
ng new project_name --style=scss
```

If you want to use **sass**, generate your project with:

```
ng new project_name --style=sass
```

Section 52.2: Set yarn as default package manager for @angular/cli

Yarn is an alternative for npm, the default package manager on @angular/cli. If you want to use yarn as package manager for @angular/cli follow this steps:

Requirements

- yarn (`npm install --global yarn` or see the installation page)
- @angular/cli (`npm install -g @angular/cli` or `yarn global add @angular/cli`)

To set yarn as @angular/cli package manager:

```
ng set --global packageManager=yarn
```

To set back npm as @angular/cli package manager:

```
ng set --global packageManager=npm
```

Section 52.3: Create empty Angular 2 application with angular-cli

Requirements:

- NodeJS : Download page
- npm or yarn

Run the following commands with cmd from new directory folder:

1. `npm install -g @angular/cli` or `yarn global add @angular/cli`
2. `ng new PROJECT_NAME`
3. `cd PROJECT_NAME`
4. `ng serve`

Open your browser at localhost:4200

Section 52.4: Generating Components, Directives, Pipes and Services

just use your cmd: You can use the ng generate (or just ng g) command to generate Angular components:

- Component: `ng g component my-new-component`
- Directive: `ng g directive my-new-directive`
- Pipe: `ng g pipe my-new-pipe`
- Service: `ng g service my-new-service`
- Class: `ng g class my-new-classt`
- Interface: `ng g interface my-new-interface`
- Enum: `ng g enum my-new-enum`
- Module: `ng g module my-module`

Section 52.5: Adding 3rd party libs

In angular-cli.json you can change the app configuration.

If you want to add ng2-bootstrap for example:

1. `npm install ng2-bootstrap --save` or `yarn add ng2-bootstrap`
2. In angular-cli.json just add the path of the bootstrap at node-modules.

```
"scripts": [
    "../node_modules/jquery/dist/jquery.js",
    "../node_modules/bootstrap/dist/js/bootstrap.js"
 ]
```

Section 52.6: build with angular-cli

In angular-cli.json at outDir key you can define your build directory;

these are equivalent

```
ng build --target=production --environment=prod
ng build --prod --env=prod
ng build --prod
```

and so are these

```
ng build --target=development --environment=dev
ng build --dev --e=dev
ng build --dev
ng build
```

When building you can modify base tag () in your index.html with --base-href your-url option.

Sets base tag href to /myUrl/ in your index.html

```
ng build --base-href /myUrl/
ng build --bh /myUrl/
```

Chapter 53: Angular 2 Change detection and manual triggering

Section 53.1: Basic example

Parent component :

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

@Component({
  selector: 'parent-component',
  templateUrl: './parent-component.html'
})
export class ParentComponent {
  users : Array<User> = [];
  changeUsersActivation(user : User){
    user.changeButtonState();
  }
  constructor(){
    this.users.push(new User('Narco', false));
    this.users.push(new User('Bombasto',false));
    this.users.push(new User('Celeritas', false));
    this.users.push(new User('Magneta', false));
  }
}


export class User {
  firstName : string;
  active : boolean;

  changeButtonState(){
    this.active = !this.active;
  }
  constructor(_firstName :string, _active : boolean){
    this.firstName = _firstName;
    this.active = _active;
  }

}
```

Parent HTML:

```
<div>
  <child-component [usersDetails]="users"
                  (changeUsersActivation)="changeUsersActivation($event)">
   </child-component>
</div>
```

child component :

```
import {Component, Input, EventEmitter, Output} from '@angular/core';
import {User} from "./parent.component";

@Component({
```

```
  selector: 'child-component',
  templateUrl: './child-component.html',
  styles: [`
     .btn {
      height: 30px;
      width: 100px;
      border: 1px solid rgba(0, 0, 0, 0.33);
      border-radius: 3px;
      margin-bottom: 5px;
     }

  `]
})
export class ChildComponent{
  @Input() usersDetails : Array<User> = null;
  @Output() changeUsersActivation = new EventEmitter();

  triggerEvent(user : User){
    this.changeUsersActivation.emit(user);
  }
}
```

child HTML :

```
<div>
  <div>
    <table>
      <thead>
        <tr>
          <th>Name</th>
          <th></th>
        </tr>
      </thead>
      <tbody *ngIf="user !== null">
        <tr *ngFor="let user of usersDetails">
          <td>{{user.firstName}}</td>
          <td><button class="btn" (click)="triggerEvent(user)">{{user.active}}</button></td>
        </tr>
      </tbody>
    </table>
  </div>
</div>
```

Chapter 54: Angular 2 Databinding

Section 54.1: @Input()

Parent Component : Initialize users lists.

```
@Component({
  selector: 'parent-component',
  template: '<div>
               <child-component [users]="users"></child-component>
             </div>'
})
export class ParentComponent implements OnInit{
  let users : List<User> = null;

  ngOnInit() {
    users.push(new User('A', 'A', 'A@gmail.com');
    users.push(new User('B', 'B', 'B@gmail.com');
    users.push(new User('C', 'C', 'C@gmail.com');
  }
}
```

Child component get user from parent component with Input()

```
@Component({
selector: 'child-component',
  template: '<div>
                  <table *ngIf="users !== null">
                    <thead>
                         <th>Name</th>
                         <th>FName</th>
                         <th>Email</th>
                    </thead>
                    <tbody>
                        <tr *ngFor="let user of users">
                            <td>{{user.name}}</td>
                            <td>{{user.fname}}</td>
                            <td>{{user.email}}</td>
                        </tr>
                    </tbody>
                  </table>

             </div>',
})
export class ChildComponent {
  @Input() users : List<User> = null;
}


export class User {
  name : string;
  fname : string;
  email : string;

  constructor(_name : string, _fname : string, _email : string){
     this.name = _name;
     this.fname = _fname;
     this.email = _email;
  }
```

```
}
```

Chapter 55: Brute Force Upgrading

If you want to upgrade the Angular CLI version of your project you may run into tough-to-fix errors and bugs from simply changing the Angular CLI version number in your project. Also, because the Angular CLI hides a lot of what's going on in the build and bundles process, you can't really do much when things go wrong there.

Sometimes the easiest way to update the Angular CLI version of the project is to just scaffold out a new proejct with the Angular CLI version that you wish to use.

Section 55.1: Scaffolding a New Angular CLI Project

```
ng new NewProject
```

or

```
ng init NewProject
```

Chapter 56: Angular 2 provide external data to App before bootstrap

In this post I will demonstrate how to pass external data to Angular app before the app bootstraps. This external data could be configuration data, legacy data, server rendered etc.

