Angular 2初探

2016-12-11

預備知識

- Typescript
- ES6
- npm

optional

- webpack

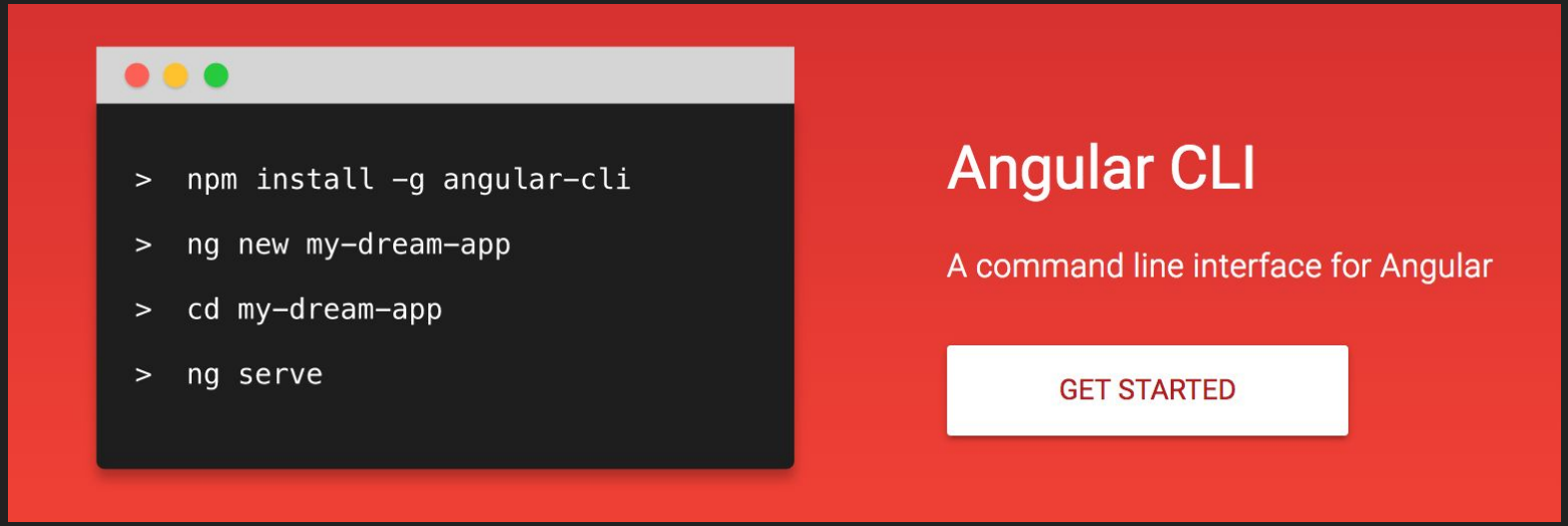
作業系統

- Windows 7 以上版本 (更新到最新 Service Pack 版本)
- Mac OS X 10.6 以上版本

npm 安裝Angular CLI　(要裝5~10分鐘)

官網 :https://cli.angular.io/

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

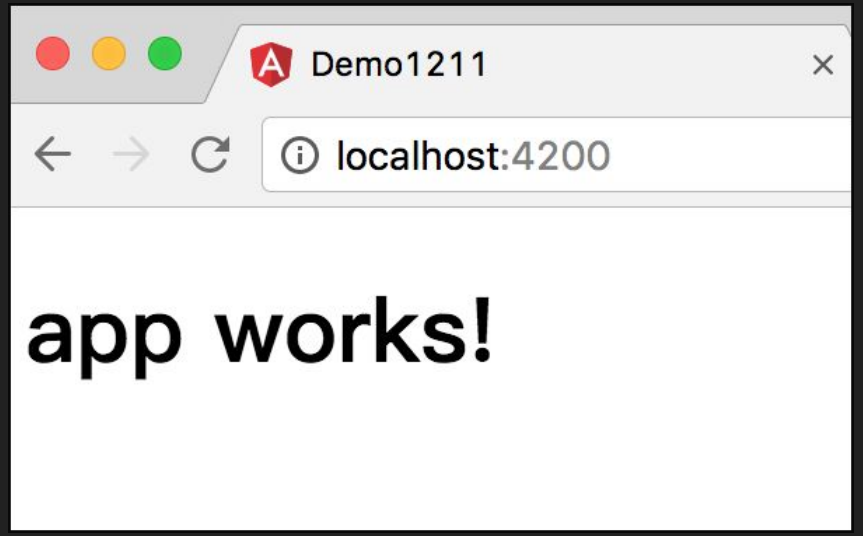


建專案用yarn去裝dependencies快很多

- yarn 100%與npm相容 速度快5-20倍
- npm install -g angular-cli
- npm install -g yarn
- ng new demo1211 --skip-npm
- cd demo1211
- yarn
- ng serve

http://localhost:4200/

看網頁是否有run起來



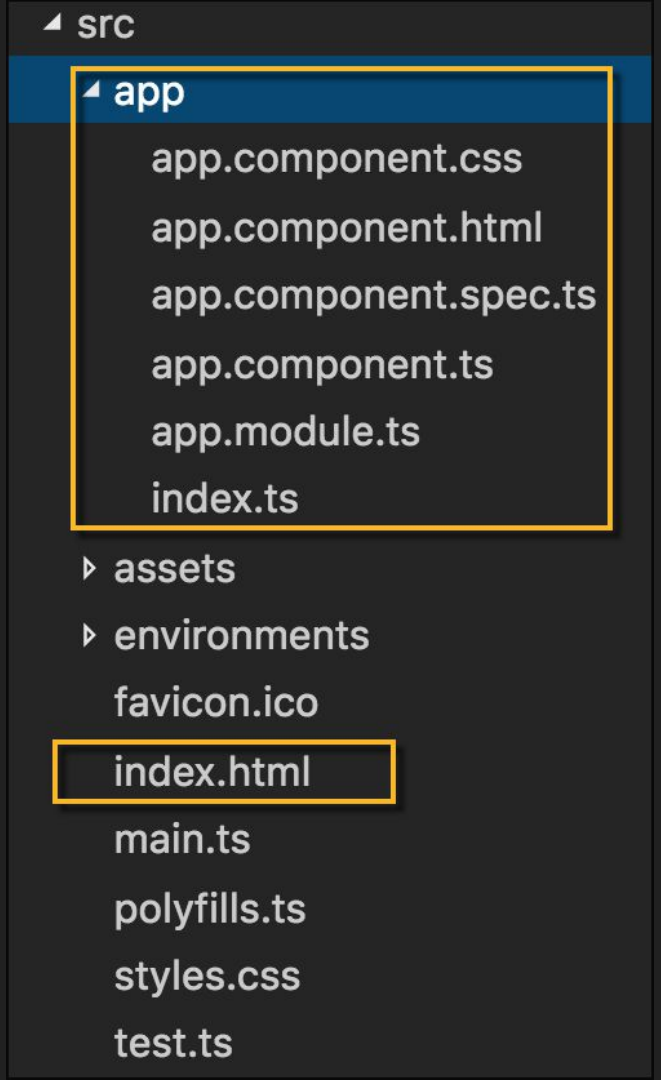
有安裝過angular cli要升級

有error可加上sudo npm uninstall -g angular-cli

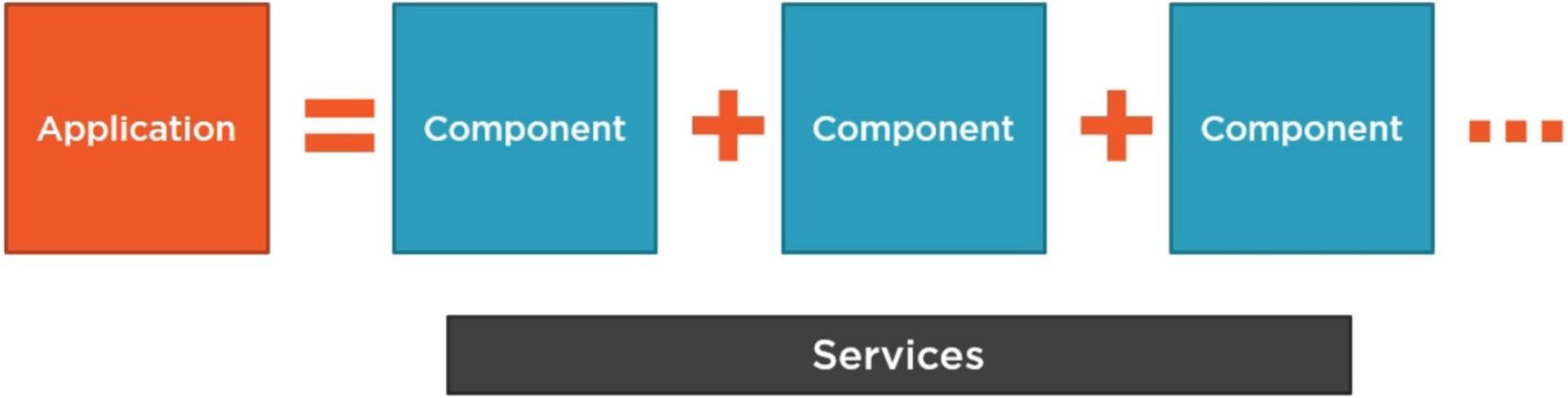
```
npm uninstall -g angular-cli
npm cache clean
npm install -g angular-cli
```

專案結構

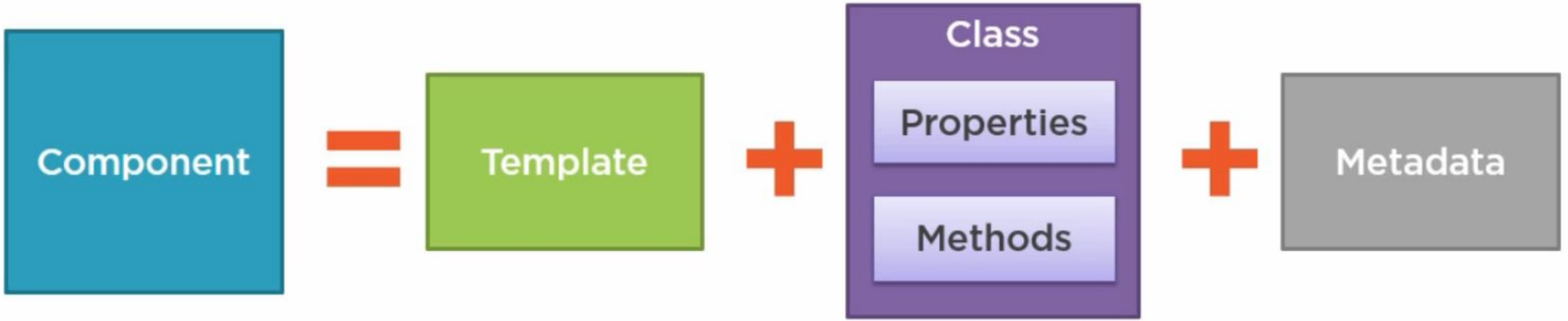
- 主要看app folder



Angular App的結構

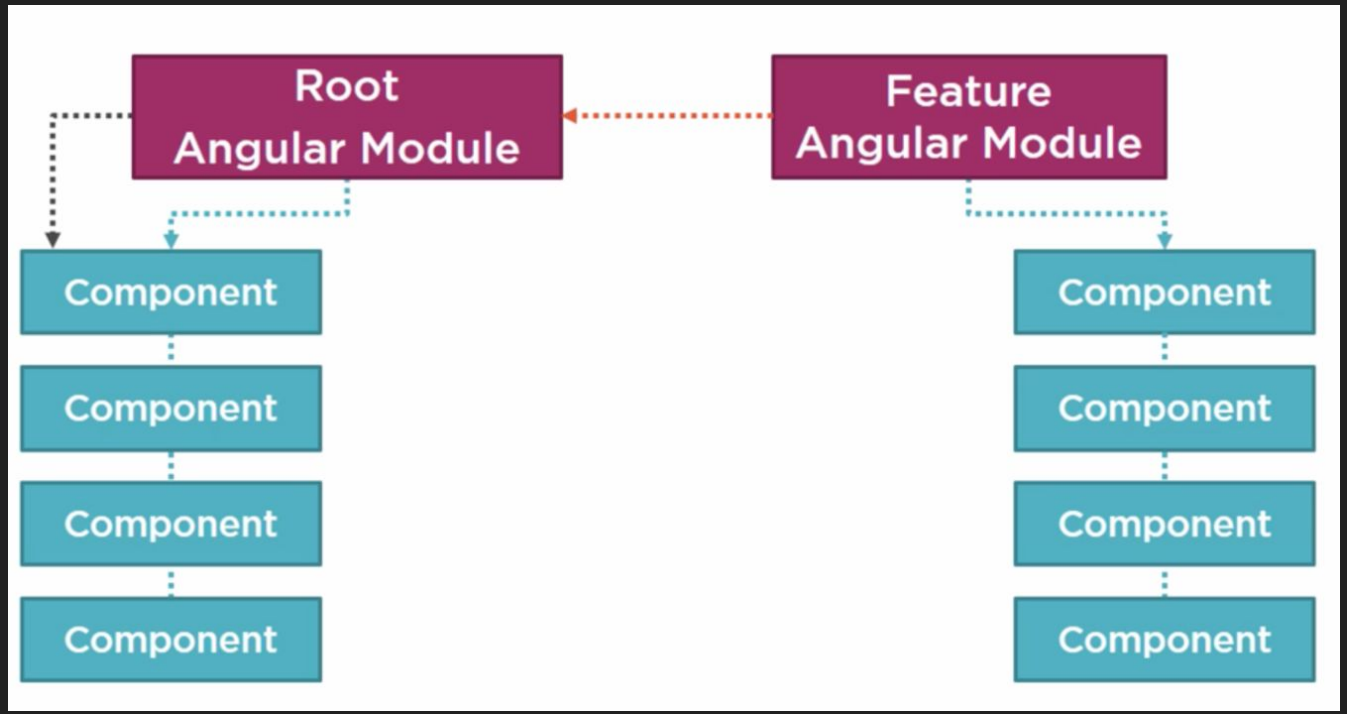


Component

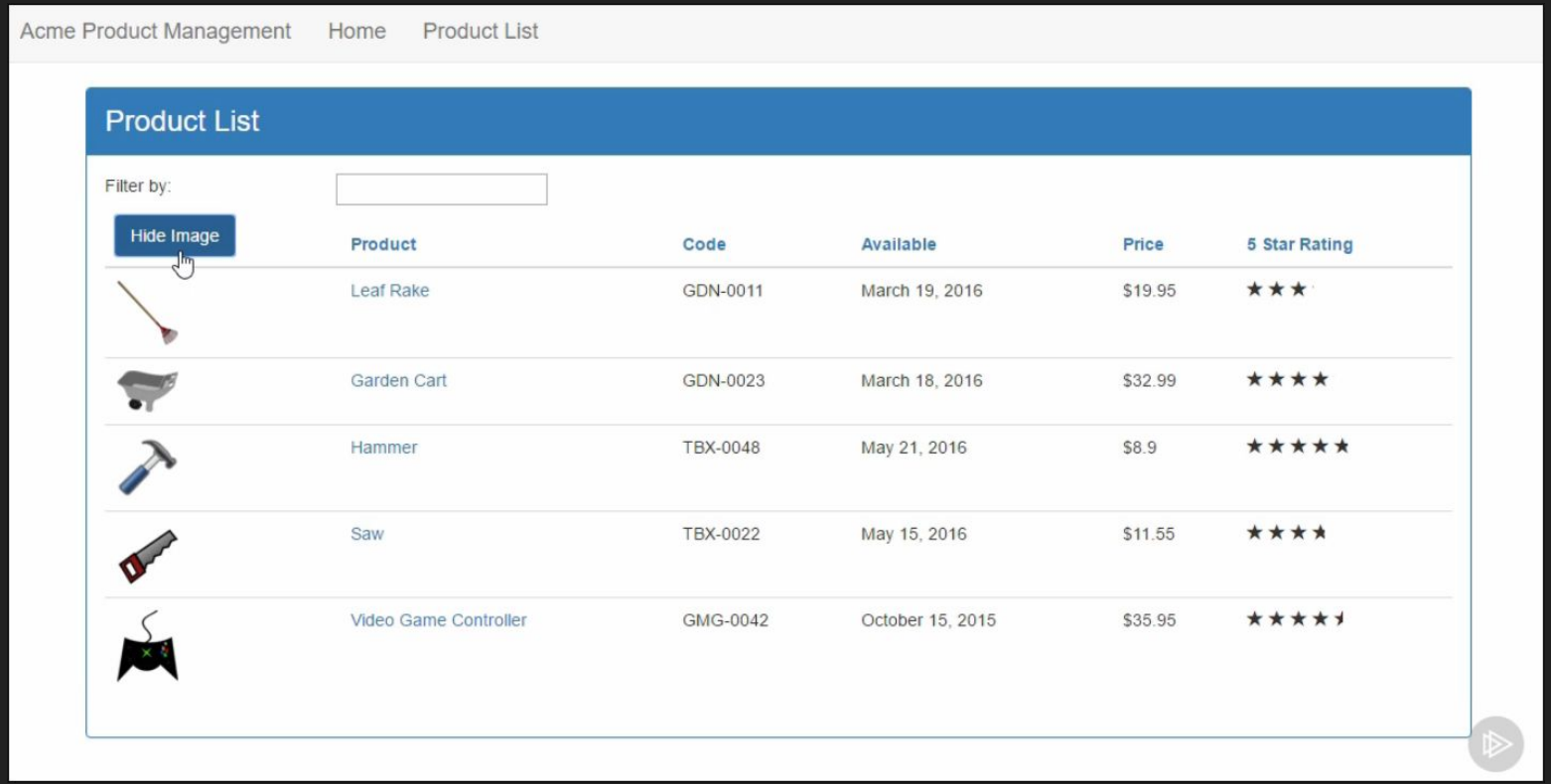


Angular Module

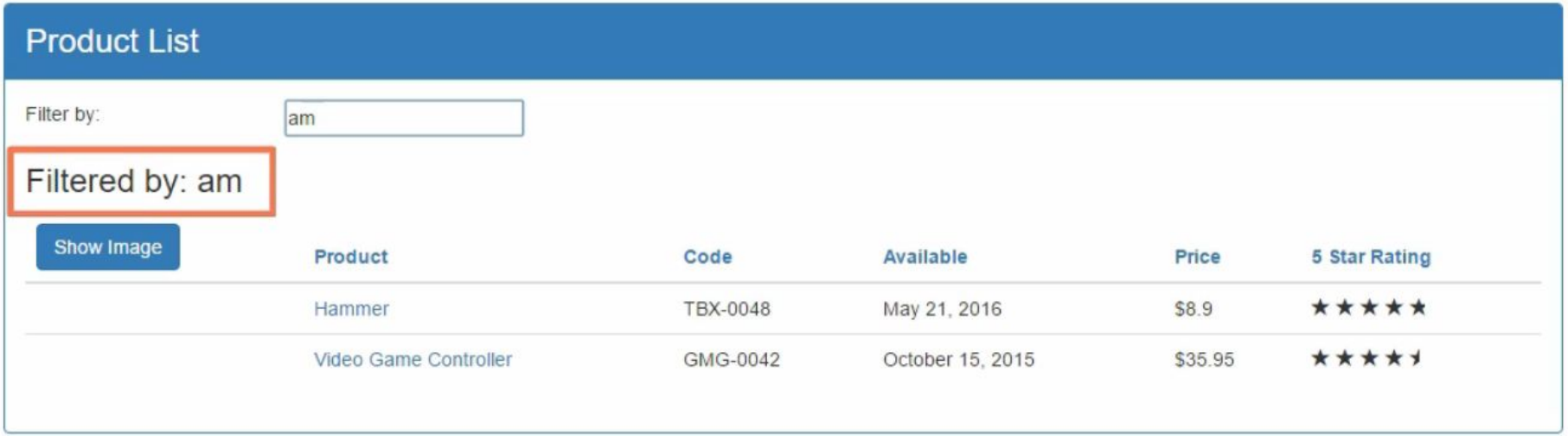
至少會有一個module - Root



Demo


Acme Product Management
Home
Product List
Product List
Filter by:
Hide Image
Product
Code
Available
Price
5 Star Rating
Leaf Rake
GDN-0011
March 19, 2016
$19.95
Garden Cart
GDN-0023
March 18, 2016
$32.99
Hammer
TBX-0048
May 21, 2016
$8.9
Saw
TBX-0022
May 15, 2016
$11.55
Video Game Controller
GMG-0042
October 15, 2015
$35.95

filter


Product List
Filter by:
am
Filtered by: am
Show Image
Product
Code
Available
Price
5 Star Rating
Hammer
TBX-0048
May 21, 2016
$8.9
Video Game Controller
GMG-0042
October 15, 2015
$35.95

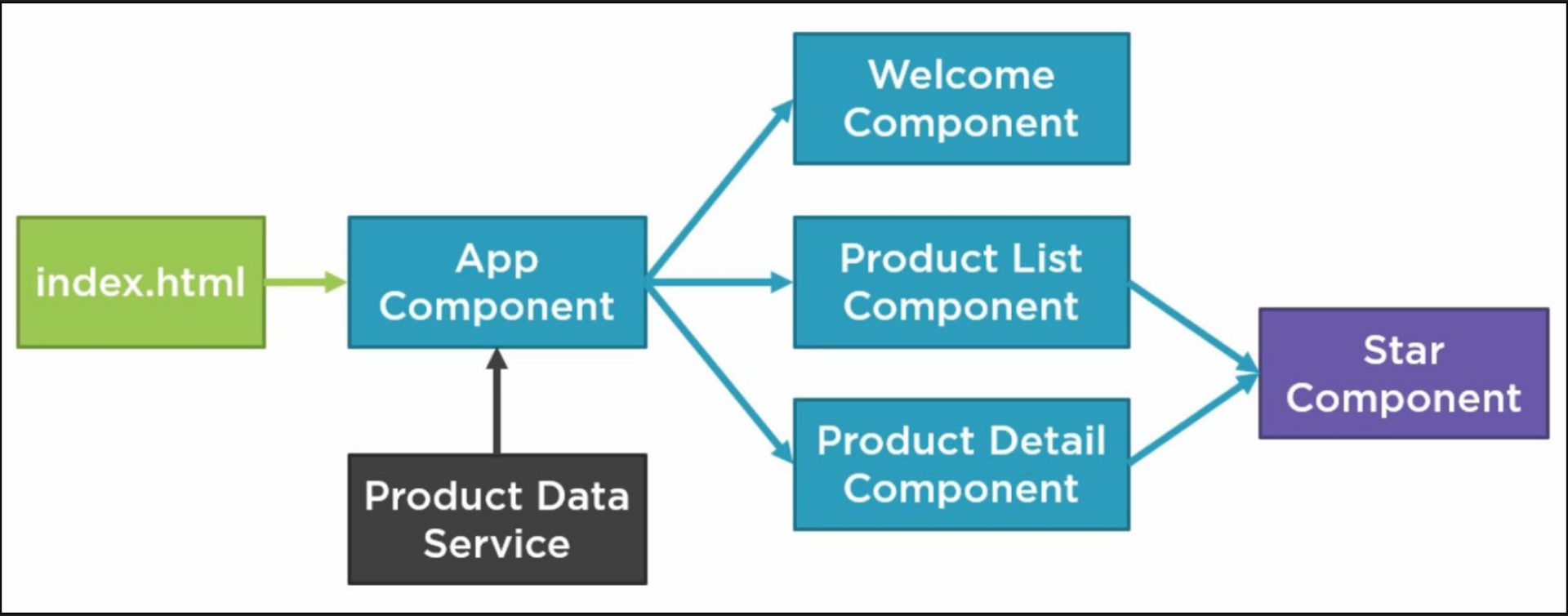
product detail

Product Detail: Video Game Controller

Name:	Video Game Controller
Code:	GMG-0042
Description:	Standard two-button video game controller
Availability:	October 15, 2015
Price:	$35.95
5 Star Rating:	★★★★½

Back

App架構


Welcome Component
index.html
App Component
Product List Component
Star Component
Product Detail Component
Product Data Service

JS有namespaces跟code organize問題

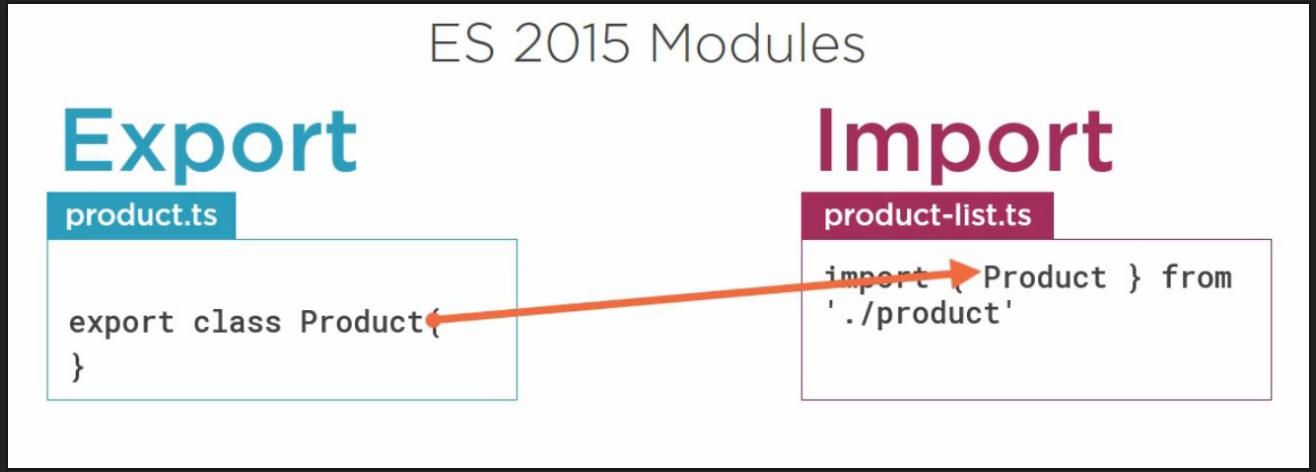
ES2015把file都當成modules
所以不用另外定義module
只要直接寫code，然後export/import,

這個file就成了module

Ag2使用此法

所以當我們建立code files，import/export某些東西

就是建立modules



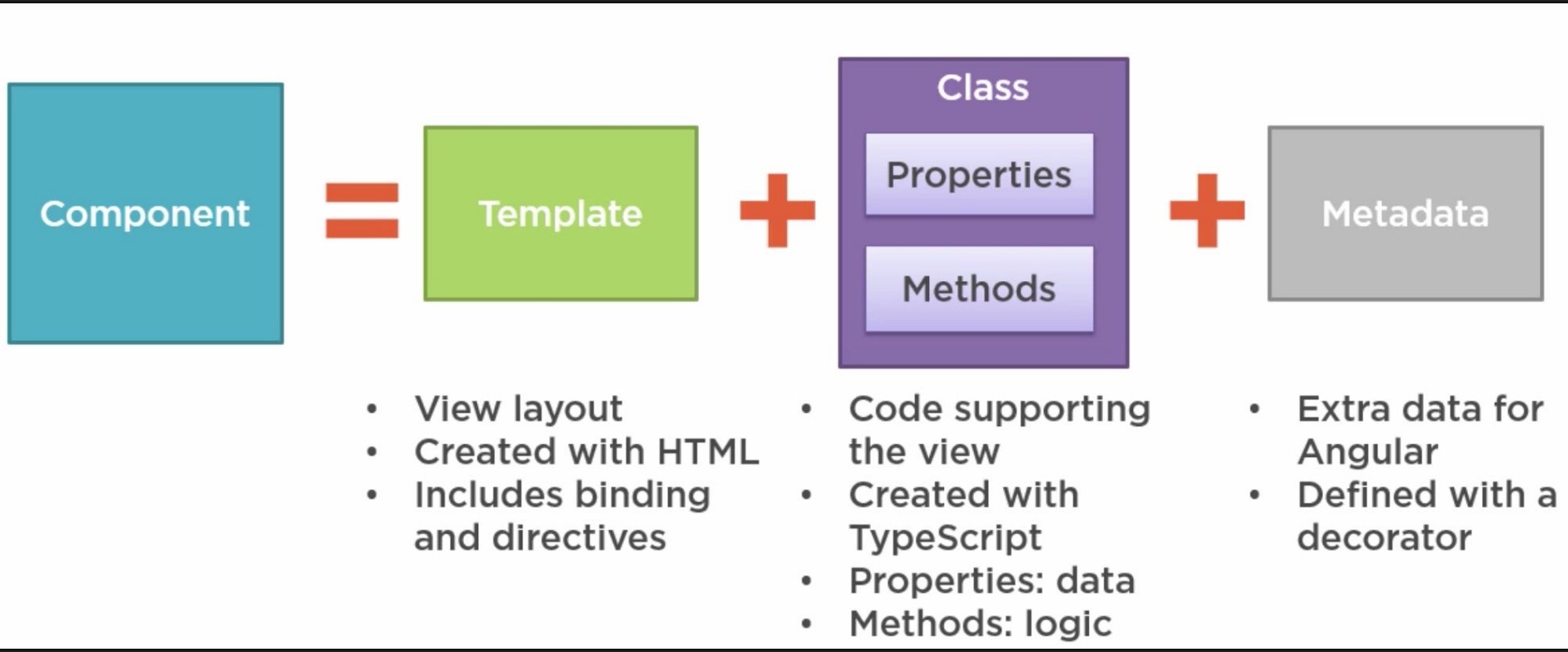
建立product.ts 並export 一個class Product, 此file就成了module

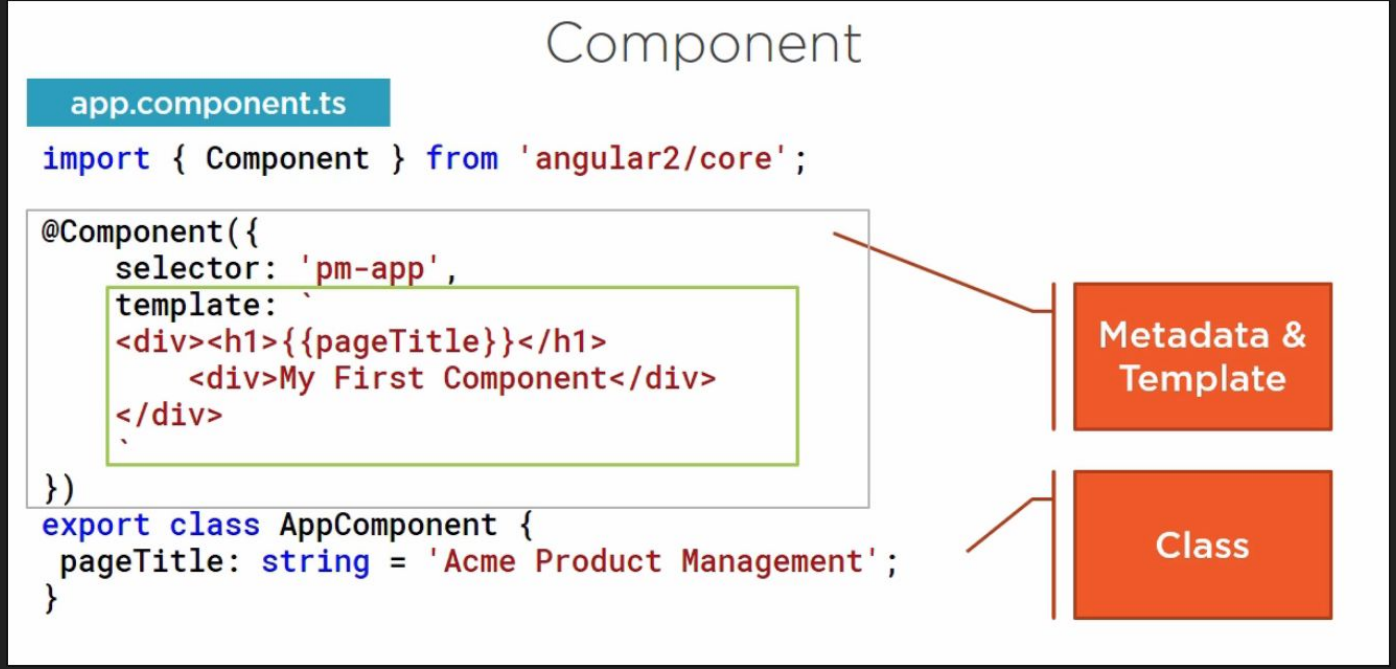
因為class被export後, 其他module就可以import它

在product-list.ts去import此class { Product }, 因為此file有import, 所以也變成了module

Introduction to Components

Angular 2就是一堆component組合起來

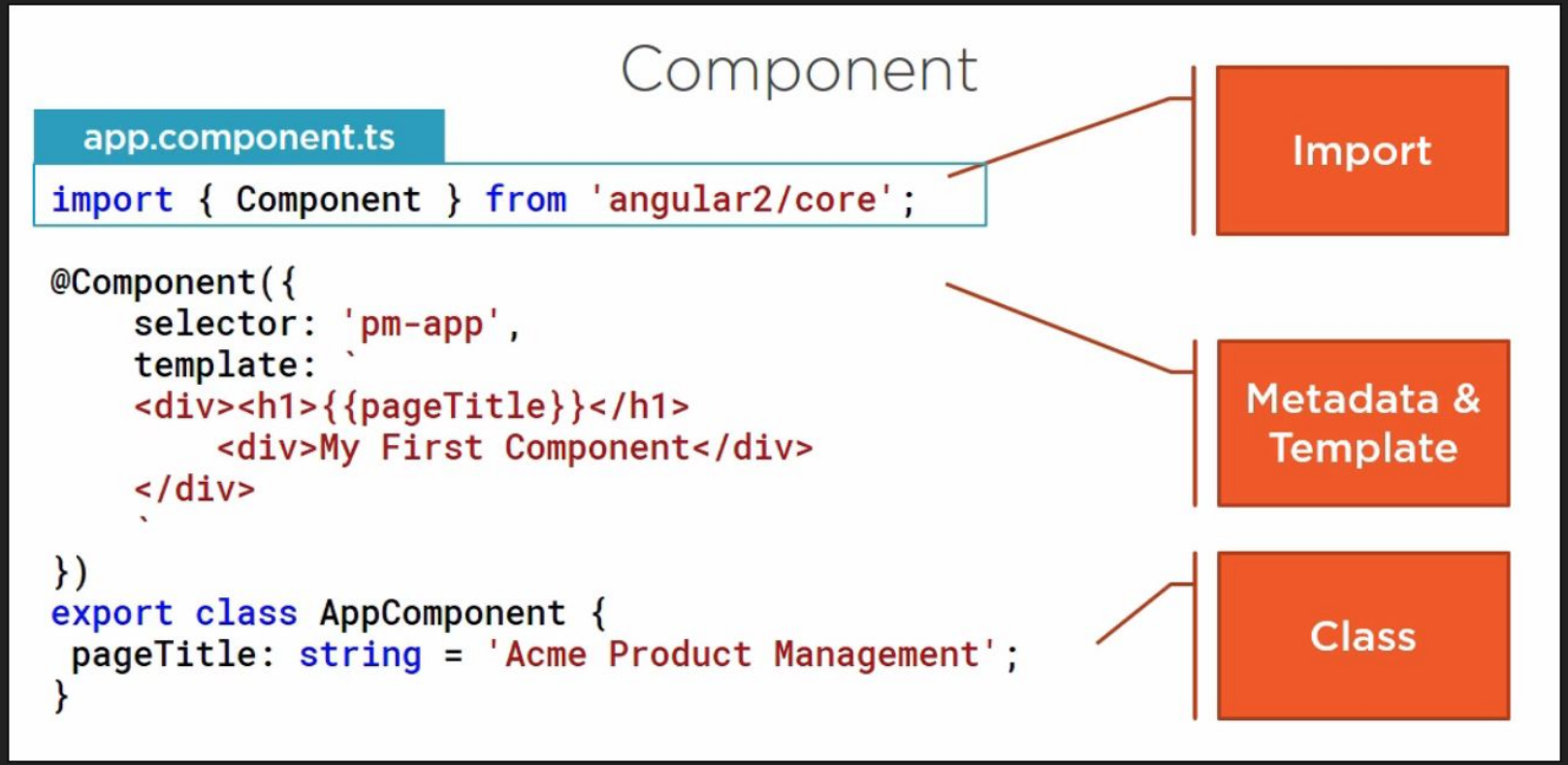

Component
=
Template
+
Class
Properties
Methods
+
Metadata
• View layout
• Created with HTML
• Includes binding and directives
• Code supporting the view
• Created with TypeScript
• Properties: data
• Methods: logic
• Extra data for Angular
• Defined with a decorator



最下面是Class：定義View要使用的 propery跟method
export使這個檔案變成module

@Component：View+metadata

template定義HTML



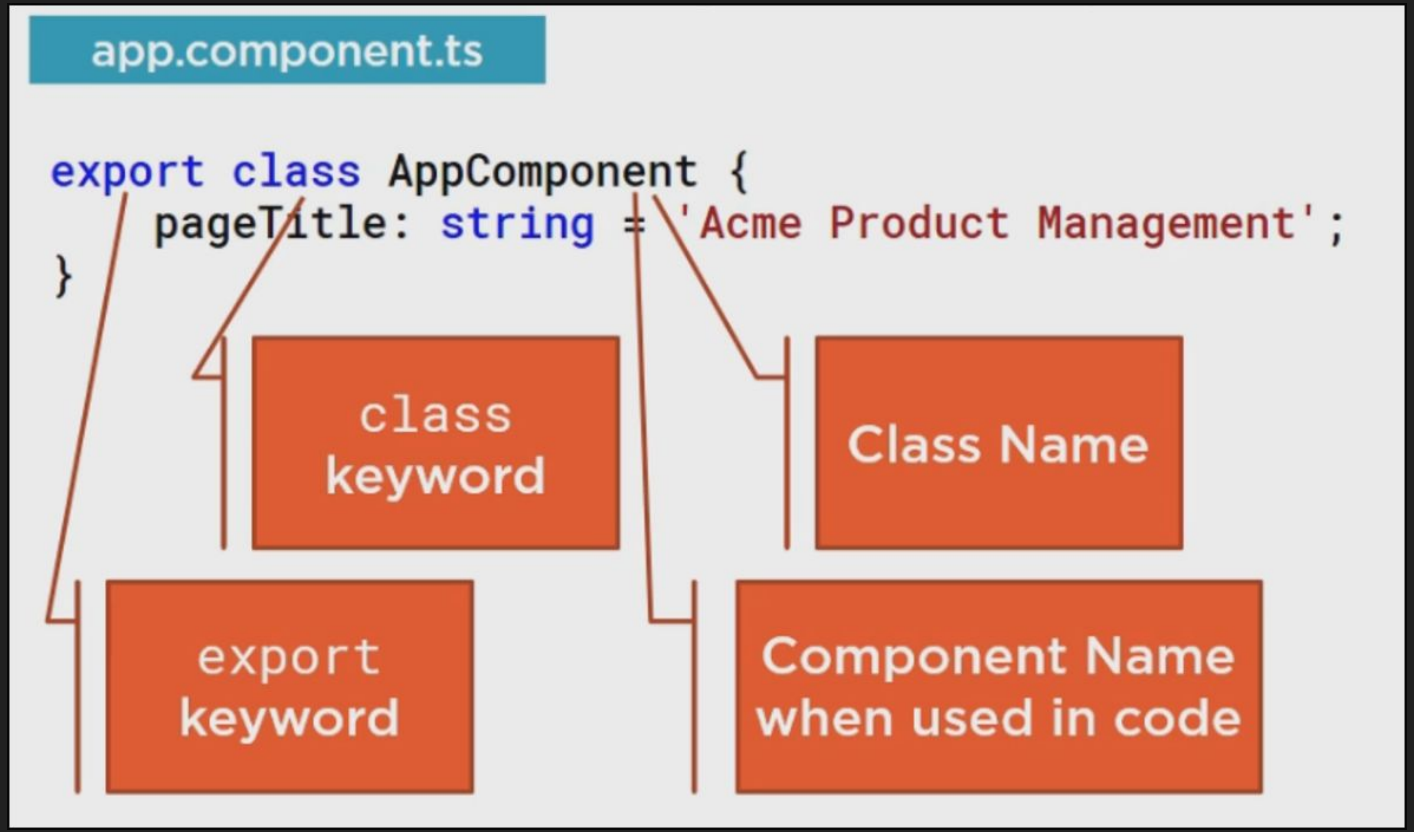
最上面是import

import需要的module

建立Component Class

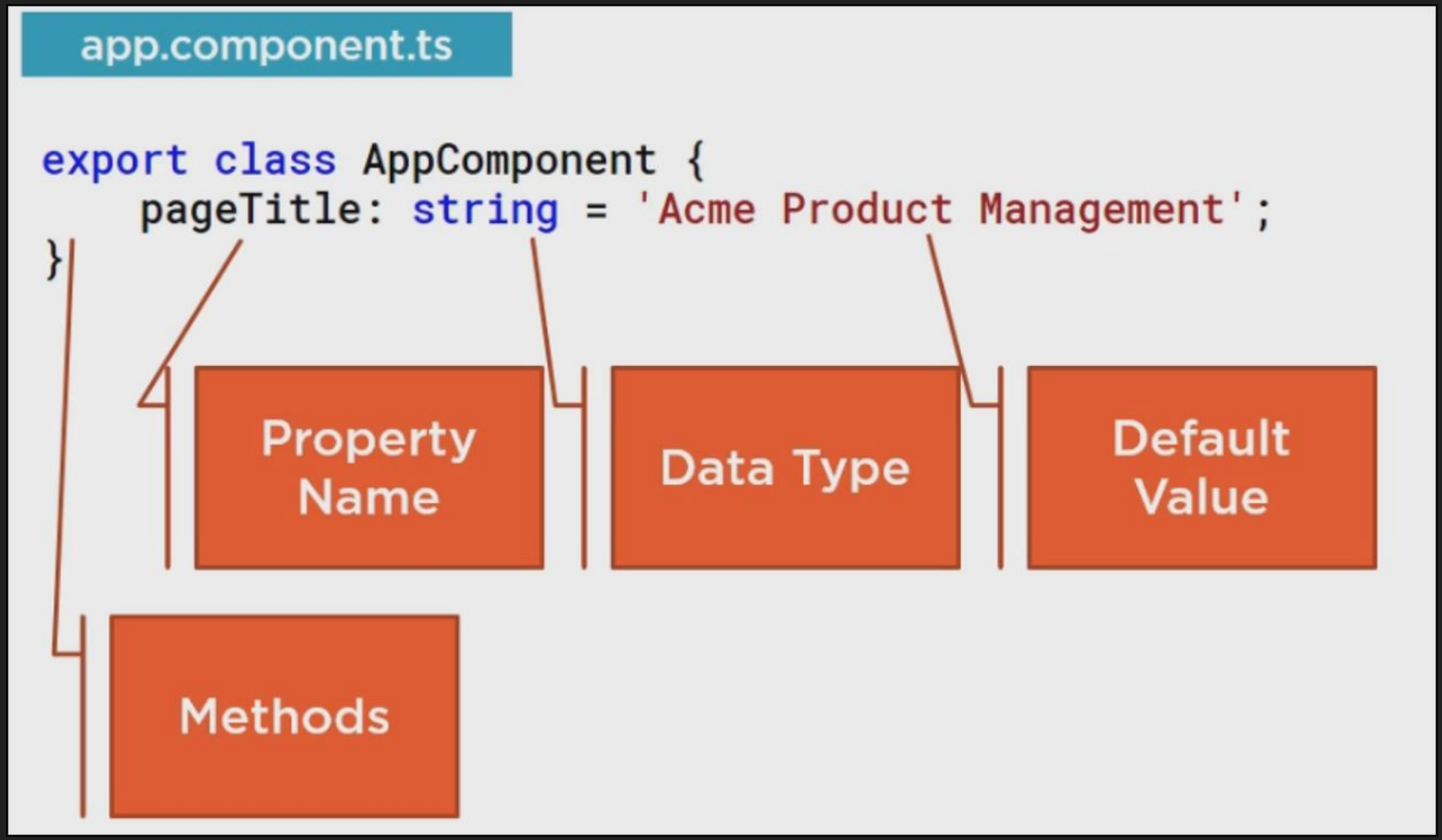
app.component.ts

```
export class AppComponent {
    pageTitle: string = 'Acme Product Management';
}
```



app.component.ts

```
export class AppComponent {
    pageTitle: string = 'Acme Product Management';
}
```



