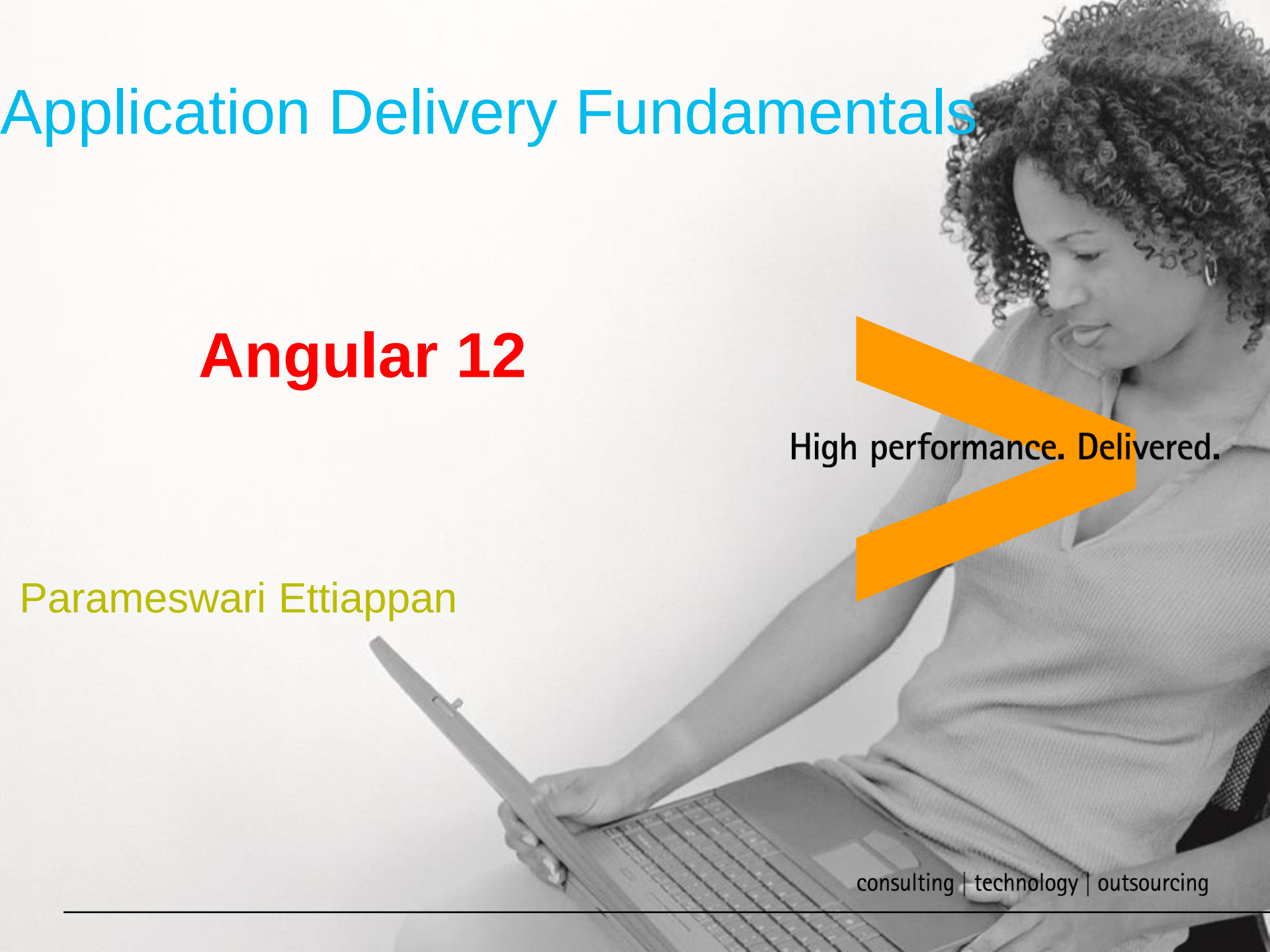
Application Delivery Fundamentals

Angular 12



Parameswari Ettiappan

Angular 12

Goals

- CROSS PLATFORM
  - Progressive Web Apps
  - Native
  - Desktop
- SPEED AND PERFORMANCE
  - Code Generation(Template to code)
  - Universal
  - Code Splitting