Section 56.1: Via Dependency Injection

Instead of invoking the Angular's bootstrap code directly, wrap the bootstrap code into a function and export the function. This function can also accept parameters.

```
import { platformBrowserDynamic } from "@angular/platform-browser-dynamic";
import { AppModule } from "./src/app";
export function runAngular2App(legacyModel: any) {
       platformBrowserDynamic([
           { provide: "legacyModel", useValue: model }
       ]).bootstrapModule(AppModule)
       .then(success => console.log("Ng2 Bootstrap success"))
       .catch(err => console.error(err));
}
```

Then, in any services or components we can inject the "legacy model" and gain access to it.

```
import { Injectable } from "@angular/core";
@Injectable()
export class MyService {
   constructor(@Inject("legacyModel") private legacyModel) {
      console.log("Legacy data —— ", legacyModel);
    }
 }
```

Require the app and then run it.

```
require(["myAngular2App"], function(app) {
   app.runAngular2App(legacyModel); // Input to your APP
});
```

Chapter 57: custom ngx-bootstrap datepicker + input

Section 57.1: custom ngx-bootstrap datepicker

> datepicker.component.html

```
<div (clickOutside)="onClickedOutside($event)" (blur)="onClickedOutside($event)">
      <div class="input-group date" [ngClass]="{'disabled-icon': disabledDatePicker == false }">
        <input (change)="changedDate()" type="text" [ngModel]="value" class="form-control"
id="{{id}}" (focus)="openCloseDatepicker()" disabled="{{disabledInput}}" />
        <span id="openCloseDatePicker" class="input-group-addon" (click)="openCloseDatepicker()">
                <span class="glyphicon-calendar glyphicon"></span>
            </span>
      </div>

      <div class="dp-popup" *ngIf="showDatepicker">
        <datepicker [startingDay]="1" [startingDay]="dt" [minDate]="min"  [(ngModel)]="dt"
 (selectionDone)="onSelectionDone($event)"></datepicker>
      </div>
    </div>
```

> datepicker.component.ts

```
import {Component, Input, EventEmitter, Output, OnChanges, SimpleChanges, ElementRef, OnInit} from
"@angular/core";
import {DatePipe} from "@angular/common";
import {NgModel} from "@angular/forms";
import * as moment from 'moment';

@Component({
  selector: 'custom-datepicker',
  templateUrl: 'datepicker.component.html',
  providers: [DatePipe, NgModel],
  host: {
    '(document:mousedown)': 'onClick($event)',
  }
})

export class DatepickerComponent implements OnChanges , OnInit{
  ngOnInit(): void {
    this.dt = null;
  }

  inputElement : ElementRef;
  dt: Date = null;
  showDatepicker: boolean = false;

  @Input() disabledInput : boolean = false;
  @Input() disabledDatePicker: boolean = false;
  @Input() value: string = null;
  @Input() id: string;
  @Input() min: Date = null;
  @Input() max: Date = null;
```

```
  @Output() dateModelChange = new EventEmitter();
  constructor(el: ElementRef) {
    this.inputElement = el;
  }

  changedDate(){
    if(this.value === ''){
      this.dateModelChange.emit(null);
    }else if(this.value.split('/').length === 3){
      this.dateModelChange.emit(DatepickerComponent.convertToDate(this.value));
    }
  }

  clickOutSide(event : Event){
    if(this.inputElement.nativeElement !== event.target) {
      console.log('click outside', event);
    }
  }

  onClick(event) {
    if (!this.inputElement.nativeElement.contains(event.target)) {
      this.close();
    }
  }
  ngOnChanges(changes: SimpleChanges): void {
    if (this.value !== null && this.value !== undefined && this.value.length > 0) {
      this.value = null;
      this.dt  = null;
    }else {
      if(this.value !== null){
        this.dt = new Date(this.value);
        this.value = moment(this.value).format('MM/DD/YYYY');
      }
    }
  }

  private static transformDate(date: Date): string {
    return new DatePipe('pt-PT').transform(date, 'MM/dd/yyyy');
  }

  openCloseDatepicker(): void {
    if (!this.disabledDatePicker) {
      this.showDatepicker = !this.showDatepicker;
    }
  }

  open(): void {
    this.showDatepicker = true;
  }

  close(): void {
    this.showDatepicker = false;
  }

  private apply(): void {
    this.value = DatepickerComponent.transformDate(this.dt);
    this.dateModelChange.emit(this.dt);
  }

  onSelectionDone(event: Date): void {
    this.dt = event;
    this.apply();
```

```
    this.close();
  }

  onClickedOutside(event: Date): void {
    if (this.showDatepicker) {
      this.close();
    }
  }

  static convertToDate(val : string): Date {
    return new Date(val.replace('/','-'));
  }

}
```

Chapter 58: Using third party libraries like jQuery in Angular 2

When building applications using Angular 2.x there are times when it's required to use any third party libraries like jQuery, Google Analytics, Chat Integration JavaScript APIs and etc.

Section 58.1: Configuration using angular-cli

NPM

If external library like `jQuery` is installed using NPM

```
npm install --save jquery
```

Add script path into your `angular-cli.json`

```
"scripts": [
    "../node_modules/jquery/dist/jquery.js"
]
```

Assets Folder

You can also save the library file in your `assets/js` directory and include the same in `angular-cli.json`

```
"scripts": [
    "assets/js/jquery.js"
]
```

Note

Save your main library `jquery` and their dependencies like `jquery-cycle-plugin` into the assets directory and add both of them into `angular-cli.json`, make sure the order is maintained for the dependencies.

Section 58.2: Using jQuery in Angular 2.x components

To use `jquery` in your Angular 2.x components, declare a global variable on the top

If using $ for jQuery

```
declare var $: any;
```

If using `jQuery` for jQuery

```
declare var jQuery: any
```

This will allow using $ or `jQuery` into your Angular 2.x component.

Chapter 59: Configuring ASP.net Core application to work with Angular 2 and TypeScript

SCENARIO: ASP.NET Core background Angular 2 Front-End Angular 2 Components using Asp.net Core Controllers

It way can implement Angular 2 over Asp.Net Core app. It let us call MVC Controllers from Angular 2 components too with the MVC result View supporting Angular 2.

Section 59.1: Asp.Net Core + Angular 2 + Gulp

Startup.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;
using Microsoft.AspNetCore.Builder;
using Microsoft.AspNetCore.Hosting;
using Microsoft.AspNetCore.Identity.EntityFrameworkCore;
using Microsoft.EntityFrameworkCore;
using Microsoft.Extensions.Configuration;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Logging;
using CoreAngular000.Data;
using CoreAngular000.Models;
using CoreAngular000.Services;
using Microsoft.Extensions.FileProviders;
using System.IO;

namespace CoreAngular000
{
    public class Startup
    {
        public Startup(IHostingEnvironment env)
        {
        var builder = new ConfigurationBuilder()
            .SetBasePath(env.ContentRootPath)
            .AddJsonFile("appsettings.json", optional: false, reloadOnChange:
true)
            .AddJsonFile($"appsettings.{env.EnvironmentName}.json", optional:
true);

        if (env.IsDevelopment())
        {

            builder.AddUserSecrets<Startup>();
        }

        builder.AddEnvironmentVariables();
        Configuration = builder.Build();
    }

    public IConfigurationRoot Configuration { get; }


    public void ConfigureServices(IServiceCollection services)
```

```
    {
        // Add framework services.
        services.AddDbContext<ApplicationDbContext>(options =>
            options.UseSqlServer(Configuration.GetConnectionString("DefaultConnection")));

        services.AddIdentity<ApplicationUser, IdentityRole>()
            .AddEntityFrameworkStores<ApplicationDbContext>()
            .AddDefaultTokenProviders();

        services.AddMvc();

        // Add application services.
        services.AddTransient<IEmailSender, AuthMessageSender>();
        services.AddTransient<ISmsSender, AuthMessageSender>();
    }

   public void Configure(IApplicationBuilder app, IHostingEnvironment env,
ILoggerFactory loggerFactory)
    {
        loggerFactory.AddConsole(Configuration.GetSection("Logging"));
        loggerFactory.AddDebug();

        if (env.IsDevelopment())
        {
            app.UseDeveloperExceptionPage();
            app.UseDatabaseErrorPage();
            app.UseBrowserLink();
        }
        else
        {
            app.UseExceptionHandler("/Home/Error");
        }

        app.UseDefaultFiles();
        app.UseStaticFiles();
        app.UseStaticFiles(new StaticFileOptions
        {
            FileProvider = new
PhysicalFileProvider(Path.Combine(env.ContentRootPath, "node_modules")),
            RequestPath = "/node_modules"
        });

        app.UseMvc(routes =>
        {
            routes.MapRoute(
                name: "default",
                template: "{controller=Home}/{action=Index}/{id?}");
        });
    }
}
}
```

tsConfig.json