Decorator

-JS feature
-在Typescript實作
-在ES2016被提出

- 是function
-scope為其decorate的feature

@Component為Ag內建decorator

Angular有許多內建decorator
也可以自己建

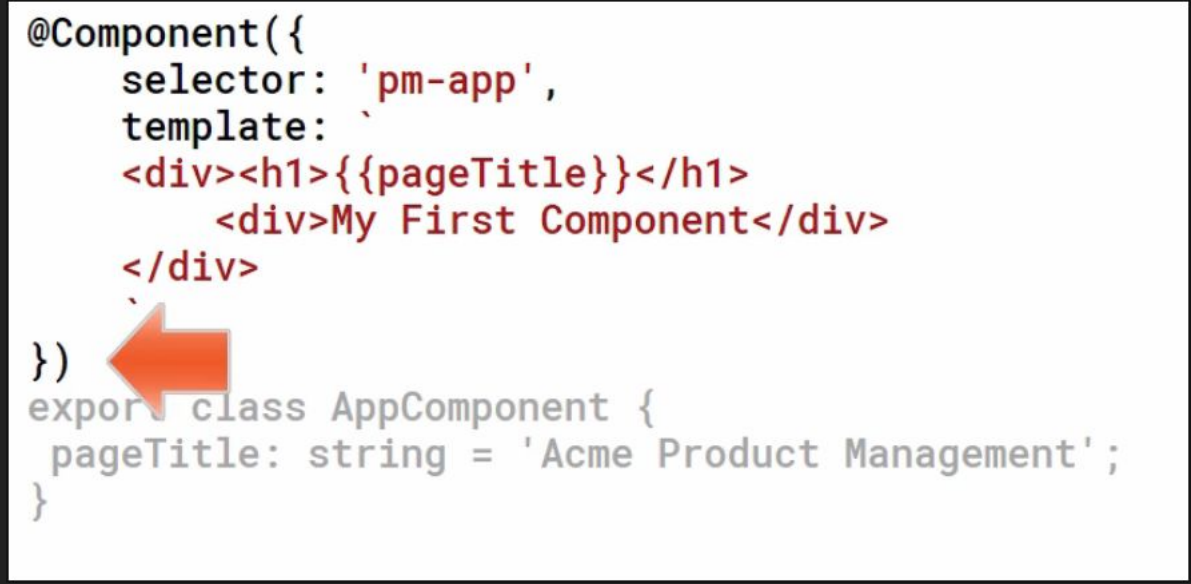
decorator可加metadata到
(1)class
(2)class memebers
(3)class method arguments

＊decorator都是以@開頭

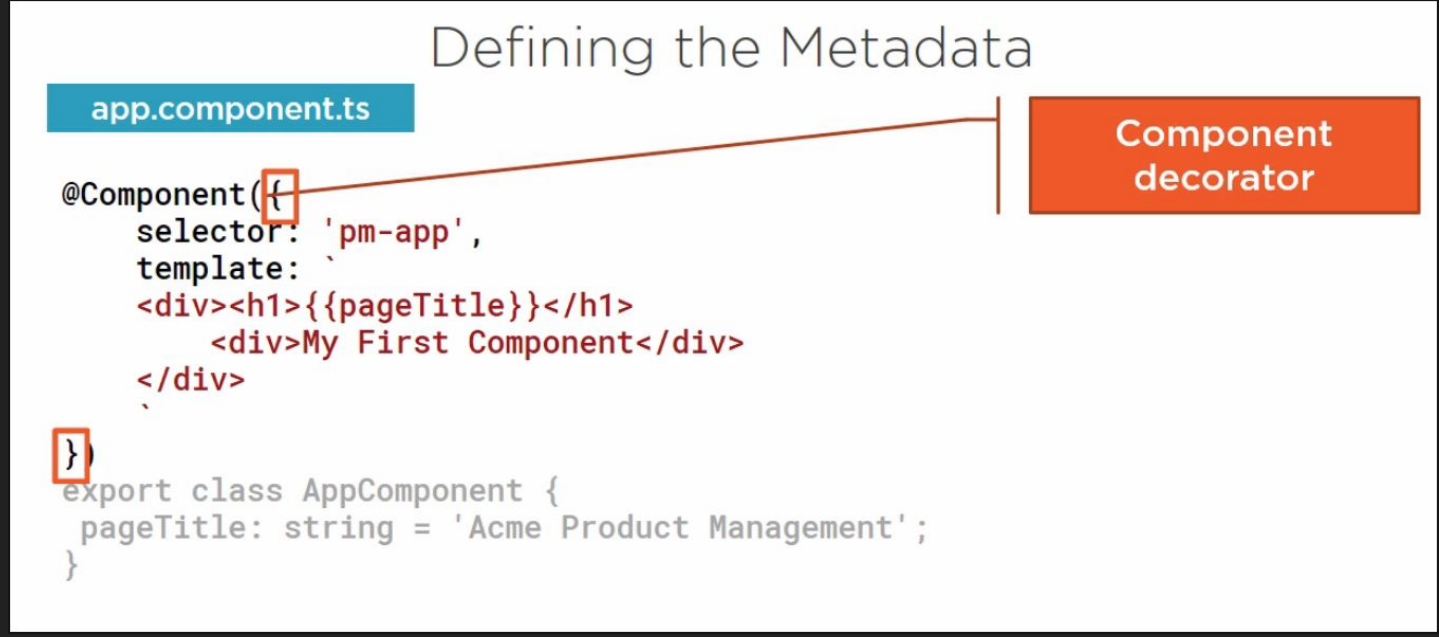
位置

decorator都會放在要

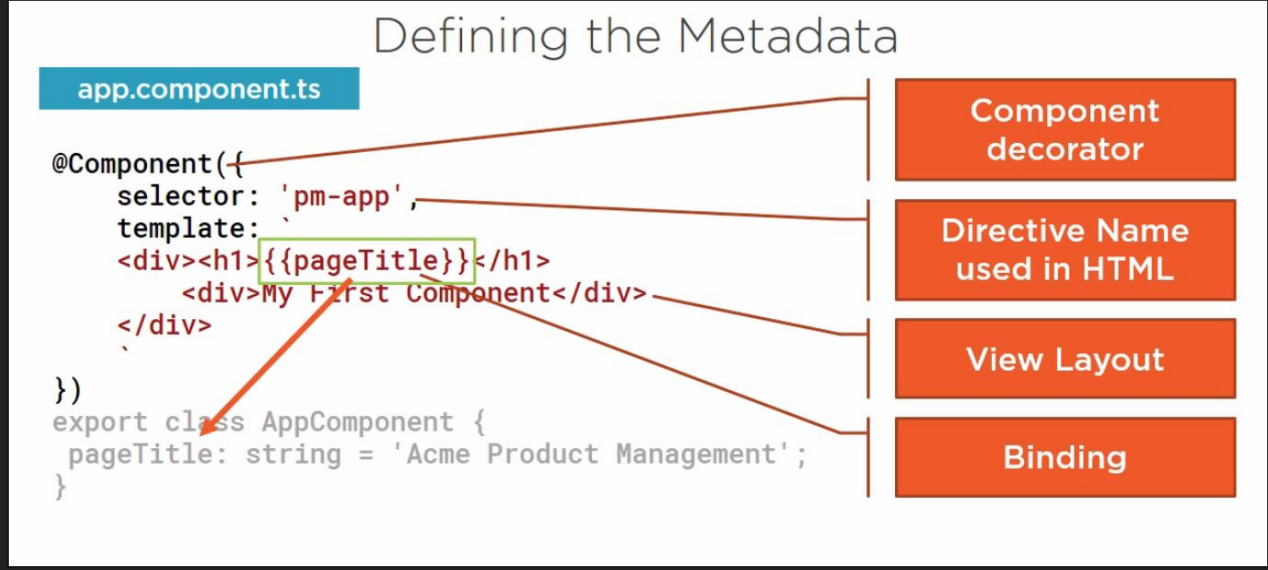
decorate的feature前面
(注意沒有;)



這邊我們要decorate的是一個class: AppComponent



@Component是function=> @Component( )



傳入設定的物件 { }, 包含一些properties

selector: 'pm-app' Component的directive Name(HTML custom tag)

template: 使用此directive會載入的HTML, 裡面的{{ }} 有data-binding
會綁定class內的東西

* 當directive在HTML使用時, AG會解析該component的template
* Component一定要寫template(在裡面定義View)

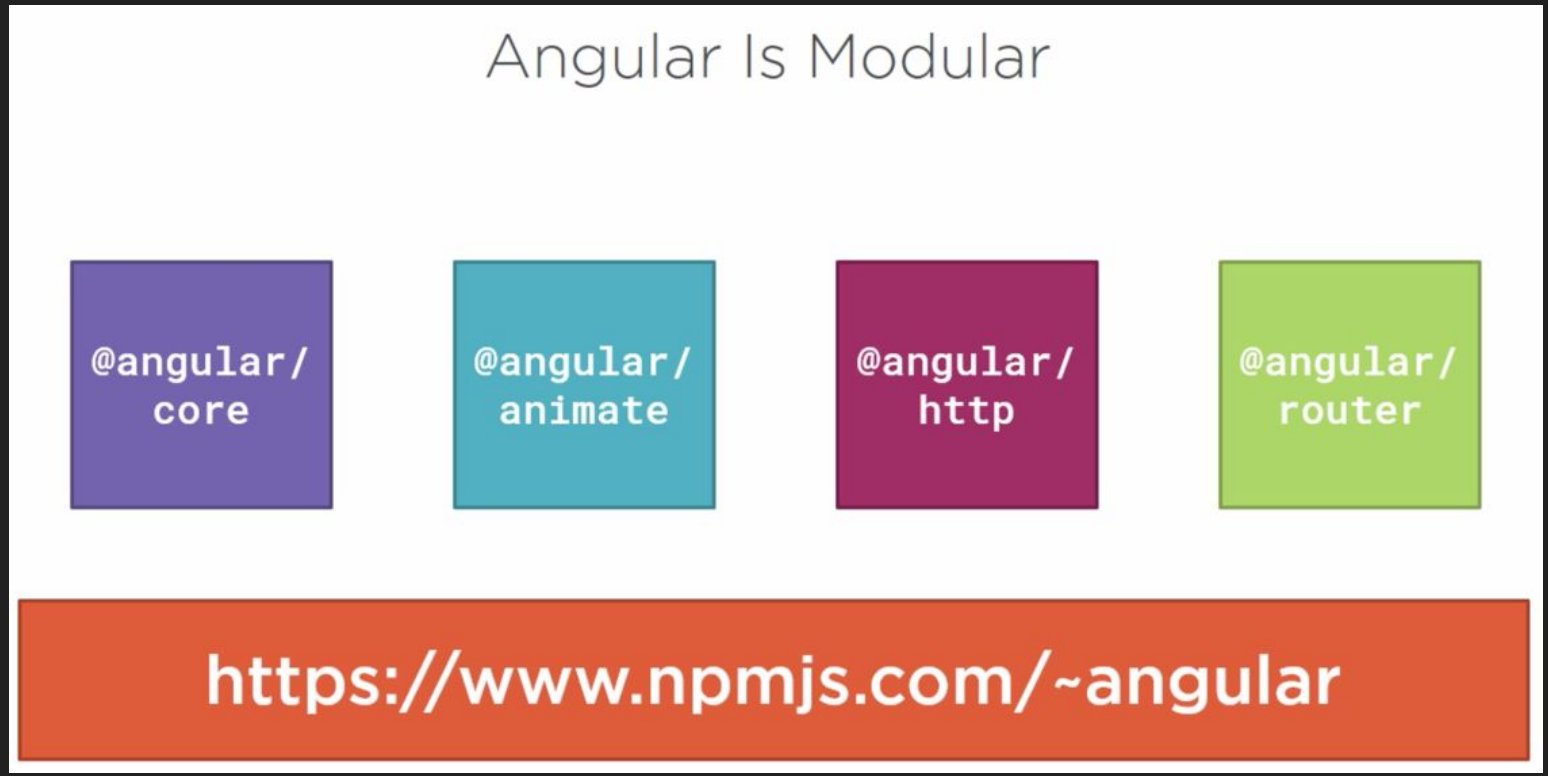
import

- ES2015 feature
- Typescript實作

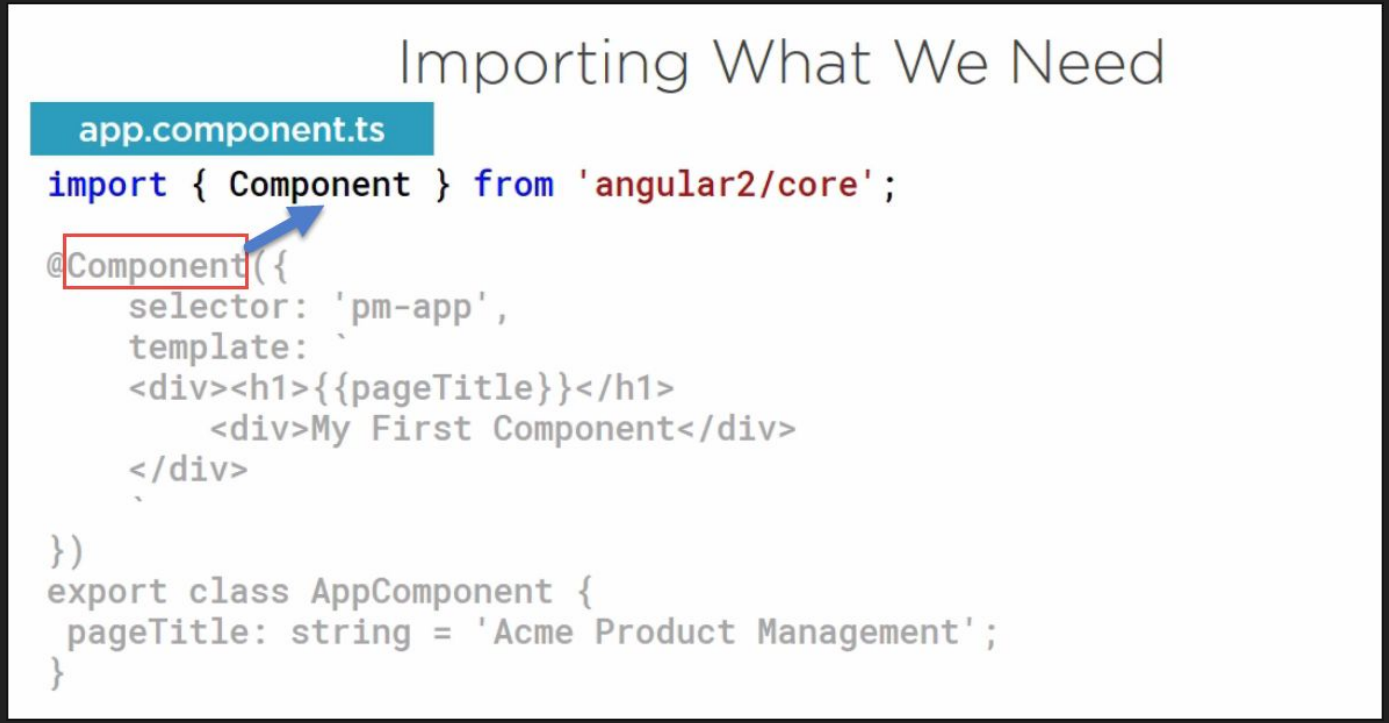
1.讓我們使用exported members from external modules

2.可import 3-rd party/**自己的**/或**Angular的**modules

import from Angular

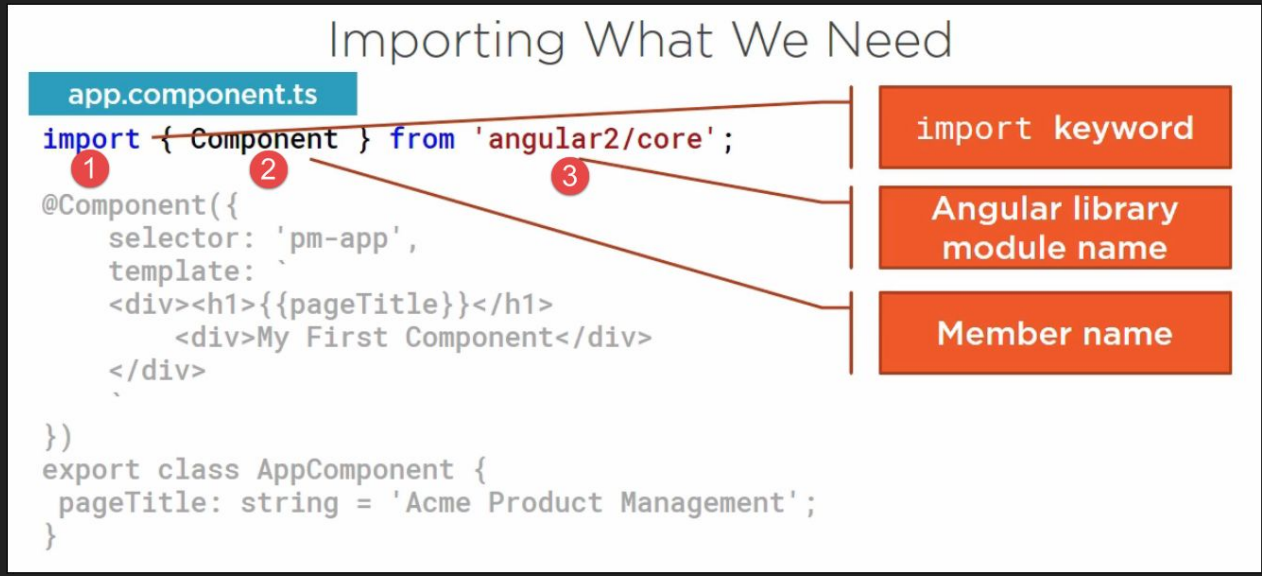


使用import告訴module loader, 到 angular2/core去找到Component這個function



1. import keyword
2. 要import的 member name (property/funtion)
3. 包含此memeber的module

＊如果要import多個memebr，用comma (，)分隔



完整的Component

app.component.ts

```
import { Component } from 'angular2/core';

@Component({
    selector: 'pm-app',
    template: `
    <div><h1>{{pageTitle}}</h1>
        <div>My First Component</div>
    </div>
    `
})
export class AppComponent {
 pageTitle: string = 'Acme Product Management';
}
```

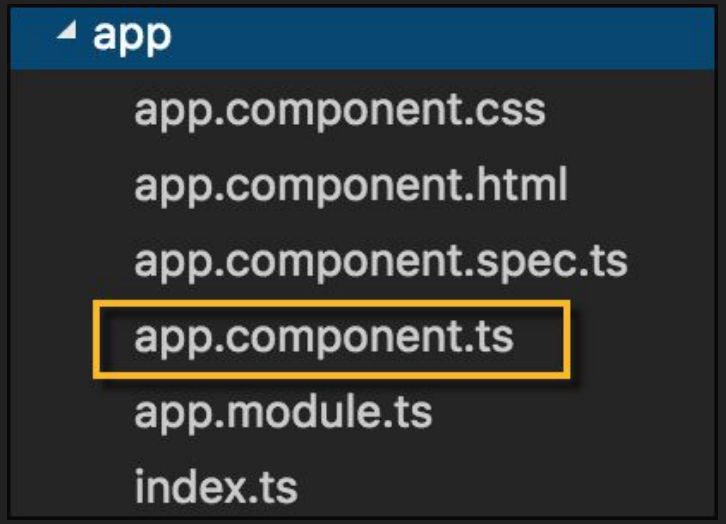
建立root Component

命名convention

Feature name:
app-代表root application

Type of module:
.component-說明這個module是component

副檔名:
typescript- **.ts**



先寫class

再寫@Component({ }) =>會有錯誤提示

所以要import Component memeber

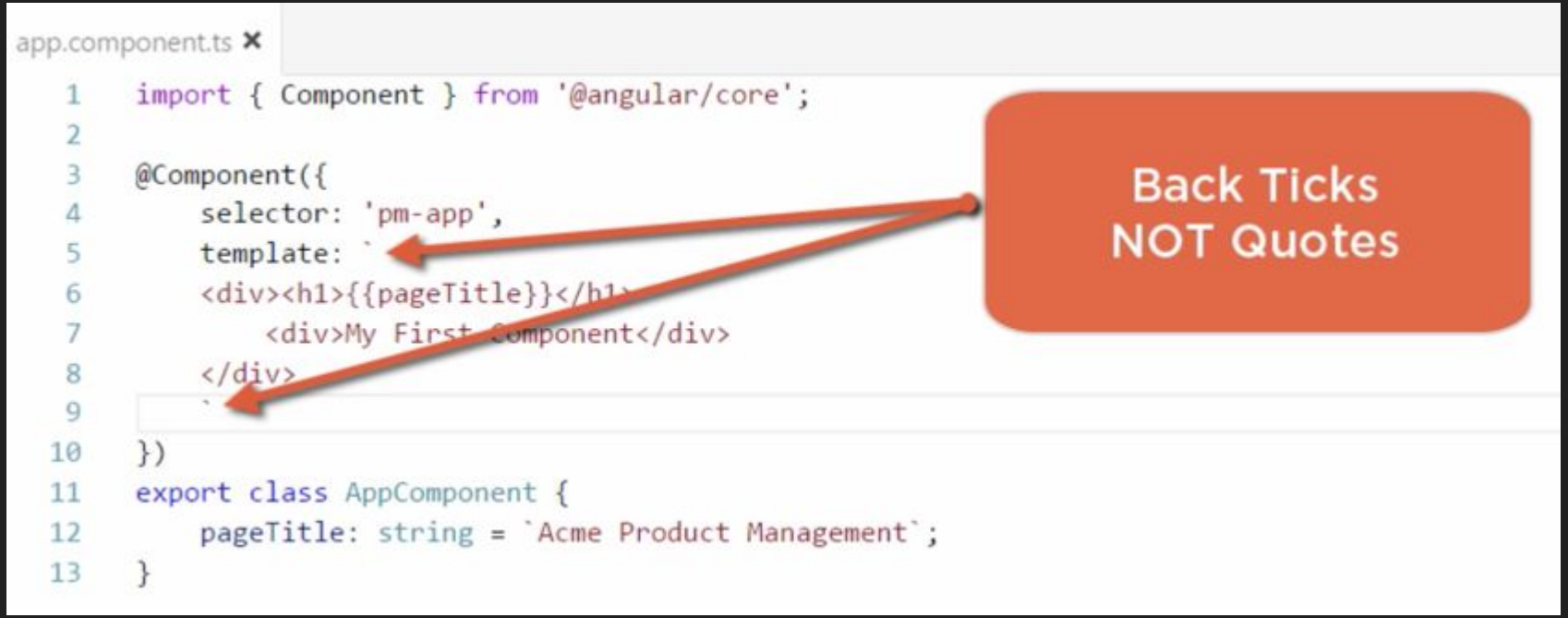
app.component.ts

```
1  @Component({})
2  export class AppComponent {
3      pageTitle: string = `Acme Product Management`;
4  }
```

app.component.ts app

```
1  @Component({
2      Cannot find name 'Component'.
3  }any
4  export class AppComponent {
5      pageTitle: string = 'Acme Product Management';
6  }
```

加上selector與template



建立順序

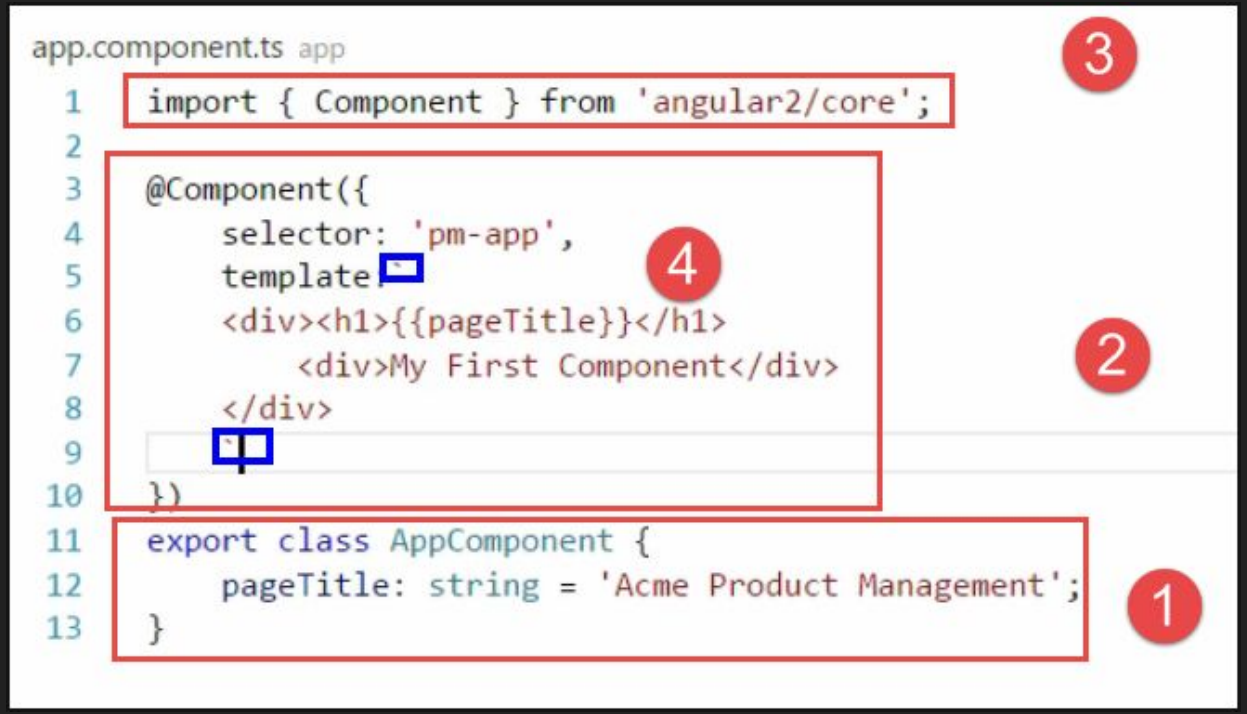
注意:

template要用 ` 包圍

(tab上方那個按鈕)

app.component.ts app

```
1  import { Component } from 'angular2/core';
2
3  @Component({
4      selector: 'pm-app',
5      template:
6      <div><h1>{{pageTitle}}</h1>
7          <div>My First Component</div>
8      </div>
9      `
10 })
11 export class AppComponent {
12     pageTitle: string = 'Acme Product Management';
13 }
```



Host the App

index.html

```
<body>
  <pm-app>Loading App ...</pm-app>
</body>
```

app.component.ts

```
import {Component} from 'angular2/core';

@Component({
    selector: 'pm-app',
    template:
    <div><h1>{{pageTitle}}</h1>
        <div>My First Component</div>
    </div>
```

當我們在HTML中使用directive 時，要用selector定義的名稱

即在index.html中使用<pm-app>（對AG為directive,對HTML為custom element)

當root element被load時，會先出現Loading App…

load結束時，directive template會被插入替換Loading App

index.html

```
<body>
  <pm-app>Loading App ...</pm-app>
</body>
```

app.component.ts

```
import {Component} from 'angular2/core';

@Component({
    selector: 'pm-app',
    template: `
    <div><h1>{{pageTitle}}</h1>
        <div>My First Component</div>
    </div>

})
export class AppComponent {
```

main.ts會去啟動AppModule

app.module.ts

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

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

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

main.ts

```ts
import './polyfills.ts';

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

if (environment.production) {
  enableProdMode();
}

platformBrowserDynamic().bootstrapModule(AppModule);
```

app.module.ts

```
1  import { BrowserModule } from '@angular/platform-browser';
2  import { NgModule } from '@angular/core';
3  import { FormsModule } from '@angular/forms';
4  import { HttpModule } from '@angular/http';
5
6  import { AppComponent } from './app.component';
7
8  @NgModule({
9    declarations: [
10     AppComponent
11   ],
12   imports: [
13     BrowserModule,
14     FormsModule,
15     HttpModule
16   ],
17   providers: [],
18   bootstrap: [AppComponent]
19 })
20 export class AppModule { }
21
```

declarations 設定屬於這個module的component (可多個)

imports 設定external modules

BrowserModule是每個browser app必須的，有註冊重要的service provider 如error handling

app.component.ts

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

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

app.module.ts

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

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

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

app component的selector

會在index.html內使用

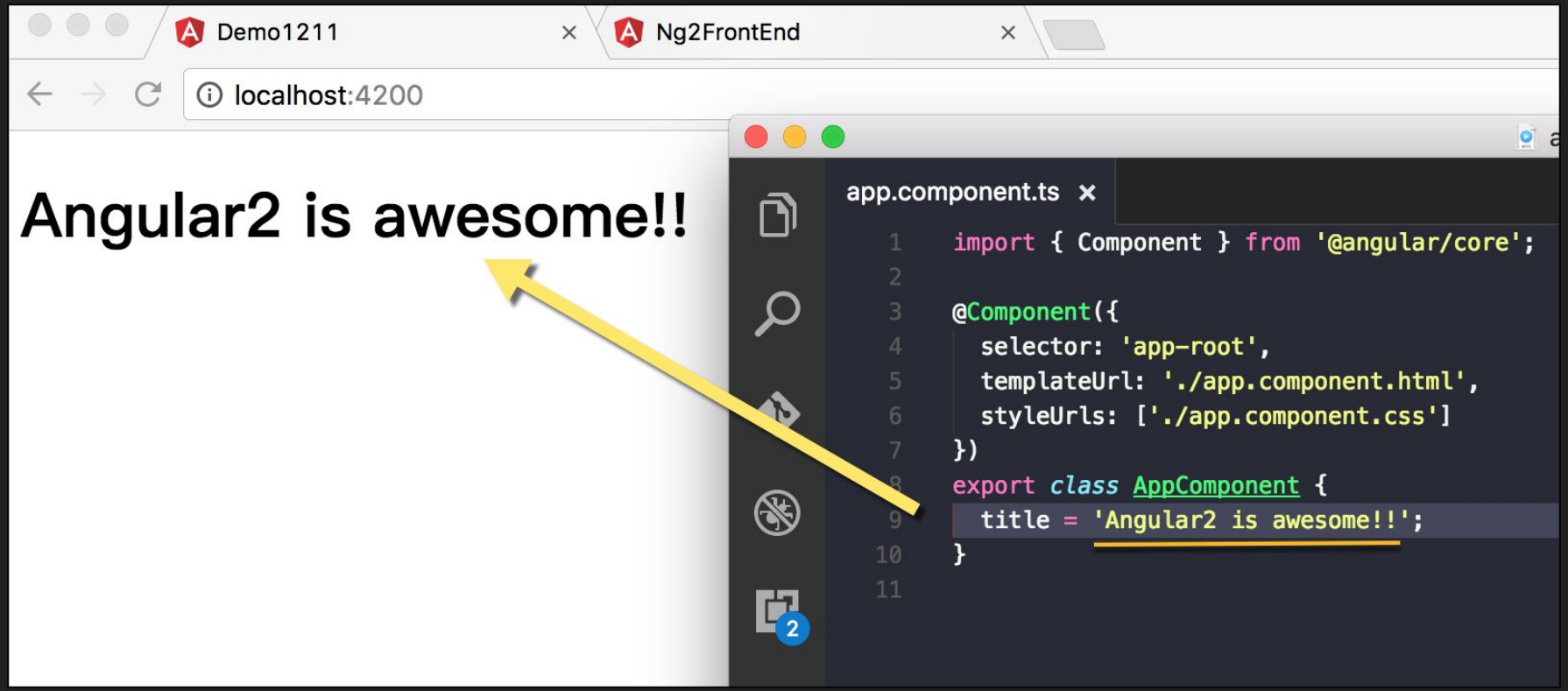
app.component.ts

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

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

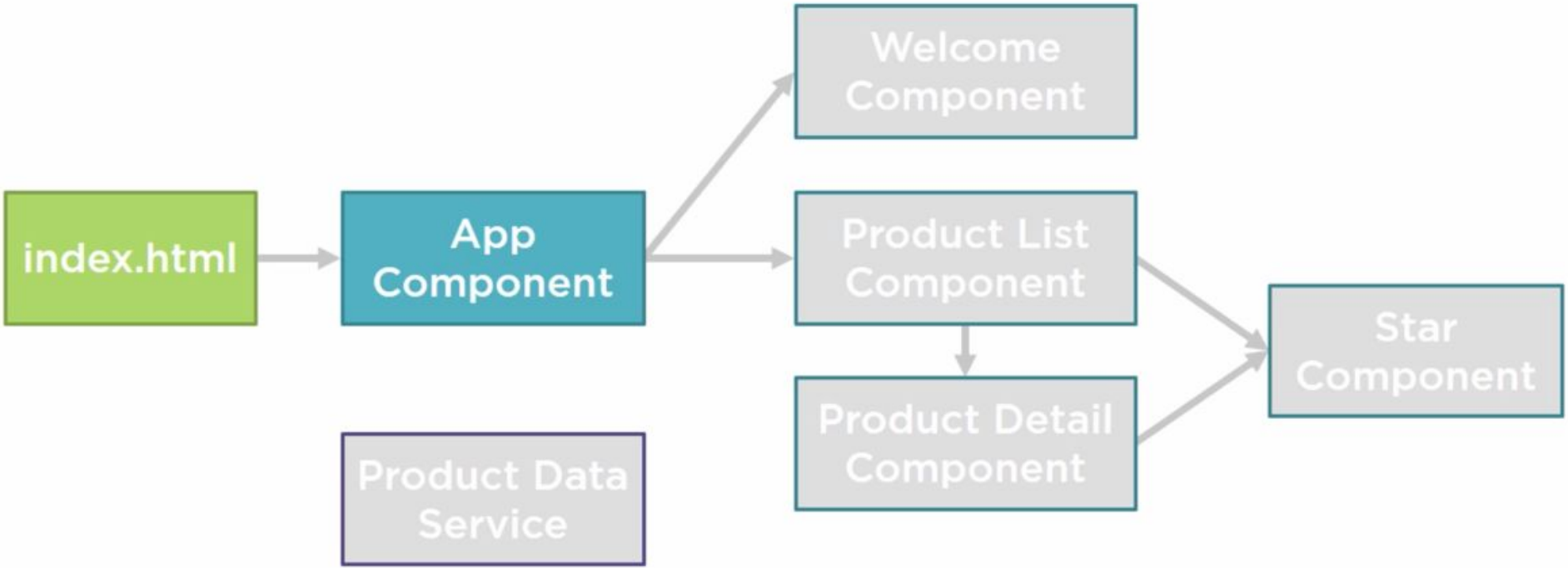
index.html

```html
<!doctype html>
<html>
<head>
  <meta charset="utf-8">
  <title>Demo1211</title>
  <base href="/">

  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="icon" type="image/x-icon" href="favicon.ico">
</head>
<body>
  <app-root>Loading...</app-root>
</body>
</html>
```

修改title 看看


Demo1211
Ng2FrontEnd
localhost:4200
Angular2 is awesome!!
app.component.ts
1 import { Component } from '@angular/core';
2
3 @Component({
4 selector: 'app-root',
5 templateUrl: './app.component.html',
6 styleUrls: ['./app.component.css']
7 })
8 export class AppComponent {
9 title = 'Angular2 is awesome!!';
10 }
11
2

Application Architecture



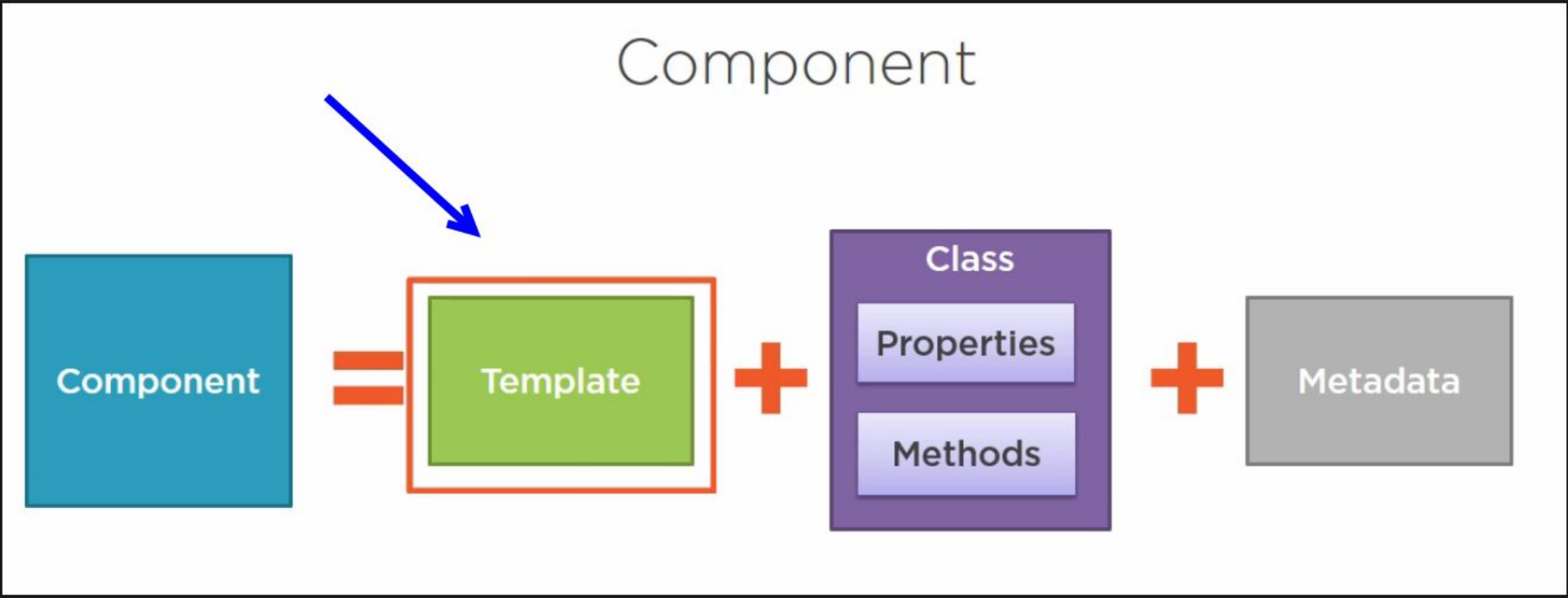
Templates
Interpolation
Directives

Data-binding:
顯示資訊+回應user動作

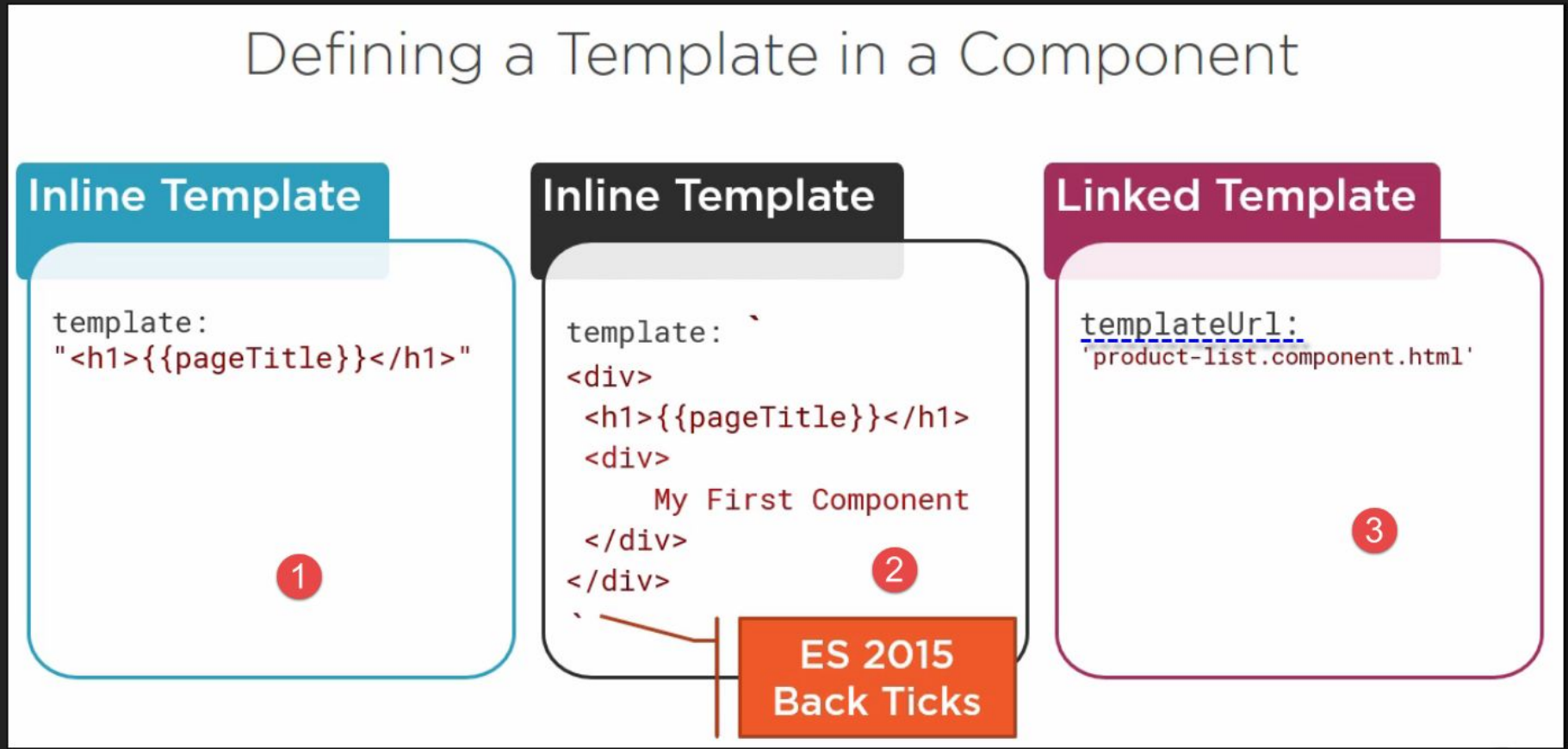
Directive:
加logic到HTML
(if statement / for loops)

