Introduction to Angular Modules or ngModule

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The building blocks of Angular Applications consist of Components, Templates, Directives, Pipes, and Services. We build a lot of such blocks to create a complete application. As the application grows bigger in size managing these blocks become difficult. The Angular Provides a nice way to organize these blocks in a simple and effectively using Angular modules (Also known as *ngModule*).

The Module is an overloaded term. It means different things depending on the context. There are two kinds of modules that exist in Angular itself. One is the **JavaScript Module** and the other one is **Angular Module**.

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What is Angular Module

The Angular module (also known as ngModule) helps us to organize the application parts into cohesive blocks of functionality. Each block focuses on providing a specific functionality or a feature.

The Angular module must implement a specific feature. The Components, Directives, Services that implement such a feature, will become part of that Module.

The Modular design helps to keep the Separation of concerns. Keep the features together. Makes it easy to maintain the code. Makes it easier to reuse the code.

The Angular itself is built on the concept of Modules. The @angular/core is the main Angular module, which implements Angular's core functionality, low-level services, and utilities.

The Features like Forms, HTTP, and Routing are implemented as separate Feature modules such as FormsModule, HttpClientModule, and RouterModule. There are many third-party libraries built around Angular such as Material Design, Ionic, etc.

Angular Applications are assembled from the modules. The module exports Component, directive, service, pipe, etc, which can be then imported into another module

JavaScript Modules vs. NgModules

JavaScript Modules

The JavaScript Modules, which also go by the name JS modules or ES modules, or ECMAScript modules are part of the JavaScript Language. The JS Modules are stored in a file. There is exactly one module per file and one file per module. These modules contain small units of independent, reusable code. They export a value, which can be imported and used in some other module.

The following is a Javascript Module that exports the `SomeComponent`.

```
1
2 export class SomeComponent {
3   //do something
4 }
5
```

The `SomeOtherComponent` is another JavaScript Module, that imports and uses the `SomeComponent`.

```
1
2 import { SomeComponent } from './some.component';
3
4 export class SomeOtherComponent {
5   /do some other thing
6 }
7
```

How to Create an Angular Module

The Angular Module must declare the Components, Pipes, and Directives it manages. We Create the Angular Modules by decorating it with the `ngModule` decorator.

ngModule

The `NgModule()` decorator is a function that takes a single metadata object, whose properties describe the module. The most important properties are as follows.

```
@NgModule({
  declarations: [ ],
  imports:      [ ],
  providers:    [ ],
  exports:      [ ],
  bootstrap:    [ ],
  entrycomponents: [ ]
})
```

Declarations array

This is where components, directives, and pipes that belong to this `NgModule` are declared.

You should add only those, which belong to this module. The Component cannot belong to more than one module.

The services must not be declared here. They are defined in the Angular Providers array.

Providers array

The Services, which you want to add to the global collection of services are added here. The services are then available for injection via dependency injection.

Remember :
Declarations are for Components, Directives & Pipes.
Providers are for Services

Remember:
Services are global in scope. Services added to Providers array are available for injection in the entire application

Suggested Readings

Angular Services
Dependency Injection in Angular
Angular Injector
Providers in Angular
Angular Hierarchical Dependency Injection

Imports array

If you want this `ngModule` require any feature or functionality, then those modules need to be imported here. Any components, directives, and pipes that are defined and exported in that module can be used in this module.

Exports array

If you want other modules to use the component, pipes, directives of this `NgModule`, then those must be specified here.

> Remember:
> Only those components declared here are visible to the other `ngModules`, when they import this module.

Bootstrap

The main component of this module, which needs to be loaded when the module is loaded is specified here.

> This is a must if you are the first module (**called the root module)** that is loaded when the Angular App starts. It is the responsibility of the root module to load the first view and it is done by specifying the component here.
>
> If the module is not the root module, then you should keep this blank

