สยามชำนาญกิจ
SIAM CHAMNAN KIT

Getting start with Angular

Somkiat Puisungnoen

Somkiat | Home

Somkiat Puisungnoen

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When did you work at Opendream?

22 Pending Items

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What's on your mind?

Public | Post

Intro

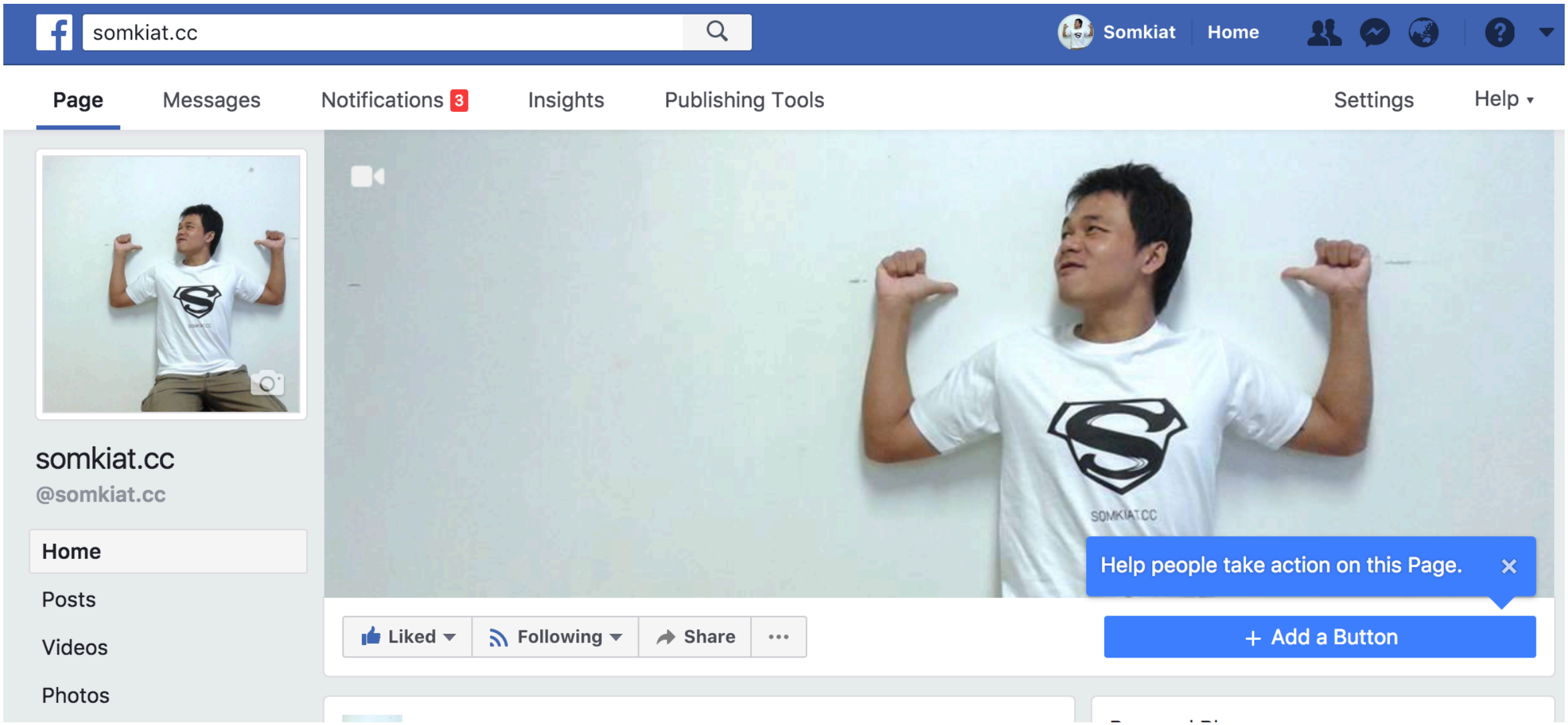
Software Craftsmanship

Software Practitioner at สยามชำนาญกิจ พ.ศ. 2556

Agile Practitioner and Technical at SPRINT3r

Somkiat Puisungnoen
15 mins · Bangkok ·

Java and Bigdata



Agenda

- Introduction to Angular 8
- Installation and configuration
- Structure of Angular project
- Introduction to TypeScript
- Design and develop component/service
- Routing management
- Working with RESTful APIs

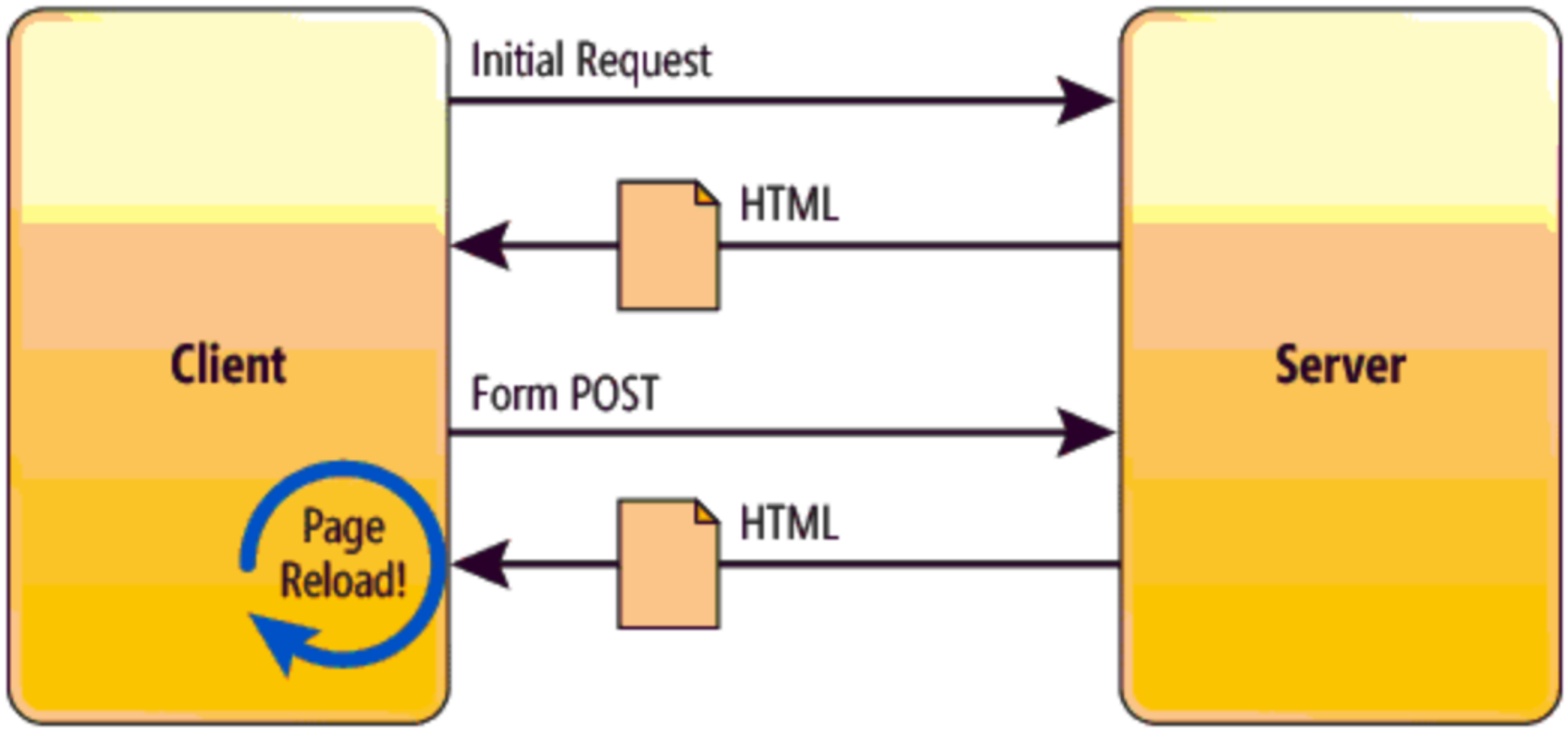
Angular 11

What is Angular ?

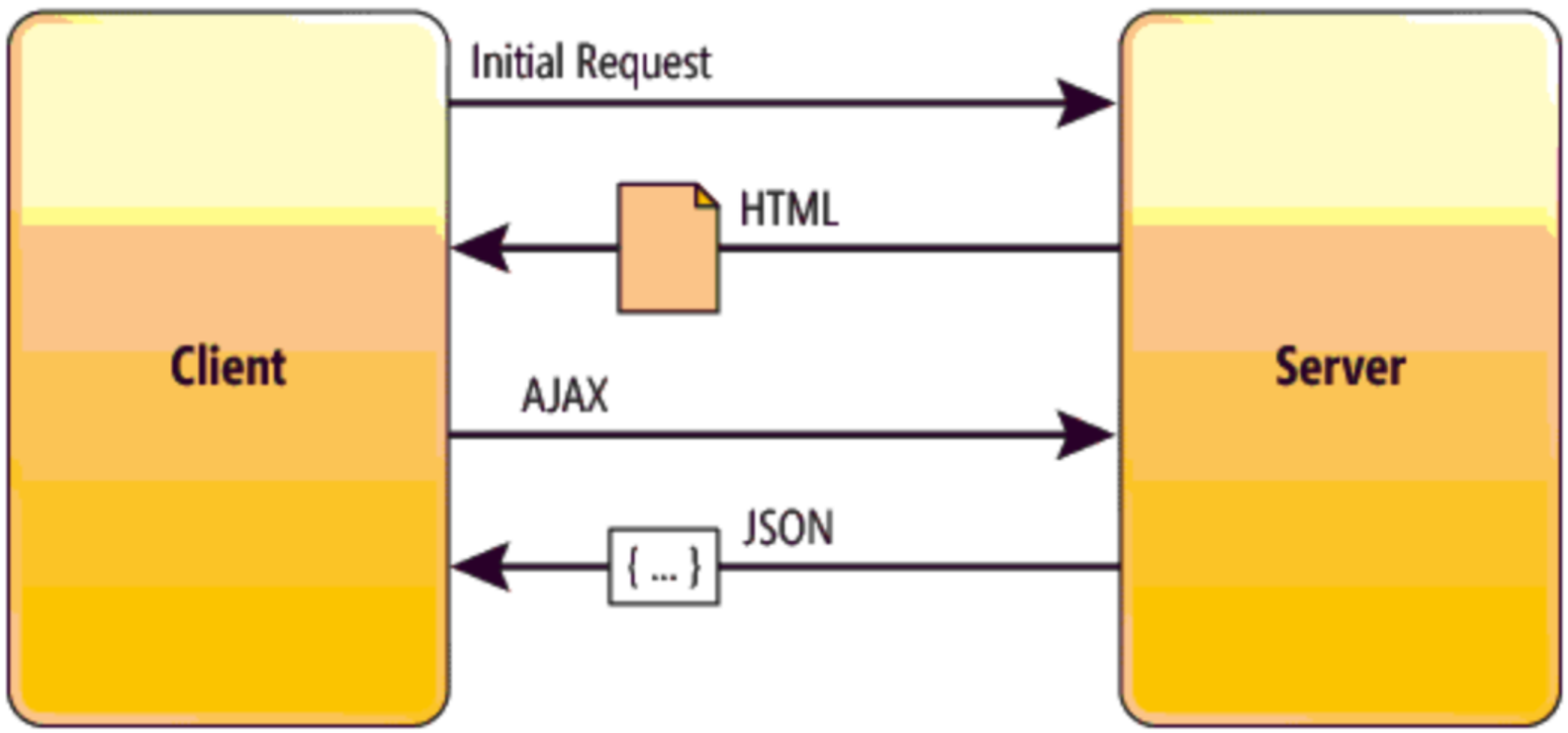
JavaScript framework with allows us to create reactive **Single Page Application** (SPA)

https://angular.io/

Traditional

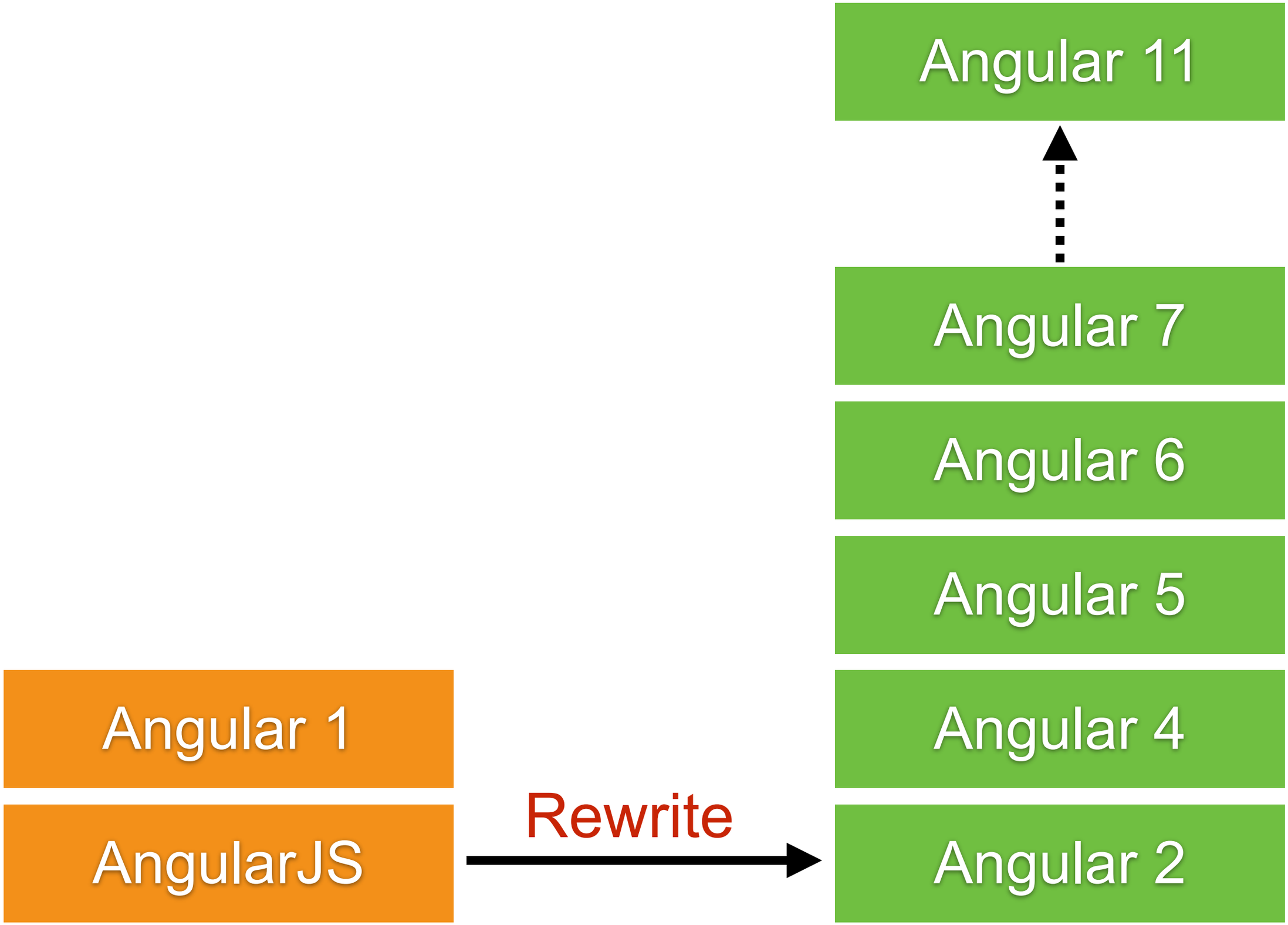


Single Page Application

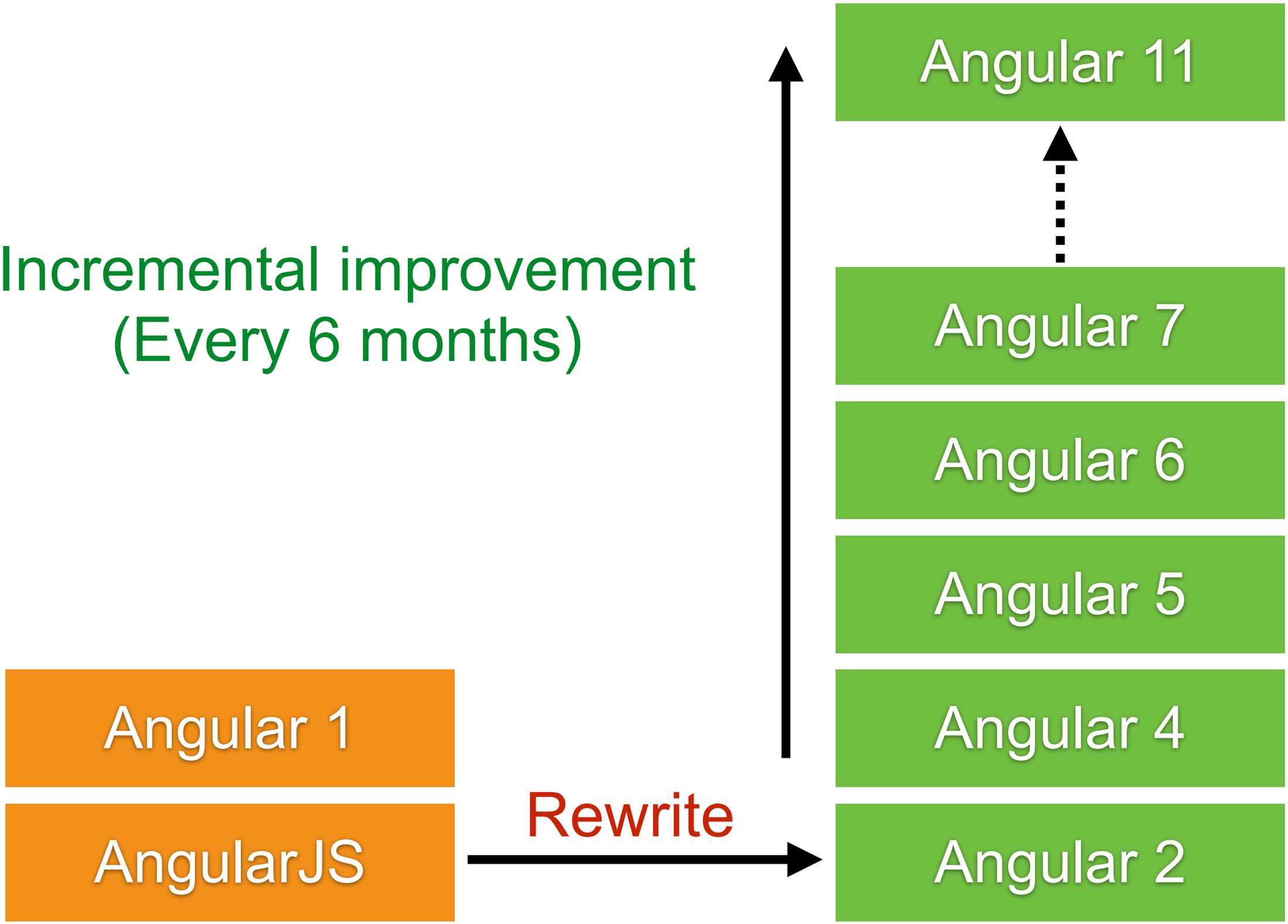


Angular 1

AngularJS

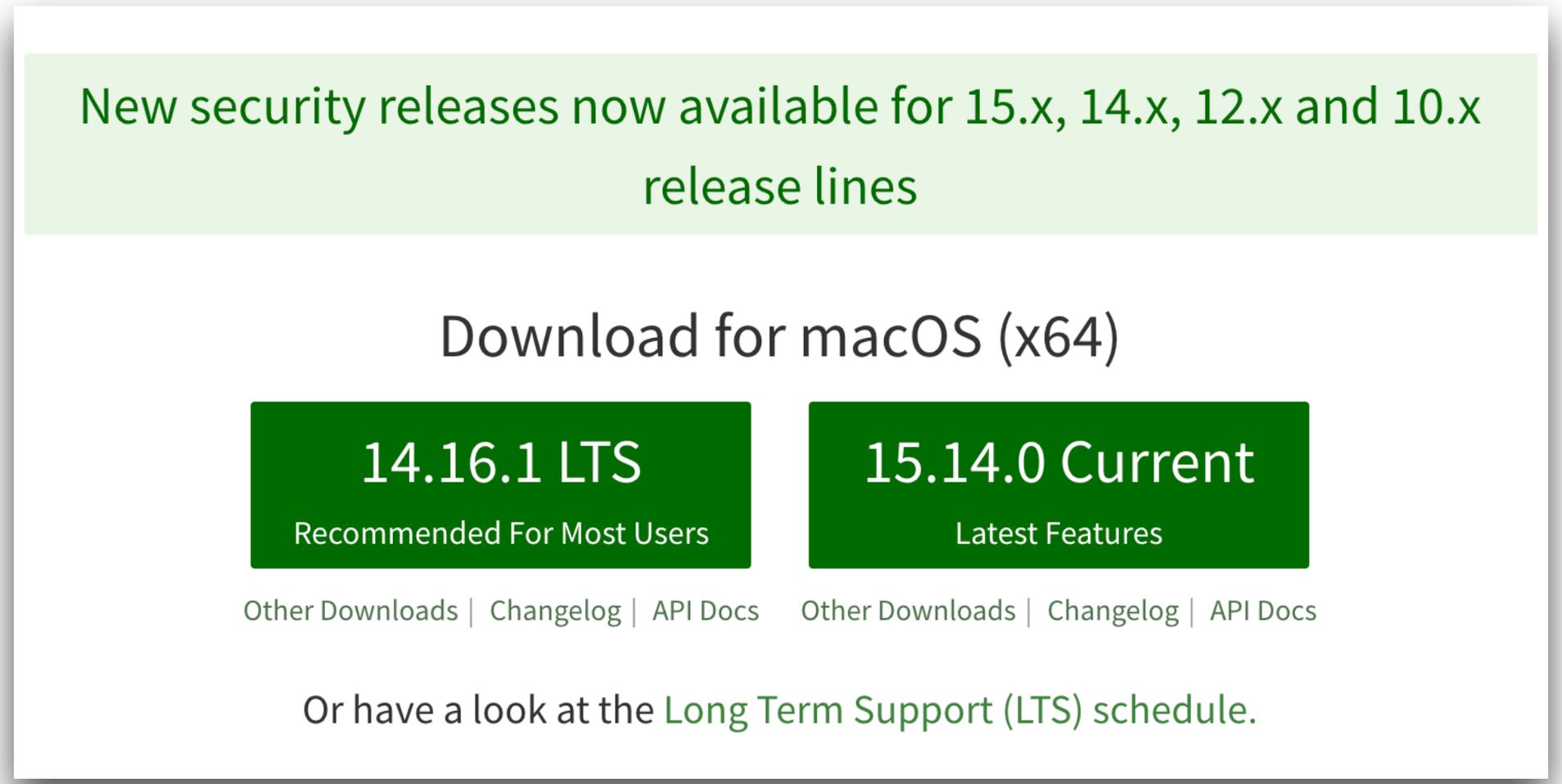


Incremental improvement
(Every 6 months)



Software requirement

Install NodeJS



https://nodejs.org/en/

Angular CLI

A tool to initialise, develop, scaffold and maintain Angular application

```
>  npm install -g @angular/cli
>  ng new my-dream-app
>  cd my-dream-app
>  ng serve
```