Component:
建立nested user interface fragments
(image rotator/rating stars)

皆下來先focus Template



Linked Template：改用templateUrl



Product List component

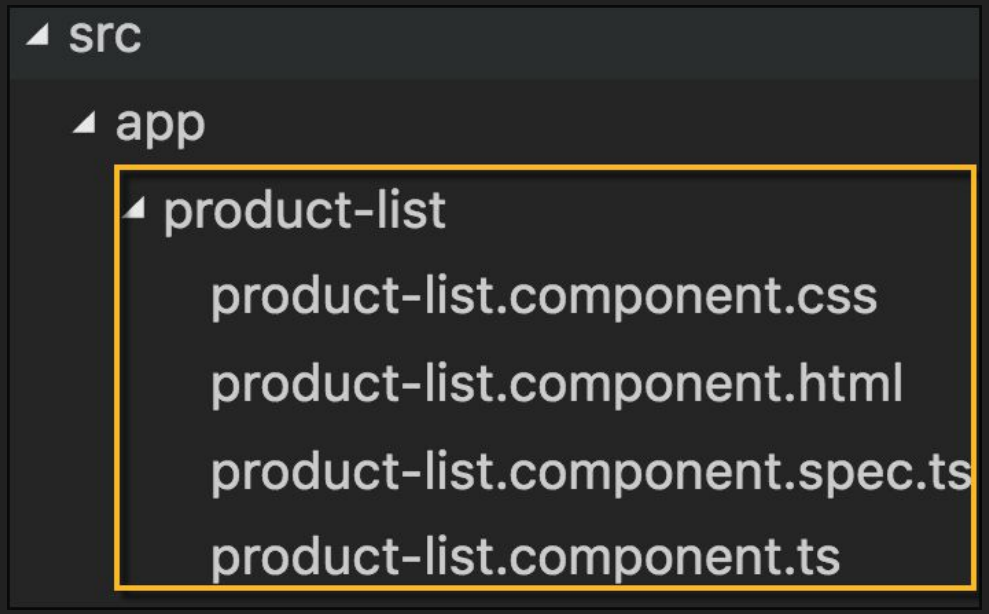
慣例會在app folder下

為各別功能建立資料夾

裡面建立html template

輸入 ng generatee component product-list

自動幫你建好component所需的檔案



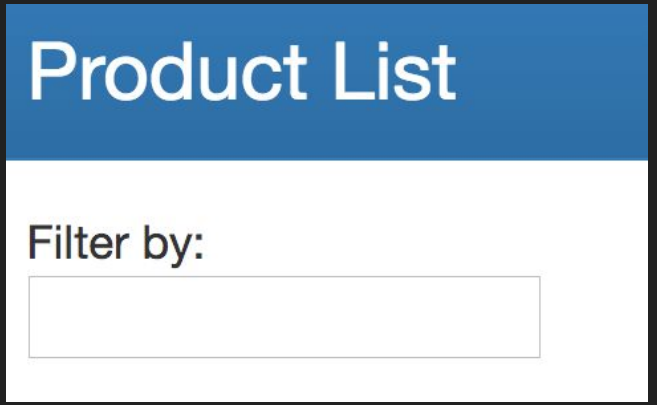
且自動在AppModule幫你import及declare

app.module.ts

```
1  import { BrowserModule } from '@angular/platform-browser';
2  import { NgModule } from '@angular/core';
3  import { FormsModule } from '@angular/forms';
4  import { HttpModule } from '@angular/http';
5
6  import { AppComponent } from './app.component';
7  import { ProductListComponent } from './product-list/product-list.component';
8
9  @NgModule({
10   declarations: [
11     AppComponent,
12     ProductListComponent
13   ],
14   imports: [
15     BrowserModule,
16     FormsModule,
17     HttpModule
18   ],
19   providers: [],
20   bootstrap: [AppComponent]
21 })
22 export class AppModule { }
```

建立product list

利用BS的panel / panel-primary / panel-heading



product-list.component.html

```
1   <div class="panel panel-primary">
2       <div class="panel-heading">Product List</div>
3   </div>
4
5
```

panel-body

col-md-2

col-md-4

col-md-6

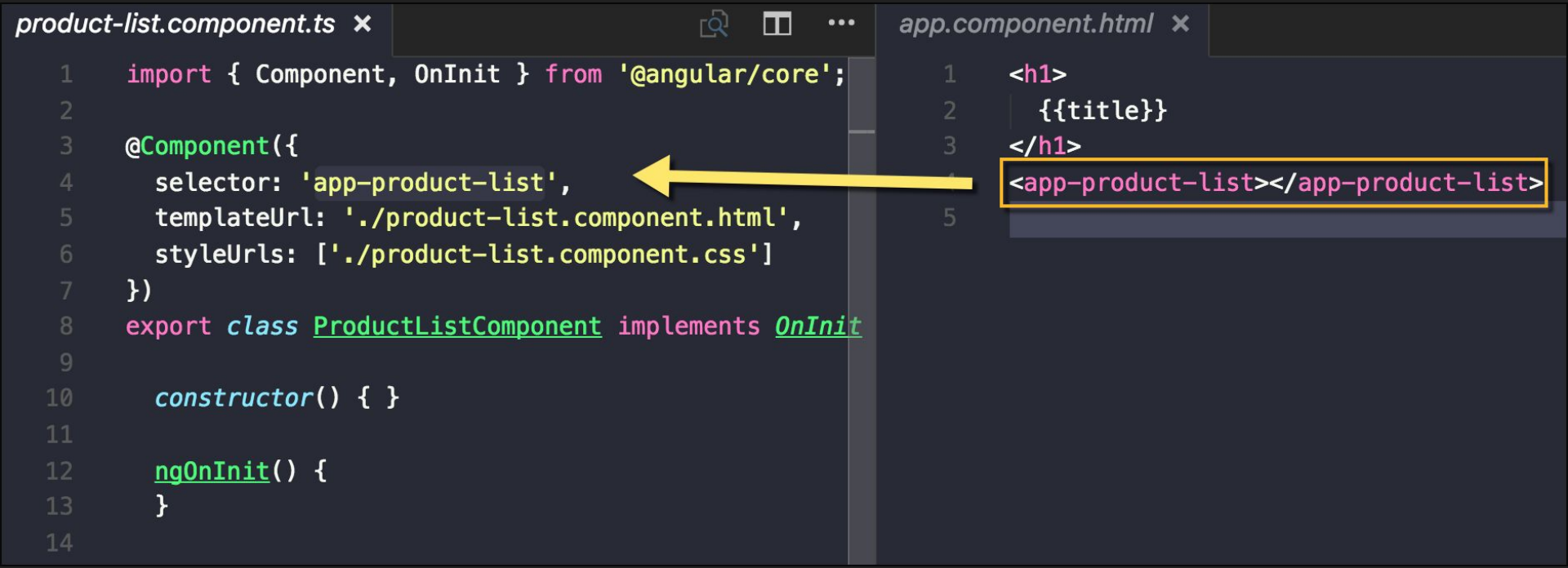

<th>Available</th>
<th>Price</th>
<th>5 Star Rating</th>
</tr>
<tbody>
</tbody>
</table>


14 <h3>Filtered by: </h3>
15
16
17
18 <table class='table'>
19 <thead>
20 <tr>
21 <th>
22 <button class='btn btn-primary'>
23 Show Image
24 </button>
25 </th>
26 <th>Product</th>
27 <th>Code</th>
28 <th>Available</th>
29 <th>Price</th>
30 <th>5 Star Rating</th>
31 </tr>
32 </thead>
33 <tbody>
34
35 </tbody>
36 </table>
37

```
</div>
<div class='table-responsive'>
    <table class='table'>
        <thead>
            <tr>
                <th>
                    <button class='btn btn-primary'>
                        Show Image
                    </button>
                </th>
                <th>Product</th>
                <th>Code</th>
                <th>Available</th>
                <th>Price</th>
```

step1: 到app.component.ts

insert <app-product-list></app-product-list>



step2:建立product list View(with BS)

到index.html加上
http://getbootstrap.com/getting-started/#download

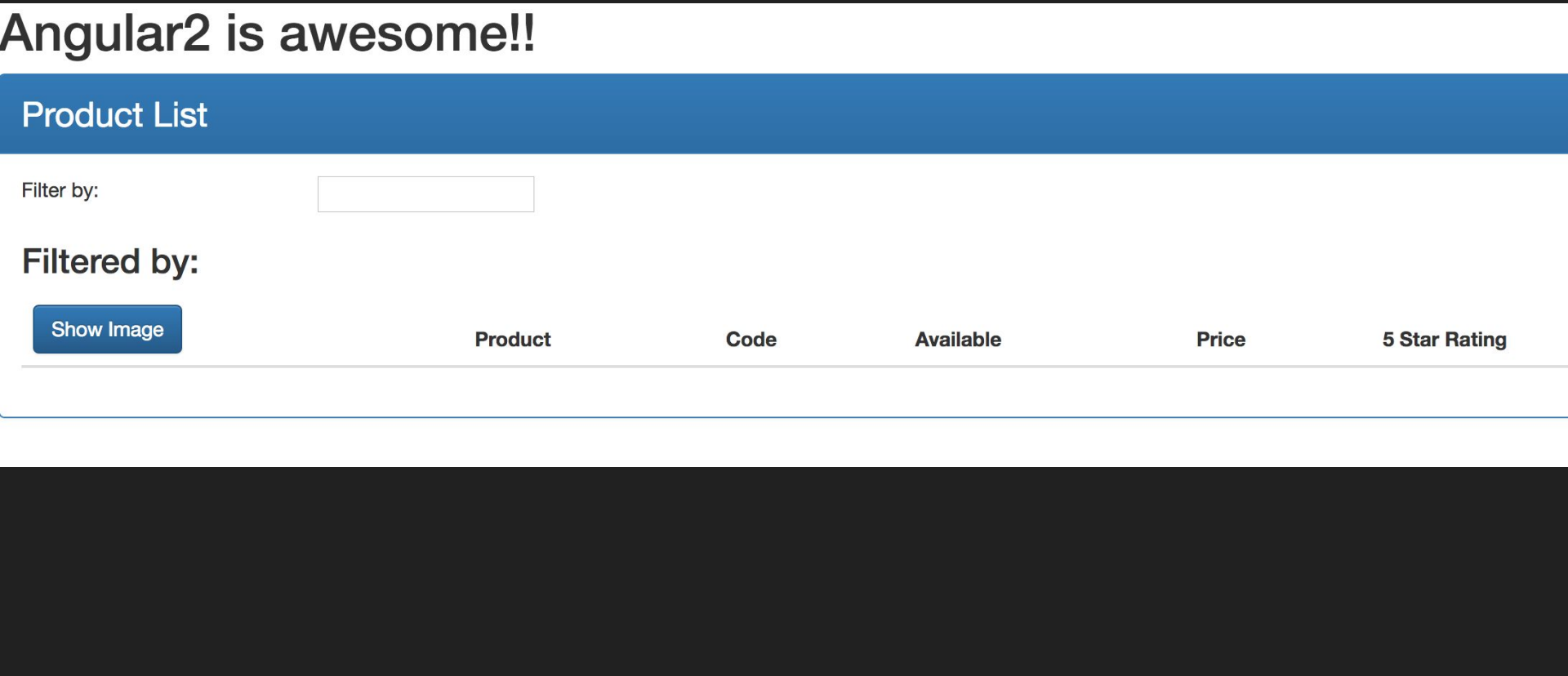
jQuery

<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.1.1/jquery.min.js"></script>

從cloud9 copy view（v1）

product-list.component.html

有畫面了!!


Angular2 is awesome!!
Product List
Filter by:
Filtered by:
Show Image
Product
Code
Available
Price
5 Star Rating

Angular如何知道去哪邊找這些selector?

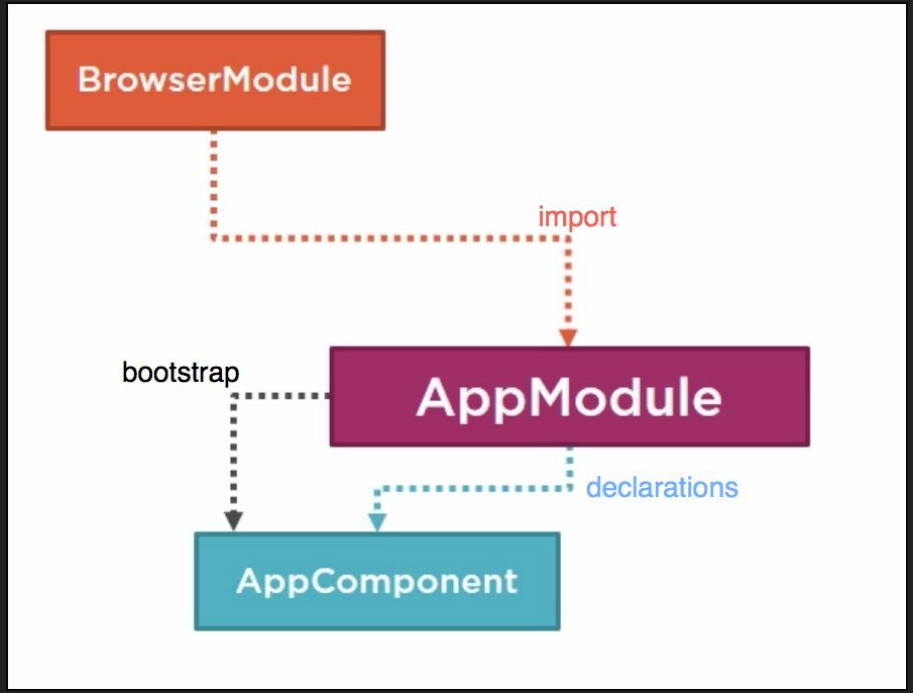
- 會去看擁有這個component的Module，找那些看得到(visible)的directive
- 每個component都只會屬於一個Module
- 要讓ProductListComponent的selector可被AppComponent看到，需要也在同一個Module去定義
- 如果要用的selector是在另一個module如BrowserModule一樣，則要 import

每個angular app
至少要有一個module
(即root module-通常會命名為AppModule)

每個component必須只屬於一個
Angular Module(透過AppModule的declare)

AppModule 啟動(boostrap)AppComponent
所以這是第一個載入到我們app的component

AppModule有import BrowserModule
(利用其功能讓app能在browser執行)



AppModule

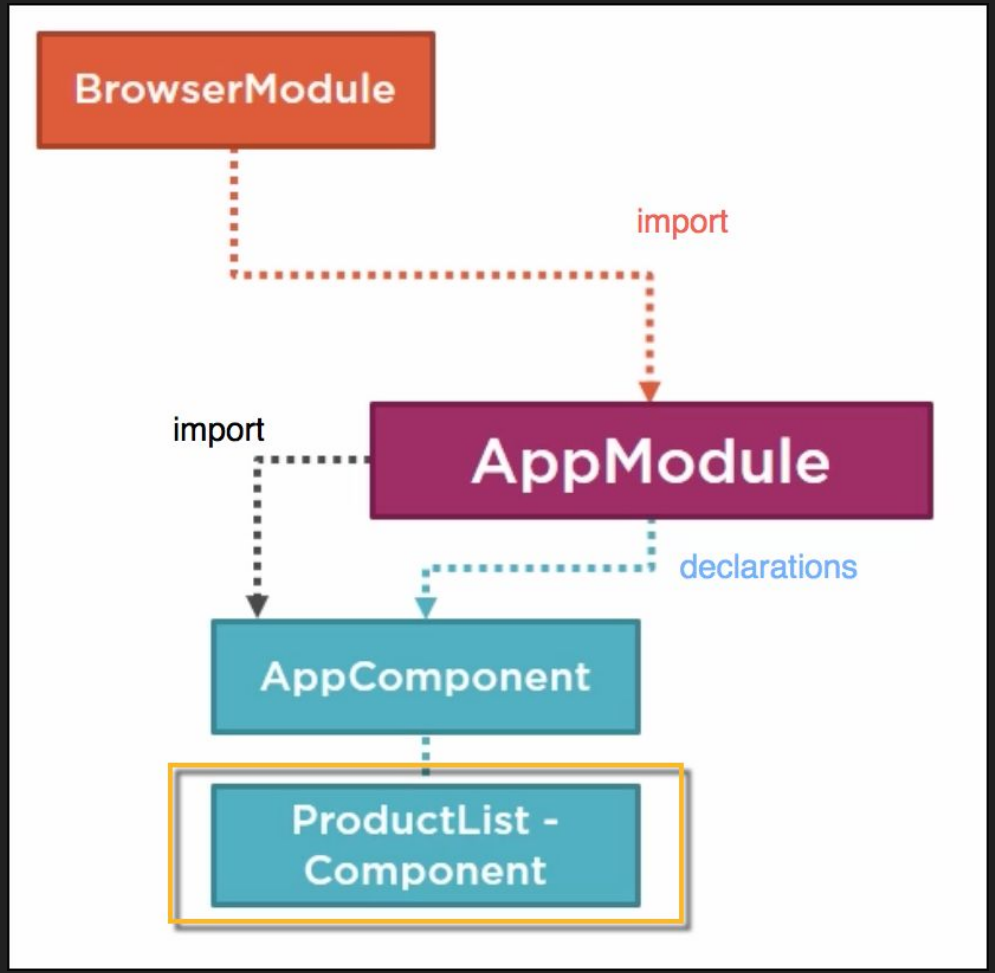
有宣告AppComponent及

ProductListComponent

app.module.ts

```
1  import { BrowserModule } from '@angular/platfor
2  import { NgModule } from '@angular/core';
3  import { FormsModule } from '@angular/forms';
4  import { HttpModule } from '@angular/http';
5
6  import { AppComponent } from './app.component';
7  import { ProductListComponent } from './product
8
9  @NgModule({
10   declarations: [
11     AppComponent,
12     ProductListComponent
13   ],
14   imports: [
15     BrowserModule,
16     FormsModule,
17     HttpModule
18   ],
19   providers: [],
20   bootstrap: [AppComponent]
21 })
22 export class AppModule { }
```

Angular Module定義了
其宣告的component
能夠解析directive跟dependencies
的boundry(界線)跟context(情境)



例如在AppComponent內

(1)
有用到<app-product-list>

(2)
這個directive
(來自ProductListComponent
有設定selector)

(3)
Angular會去看AppModule有
沒有宣告ProductListComponent

app.component.html

```
<h1>
  {{title}}
</h1>
<app-product-list></app-product-list>
```

1

product-list.component.html

```
import { BrowserModule }
import { NgModule } from
import { FormsModule } fr
import { HttpModule } fro

import { AppComponent } f
import { ProductListCompo

@NgModule({
  declarations: [
    AppComponent,
    ProductListComponent
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule
  ],
  providers: [],
  bootstrap: [AppComponen
})
```

3

product-list.component.ts

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

@Component({
  selector: 'app-product-list',
  templateUrl: './product-list.component.html',
  styleUrls: ['./product-list.component.css']
})
```

2

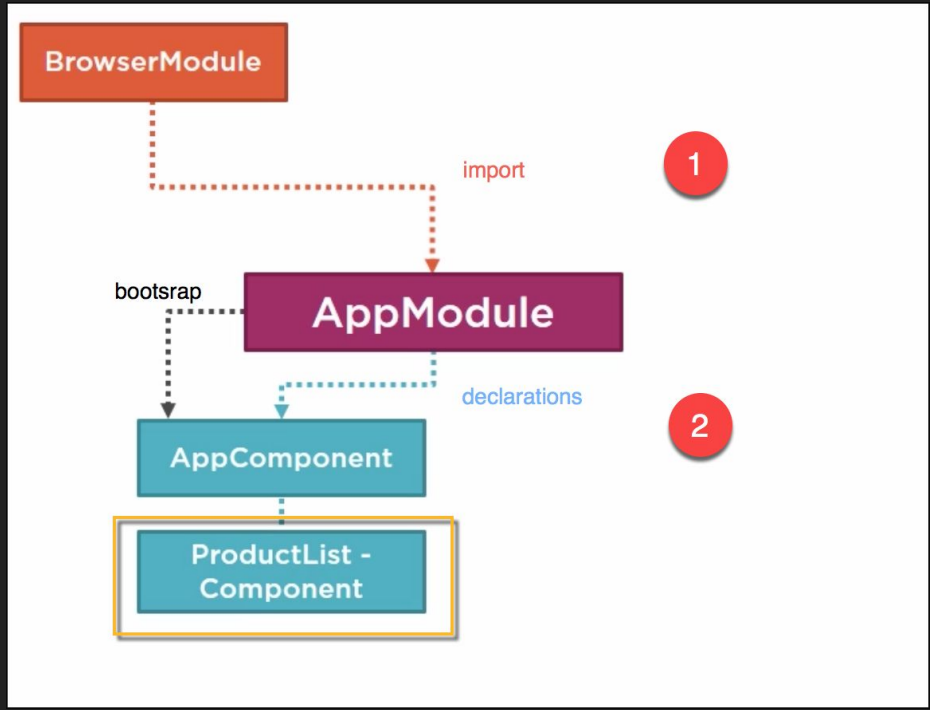
有2種方式可讓AppModule知道
有directive可用

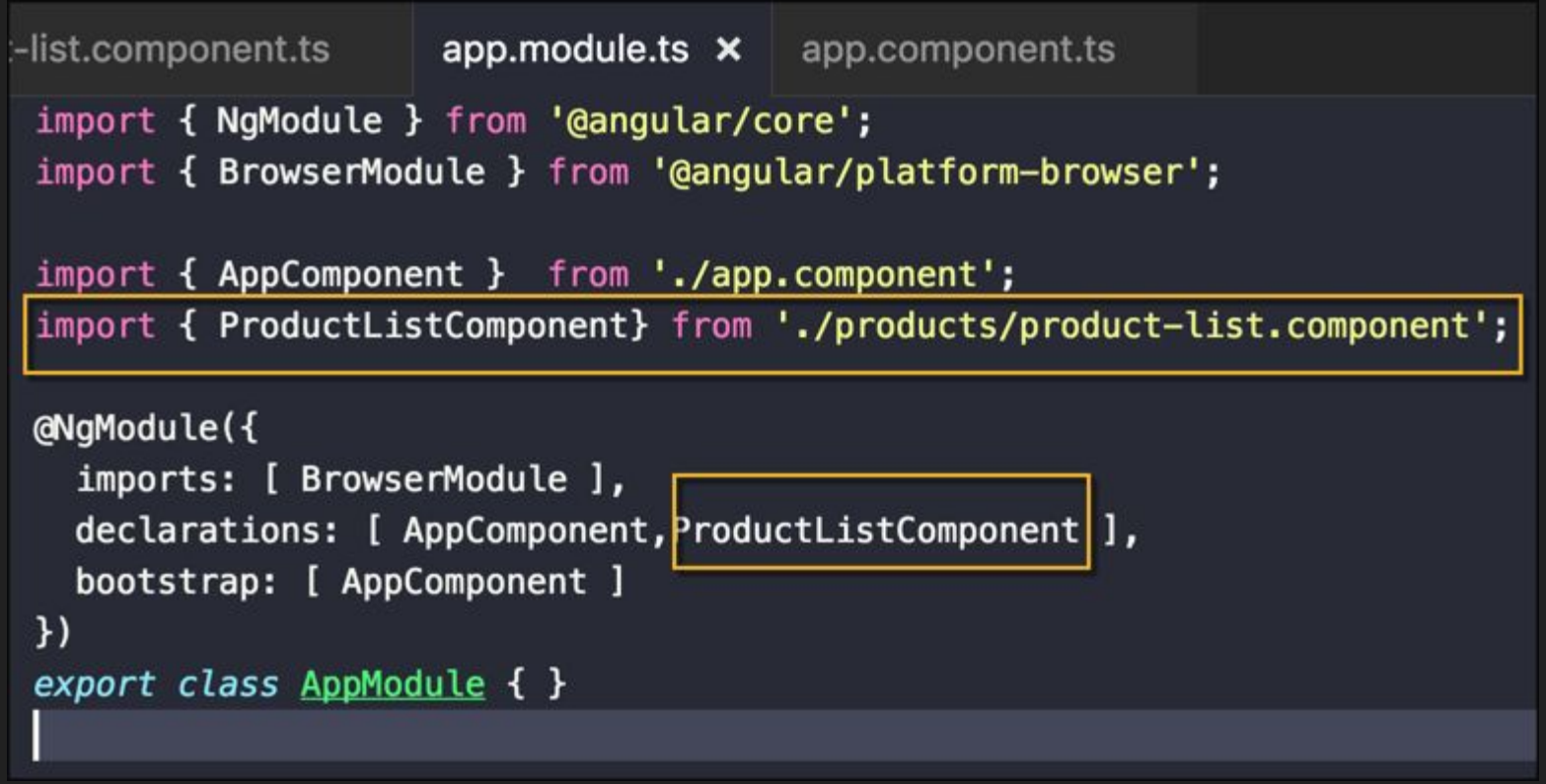
(1)import

當directive已在另一個module有被宣告
直接匯入

(2)declararions

在自己本身有宣告



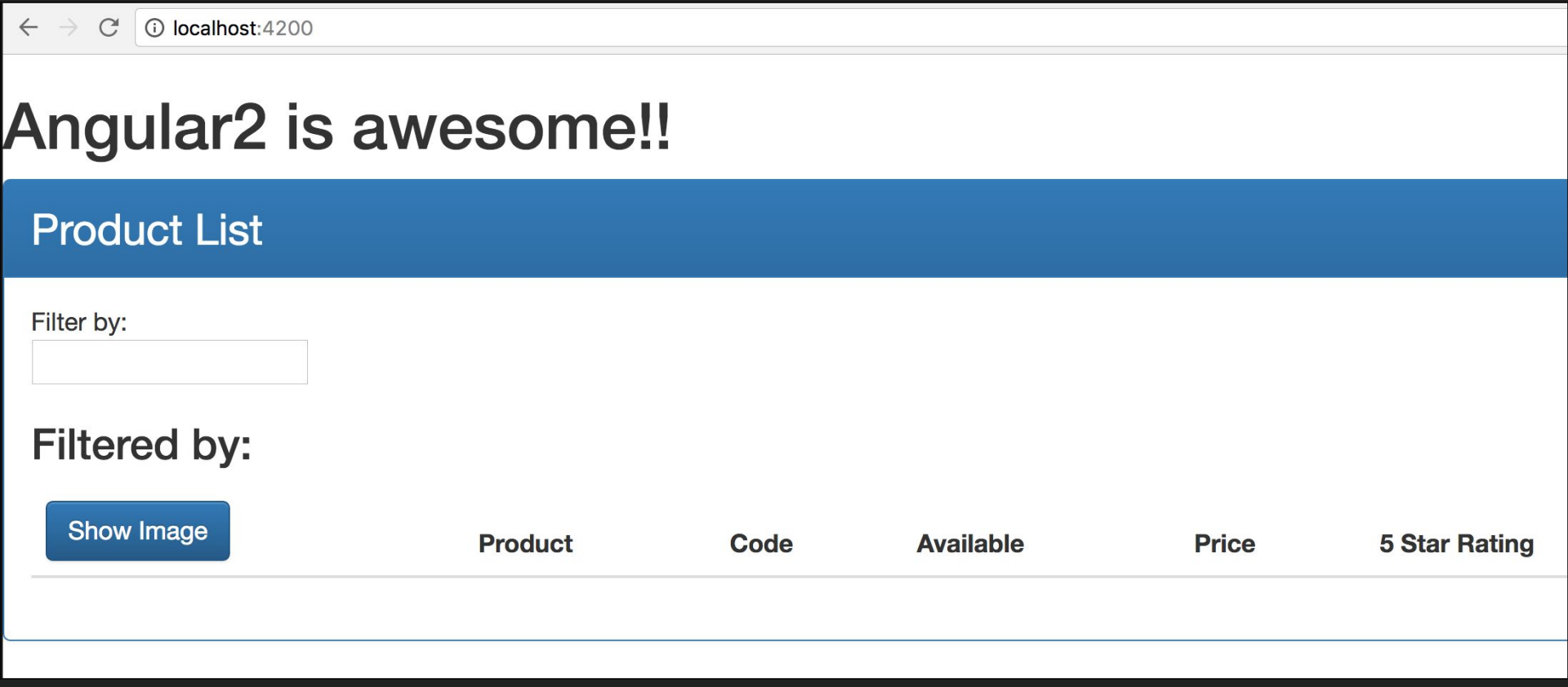


1.在declarations加上 ProductListComponent

2. import 對應的component

＊注意這邊from path是對應此檔案

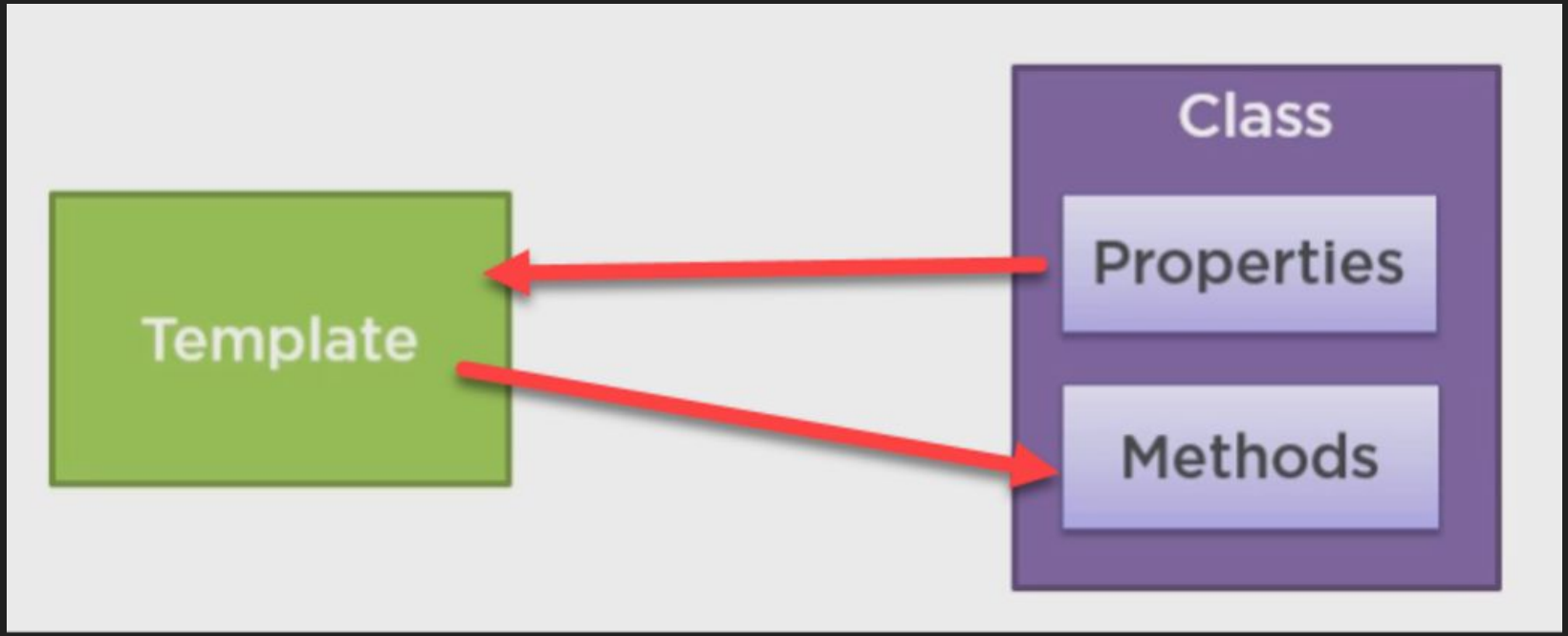
再看一次畫面


localhost:4200
Angular2 is awesome!!
Product List
Filter by:
Filtered by:
Show Image
Product
Code
Available
Price
5 Star Rating

Binding

什麼是Binding？

- 協調 component的class與其template之間的溝通
- 通常會傳遞資料


Class
Properties
Methods
Template

Interpolation

Template

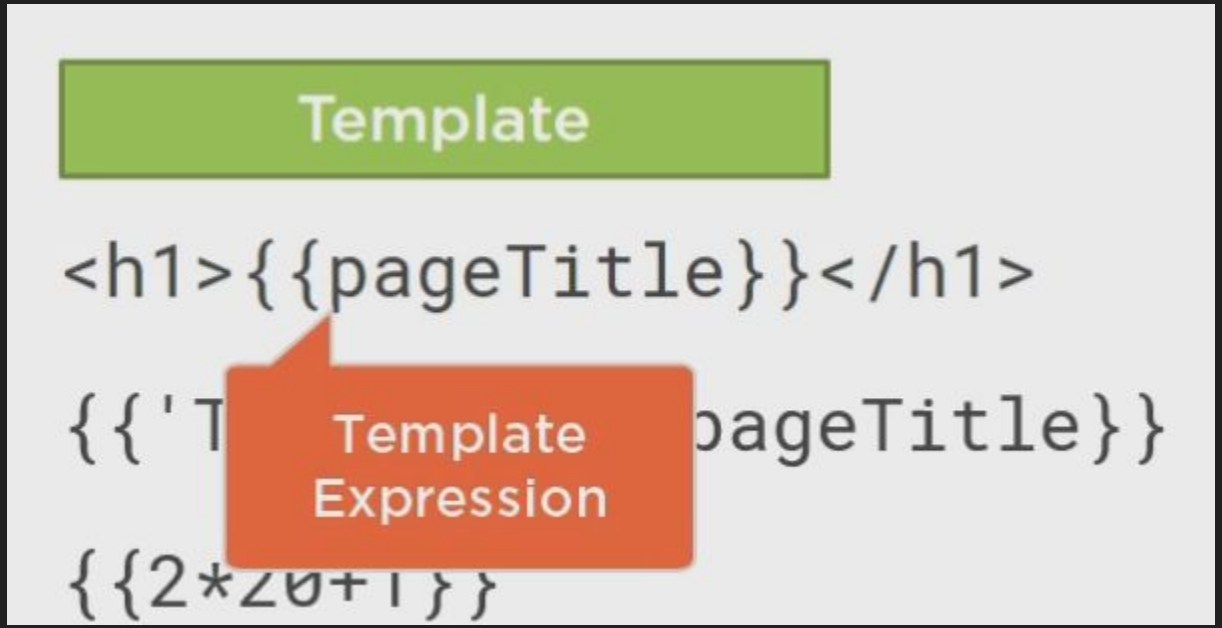
```
<h1>{{pageTitle}}</h1>

{{'Title: ' + pageTitle}}

{{2*20+1}}

{{'Title: ' + getTitle()}}

<h1 innerText={{pageTitle}}></h1>
```

Class

```
export class AppComponent {
 pageTitle: string =
      'Acme Product Management';
 getTitle(): string {...};
}
```

1
2
3
4
5

Template Expression {{ }}



調整product-list.component.html與 .ts檔

product-list.component.ts

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

@Component({
  selector: 'app-product-list',
  templateUrl: './product-list.component.html',
  styleUrls: ['./product-list.component.css']
})
export class ProductListComponent implements OnInit {

  pageTitle: string = "Product List";

  constructor() { }

  ngOnInit() {
  }
```

product-list.component.html

```html
<div class='panel panel-primary'>
  <div class='panel-heading'>
    {{pageTitle}}
  </div>
  <!-- Filter the Products    -->
  <div class='panel-body'>
    <div class='row'>
      <div class='col-md-2'>Filter
      <div class='col-md-4'>
        <input type='text' />
      </div>
    </div>
    <div class='row'>
      <div class='col-md-6'>
        <h3>Filtered by: </h3>
      </div>
```

Directives

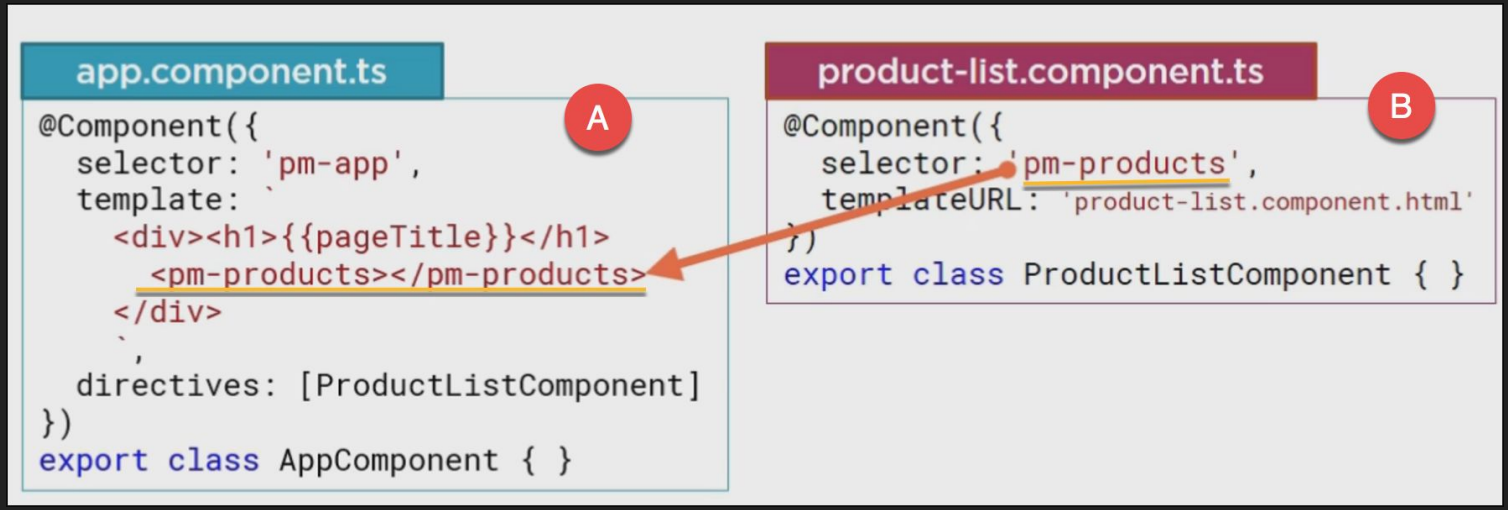
Directive

客制化的 HTML element 或 attribute

用來強化或擴充HTML

- 可客製化(custom)
- 內建(built-in)

Custom Directive

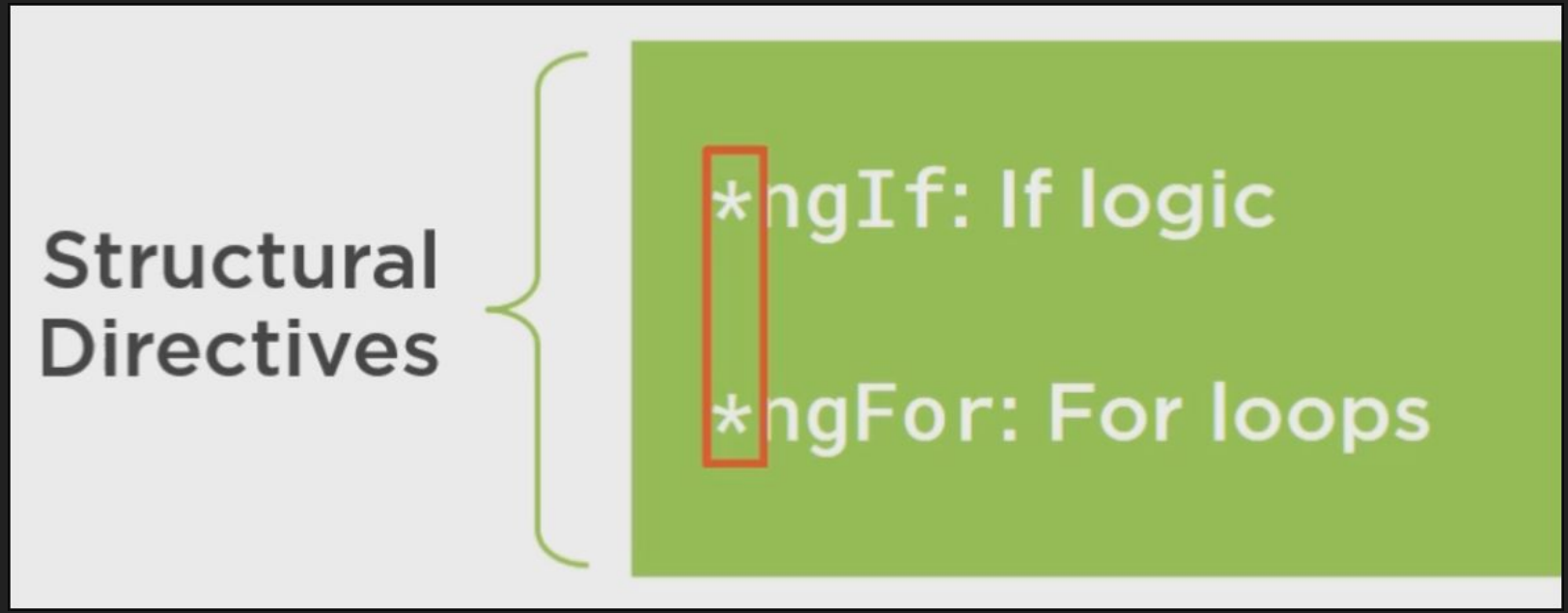


在AppComponent的template中使用ProductListComponent的selector來呈現其template

也就是在A component中呈現 B component的template

(把component當成 directive)

Built-in Directives



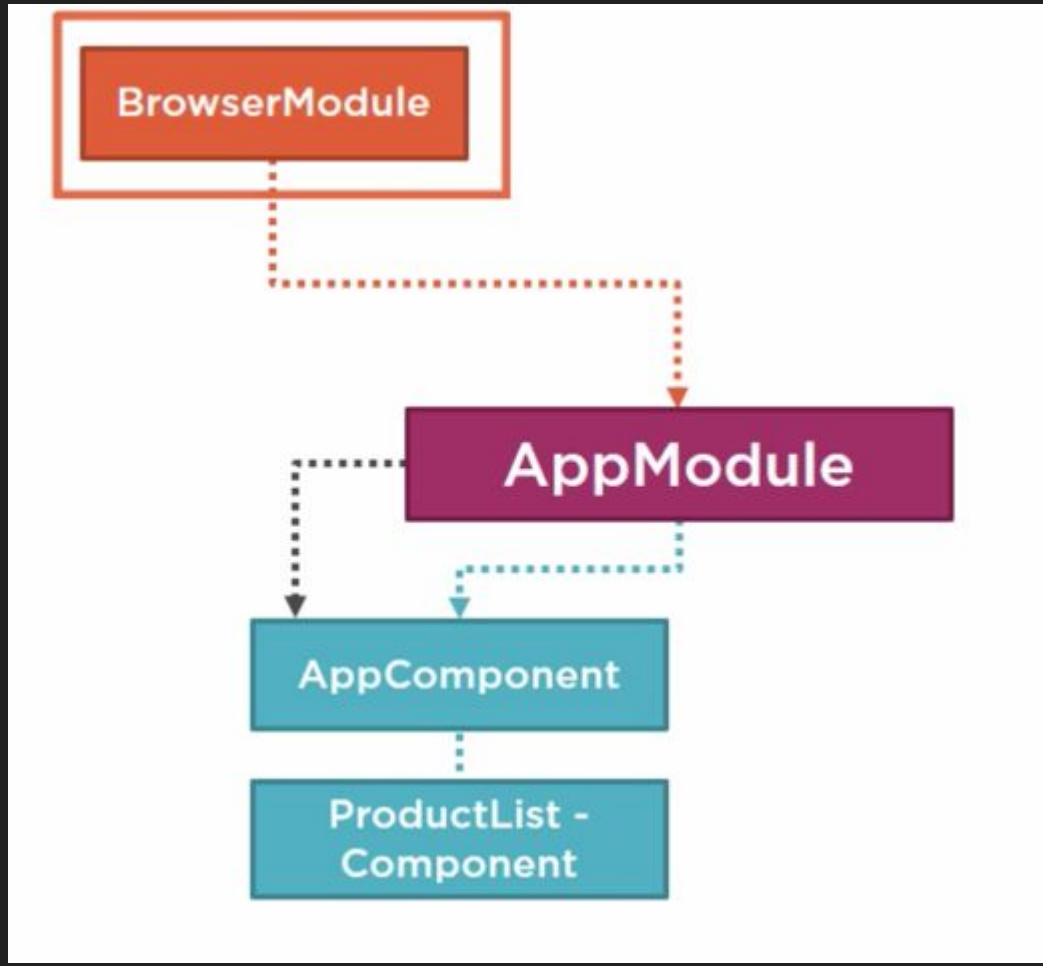
*ngIf Built-In Directive

```
<div class='table-responsive'>
  <table class='table' *ngIf='products && products.length'>
    <thead> ...
    </thead>
    <tbody> ...
    </tbody>
  </table>
</div>
```

application去哪邊找到
*ngIf ?

