INTRODUCTION TO ANGULAR

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Agenda

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- Angular Versions
- Why Angular?
- Where does Angular fit?
- Setting up Angular
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- Angular Building Blocks
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  - Service
  - Router
- Server Communication
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What is Angular?

- Developed in 2009 by Misko Hevery
- Currently maintained by Google
- Framework for building front-end JavaScript applications
- Angular apps
  - Can run on desktop and mobile devices
  - Are generally SPAs
- Open-source, TypeScript-based framework
- ‘A’ of MEAN stack

Angular Versions

- AngularJS (v1.x)
  - Aims to simplify the development and testing of web apps
  - Worked on the concept of scope and controllers
  - Initial release, v0.9.0 – Oct 2010
  - Latest release, v1.6.9 – Feb 2018

- Angular 2
  - Added component as a key building block
  - Complete re-write of AngularJS, no backward compatibility
  - Released in Sep 2016

Angular Versions

- Angular 4
  - Apps are smaller & faster
  - AOT compilation, Angular Universal - SSR
  - Backward compatible with Angular 2
  - Released in Mar 2017

- Angular 5
  - Smaller, faster and easier to use
  - Build optimizer, complier improvements
  - New HttpClient, pipes, router lifecycle events
  - Released in Nov 2017

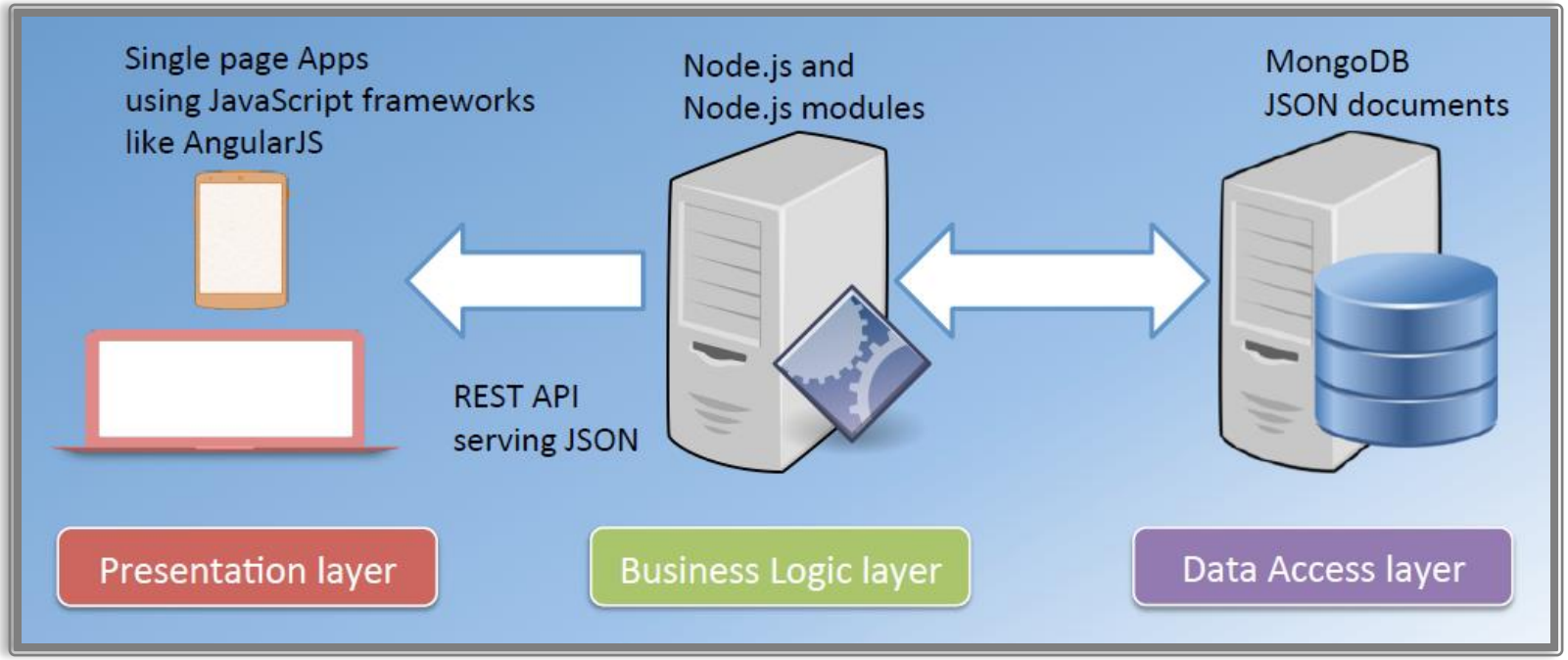
Why Angular?