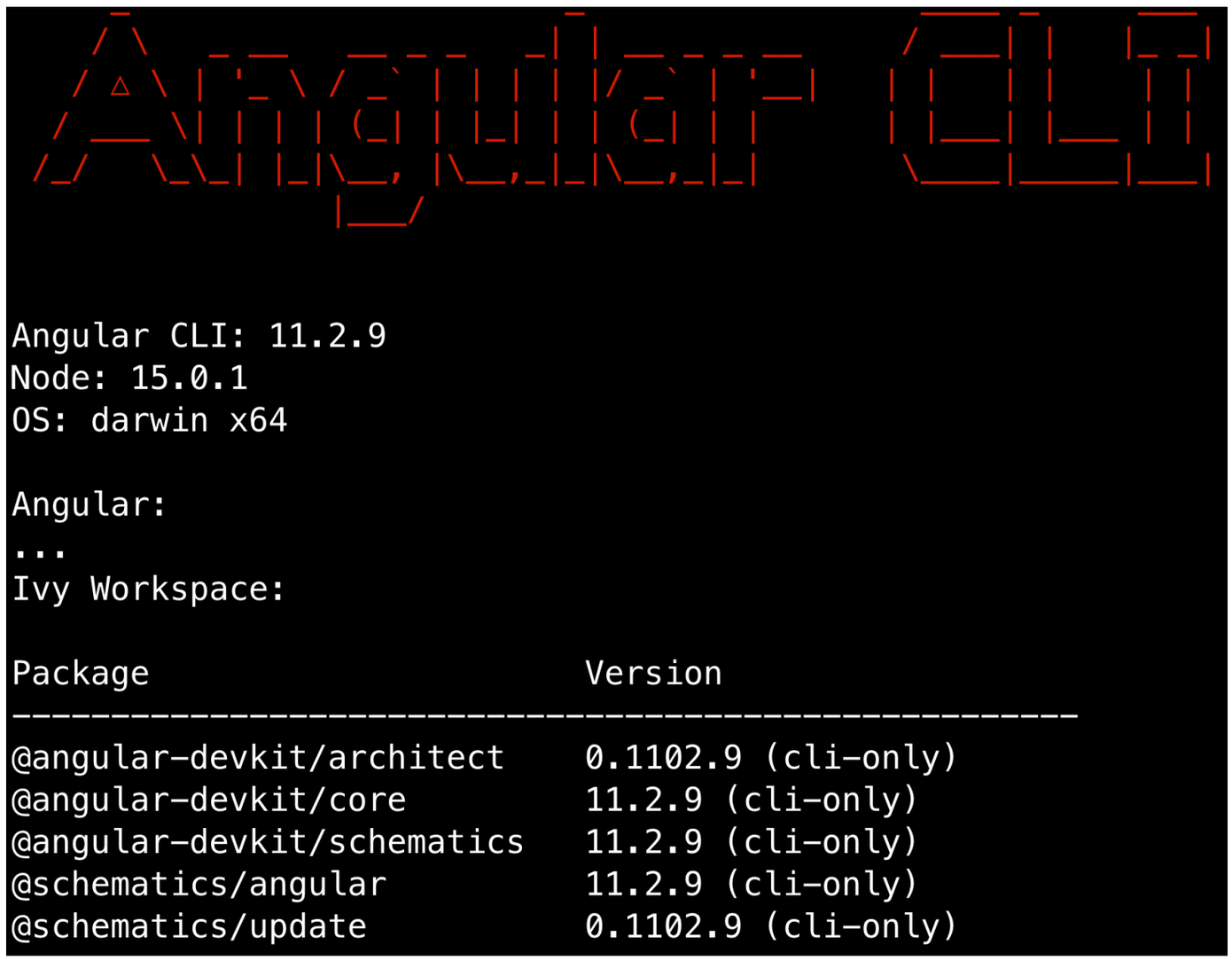
https://cli.angular.io/

Install Angular CLI

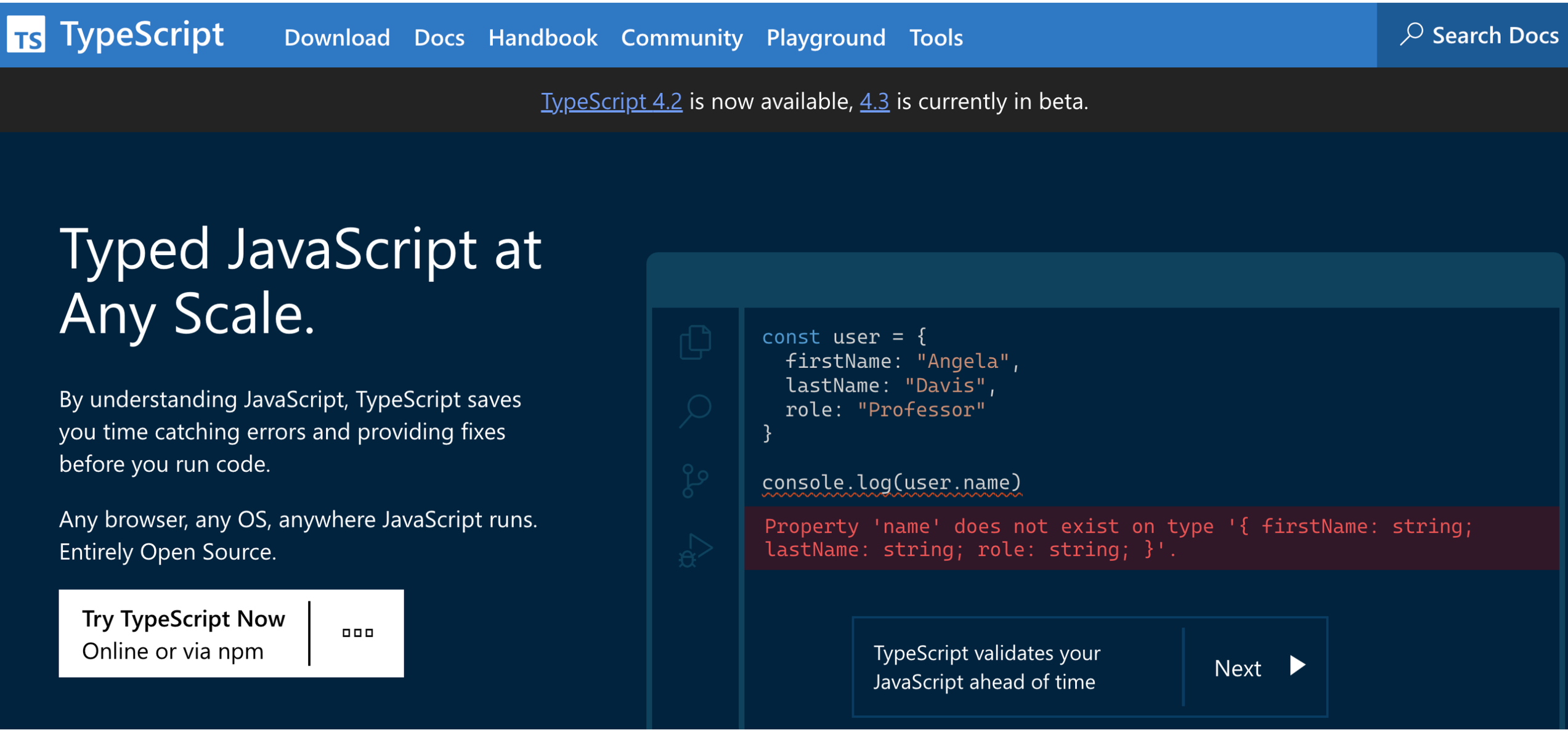
$npm install -g @angular/cli

Try after installed

$ng version



TypeScript



https://www.typescriptlang.org/

RxJS

RxJS

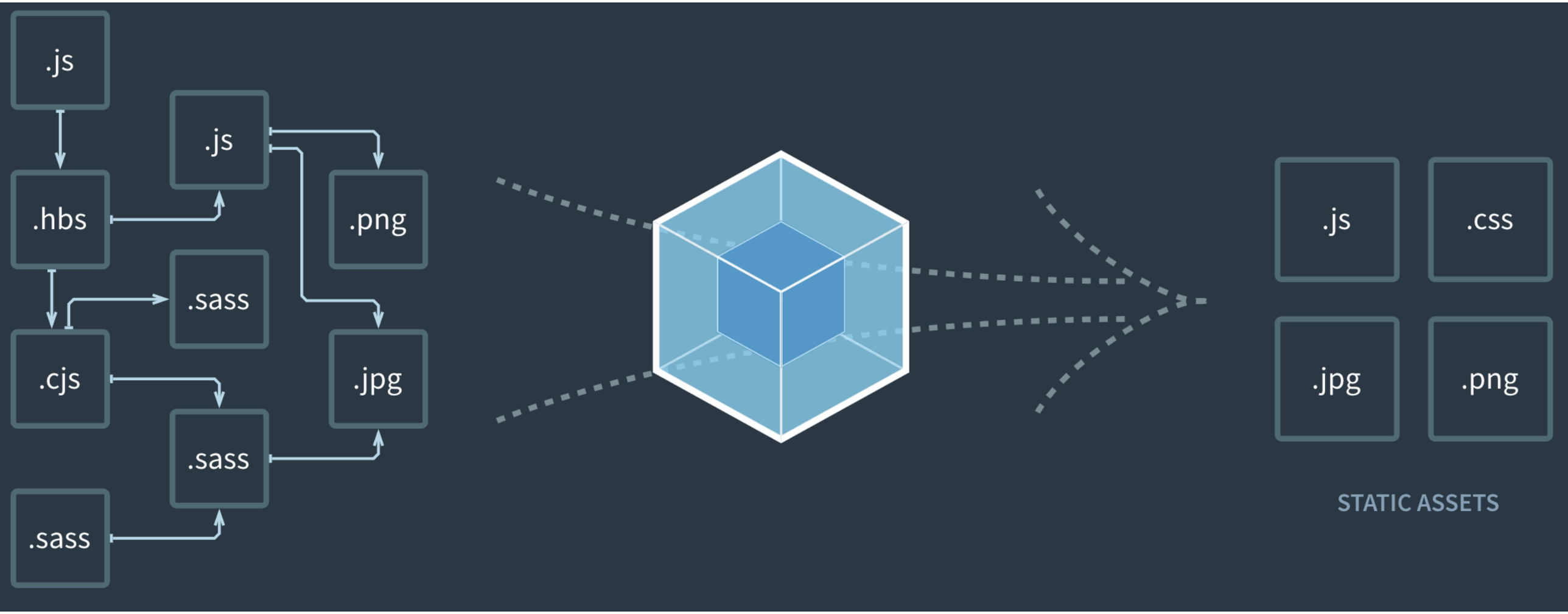
Reactive Extensions Library for JavaScript

GET STARTED

API DOCS

https://rxjs.dev/

Webpack



https://webpack.js.org

Create first project

Try to create first project

$ng new hello-app

```
CREATE hello-app/README.md (1017 bytes)
CREATE hello-app/.editorconfig (274 bytes)
CREATE hello-app/.gitignore (631 bytes)
CREATE hello-app/angular.json (3647 bytes)
CREATE hello-app/package.json (1208 bytes)
CREATE hello-app/tsconfig.json (783 bytes)
CREATE hello-app/tslint.json (3185 bytes)
CREATE hello-app/.browserslistrc (703 bytes)
CREATE hello-app/karma.conf.js (1426 bytes)
CREATE hello-app/tsconfig.app.json (287 bytes)
CREATE hello-app/tsconfig.spec.json (333 bytes)
CREATE hello-app/src/favicon.ico (948 bytes)
```

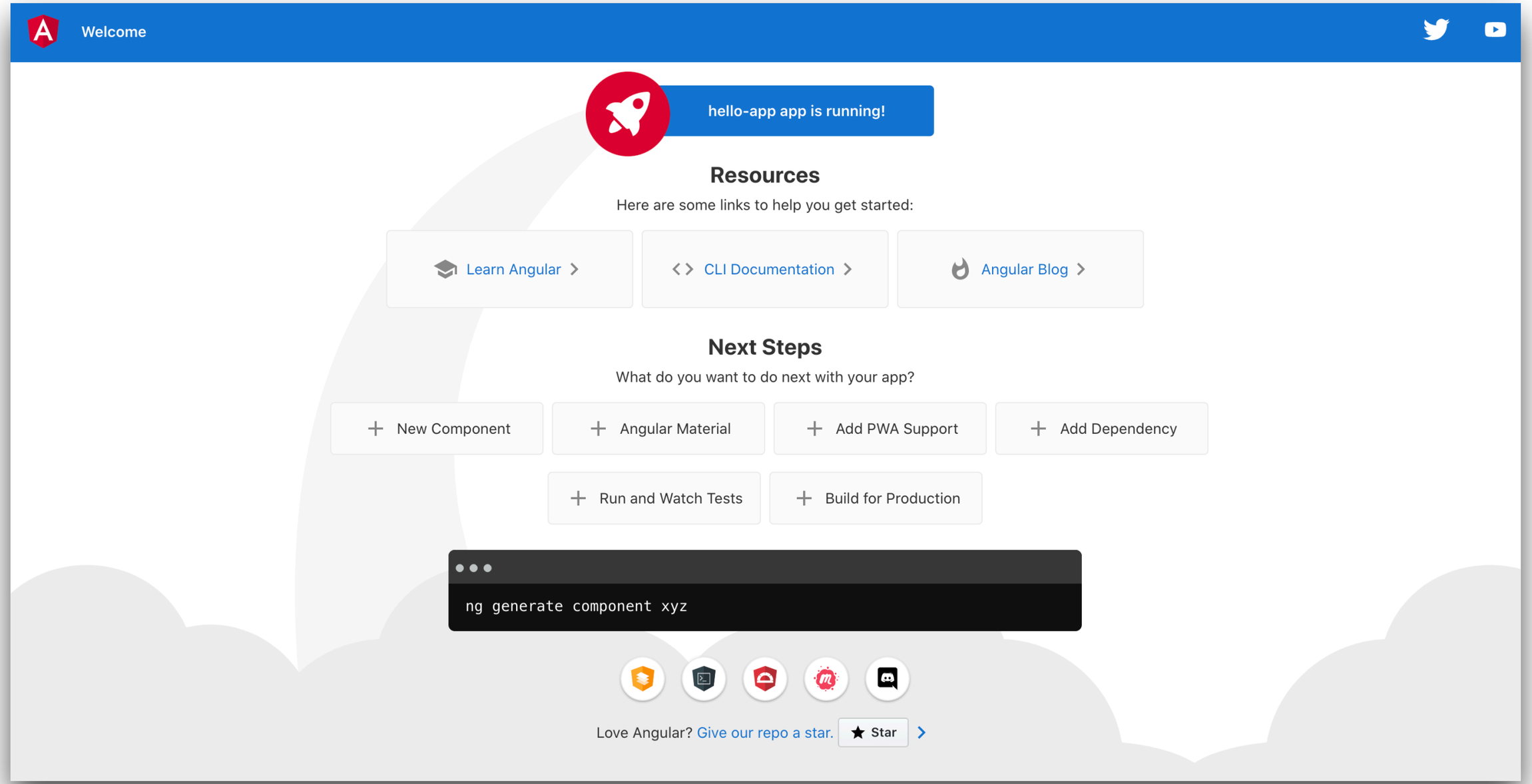
Run your app

$cd hello-app
$ng serve

```
Compiling @angular/core : es2015 as esm2015
Compiling @angular/common : es2015 as esm2015
Compiling @angular/platform-browser : es2015 as esm2015
Compiling @angular/router : es2015 as esm2015
Compiling @angular/platform-browser-dynamic : es2015 as esm2015
✔ Browser application bundle generation complete.

Initial Chunk Files | Names         |      Size
vendor.js           | vendor        |   2.69 MB
polyfills.js        | polyfills     | 128.81 kB
main.js             | main          |  57.09 kB
runtime.js          | runtime       |   6.15 kB
styles.css          | styles        | 119 bytes

                    | Initial Total |   2.88 MB
```