BrowserModule 會expose
*ngIf
*ngFor

所以宣告在AppModule的
component都可以使用
*ng-If跟*ngFor



實作:要讓table依據有沒有products而顯示出來

因為不知道products array中的item type，所以先放 any

(通常data會從後端來)

```
ngOnInit() {
}

pageTitle:string = "Product List!";
products:any[]=
```

貼上api內product資料

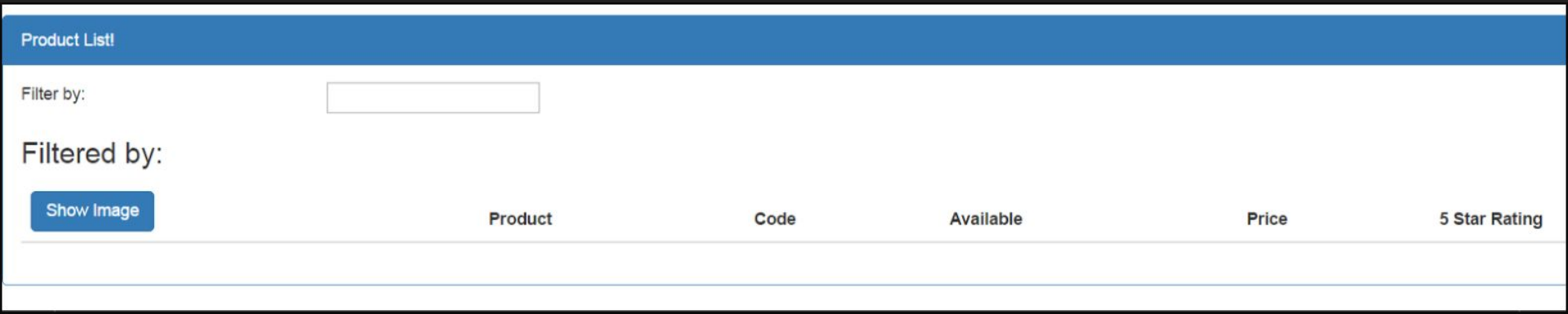
```
pageTitle:string = "Product List!";
products:any[]=[
  {
      "productId": 1,
      "productName": "Leaf Rake",
      "productCode": "GDN-0011",
      "releaseDate": "March 19, 2016",
      "description": "Leaf rake with 48-inch wooden handle.",
      "price": 19.95,
      "starRating": 3.2,
      "imageUrl": "http://openclipart.org/image/300px/svg_to_png/26
  },
  {
      "productId": 2,
      "productName": "Garden Cart",
      "productCode": "GDN-0023",
      "releaseDate": "March 18, 2016",
      "description": "15 gallon capacity rolling garden cart",
      "price": 32.99,
      "starRating": 4.2
```

*ngIf 後面要加上’ ‘

table element 加上 * ngIf
如果products存在且有東西，就顯示table

```
<div class='table-responsive'>
    <table class='table' *ngIf='products && products.length'>
        <thead>
            <tr>
                <th>
                    <button class='btn btn-primary'>Show Image
                    </button>
```

有product資料時



註解掉products時

*ngFor product of products

```
<tr *ngFor='let product of products'>
    <td></td>
    <td>{{ product.productName }}</td>
    <td>{{ product.productCode }}</td>
    <td>{{ product.releaseDate }}</td>
    <td>{{ product.price }}</td>
    <td>{{ product.starRating }}</td>
</tr>
```

Template input variable

要在<tbody>顯示資料

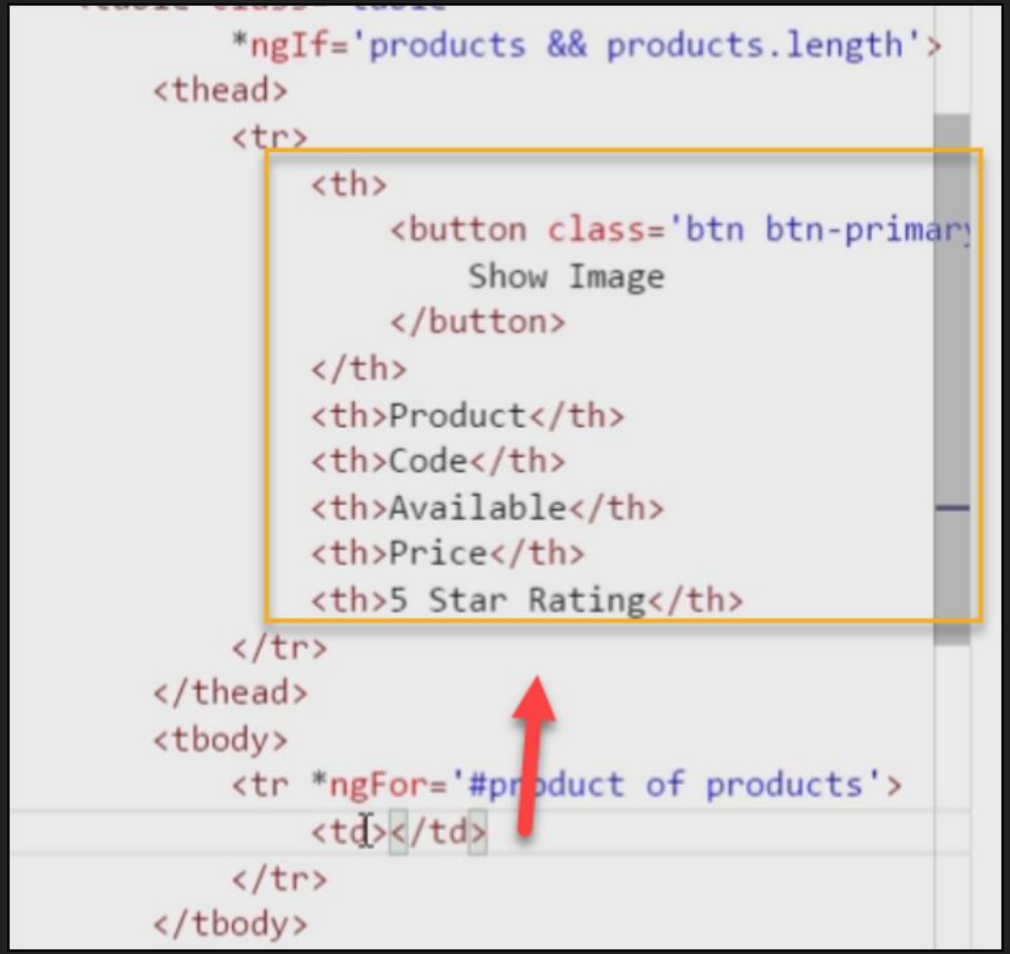
對應th去產生td

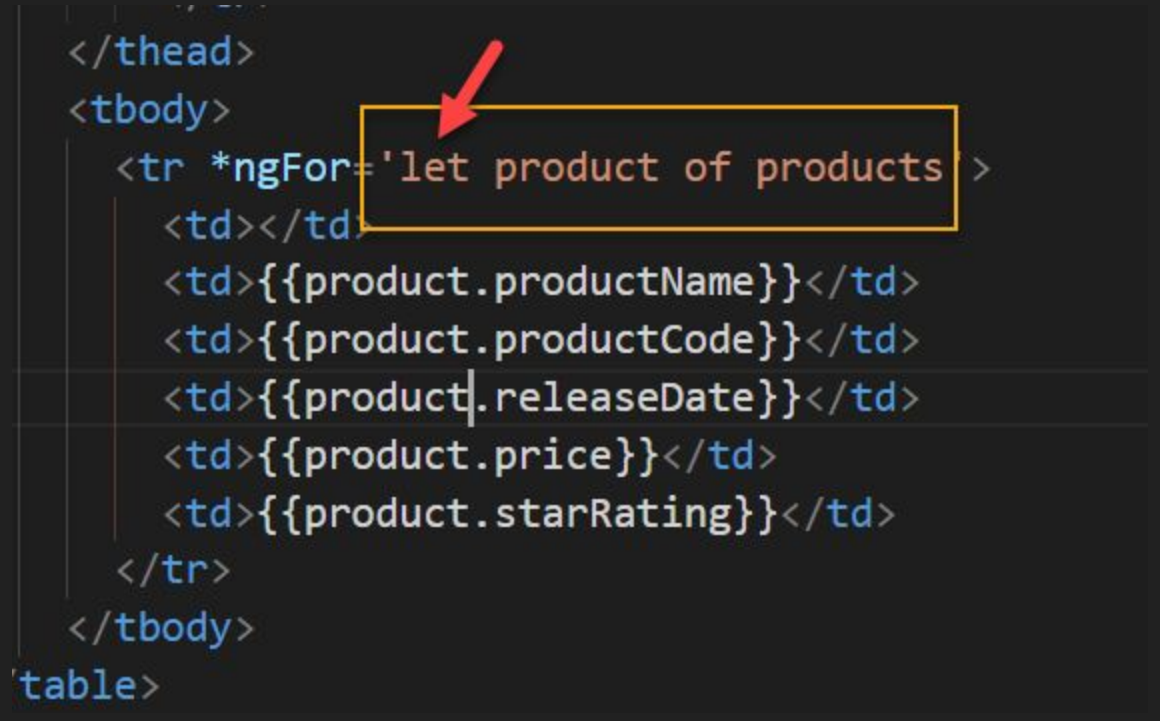
第一個欄位是image

接著是Product

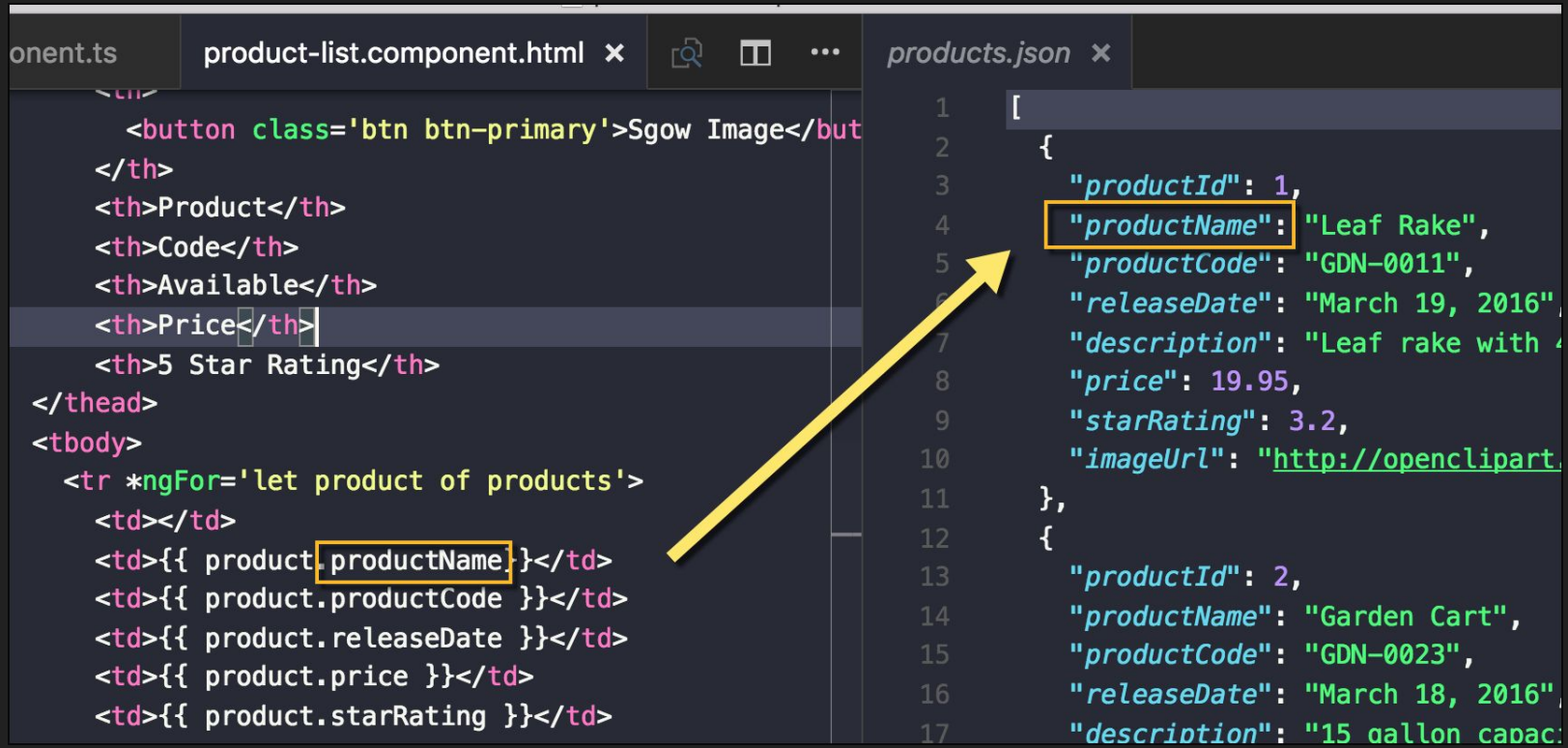
Code

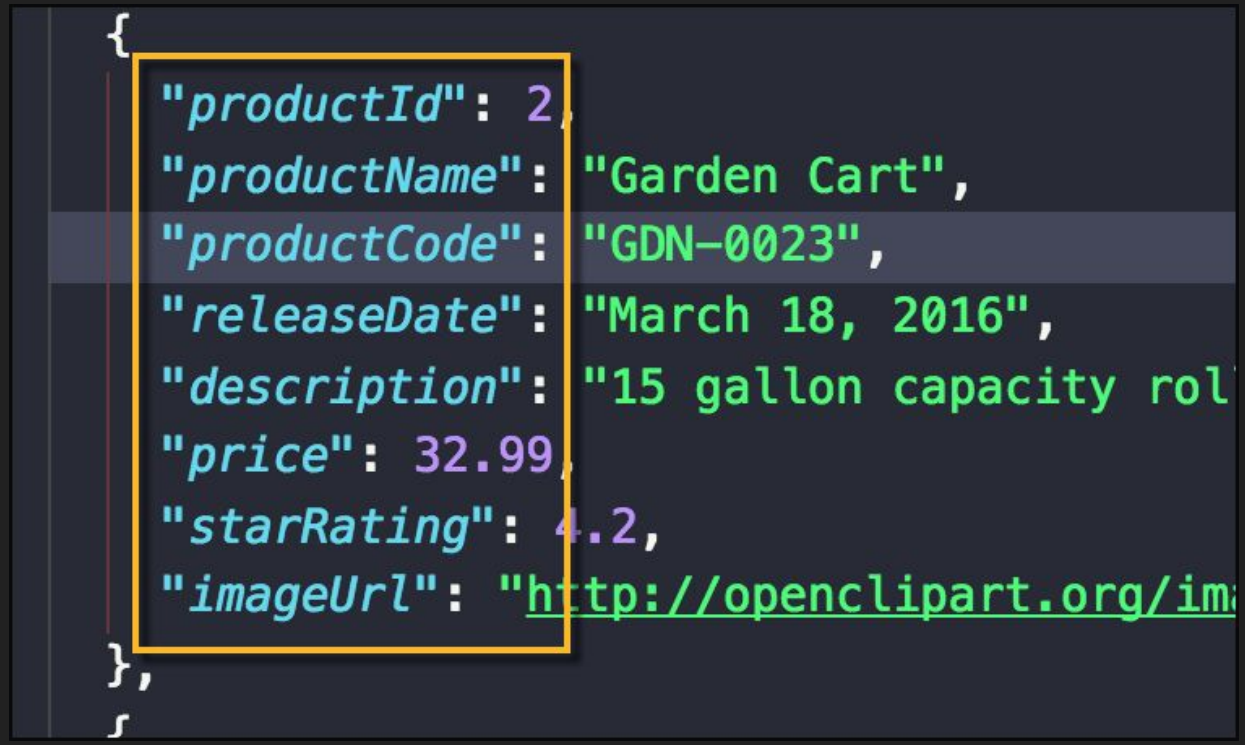
Available

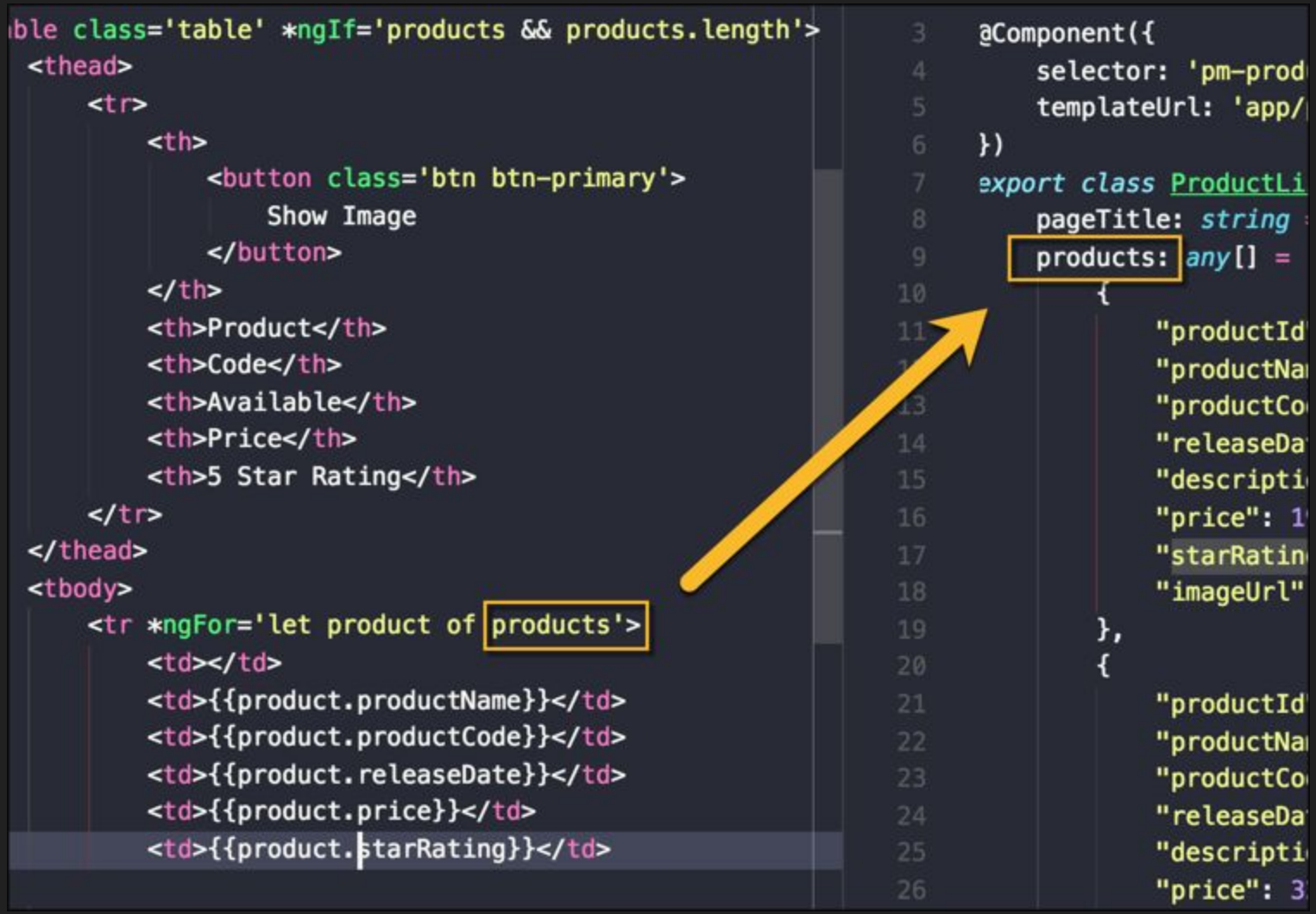



</thead>
<tbody>
<tr *ngFor='let product of products'>
<td></td>
<td>{{product.productName}}</td>
<td>{{product.productCode}}</td>
<td>{{product.releaseDate}}</td>
<td>{{product.price}}</td>
<td>{{product.starRating}}</td>
</tr>
</tbody>
table>

如何知道property name?




{
"productId": 2,
"productName": "Garden Cart",
"productCode": "GDN-0023",
"releaseDate": "March 18, 2016",
"description": "15 gallon capacity rol
"price": 32.99,
"starRating": 4.2,
"imageUrl": "http://openclipart.org/im
},

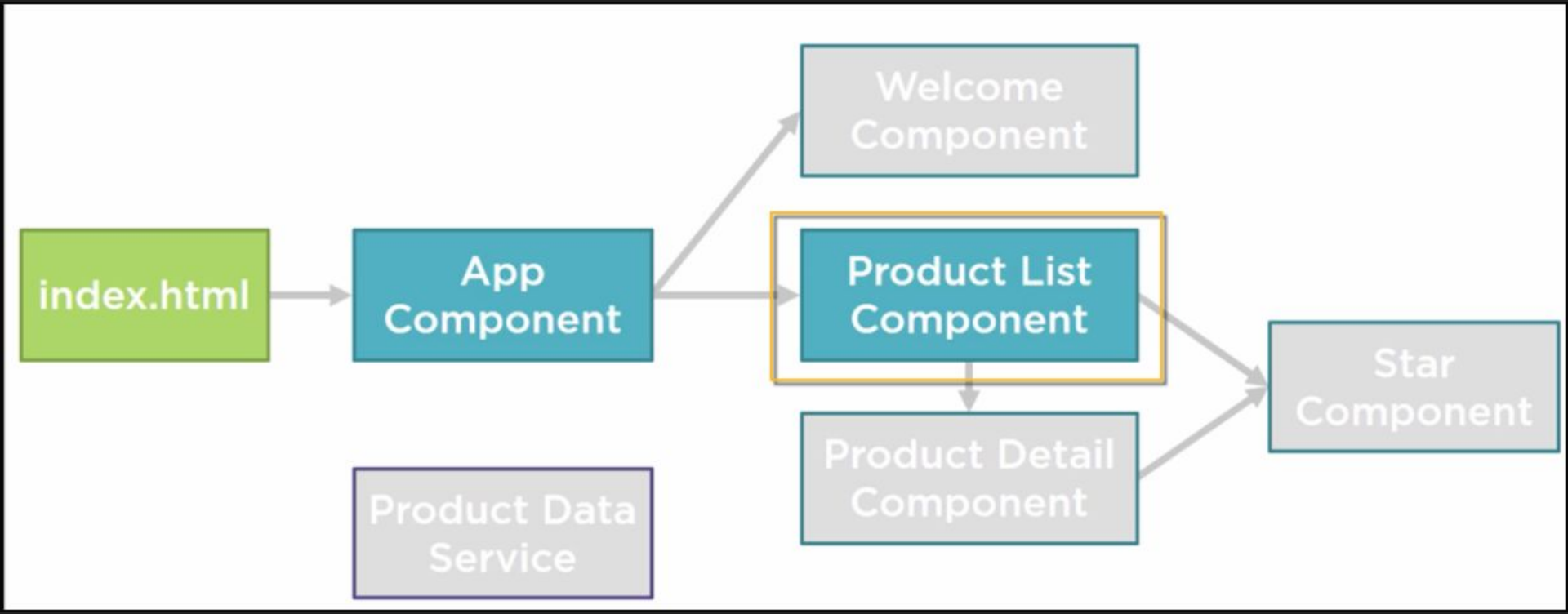

ble class='table' *ngIf='products && products.length'>
<thead>
<tr>
<th>
<button class='btn btn-primary'>
Show Image
</button>
</th>
<th>Product</th>
<th>Code</th>
<th>Available</th>
<th>Price</th>
<th>5 Star Rating</th>
</tr>
</thead>
<tbody>
<tr *ngFor='let product of products'>
<td></td>
<td>{{product.productName}}</td>
<td>{{product.productCode}}</td>
<td>{{product.releaseDate}}</td>
<td>{{product.price}}</td>
<td>{{product.starRating}}</td>
@Component({
selector: 'pm-prod
templateUrl: 'app/
})
export class ProductLi
pageTitle: string
products: any[] =
{
"productId
"productNa
"productCo
"releaseDa
"descripti
"price": 1
"starRatin
"imageUrl"
},
{
"productId
"productNa
"productCo
"releaseDa
"descripti
"price": 3

產品出現

Filtered by:

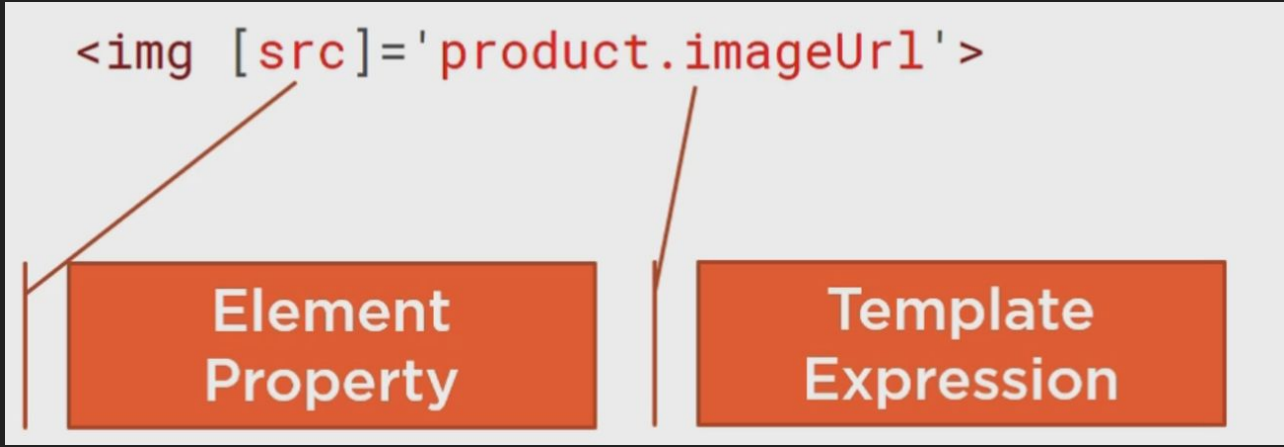
Sgow Image

Product	Code	Available	Price	5 Star Rating
Leaf Rake	GDN-0011	March 19, 2016	19.95	3.2
Garden Cart	GDN-0023	March 18, 2016	32.99	4.2
Hammer	TBX-0048	May 21, 2016	8.9	4.8
Saw	TBX-0022	May 15, 2016	11.55	3.7
Video Game Controller	GMG-0042	October 15, 2015	35.95	4.6


Welcome Component
index.html
App Component
Product List Component
Star Component
Product Detail Component
Product Data Service

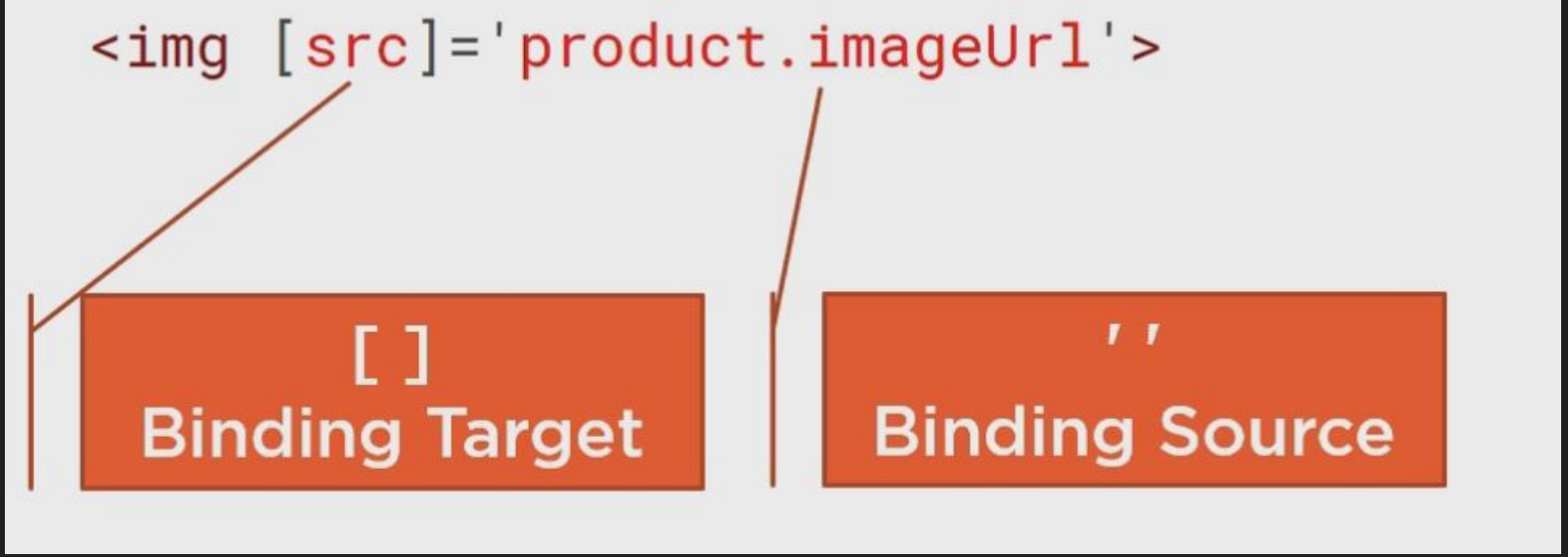
Data Binding
&
Pipes

Property Binding



把img element的 source property 綁定(bind)到 product的property imageUrl

(把src的值 參考到 class中的資訊)



Binding Target 都要用[ ]，放在=的左邊　(property of the element)

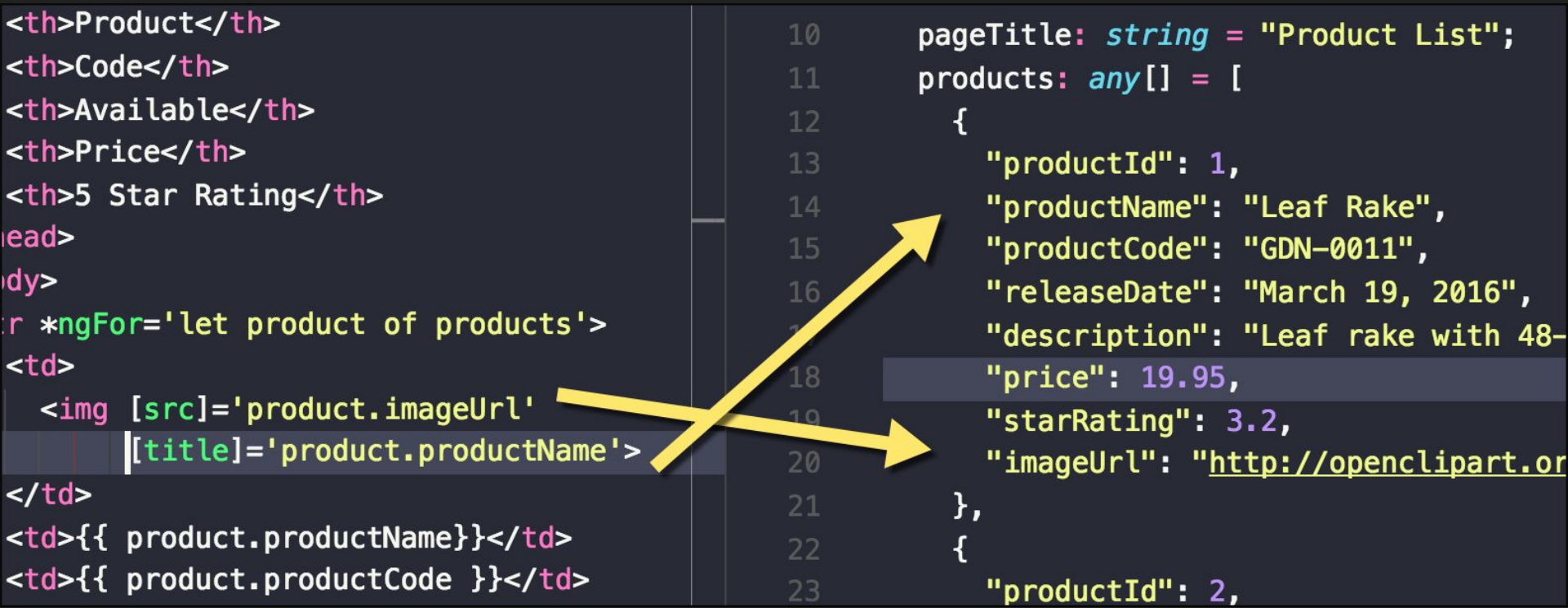
Binding Source都要用‘‘，放在=的右邊　(Template Expression)

Property Binding

```
<img [src]='product.imageUrl'> 1

<img src={{product.imageUrl}}> 2

<img src='http://openclipart.org/{{product.imageUrl}}'> 3
```

(1) property binding跟(2)interpolation 都是one way binding
(class中的property => element中property)
可達成同樣結果時
一般建議用(1)

但如(3), 需要把template expression放到比較大的expression中時, 就要用interpolation


<th>Product</th>
<th>Code</th>
<th>Available</th>
<th>Price</th>
<th>5 Star Rating</th>
ead>
dy>
r *ngFor='let product of products'>
<td>
<img [src]='product.imageUrl'
[title]='product.productName'>
</td>
<td>{{ product.productName}}</td>
<td>{{ product.productCode }}</td>
pageTitle: string = "Product List";
products: any[] = [
{
"productId": 1,
"productName": "Leaf Rake",
"productCode": "GDN-0011",
"releaseDate": "March 19, 2016",
"description": "Leaf rake with 48-
"price": 19.95,
"starRating": 3.2,
"imageUrl": "http://openclipart.or
},
{
"productId": 2,

圖太大怎麼辦？

[style.width.px]
設定寬度，單位為px

[style.margin.px]
設定margin

注意這邊imageWidth前面
沒有product
因為imageWidth是
class property

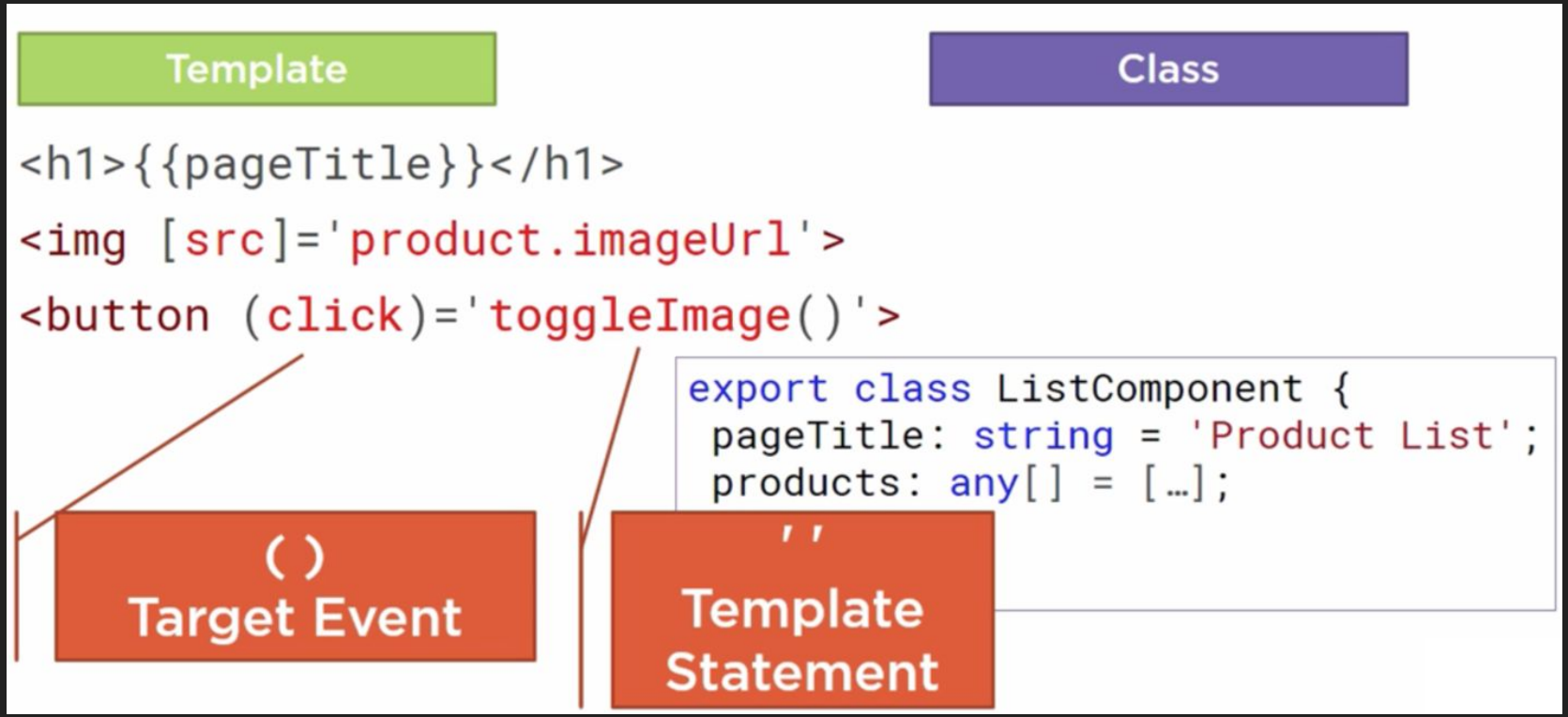
Filtered by:

Show Image

Product	Code	Available
 Leaf Rake	GDN-0011	March 19, 2016
 Garden Cart	GDN-0023	March 18, 2016
 Hammer	TBX-0048	May 21, 2016

Event Binding

Handling Events with event binding



發生Event時

當event發生時

template statement
會被執行

DOM Events

https://developer.mozilla.org/en-US/docs/Web/Events

Mouse Events

Event Name	Fired When
`mouseenter`	A pointing device is moved onto the element that has the listener attached.
`mouseover`	A pointing device is moved onto the element that has the listener attached or onto one of its children.
`mousemove`	A pointing device is moved over an element. (Fired continously as the mouse moves.)
`mousedown`	A pointing device button (ANY button) is pressed on an element.
`mouseup`	A pointing device button (ANY button) is released over an element.
`click`	A pointing device button (ANY button) has been pressed and released on an element.
`dblclick`	A pointing device button is clicked twice on an element.