```
    {
  "compilerOptions": {
    "diagnostics": true,
    "emitDecoratorMetadata": true,
    "experimentalDecorators": true,
    "lib": [ "es2015", "dom" ],
    "listFiles": true,
```

```
    "module": "commonjs",
    "moduleResolution": "node",
    "noImplicitAny": true,
    "outDir": "wwwroot",
    "removeComments": false,
   "rootDir": "wwwroot",
    "sourceMap": true,
    "suppressImplicitAnyIndexErrors": true,
    "target": "es5"
  },
  "exclude": [
    "node_modules",
    "wwwroot/lib/"
  ]
}
```

Package.json

```
   {
 "name": "angular dependencies and web dev package",
 "version": "1.0.0",
 "description": "Angular 2 MVC. Samuel Maícas Template",
 "scripts": {},
 "dependencies": {
   "@angular/common": "~2.4.0",
   "@angular/compiler": "~2.4.0",
   "@angular/core": "~2.4.0",
   "@angular/forms": "~2.4.0",
   "@angular/http": "~2.4.0",
   "@angular/platform-browser": "~2.4.0",
   "@angular/platform-browser-dynamic": "~2.4.0",
   "@angular/router": "~3.4.0",
  "angular-in-memory-web-api": "~0.2.4",
   "systemjs": "0.19.40",
   "core-js": "^2.4.1",
   "rxjs": "5.0.1",
   "zone.js": "^0.7.4"
 },
 "devDependencies": {
   "del": "^2.2.2",
   "gulp": "^3.9.1",
   "gulp-concat": "^2.6.1",
   "gulp-cssmin": "^0.1.7",
   "gulp-htmlmin": "^3.0.0",
   "gulp-uglify": "^2.1.2",
   "merge-stream": "^1.0.1",
   "tslint": "^3.15.1",
   "typescript": "~2.0.10"
  },
  "repository": {}
}
```

bundleconfig.json

```
    [
  {
    "outputFileName": "wwwroot/css/site.min.css",
     "inputFiles": [
      "wwwroot/css/site.css"
    ]
  },
```

```
  {
    "outputFileName": "wwwroot/js/site.min.js",
    "inputFiles": [
      "wwwroot/js/site.js"
    ],
    "minify": {
      "enabled": true,
      "renameLocals": true
    },
    "sourceMap": false
  }
]
```

Convert bundleconfig.json to gulpfile (RightClick bundleconfig.json on solution explorer, Bundler&Minifier > Convert to Gulp

Views/Home/Index.cshtml

```
    @{
    ViewData["Title"] = "Home Page";
}
<div>{{ nombre }}</div>
```

For wwwroot folder use https://github.com/angular/quickstart seed. You need: **index.html main.ts, systemjs-angular-loader.js, systemjs.config.js, tsconfig.json** And the **app folder**

wwwroot/Index.html

```
    <html>
  <head>
    <title>SMTemplate Angular2 & ASP.NET Core</title>
   <base href="/">
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1">


   <script src="node_modules/core-js/client/shim.min.js"></script>

   <script src="node_modules/zone.js/dist/zone.js"></script>
   <script src="node_modules/systemjs/dist/system.src.js"></script>

   <script src="systemjs.config.js"></script>
   <script>
     System.import('main.js').catch(function(err){ console.error(err); });
    </script>
  </head>

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

You can call as it to Controllers from templateUrl. wwwroot/app/app.component.ts

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

@Component({
  selector: 'my-app',
  templateUrl: '/home/index',
```

```
 })
export class AppComponent  { nombre = 'Samuel Maícas'; }
```

Section 59.2: [Seed] Asp.Net Core + Angular 2 + Gulp on Visual Studio 2017

1. Download seed
2. Run dotnet restore
3. Run npm install

Always. Enjoy.

https://github.com/SamML/CoreAngular000

Section 59.3: MVC <-> Angular 2

How to: CALL ANGULAR 2 HTML/JS COMPONENT FROM ASP.NET Core CONTROLLER:

We call the HTML instead return View()

```
 return File("~/html/About.html", "text/html");
```

And load angular component in the html. Here we can decide if we want to work with same or diferent module. Depends on situation.

wwwroot/html/About.html

```
    <!DOCTYPE html>
<html>
  <head>
    <title>About Page</title>
    <base href="/">
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
      <link href="../css/site.min.css" rel="stylesheet" type="text/css"/>

    <script src="../node_modules/core-js/client/shim.min.js"></script>

    <script src="../node_modules/zone.js/dist/zone.js"></script>
    <script src="../node_modules/systemjs/dist/system.src.js"></script>

    <script src="../systemjs.config.js"></script>
    <script>
      System.import('../main.js').catch(function(err){ console.error(err); });
    </script>
  </head>

  <body>
    <aboutpage>Loading AppComponent here ...</aboutpage>
  </body>
</html>
```

(*)Already this seed needs to load the entire list of resources

How to: CALL ASP.NET Core Controller to show a MVC View with Angular2 support:

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

```
@Component({
  selector: 'aboutpage',
  templateUrl: '/home/about',
})
export class AboutComponent  {

}
```

Chapter 60: Angular 2 using webpack

Section 60.1: Angular 2 webpack setup

webpack.config.js

```
const webpack = require("webpack")
const helpers = require('./helpers')
const path = require("path")
const WebpackNotifierPlugin = require('webpack-notifier');

module.exports = {

    // set entry point for your app module
    "entry": {
        "app": helpers.root("app/main.module.ts"),
    },

    // output files to dist folder
    "output": {
        "filename": "[name].js",
        "path": helpers.root("dist"),
        "publicPath": "/",
    },

    "resolve": {
        "extensions": ['.ts', '.js'],
    },

    "module": {
        "rules": [
            {
                "test": /\.ts$/,
                "loaders": [
                    {
                        "loader": 'awesome-typescript-loader',
                        "options": {
                            "configFileName": helpers.root("./tsconfig.json")
                        }
                    },
                    "angular2-template-loader"
                ]
            },
        ],
    },

    "plugins": [

        // notify when build is complete
        new WebpackNotifierPlugin({title: "build complete"}),

        // get reference for shims
        new webpack.DllReferencePlugin({
            "context": helpers.root("src/app"),
            "manifest": helpers.root("config/polyfills-manifest.json")
        }),

        // get reference of vendor DLL
        new webpack.DllReferencePlugin({
            "context": helpers.root("src/app"),
```

```
            "manifest": helpers.root("config/vendor-manifest.json")
        }),

        // minify compiled js
        new webpack.optimize.UglifyJsPlugin(),
    ],
}
```

vendor.config.js

```
const webpack = require("webpack")
const helpers = require('./helpers')
const path = require("path")

module.exports = {
    // specify vendor file where all vendors are imported
    "entry": {
        // optionally add your shims as well
        "polyfills": [helpers.root("src/app/shims.ts")],
        "vendor": [helpers.root("src/app/vendor.ts")],
    },

    // output vendor to dist
    "output": {
        "filename": "[name].js",
        "path": helpers.root("dist"),
        "publicPath": "/",
        "library": "[name]"
    },

    "resolve": {
        "extensions": ['.ts', '.js'],
    },

    "module": {
        "rules": [
            {
                "test": /\.ts$/,
                "loaders": [
                    {
                        "loader": 'awesome-typescript-loader',
                        "options": {
                            "configFileName": helpers.root("./tsconfig.json")
                        }
                    },
                ]
            },
        ],
    },

    "plugins": [

        // create DLL for entries
        new webpack.DllPlugin({
            "name": "[name]",
            "context": helpers.root("src/app"),
            "path": helpers.root("config/[name]-manifest.json")
        }),