Open in browser

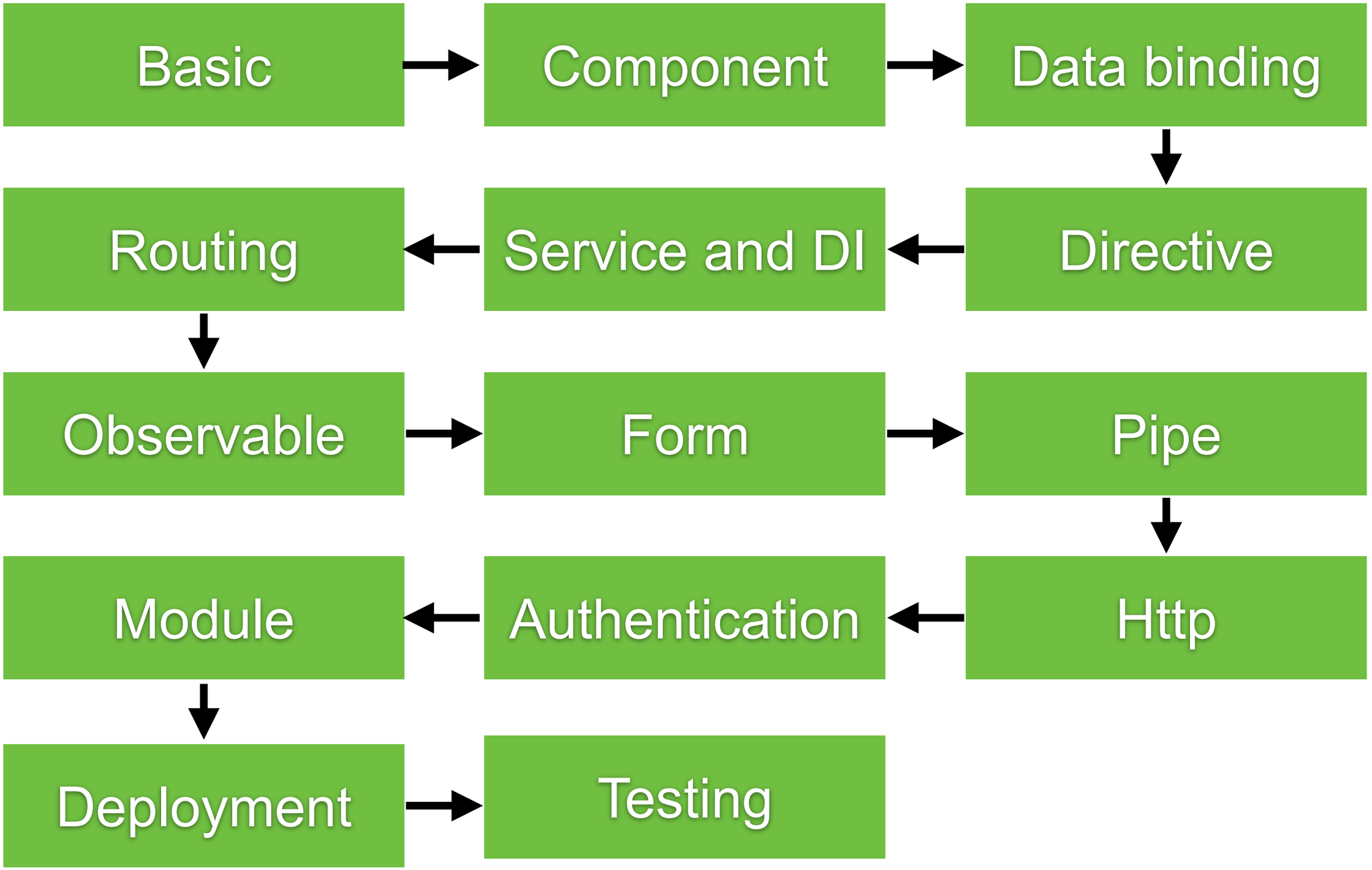
http://localhost:4200/



Install Text Editor

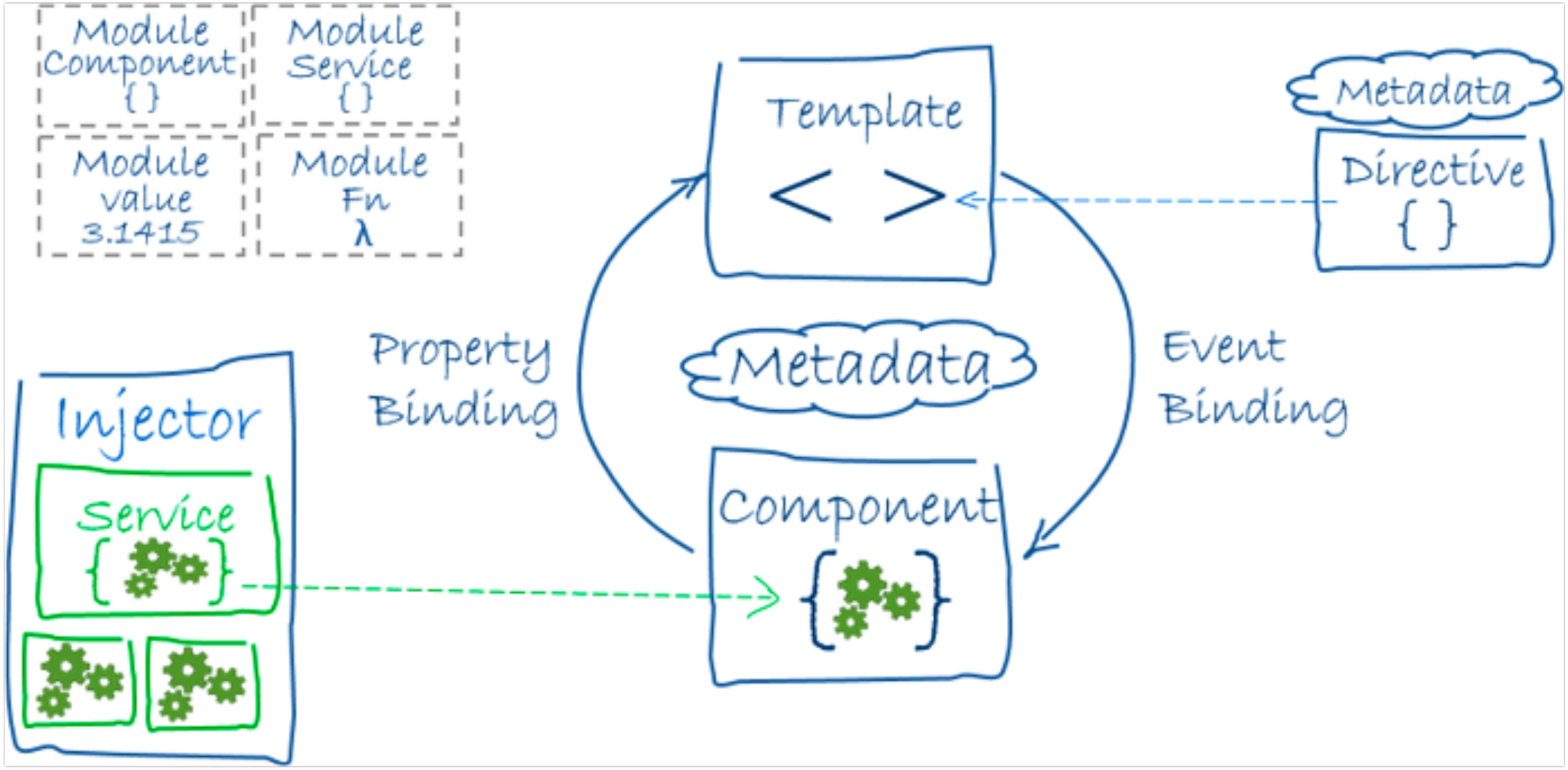
Learning path

Learning path



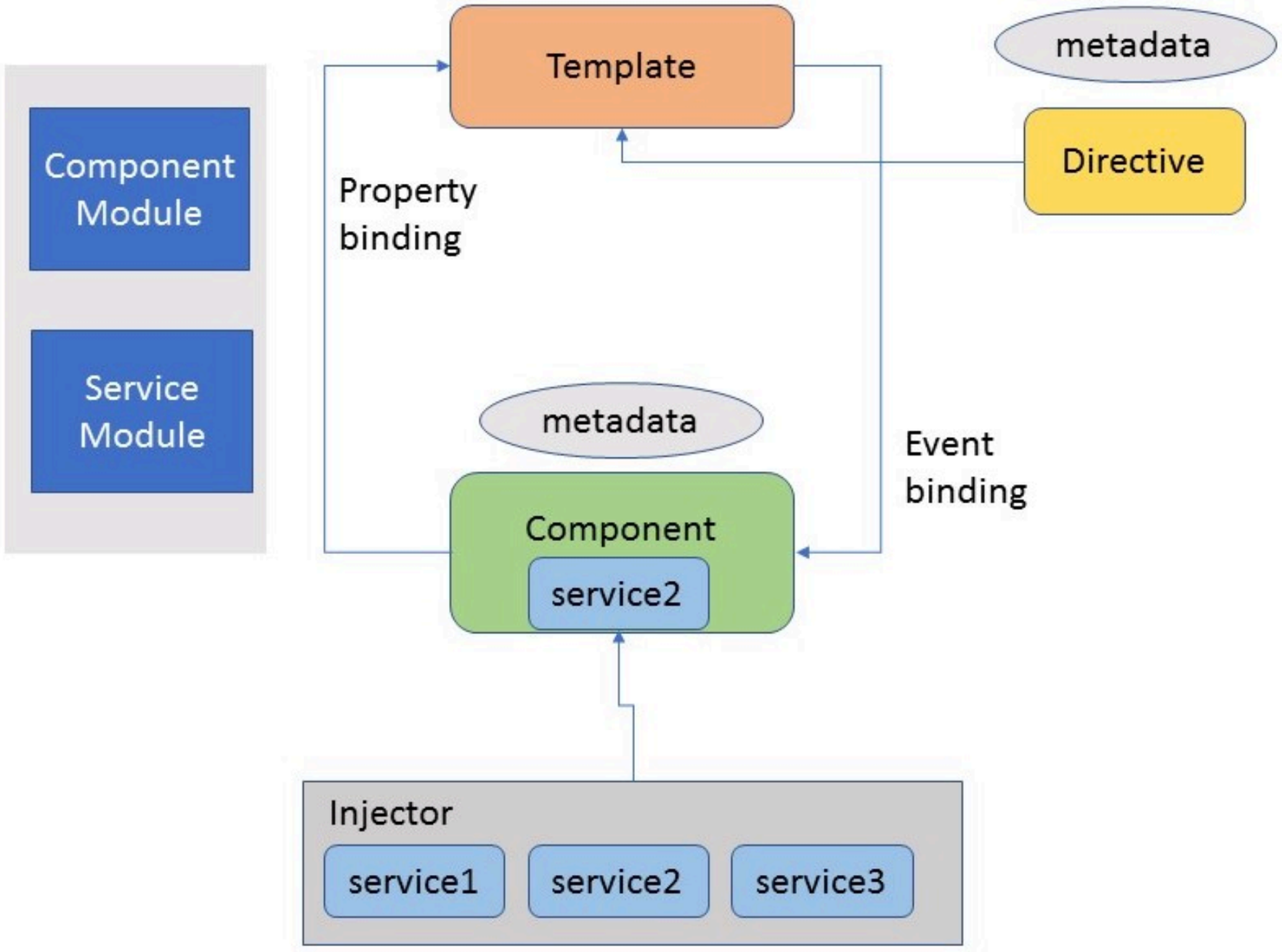
Basic of Angular

Angular Architecture

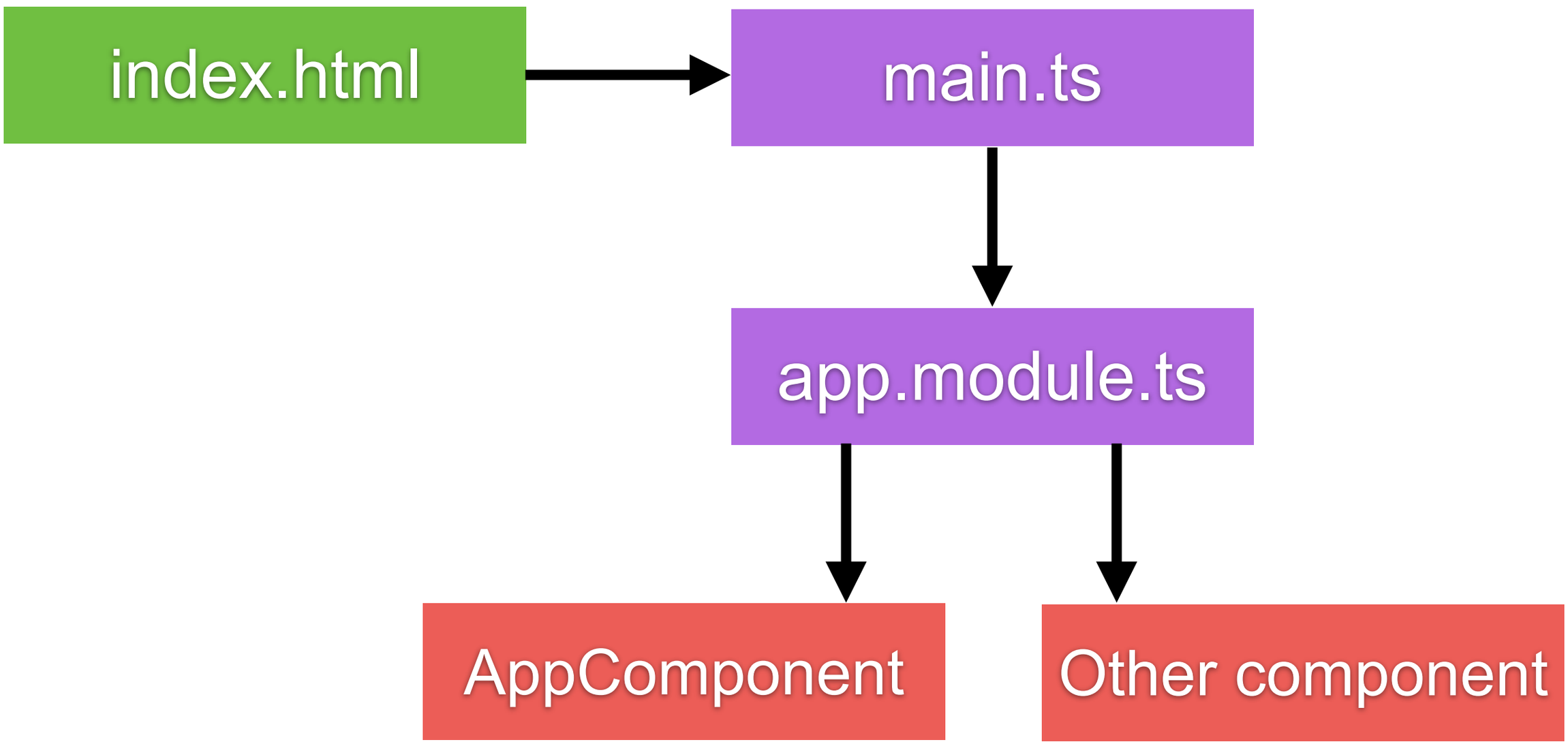


https://angular.io/guide/architecture

Angular Architecture

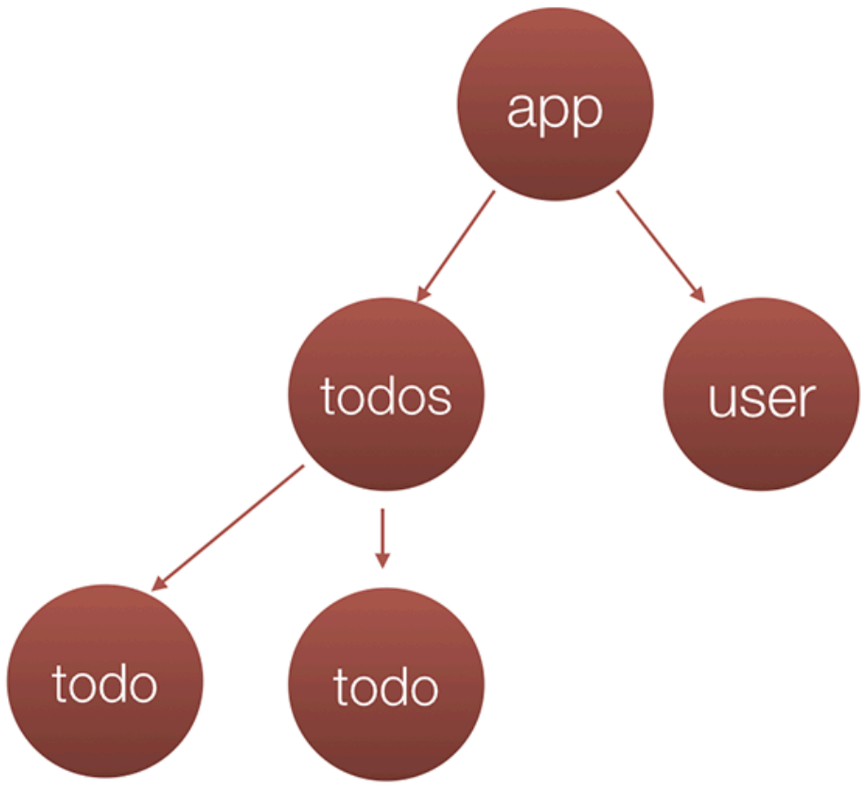


How Angular working ?



Components

Angular application is a tree of **Components**
Top level component is the application itself
Component is rendered by the browser



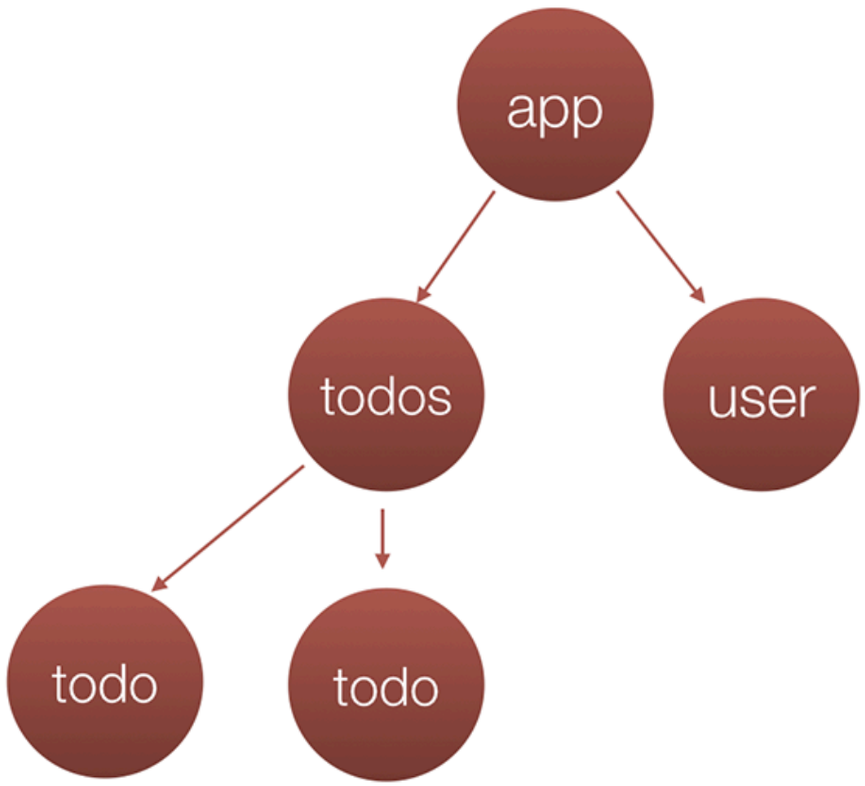
Components

Own template
Own style
Own business logic

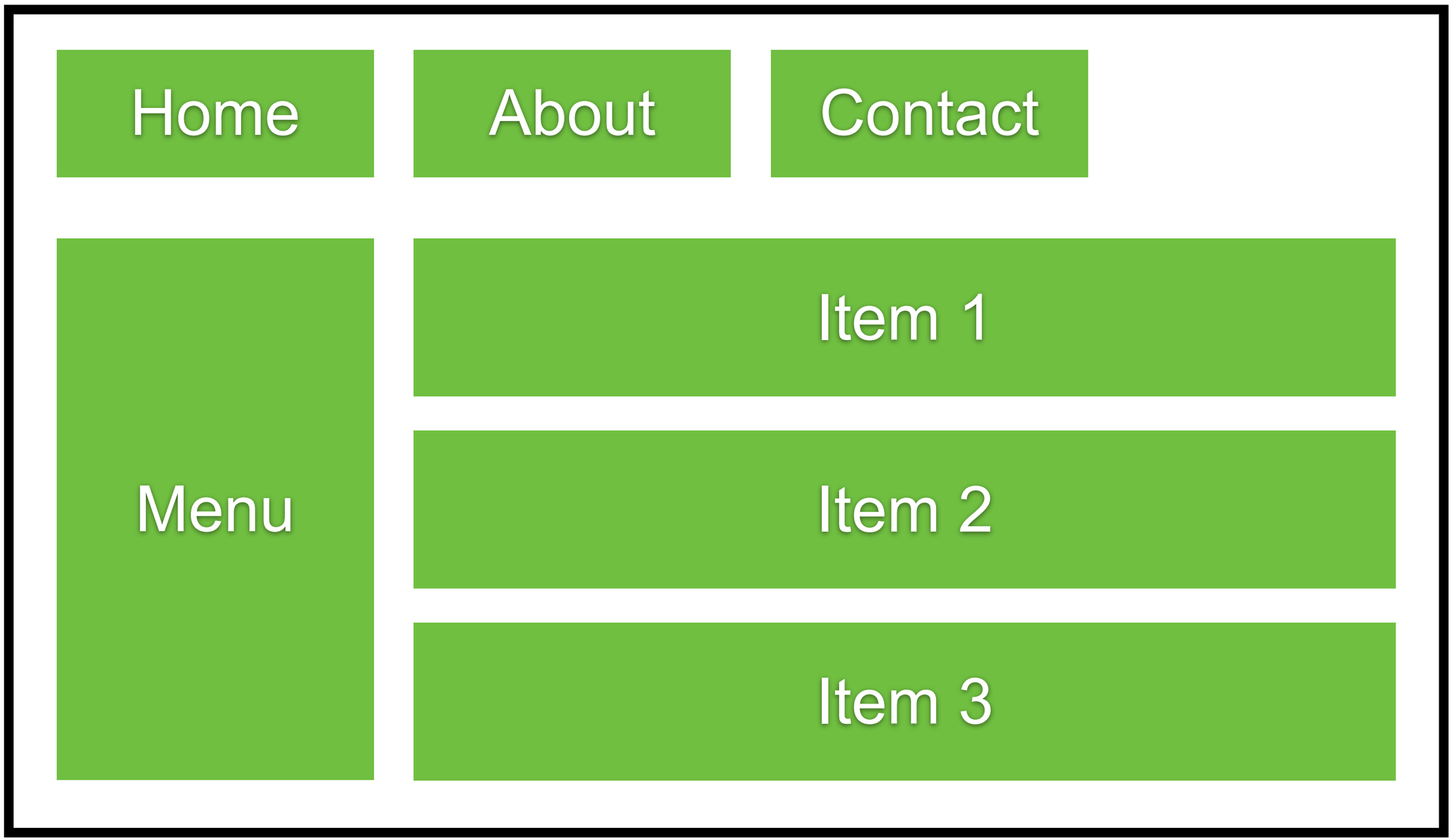
Split complex app to small component !!

Components

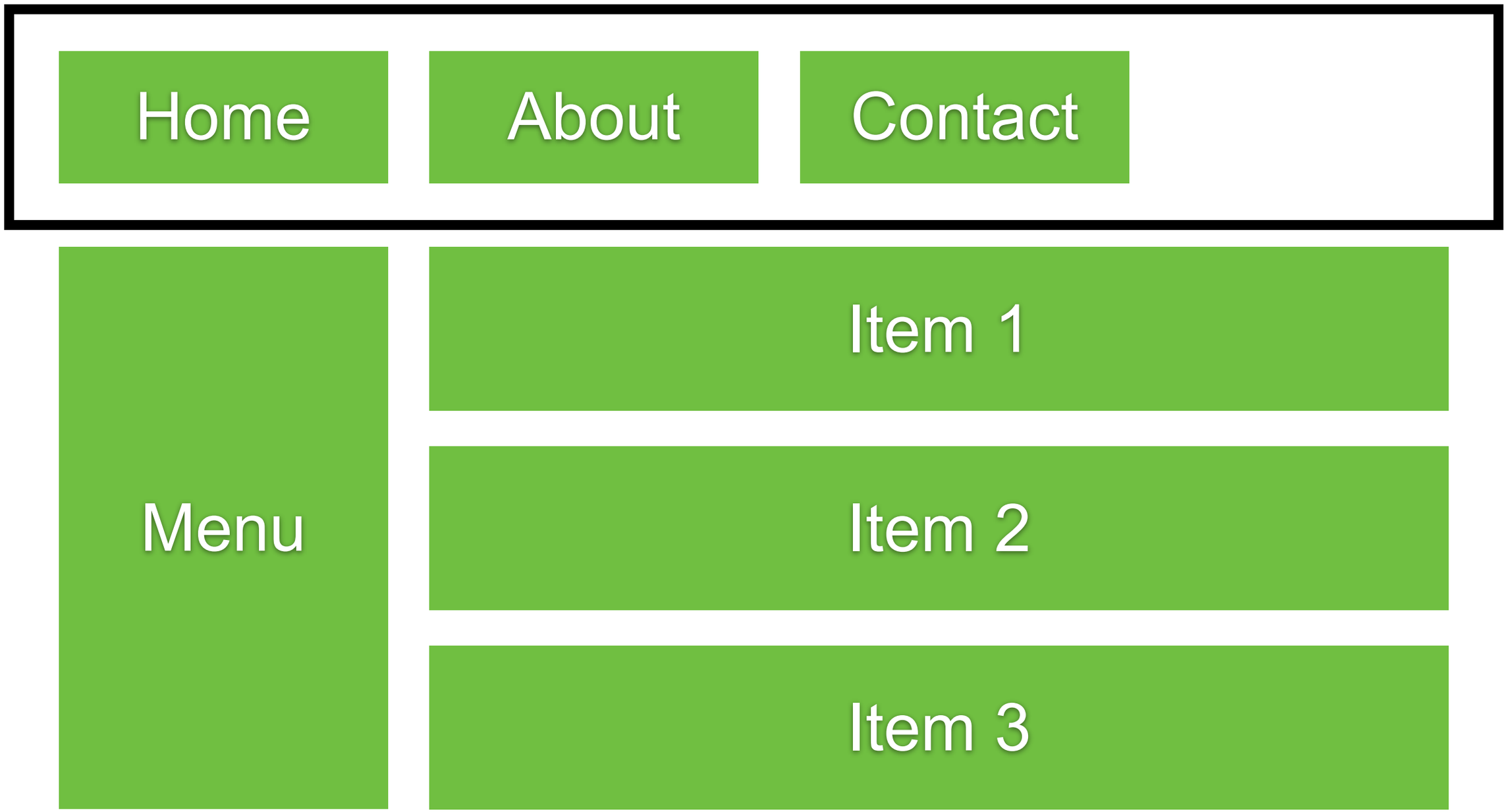
Composable
Reusable
Hierarchical



Design components



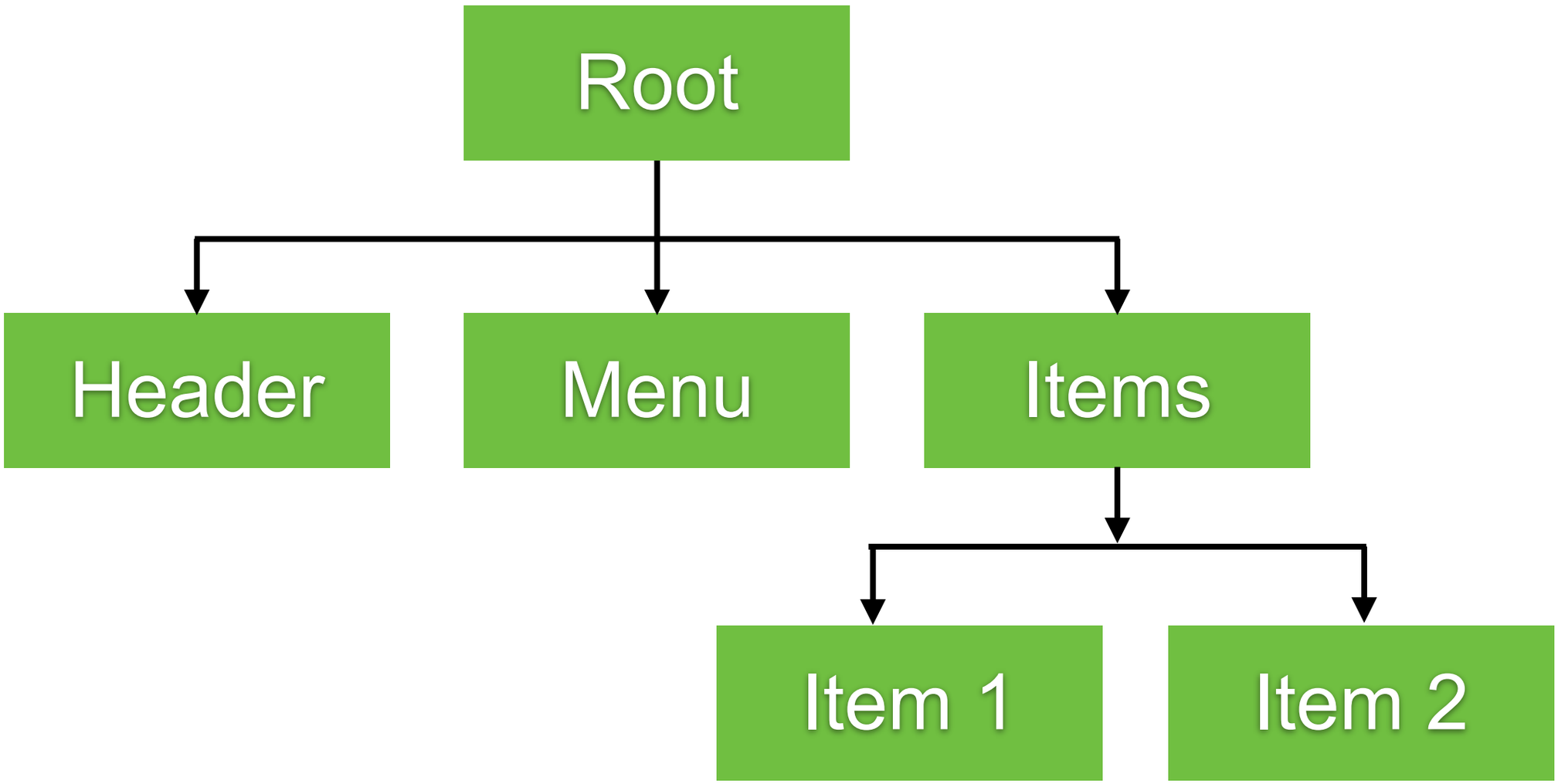
Header component



Sidebar/Menu component

Item component

Design components



Component

Template	Class	Metadata
View layout Create with HTML Binding and directives	Code support view Create with TypeScript Data and logic	Extra data Define decorator @Component

Component

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

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

export class AppComponent {
  title = 'demo01';
}
```

Metadata

Template

Metadata

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

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

export class AppComponent {
  title = 'demo01';
}
```

Component decorator

Directive name used in HTML

Metadata

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

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'demo01';
}
```

Component decorator

Directive name used in HTML

View layout , template and style

Component

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

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

```
export class AppComponent {
  title = 'demo01';
}
```

Class

Component

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

Import module/library

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

export class AppComponent {
  title = 'demo01';
}
```

Import ?

3-party libraries
ES modules
Angular modules

Angular is Modular

@angular/
core

@angular/
http

@angular/
router

Hello

Hello World

Output= …….

Click button


```
<button type="button"
        (click)="onAdd()">Add</button>
```

Show data (interpolation)

Output= .....

```
<button type="button"
        (click)="onAdd()">Add</>
<p>Output={{output}}</p>
```

Show array data (*ngFor)

```
tasks = ['Task 1', 'Task 2'];
```

```
<p>My Tasks:</p>
<ul>
  <li *ngFor="let task of tasks">
    {{ task }}
  </li>
</ul>
```

https://angular.io/guide/structural-directives

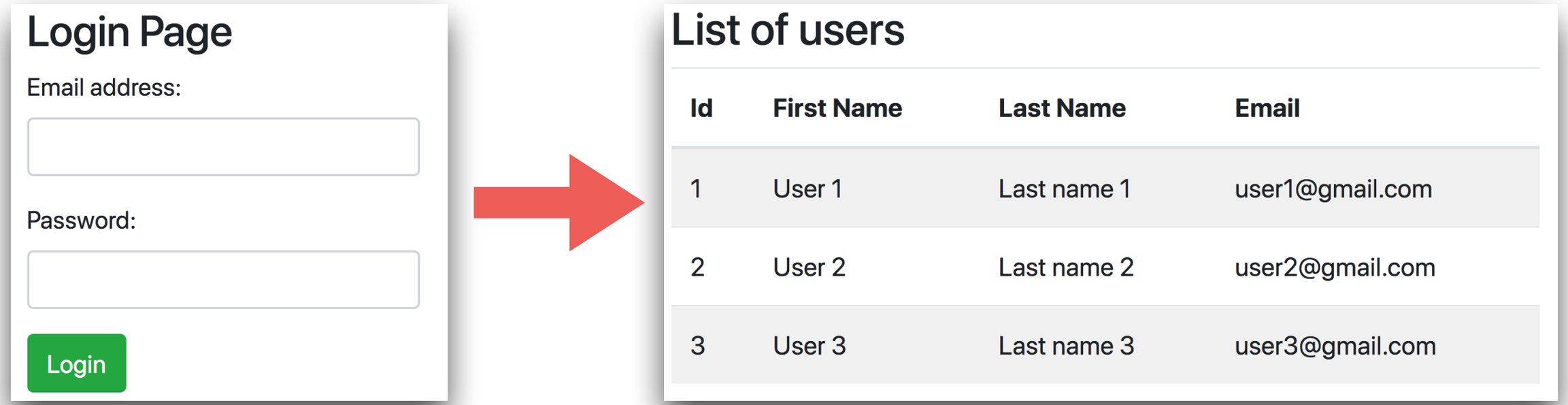
Get data from input (template reference)

Output= …….

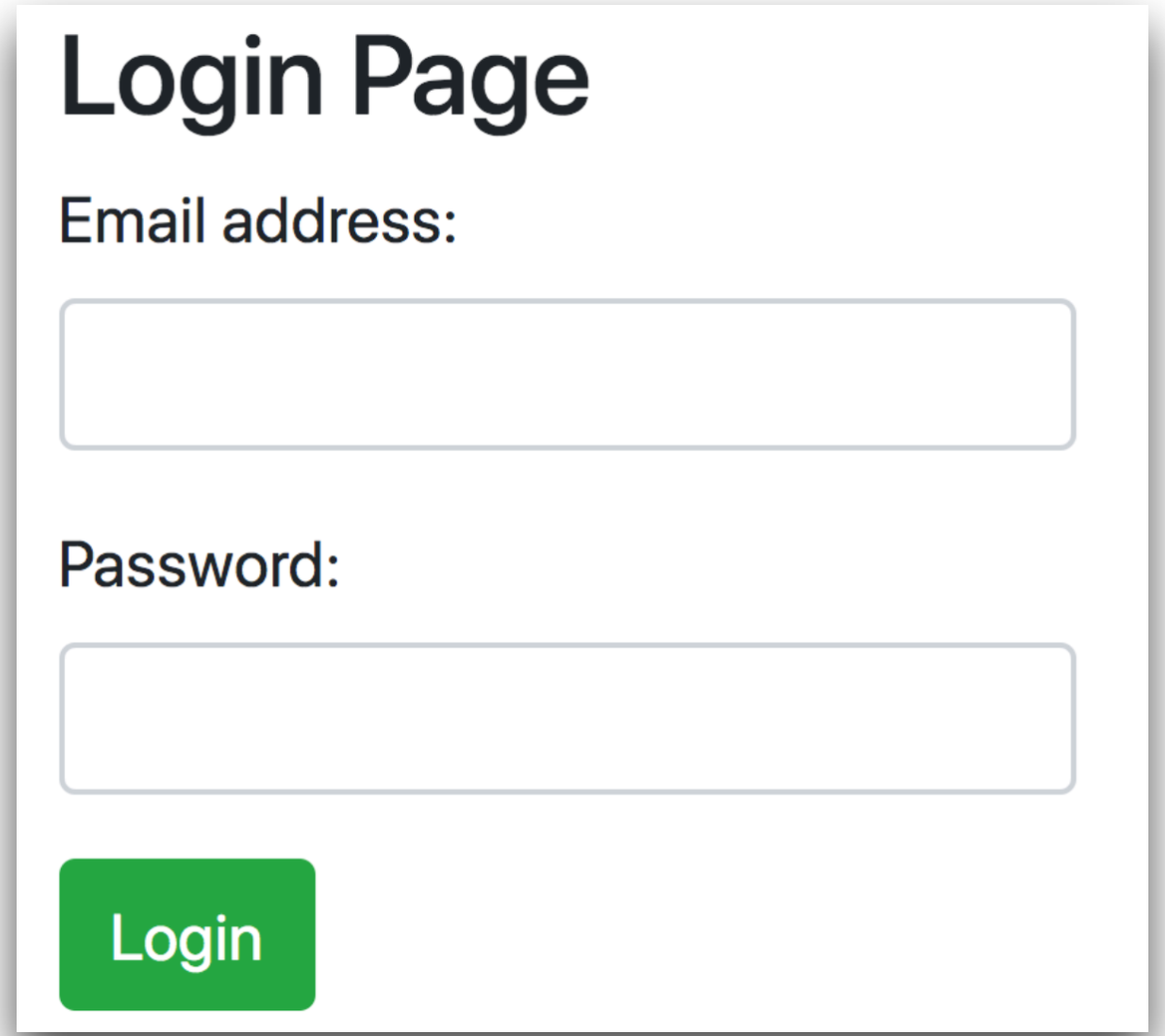
```
<input #box2 (keyup.enter)="onEnter(box2.value)">

<button (click)="onAdd(box3.value)">Add</button>
```

Workshop

Workshop



Login Page



Create new component with CLI

$ng generate component <name>

Create Login Component

$ng generate component login

```
CREATE src/app/login/login.component.css (0 bytes)
CREATE src/app/login/login.component.html (24 bytes)
CREATE src/app/login/login.component.spec.ts (621 bytes)
CREATE src/app/login/login.component.ts (265 bytes)
UPDATE src/app/app.module.ts (560 bytes)
```