實作show image button 功能

要有個flag去切換

當button點下去時，flag要切換

用method來控制

通常method寫在所有property後面

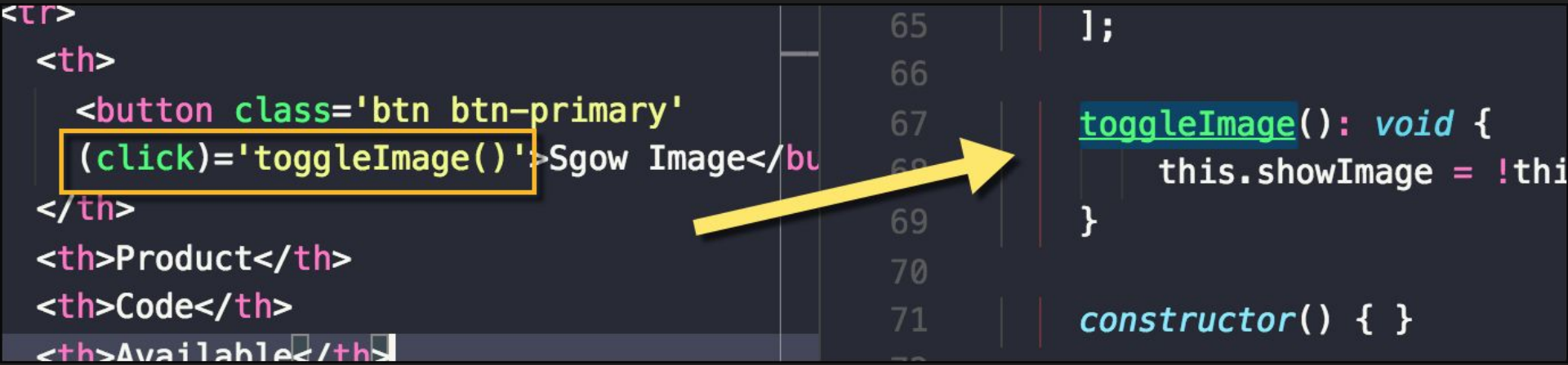
＊typescript的function不用寫function keyword

:void表示沒有回傳值

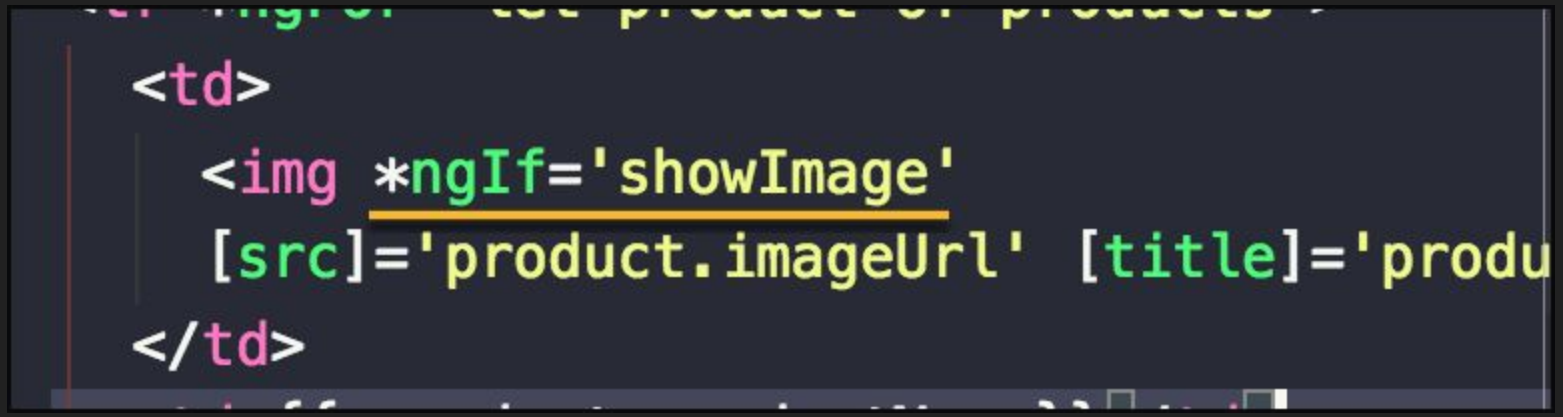
```
pageTitle: string = "Product List";
imageWidth: number = 50;
imageMargin: number = 2;
showImage: boolean = false;
products: any[] = [...
];

toggleImage(): void {
    this.showImage = !this.showImage;
}
```

點button時觸發toggleImage( )

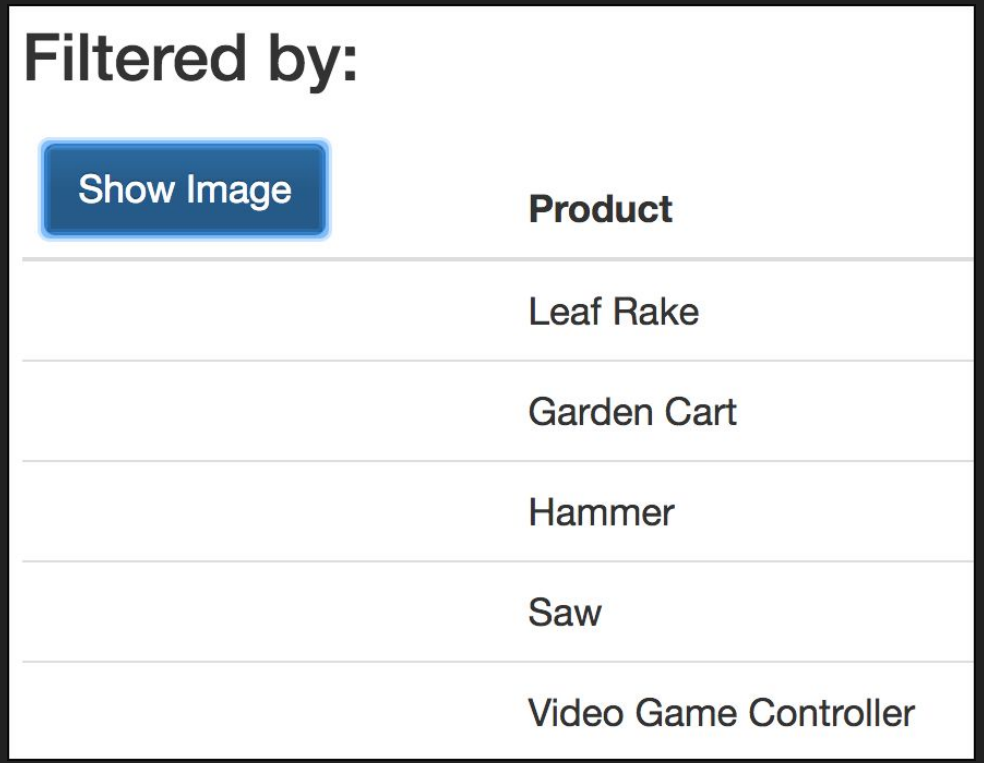
用event binding綁定clicl event



要把image隱藏或顯示

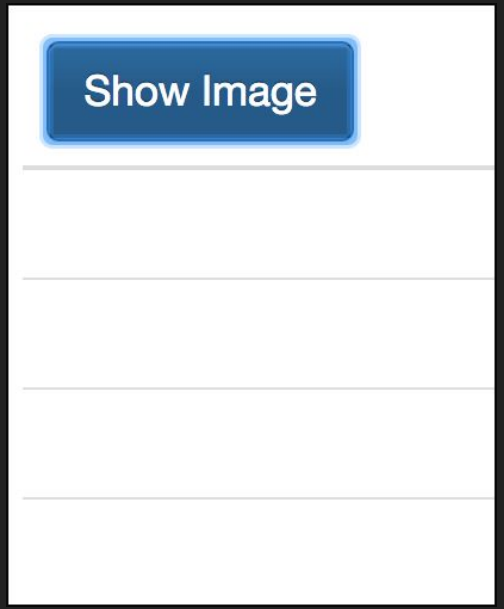


測試


Filtered by:
Show Image
Product
Leaf Rake
Garden Cart
Hammer
Saw
Video Game Controller

調整button text

根據不同情況變化

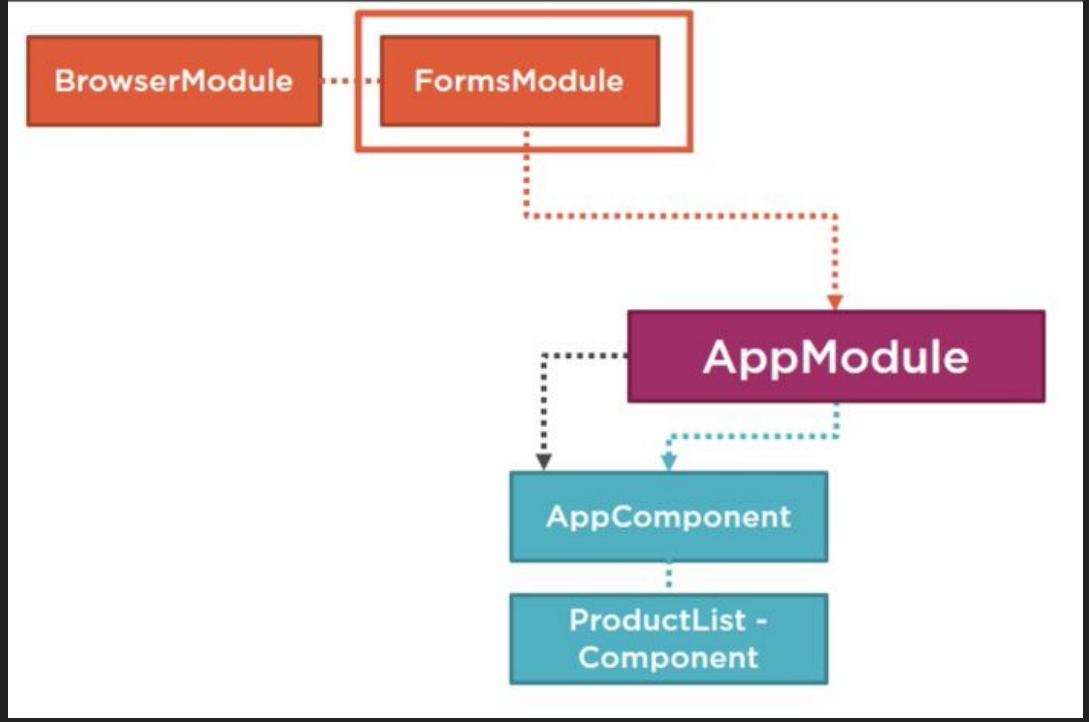


JS condition operator

```
<th>
  <button class='btn btn-primary' (click)=
    {{showImage ?'Hide':'Show'}} Image
  </button>
</th>
<th>Product</th>
```

Handling Input with 2-way binding

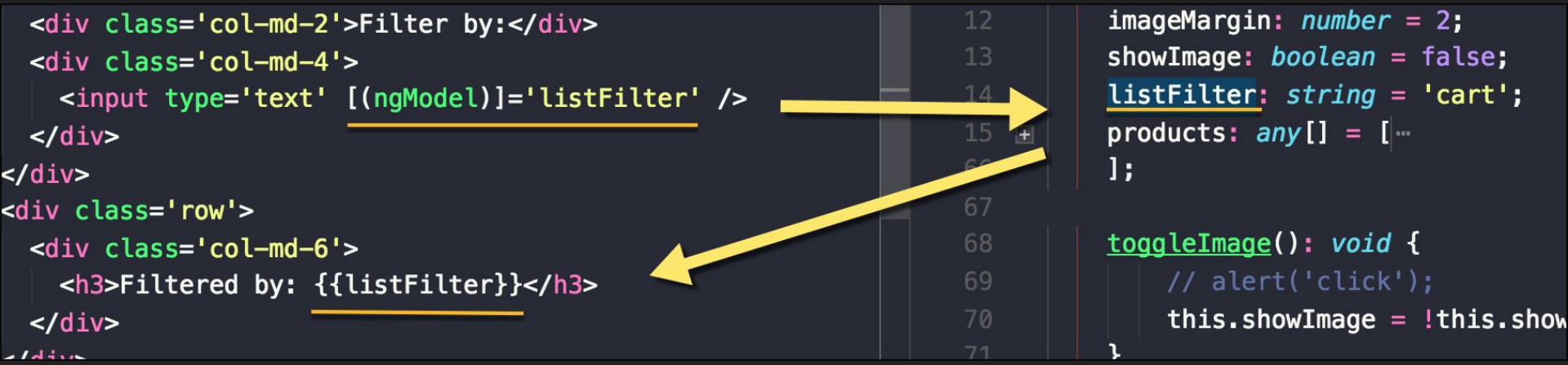
Two-way data binding



ngModel是FormsModule的一部份，需要import

t-list.component.html | app.module.ts ×

```
import { BrowserModule } from '@angular/platform-br
import { NgModule } from '@angular/core';
import { FormsModule } from '@angular/forms';
import { HttpModule } from '@angular/http';

import { AppComponent } from './app.component';
import { ProductListComponent } from './product-lis

@NgModule({
  declarations: [
    AppComponent,
    ProductListComponent
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule
  ]
```

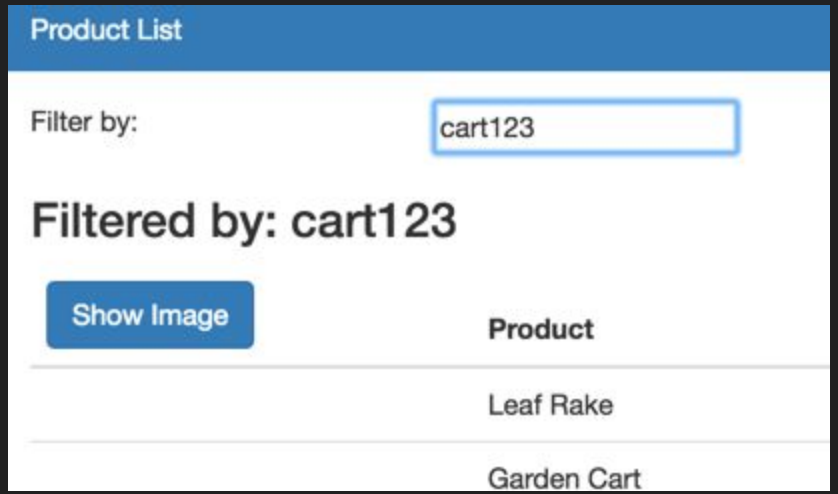


新增 listFilter property

幫input綁定 ngModel

顯示 {{listFilter}}

測試


Product List
Filter by:
cart123
Filtered by: cart123
Show Image
Product
Leaf Rake
Garden Cart

Transforming Data with Pipes

- 顯示綁定的properties前，先做轉換
- 內建pipes
  - Date，number，percent，currency
  - json，slice (處理object
  - etc
- 客製化 pipes

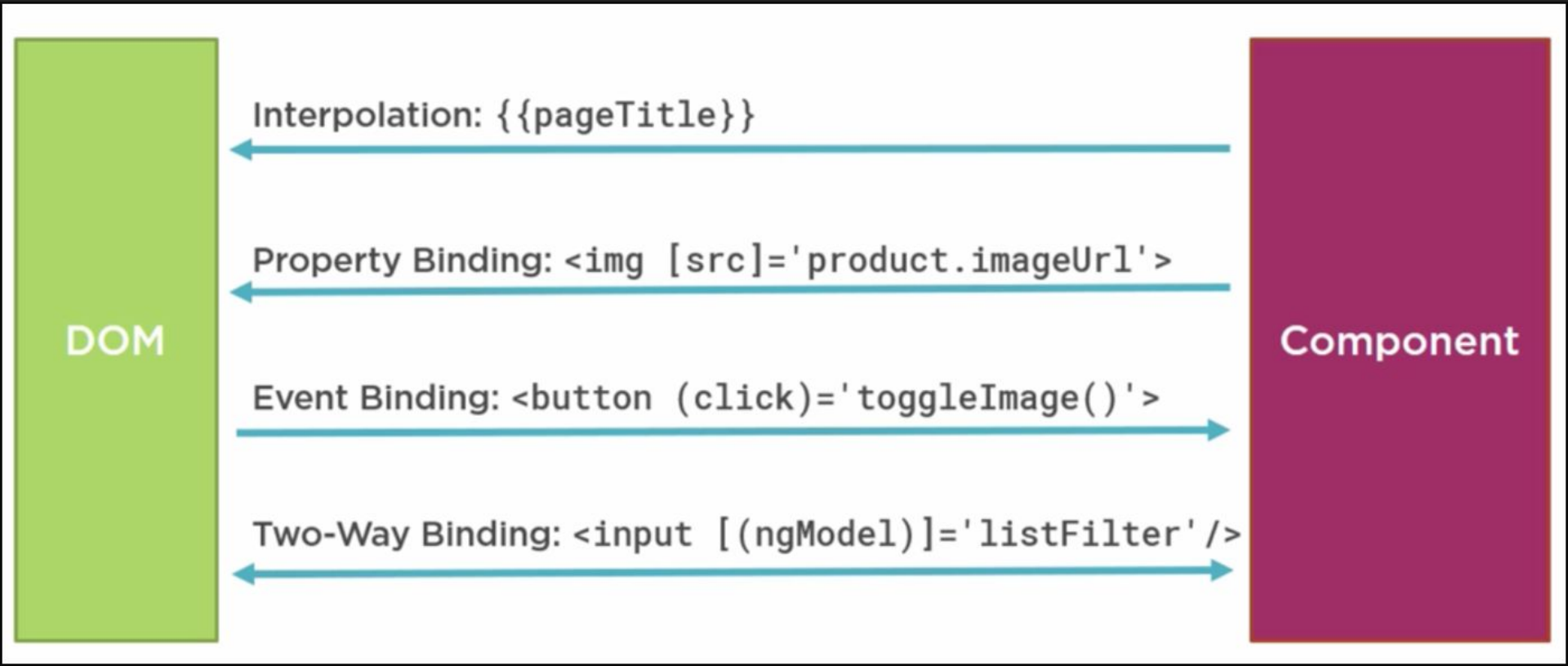
Pipe Example

```
{{ product.productCode | lowercase }}

<img [src]='product.imageUrl'
     [title]='product.productName | uppercase'>

{{ product.price | currency | lowercase }}

{{ product.price | currency:'USD':true:'1.2-2' }}
```

```
<td>{{ product.productName}}</td>
<td>{{ product.productCode |lowercase}}</td>
<td>{{ product.releaseDate }}</td>
<td>{{ product.price | currency:'USD':true:'1.1-2' }}</td
<td>{{ product.starRating }}</td>
/tr>
```

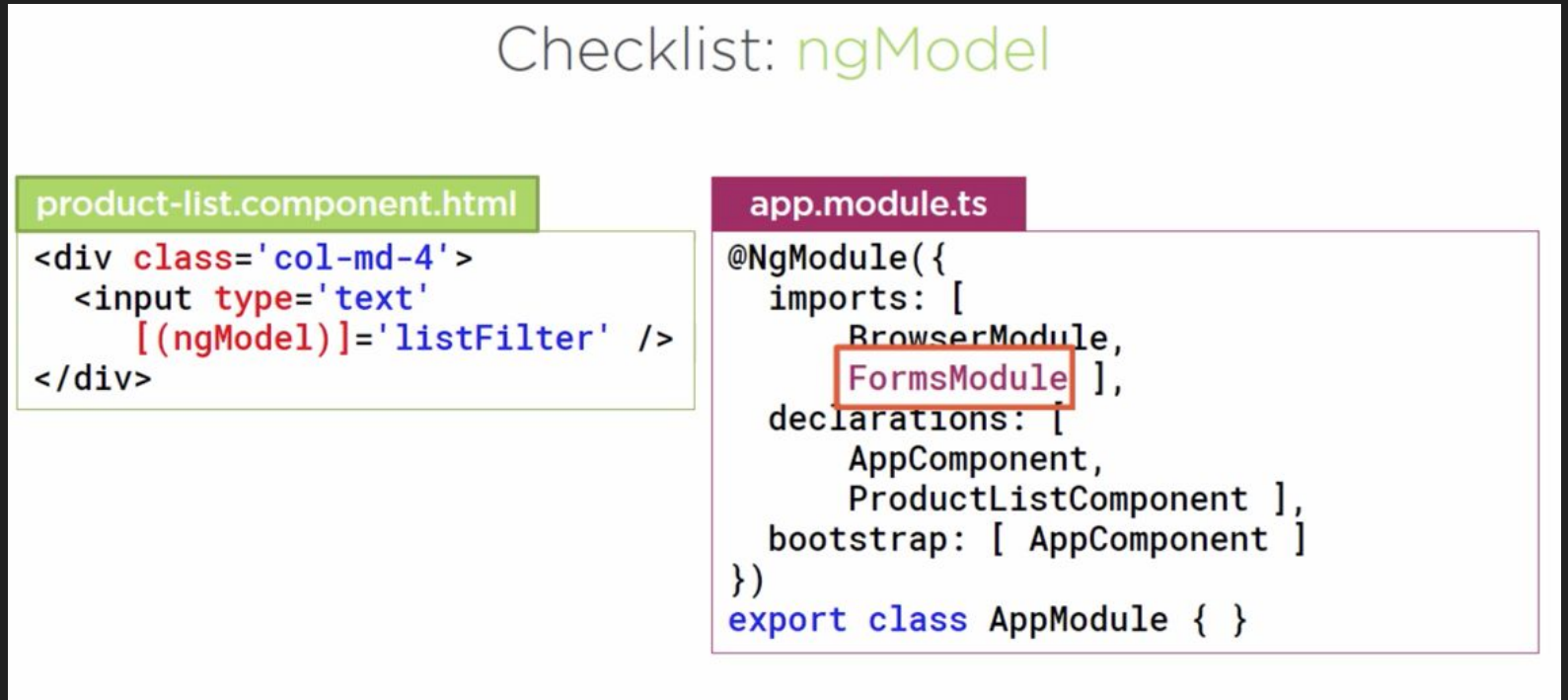
Code	Available	Price
gdn-0011	March 19, 2016	$19.95
gdn-0023	March 18, 2016	$32.99
tbx-0048	May 21, 2016	$8.90
tbx-0022	May 15, 2016	$11.55
gmg-0042	October 15, 2015	$35.95

Data Binding記憶圖



使用ngModel要記得import FormsModule

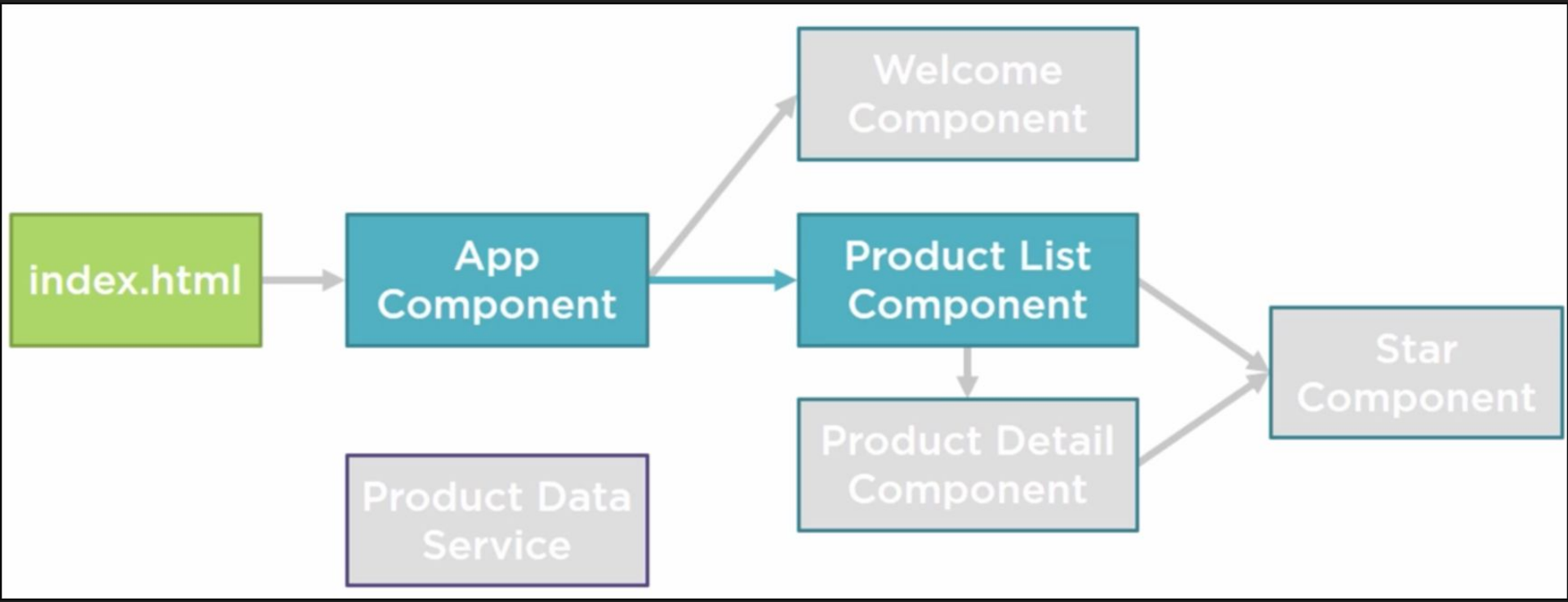
讓跟這個Module相關的Component都能使用ngModel
(AppComponent/ProductListComponent)



More on Components

- Strong typing & interfaces
- Encapsulating styles
- Lifecycle hooks
- Custom pipes

App架構


Welcome Component
index.html
App Component
Product List Component
Star Component
Product Detail Component
Product Data Service

Strong typing

可以有type的地方
(1) property
(2) method的return type
(3) method的parameter type

但有時候property/method

會沒有適合的predefined type

如這裡的producrs array為 any

要指定custom type，要使用interface

Interface

一份定義properties/methods的規格

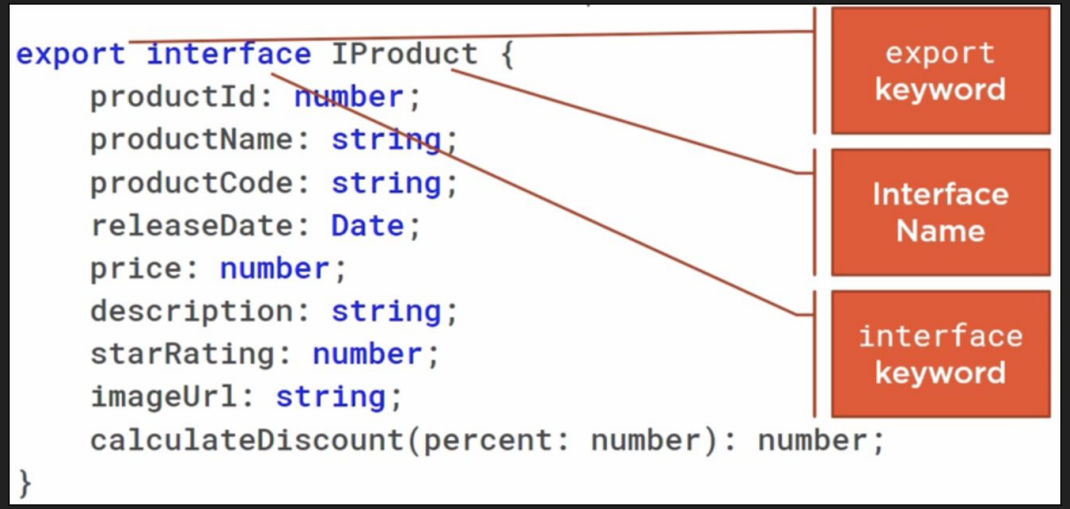
有實作(implement) Interface的class會支援這份規格

並可把interface當成data type來用

主要提供strong typing跟debug

ES5跟ES6不支援，但Typescript支援
只是transpile後會消失，不會出現在JS檔內
(interface只有development time only)

TypeScript Interface範例



- export 讓Interface可以在app中到處被使用
- 命名通常會在最前面加上 I 代表Interface

定義Interface

```
export interface IProduct {
    productId: number;
    productName: string;
    productCode: string;
    releaseDate: Date;
    price: number;
    description: string;
    starRating: number;
    imageUrl: string;
    calculateDiscount(percent: number): number;
}
```

在interface中定義property跟method如上(含有data type)

使用Interface做為data type

(1) import interface
(2) 當成data type來用

```
import { IProduct } from './product';

export class ProductListComponent {
  pageTitle: string = 'Product List';
  showImage: boolean = false;
  listFilter: string = 'cart';

  products: IProduct[] = […];

  toggleImage(): void {
      this.showImage = !this.showImage;
   }
}
```

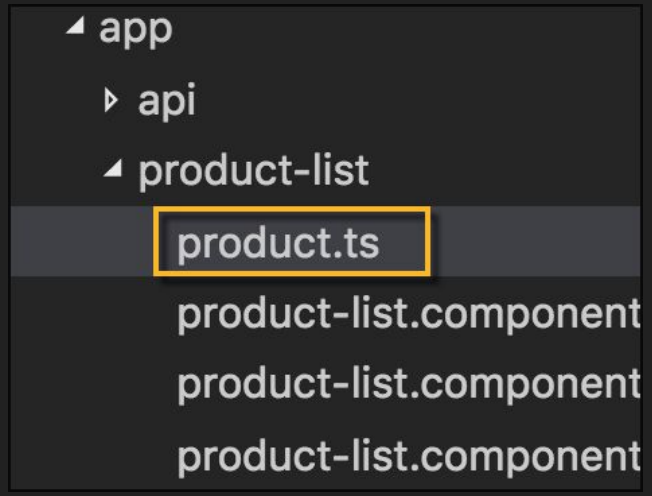
1

2

新增product.ts

要修正any
新增Interface來定義product是什麼

新增product.ts




```
listFilter: string = 'cart';
products: any[] = [
    {
        "productId": 1,
        "productName": "Leaf
```

product.ts

```
1  export interface IProduct {
2    productId: number;
3    productName: string;
4    productCode: string;
5    releaseDate: string;
6    price: number;
7    description: string;
8    starRating: number;
9    imageUrl: string;
```

```
    "price": 32.99,
    "starRating": 4.2,
    "imageUr": "http://openclip
},                  imageUrl
{
```

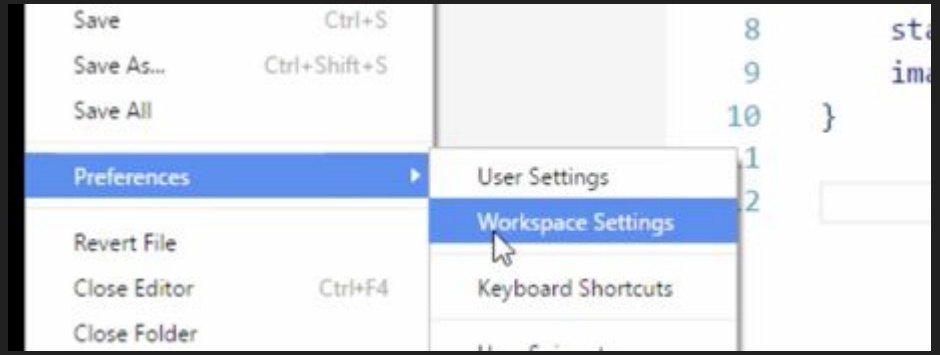
type checking

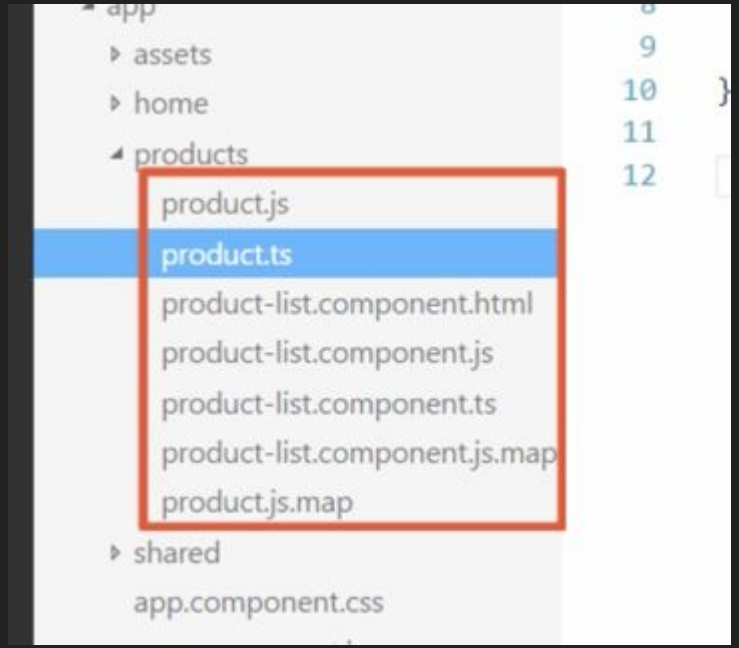
intellisense

product-list.component.ts

```
1  import { Component, OnInit } from '@angular/core';
2  import { IProduct } from './product';
3
4  @Component({
5      selector: 'app-product-list',
6      templateUrl: './product-list.component.html',
7      styleUrls: ['./product-list.component.css']
8  })
9  export class ProductListComponent implements OnInit {
10
11     pageTitle: string = "Product List";
12     imageWidth: number = 50;
13     imageMargin: number = 2;
14     showImage: boolean = false;
15     listFilter: string = 'cart';
16     products: IProduct[] = [
17         {
18             "productId": 1,
19             "productName": "Leaf Rake",
20             "productCode": "GDN-0011",
21             "releaseDate": "March 19, 2016",
22             "description": "Leaf rake with 48-inch wooden
23             "price": 19.94,
24             "starRating": 3.2,
25             "imageUrls": "http://openclipart.org/image/300
26         },
```

把.js跟.map藏起來






```
"files.exclude": {
        "**/.git": true,
        "**/.DS_Store": true,
        "**/*.js.map": true,
        "**/*.js": {"when": "$(basename).ts"}
    }
```

Component Styles

```
import { Component, OnInit } from '@angular/core';
import { IProduct } from './product';

@Component({
    selector: 'app-product-list',
    templateUrl: './product-list.component.html',
    styleUrls: ['./product-list.component.css']
})
```

封装component的style（@Component)

Encapsulating Component Styles

styles

```
@Component({
    selector: 'pm-products',
    templateUrl: 'app/products/product-list.component.html',
    styles: ['thead {color: #337AB7;}']})
```

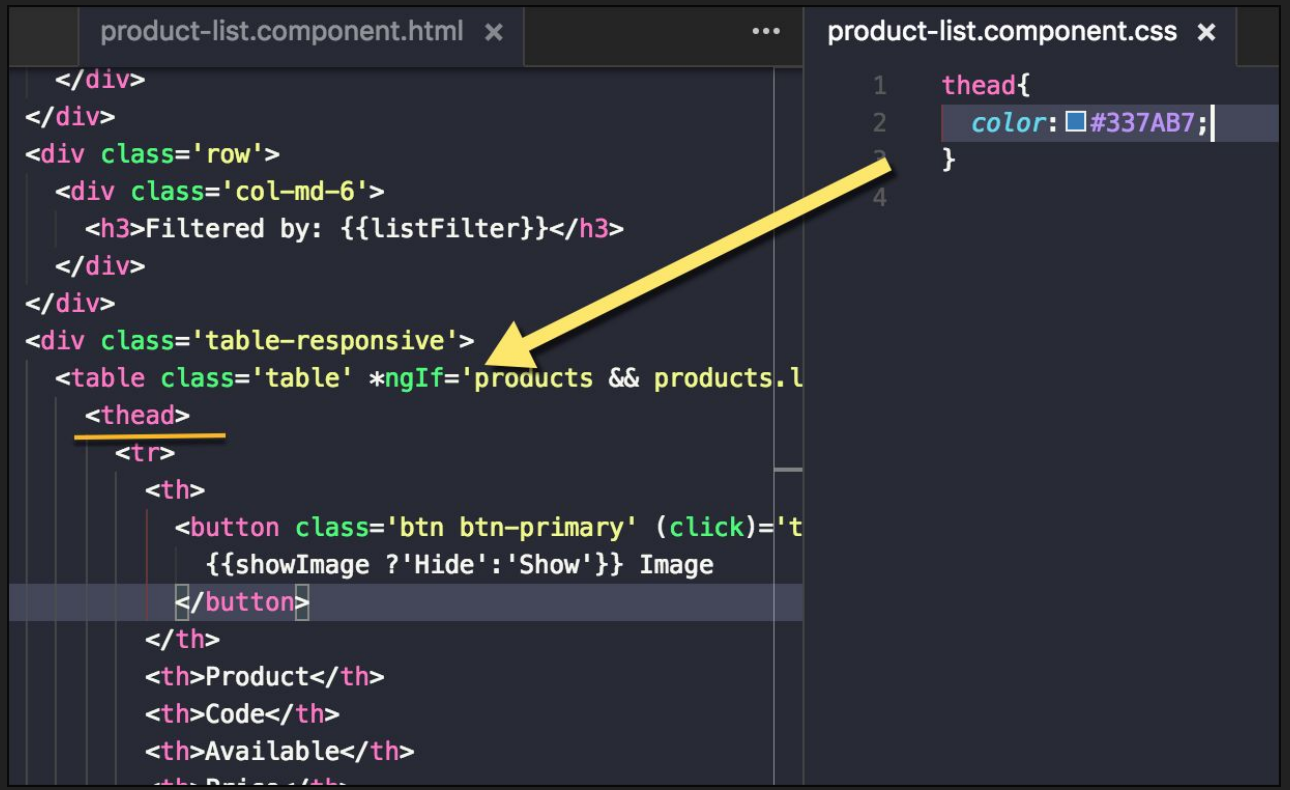
styleUrls

```
@Component({
    selector: 'pm-products',
    templateUrl: 'app/products/product-list.component.html',
    styleUrls: ['app/products/product-list.component.css']})
```

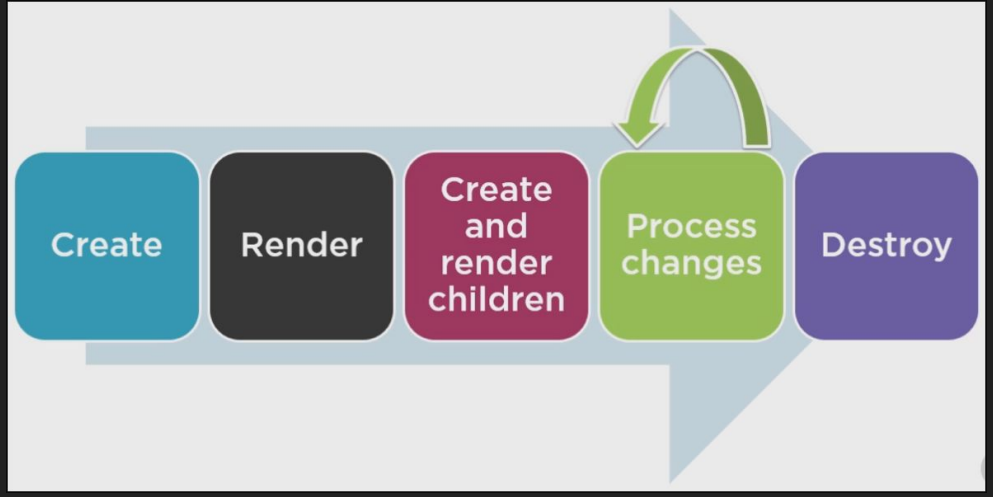
幫header加上color

新增product-list css

可以直接寫thead{ }
因為style sheet有被封裝
所以不會影響其他部分的
component



Component LifeCycle Hooks



component有生命週期(lifecycle)，由angular管理

- 建立
- 解析
- 建立及解析children
- 當data綁定的properties改變時要處理變動
- 把template從DOM移除前要destroy

看最常用的三個

OnInit:

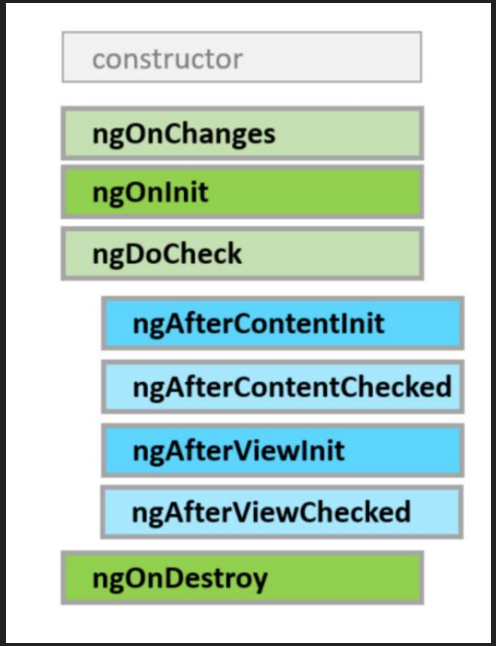
當angular初始化data-bound properties後
執行任何component初始化
=>適合從後端讀取資料給template

OnChange:

當data-bound input properties有改變時，可執行動作

OnDestroy:

detroy component前可進行清理動作

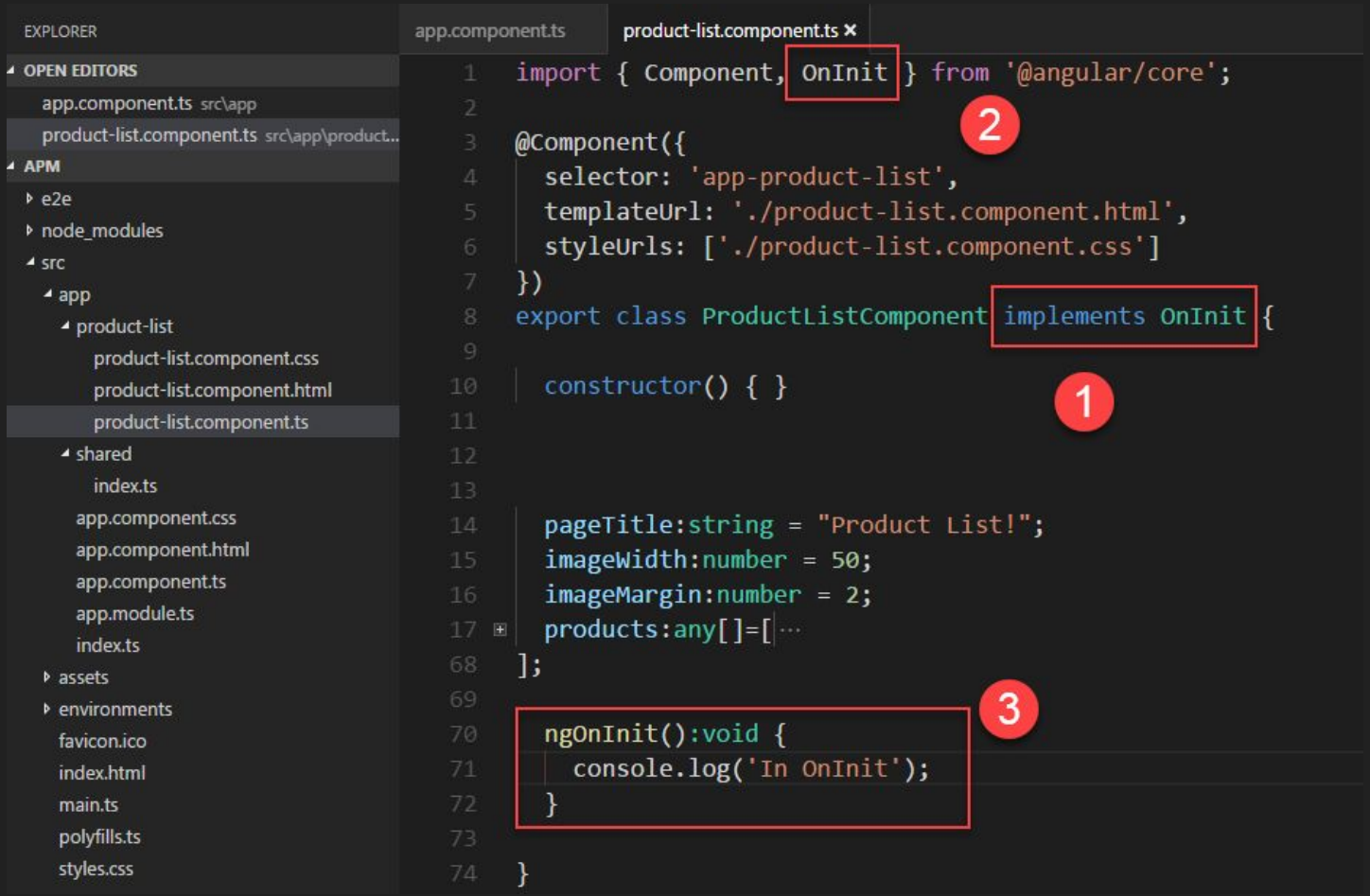


Angular有提供每個Lifecycle Hook對應的 interface供implement

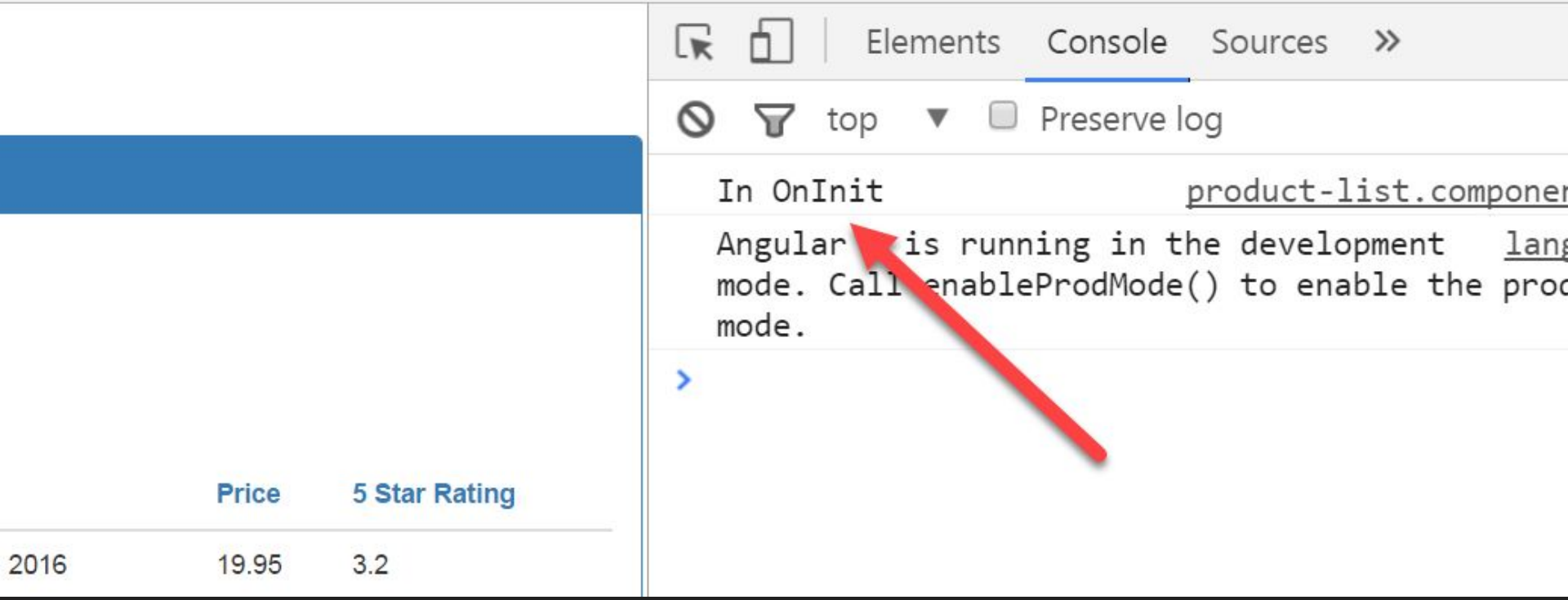
```
2 import { Component, OnInit } from 'angular2/core';

  export class ProductListComponent
1                   implements OnInit {
    pageTitle: string = 'Product List';
    showImage: boolean = false;
    listFilter: string = 'cart';
    products: IProduct[] = […];

3   ngOnInit(): void {
          console.log('In OnInit');
    }
  }
```

每個對應的interface都只定義一個method，名字為ngXXXX
如這邊的ngOnInit( )

＊LifeCycel interface不一定要實作，因為transpile後會不見
除非有要在LifeCycle hook處理事情


EXPLORER
app.component.ts
product-list.component.ts ×
OPEN EDITORS
app.component.ts src\app
product-list.component.ts src\app\product...
APM
e2e
node_modules
src
app
product-list
product-list.component.css
product-list.component.html
product-list.component.ts
shared
index.ts
app.component.css
app.component.html
app.component.ts
app.module.ts
index.ts
assets
environments
favicon.ico
index.html
main.ts
polyfills.ts
styles.css
import { Component, OnInit } from '@angular/core';
@Component({
selector: 'app-product-list',
templateUrl: './product-list.component.html',
styleUrls: ['./product-list.component.css']
})
export class ProductListComponent implements OnInit {
constructor() { }
pageTitle:string = "Product List!";
imageWidth:number = 50;
imageMargin:number = 2;
products:any[]=[
];
ngOnInit():void {
console.log('In OnInit');
}
}
1
2
3

驗證


Elements
Console
Sources
top
Preserve log
In OnInit
product-list.componer
Angular is running in the development
lang
mode. Call enableProdMode() to enable the prod
mode.
Price
5 Star Rating
2016
19.95
3.2

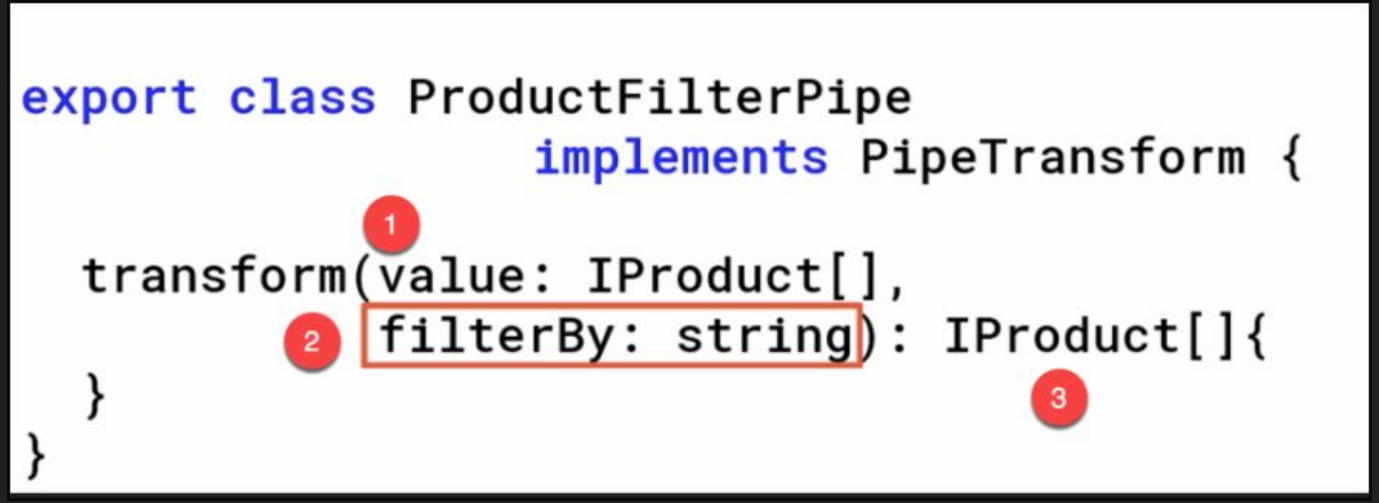
Transforming Data with Pipes

需求:

使用者在input field輸入字串後

用來過濾product array

=>透過pipe實作



class implements PipeTransform interface

-只有一個 transform method

(1)要過濾的array

(2)使用者輸入的string

(3)回傳過濾後的array

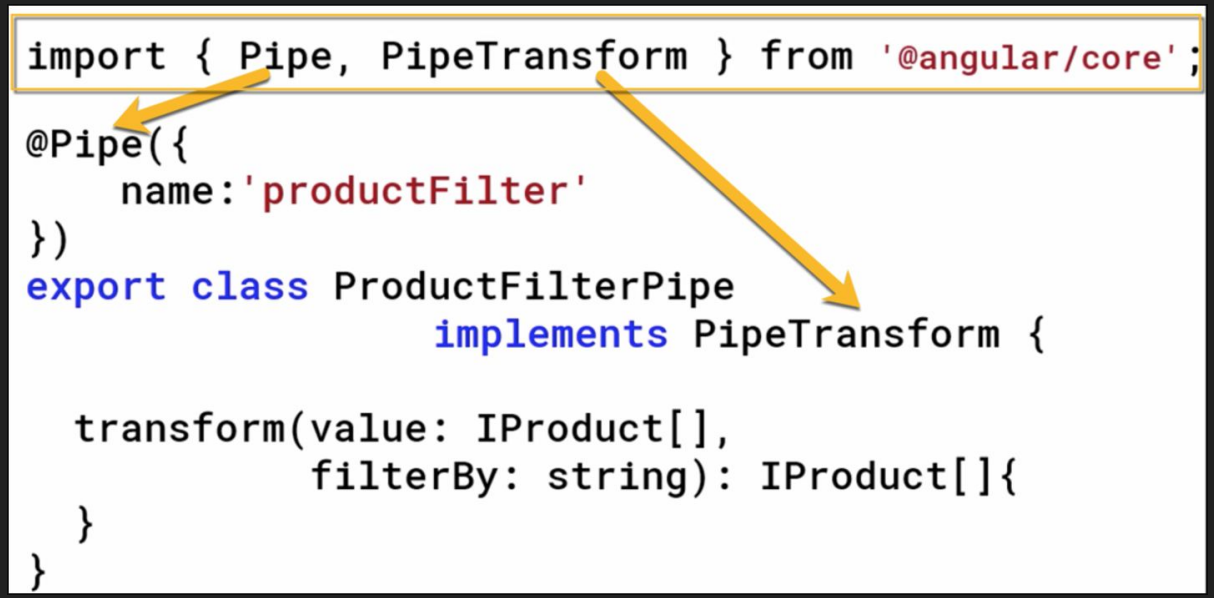
加上@Pipe decorator，讓此class變成pipe

```
@Pipe({
    name:'productFilter'
})
export class ProductFilterPipe
                implements PipeTransform {

  transform(value: IProduct[],
            args: string[]): IProduct[]{
  }
}
```

設定pipe的名稱:

name: productFilter是要在template中去使用

從@angular/core import



是否與component很像？

angular提供一致性的style

使用piple

Template

```
<tr *ngFor ='let product of products | productFilter: listFilter'>
```

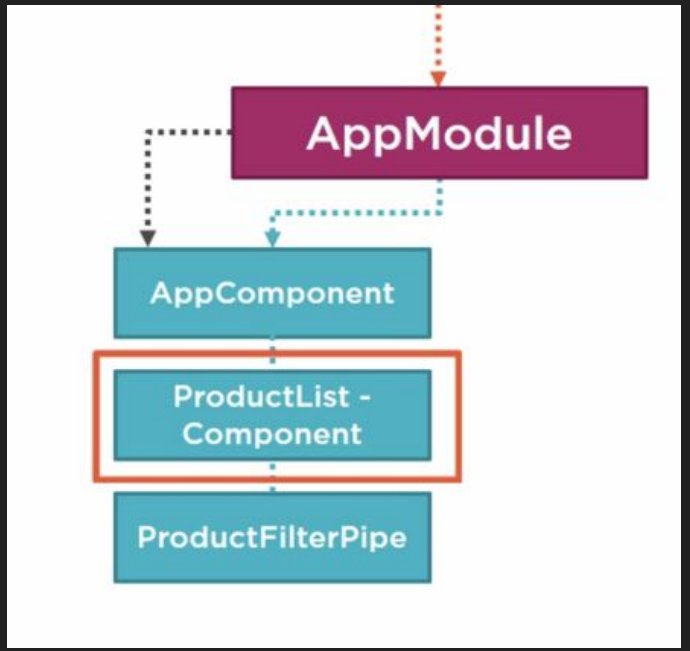
products會做為 productFilrer中的transform method第一個參數
listFilter是transform method的第二個參數，對應user輸入的string

告訴angular去哪找這個pipe

因為是product list component要使用

其屬於AppModule

所以一樣去AppModule宣告



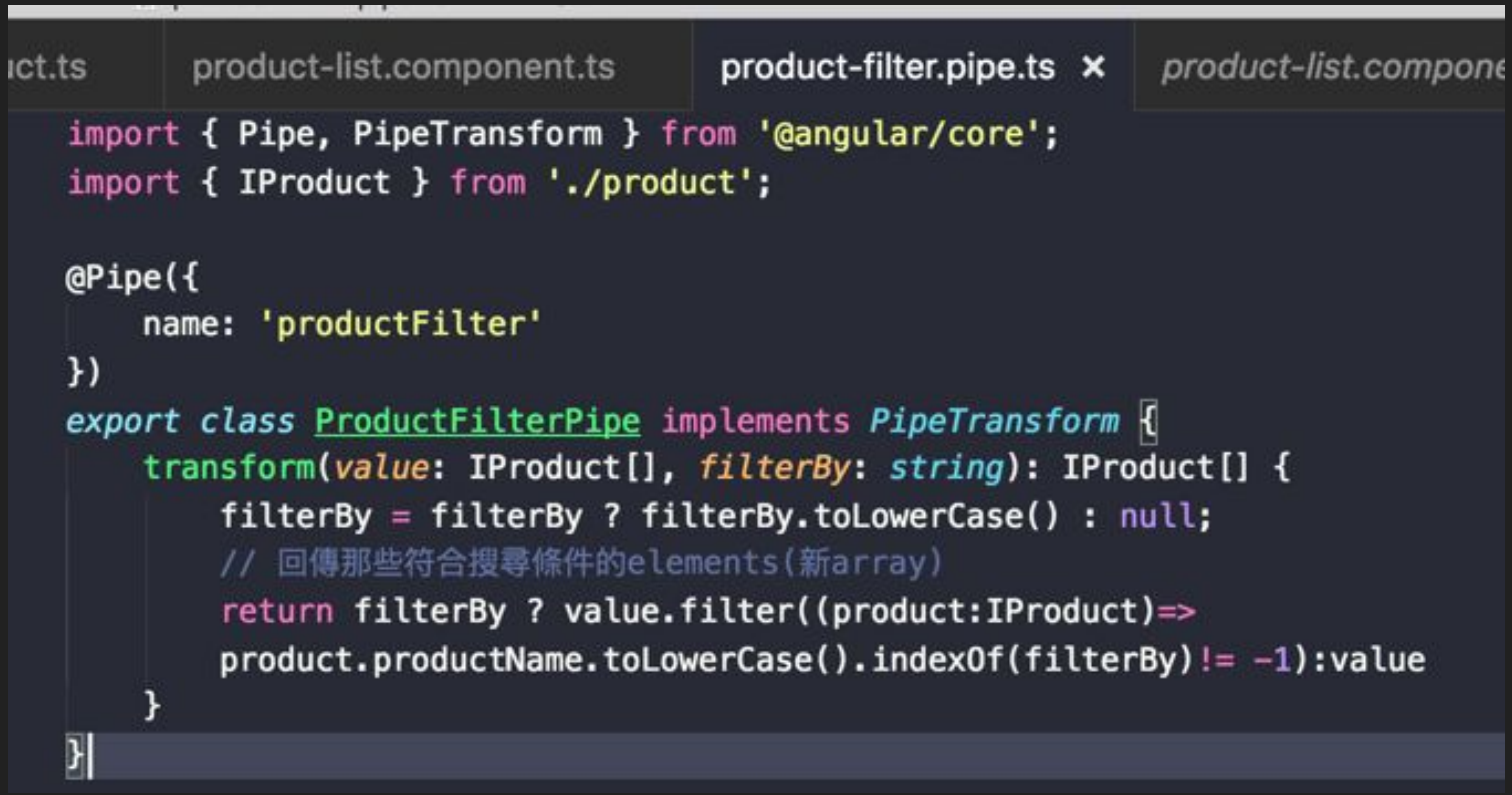
Module

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

輸入ng g pipe product-filter

```
kuolundeMacBook-Pro:demo1211 kuolun$ ng g pipe product-filter
Could not start watchman; falling back to NodeWatcher for file
 system events.
Visit http://ember-cli.com/user-guide/#watchman for more info.
installing pipe
  create src/app/product-filter.pipe.spec.ts
  create src/app/product-filter.pipe.ts
```

user輸入string後，用來過濾products array

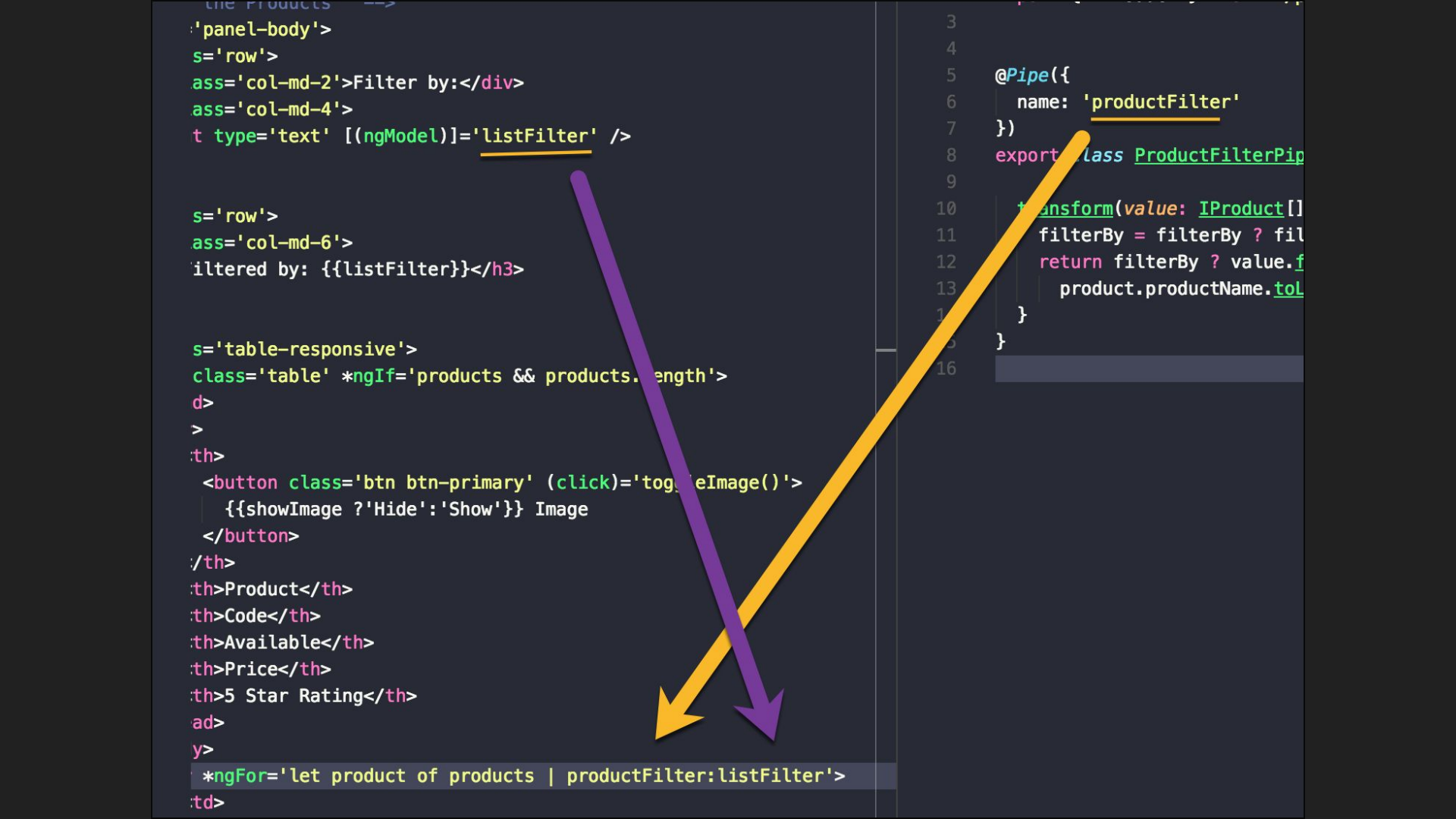


```
transform(value: IProduct[], filterBy: string): IProduct[] {
  filterBy = filterBy ? filterBy.toLocaleLowerCase() : null;
  return filterBy ? value.filter((product: IProduct) =>
    product.productName.toLocaleLowerCase().indexOf(filterBy) !== -1) : value;
}
```

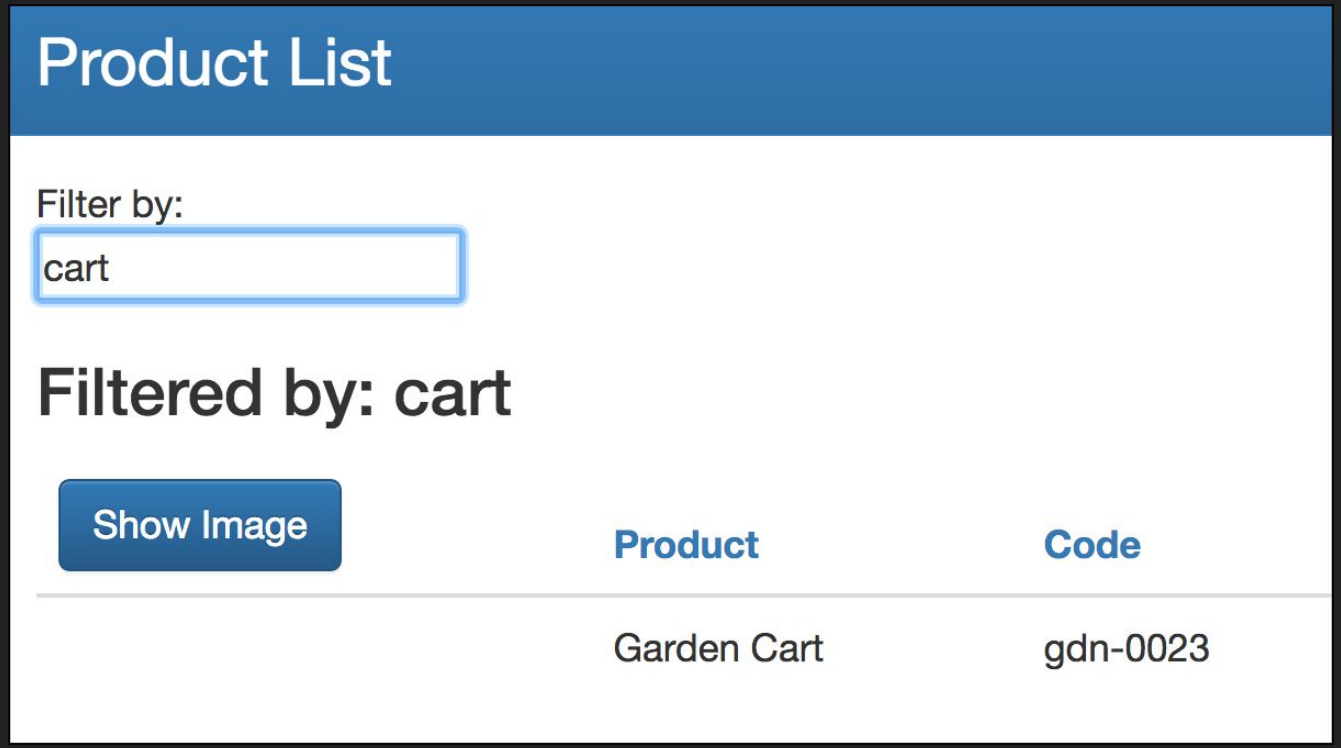
string.indexOf(searchString) 回傳第一個找到的位置

找不到則回傳-1

array.filter => 回傳符合callback fn內條件的那些elements組成的新array


'panel-body'>
s='row'>
ass='col-md-2'>Filter by:
ass='col-md-4'>
t type='text' [(ngModel)]='listFilter' />
s='row'>
ass='col-md-6'>
iltered by: {{listFilter}}</h3>
s='table-responsive'>
class='table' *ngIf='products && products.length'>
d>
>
th>
<button class='btn btn-primary' (click)='toggleImage()'>
{{showImage ?'Hide':'Show'}} Image
</button>
/th>
th>Product</th>
th>Code</th>
th>Available</th>
th>Price</th>
th>5 Star Rating</th>
ad>
y>
*ngFor='let product of products | productFilter:listFilter'>
td>
@Pipe({
name: 'productFilter'
})
export class ProductFilterPip
transform(value: IProduct[]
filterBy = filterBy ? fil
return filterBy ? value.f
product.productName.toL
}
}

測試


Product List
Filter by:
cart
Filtered by: cart
Show Image
Product
Code
Garden Cart
gdn-0023

記得要到ngModuel import

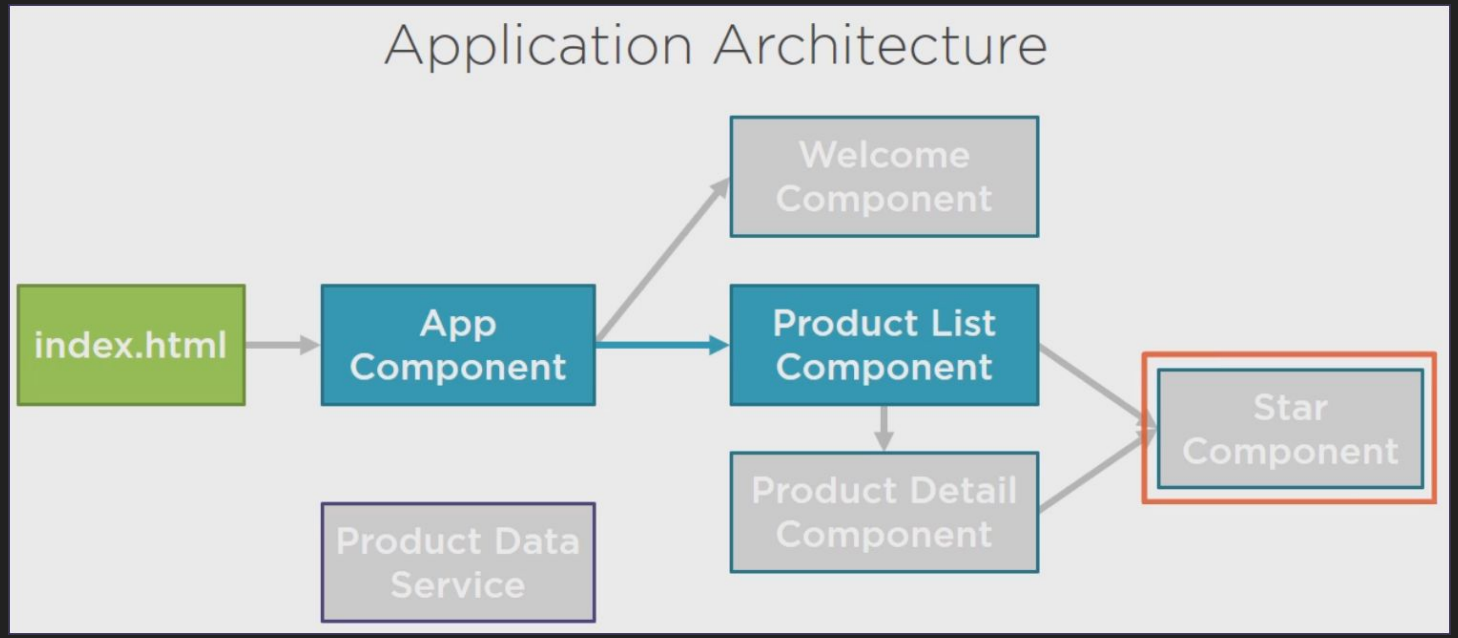
```
import { ProductFilterPipe } from './product-filter.pipe';

@NgModule({
  declarations: [
    AppComponent,
    ProductListComponent,
    ProductFilterPipe
  ],
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule
  ],
```

用angular cli建立pipe時會自動幫我們加好

product-list.component.html | product-filter.pipe.ts × | Extension: beautify | produ

```ts
import { Pipe, PipeTransform } from '@angular/core';
import { IProduct } from './product';

@Pipe({
  name: 'productFilter'
})
export class ProductFilterPipe implements PipeTransform {

  transform(value: IProduct[], args: string): IProduct[] {
    let filter:string = args?args.toLocaleLowerCase():null;
    return filter ? value.filter((product:IProduct) =>
      product.productName.toLocaleLowerCase().indexOf(filter) !== -1):value;
  }

}
```

完成Product List Component



Service and Dependency Injection

Service

component很好用

但data/logic如果與view無關

或是我們想要跨component去分享時

要怎麼處理？

Service

有特定目的的class

有幾項特點:

- 獨立於其他component
- 提供共享的data/logic給其他component
- 封裝外部的互動(如取得資料)

程式容易test, debug, reuse

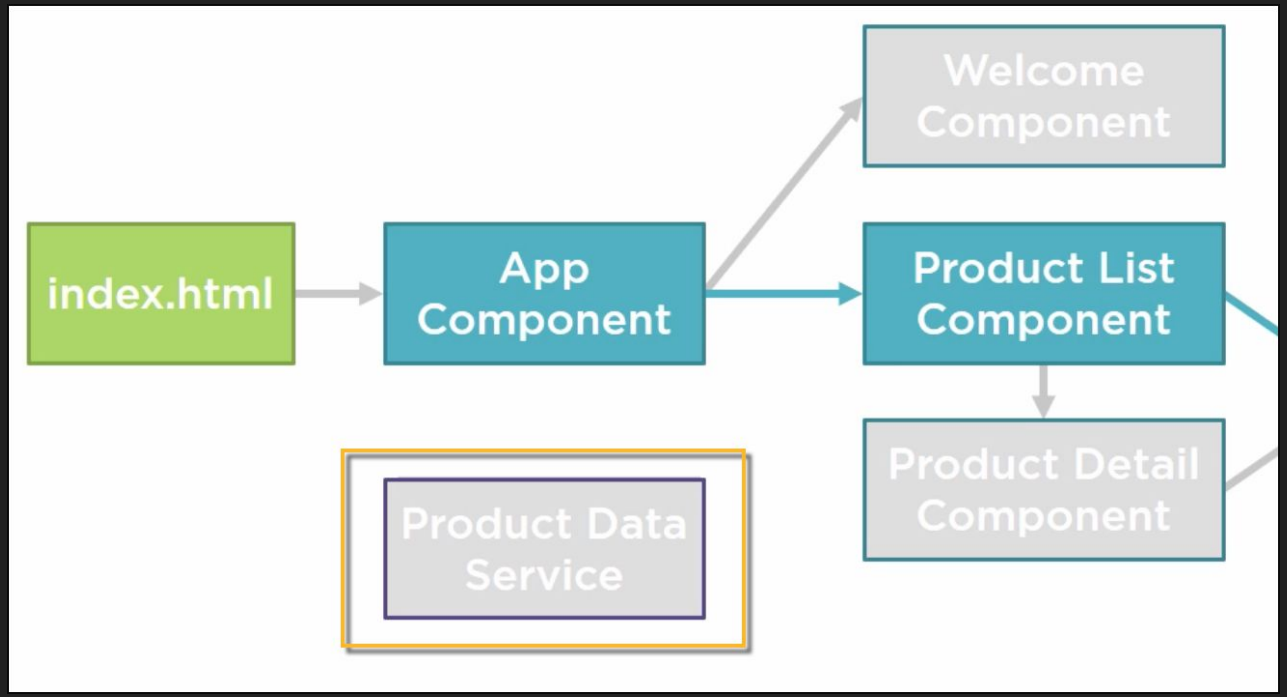
目標

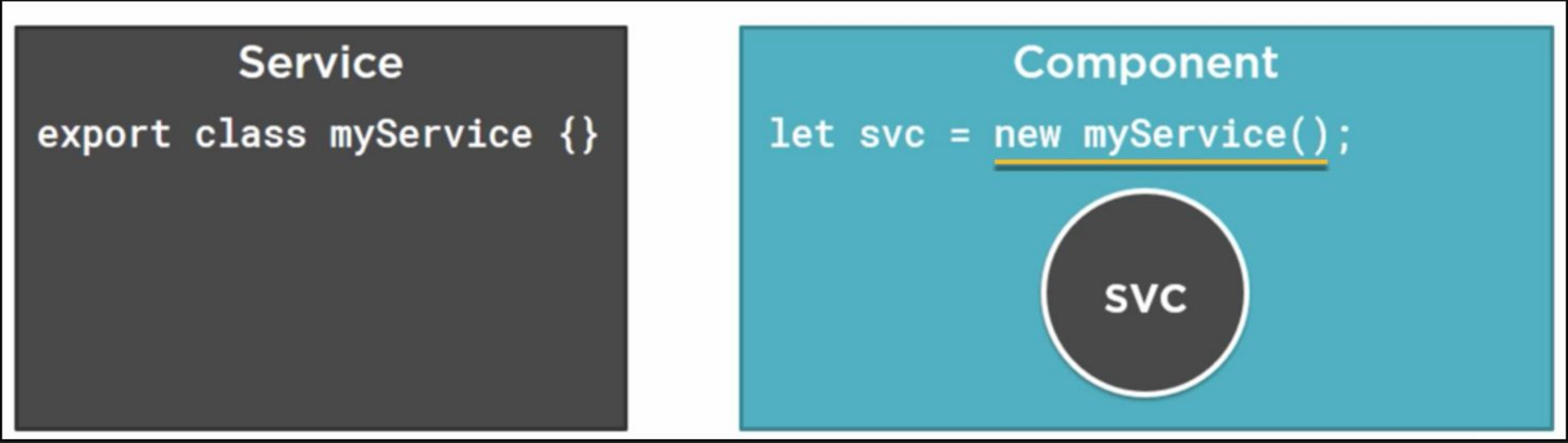
要建立一個service

需要此service的component

要使用dependency injection

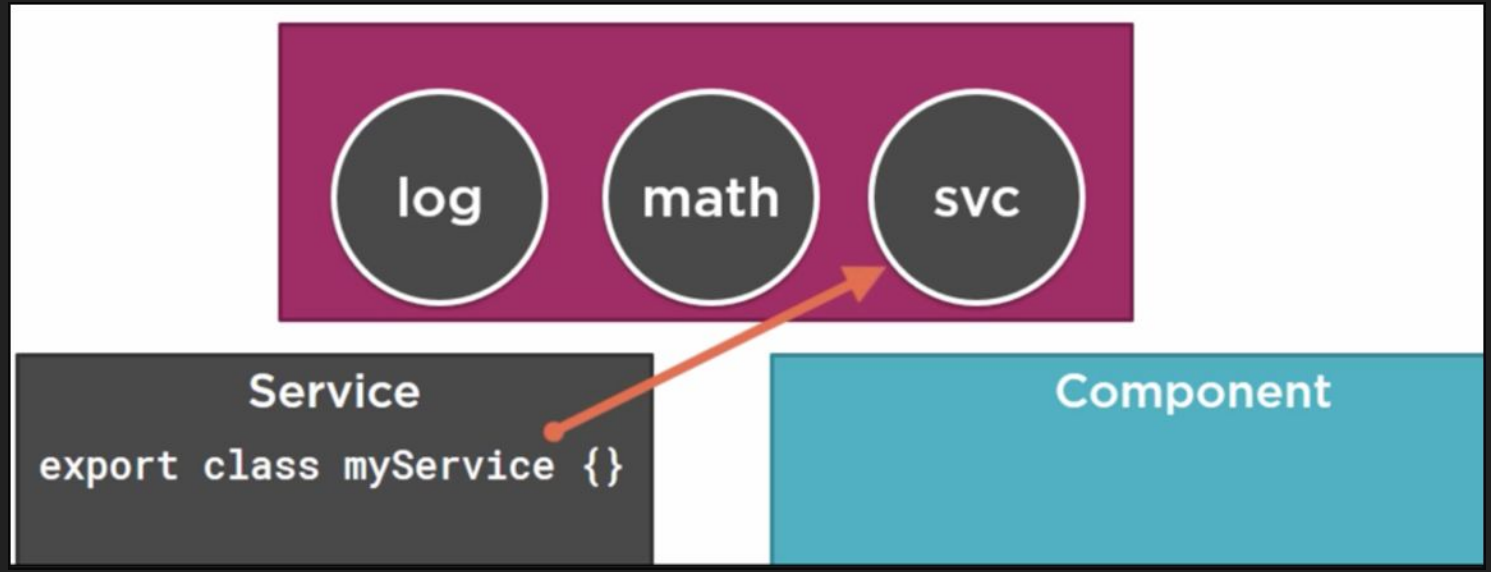
建立product data service





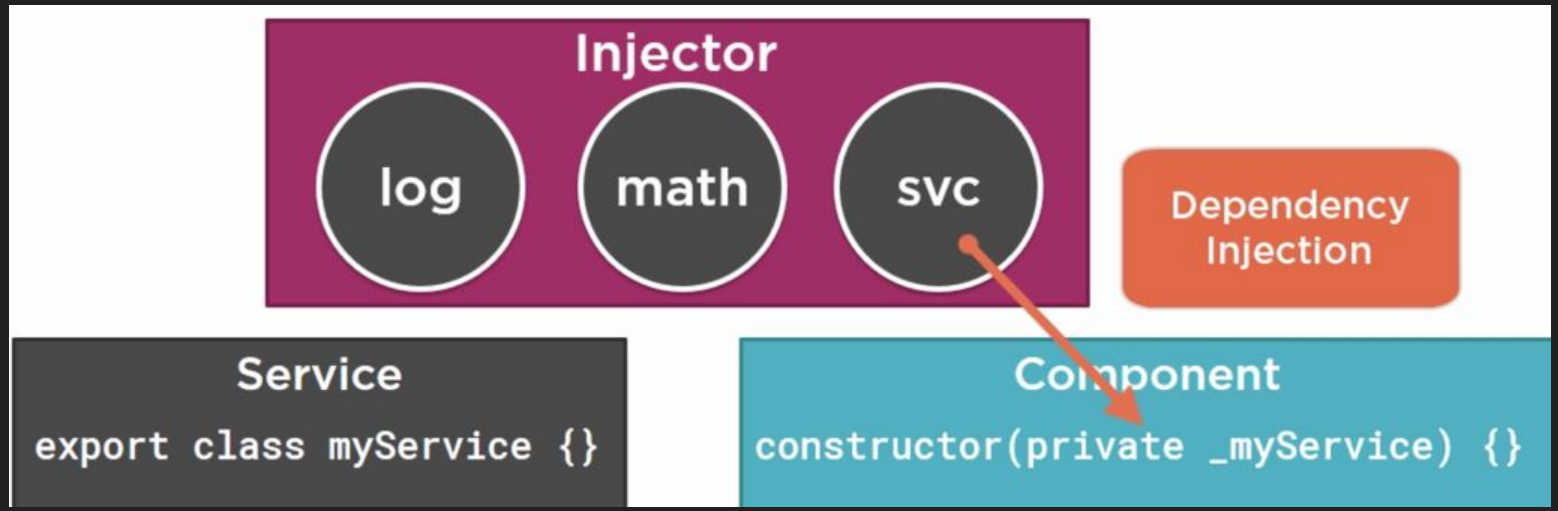
如果直接new一個service class
會拿到instance，但是這會是local to the component