        // minify generated js
        new webpack.optimize.UglifyJsPlugin(),
```

```
    ],
}
```

helpers.js

```
var path = require('path');

var _root = path.resolve(__dirname, '..');

function root(args) {
  args = Array.prototype.slice.call(arguments, 0);
  return path.join.apply(path, [_root].concat(args));
}

exports.root = root;
```

vendor.ts

```
import "@angular/platform-browser"
import "@angular/platform-browser-dynamic"
import "@angular/core"
import "@angular/common"
import "@angular/http"
import "@angular/router"
import "@angular/forms"
import "rxjs"
```

index.html

```
<!DOCTYPE html>
<html>
<head>
    <title>Angular 2 webpack</title>

    <script src="/dist/vendor.js" type="text/javascript"></script>
    <script src="/dist/app.js" type="text/javascript"></script>
</head>
<body>
    <app>loading...</app>
</body>
</html>
```

package.json

```
{
  "name": "webpack example",
  "version": "0.0.0",
  "description": "webpack",
  "scripts": {
    "build:webpack": "webpack --config config/webpack.config.js",
    "build:vendor": "webpack --config config/vendor.config.js",
    "watch": "webpack --config config/webpack.config.js --watch"
  },
  "devDependencies": {
    "@angular/common": "2.4.7",
    "@angular/compiler": "2.4.7",
    "@angular/core": "2.4.7",
    "@angular/forms": "2.4.7",
    "@angular/http": "2.4.7",
    "@angular/platform-browser": "2.4.7",
```

```
    "@angular/platform-browser-dynamic": "2.4.7",
    "@angular/router": "3.4.7",
    "webpack": "^2.2.1",
    "awesome-typescript-loader": "^3.1.2",
  },
  "dependencies": {
  }
}
```

Chapter 61: Angular material design

Section 61.1: Md2Accordion and Md2Collapse

Md2Collapse : Collapse is a directive, it's allow the user to toggle visiblity of the section.

Examples

> A collapse would have the following markup.

```
<div [collapse]="isCollapsed">
  Lorum Ipsum Content
</div>
```

Md2Accordion : Accordion it's allow the user to toggle visiblity of the multiple sections.

Examples

> A accordion would have the following markup.

```
<md2-accordion [multiple]="multiple">
  <md2-accordion-tab *ngFor="let tab of accordions"
                     [header]="tab.title"
                     [active]="tab.active"
                     [disabled]="tab.disabled">
    {{tab.content}}
  </md2-accordion-tab>
  <md2-accordion-tab>
    <md2-accordion-header>Custom Header</md2-accordion-header>
    test content
  </md2-accordion-tab>
</md2-accordion>
```

Section 61.2: Md2Select

Component:

```
<md2-select [(ngModel)]="item" (change)="change($event)" [disabled]="disabled">
<md2-option *ngFor="let i of items" [value]="i.value" [disabled]="i.disabled">
{{i.name}}</md2-option>
</md2-select>
```

> Select allow the user to select option from options.

```
<md2-select></md2-select>
<md2-option></md2-option>
<md2-select-header></md2-select-header>
```

Section 61.3: Md2Toast

Toast is a service, which show notifications in the view.

> Creates and show a simple toast noticiation.

```
import {Md2Toast} from 'md2/toast/toast';

@Component({
 selector: "..."
})

export class ... {

...
constructor(private toast: Md2Toast) { }
toastMe() {
this.toast.show('Toast message...');

---  or  ---

this.toast.show('Toast message...', 1000);
}

...

}
```

Section 61.4: Md2Datepicker

Datepicker allow the user to select date and time.

```
<md2-datepicker [(ngModel)]="date"></md2-datepicker>
```

see for more details here

Section 61.5: Md2Tooltip

Tooltip is a directive, it allows the user to show hint text while the user mouse hover over an element.

> A tooltip would have the following markup.

```
<span tooltip-direction="left" tooltip="On the Left!">Left</span>
<button tooltip="some message"
    tooltip-position="below"
    tooltip-delay="1000">Hover Me
</button>
```

Chapter 62: Dropzone in Angular 2

Section 62.1: Dropzone

Angular 2 wrapper library for Dropzone.

> npm install angular2-dropzone-wrapper --save-dev

Load the module for your app-module

```
import { DropzoneModule } from 'angular2-dropzone-wrapper';
import { DropzoneConfigInterface } from 'angular2-dropzone-wrapper';

const DROPZONE_CONFIG: DropzoneConfigInterface = {
  // Change this to your upload POST address:
  server: 'https://example.com/post',
  maxFilesize: 10,
  acceptedFiles: 'image/*'
};

@NgModule({
  ...
  imports: [
    ...
    DropzoneModule.forRoot(DROPZONE_CONFIG)
  ]
})
```

> COMPONENT USAGE
>
> Simply replace the element that would oridinarily be passed to Dropzone with the dropzone component.

```
<dropzone [config]="config" [message]="'Click or drag images here to upload'"
(error)="onUploadError($event)" (success)="onUploadSuccess($event)"></dropzone>
```

Create dropzone component

```
import {Component} from '@angular/core';
@Component({
    selector: 'app-new-media',
    templateUrl: './dropzone.component.html',
    styleUrls: ['./dropzone.component.scss']
})
export class DropZoneComponent {


    onUploadError(args: any) {
        console.log('onUploadError:', args);
    }

    onUploadSuccess(args: any) {
        console.log('onUploadSuccess:', args);
    }
}
```

Chapter 63: angular redux

Section 63.1: Basic

app.module.ts

```
import {appStoreProviders} from "./app.store";
providers : [
  ...
  appStoreProviders,
  ...
]
```

app.store.ts

```
import {InjectionToken} from '@angular/core';
import {createStore, Store, compose, StoreEnhancer} from 'redux';
import {AppState, default as reducer} from "../app.reducer";



export const AppStore = new InjectionToken('App.store');

const devtools: StoreEnhancer<AppState> =
    window['devToolsExtension'] ?
    window['devToolsExtension']() : f => f;

export function createAppStore(): Store<AppState> {
  return createStore<AppState>(
    reducer,
    compose(devtools)
  );
}

export const appStoreProviders = [
  {provide: AppStore, useFactory: createAppStore}
];
```

app.reducer.ts

```
export interface AppState {
  example : string
}

const rootReducer: Reducer<AppState> = combineReducers<AppState>({
 example : string
});

export default rootReducer;
```

store.ts

```
export interface IAppState {
  example?: string;
}

export const INITIAL_STATE: IAppState = {
  example: null,
};

export function rootReducer(state: IAppState = INITIAL_STATE, action: Action): IAppState {
  switch (action.type) {
    case EXAMPLE_CHANGED:
      return Object.assign(state, state, (<UpdateAction>action));
    default:
      return state;
  }
}
```

> actions.ts

```
import {Action} from "redux";
export const EXAMPLE_CHANGED = 'EXAMPLE CHANGED';

export interface UpdateAction extends Action {
  example: string;
}
```

Section 63.2: Get current state

```
import * as Redux from 'redux';
import {Inject, Injectable} from '@angular/core';

@Injectable()
export class exampleService {
    constructor(@Inject(AppStore) private store: Redux.Store<AppState>) {}
    getExampleState(){
      console.log(this.store.getState().example);
   }
}
```

Section 63.3: change state

```
import * as Redux from 'redux';
import {Inject, Injectable} from '@angular/core';

@Injectable()
export class exampleService {
    constructor(@Inject(AppStore) private store: Redux.Store<AppState>) {}
    setExampleState(){
       this.store.dispatch(updateExample("new value"));
   }
}
```

> actions.ts