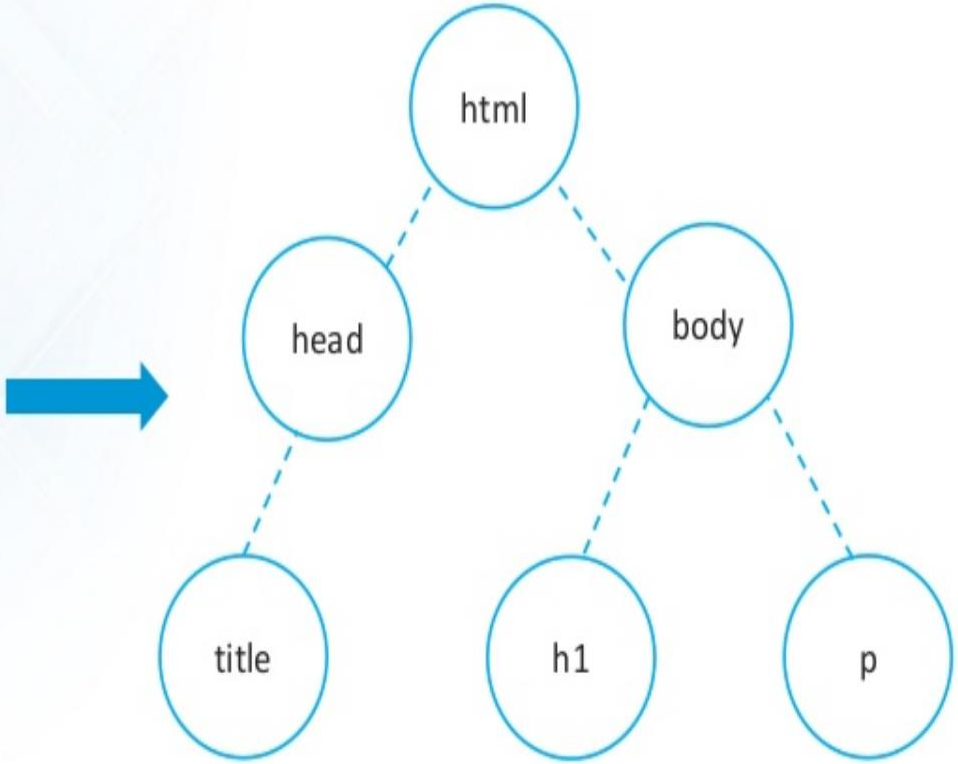
Angular 12

Goals

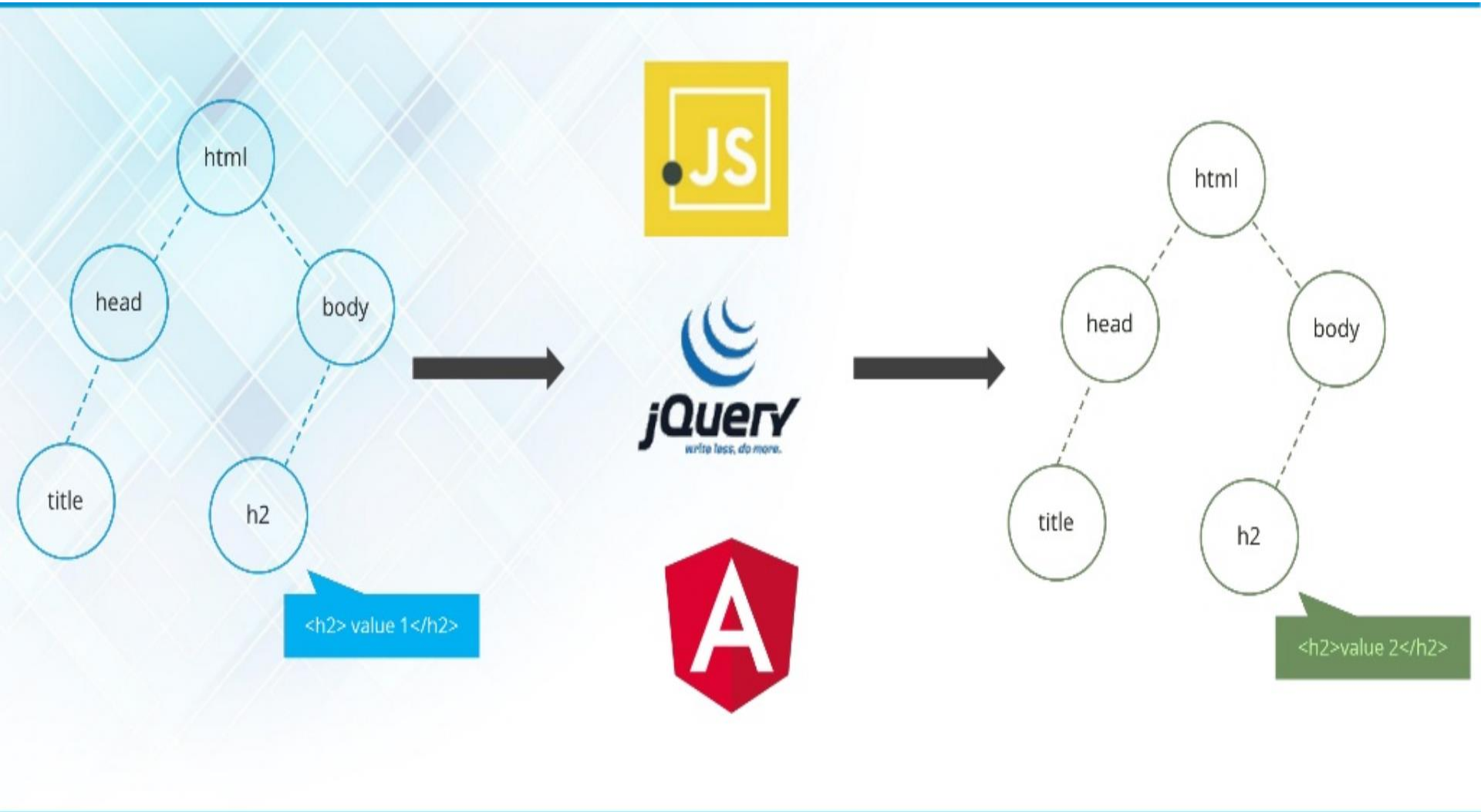
- PRODUCTIVITY
  - Templates
  - Angular CLI
  - IDEs
- FULL DEVELOPMENT STORY
  - Testing
  - Animation
  - Accessibility(RPA enabled components)

```
<html>
 <head>
 <title> Angular 2 Tutorial </title>
 </head>
 <body>
    <h1> Welcome to Angular 2 Tutorial </h1>
    <p>Angular is a development platform for creating
      applications using modern web standards.</p>
 </body>
</html>
```

HTML Markup



DOM Tree of the HTML document


html
head
body
title
h2
<h2> value 1</h2>
.JS
jQuery
write less, do more.
A
html
head
body
title
h2
<h2>value 2</h2>

- JavaScript is a programming language designed for use in a web browser.
- Used for manipulating DOM
- Example:

```
Document.body.style.background = red;
```

- jQuery is a library built in JavaScript to automate and simplify common tasks.
- Used for manipulating DOM
- Example:

```
$ ('body') .css ('background', '#ccc');
```

Demands of Modern Front-end Applications

- Step 1. Verify you have a working & stable data API.
- Step 2. Select software management tools(github,slack etc.,)
- Step 3. Create a foundational specification(device,browser, language,cultures etc.,)
- Step 4. Select a software development process
- Step 5. Select a development platform & a host platform (i.e. staging & production platforms)
- Step 6. Select package managers (node and bower)

Demands of Modern Front-end Applications

- Step 7. Select site & user analytic tools(Chart analytics and user analytics)
  - analytics tools example
  - site analytics chartbeat
  - user analytics mixpanel
- Step 8. Select error, quality, and style code enforcement tools
- error, quality, and style enforcement code tools example
- linters/hinters CSSLint, HTMLhint, JShint
- code style checker JavaScript Code Style
- code editor configuration file .editorconfig

Demands of Modern Front-end Applications

- Step 9. Select an automated task running tool
- The most common JavaScript task runners are Grunt.js, Gulp.js, or npm run using your package.json file.