無法share data且難以測試



可以改向angular的injector註冊，angular會產生service的單一instance

稱為 singleton



Injector會管理這些instance，當Compoent有定義service做為dependency

在instantiate Component時，angular會inject service [即Dependecy Injection]

因為由angular管理service instance，所以其內的data/logic可以分享給使用這個instance的 classes

Dependency Injection

一種coding pattern
class從外部來源接收所需的object instance
(稱為dependencies)
而不是自己建立

＊這邊外部來源是Angular Injector

建立一個Service

(1)建立service class

(2)用decorator定義metadata

(3)import

product.service.ts

```
import { Injectable } from '@angular/core'

@Injectable()
export class ProductService {

  getProducts(): IProduct[] {
  }

}
```

(1) export
(2) @Injectable( )
(3) import

ng g service product

```
kuolundeMacBook-Pro:demo1211 kuolun$ ng g service product
Could not start watchman; falling back to NodeWatcher for file
 system events.
Visit http://ember-cli.com/user-guide/#watchman for more info.
installing service
  create src/app/product.service.spec.ts
  create src/app/product.service.ts
```

幫service向injector註冊

向 provider 註冊

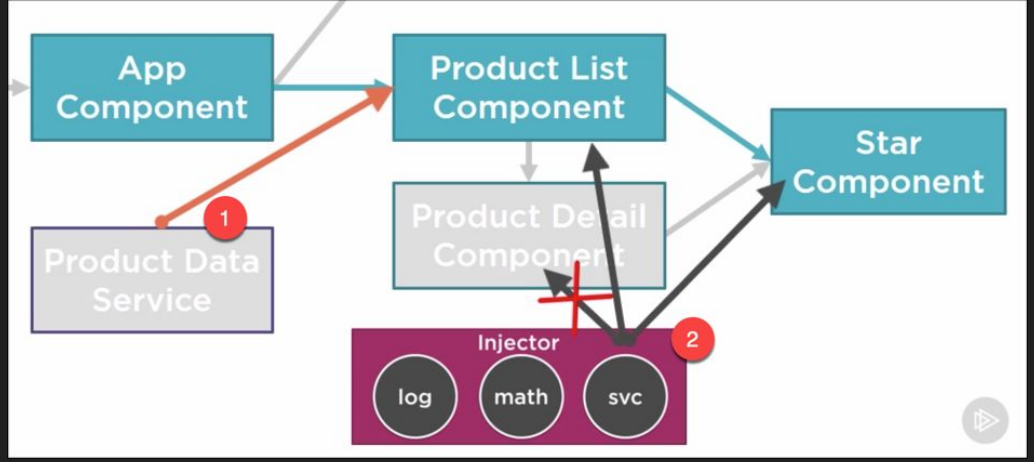
provider可以建立或回傳service

一般來說會是service class本身

定義在component內或Angular module metadata

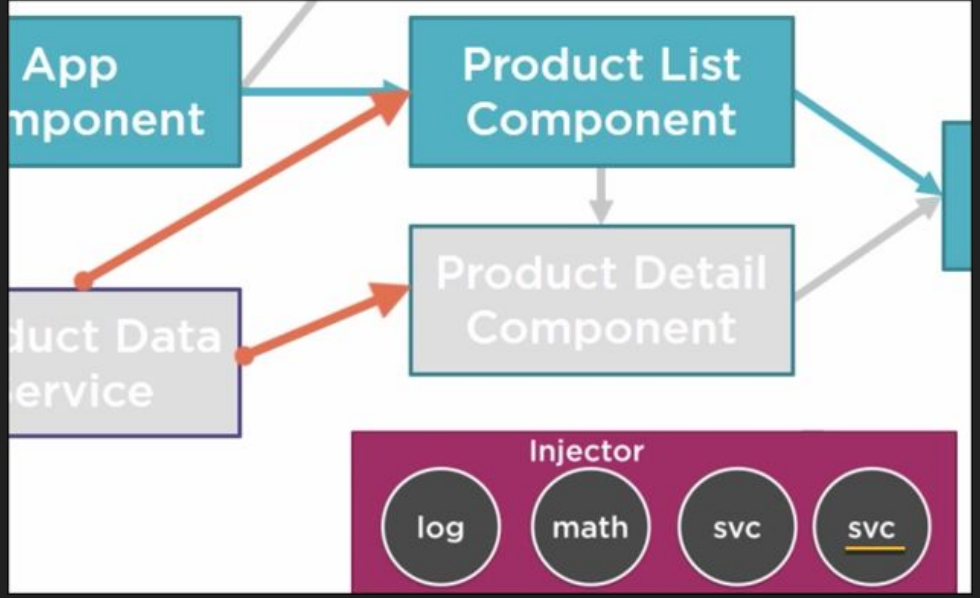
註冊在component內 :可以inject到component及其children

註冊在Angular module: 可以inject 到 app任何地方

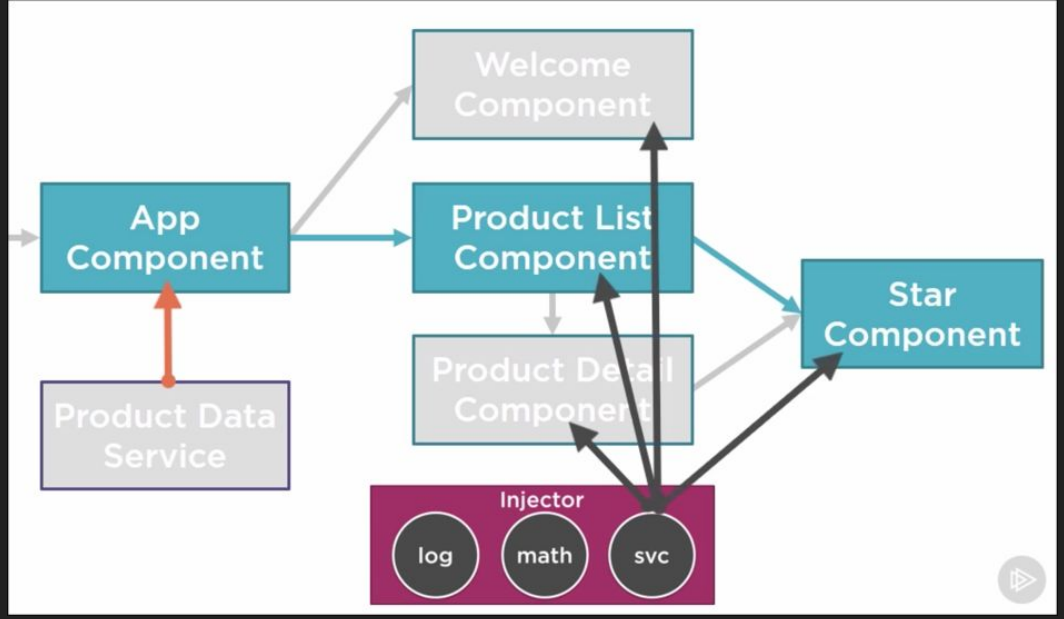


(1)如果service註冊在product list component
(2) 可以Inject到
-product list
-star(children)

但不能inject到product detial (非children)



要讓service也可inject到product detail的話
可以用service也註冊到product detail
但這樣會產生兩個service instance, 就不會是singleton了！



如果service註冊到root component (紅箭頭)
則instance可inject到任何component

以這個情況
我們要register到root component (AppComponent)

註冊provider

app.component.ts

```
...
import { ProductService } from './products/product.service';

@Component({
  selector: 'pm-app',
  template: `
    <div><h1>{{pageTitle}}</h1>
      <pm-products></pm-products>
    </div>
    `
  providers: [ProductService]
})
export class AppComponent { }
```

在appComponent要註冊provider (用來建立service)
新增一個 providers property 為array
把要註冊的service放進去

(可註冊多個)

app.component.ts

```
1  import { Component } from '@angular/core';
2  import { ProductService } from './product.service';
3
4  @Component({
5    selector: 'app-root',
6    templateUrl: './app.component.html',
7    styleUrls: ['./app.component.css'],
8    providers: [ProductService]
9  })
10 export class AppComponent {
11   title = 'Angular2 is awesome!!';
12 }
```

在app.component.ts

import ProductService並新增一providers property

這樣service instance就可以inject到AppComponent及其child component了

Dependency Injection

Inject Service

constructor( )
在class被建立實體時(component)
會執行

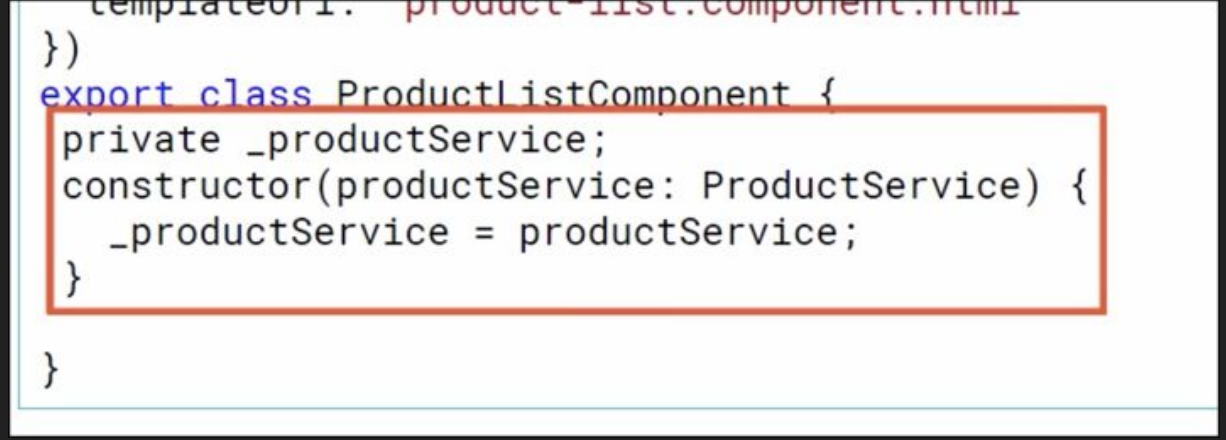
如果沒有定義
會自動執行隱含的constructor( )

所以service可放在這邊去inject

＊constructor是用來初始化 component
所以code越少越好，不要放會花時間的code

product-list.component.ts

```
@Component({
  selector: 'pm-products',
  templateUrl: 'product-list.component.html'
})
export class ProductListComponent {

  constructor() {
  }

}
```



(1)定義 private variable

(2)constructor fn會接收productService參數

當constructor被執行時，injector會把參數(productService)設定為要求的Service instance(ProductService的instance)

(3)把injected service instence(productService)指派給local variable(_productServire)

就可在class內使用_productServire去存取service的properties/method

比較簡潔的寫法

```
export class ProductListComponent {

 constructor(private _productService: ProductService) {
 }

}
```

(Demo)　product-list.component.ts

product list component不需寫provider

因為service已經註冊在app component (parent)

```
constructor(private _productService: ProductService){

}
```

所以只需要constructor fn (通常寫在所有prop之後)

```
import { IProduct } from './product';
import { ProductService } from './product.service';
```

(1)inject product service

(2)import service

(3)使用serviec的method取資料

(4)把hard code的product拿掉

(5)把filter條件拿掉

＊抓資料的動作通常不會放在constructor，所以改放到ngOnInit( )

mponent.ts | product-list.component.ts × | app.module.ts

```ts
import { Component, OnInit } from '@angular/core';
import { IProduct } from './product';
import { ProductService } from '../product.service';

@Component({
    selector: 'app-product-list',
    templateUrl: './product-list.component.html',
    styleUrls: ['./product-list.component.css']
})
export class ProductListComponent implements OnInit {

    pageTitle: string = "Product List";
    imageWidth: number = 50;
    imageMargin: number = 2;
    showImage: boolean = false;
    listFilter: string;
    products: IProduct[];

    toggleImage(): void {
        // alert('click');
        this.showImage = !this.showImage;
    }

    constructor(private _productservice: ProductService) { }

    ngOnInit() {
        console.log('OnInit!');
        this.products = this._productservice.getProducts();
    }

}
```

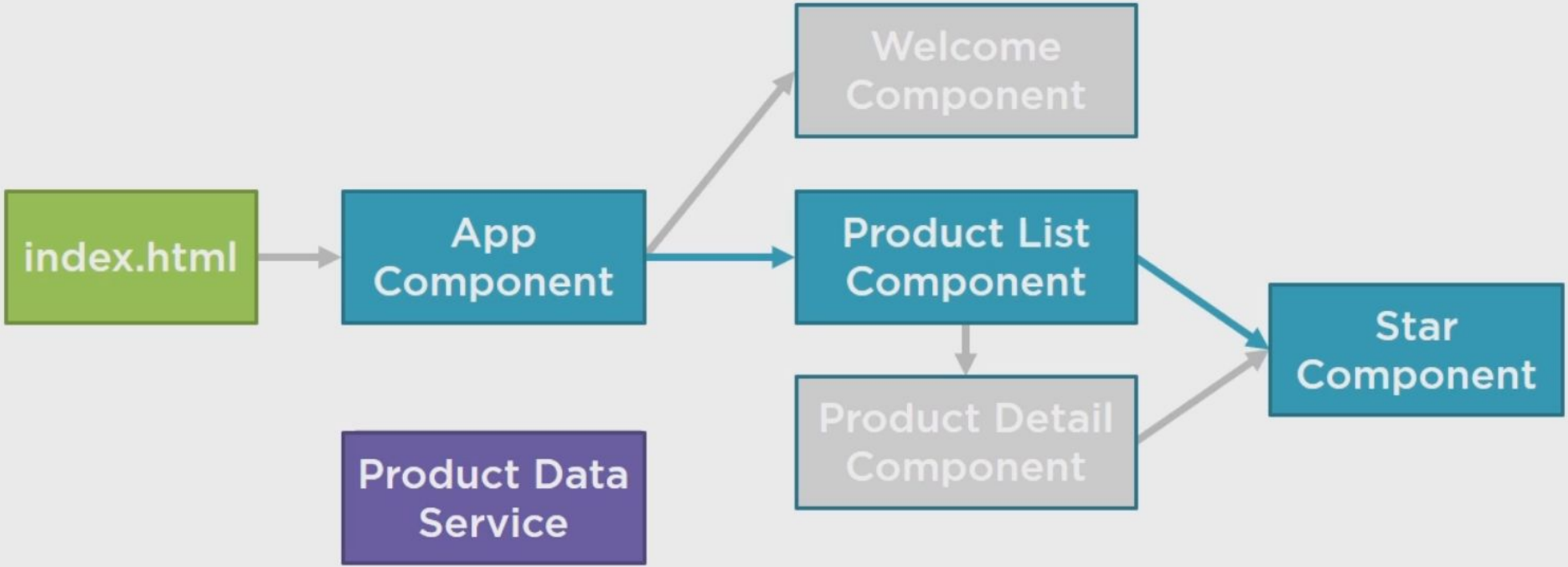
2 5 4 1 3

資料還是存在

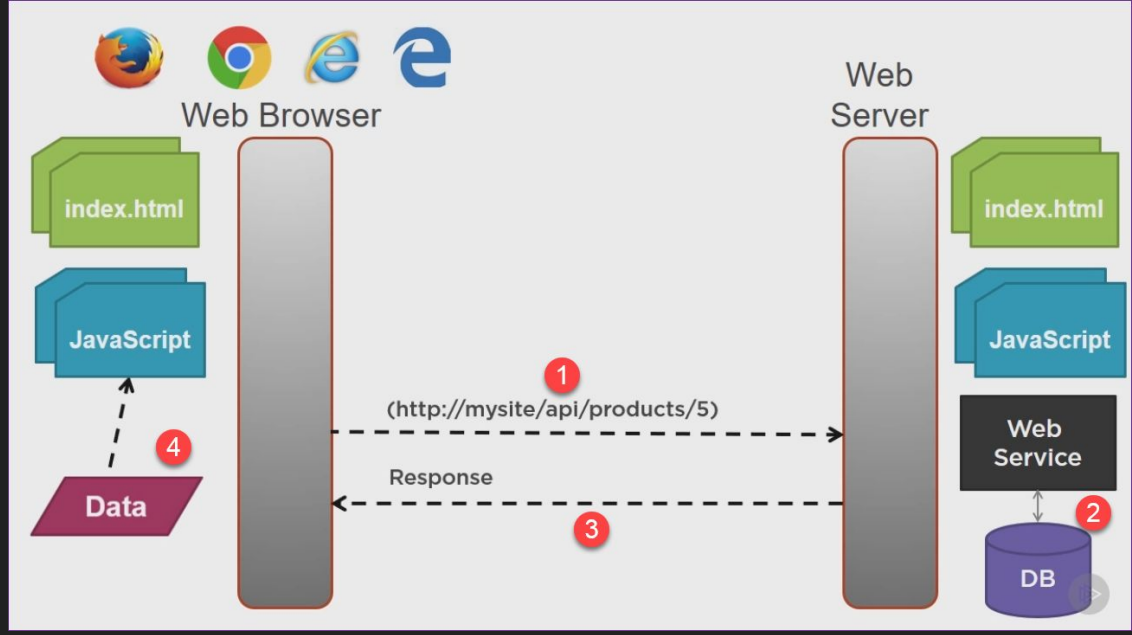
Show Image

Product	Code
Leaf Rake	gdn-0011
Garden Cart	gdn-0023
Hammer	tbx-0048
Saw	tbx-0022
Video Game Controller	gmg-0042

Application Architecture

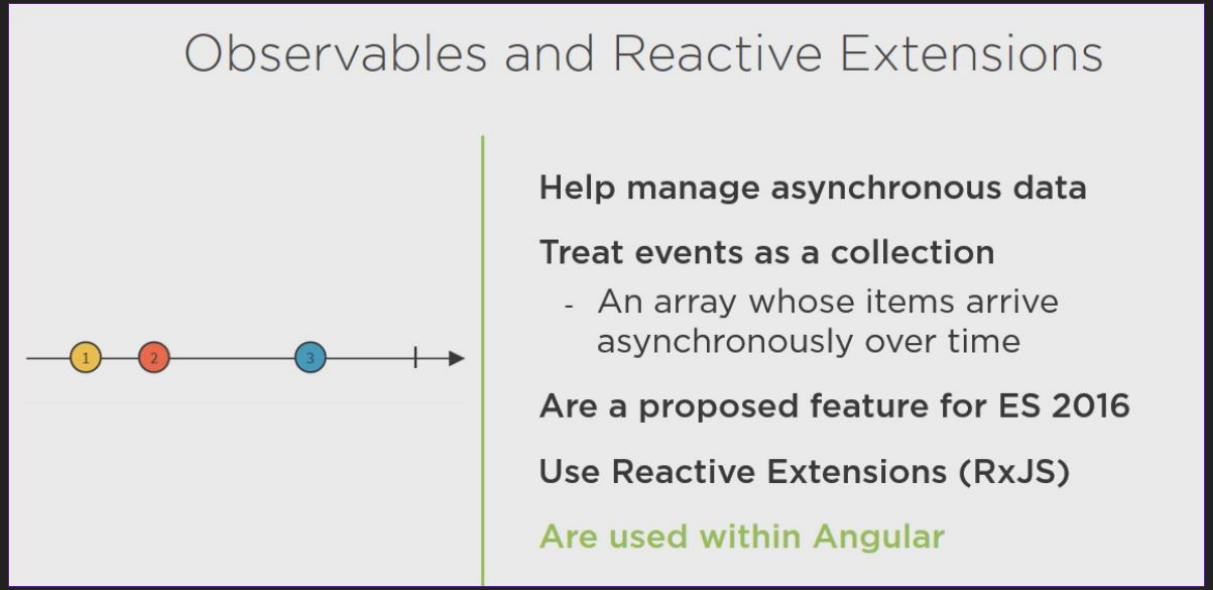


Retriving Data using HTTP



(1)application發出get HTTP request到Web Service
(2)從DB取出資料後
(3)透過HTTP response回傳資料給application
(4)application處理data

Observable



(1)幫助處理非同步資料

(2)把events視為collection

- array的item隨著時間非同步的抵達

(3)是ES7的功能

(4)使用RxJS

(5)Angular內部有使用(含ag的event system跟http client service)

Observable Operators

Methods on observables that compose new observables

Transform the source observable in some way

Process each value as it is emitted

Examples: map, filter, take, merge, ...

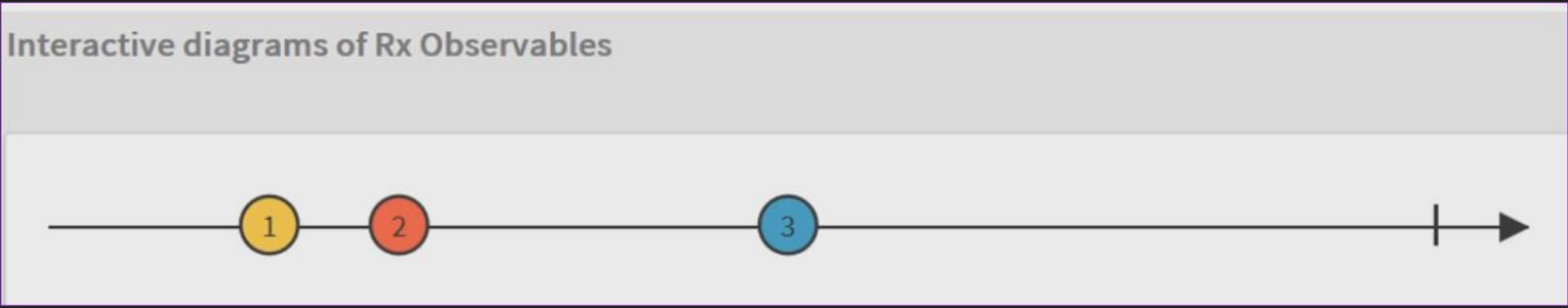
(1)Operator就是在observable上的method，用來產生新的observable
(2)把來源observable用某種方式轉換
(3)當value被emit時才處理
(4) 如 map/ filter/ take /merge

Data sequesce有很多形式

- backend service的response
- 一串系統的notifications
- 一串events (如user input)

RxJS把data sequence稱為observable sequence (簡稱 an observable)

下面圖包含三個elements



我們code裡面的method

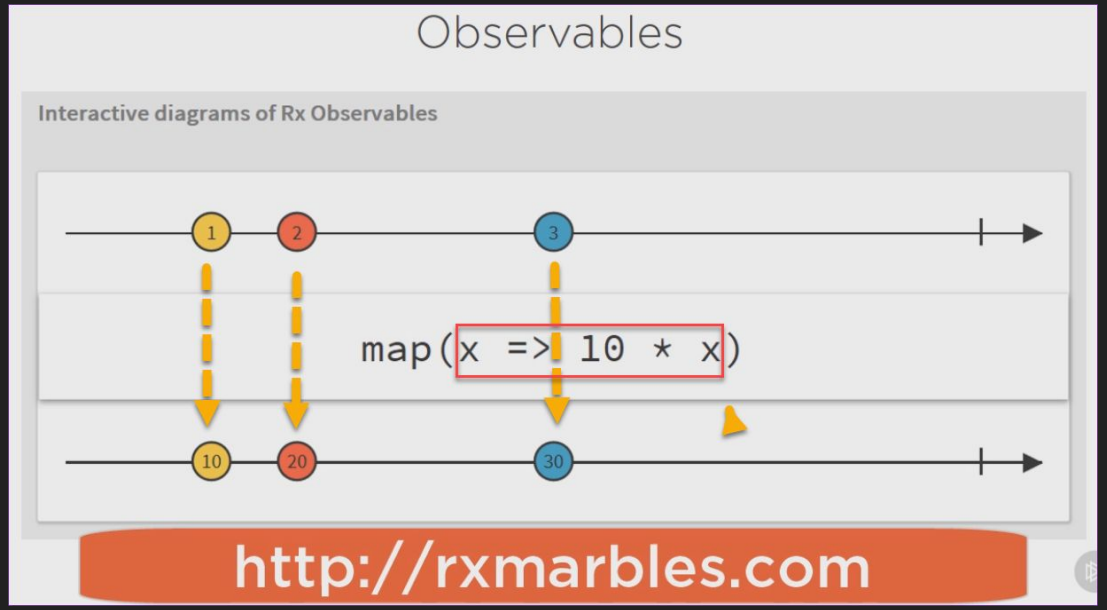
可以訂閱(subscribe) observable

當有data非同步抵達時

我們就會收到通知

method就可以對push給它的

data做出反應



(沒有更多data/或發生error時也會收到通知)

operator會對data item做出轉換(如把x都乘以10)　上圖稱為**marble diagrams**

Promise與Observable比較

Lazy: observable只有在被subscribe時才會emit

＊呼叫http時也可用promise(但這邊會用observable)

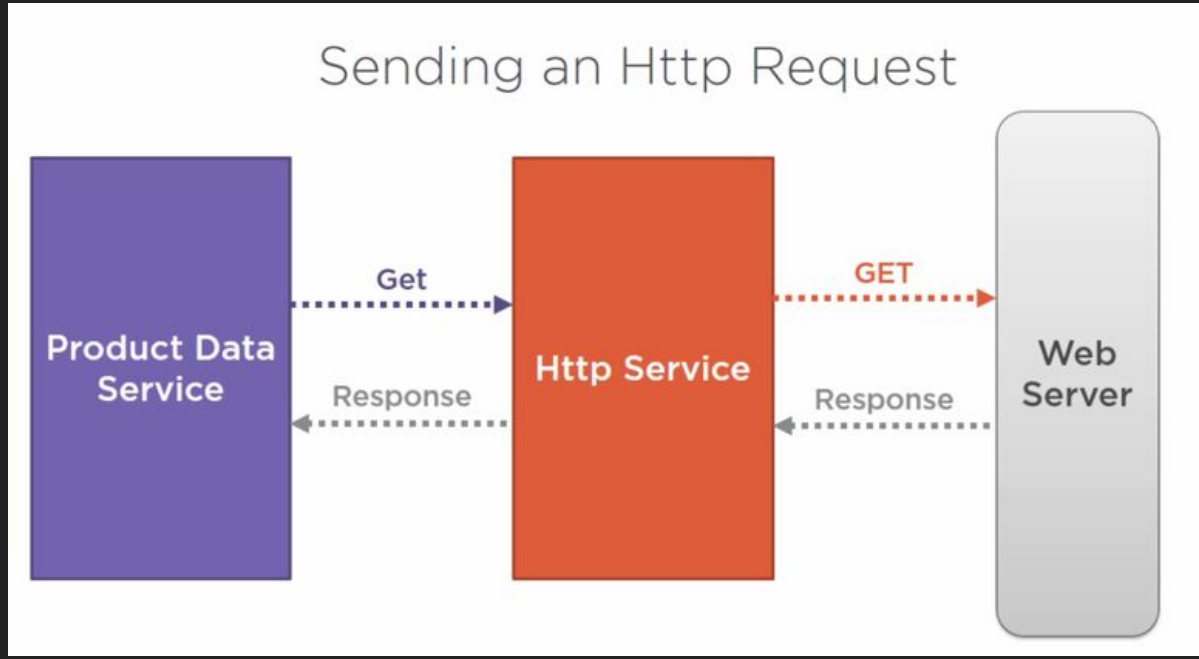
Promise	Observable
Provides a single future value	Emits multiple values over time
Not lazy	Lazy
Not cancellable	Cancellable
	Supports map, filter, reduce and similar operators

讓service從後端Web Server取資料

angular提供
HTTP service讓我們可以
跟後端server溝通

使用HTTP request/response
protocol

呼叫HTTP service的get method
會接著送出get request到
web server



web server response會被HTTP Service
以Observable形式回傳給product data service

送出HTTP Request

_productUrl
是要送出request的地方
(web server)

constructor
用來inject dependency
(必須先註冊provider)
inject Angular Http service
(建立_http變數，並把Http service instance指派給它)

this._http.get
使用_http指向
傳進來service的
instance

product.service.ts

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



@Injectable()
export class ProductService {
  private _productUrl = 'www.myWebService.com/api/products';

  constructor(private _http: Http) { }

  getProducts() {
   return this._http.get(this._productUrl);

  }
```

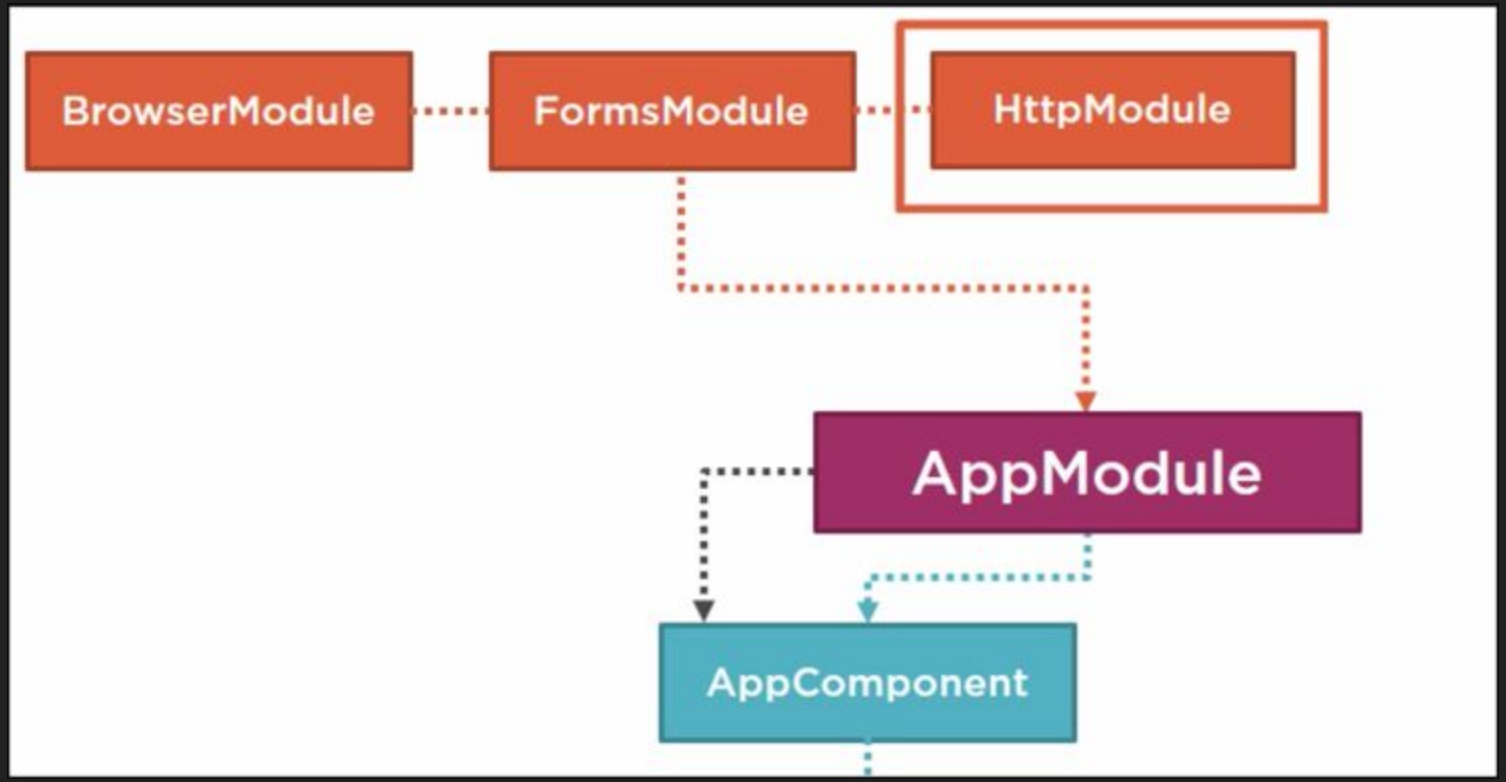
使用Http需要import HttpModule

imports array加入外部module HttpModule

*impors array放的是AppModule會用到的外部module

app.module.ts

```
...
import { HttpModule } from '@angular/http';

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


BrowserModule
FormsModule
HttpModule
AppModule
AppComponent

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

```
private _productUrl = 'www.myWebService.com

constructor(private _http: Http) { }

getProducts(): Observable<Response> {
 return this._http.get(this._productUrl);

}
```

getProducts( )的回傳type為
Observable<Response>
(因為_http.get會得到Observable，data type為HTTP response)

這邊的generic
定義Observable觀察(Observing)的Observable sequence中的data type
這個case是HTTP Response

＊HTTP call是一個single async operation
(代表observable sequence只會含有一個element：HTTP response object)

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

要import { Response }　(從@angular/http)

及

Observable　(從rxjs/Observable)

但getProducts( )要得的不是http response

Product-list component是期望拿到list of products =>轉換response obj成為array of products

product.service.ts

```
...
import { Http, Response} from '@angular/http';
import { Observable } from 'rxjs/Observable';
import 'rxjs/add/operator/map';   1

@Injectable()
export class ProductService {
  private _productUrl = 'www.myWebService.com/api/products';

  constructor(private _http: Http) { }   2

  getProducts(): Observable<IProduct[]> {
   return this._http.get(this._productUrl)
              .map((response: Response) => <IProduct[]>response.json());   3  4
  }
```

但我們期望拿到的是array資料

所以要用map operator來進行轉換

(1) import map (這邊是執行JS library去載入map，並沒真的import進來)

(3)_http.get會拿到observable，.map把emit出的http response obj用.json( )轉成json obejct

(4)再用casting <IProduct[ ]>把json obejct轉成an array of products

*如果資料包在data property中，則用response.json.data取得

.map會拿到另一個observable

(2)這時回傳的資料就可改寫是 IProduct array => Observable<IProduct[ ]>

```
...
import { Http, Response} from '@angular/http';
import { Observable } from 'rxjs/Observable';
import 'rxjs/add/operator/map';
```

這種寫法的import 跟平常不太一樣
告訴module loader去載入library但是沒有import任何東西進來

載入library會執行js
這邊的js會載入map operator

step1 import HttpModule

(Recall)
Angular在HttpModule
內註冊其http service provider

app.module.ts × product.service.ts

```
1  import { NgModule } from '@angular/core';
2  import { BrowserModule } from '@angular/platform-
3  import { FormsModule } from '@angular/forms';
4  import { HttpModule } from '@angular/http';
5
```

現在可以inject HTTP service

到任何需要它的class

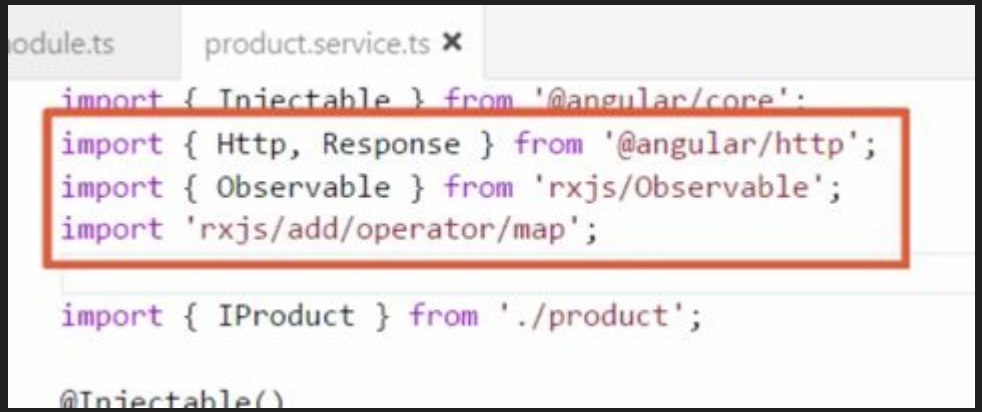
```
@NgModule({
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule
  ],
  declarations: [
    AppComponent,
    ProductListComponent,
```

step2- import Http , Response, Observable, map

import
@angular/http
Http - http client service
Response -http response

rxjs/Observable
Observable

map operator
利用特別語法載入operator, 但沒有import任何東西



step3 - 建立constructor來取得http client service

我們需要http client service instance

所以透過inject來取得

```
@Injectable()
export class ProductService {
    private _productUrl = 'api/products/products.json';

    constructor(private _http: Http){}

    getProducts(): IProduct[] {
```

這邊連到自己local的json (因為這樣不用建server)
如果要連web server, 就改這邊的URL

step4 - 使用operator轉換response object

但這邊寫完還不能測試, 因為還沒有subscribe這個Observable

```
@Injectable()
export class ProductService {
    private _productUrl = 'api/products/products.json';

    constructor(private _http: Http){}

    getProducts(): Observable<IProduct[]> {
        return this._http.get(this._productUrl)
            .map((response: Response) => <IProduct[]> response.json());
    }
}
```

Exception handling:
可能有invalid request / lost connection

product.service.ts

```
...
import 'rxjs/add/operator/do';
import 'rxjs/add/operator/catch';
...

  getProducts(): Observable<IProduct[]> {
   return this._http.get(this._productUrl)
                .map((response: Response) => <IProduct[]>response.json())
                .do(data => console.log('All: ' + JSON.stringify(data)))
                .catch(this.handleError);
  }

  private handleError(error: Response) {
  }
```

(1) import do跟catch operator

(2) do可以看傳回來的data =>可用來debug

(3) .catch可以傳入錯誤處理fn，有錯誤時，會傳入error response object

handleError method

(1)把error印出
(2)回傳錯誤給呼叫的人

```
private handleError(error: Response) {
    console.error(error);
    return Observable.throw(error.json().error || 'Server error');
}
```

do method

```
getProducts(): Observable<IProduct[]> {
    return this._http.get(this._productUrl)
        .map((response: Response) => <IProduct[]> response.json())
        .do(data => console.log('All: ' +  JSON.stringify(data)))
        .catch(this.handleError);
}
```

可窺看response data

並用JSON.stringfy美化

訂閱 Observable

訂閱(subscribe) Observable

```
x.then(valueFn, errorFn)                          //Promise
x.subscribe(valueFn, errorFn)                     //Observable
x.subscribe(valueFn, errorFn, completeFn)         //Observable
let sub = x.subscribe(valueFn, errorFn, completeFn)
```

第1行x是promise，透過then可取得x的結果，2個參數函數分別處理完成及錯誤情況

第2行x是observable，只把then改成subscribe
因為observable隨時間處理多個value，每當value emit時，就會呼叫valueFn
有第3個optional completeFn，Observable完成時會呼叫

subscribe回傳的是subscription obeject，可用來cancel subscribe (unsubscribe)

抓產品資料

product-list.component.ts

```
ngOnInit(): void {
    this._productService.getProducts()
            .subscribe(
              products => this.products = products,
              error => this.errorMessage = <any>error);
}
```

在product-list component內inject productService
並呼叫其getProducts( )取得Observable
因為
--Observable是lazy的，直到subscribe被呼叫前不會開始emit value
這邊會透過.subscribe觸發http get request並拿到回傳的array of products (非同步)
products就是emit出來的東西

因為http call是single async operation，只會有一個item被emit(即http response obj)

如果observable fail，第2個參數的fn會被呼叫處理error
(第3個completeFn不太使用在http request的狀況，
因為emit single response之後就會自動結束(complete))

新增errorMessage

<any>error代表

把observable回傳的error
轉成<any> data type

```
export class ProductListComponent implements OnInit {
    pageTitle: string = 'Product List';
    imageWidth: number = 50;
    imageMargin: number = 2;
    showImage: boolean = false;
    listFilter: string;
    errorMessage: string;

    products: IProduct[];

    constructor(private _productService: ProductService) {

    }

    toggleImage(): void {
        this.showImage = !this.showImage;
    }

    ngOnInit(): void {
        this._productService.getProducts()
                .subscribe(products => this.products = products,
                           error => this.errorMessage = <any>error);
    }

    onRatingClicked(message: string): void {
        this.pageTitle = 'Product List: ' + message;
```