```
export interface UpdateExapleAction extends Action {
```

```
  example?: string;
}

export const updateExample: ActionCreator<UpdateExapleAction> =
   (newVal) => ({
     type: EXAMPLE_CHANGED,
     example: newVal
});
```

Section 63.4: Add redux chrome tool

> app.store.ts

```
 import {InjectionToken} from '@angular/core';
 import {createStore, Store, compose, StoreEnhancer} from 'redux';
 import {AppState, default as reducer} from "../app.reducer";


 export const AppStore = new InjectionToken('App.store');

const devtools: StoreEnhancer<AppState> =
     window['devToolsExtension'] ?
     window['devToolsExtension']() : f => f;

export function createAppStore(): Store<AppState> {
   return createStore<AppState>(
     reducer,
     compose(devtools)
   );
}

    export const appStoreProviders = [
      {provide: AppStore, useFactory: createAppStore}
    ];
```

> install Redux DevTools chrome extention

Chapter 64: Creating an Angular npm library

How to publish your NgModule, written in TypeScript in npm registry. Setting up npm project, typescript compiler, rollup and continous integration build.

Section 64.1: Minimal module with service class

File structure

```
/
    -src/
        awesome.service.ts
        another-awesome.service.ts
        awesome.module.ts
    -index.ts
    -tsconfig.json
    -package.json
    -rollup.config.js
    -.npmignore
```

Service and module

Place your awesome work here.

src/awesome.service.ts:

```
export class AwesomeService {
    public doSomethingAwesome(): void {
        console.log("I am so awesome!");
    }
}
```

src/awesome.module.ts:

```
import { NgModule } from '@angular/core'
import { AwesomeService } from './awesome.service';
import { AnotherAwesomeService } from './another-awesome.service';

@NgModule({
    providers: [AwesomeService, AnotherAwesomeService]
})
export class AwesomeModule {}
```

Make your module and service accessible outside.

/index.ts:

```
export { AwesomeService } from './src/awesome.service';
export { AnotherAwesomeService } from './src/another-awesome.service';
export { AwesomeModule } from './src/awesome.module';
```

Compilation

In compilerOptions.paths you need to specify all external modules which you used in your package.

/tsconfig.json

```
{
  "compilerOptions": {
    "baseUrl": ".",
    "declaration": true,
    "stripInternal": true,
    "experimentalDecorators": true,
    "strictNullChecks": false,
    "noImplicitAny": true,
    "module": "es2015",
    "moduleResolution": "node",
    "paths": {
      "@angular/core": ["node_modules/@angular/core"],
      "rxjs/*": ["node_modules/rxjs/*"]
    },
    "rootDir": ".",
    "outDir": "dist",
    "sourceMap": true,
    "inlineSources": true,
    "target": "es5",
    "skipLibCheck": true,
    "lib": [
      "es2015",
      "dom"
    ]
  },
  "files": [
    "index.ts"
  ],
  "angularCompilerOptions": {
    "strictMetadataEmit": true
  }
}
```

Specify your externals again

/rollup.config.js

```
export default {
    entry: 'dist/index.js',
    dest: 'dist/bundles/awesome.module.umd.js',
    sourceMap: false,
    format: 'umd',
    moduleName: 'ng.awesome.module',
    globals: {
        '@angular/core': 'ng.core',
        'rxjs': 'Rx',
        'rxjs/Observable': 'Rx',
        'rxjs/ReplaySubject': 'Rx',
        'rxjs/add/operator/map': 'Rx.Observable.prototype',
        'rxjs/add/operator/mergeMap': 'Rx.Observable.prototype',
        'rxjs/add/observable/fromEvent': 'Rx.Observable',
        'rxjs/add/observable/of': 'Rx.Observable'
    },
    external: ['@angular/core', 'rxjs']
}
```

NPM settings

Now, lets place some instructions for npm

/package.json

```
{
  "name": "awesome-angular-module",
  "version": "1.0.4",
  "description": "Awesome angular module",
  "main": "dist/bundles/awesome.module.umd.min.js",
  "module": "dist/index.js",
  "typings": "dist/index.d.ts",
  "scripts": {
    "test": "",
    "transpile": "ngc",
    "package": "rollup -c",
    "minify": "uglifyjs dist/bundles/awesome.module.umd.js --screw-ie8 --compress --mangle --
comments --output dist/bundles/awesome.module.umd.min.js",
    "build": "rimraf dist && npm run transpile && npm run package && npm run minify",
    "prepublishOnly": "npm run build"
  },
  "repository": {
    "type": "git",
    "url": "git+https://github.com/maciejtreder/awesome-angular-module.git"
  },
  "keywords": [
    "awesome",
    "angular",
    "module",
    "minimal"
  ],
  "author": "Maciej Treder <contact@maciejtreder.com>",
  "license": "MIT",
  "bugs": {
    "url": "https://github.com/maciejtreder/awesome-angular-module/issues"
  },
  "homepage": "https://github.com/maciejtreder/awesome-angular-module#readme",
  "devDependencies": {
    "@angular/compiler": "^4.0.0",
    "@angular/compiler-cli": "^4.0.0",
    "rimraf": "^2.6.1",
    "rollup": "^0.43.0",
    "typescript": "^2.3.4",
    "uglify-js": "^3.0.21"
  },
  "dependencies": {
    "@angular/core": "^4.0.0",
    "rxjs": "^5.3.0"
  }
}
```

We can also specify what files, npm should ignore

/.npmignore

```
node_modules
npm-debug.log
Thumbs.db
.DS_Store
src
!dist/src
plugin
!dist/plugin
*.ngsummary.json
*.iml
rollup.config.js
```

```
tsconfig.json
*.ts
!*.d.ts
.idea
```

Continuous integration

Finally you can set up continuous integration build

.travis.yml

```
language: node_js
node_js:
- node

deploy:
  provider: npm
  email: contact@maciejtreder.com
  api_key:
    secure: <your api key>
  on:
    tags: true
    repo: maciejtreder/awesome-angular-module
```

Demo can be found here: https://github.com/maciejtreder/awesome-angular-module

Chapter 65: Barrel

A barrel is a way to rollup exports from several ES2015 modules into a single convenience ES2015 module. The barrel itself is an ES2015 module file that re-exports selected exports of other ES2015 modules.

Section 65.1: Using Barrel

For example without a barrel, a consumer would need three import statements:

```
import { HeroComponent } from '../heroes/hero.component.ts';
import { Hero }          from '../heroes/hero.model.ts';
import { HeroService }   from '../heroes/hero.service.ts';
```

We can add a barrel by creating a file in the same component folder. In this case the folder is called 'heroes' named index.ts (using the conventions) that exports all of these items:

```
export * from './hero.model.ts';   // re-export all of its exports
export * from './hero.service.ts'; // re-export all of its exports
export { HeroComponent } from './hero.component.ts'; // re-export the named thing
```

Now a consumer can import what it needs from the barrel.
`import { Hero, HeroService } from '../heroes/index';`

Still, this can become a very long line; which could be reduced further.