- Single Page Apps (SPA)
  - Better user experience
  - Reduced full page reloads
  - Better overall performance
  - Less network bandwidth
- Proven software patterns and practices
  - Model View Controller (MVC)
  - Model View ViewModel (MVVM)
  - Dependency Injection (DI)
- Declarative programming
  - Better readability, concise code
  - Better developer productivity
  - Faster development

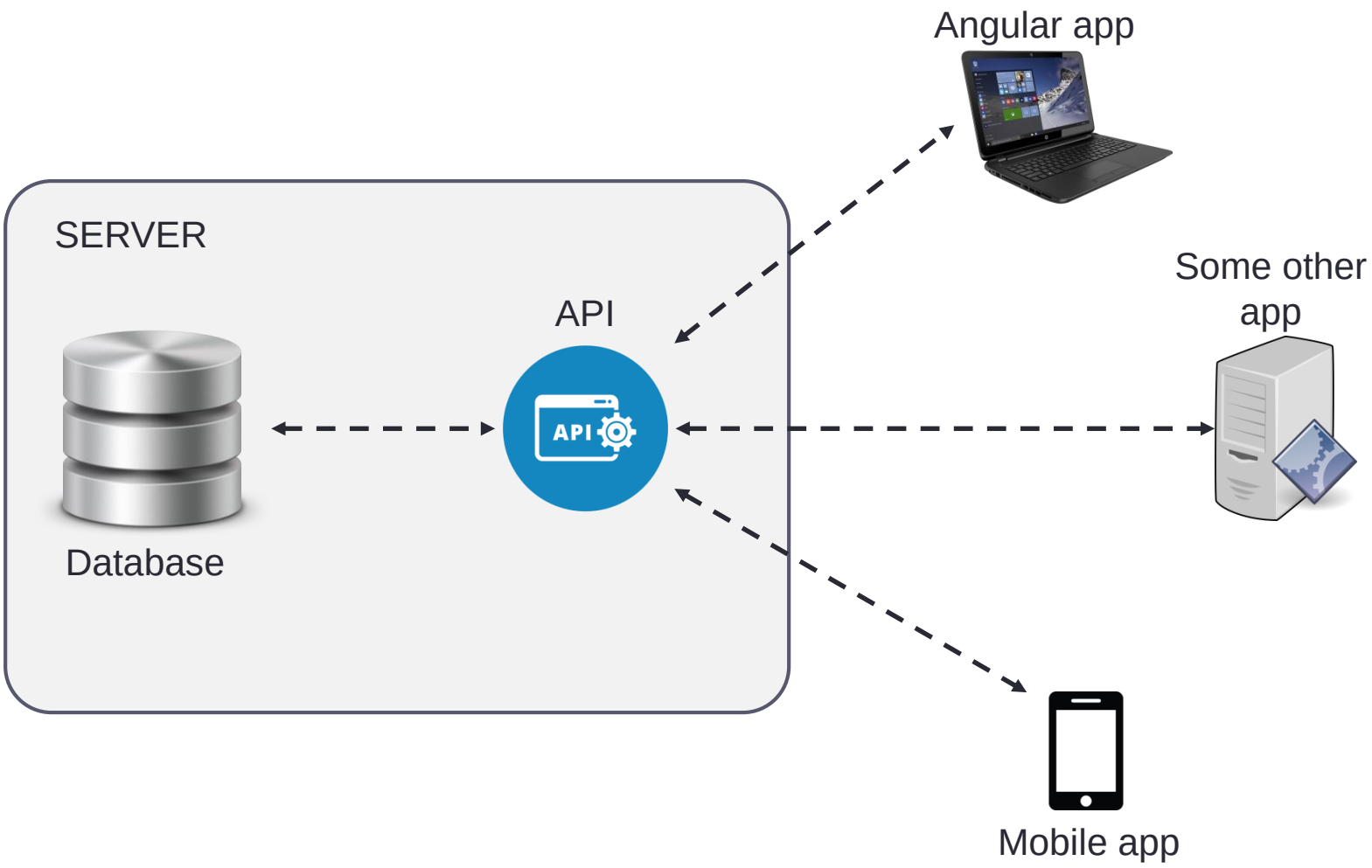
Why Angular?