Suggested Reading

How Angular Bootstraps your Application

EntryComponents

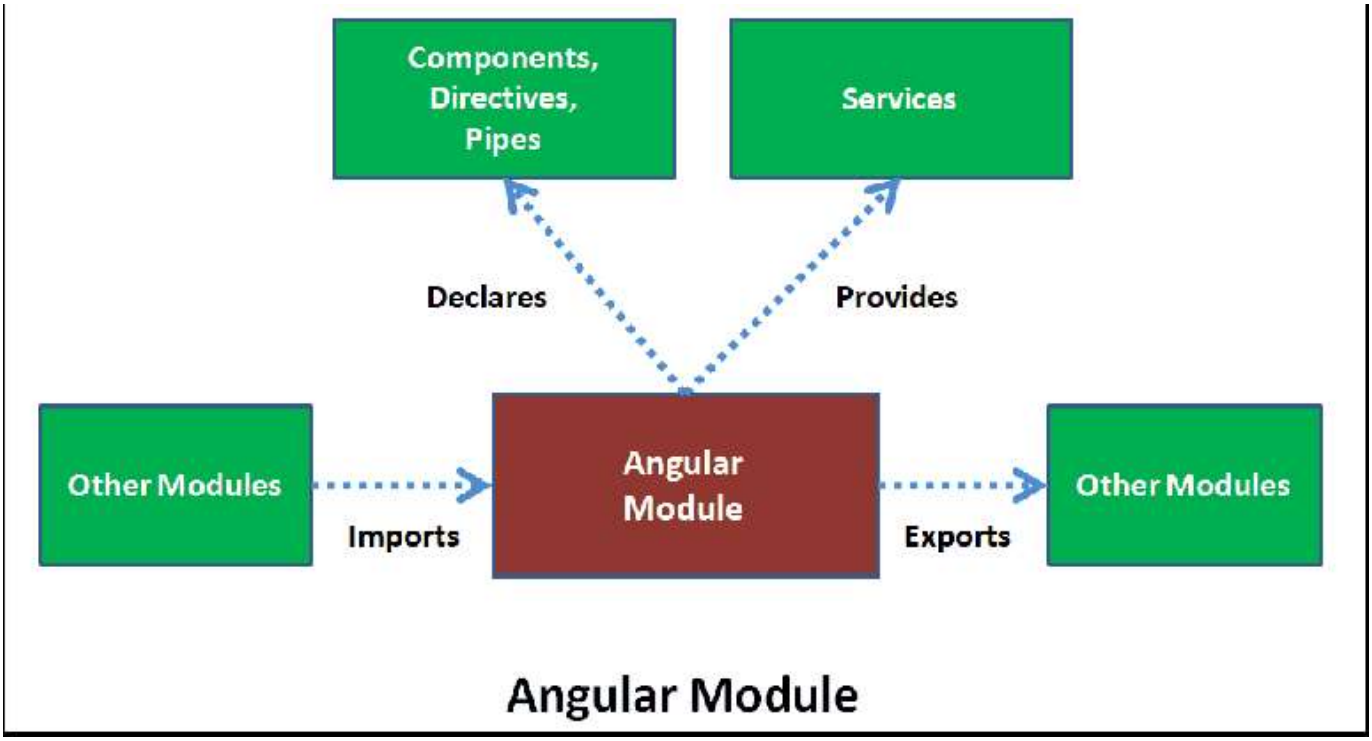
The components that are dynamically loaded needs to be declared here.

The components are loaded when angular

- Finds the Component Selector in the HTML
- Declared in the bootstrap array
- Declared in the root definition

If your component is not listed any of the above, then it needs to be declared in `EntryComponent` so that Angular knows where to find them and compile them.

The following image should make it clear, how the `ngModule` metadata works



Angular Module Example

Let us create an example application with multiple modules to demonstrate the use of the Angular Modules.

Create the application

```
ng new --routing  --style css ModuleDemo
```

Use `npm start` to run the program and test everything is ok.

```
Cd ModuleDemo
npm start
```

The App Contains two Modules. i.e. `AppModule` & `AppRoutingModule`

Routing Module

The `AppRoutingModule` is an Angular Module, which specifically defines the application `Routes`

```
1
2  import { NgModule } from '@angular/core';
3  import { Routes, RouterModule } from '@angular/router';
4
5  const routes: Routes = [];
6
7  @NgModule({
8    imports: [RouterModule.forRoot(routes)],
9    exports: [RouterModule]
10 })
11 export class AppRoutingModule { }
12
```

This module does not contain any components, pipes or directives. Hence it does not need to declare anything in the `declaration` array

No services are part of this Module, Hence providers array is also not needed.

The Angular `RouterModule` is needed for the routing to work, Hence it is imported. The `Routermodule` requires the routes to work, hence it is passed to the `RouterModule` in the `forRoot` method.

The application needs only one instance of the services provided by the `RouterModule`. But every Angular module might contain routes of its own and needs to import `RouterModule` and register the routes.

Angular has a nice way to solve this problem. The Services are registered only if you call the `forRoot` method. `forRoot` method must be called only once and in the Root module. In the other modules, we will be using the `forChild` method to register the routes

Root Module

The first module that gets loaded is called **Root Module**, which is conventionally named as `AppModule` and is automatically created by the Angular CLI.