```
import * as h from '../heroes/index';
```

That's pretty reduced! The `* as h` imports all of the modules and aliases as h

Chapter 66: Testing an Angular 2 App

Section 66.1: Setting up testing with Gulp, Webpack, Karma and Jasmine

The first thing we need is to tell karma to use Webpack to read our tests, under a configuration we set for the webpack engine. Here, I am using babel because I write my code in ES6, you can change that for other flavors, such as Typescript. Or I use Pug (formerly Jade) templates, you don't have to.

Still, the strategy remains the same.

So, this is a webpack config:

```
const webpack = require("webpack");
let packConfig = {
    entry: {},
    output: {},
    plugins:[
        new webpack.DefinePlugin({
            ENVIRONMENT: JSON.stringify('test')
        })
    ],
    module: {
       loaders: [
        {
            test: /\.js$/,
            exclude:/(node_modules|bower_components)/,
            loader: "babel",
            query:{
                presets:["es2015", "angular2"]
            }
        },
        {
            test: /\.woff2?$|\.ttf$|\.eot$|\.svg$/,
            loader: "file"
        },
        {
            test: /\.scss$/,
            loaders: ["style", "css", "sass"]
        },
        {
            test: /\.pug$/,
            loader: 'pug-html-loader'
        },
        ]
    },
    devtool : 'inline-cheap-source-map'
};
module.exports = packConfig;
```

And then, we need a karma.config.js file to use that webpack config:

```
const packConfig = require("./webpack.config.js");
module.exports = function (config) {
    config.set({
    basePath: '',
    frameworks: ['jasmine'],
    exclude:[],
```

```
    files: [
        {pattern: './karma.shim.js', watched: false}
    ],

    preprocessors: {
        "./karma.shim.js":["webpack"]
    },
    webpack: packConfig,

    webpackServer: {noInfo: true},

    port: 9876,

    colors: true,

    logLevel: config.LOG_INFO,

    browsers: ['PhantomJS'],

    concurrency: Infinity,

    autoWatch: false,
    singleRun: true
});
};
```

So far, we have told Karma to use webpack, and we have told it to start at a file called **karma.shim.js**. this file will have the job of acting as the starting point for webpack. webpack will read this file and use the **import** and **require** statements to gather all our dependencies and run our tests.

So now, let's look at the karma.shim.js file:

```
// Start of ES6 Specific stuff
import "es6-shim";
import "es6-promise";
import "reflect-metadata";
// End of ES6 Specific stuff

import "zone.js/dist/zone";
import "zone.js/dist/long-stack-trace-zone";
import "zone.js/dist/jasmine-patch";
import "zone.js/dist/async-test";
import "zone.js/dist/fake-async-test";
import "zone.js/dist/sync-test";
import "zone.js/dist/proxy-zone";

import 'rxjs/add/operator/map';
import 'rxjs/add/observable/of';

Error.stackTraceLimit = Infinity;

import {TestBed} from "@angular/core/testing";
import { BrowserDynamicTestingModule, platformBrowserDynamicTesting} from "@angular/platform-
browser-dynamic/testing";

TestBed.initTestEnvironment(
     BrowserDynamicTestingModule,
     platformBrowserDynamicTesting());

let testContext = require.context('../src/app', true, /\.spec\.js/);
```

```
testContext.keys().forEach(testContext);
```

In essence, we are importing **TestBed** from angular core testing, and initiating the environment, as it needs to be initiated only once for all of our tests. Then, we are going through the **src/app** directory recursively and reading every file that ends with **.spec.js** and feed them to testContext, so they will run.

I usually try to put my tests the same place as the class. Personat taste, it makes it easier for me to import dependencies and refactor tests with classes. But if you want to put your tests somewhere else, like under **src/test** directory for example, here is you chance. change the line before last in the karma.shim.js file.

Perfect. what is left? ah, the gulp task that uses the karma.config.js file we made above:

```
gulp.task("karmaTests",function(done){
    var Server = require("karma").Server;
    new Server({
        configFile : "./karma.config.js",
        singleRun: true,
        autoWatch: false
    }, function(result){
        return result ? done(new Error(`Karma failed with error code ${result}`)):done();
    }).start();
});
```

I am now starting the server with the config file we created, telling it to run once and don't watch for changes. I find this to suite me better as the tests will run only if I am ready for them to run, but of course if you want different you know where to change.

And as my final code sample, here is a set of tests for the Angular 2 tutorial, "Tour of Heroes".

```
import {
    TestBed,
    ComponentFixture,
    async
} from "@angular/core/testing";

import {AppComponent} from "./app.component";
import {AppModule} from "./app.module";
import Hero from "./hero/hero";

describe("App Component", function () {

    beforeEach(()=> {
        TestBed.configureTestingModule({
            imports: [AppModule]
        });

        this.fixture = TestBed.createComponent(AppComponent);
        this.fixture.detectChanges();
    });

    it("Should have a title", async(()=> {
        this.fixture.whenStable().then(()=> {
            expect(this.fixture.componentInstance.title).toEqual("Tour of Heros");
        });
    }));

    it("Should have a hero", async(()=> {
        this.fixture.whenStable().then(()=> {
            expect(this.fixture.componentInstance.selectedHero).toBeNull();
```

```
        });
    }));

    it("Should have an array of heros", async(()=>
        this.fixture.whenStable().then(()=> {
            const cmp = this.fixture.componentInstance;
            expect(cmp.heroes).toBeDefined("component should have a list of heroes");
            expect(cmp.heroes.length).toEqual(10, "heroes list should have 10 members");
            cmp.heroes.map((h, i)=> {
                expect(h instanceof Hero).toBeTruthy(`member ${i} is not a Hero instance. ${h}`)
            });
        })));

        it("Should have one list item per hero", async(()=>
        this.fixture.whenStable().then(()=> {
            const ul = this.fixture.nativeElement.querySelector("ul.heroes");
            const li = Array.prototype.slice.call(
                this.fixture.nativeElement.querySelectorAll("ul.heroes>li"));
            const cmp = this.fixture.componentInstance;
            expect(ul).toBeTruthy("There should be an unnumbered list for heroes");
            expect(li.length).toEqual(cmp.heroes.length, "there should be one li for each hero");
            li.forEach((li, i)=> {
                expect(li.querySelector("span.badge"))
                    .toBeTruthy(`hero ${i} has to have a span for id`);
                expect(li.querySelector("span.badge").textContent.trim())
                    .toEqual(cmp.heroes[i].id.toString(), `hero ${i} had wrong id displayed`);
                expect(li.textContent)
                    .toMatch(cmp.heroes[i].name, `hero ${i} has wrong name displayed`);
            });
        })));

    it("should have correct styling of hero items", async(()=>
        this.fixture.whenStable().then(()=> {
            const hero = this.fixture.nativeElement.querySelector("ul.heroes>li");
            const win = hero.ownerDocument.defaultView ||hero.ownerDocument.parentWindow;
            const styles = win.getComputedStyle(hero);
            expect(styles["cursor"]).toEqual("pointer", "cursor should be pointer on hero");
            expect(styles["borderRadius"]).toEqual("4px", "borderRadius should be 4px");
        })));

    it("should have a click handler for hero items",async(()=>
        this.fixture.whenStable().then(()=>{
            const cmp = this.fixture.componentInstance;
            expect(cmp.onSelect)
                .toBeDefined("should have a click handler for heros");
            expect(this.fixture.nativeElement.querySelector("input.heroName"))
                .toBeNull("should not show the hero details when no hero has been selected");
            expect(this.fixture.nativeElement.querySelector("ul.heroes li.selected"))
                .toBeNull("Should not have any selected heroes at start");

            spyOn(cmp,"onSelect").and.callThrough();
            this.fixture.nativeElement.querySelectorAll("ul.heroes li")[5].click();

            expect(cmp.onSelect)
                .toHaveBeenCalledWith(cmp.heroes[5]);
            expect(cmp.selectedHero)
                .toEqual(cmp.heroes[5], "click on hero should change hero");
        })
    ));
});
```

Noteworthy in this is how we have **beforeEach()** configure a test module and create the component in test, and

how we call **detectChanges()** so that angular actually goes through the double-binding and all.

Notice that each test is a call to **async()** and it always waits for **whenStable** promise to resolve before examining the fixture. It then has access to the component through **componentInstance** and to the element through **nativeElement**.

There is one test which is checking the correct styling. as part of the Tutorial, Angular team demonstrates use of styles inside components. In our test, we use **getComputedStyle()** to check that styles are coming from where we specified, however we need the Window object for that, and we are getting it from the element as you can see in the test.

Section 66.2: Installing the Jasmine testing framework

The most common way to test Angular 2 apps is with the Jasmine test framework. Jasmine allows you to test your code in the browser.

Install

To get started, all you need is the `jasmine-core` package (not `jasmine`).