- Component based
  - Reusable
- Structures app code
  - Modular, Maintainable, Scalable
- Cross platform, mobile support
  - Target multiple browsers, platforms & devices
- Decouples DOM manipulation from app logic
  - Testable, TDD
- Move app code forward in the stack
  - Reduces server load, reduces cost
  - Crowd sourcing of computational power

Where does Angular fit?



Where does Angular fit?



Setting up Angular

- Angular CLI
  - Toolset that makes creating, managing and building Angular apps very simple
  - Great tool for big Angular projects
    - Website: https://cli.angular.io
    - Wiki: https://github.com/angular/angular-cli/wiki

- Requires Node.js
  - https://nodejs.org

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

Setting up Angular

- Angular CLI commands

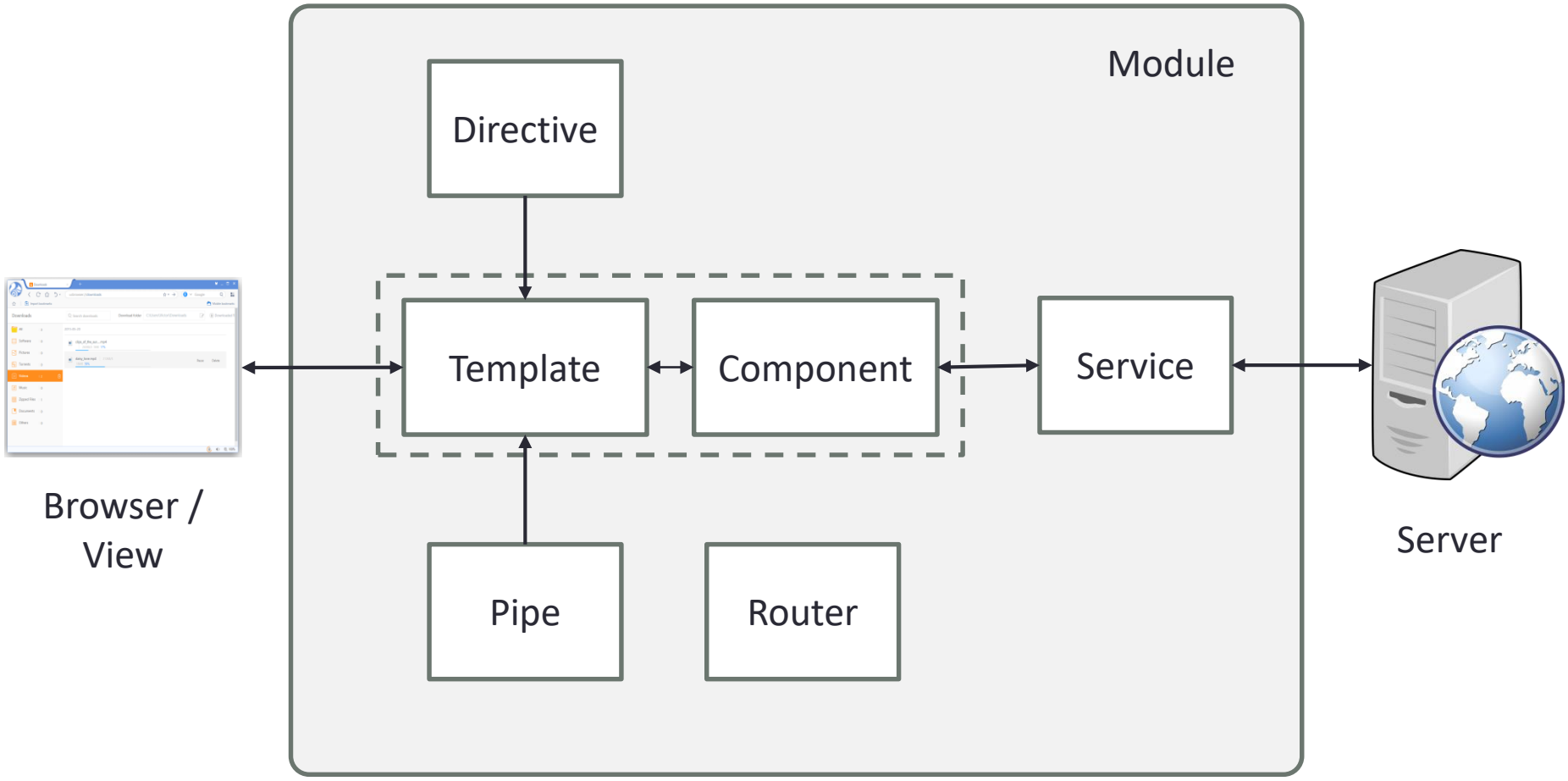
```
> ng new <project-name>

> ng serve

> ng build

> ng test

> ng generate <type> <name>

   where <type> can be one any one of:
      class | component | directive | interface |
      module | pipe | service | enum | guard
```