Edit file login.component.html

```
<form>
  <div class="form-group">
    <label for="email">Email address:</label>
    <input type="email" class="form-control"
                        id="email" name="email" [(ngModel)]
                        ="email">
  </div>
  <div class="form-group">
    <label for="pwd">Password:</label>
    <input type="password" class="form-control"
                          id="password" name="password" [
                          (ngModel)]="password">
  </div>
  <button class="btn btn-success" (click)="login()
  ">Login</button>
</form>
```

Form have email and password

```
<form>
  <div class="form-group">
    <label for="email">Email address:</label>
    <input type="email" class="form-control"
                        id="email" name="email" [(ngModel)]="email">
  </div>
  <div class="form-group">
    <label for="pwd">Password:</label>
    <input type="password" class="form-control"
                          id="password" name="password" [(ngModel)]="password">
  </div>
  <button class="btn btn-success" (click)="login()">Login</button>
</form>
```

Handle click event of Login button

```
<form>
  <div class="form-group">
    <label for="email">Email address:</label>
    <input type="email" class="form-control"
                        id="email" name="email" [(ngModel)]="email">
  </div>
  <div class="form-group">
    <label for="pwd">Password:</label>
    <input type="password" class="form-control"
                          id="password" name="password" [(ngModel)]="password">
  </div>
  <button class="btn btn-success" (click)="login()">Login</button>
</form>
```

Add FormModule in app.module.ts

Add in imports section

```
@NgModule({
  declarations: [
    AppComponent,
    LoginComponent
  ],
  imports: [
    BrowserModule,
    AppRoutingModule,
    FormsModule
  ],
  providers: [],
  bootstrap: [AppComponent]
})
```

Edit file login.component.ts

Add fields to keep email and password

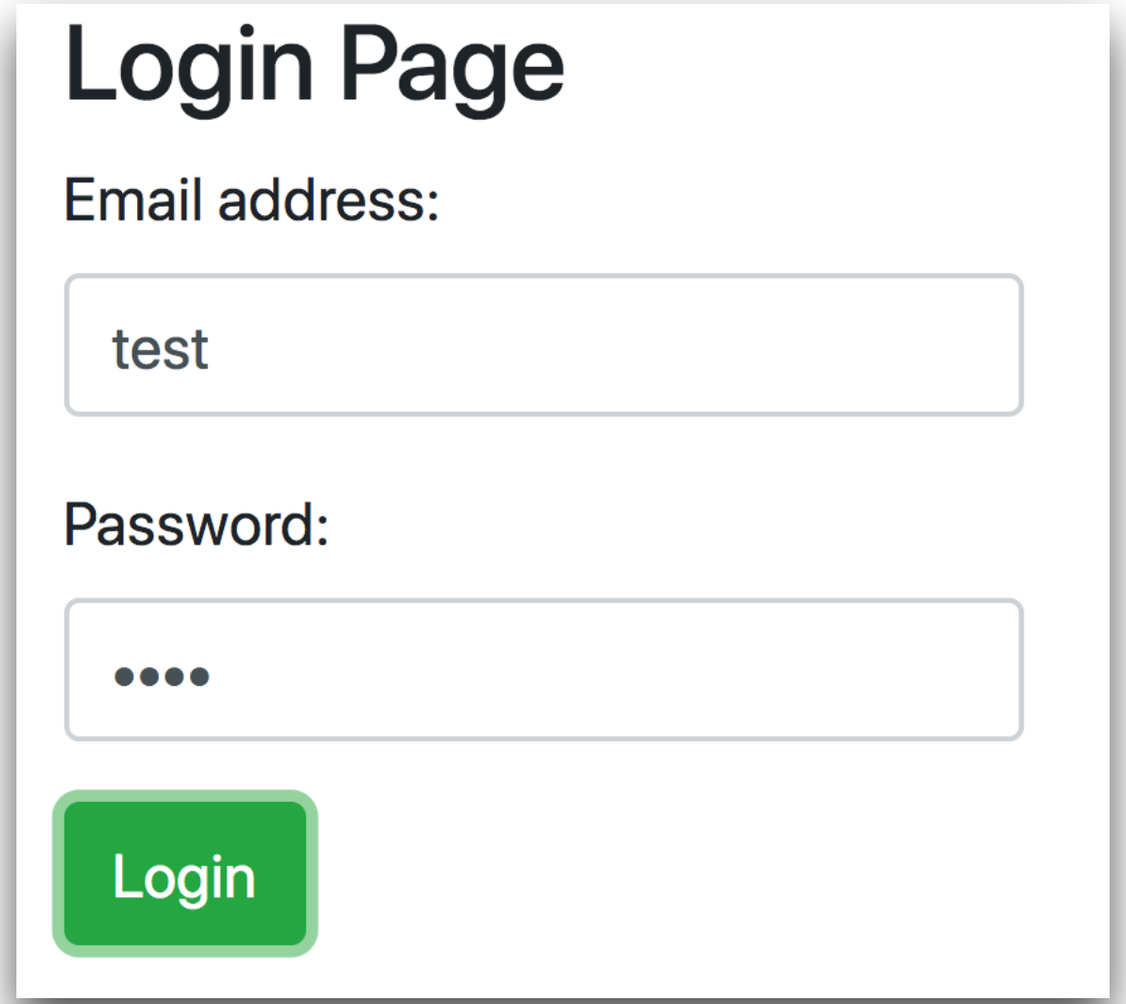
```
export class LoginComponent implements OnInit {

  email: string;
  password: string;

  constructor() { }
```

Edit file login.component.ts

Add login() to handle click action from HTML

```
login() {
  if (this.email === 'test' && this.password === 'test') {
    alert('Login success');
  } else {
    alert('Login failure');
  }
}
```

Run and see result



List of user page

List of users

Id	First Name	Last Name	Email
1	User 1	Last name 1	user1@gmail.com
2	User 2	Last name 2	user2@gmail.com
3	User 3	Last name 3	user3@gmail.com

Create User Component

$ng generate component user

```
CREATE src/app/user/user.component.css (0 bytes)
CREATE src/app/user/user.component.html (23 bytes)
CREATE src/app/user/user.component.spec.ts (614 bytes)
CREATE src/app/user/user.component.ts (261 bytes)
UPDATE src/app/app.module.ts (531 bytes)
```

Create Model of User

$ng generate class models/user

```
export class User {
    id: number;
    firstName: string;
    lastName: string;
    email: string;
}
```

Edit file user.component.ts

Create **list of user** field to UserComponent

```
import { Component, OnInit } from '@angular/core';
import { User } from '../models/user';

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

  users: User[];

  constructor() { }
```

Edit file user.component.ts

Create **fake data** of users

```
ngOnInit() {
  const fakeUsers = [
    {id: 1, firstName: 'User 1', lastName: 'Last name 1', email: 'user1@gmail.com'},
    {id: 2, firstName: 'User 2', lastName: 'Last name 2', email: 'user2@gmail.com'},
    {id: 3, firstName: 'User 3', lastName: 'Last name 3', email: 'user3@gmail.com'},
  ];
  this.users = fakeUsers;
}
```

We need routing ?

Angular have @angular/router

/login

Login Page

Email address:

Password:

Login

/user

List of users

Id	First Name	Last Name	Email
1	User 1	Last name 1	user1@gmail.com
2	User 2	Last name 2	user2@gmail.com
3	User 3	Last name 3	user3@gmail.com

Create AppRoutingModule

$ng generate module app-routing --flat --module=app

```
CREATE src/app/app-routing.module.spec.ts (308 bytes)
CREATE src/app/app-routing.module.ts (194 bytes)
UPDATE src/app/app.module.ts (933 bytes)
```

Open file app-routing.module.ts

```ts
import { NgModule } from '@angular/core';
import { CommonModule } from '@angular/common';

@NgModule({
  imports: [
    CommonModule
  ],
  declarations: []
})
export class AppRoutingModule { }
```

Open file app-routing.module.ts

Add RouterModule to module

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

@NgModule({
  imports: [
    RouterModule
  ],
  declarations: []
})
export class AppRoutingModule { }
```

Open file app-routing.module.ts

Add all route to Angular Routes

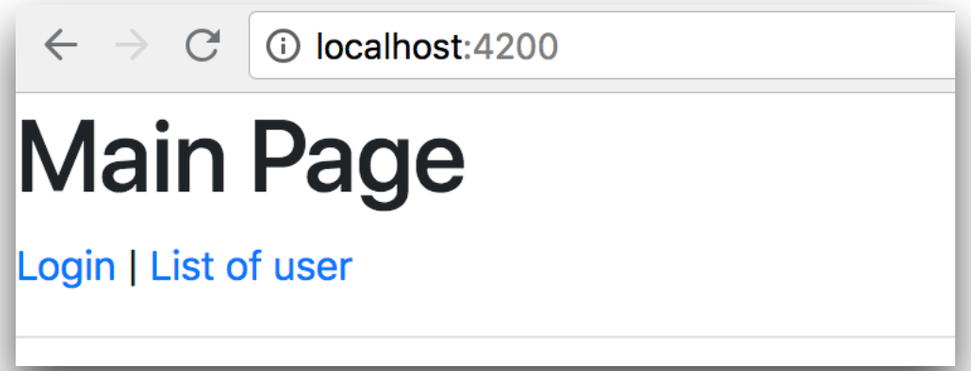
```
import { LoginComponent } from './login/login.component';
import { UserComponent } from './user/user.component';

const routes: Routes = [
  { path: 'login', component: LoginComponent },
  { path: 'user', component: UserComponent },
  { path: '', component: UserComponent },
];

@NgModule({
  imports: [
    RouterModule.forRoot(routes)
  ],
```

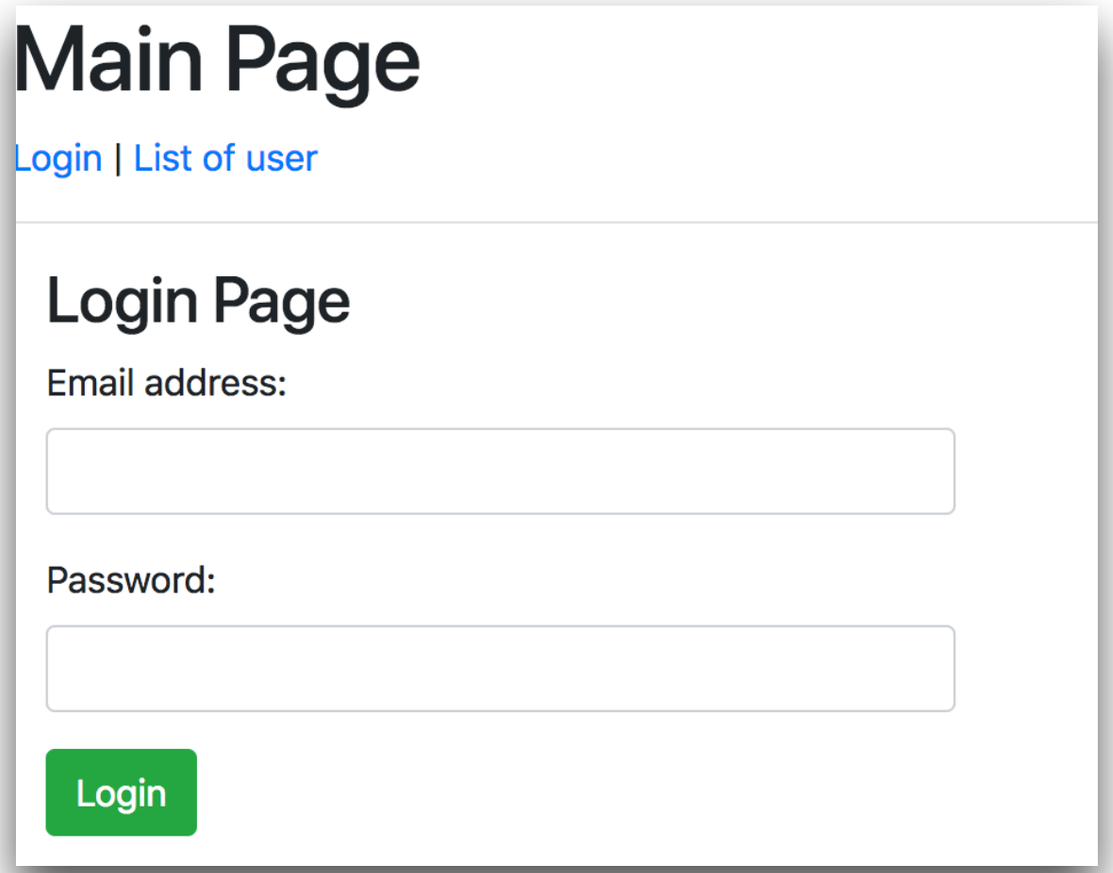
Edit app.component.html

Create template of app component

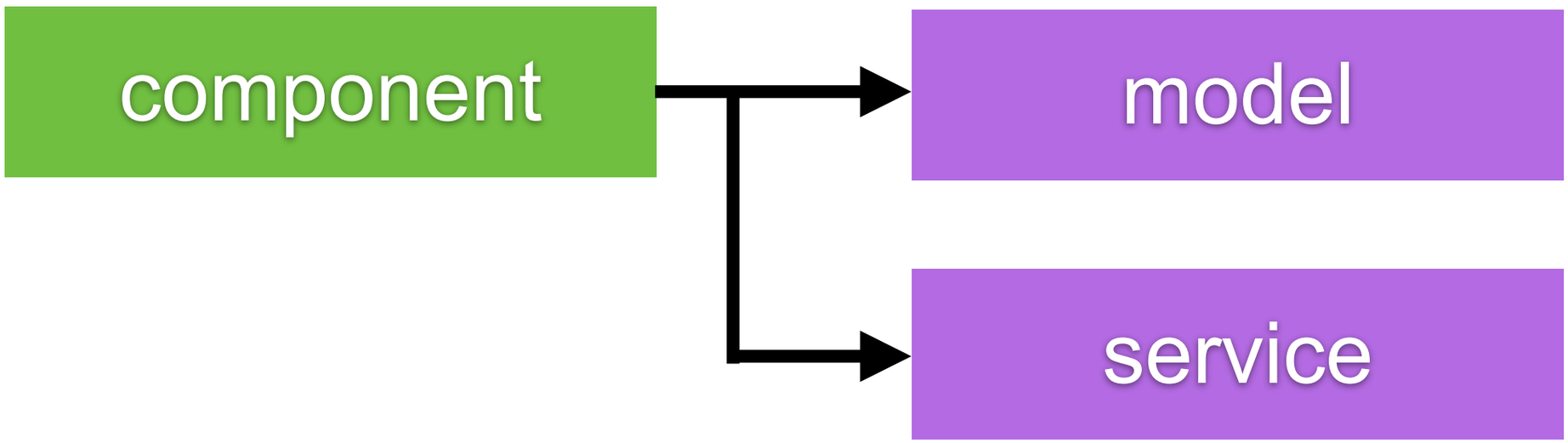
```
<h1 class="title">Main Page</h1>
<nav>
    <a routerLink="/login" routerLinkActive="active">Login</a> |
    <a routerLink="/user" routerLinkActive="active">List of user</a>
</nav>
<hr/>
<router-outlet></router-outlet>
```

See result in first page



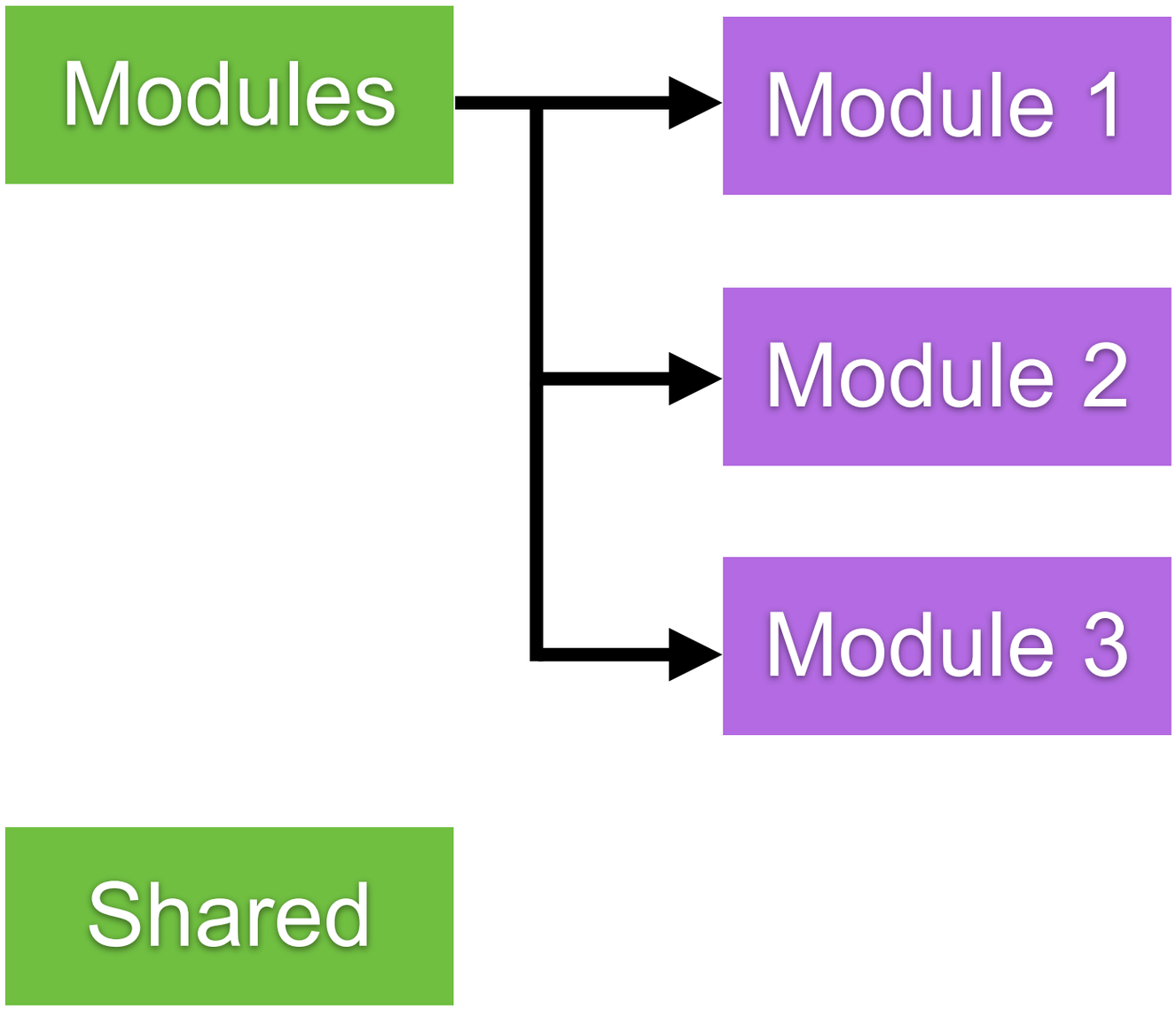


Better Structure of project

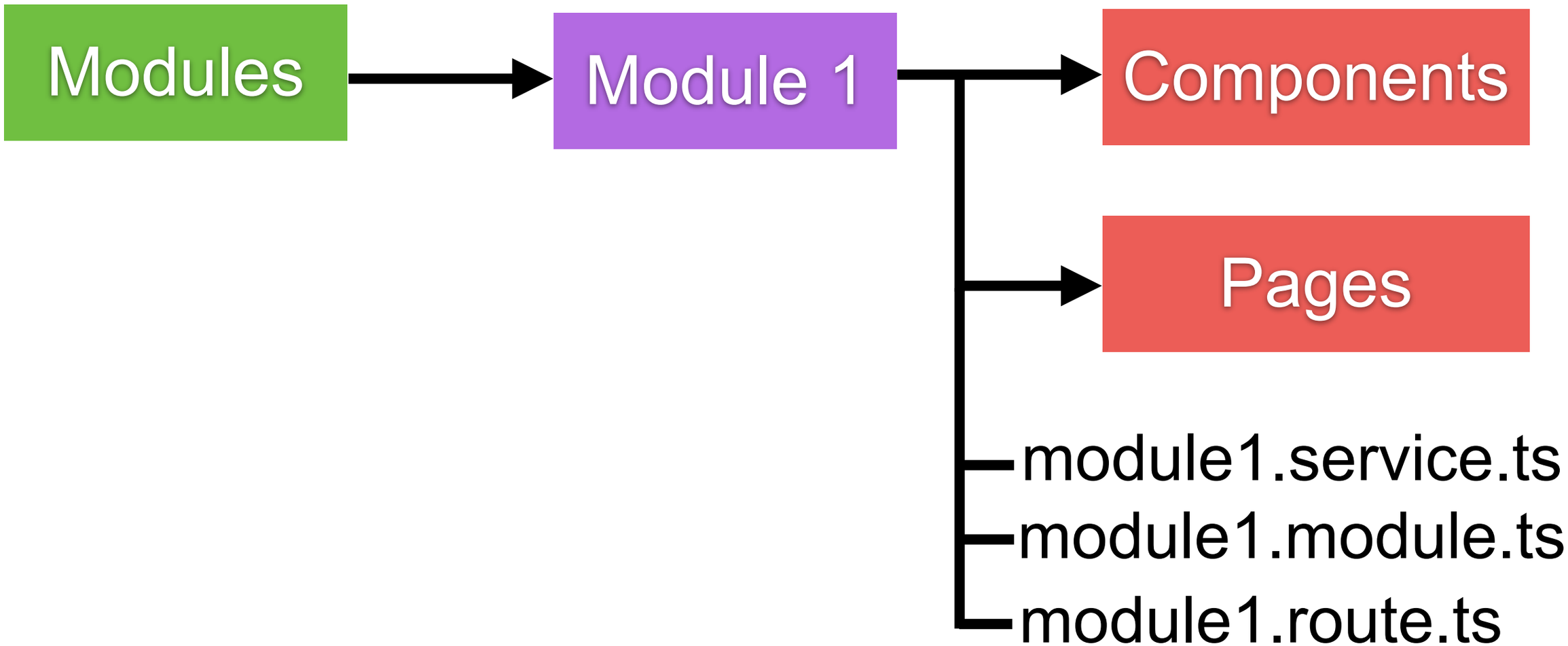


Large Project Structure

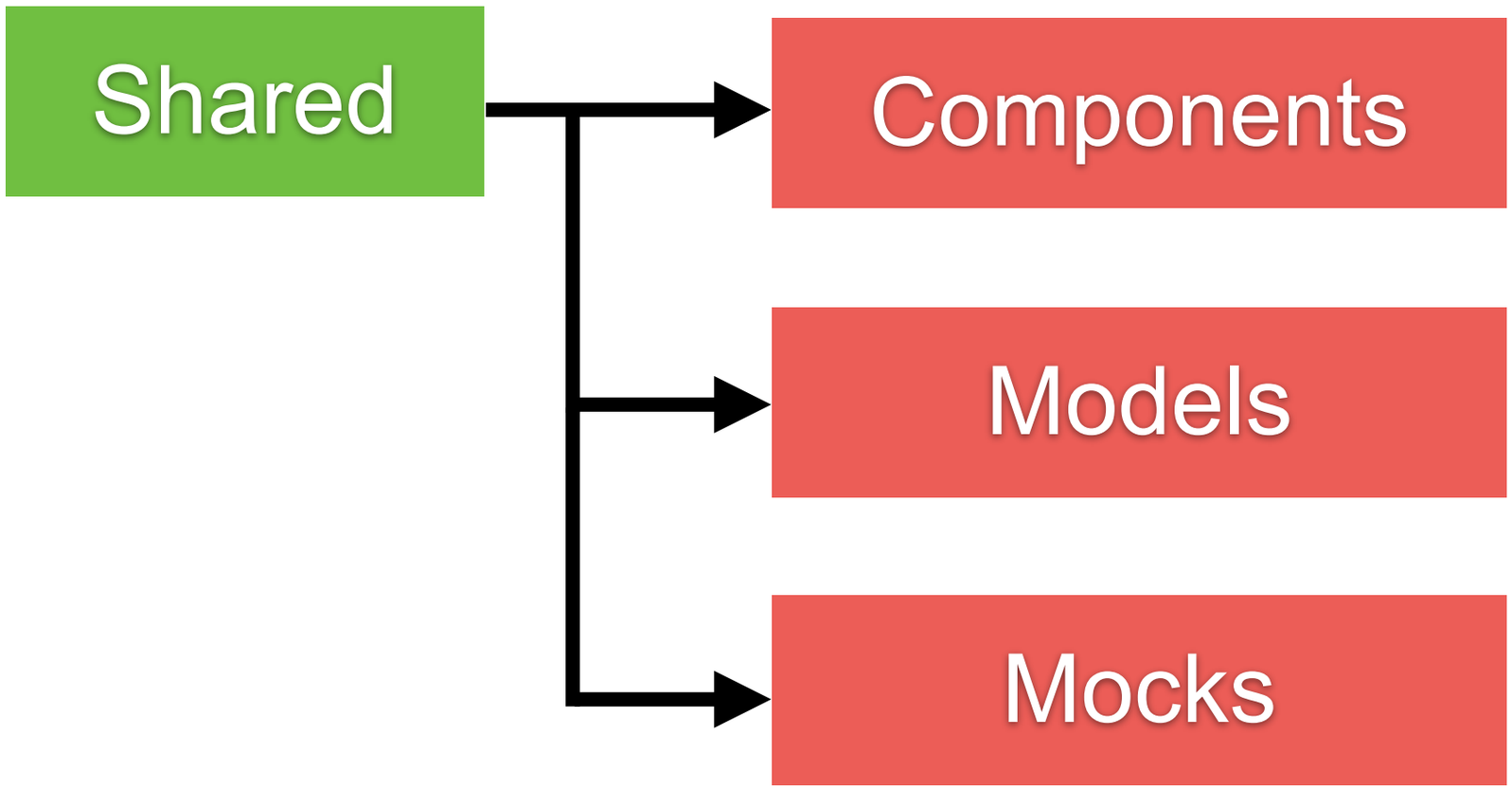
Better Structure of project



Module structure



Shared



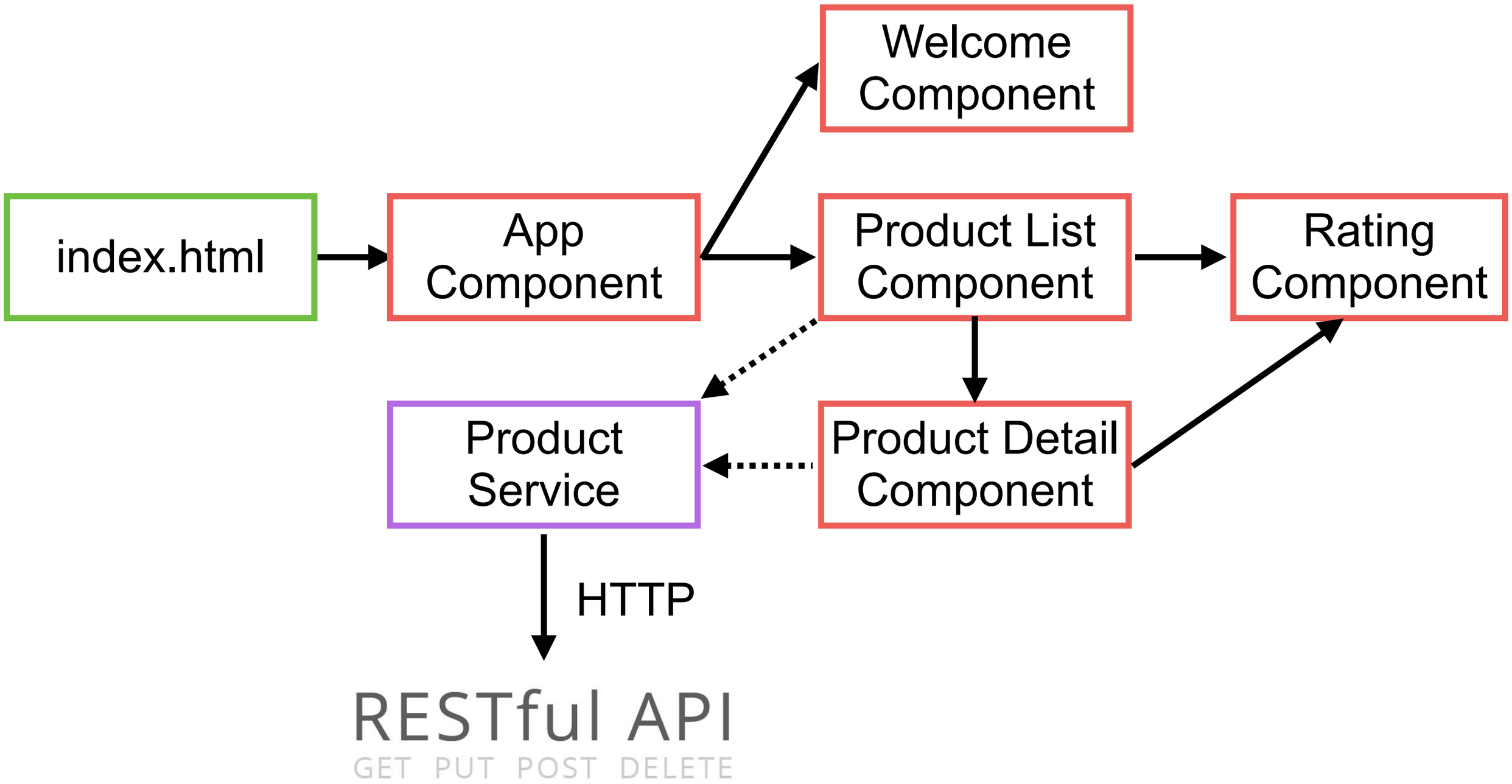
BEWARE....

../../../../../../

Environment with build

Application Architecture

Application Architecture



Component

Template + Class + Metadata

View layout
Create with HTML
Binding and directives

Code support view
Create with TypeScript
Data and logic

Extra data
Define decorator
@Component

Component

Module

Template

Template

Building template
Using component as a **directive**
Binding with **Interpolation**
Add logic with directive

Define template in component

Inline template
Link template

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

@Component({
  selector: 'app-root',
  template: `<h1>Welcome to {{ title }}!</h1>`,
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'hello';
}
```