```
npm install jasmine-core --save-dev --save-exact
```

Verify

To verify that Jasmine is set up properly, create the file `./src/unit-tests.html` with the following content and open it in the browser.

```
<!DOCTYPE html>
<html>
<head>
  <meta http-equiv="content-type" content="text/html;charset=utf-8">
  <title>Ng App Unit Tests</title>
  <link rel="stylesheet" href="../node_modules/jasmine-core/lib/jasmine-core/jasmine.css">
  <script src="../node_modules/jasmine-core/lib/jasmine-core/jasmine.js"></script>
  <script src="../node_modules/jasmine-core/lib/jasmine-core/jasmine-html.js"></script>
  <script src="../node_modules/jasmine-core/lib/jasmine-core/boot.js"></script>
</head>
<body>
   <!-- Unit Testing Chapter #1: Proof of life.  -->
   <script>
     it('true is true', function () {
       expect(true).toEqual(true);
     });
   </script>
</body>
</html>
```

Section 66.3: Testing Http Service

Usually, services call remote Api to retrieve/send data. But unit tests shouldn't do network calls. Angular internally uses `XHRBackend` class to do http requests. User can override this to change behavior. Angular testing module provides `MockBackend` and `MockConnection` classes which can be used to test and assert http requests.

`posts.service.ts` This service hits an api endpoint to fetch list of posts.

```
import { Http } from '@angular/http';
import { Injectable } from '@angular/core';
```

```
import { Observable }     from 'rxjs/rx';

import 'rxjs/add/operator/map';

export interface IPost {
    userId: number;
    id: number;
    title: string;
    body: string;
}

@Injectable()
export class PostsService {
    posts: IPost[];

    private postsUri = 'http://jsonplaceholder.typicode.com/posts';

    constructor(private http: Http) {
    }

    get(): Observable<IPost[]> {
        return this.http.get(this.postsUri)
                .map((response) => response.json());
    }
}
```

`posts.service.spec.ts` Here, we will test above service by mocking http api calls.

```
import { TestBed, inject, fakeAsync } from '@angular/core/testing';
import {
    HttpModule,
    XHRBackend,
    ResponseOptions,
    Response,
    RequestMethod
} from '@angular/http';
import {
    MockBackend,
    MockConnection
} from '@angular/http/testing';

import { PostsService } from './posts.service';

describe('PostsService', () => {
    // Mock http response
    const mockResponse = [
        {
            'userId': 1,
            'id': 1,
            'title': 'sunt aut facere repellat provident occaecati excepturi optio reprehenderit',
            'body': 'quia et suscipit\nsuscipit recusandae consequuntur expedita et
cum\nreprehenderit molestiae ut ut quas totam\nnostrum rerum est autem sunt rem eveniet architecto'
        },
        {
            'userId': 1,
            'id': 2,
            'title': 'qui est esse',
            'body': 'est rerum tempore vitae\nsequi sint nihil reprehenderit dolor beatae ea
dolores neque\nfugiat blanditiis voluptate porro vel nihil molestiae ut reiciendis\nqui aperiam non
debitis possimus qui neque nisi nulla'
        },
```

```
        {
            'userId': 1,
            'id': 3,
            'title': 'ea molestias quasi exercitationem repellat qui ipsa sit aut',
            'body': 'et iusto sed quo iure\nvoluptatem occaecati omnis eligendi aut ad\nvoluptatem
doloribus vel accusantium quis pariatur\nmolestiae porro eius odio et labore et velit aut'
        },
        {
            'userId': 1,
            'id': 4,
            'title': 'eum et est occaecati',
            'body': 'ullam et saepe reiciendis voluptatem adipisci\nsit amet autem assumenda
provident rerum culpa\nquis hic commodi nesciunt rem tenetur doloremque ipsam iure\nquis sunt
voluptatem rerum illo velit'
        }
    ];

    beforeEach(() => {
        TestBed.configureTestingModule({
            imports: [HttpModule],
            providers: [
                {
                    provide: XHRBackend,
                    // This provides mocked XHR backend
                    useClass: MockBackend
                },
                PostsService
            ]
        });
    });

    it('should return posts retrieved from Api', fakeAsync(
        inject([XHRBackend, PostsService],
            (mockBackend, postsService) => {
                mockBackend.connections.subscribe(
                    (connection: MockConnection) => {
                        // Assert that service has requested correct url with expected method
                        expect(connection.request.method).toBe(RequestMethod.Get);

expect(connection.request.url).toBe('http://jsonplaceholder.typicode.com/posts');
                        // Send mock response
                        connection.mockRespond(new Response(new ResponseOptions({
                            body: mockResponse
                        })));
                    });

                postsService.get()
                    .subscribe((posts) => {
                        expect(posts).toBe(mockResponse);
                    });

            })));
});
```

Section 66.4: Testing Angular Components - Basic

The component code is given as below.

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

@Component({
```

```
  selector: 'my-app',
  template: '<h1>{{title}}</h1>'
})
export class MyAppComponent{
  title = 'welcome';
}
```

For angular testing, angular provide its testing utilities along with the testing framework which helps in writing the good test case in angular. Angular utilities can be imported from `@angular/core/testing`

```
import { ComponentFixture, TestBed } from '@angular/core/testing';
import { MyAppComponent } from './banner-inline.component';

describe('Tests for MyAppComponent', () => {

  let fixture: ComponentFixture<MyAppComponent>;
  let comp: MyAppComponent;

  beforeEach(() => {
    TestBed.configureTestingModule({
      declarations: [
        MyAppComponent
      ]
    });
  });

  beforeEach(() => {

    fixture = TestBed.createComponent(MyAppComponent);
    comp = fixture.componentInstance;

  });

  it('should create the MyAppComponent', () => {

      expect(comp).toBeTruthy();

  });

});
```

In the above example, there is only one test case which explain the test case for component existence. In the above example angular testing utilities like `TestBed` and `ComponentFixture` are used.

`TestBed` is used to create the angular testing module and we configure this module with the `configureTestingModule` method to produce the module environment for the class we want to test. Testing module to be configured before the execution of every test case that's why we configure the testing module in the `beforeEach` function.

`createComponent` method of `TestBed` is used to create the instance of the component under test. `createComponent` return the `ComponentFixture`. The fixture provides access to the component instance itself.

Chapter 67: angular-cli test coverage

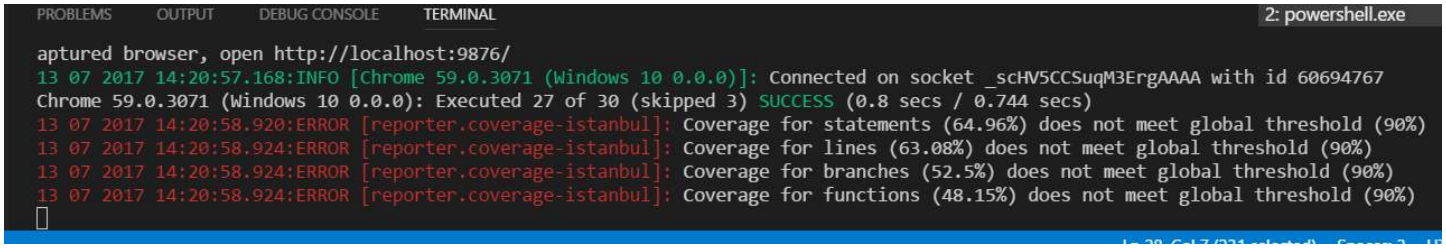
test coverage is defined as a technique which determines whether our test cases are actually covering the application code and how much code is exercised when we run those test cases.