TypeScript

- Superset of JavaScript
  - Any valid JavaScript code is also valid TypeScript code
- Developed and maintained by Microsoft
- Primary language for Angular app development
- Does not run in the browser, it is “transpiled” into JS

- Why TypeScript?
  - Static typing
    - Compile-time errors, provides IDE support, easier to debug
  - Object-oriented features
    - Classes, Interfaces, Properties, Generics, Decorators, …
  - Next gen JS features
    - Modules, Import, Export, …

Angular Building Blocks



Module

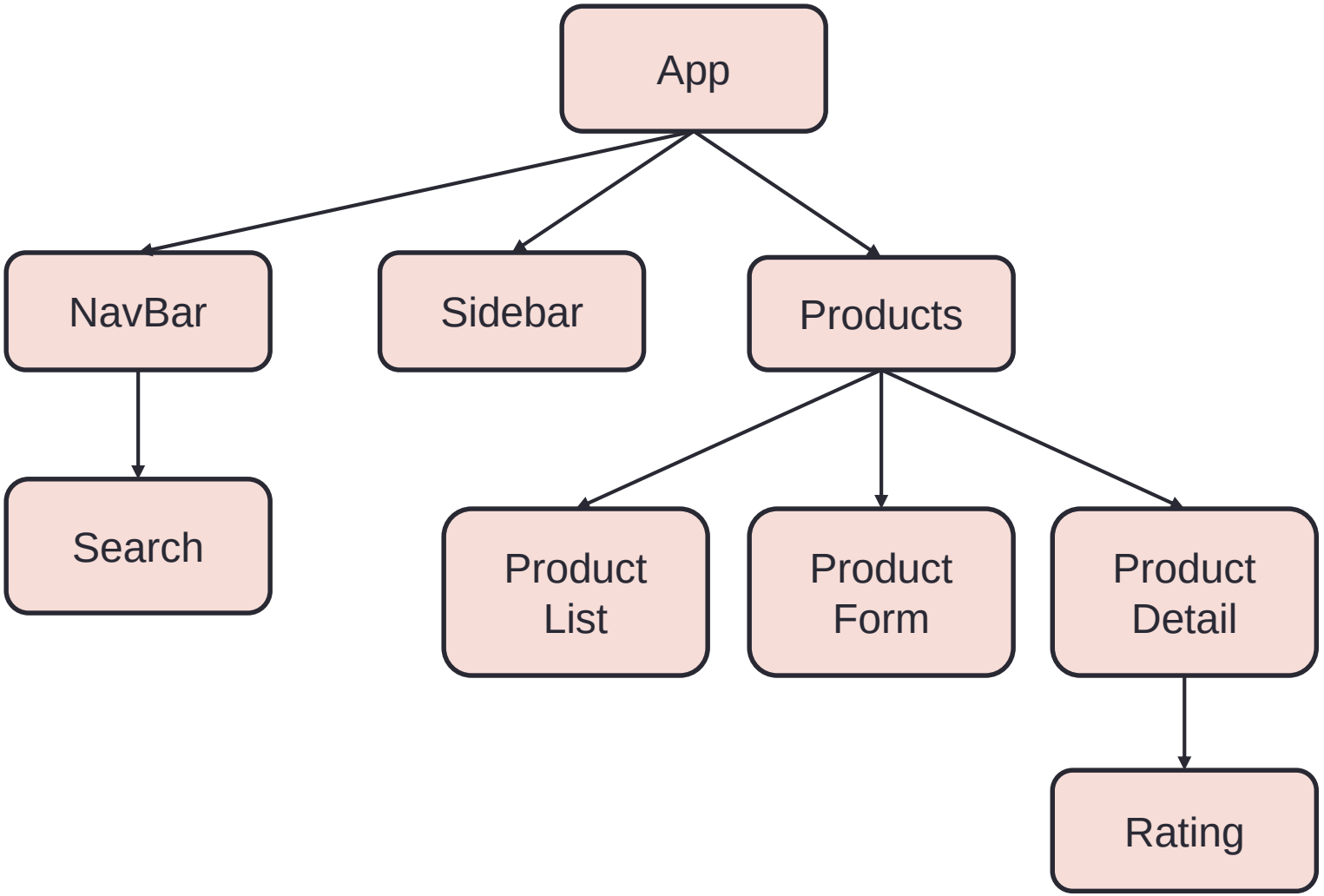
- Organizes an app into cohesive blocks of functionality
- A class marked by @NgModule decorator
- Every Angular app has at least one module class, the ***root*** module

```
@NgModule({
   imports: [module1, module2, ...],
   declarations: [
      component(s), directive(s), pipe(s), ...
   ],
   providers: [service1, service2, ...],
   bootstrap: [AppComponent]
})
export class AppModule {}
```

Component

- Key feature of Angular apps
- Encapsulate the template, data and the behavior of a view
- Allows you to break a complex web page into smaller, manageable & reusable parts
- A Component has its own
  - Template – HTML markup
  - Style – CSS styles
  - Business logic (data and behavior) – TypeScript code
- App component
  - Root component
  - Other components are added to App component

Component


App
NavBar
Sidebar
Products
Search
Product List
Product Form
Product Detail
Rating