結論:建議使用HTTP的方式

- 封裝在service內
- 透過observable提供給需要呼叫的class
- class僅需透過subscribe就可獲取data

(補充) Observable vs promise

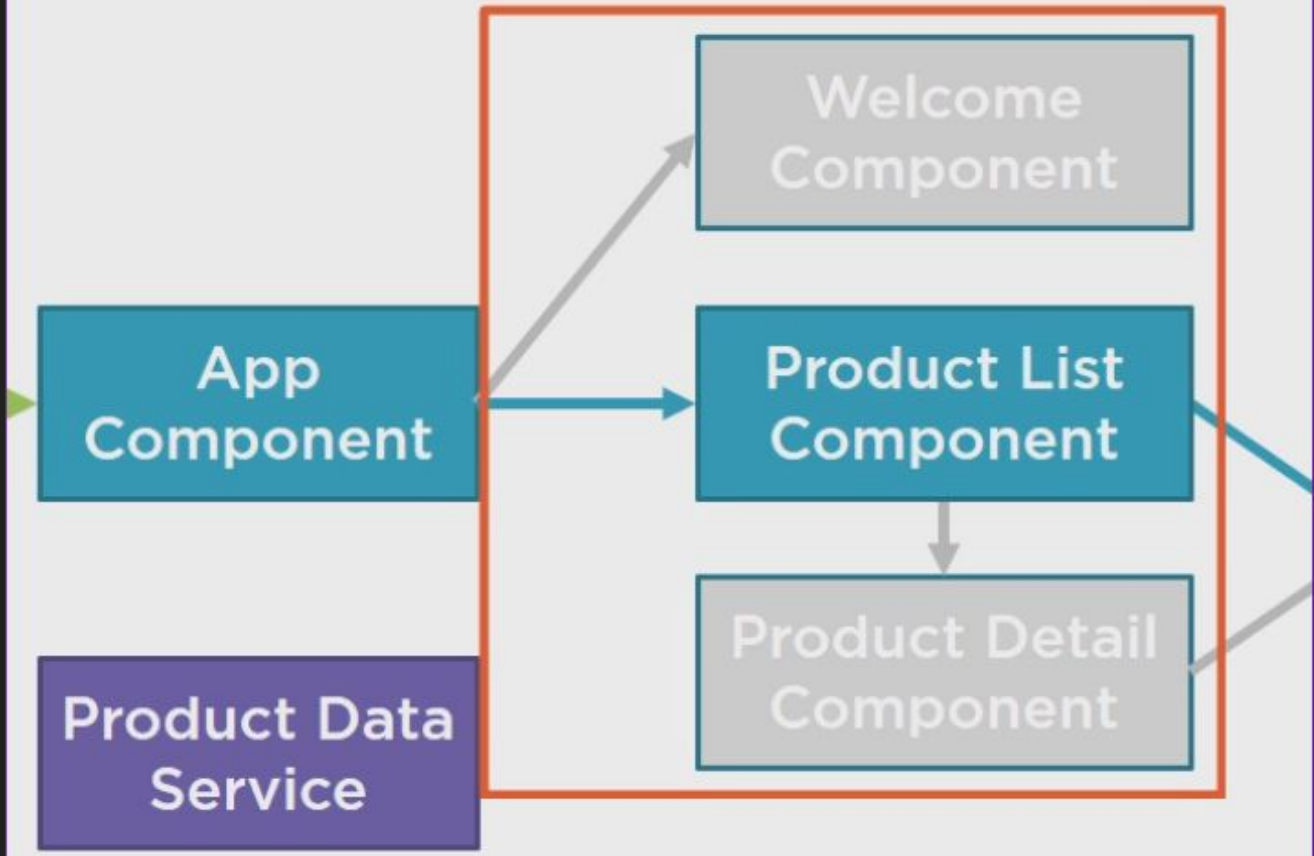
https://angular.io/docs/ts/latest/guide/server-communication.html

Angular http client回傳 Observable<Response>
但可轉成Observable<Response>

＊promise也許比較熟悉，但Observable有許多優勢

Navigation and Routinig Basics

Application Architecture



Route如何運作

1.替每個component設定route

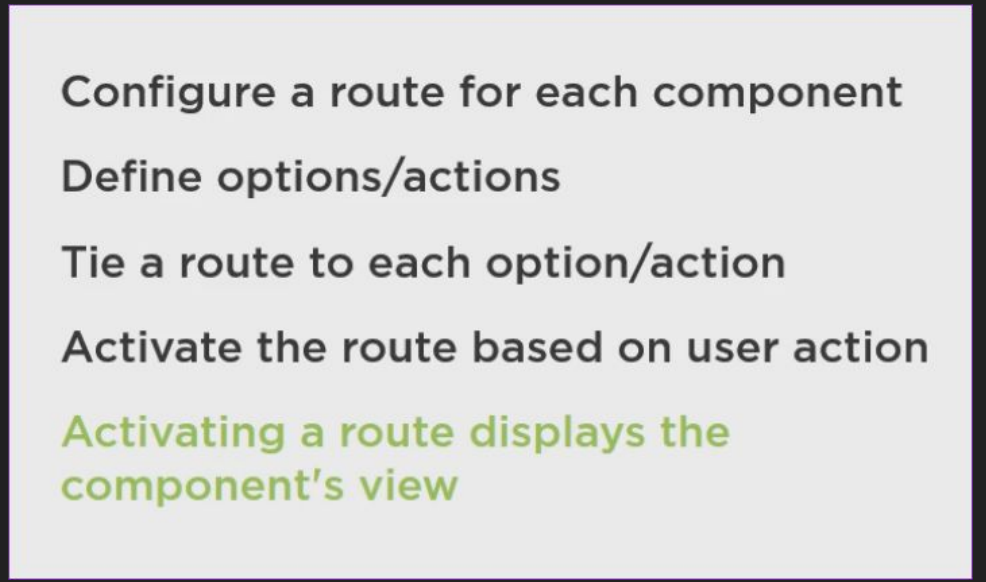
2.定義options/actions

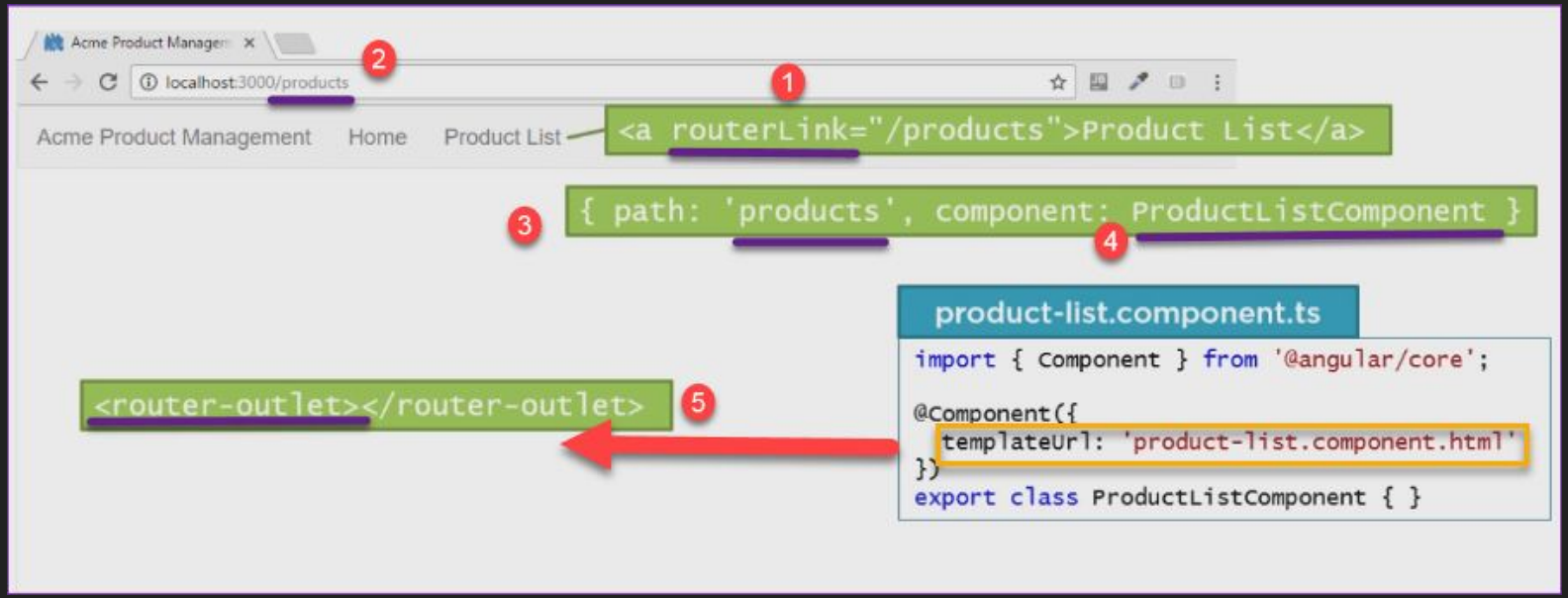
3.把每個option/action綁定route

4.根據user action啟動route

啟動route會顯示出component的view\

*option是選項的意思





(1)把menu option綁定內建的router directive：routerLink

當user點了這個option時，angular router會導向/products route

(2)此時URL會改變 (沒有#的需要server設定URL rewriting)

＊Angular預設使用HTML5 style URLs，不會有#來指出local navigation

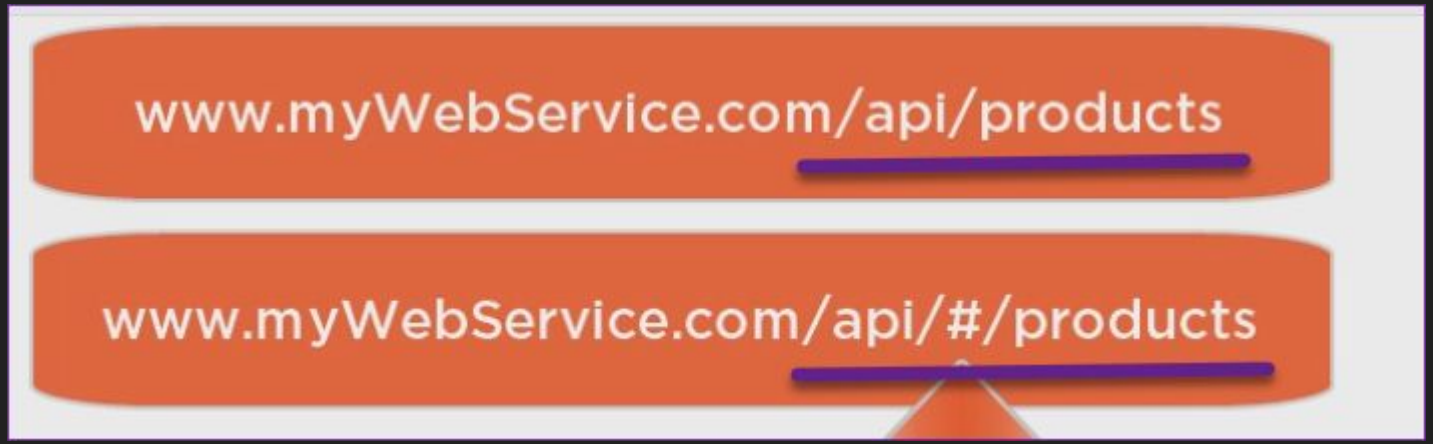
＊也支援#

(3)當URL改變，angular router會找**route definition**，path 對應到products時 (/products)

(4)component對應會載入的ProductListComponent之template

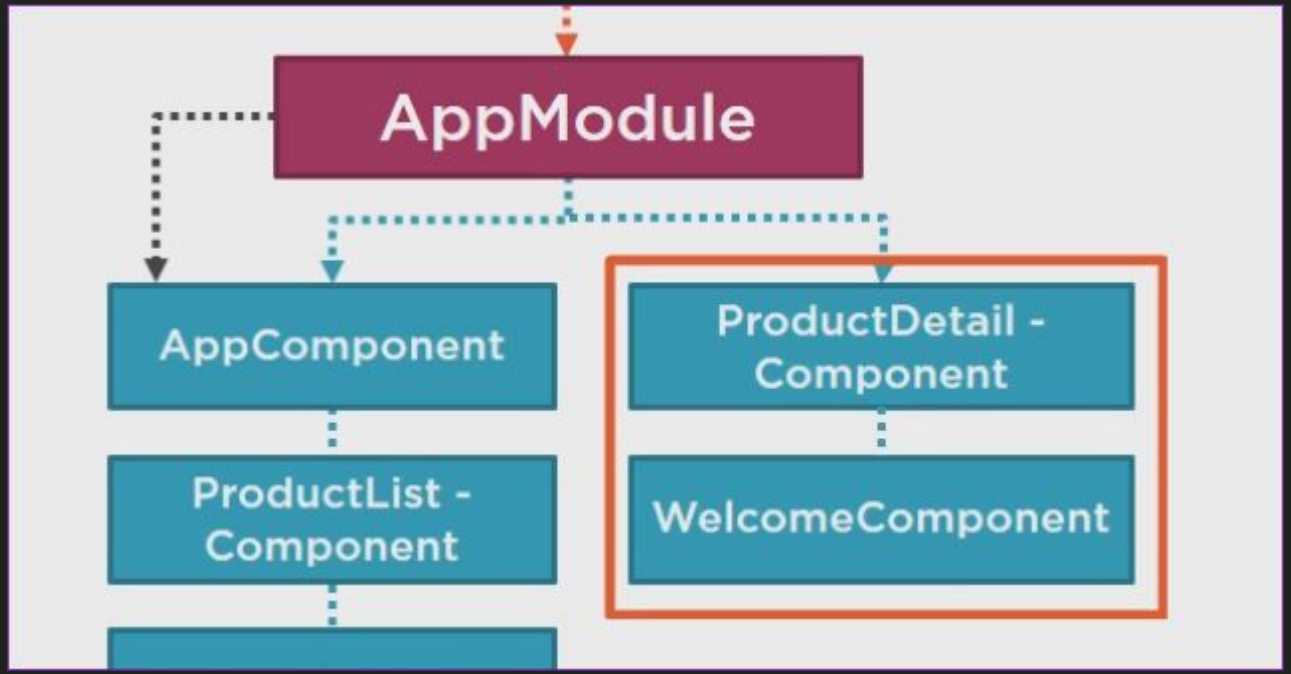
(5)載入template的點為 <router-outlet></router-outlet>

HTML5 style URLs



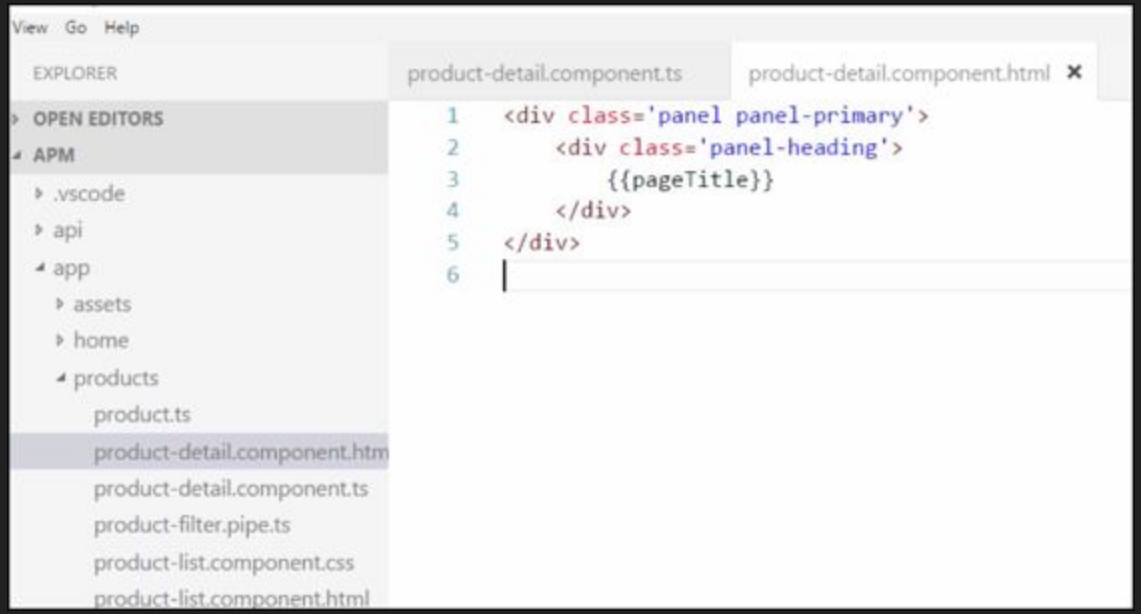
要做HTML 5 style URLs
必須要設定web server去執行URL rewriting
check web server for URL rewriting

每次新增component都要加到AppModule上




localhost:3000/product/10
Product Management
Home
Product List
Product Detail: Video Game Controller
Name: Video Game Controller
Code: GMG-0042
Description: Standard two-button video game controller
Availability: October 15, 2015
Price: $35.95
5 Star Rating:
Back

新增product-detail.component.ts

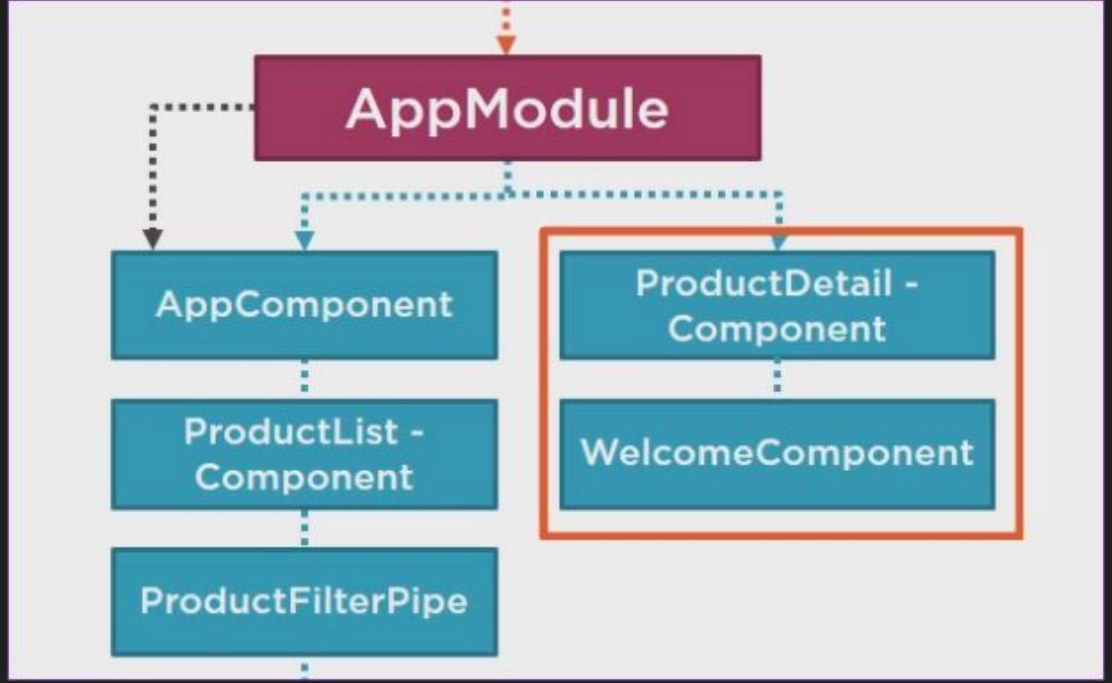


product-detail.component.ts × product-detail.component.html

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

import { IProduct } from './product';

@Component({
    templateUrl: 'app/products/product-detail.component.html'
})
export class ProductDetailComponent  {
    pageTitle: string = 'Product Detail';
    product: IProduct;
}
```

這邊沒有設定selector

因為那是要用在nest 這個compoent時才會用到



有新增component時，要加到Module

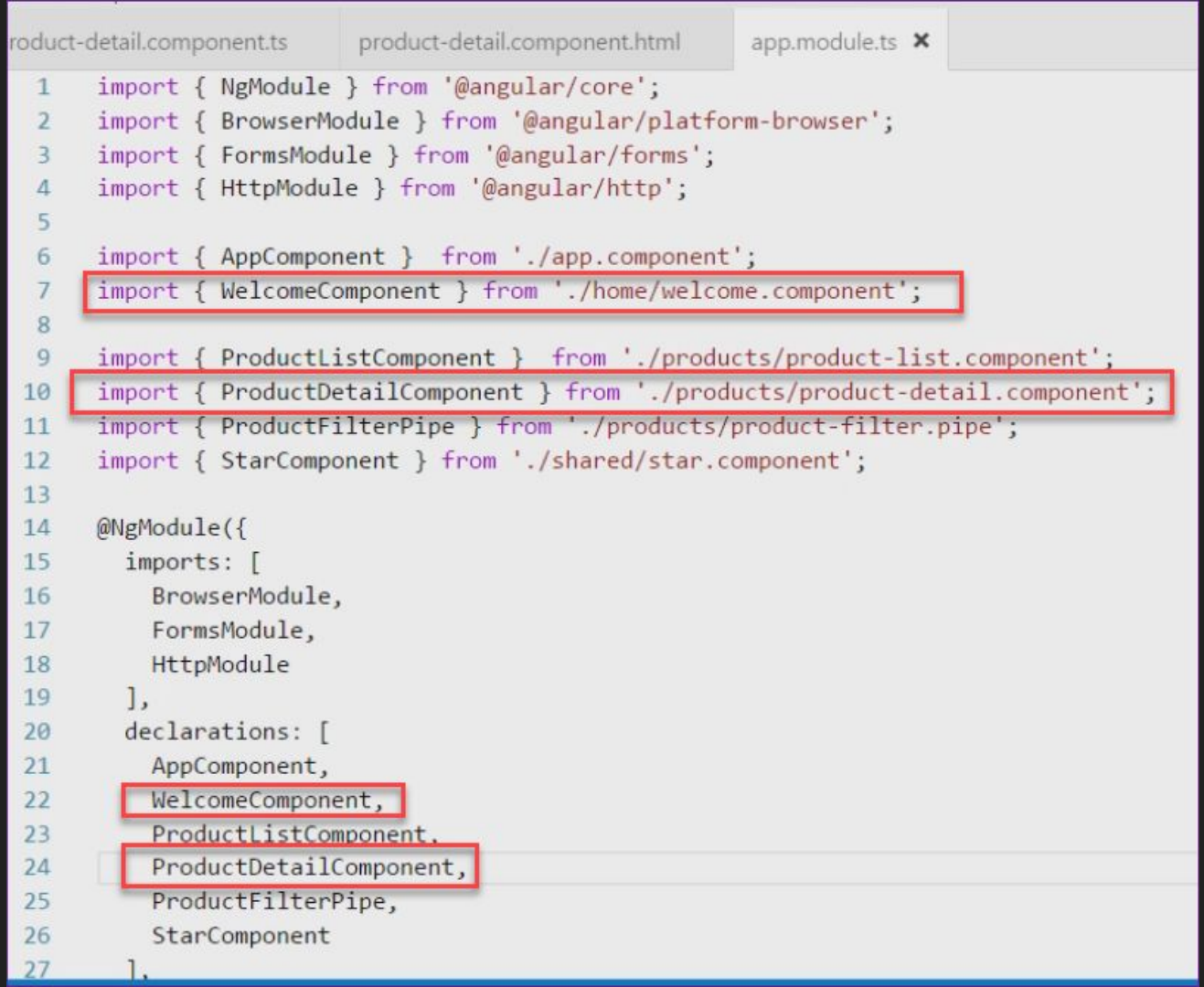
app.module

加入

WelcomeComponent

與

ProductDetailComponent



Router Service

Angular app會有一個router由 Angular’s router service管理

使用service前，需要先在Angular Module註冊service provider

app.module.ts

```
...
import { RouterModule } from '@angular/router';

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

1. Registers the router service
2. Declares the router directives
3. Exposes configured routes

在app.module.ts 中 import RouterModule
代表
(1)註冊了router service
(2)宣告了router directives
(3)曝光設定過的route

如何讓routes可被App取用？

```
@NgModule({
  imports: [
    BrowserModule,
    FormsModule,
    HttpModule,
    RouterModule.forRoot([])
  ],
```

在navigate routes之前，必須確認routes是可被App取用

=>透過RouterModule.forRoot( ) 把 routes用array傳入

在App root建立 routes

如果要用URL中有帶#的，需加上設定

```
  HttpModule,
  RouterModule.forRoot([], { useHash: true })
],
declarations: [
```

```
[
1{ path: 'products', component: ProductListComponent },
2{ path: 'product/:id', component: ProductDetailComponent },
3{ path: 'welcome', component: WelcomeComponent },
4{ path: '', redirectTo: 'welcome', pathMatch: 'full' },
5{ path: '**', component: PageNotFoundComponent }
]
```

設定routes

1. 對應到 /products
2. 對應 /product/5 類型，會使用id
3. 對應/welcome
4. 當沒有東西對應時，redirect到welcom path
5. wildcard path-- 當1~4都不match時，會被5捕捉到(適合404 page或redirect)

＊注意path前面不加上/ ， routes的順序很重要，先碰到的先套用

表示明確的route要放前面

(補)

Empty Path

Empty-path route configurations can be used to instantiate components that do not 'consume' any url segments. Let's look at the following configuration:

```
[{
  path: 'team/:id',
  component: Team,
  children: [
    {
      path: '',
      component: AllUsers
    },
    {
      path: 'user/:name',
      component: User
    }
  ]
}]
```

team/11

team/11/user/jason

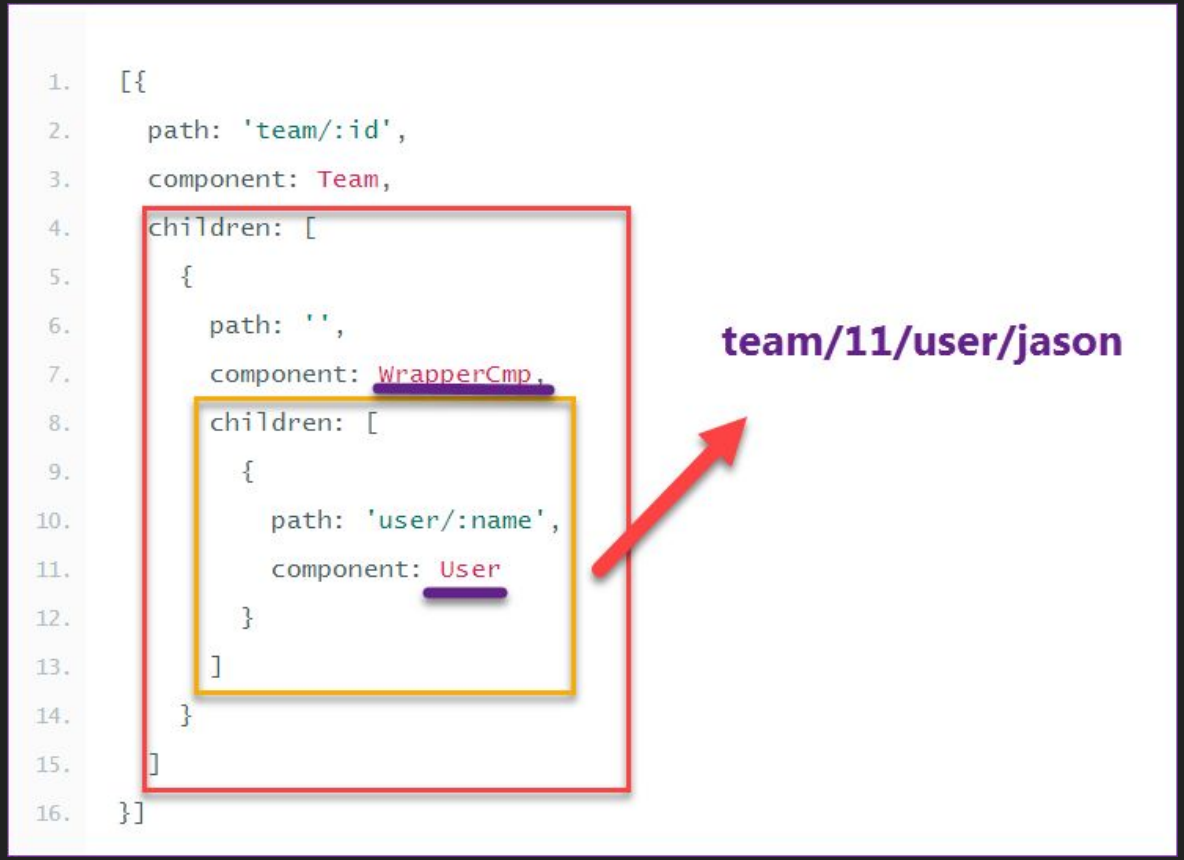
When navigating to `/team/11`, the router will instantiate the AllUsers component.

Empty path可有children

當導航到
team/11/user/jason時
會實體化一個
WrapperCmp component
(內包User component)

＊empty path會繼承
parent的params跟data

(因為其無法有自己的
params)



(補)Matching Strategy

Matching Strategy

By default the router will look at what is left in the url and check if it starts with the specified path (e.g., `/team/11/user` starts with `team/:id`).

We can change the matching strategy to make sure that the path covers the whole unconsumed url, which is akin to `unconsumedUrl === path` or `$` regular expressions.

This is particularly important when redirecting empty-path routes.

router會看去check剩下的url部分是否是特定path起頭
如:/team/11/user是從 team/:id 起頭

```
[{
  path: '',
  pathMatch: 'prefix', //default
  redirectTo: 'main'
},
{
  path: 'main',
  component: Main
}]
```

COPY CODE

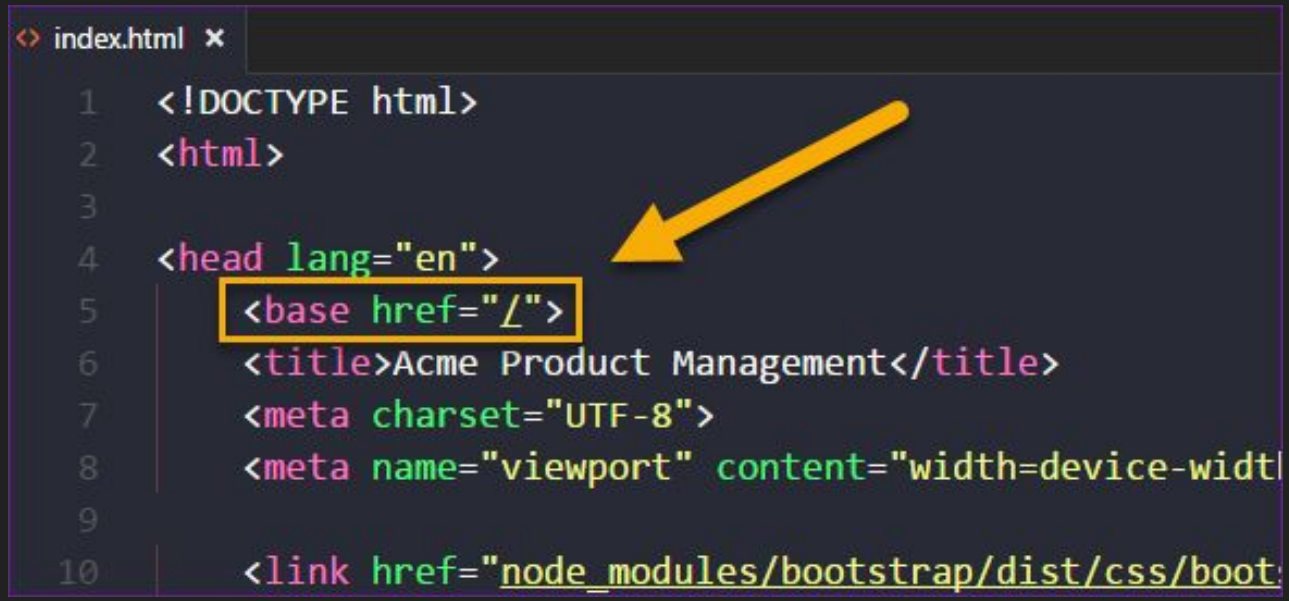
Since an empty path is a prefix of any url, even when navigating to '/main', the router will still apply the redirect.

pathMatch：’prefix’ 加上path：’ ‘時，表示empty path作為任何url的前綴

所以當導航到 /main時，router也會仍然套用redirect（???）

step1:在index.html加上 base element

告訴router如何構成navigation URLs
因為app folder是application root



(補充) Set the <base href>

We must **add a <base href> element tag** to the `index.html` to make `pushState` routing work. The browser also needs the base `href` value to prefix *relative* URLs when downloading and linking to css files, scripts, and images.

Add the base element just after the `<head>` tag. If the `app` folder is the application root, as it is for our application, set the `href` value in `index.html` *exactly* as shown here.

https://angular.io/docs/ts/latest/guide/router.html#!#base-href

必須加上 <base href> tag到index.html來讓pushState routing作用
瀏覽器也需要 href value來對相對URL路徑做前綴(prefix)

如果app folder是應用程式的root
則href就像右邊一樣設定

index.html (base-href)

```
<base href="/">
```

code/routes/basic/app/index.html

```
<!doctype html>
<html>
  <head>
    <base href="/">
    <title>ng-book 2: Angular 2 Router</title>

    {% for (var css in o.htmlWebpackPlugin.files.cs
      <link href="{%=o.htmlWebpackPlugin.files.css[
    {% } %}
  </head>
  <body>
    <router-app></router-app>
    <script src="/core.js"></script>
```

(補充)

https://angular.io/docs/ts/latest/guide/router.html#!#browser-url-styles

> HTML 5 style navigation is the Router default. Learn why "HTML 5" style is preferred, how to adjust its behavior, and how to switch to the older hash (#) style if necessary in the Browser URL Styles appendix below.

如果要切回 # style 請參考上方文章

step2: 加上RouterModule

import RouterModule

把RouterModule放到imports array

=>

1.註冊了router's service provider

2.宣告router的directive

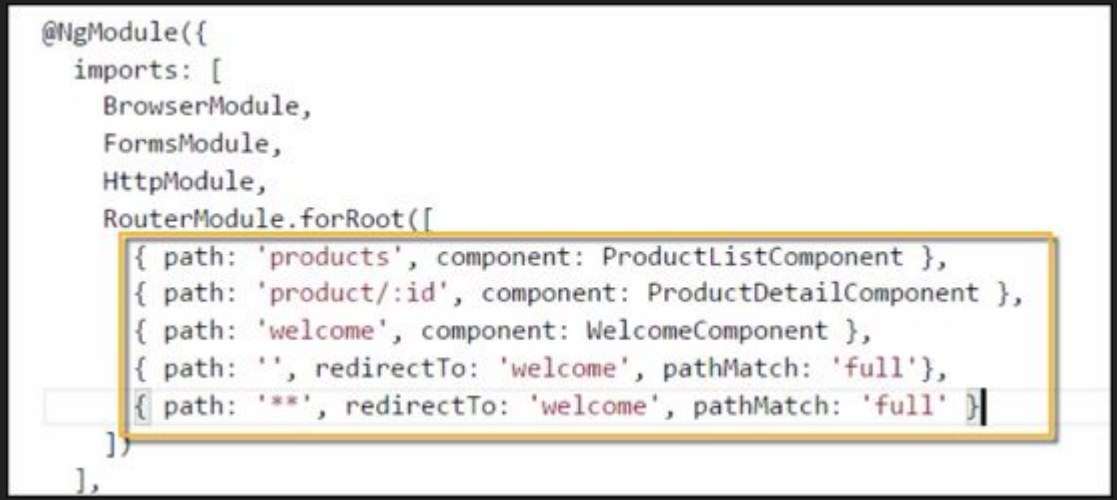
3.expose了configured routes

ndex.html app.module.ts ×

```
1  import { NgModule } from '@angular/core';
2  import { BrowserModule } from '@angular/platform-browser';
3  import { FormsModule } from '@angular/forms';
4  import { HttpModule } from '@angular/http';
5  import { RouterModule } from '@angular/router';
6
7  import { AppComponent }  from './app.component';
8  import { WelcomeComponent } from './home/welcome.component';
9
10 import { ProductListComponent }  from './products/product-list.component';
11 import { ProductDetailComponent } from './products/product-detail.component';
12 import { ProductFilterPipe } from './products/product-filter.pipe';
13 import { StarComponent } from './shared/star.component';
14
15 @NgModule({
16   imports: [
17     BrowserModule,
18     FormsModule,
19     HttpModule,
20     RouterModule
21   ],
22   declarations: [
23     AppComponent,
24     WelcomeComponent,
25     ProductListComponent,
```

RouterModule怎麼知道我們設定的routes?

將routes放在array後傳入forRoot( )



幫route綁上actions

app.component.ts

```
...

@Component({
    selector: 'pm-app',
    template: `
     <ul class='nav navbar-nav'>
       <li><a [routerLink]="['/welcome']">Home</a></li>
       <li><a [routerLink]="['/products']">Product List</a></li>
     </ul>
    `
})
```

這邊把routerLink 綁上(bind) template expression
=>回傳link parameters array （即 [‘/welcome’] ）

第一個參數是route的path(為string), 可加入其他element
代表額外的route parameters

step1：到app.component.ts增加routerLink

Home =>連到welcome

Product List=>連到/products

app.component.ts

```
1  import { Component } from '@angular/core';
2
3  import { ProductService } from './products/product.service';
4
5  @Component({
6      selector: 'pm-app',
7      template: `
8      <div>
9          <nav class='navbar navbar-default'>
10             <div class='container-fluid'>
11                 <a class='navbar-brand'>{{pageTitle}}</a>
12                 <ul class='nav navbar-nav'>
13                     <li><a [routerLink]="['/welcome']">Home</a></li>
14                     <li><a [routerLink]="['/products']">Product List</a></li>
15                 </ul>
16             </div>
17         </nav>
18     </div>
19     `,
20     providers: [ ProductService ]
21 })
```

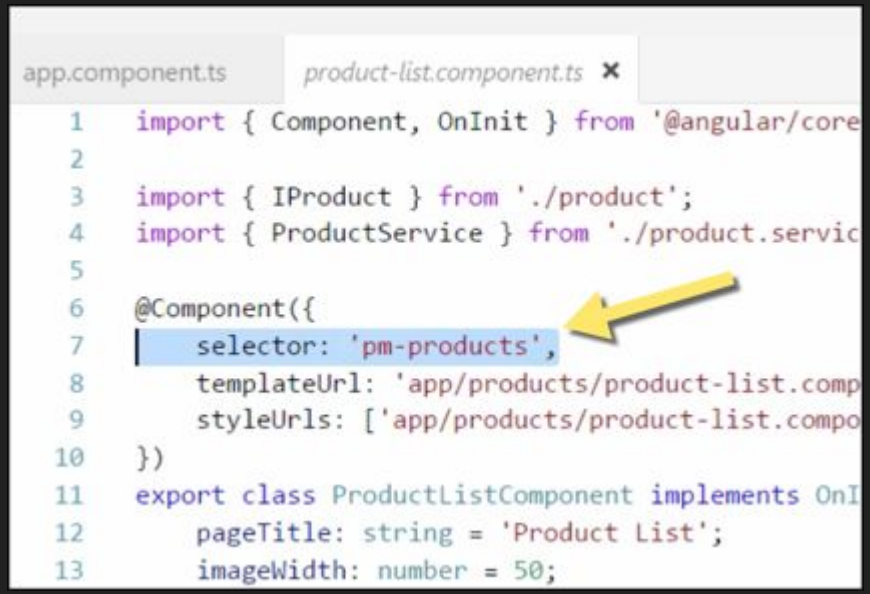
step2: product-list.component.ts

因為現在product-list component

要用router來切換

不再是nested component了

所以可把selector拿掉



啟動的view要顯示在哪？

用<router-outlet>

app.component.ts

```
...

@Component({
    selector: 'pm-app',
    template: `
     <ul class='nav navbar-nav'>
       <li><a [routerLink]="['/welcome']">Home</a></li>
       <li><a [routerLink]="['/products']">Product List</a></li>
     </ul>
     <router-outlet></router-outlet>
    `
})
```

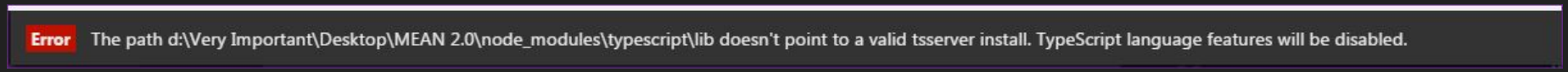
當不同的route被activate之後

view會顯示在<router-outlet>

```
@Component({
    selector: 'pm-app',
    template: `
    <div>
        <nav class='navbar navbar-default'>
            <div class='container-fluid'>
                <a class='navbar-brand'>{{pageTitle}}</a>
                <ul class='nav navbar-nav'>
                    <li><a [routerLink]="['/welcome']">Home</a></li>
                    <li><a [routerLink]="['/products']">Product List</a></li>
                </ul>
            </div>
        </nav>
        <div class='container'>
            <router-outlet></router-outlet>
        </div>
    </div>
    `,
    providers: [ ProductService ]
})
```

其他

Typescript error



使用較新版本的Typescript

vs code預設使用最新的穩定版本
Typescript會執行version checking(locally and globally)

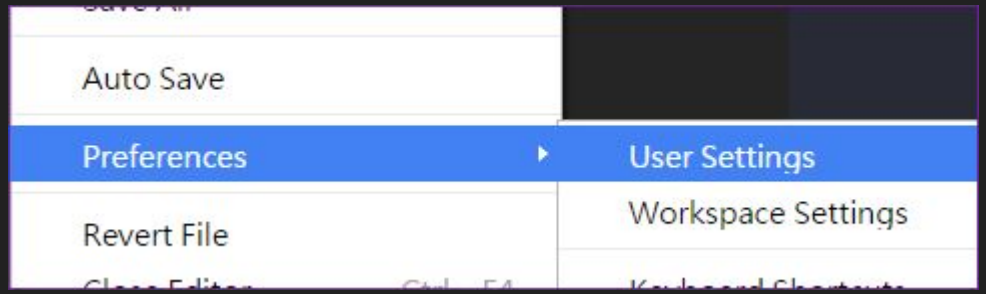
如果global version跟VScode的Typescript version不一樣時會有警告

你可以讓VScode使用你workspace的typescript版本

設定typescript.tsdk指向包含tsserver.js的資料夾

```
{
    "typescript.tsdk": "./node_modules/typescript/lib"
}
```

改user setting




```
45          ]
46      },
47      "editor.fontSize": 18,
48      "editor.formatOnSave": true,
49      "typescript.tsdk": "./node_modules/typescript/lib",
50      "window.zoomLevel": 1
51  }
```