Angular CLI has built in code coverage feature with just a simple command `ng test --cc`

Section 67.1: A simple angular-cli command base test coverage

If you want to see overall test coverage statistics than of course in Angular CLI you can just type below command, and see the bottom of your command prompt window for results.

```
ng test --cc // or --code-coverage
```



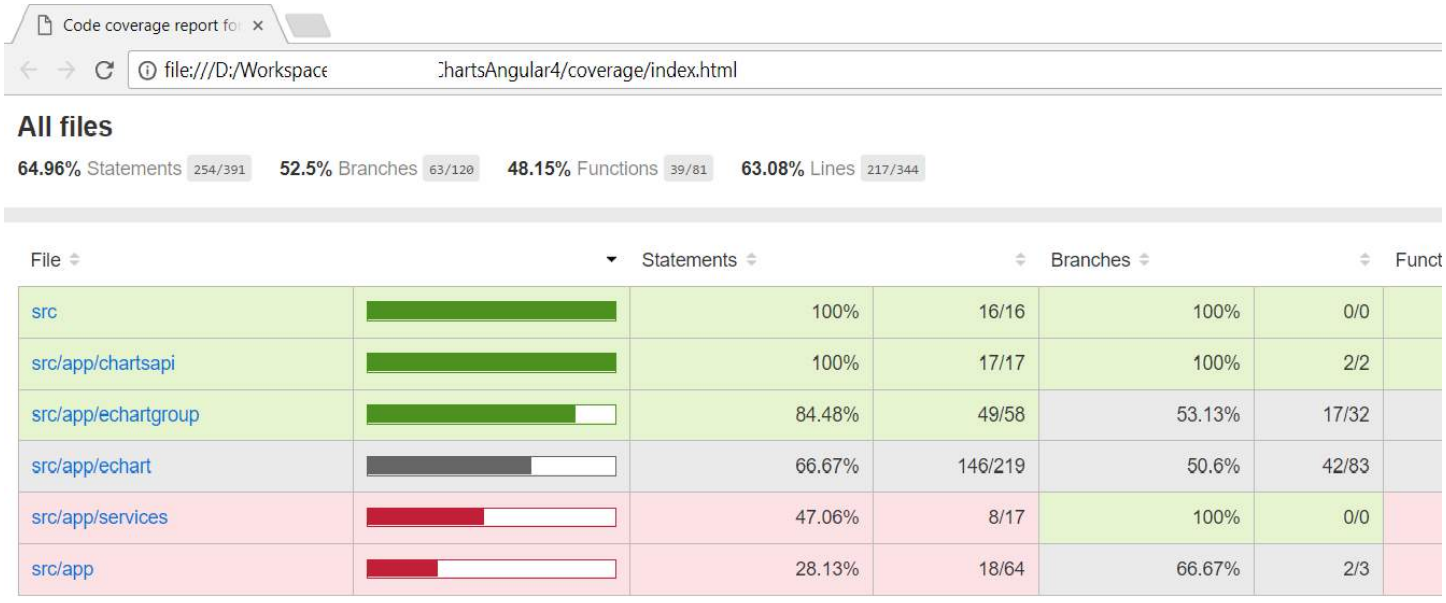
Section 67.2: Detailed individual component base graphical test coverage reporting

if you want to see component's individual coverage of tests follow these steps.

1. `npm install --save-dev karma-teamcity-reporter`
2. `Add `require('karma-teamcity-reporter')` to list of plugins in karma.conf.js`
3. `ng test --code-coverage --reporters=teamcity,coverage-istanbul`

note that list of reporters is comma-separated, as we have added a new reporter, teamcity.

after running this command you can see the folder `coverage` in your dir and open `index.html` for a graphical view of test coverage.



You can also set the coverage threshold that you want to achieve, in `karma.conf.js`, like this.

```
coverageIstanbulReporter: {
      reports: ['html', 'lcovonly'],
      fixWebpackSourcePaths: true,
      thresholds: {
        statements: 90,
        lines: 90,
        branches: 90,
        functions: 90
      }
    },
```

Chapter 68: Debugging Angular 2 TypeScript application using Visual Studio Code

Section 68.1: Launch.json setup for you workspace

1. Turn on Debug from menu - view > debug
2. it return some error during start debug, show pop out notification and open launch.json from this popup notification It is just because of launch.json not set for your workspace. copy and paste below code in to launch.json //new launch.json

   your old launch.json

```
{
    "version": "0.2.0",
    "configurations": [
        {
            "name": "Launch Extension",
            "type": "extensionHost",
            "request": "launch",
            "runtimeExecutable": "${execPath}",
            "args": [
                "--extensionDevelopmentPath=${workspaceRoot}"
            ],
            "stopOnEntry": false,
            "sourceMaps": true,
            "outDir": "${workspaceRoot}/out",
            "preLaunchTask": "npm"
        }
    ]
}
```

Now update your launch.json as below
new launch.json
// remember please mention your main.js path into it

```
{
    "version": "0.2.0",
    "configurations": [
        {
            "name": "Launch",
            "type": "node",
            "request": "launch",
            "program": "${workspaceRoot}/app/main.js", // put your main.js path
            "stopOnEntry": false,
            "args": [],
            "cwd": "${workspaceRoot}",
            "preLaunchTask": null,
            "runtimeExecutable": null,
            "runtimeArgs": [
                "--nolazy"
            ],
            "env": {
                "NODE_ENV": "development"
            },
            "console": "internalConsole",
```

```
            "sourceMaps": false,
            "outDir": null
        },
        {
            "name": "Attach",
            "type": "node",
            "request": "attach",
            "port": 5858,
            "address": "localhost",
            "restart": false,
            "sourceMaps": false,
            "outDir": null,
            "localRoot": "${workspaceRoot}",
            "remoteRoot": null
        },
        {
            "name": "Attach to Process",
            "type": "node",
            "request": "attach",
            "processId": "${command.PickProcess}",
            "port": 5858,
            "sourceMaps": false,
            "outDir": null
        }
    ]
}
```

3. Now it debug is working, show notification popup for step by step debugging

Chapter 69: unit testing

Section 69.1: Basic unit test

component file

```
@Component({
  selector: 'example-test-compnent',
  template: '<div>
                <div>{{user.name}}</div>
                <div>{{user.fname}}</div>
                <div>{{user.email}}</div>
            </div>'
})

export class ExampleTestComponent implements OnInit{

    let user :User = null;
    ngOnInit(): void {
       this.user.name = 'name';
       this.user.fname= 'fname';
       this.user.email= 'email';
    }

}
```

Test file

```
describe('Example unit test component', () => {
  let component: ExampleTestComponent ;
  let fixture: ComponentFixture<ExampleTestComponent >;

  beforeEach(async(() => {
    TestBed.configureTestingModule({
      declarations: [ExampleTestComponent]
    }).compileComponents();
  }));

  beforeEach(() => {
    fixture = TestBed.createComponent(ExampleTestComponent );
    component = fixture.componentInstance;
    fixture.detectChanges();
  });


  it('ngOnInit should change user object values', () => {
    expect(component.user).toBeNull(); // check that user is null on initialize
    component.ngOnInit(); // run ngOnInit

    expect(component.user.name).toEqual('name');
    expect(component.user.fname).toEqual('fname');
    expect(component.user.email).toEqual('email');
  });
});
```

Credits

Thank you greatly to all the people from Stack Overflow Documentation who helped provide this content, more changes can be sent to web@petercv.com for new content to be published or updated

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