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

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

Create Product List page

Product List Page

1. Install bootstrap and font

$npm install bootstrap font-awesome

2. Setting global stylesheet

Edit in file style.css

```
@import "~bootstrap/dist/css/bootstrap.min.css";
@import "~font-awesome/css/font-awesome.min.css";

div.card-header {
  font-size: large;
}

div.card {
  margin-top: 16px
}

.table {
  margin-top: 16px
}
```

http://bit.ly/2WTOsRt

3. Create product list

Create directory /app/products
Create file product-list.component.html

$ng **g**enerate **c**omponent products

4. Edit product-list-component.html

List of Product Page

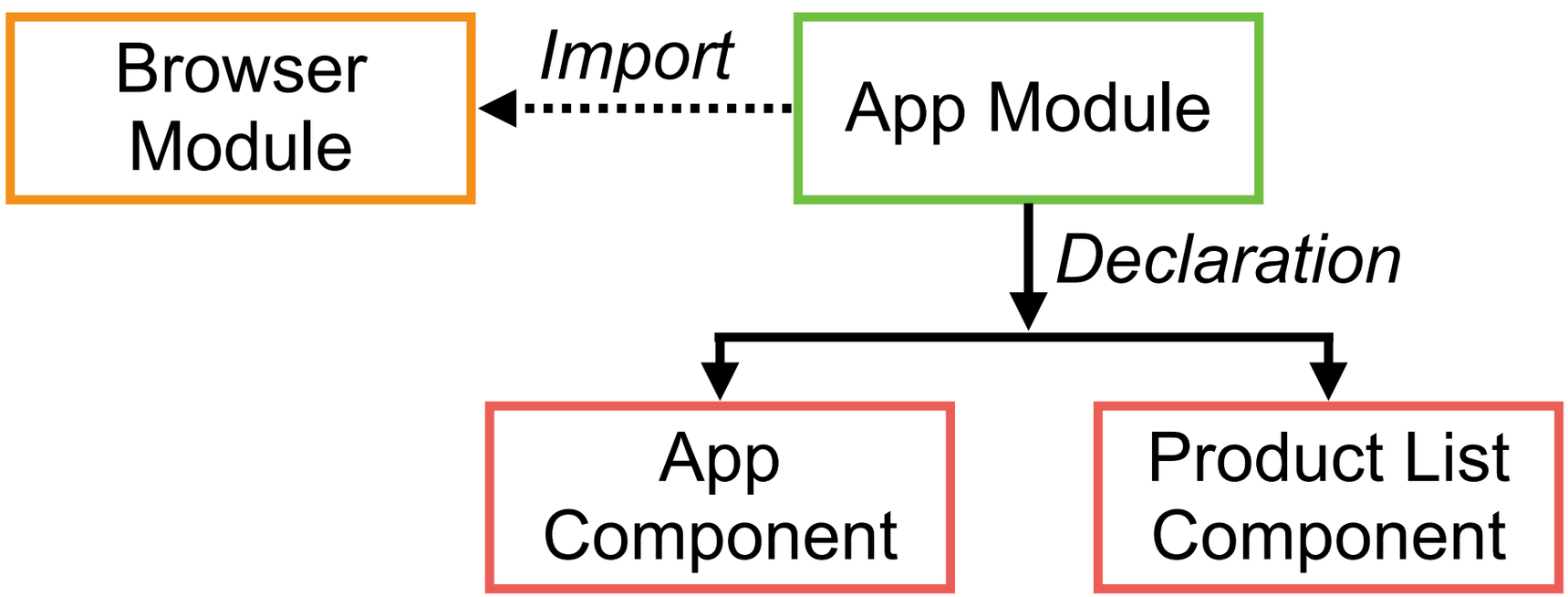
Filter by: Choosing
Filtered by ...

Product Image	Product Code	Product Name	Price	Available	Rating
XXX	0001	Name 01	1000.00	Yes	****
XXX	0002	Name 02	1000.00	Yes	****
XXX	0003	Name 03	1000.00	Yes	****

http://bit.ly/2WTOsRt

5. Add component to App Module

Edit file /app/app.module.ts



5. Add component to App Module

Edit file /app/app.module.ts

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

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

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

6. Use component as directive

Edit file /app/app.component.html

```
<div style="text-align:center">
  <h1 id="welcome_title">
    Welcome to {{ title }}!
  </h1>
</div>

<app-product-list></app-product-list>
```

Component directive

What is angular directives ?

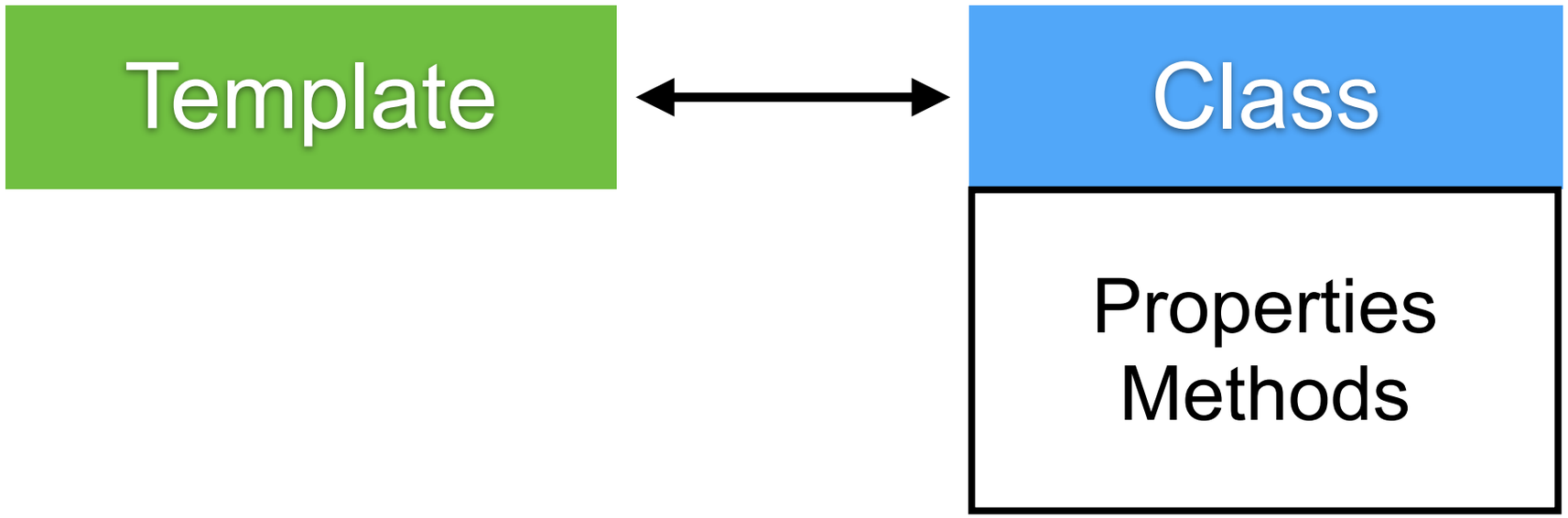
Custom HTML element or attribute use to power up and extend HTML

Types of directives

Component directive
Structural directive
Attribute directive

Data binding in Angular

Coordinate communication between component class and template



Data binding in Angular

One-way data binding
Two-way data binding

Interpolation

One-way data binding

Template

```
<div class='card'>
  <div class='card-header'>

    {{pageName}}

  </div>
```

Template expression

Class

```
export class ProductListComponent {

  pageName = 'List of Product Page';

  constructor() { }

}
```

Structure directive

Build-in directive from Angular

***ngIf:** if logic

***ngFor:** for loop

List of product

List of Product Page

Filter by: Choosing
Filtered by ...

Product Image	Product Code	Product Name	Price	Available	Rating
XXX	0001	Name 01	1000.00	Yes	****
XXX	0002	Name 02	1000.00	Yes	****
XXX	0003	Name 03	1000.00	Yes	****

Show data when found product(s)

Use *ngIf to check products

List of Product Page

Filter by: Choosing
Filtered by ...

Product Image	Product Code	Product Name	Price	Available	Rating
XXX	0001	Name 01	1000.00	Yes	****
XXX	0002	Name 02	1000.00	Yes	****
XXX	0003	Name 03	1000.00	Yes	****

Show data when found product(s)

Use *ngIf to check products

Class

```
export class ProductListComponent {

  pageName = 'List of Product Page';

  products = [
    {
      code: '0001',
      name: 'Product name 1',
      price: 100
    },
    {
      code: '0002',
      name: 'Product name 2',
      price: 200
    }
  ];
```

Template

```
<table class='table'

 *ngIf="products && products.length"

>
```

Use *ngFor to display all products

List of Product Page

Filter by: Choosing
Filtered by ...

Product Image	Product Code	Product Name	Price	Available	Rating
XXX	0001	Name 01	1000.00	Yes	****
XXX	0002	Name 02	1000.00	Yes	****
XXX	0003	Name 03	1000.00	Yes	****

Show data when found product(s)

Use *ngFor to display all products

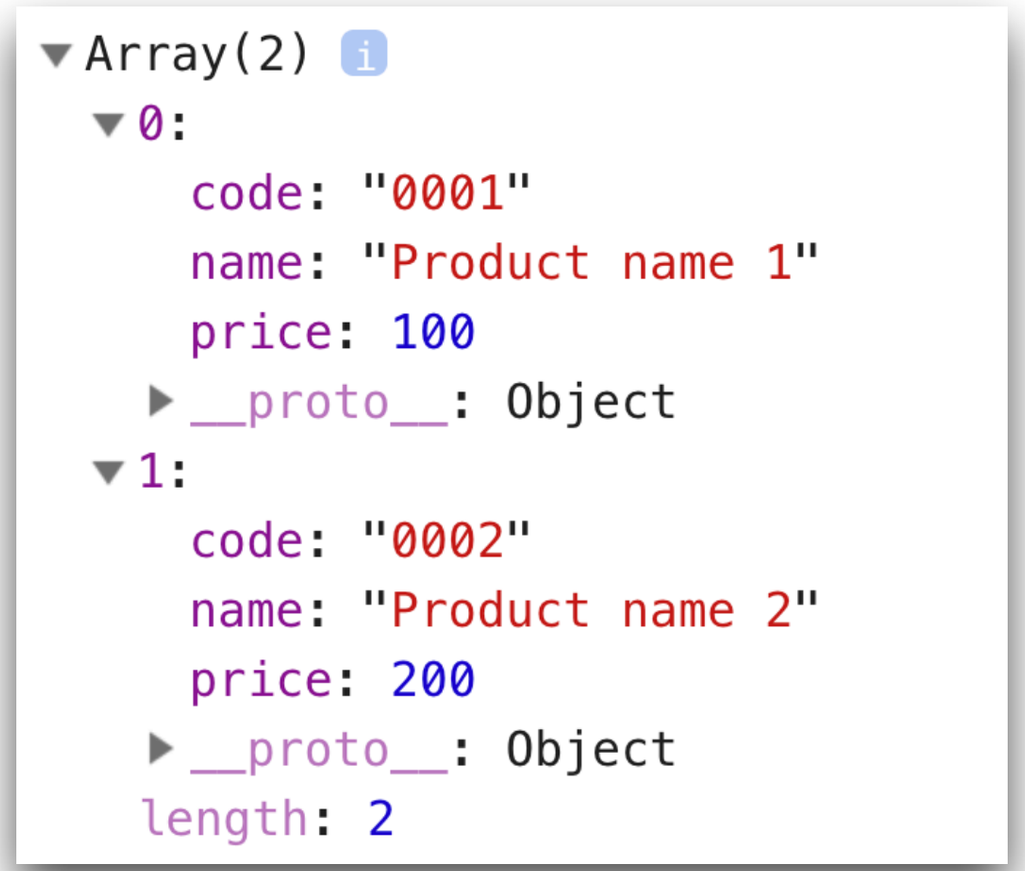
```
<tbody>
   <tr *ngFor="let product of products">
      <th>
         XXX
      </th>
      <th>{{product.code}}</th>
      <th>{{product.name}}</th>
      <th>{{product.price}}</th>
      <th>Yes</th>
      <th>****</th>
   </tr>
</tbody>
```

For loops

For … of
For … in

For … in

1, 2



For … of

Product 0
Product 1

Data binding in Angular

One-way data binding
Two-way data binding

More ..

Property binding
Handling events with event binding
Handling input with 2-way binding

Property binding

Property binding

```
<img
    [src]="product.imageUrl"
    [title]="product.name"
    [style.width.px]="imageWidth"
/>
```

https://angular.io/guide/template-syntax

List of product

List of Product Page

Filter by:

Filtered by ...

Handling input

Product Image	Product Code	Product Name	Price	Available	Rating
XXX	0001	Product name 1	100	Yes	****
XXX	0002	Product name 2	200	Yes	****

Handling events

Event binding

Template

```
<button class='btn btn-primary'
   (click)="toggleToShow()"
>
{{isShowImage ?
     'Hide Image' : 'Show Image'}}
</button>
```

Class

```
isShowImage = true;

toggleToShowProductImage() {
  this.isShowImage = !this.isShowImage;
}
```

Two-way binding

https://angular.io/guide/user-input

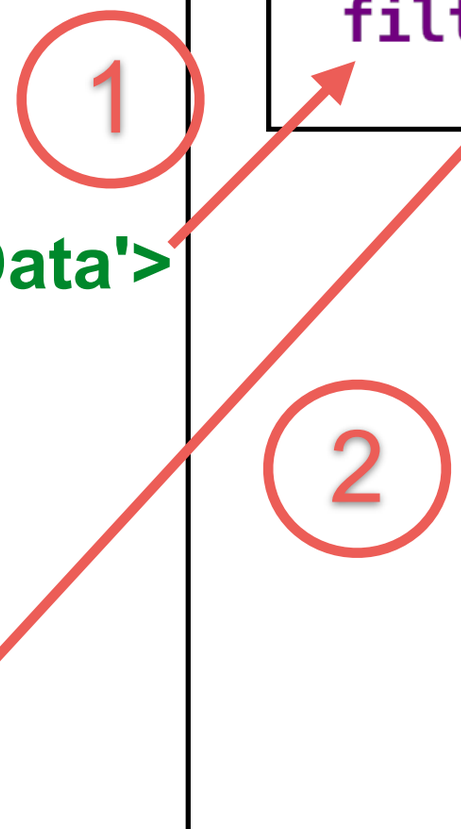
Two-way binding

Template

```
<div class='row'>
    <div class='col-md-2'>
        Filter by:
    </div>
    <div class='col-md-4'>
    <input type="text"
            [(ngModel)] = 'filterData'>
    </div>
</div>
<div class='row'>
    <div class='col-md-6'>
    Filtered by {{filterData}}
    </div>
</div>
```

Class

```
export class ProductListComponent {

  filterData = '';
```

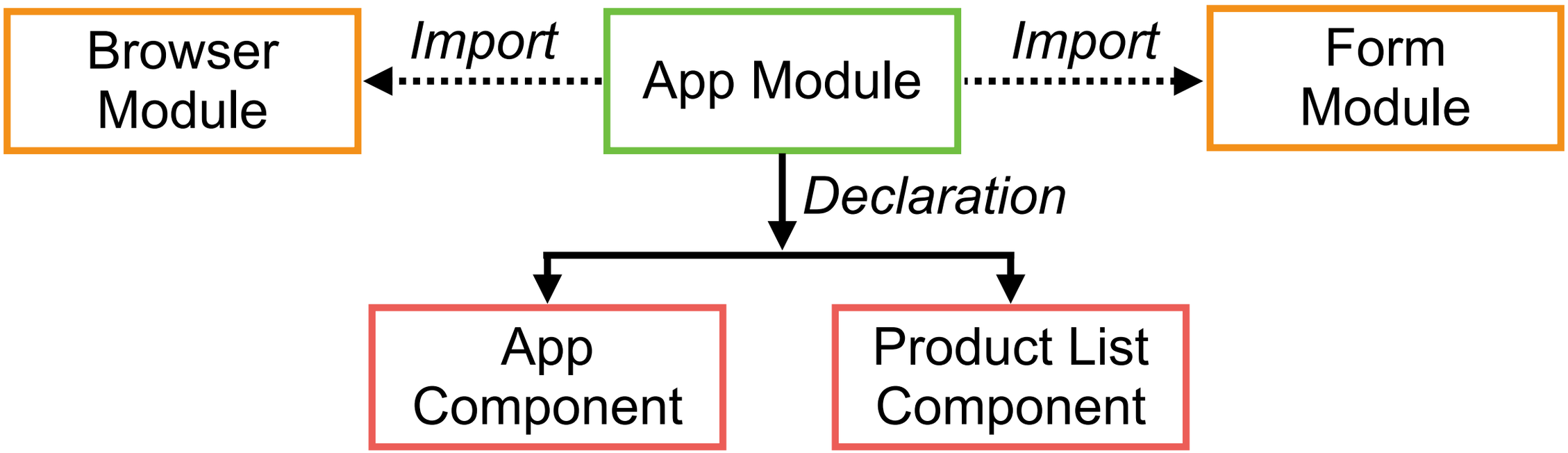


Error !!

```
Uncaught Error: Template parse errors:
Can't bind to 'ngModel' since it isn't a known property of 'input'. ("
      <div class='col-md-4'>
        <input type="text"
               [ERROR ->][(ngModel)] = 'filterData'>
      </div>
    </div>
"): ng:///AppModule/ProductListComponent.html@10:15
    at syntaxError (compiler.js:2426)
```

Add FormModule to AppModule

Edit file /app/app.module.ts

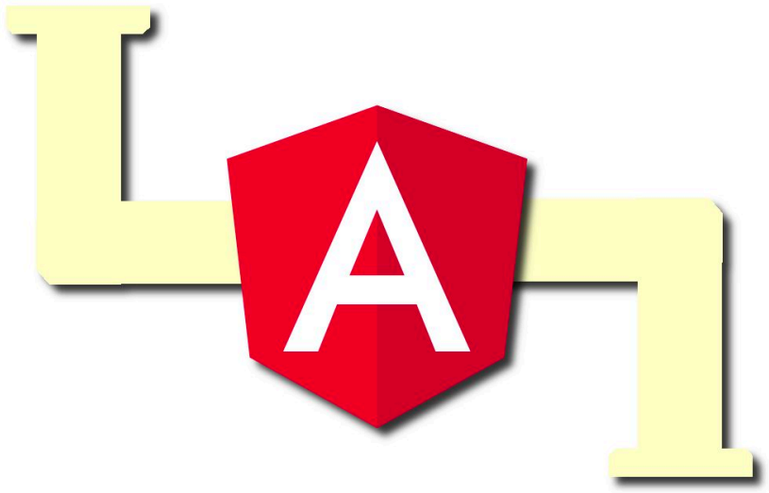


Add FormModule to AppModule

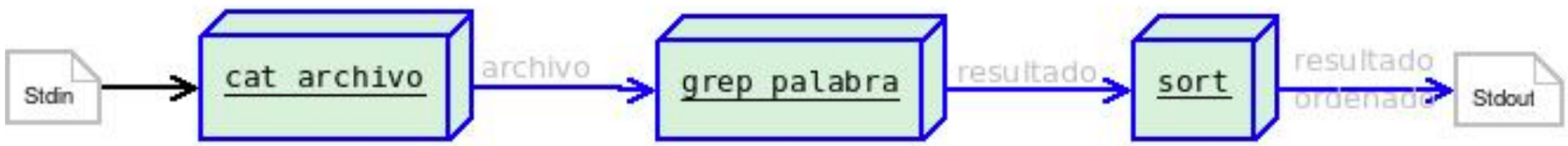
Edit file /app/app.module.ts

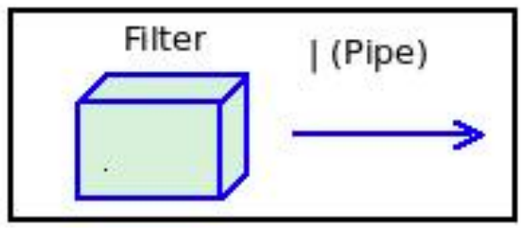
```
import { BrowserModule } from '@angular/platform-browser';
import { NgModule } from '@angular/core';

import {FormsModule} from '@angular/forms';

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

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

Transform data with Pipe



```
$cat Arquivo | grep palabra | sort
```





Angular Pipe

Pipes allow us to change the way to show data and transform data in our template

Angular Pipe

Build-in pipe

Parameterize pipe

Chaining pipe

Custom pipe

Filter

Build-in pipes

Date
Lowercase
Uppercase
Currency
Percent

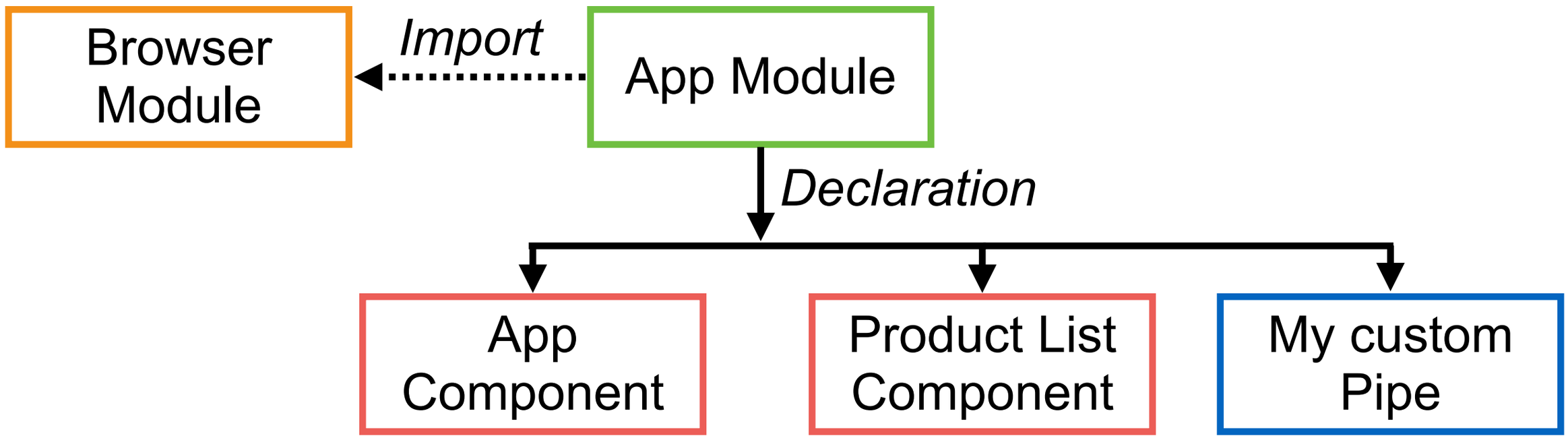
https://angular.io/api?type=pipe

Build-in pipes