The following is the auto-generated code of the `AppModule`. The class is decorated with the `@NgModule` decorator

```
1
2  import { BrowserModule } from '@angular/platform-browser';
3  import { NgModule } from '@angular/core';
4
5  import { AppRoutingModule } from './app-routing.module';
6  import { AppComponent } from './app.component';
7
8  @NgModule({
9    declarations: [
10     AppComponent
11   ],
12   imports: [
13     BrowserModule,
14     AppRoutingModule
15   ],
16   providers: [],
17   bootstrap: [AppComponent]
18 })
19 export class AppModule { }
20
```

The `AppModule` has only one component i.e `AppComponent` and it does not have any pipes or directives. Hence the `declaration` array contains only `AppComponent`

The `imports` metadata should contain the other modules that are being used by this module. Hence it imports the `BrowserModule`, which is an Angular Library. It also requires Routes, hence we are importing `AppRoutingModule`

The `AppModule` does not define any services. Hence the `providers` array is empty

Finally, we need to load the `AppComponent` when the App starts, hence we define it in `bootstrap` array

Creating a Module

Let us add another Module to our above application.

Create a folder `home` under `src/app` folder

Components

Let us add three components. `HomeComponent`, `AboutUsComponent`, `ContactUsComponent`.

Create a folder called `pages` under the `home` folder. Create a three folder under pages `aboutus`, `contactus` & `home`.

home/pages/aboutus/about-us.component.ts

```
1
2 import { Component } from '@angular/core';
3
4 @Component({
5     templateUrl: './about-us.component.html',
```

```
})
export class AboutUsComponent
{
}

```

home/pages/aboutus/about-us.component.html

```

<h1> About Us Page</h1>

```

home/pages/contactus/contact-us.component.ts

```

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

@Component({
    templateUrl: './contact-us.component.html',
})
export class ContactUsComponent
{
}

```

home/pages/contactus/contact-us.component.html

```

<h1> Contact Us</h1>

```

home/pages/home/home.component.ts

```

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

@Component({
    templateUrl: './home.component.html',
```

```
})
export class HomeComponent
{
}

```

home/pages/home/home.component.html

```
<h1> Welcome To Module Demo</h1>

```

home/pages/index.ts

```
export * from './aboutus/about-us.component';
export * from './contactus/contact-us.component';
export * from './home/home.component';

```

Home Module

Now, our components are ready, we can now create the HomeModule

Create the home.module.ts under the home folder

```
1
2  import { NgModule } from '@angular/core';
3  import { RouterModule, Routes } from '@angular/router';
4  import { CommonModule } from '@angular/common';
5
6  import { AboutUsComponent,ContactUsComponent,HomeComponent } from './pages';
7
8  const routes: Routes = [
9    {   path: '',   component: HomeComponent   },
10   {   path: 'home',   component: HomeComponent   },
11   {   path: 'contactus',   component: ContactUsComponent   },
12   {   path: 'aboutus',   component: AboutUsComponent   },
13 ];
14
15 @NgModule({
16   declarations: [AboutUsComponent,ContactUsComponent,HomeComponent],
17   imports: [
18     CommonModule,
19     RouterModule.forChild(routes),
20   ],
21   providers: [],
22 })
23 export class HomeModule { }
24
```

We decorate the `HomeModule` class with `@NgModule` to let Angular know that it is an Angular Module

Next, use the `declarations` array to declare the three components that we have created.

The `HomeModule` do not expose any services, hence we keep the `providers` array empty

We are keeping the `Routes` in the module itself. You can create a separate routing module similar to the `AppRoutingModule`. That will help to keep the `HomeModule` code clean.

HomeModule requires CommonModule hence it is added to the imports array. The RouterModule module is imported and routes are registered with the call to forChild(routes). forChild registered the routes but does not register any services.

home/index.ts

```
export * from './pages';
export * from './home.module';
```

Using HomeModule in AppModule

The next step is to import the HomeModule in the AppModule. First import the HomeModule

```
import { HomeModule} from './home';
```

Next, add HomeModule to the imports metadata of the @ngModule

```
  imports: [
    BrowserModule,
    AppRoutingModule,
    HomeModule
  ],
```

Next, we need to use the Components of the HomeModule. Open the app.component.ts and add the following code

```
```

```
<ul>
  <li>
    <a class="navbar-brand" routerLink="/">Home</a>
  </li>
  <li>
     <a class="navbar-brand" routerLink="/aboutus">About</a>
  </li>
  <li>
    <a class="navbar-brand" routerLink="/contactus">Contact</a>
  </li>
</ul>

<router-outlet></router-outlet>

```

All we have done is to use them `routerLink` to create a menu item.

Suggested Readings:

Angular Router

Copy the following CSS to app.component.css

```

ul {
    list-style-type: none;
    margin: 0;
    padding: 0;
    overflow: hidden;
    background-color: #333333;
}

li {
    float: left;
}

li a {
    display: block;
    color: white;
    text-align: center;
    padding: 16px;
    text-decoration: none;
```

```
}

li a:hover {
   background-color: #111111;
}

```

Finally, run the app

Summary

In this tutorial, we learned what is Angular Modules are and how to create an Angular Module.

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