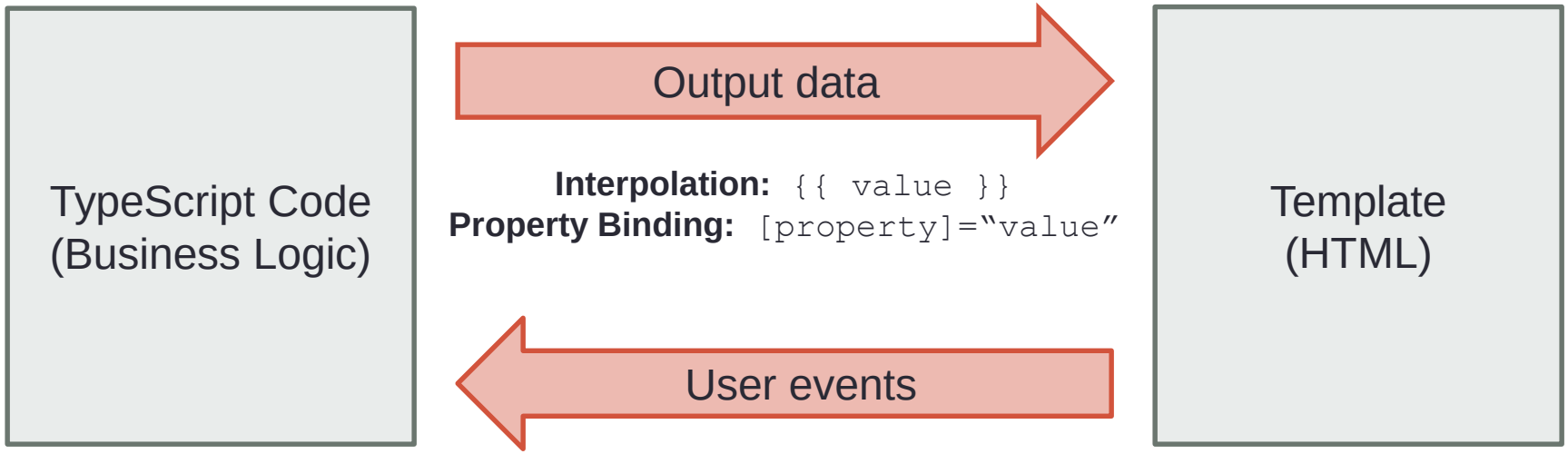
Decorator

- Extends the behavior of a class / function / property without explicitly modifying it
- Attaches metadata to classes

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

@Component({
    selector: 'app-products',
    templateUrl: `products.component.html`,
    styleUrls: [`products.component.css`]
})
export class ProductsComponent {
   products: [];