```
<th>{{product.code}}</th>
<th>{{product.name | uppercase}}</th>
<th>{{product.price | currency: 'THB ' : 'symbol': '1.2'}}</th>
<th>Yes</th>
<th>****</th>
```

Custom pipes

$ng **g**enerate **p**ipe <pipe name>



Create custom pipes

$ng **g**enerate **p**ipe ReplaceWithDash

replace-with-dash.pipe.ts

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

@Pipe({
  name: 'replaceWithDash'
})
export class ReplaceWithDashPipe implements PipeTransform {

  transform(value: string, character: string): any {
     return value.replace(character, '-');
  }

}
```

Add pipe in app module

$ng **g**enerate **p**ipe ReplacewithDash

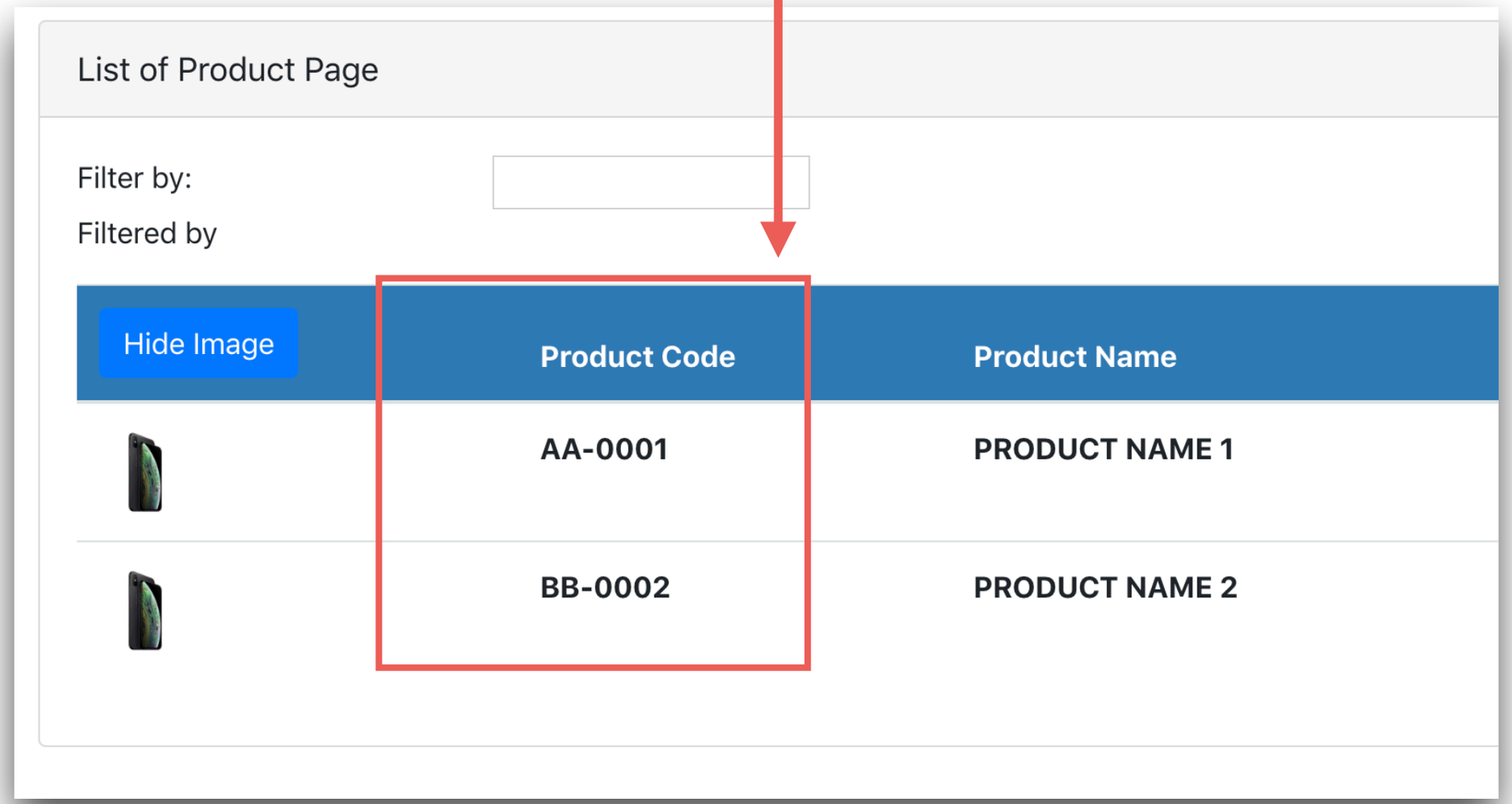
app.module.ts

```
import { ReplaceWithDashPipe } from './replace-with-dash.pipe';

@NgModule({
  declarations: [
    AppComponent,
    ProductListComponent,
    ReplaceWithDashPipe,
  ]})
```

Using pipe in template

product-list.component.html

```
<th>{{product.code | replaceWithDash: ' '}}</th>
```



Improve your component

Improve your component

Strong type and interface
Encapsulate style
Component Life cycle

Strong type

TypeScript is static type language
Cannot change type after assigned

```
16    pageName = 'List of Product Page';
17    imageWidth = 50;
18    imageWidth = 'New';
```

TS2300: Duplicate identifier 'imageWidth'.

TS2717: Subsequent property declarations must have the same type. Property 'imageWidth' must be of type 'number', but here has type 'string'.

Remove unused field 'imageWidth' ⌥⇧⏎ More actions... ⌥⏎

```
22        code: '0001',
```

https://www.typescriptlang.org/docs/handbook/basic-types.html

Improve product-list.componet.ts

Any for unknown type or dynamic content

```
products: any[] = [
  {
    code: '0001',
    name: 'Product name 1',
    price: 100,
    imageUrl: 'https://th-live-01.slatic.net/(
  },
  {
    code: '0002',
    name: 'Product name 2',
    price: 2000,
    imageUrl: 'https://th-live-01.slatic.net/(
  }
];
```

Interface is a specification

Using **interface** instead any type
Use interface as data type

```
export interface ProductDataModel {

  code: string;
  name: string;
  price: number;
  imageUrl: string;

}
```

https://www.typescriptlang.org/docs/handbook/interfaces.html

Use interface as data type

Edit file product-list.component.ts

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

export class ProductListComponent {


  products: ProductDataModel[] = [
    {
      code: '0001',
      name: 'Product name 1',
      price: 100,
      imageUrl: '',
    }
  ];
}
```

Encapsulate style in component

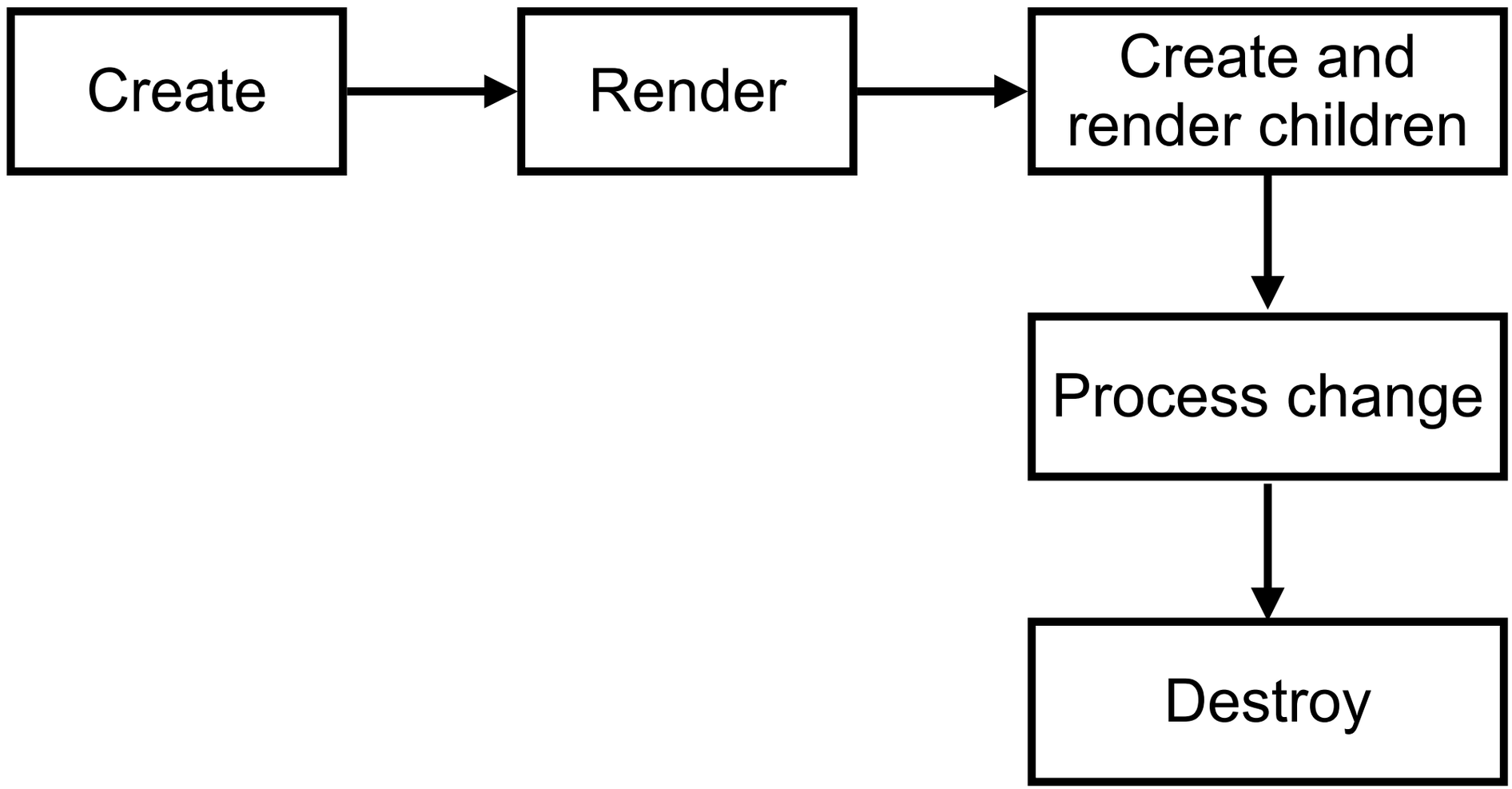
Styles

```
@Component({
  selector: 'app-product-list',
  templateUrl: './product-list.component.html',

  styles: ['thead {background: #337AB7; color: white}']

})
```

StyleUrls

```
@Component({
  selector: 'app-product-list',
  templateUrl: './product-list.component.html',

  styleUrls: ['./product-list.component.css']

})
```

Component life cycle



Component life cycle hooks

Method	Description
OnInit()	Perform component initialization Retrive data
OnChanges()	Perform action after properties are changed
OnDestroy()	Perform cleanup

https://angular.io/guide/lifecycle-hooks

Using life cycle hook

1. Import hook from @angular core

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

export class ProductListComponent implements OnInit {

  constructor() {
    console.log(this.products);
  }

  ngOnInit(): void {
    console.log('Called ngOnInit');
  }

}
```

2. Implement Hooks interface

3. Implement methods from hook

Filter data in product list

Filter data in product list

List of Product Page

Filter by:

Filtered by ...

1. Key-in data

Product Image	Product Code	Product Name	Price	Available	Rating
XXX	0001	Product name 1	100	Yes	****
XXX	0002	Product name 2	200	Yes	****

2. Filter and display data from criteria

Filter data using Pipe !!

"Angular not offer such pipe Filtering and Sorting because they perform poorly and prevent aggressive minification"

Filtering and sorting are expensive operation

https://angular.io/guide/pipes#no-filter-pipe

How to filtering and sorting ?

"Moving filtering and sorting login into component"

https://angular.io/guide/pipes#no-filter-pipe

Filter data

Create setter/getter method in component

Product-list.component.ts

```
export class ProductListComponent implements OnInit {

  private _filterData = '';

  set filterData(value: string) {
    this._filterData = value;
  }

  get filterData(): string {
    return this._filterData;
  }
```

Filter data

Filter data by input from HTML

Product-list.component.ts

Create filteredProduct to keep result

```
export class ProductListComponent implements OnInit {

  private _filterData: string;
  filteredProducts: ProductDataModel[];

  set filterData(value: string) {
    this._filterData = value;
    this.filteredProducts =
      this.filterData ?
        this.performFilter(this.filterData) : this.products;
  }

  get filterData(): string {
    return this._filterData;
  }
```

Filter data

Create function performFilter()

Product-list.component.ts

```
private performFilter(filterBy: string) {

  filterBy = filterBy.toLocaleLowerCase();

  return this.products.filter(
    (p: ProductDataModel) =>
       p.name.toLocaleLowerCase().indexOf(filterBy) !== -1);
}
```

Filter data from product name

https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/filter

Change in template

Product-list.component.html

```
<tbody>
  <tr *ngFor="let product of filteredProducts">
    <th>
      <img *ngIf="isShowImage"
           [src]="product.imageUrl"
           [title]="product.name"
           [style.width.px]="imageWidth"
      />
    </th>
```

Try to run

List of Product Page

Filter by:

Filtered by

Hide Image	Product Code	Product Name	Price	Available	Rating

Filter data

Initial data in constructor

Product-list.component.ts

```
export class ProductListComponent implements OnInit {


  constructor() {
    console.log(this.products);
    this.filteredProducts = this.products;
  }

}
```

https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/filter

Try to run

List of Product Page

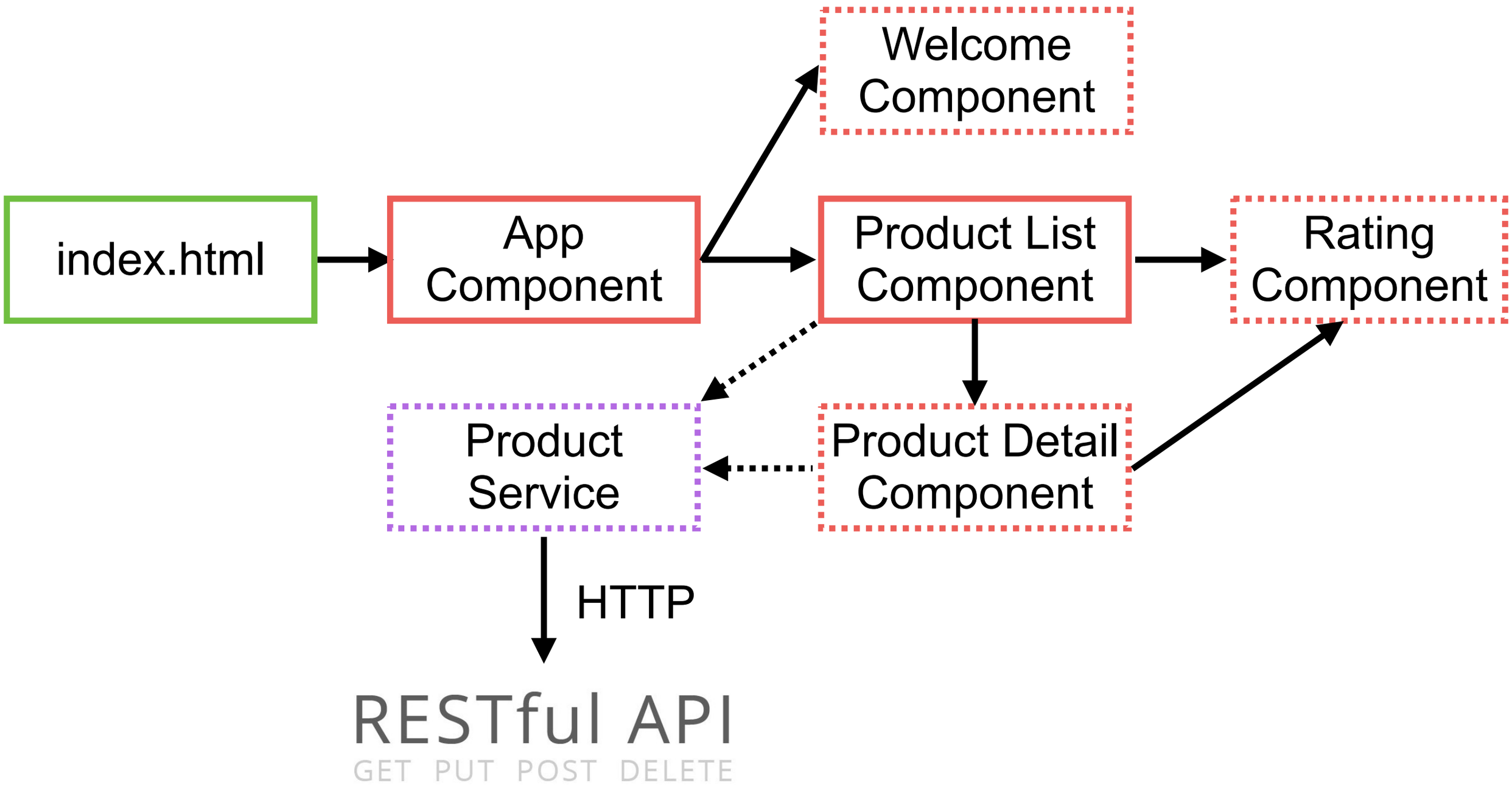
Filter by:

Filtered by

Hide Image	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	****
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	****

Nested components

Application Architecture



Rating component

List of Product Page

Filter by:

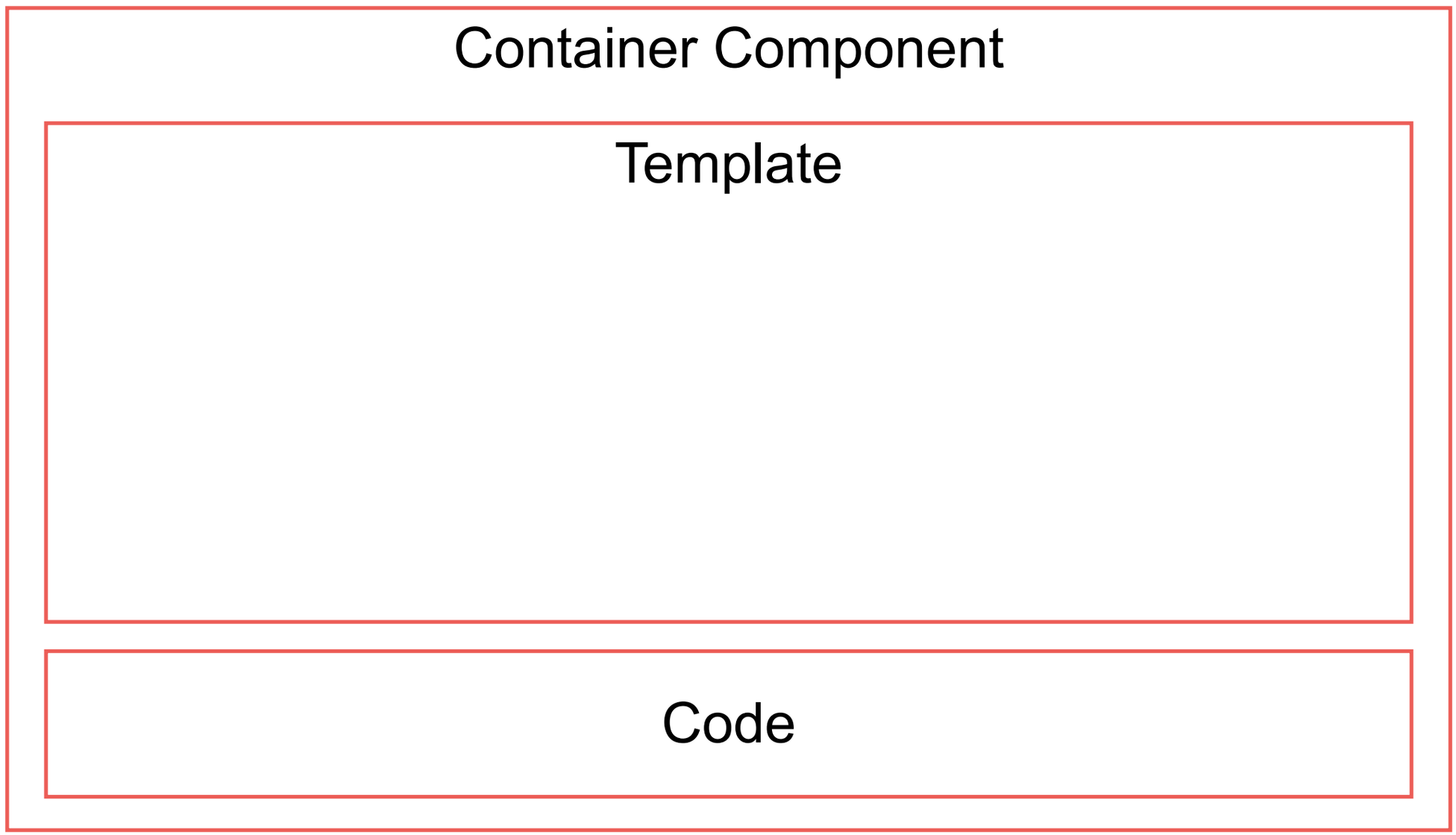
Filtered by

Hide Image	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	****
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	****

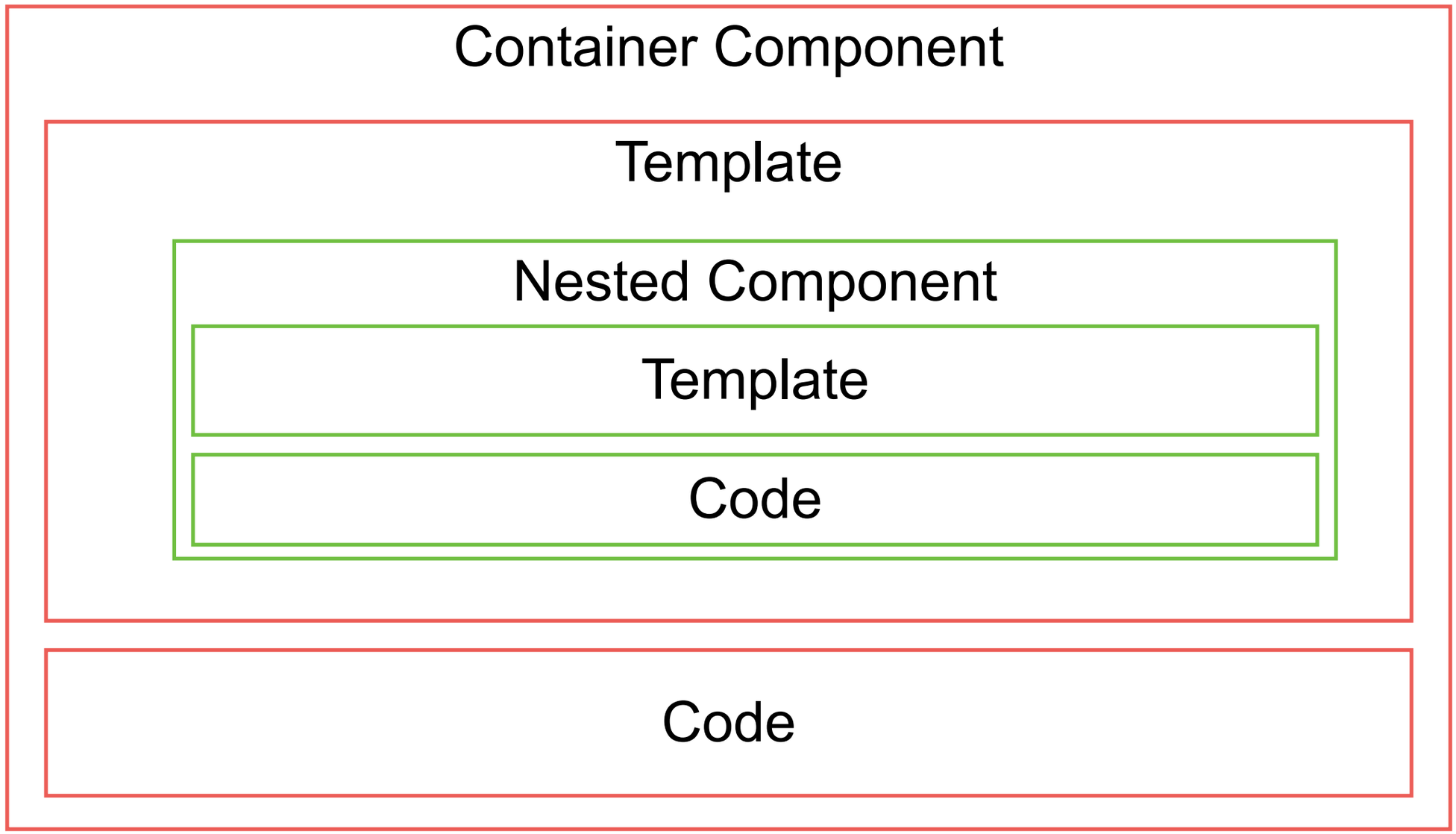
Nested component

Building component
Using component
Passing data to component (@Input)
Raising event from component (@Output)

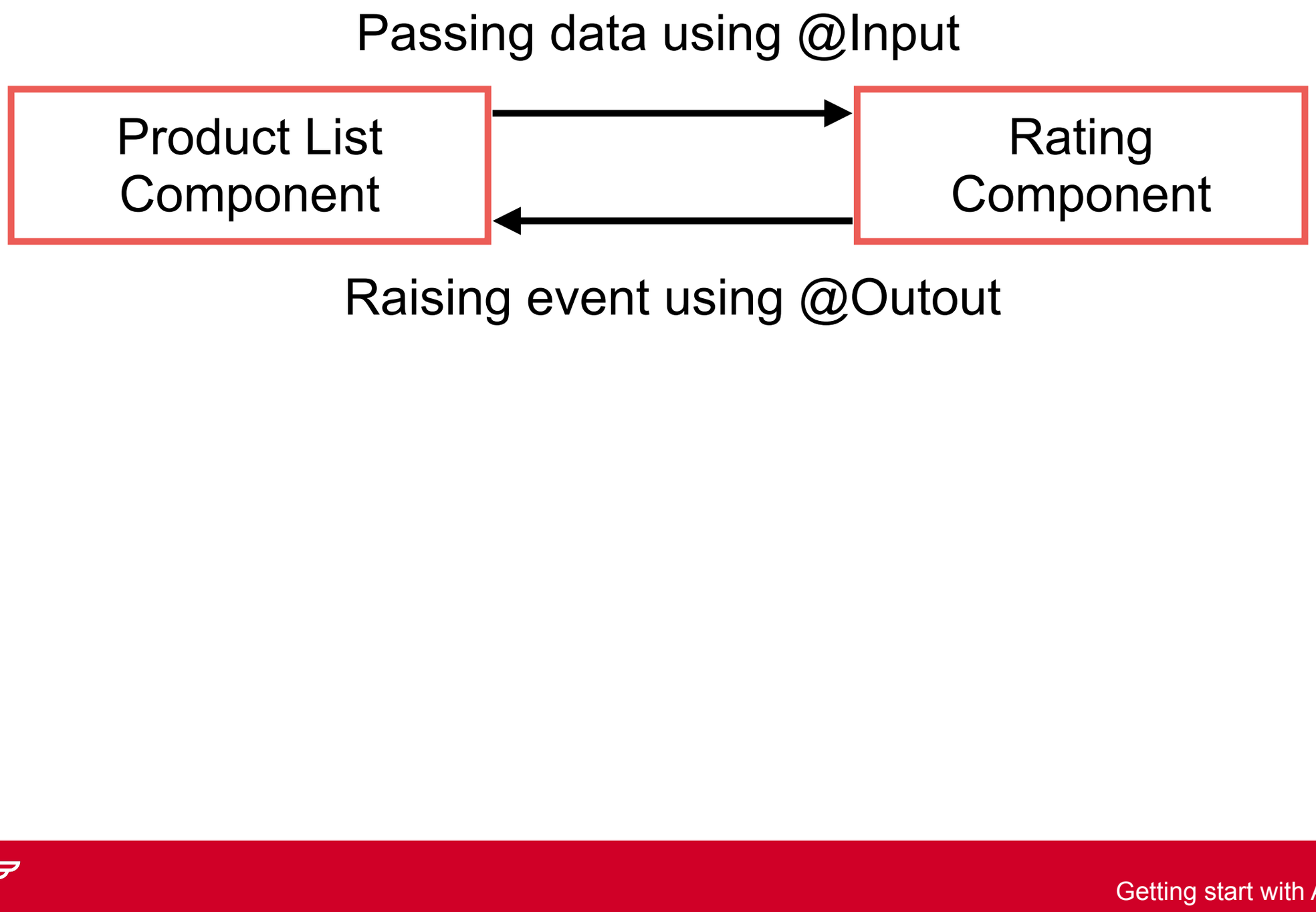
Nested component



Nested component



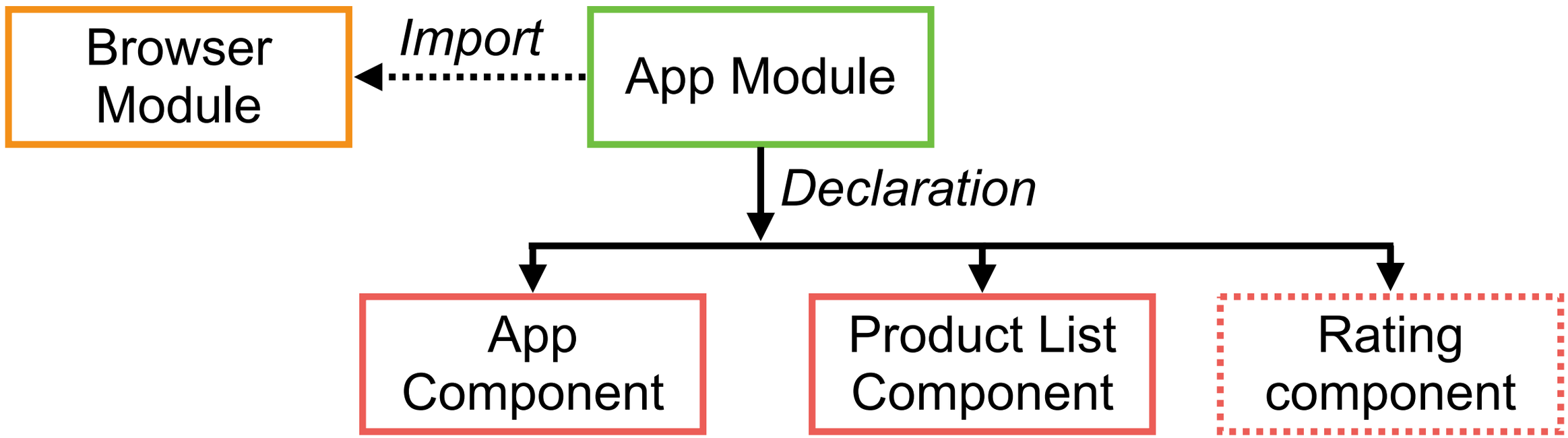
Nested component



Building component

1. Create rating component

$ng **g**enerate **c**omponent rating



1. Create rating component

$ng **g**enerate **c**omponent rating

Rating.component.ts

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

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

}
```

→ *Directive name of rating component*

2. Add rating component in module

/app/app.module.ts

App.module.ts

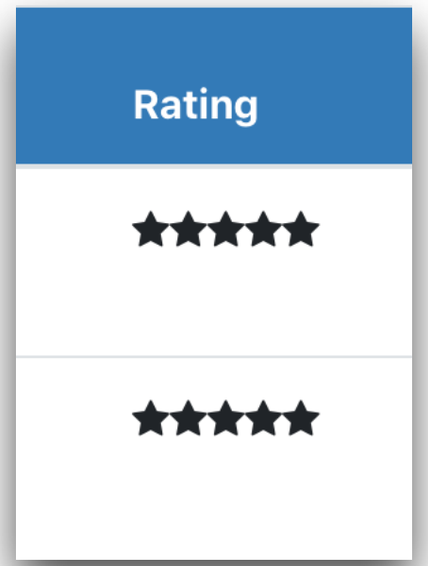
```ts
import { RatingComponent } from './rating/rating.component';

@NgModule({
  declarations: [
    AppComponent,
    ProductListComponent,
    ReplaceWithDashPipe,
    RatingComponent,
  ],
```

3. Edit template of rating

/app/rating/rating.component.html

Rating.component.html

```
<div>
  <div style="width: 75px">
    <span class="fa fa-star"></span>
    <span class="fa fa-star"></span>
    <span class="fa fa-star"></span>
    <span class="fa fa-star"></span>
    <span class="fa fa-star"></span>
  </div>
</div>
```



4. Using rating in product list

/app/product-list/product-list.component.html

Product-list.component.html

```
<tbody>
  <tr *ngFor="let product of filteredProducts">
    <th>
      <img *ngIf="isShowImage"
           [src]="product.imageUrl"
           [title]="product.name"
           [style.width.px]="imageWidth"
      />
    </th>
    <th>{{product.code | replaceWithDash: ' '}}</th>
    <th>{{product.name | uppercase}}</th>
    <th>{{product.price | currency: 'THB ' : 'symbol': '1.2'}}</th>
    <th>Yes</th>
    <th>
      <app-rating></app-rating>
    </th>
  </tr>
</tbody>
```

4. Using rating in product list

List of Product Page

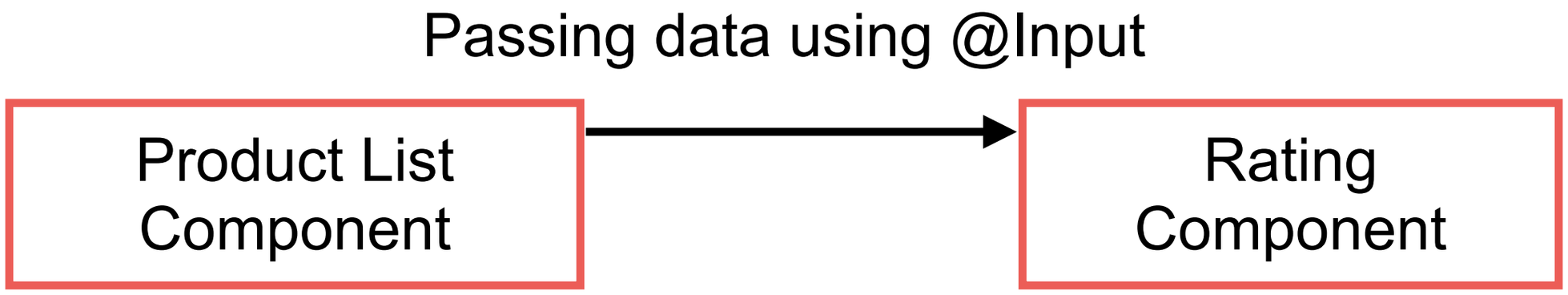
Filter by:

Filtered by

Hide Image	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	★★★★★
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	★★★★★

Passing data to component

Passing data to component



Passing data to component

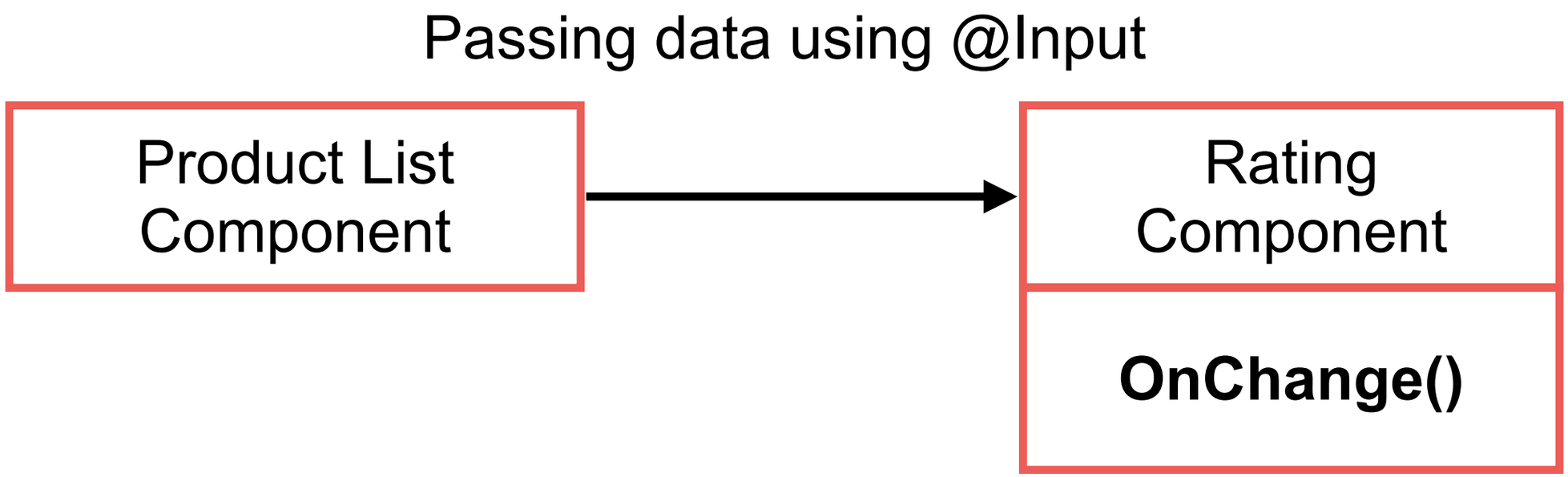
Product-list.component.html

```
<th>
  <app-rating [rating]="product.rating"></app-rating>
</th>
```

Rating.component.ts

```
export class RatingComponent implements OnInit {
  @Input() rating: number;
}
```

Detect data change in component



Detect data change in component

Rating.component.html

```
<div
  [style.width.px]="starWidth"
  style="overflow: hidden;"
>
  <div style="width: 75px"></div>
</div>
```

Rating.component.ts

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

export class RatingComponent implements OnChanges {
  @Input() rating: number;
  private starWidth: number;

  ngOnChanges(): void {
    this.starWidth = this.rating * 75 / 5;
  }
}
```

Result

List of Product Page

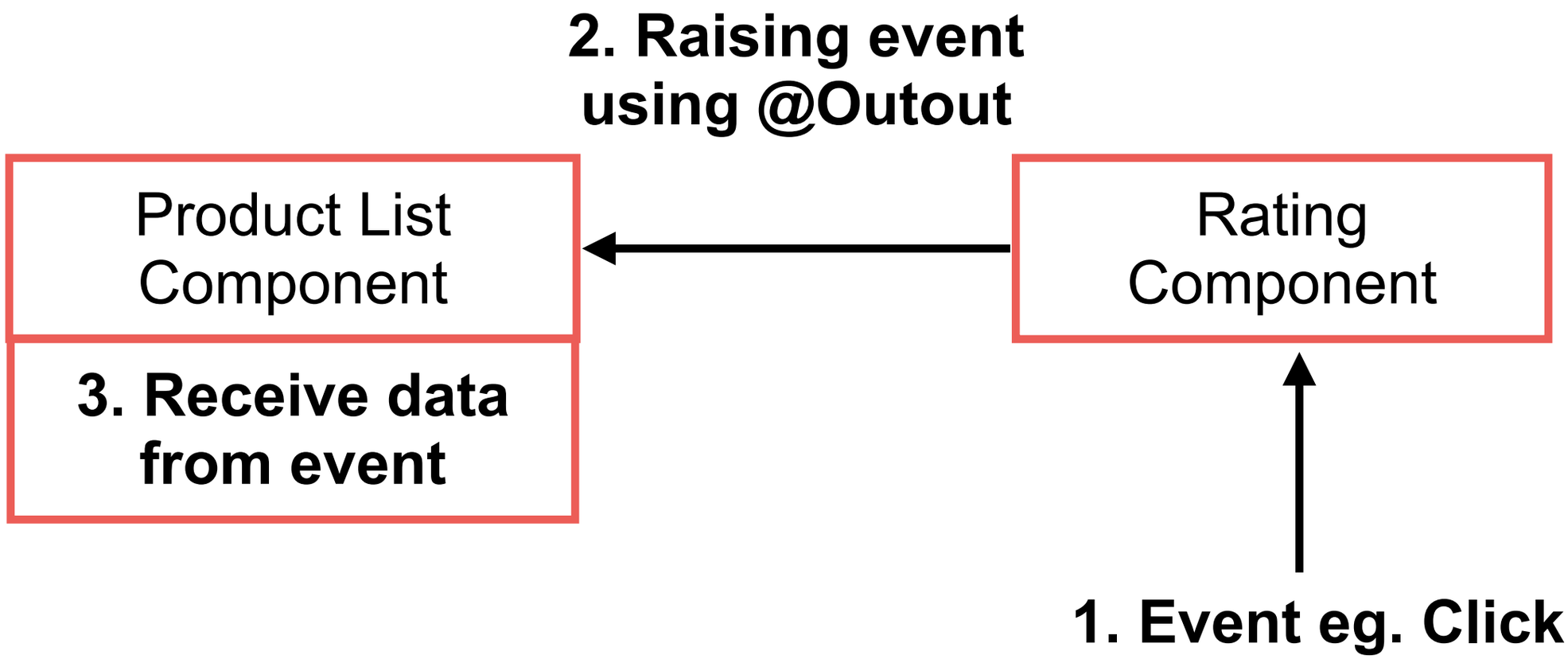
Filter by:

Filtered by

Hide Image	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	★★★★★
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	★★
	BB-0003	PRODUCT NAME 3	THB 2,000.00	Yes	★★★½

Raising event from component

Raising event from component



1. Event handling on rating

Rating.component.html

```
<div
  [style.width.px]="starWidth"
  style="overflow: hidden;"
  (click)="onClickRating()"
>
  </div>
```

Rating.component.ts

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

export class RatingComponent implements OnChanges {

  onClickRating() {
    console.log('Click on rating');
  }

}
```

2. Raising event with @Output

Product-list.component.html

```
<app-rating
   [rating]="product.rating"

   (ratingClicked)="onRatingClicked($event)">

</app-rating>
```

Rating.component.ts

```
export class RatingComponent implements OnChanges {

  @Output() ratingClicked: EventEmitter<string>
                                    = new   EventEmitter<string>();


  onClickRating() {
    console.log('Click on rating');
    this.ratingClicked.emit(`Rating ${this.rating} was clicked`);
  }
}
```

3. Receive data from event

Product-list.component.html

```
<app-rating
   [rating]="product.rating"

   (ratingClicked)="onRatingClicked($event)">

</app-rating>
```

Product-list.component.ts

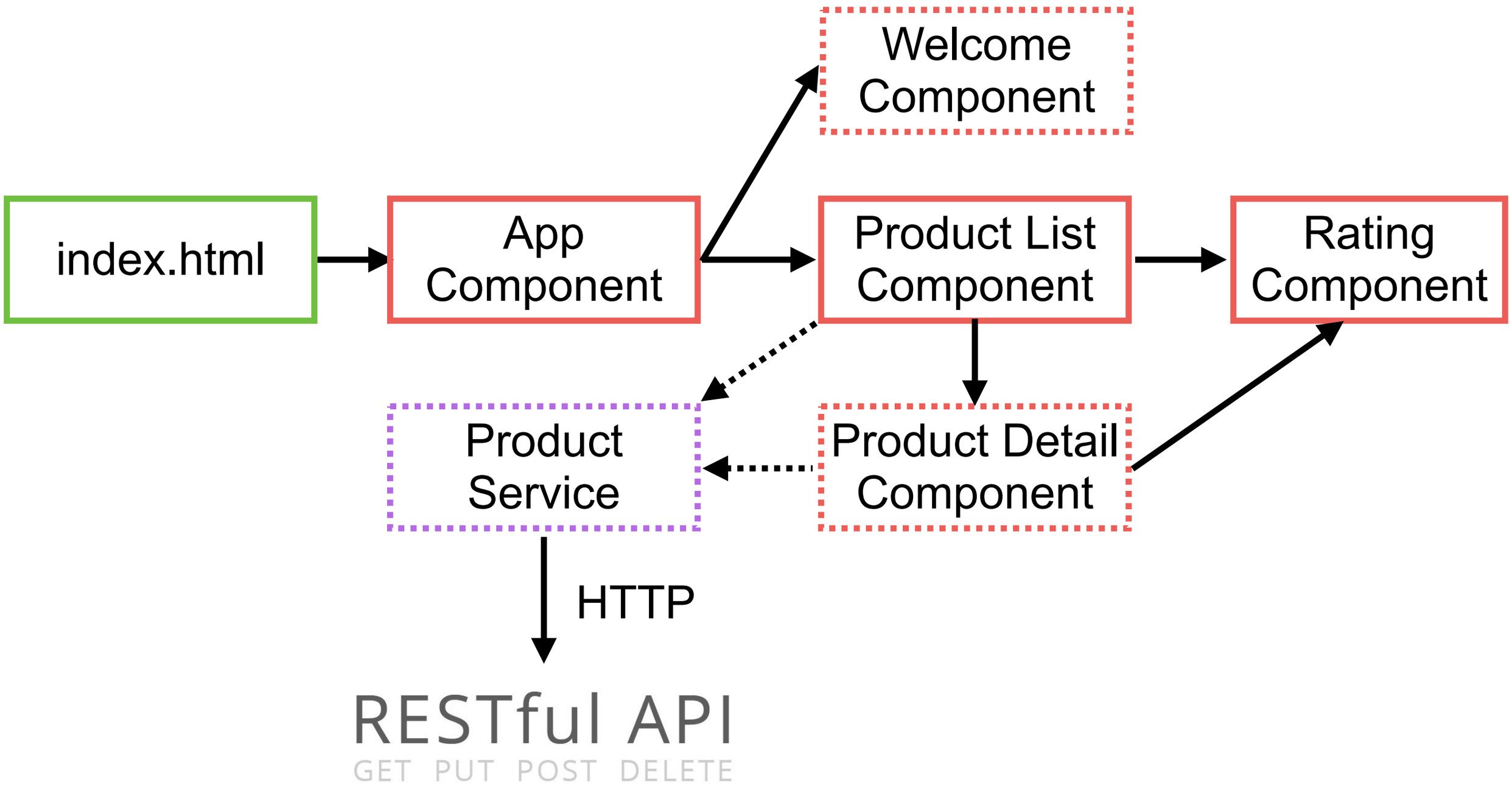
```
export class ProductListComponent implements OnInit {

   onRatingClicked(message: string) {
      this.pageName = `List of Product Page :: ${message}`;
   }
}
```

Navigation and Routing

Navigation and Routing

Configure route in each component
Define actions and route
Display routing in each component’s view

Application Architecture



Create angular router

Route	Description
/welcome	Show welcome page
/products	Show list of product page
/product/:id	Show product detail page
“”	Default page
**	For other path (Page not found)

Configure router in app module

Add RouterModule and configure routes

app.module.ts

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

@NgModule({

  imports: [
    BrowserModule,
    FormsModule,
    RouterModule.forRoot([
      { path: 'products', component: ProductListComponent },
      { path: '', redirectTo: 'products', pathMatch: 'full' },
      { path: '**', redirectTo: 'products', pathMatch: 'full' }
    ]),
  ],
```

RouterModule

Register router service
Declare router directives
Expose configured routes

Using router as directive

Add configured routes in template

app.component.html

```
<nav class='navbar navbar-expand navbar-light bg-light'>
  <a class='navbar-brand'>{{pageTitle}}</a>
  <ul class='nav nav-pills'>
```

Use configured routes

```
    <li><a class='nav-link' routerLinkActive='active'
                            [routerLink]="['/welcome']">Home</a></li>
    <li><a class='nav-link' routerLinkActive='active'
                            [routerLink]="['/products']">Product List</a></li>
  </ul>

</nav>
```

Show content from component's view

```
<div class='container-fluid'>
  <router-outlet></router-outlet>
</div>
```

Result

Home | Product List

List of Product Page

Filter by:

Filtered by

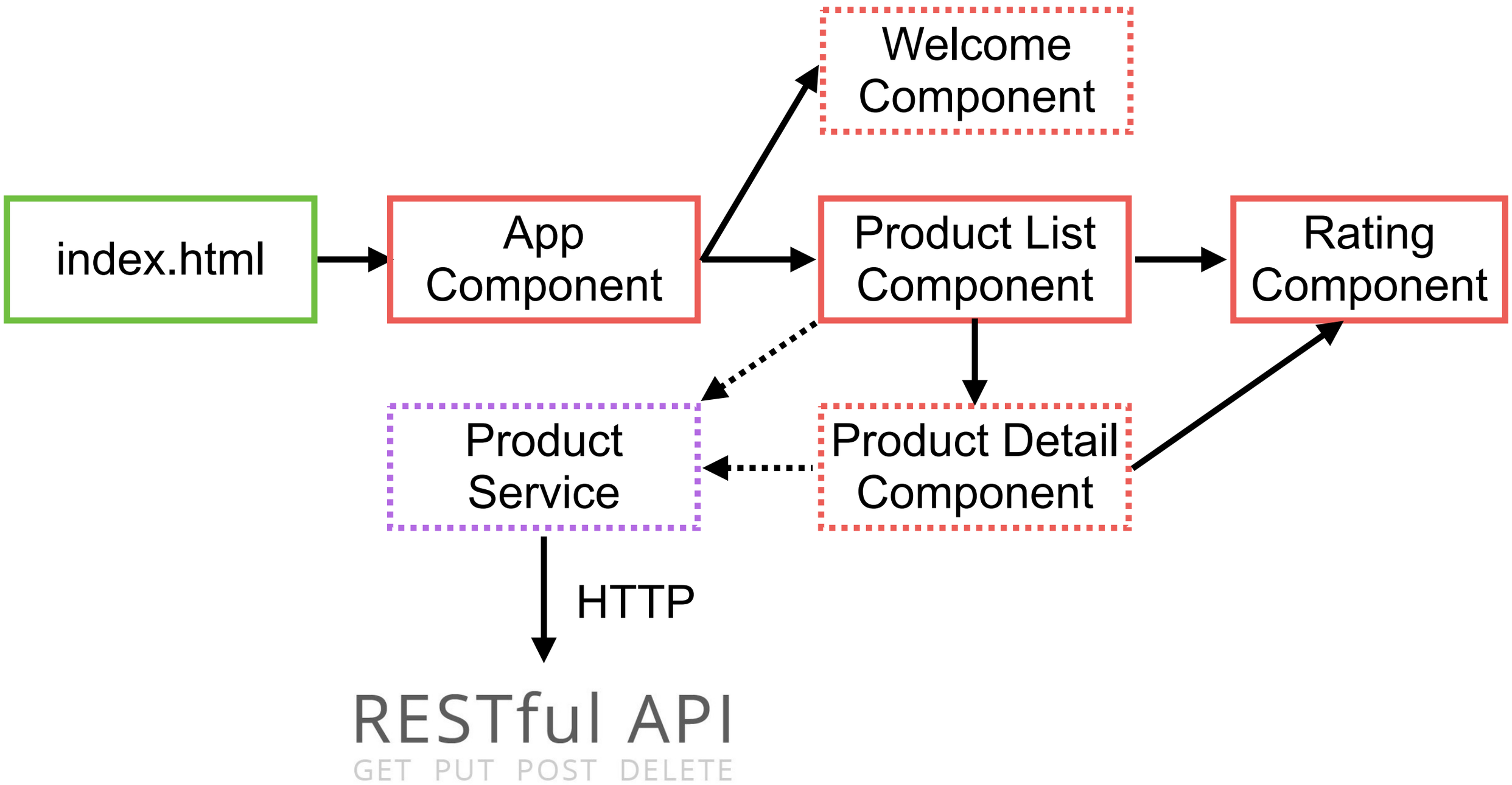
Hide Image	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	★★★★★
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	★★
	BB-0003	PRODUCT NAME 3	THB 2,000.00	Yes	★★★½