   addProduct(product) {
      this.products.push(product)
   }
}
```

Data Binding

- Communication between the TypeScript code and the HTML template



Event Binding: `(event)="eventHandler()"`

Two-way Binding: `[(ngModel)]="property"`

Data Binding

- Interpolation
  - <h1>{{ product.name }}</h1>
- Property binding
  - <img [src]="product.imageUrl">
- Event binding
  - <button (click)="addProduct()">New</button>
- Two-way data binding
  - <input type="text" name="productName" [(ngModel)]="product.name">

Directive

- Helps you to extend HTML to support dynamic behavior
- Transforms the DOM according to the instructions given
- Can be built-in or custom
- Built-in directives
  - Structural directives
    - Have a leading *
    - Alter layout by adding, removing, and replacing elements in DOM
    - E.g. *ngIf, *ngFor
  - Attribute directives
    - Look like a normal HTML attribute
    - Modify the behavior of an existing element by setting its display value property and responding to change events
    - E.g. ngStyle, ngClass

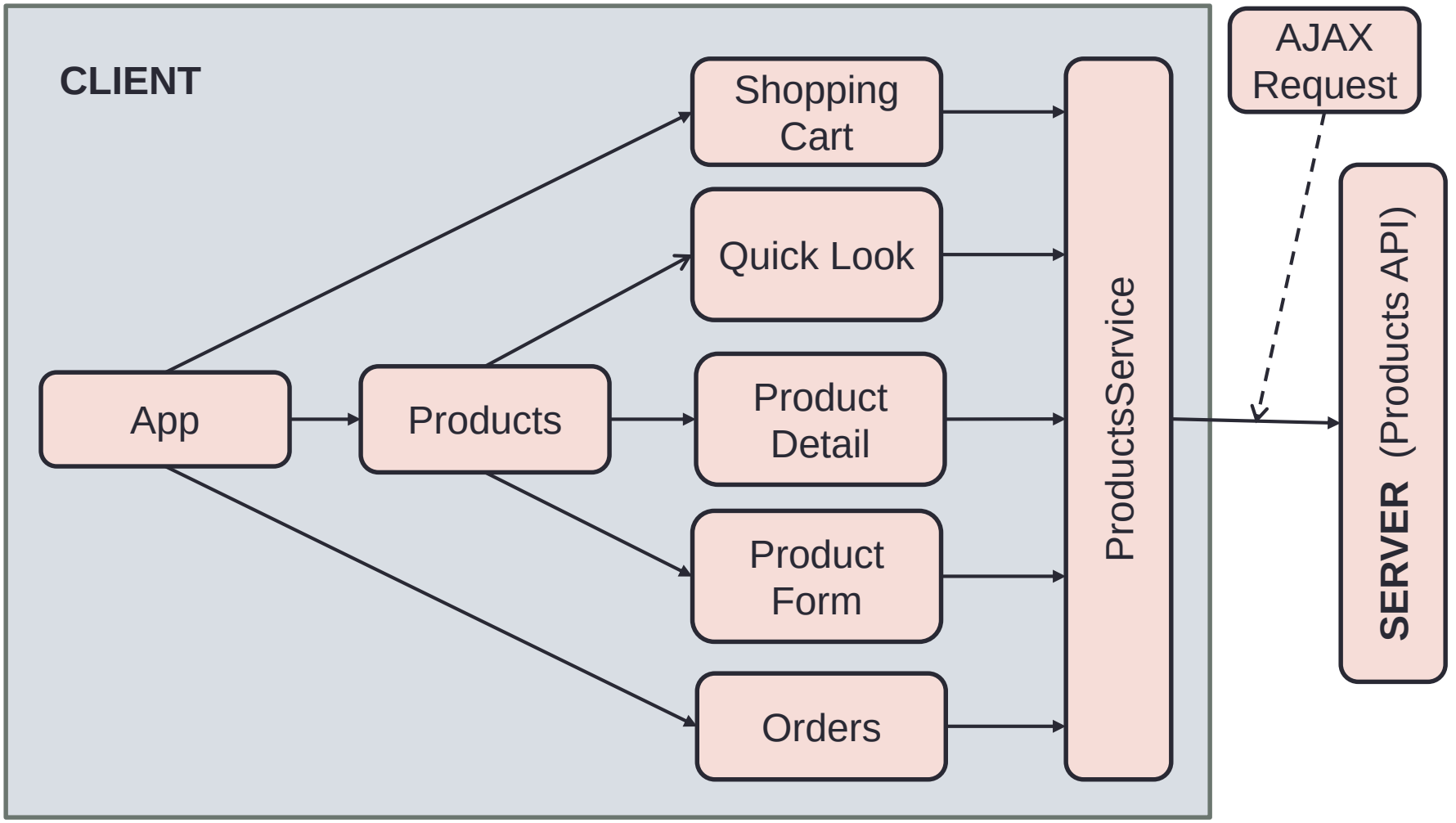
Pipe

- Takes in data as input and transforms (formats) it to a desired output
- Does not modify the underlying data
- Some examples of built-in pipes
  - lowercase
  - uppercase
  - date
  - currency
  - percent

Service

- A class with a narrow, well-defined purpose
  - Shares data and/or functionality across components
  - Encapsulates any non-UI logic
    - For e.g.
      - Logging service
      - Data service
      - Tax calculator
      - App configuration
      - Message bus
- Components consume services through Dependency Injection

Service


CLIENT
App
Products
Shopping Cart
Quick Look
Product Detail
Product Form
Orders
ProductsService
AJAX Request
SERVER (Products API)

Router

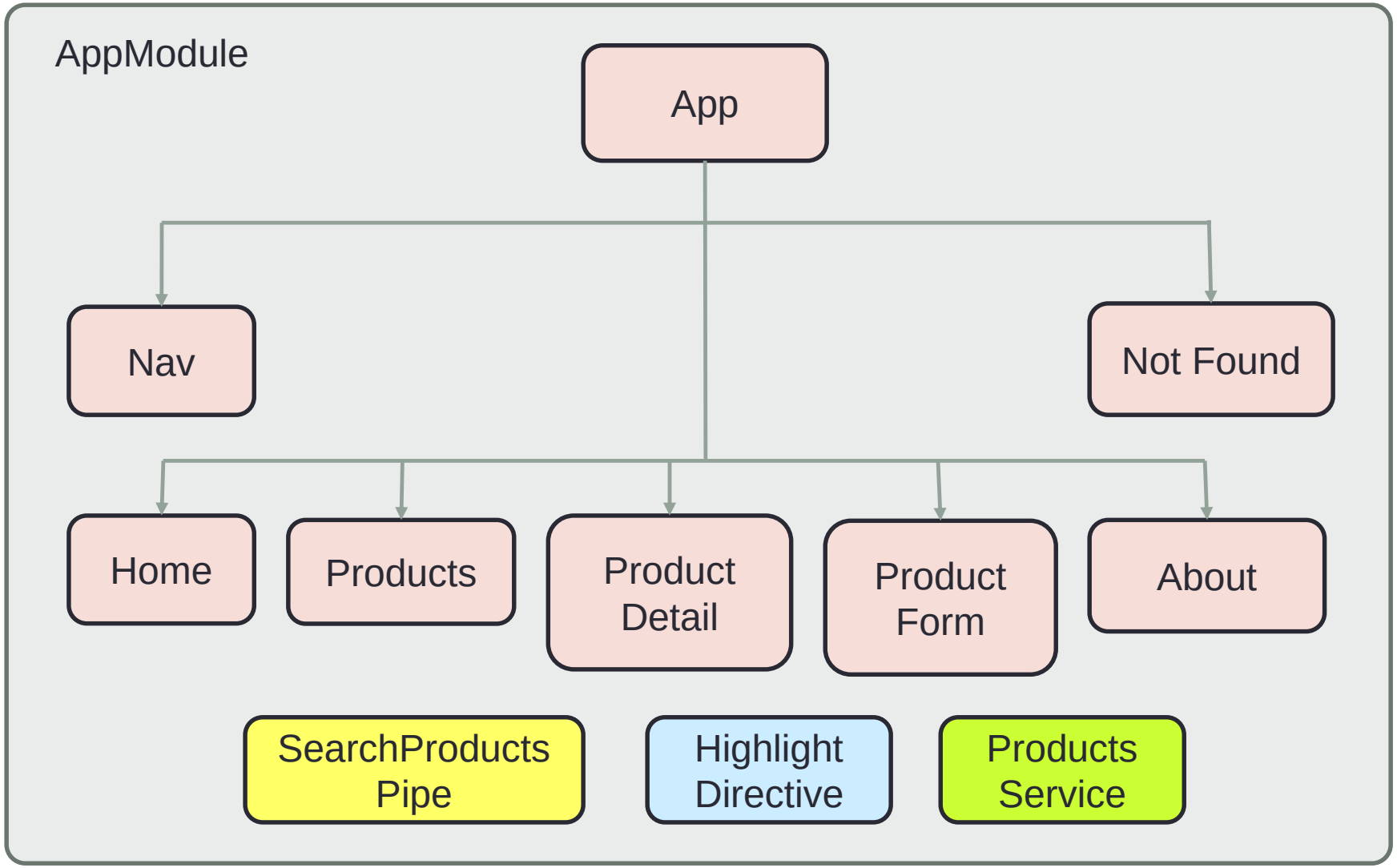
- Enables navigation from one view to another
- Maps a URL path to a component

- AppModule
  - Import RouterModule and Routes from '@angular/router'
  - Define array of routes for the app
  - Register routes with RouterModule using 'forRoot()' method
  - Add RouterModule to 'imports' array of AppModule
- AppComponent template
  - Add <router-outlet> element
- NavComponent template
  - Use 'routerLink' attribute directive in <a> tag to navigate to a specific route
    - <a routerLink="/products">Products

Server Communication

- HttpClient
  - Offers a simplified client HTTP API
  - Internally uses ‘XMLHttpRequest’ interface exposed by browsers
- AppModule
  - Import HttpClientModule from ‘@angular/common/http’
  - Add HttpClientModule to imports array of @NgModule decorator
- DataService
  - Import HttpClient from ‘@angular/common/http’
  - Inject HttpClient instance into constructor
  - Use following methods:
    - get()
    - post()
    - put() / patch()
    - delete()
  - Above methods return Observable<T>

Demo App – My Product Store



Q & A

- Thank you!