Working with route

Passing parameter
Activate route with code
Protect routes with **guards**

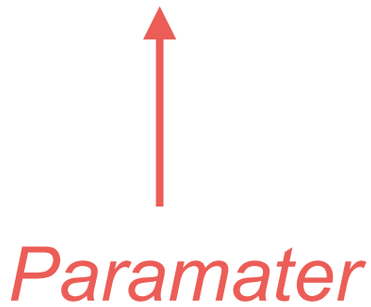
Passing parameters with route

Application Architecture



Product detail

URL = /product/:id



Create product detail component

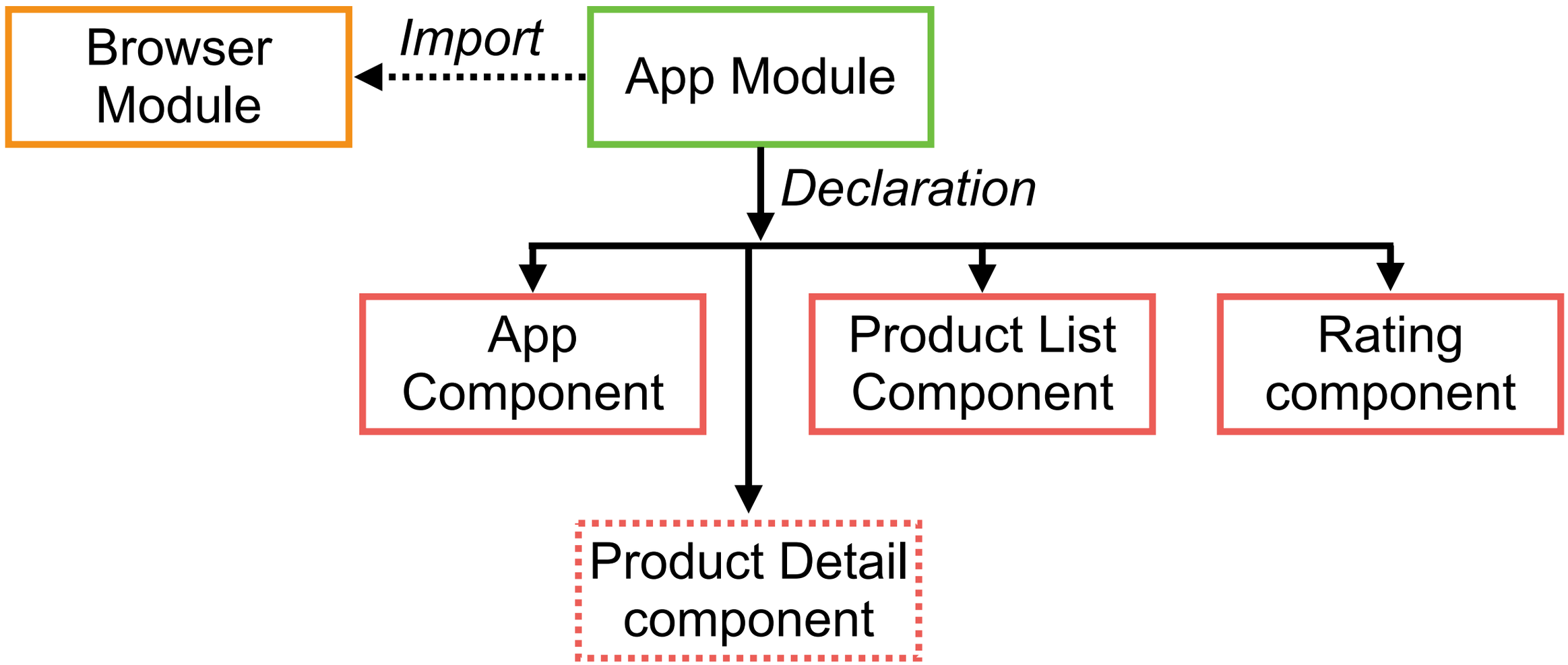
$ng **g**enerate **c**omponent productDetail

$ng **g**enerate **c**omponent product/productDetail --flat

Generate component with existing directory

Create product detail component

$ng **g**enerate **c**omponent productDetail



Configure router in app module

Add RouterModule and configure routes

app.module.ts

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

@NgModule({

  imports: [
    BrowserModule,
    FormsModule,
    RouterModule.forRoot([
      { path: 'products', component: ProductListComponent },

      { path: 'product/:id', component: ProductDetailComponent },

      { path: '', redirectTo: 'products', pathMatch: 'full' },
      { path: '**', redirectTo: 'products', pathMatch: 'full' }
    ]),
  ],
```

Link to product detail page

List of Product Page

Filter by:

Filtered by

Hide Image	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	★★★★★
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	★★
	BB-0003	PRODUCT NAME 3	THB 2,000.00	Yes	★★★½

Using router as directive

Add configured routes in template

product-list.component.html

```
<a
  [routerLink]="['/product', product.id]">
      {{product.name}}
</a>
```

product-detail.component.ts

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

export class ProductDetailComponent {

  constructor(private route: ActivatedRoute) {
    console.log(route.snapshot.paramMap.get('id'));
  }

}
```

Read parameter from route

Result

List of Product Page

Filter by:

Filtered by

Hide Image

	Product Code	Product Name	Price	Available	Rating
	AA-0001	PRODUCT NAME 1	THB 100.00	Yes	★★★★★
	BB-0002	PRODUCT NAME 2	THB 2,000.00	Yes	★★
	BB-0003	PRODUCT NAME 3	THB 2,000.00	Yes	★★★½

Link to /product/:id

Show product detail

Mock data to show product detail

product-detail.component.ts

```
import {ProductDataModel} from '../product-list/product';

export class ProductDetailComponent {
  pageName = 'Product detail';
  product: ProductDataModel;

  constructor(private route: ActivatedRoute) {
    console.log(route.snapshot.paramMap.get('id'));
    this.product = {
      code: 'AA 0001',
      name: 'Product name 1',
      price: 100,
      rating: 5,
      imageUrl: '',
    };
  }

}
```

Activate route with code

Product detail

When click back button should show List product

Home Product List

Product detail: Product name 1

Code:	AA-0001
Name:	Product name 1
Price:	100
Rating:	★★★★★

Back

Back to List of product page

Use route with code

Add configured routes in template

product-detail.component.ts

```
import {ActivatedRoute, Router} from '@angular/router';

export class ProductDetailComponent {


  constructor(private route: ActivatedRoute,
              private router: Router) {
  }

  onBack() {
    this.router.navigate(['/products']);
  }
}
```

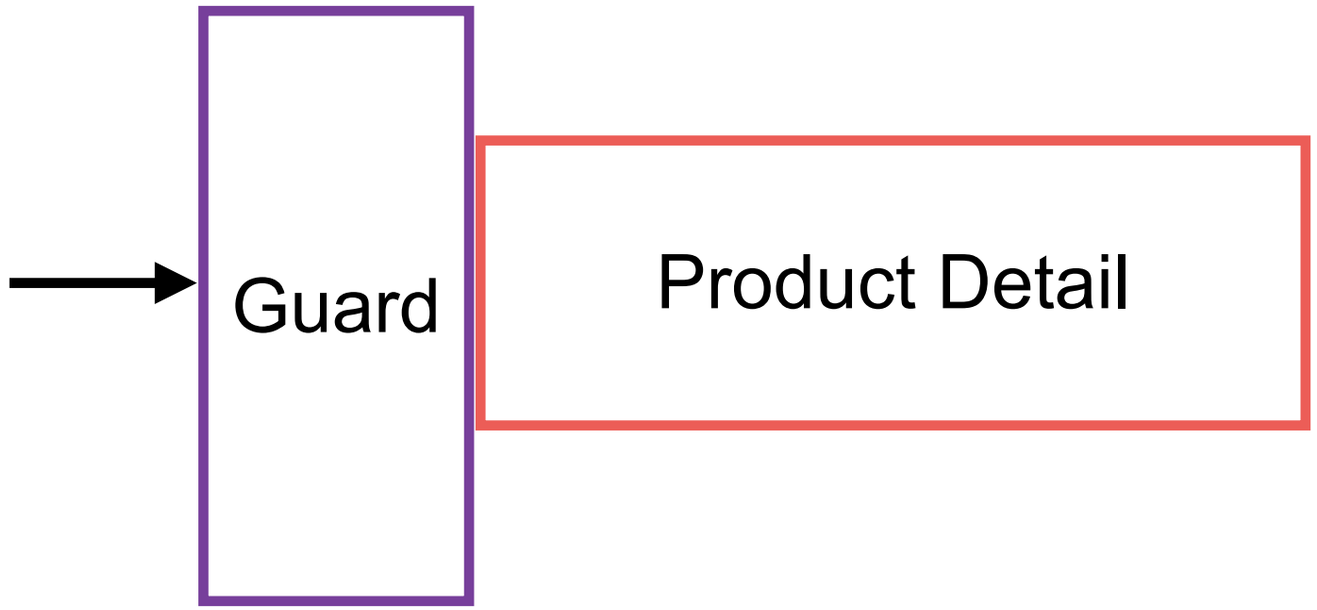
Protect route with guard

Protect route with guard

Guard	Description
CanActivate	Guard navigate to route
CanDeactivate	Guard navigate from route
Resolve	Prefetch data before activate route
CanLoad	Prevent asynchonous routing

Protect route with guard

Try to protect a product detail page



Product id MUST be number !!

Create guard

$ng generate guard product-detail/product-detail --flat

Create product detail guard

product-detail.guard.ts

```
import { Injectable } from '@angular/core';
import { CanActivate, Router, ActivatedRouteSnapshot, RouterStateSnapshot,
UrlTree } from '@angular/router';
import { Observable } from 'rxjs';

@Injectable({
  providedIn: 'root'
})
export class ProductDetailGuard implements CanActivate {

  constructor(private router: Router) { }

  canActivate(
    next: ActivatedRouteSnapshot,
    state: RouterStateSnapshot): Observable<boolean | UrlTree> |
Promise<boolean | UrlTree> | boolean | UrlTree {

        return true;
  }

}
```

Create product detail guard

product-detail.guard.ts

```
export class ProductDetailGuard implements CanActivate {

  constructor(private router: Router) { }

  canActivate(
    next: ActivatedRouteSnapshot,
    state: RouterStateSnapshot): Observable<boolean | UrlTree> |
Promise<boolean | UrlTree> | boolean | UrlTree {

    const id = +next.url[1].path;
    if (isNaN(id) || id < 1) {
      alert('Invalid product Id');
      this.router.navigate(['/products']);
      return false;
    }
    return true;
  }

}
```

Services

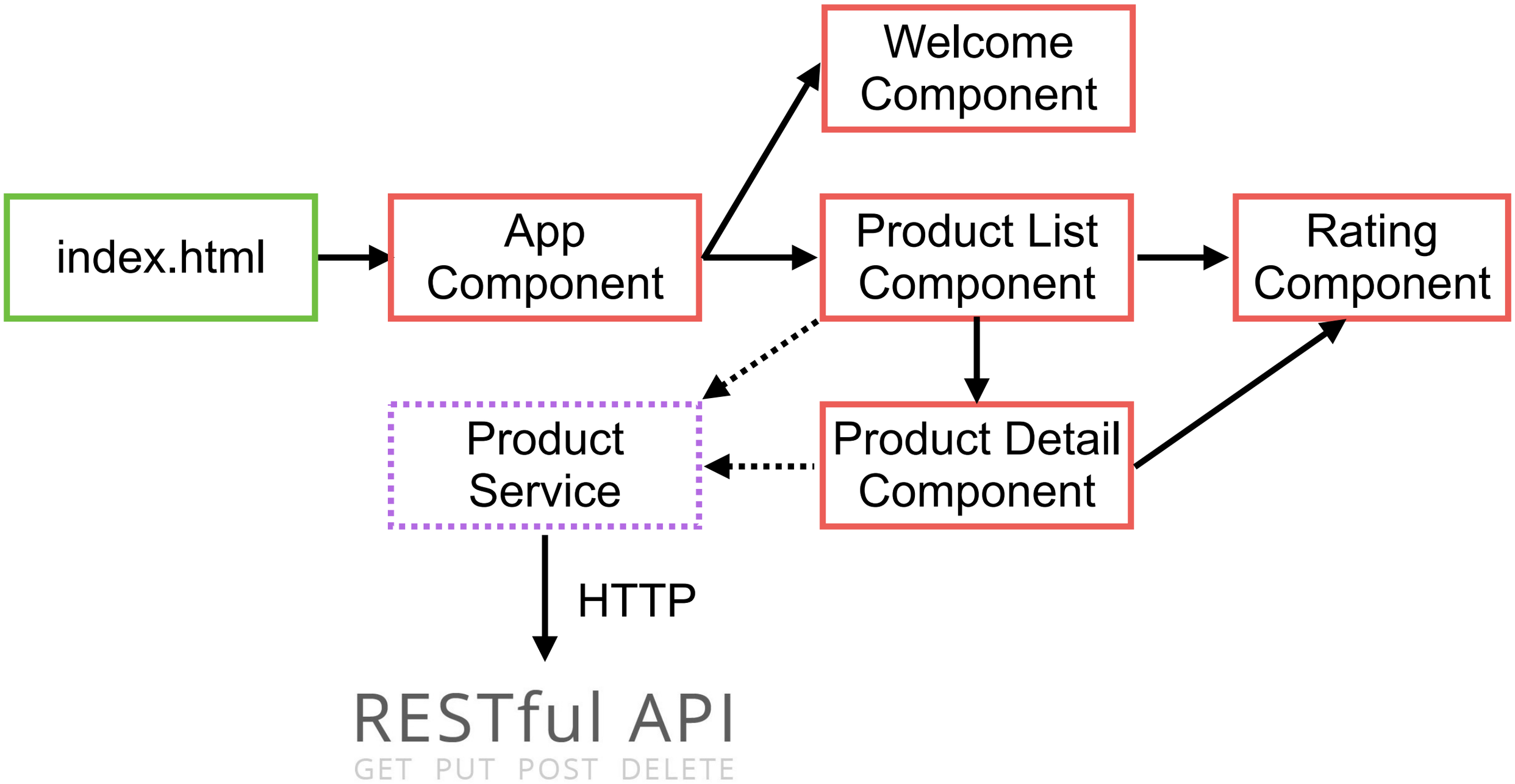
Service

Class with specified purpose
Independent from any component
Provide shared data and logic across components
Encapsulate external interactions

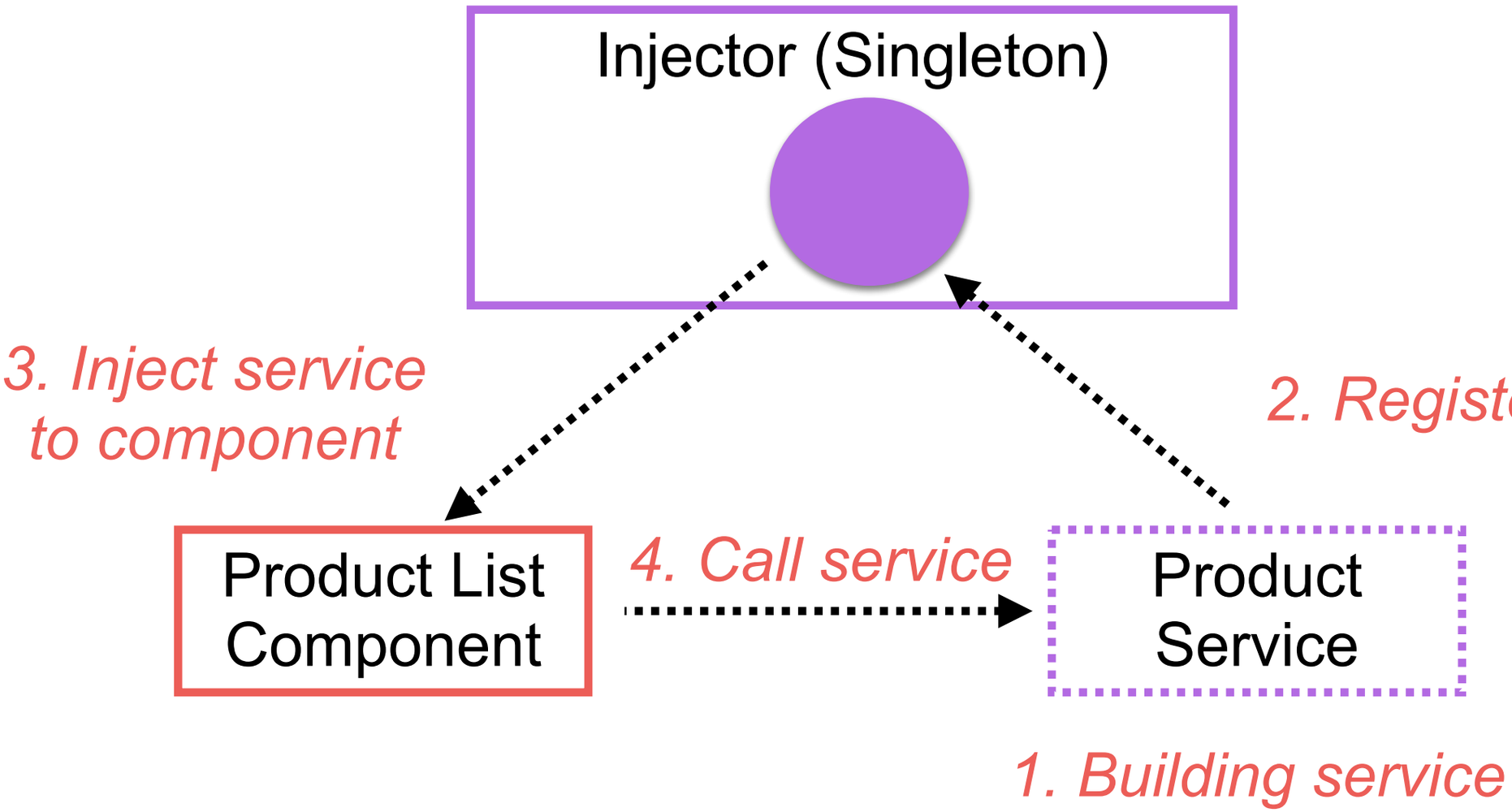
Service

How service working ?
Building service
Register service
Inject service

Application Architecture



How service working ?



Building service

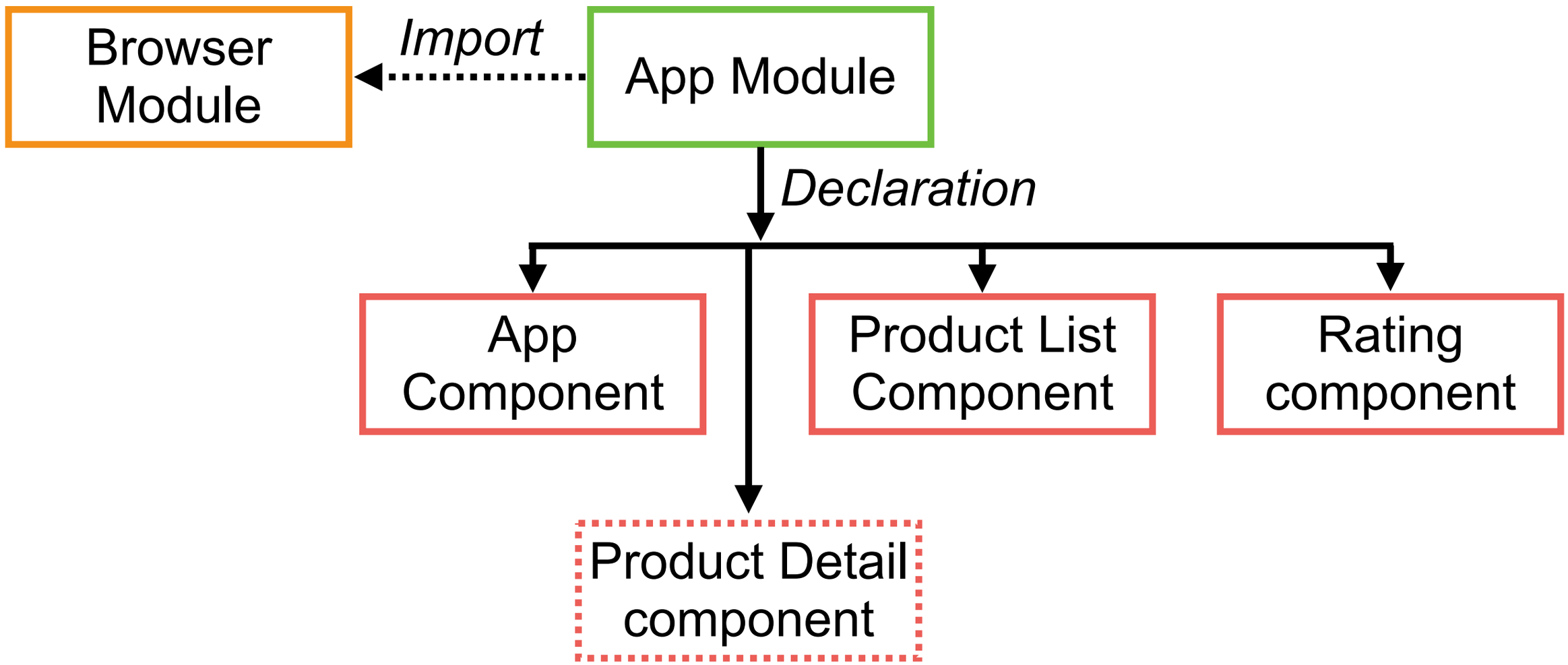
$ng generate service products/product

product.service.ts

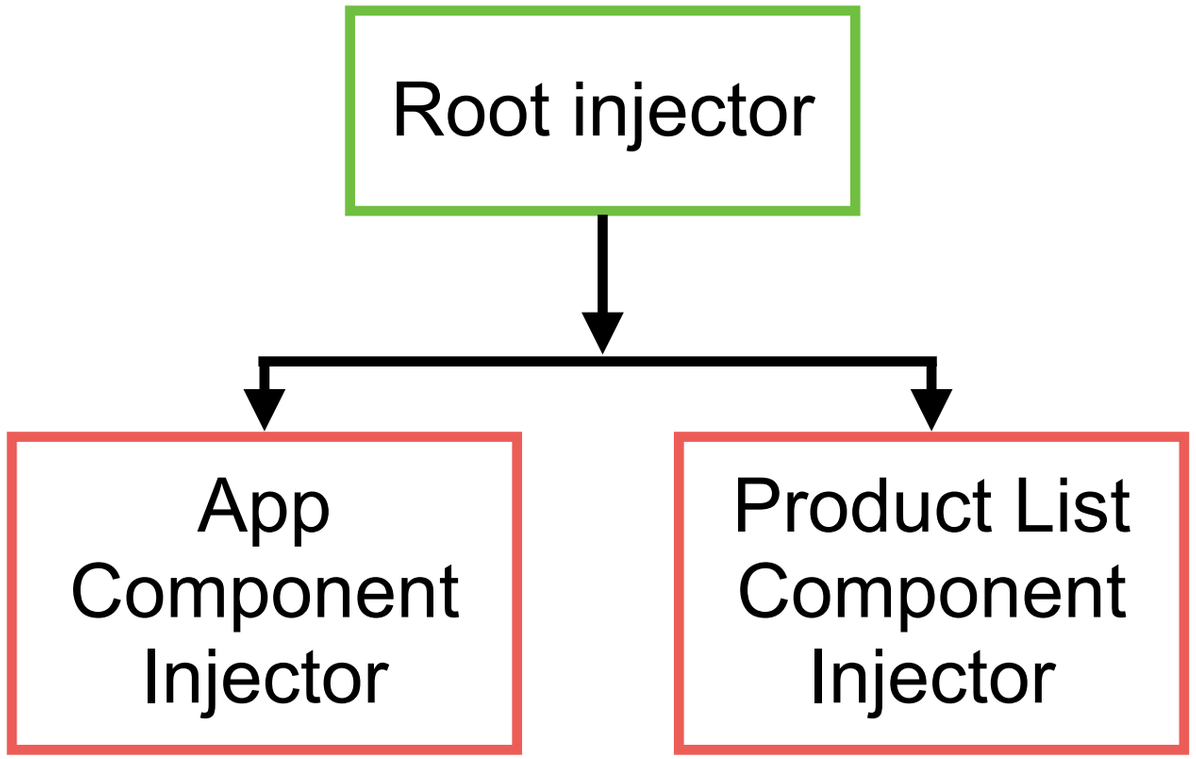
```
import { Injectable } from '@angular/core';
import {ProductDataModel} from './product';

@Injectable({
  providedIn: 'root'
})
export class ProductService {

  constructor() { }

  getProducts(): ProductDataModel[] {
    return;
  }
}
```

Create product detail component

$ng **g**enerate **c**omponent productDetail



Register service



Register service

Root injector
Component injector

product.service.ts

```
import { Injectable } from '@angular/core';
import {ProductDataModel} from './product';

@Injectable({
  providedIn: 'root'
})
export class ProductService {

  constructor() { }

  getProducts(): ProductDataModel[] {
    return;
  }
}
```

Root injector

Add service in component

product-list.component.ts

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

@Component({
  selector: 'app-product-list',
  providers: [ProductService],
})
export class ProductListComponent implements OnInit {
```

Add service providers

Inject service to component

Using constructor

product-list.component.ts

```
export class ProductListComponent implements OnInit {

  private _filterData: string;
  filteredProducts: ProductDataModel[];

  constructor(private productSerive: ProductService) {
    console.log(this.products);
  }

  ngOnInit(): void {
    this.products = this.productService.getProducts();
    this.filteredProducts = this.products;
  }
```

Constructor injection

Working with HTTP

Angular Modules