Demands of Modern Front-end Applications

- Step 10. Select application architecture/structure (and corresponding tools/solutions)

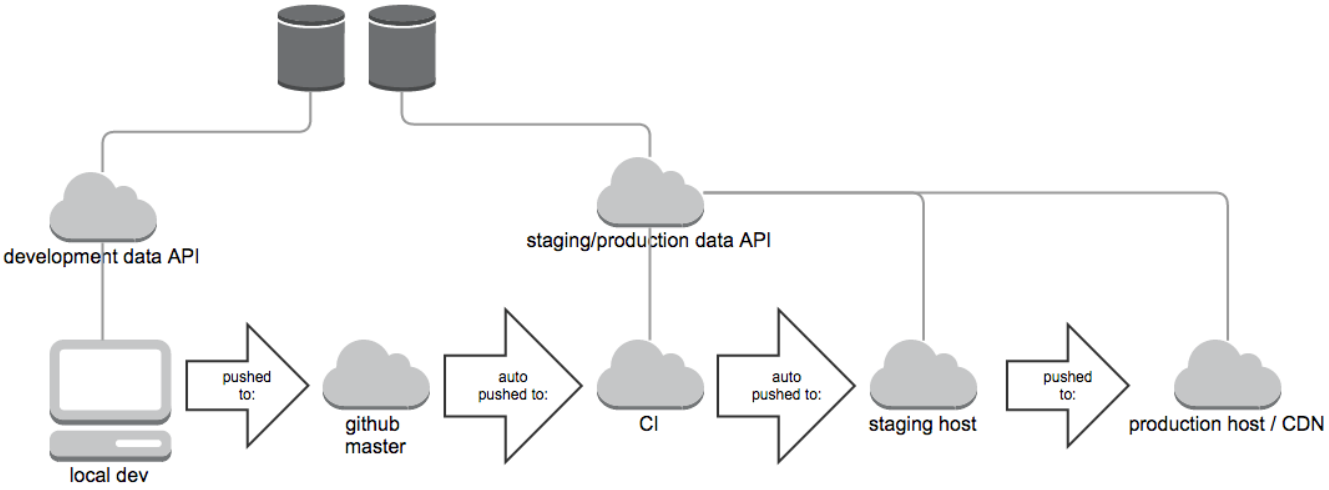
app architecture/structure	example
MV*	AngularJS
templates	MVVM from AngularJS
module communication	AngularJS $rootScope.$broadcast and $scope.$on for a PubSub communication.
data abstraction	Kendo UI dataSource
app structure	NG seed
routing	AngularUI Router
dependency management	AngularJS Dependency Injection
widgets/components	Kendo UI (using built-in directives)
css UI frameworks	Material Design for Angular

Demands of Modern Front-end Applications

- Step 11. Select testing methodologies & tools
- testing tools example
- test runner (for unit testing) karma
- unit testing framework mocha
- unit testing assertions chai
- unit testing mocking sinon.js
- unit testing coverage blanketjs
- browser testing platform (for unit & functional testing)
  browserstack
- browser automation framework (for functional testing)
  nightwatch.js

Demands of Modern Front-end Applications

- Step 12. Select code quality/complexity tools
- quality/complexity example
- JavaScript Source Analysis Plato
- Step 13. Define deployment strategy



Demands of Modern Front-end Applications

- Step 14. Select package monitoring solution
- A tool like gemnasium can monitor both your npm package.json file as well as your bower.json file.
- Step 15. Select a JavaScript error monitoring solution
- Step 16. Select a performance monitoring solution
- Use something like Pingdom to capture uptime and performance stats.

What is a Functional Requirement?

- In software engineering, a functional requirement defines a system or its component.
- It describes the functions a software must perform. A function is nothing but inputs, its behavior, and outputs.
- It can be a calculation, data manipulation, business process, user interaction, or any other specific functionality which defines what function a system is likely to perform.
- Functional software requirements help you to capture the intended behavior of the system.
- This behavior may be expressed as functions, services or tasks or which system is required to perform.

What is a Functional Requirement?

- Example of Functional Requirements
- The software automatically validates customers against the ABC Contact Management System
- The Sales system should allow users to record customers sales
- The background color for all windows in the application will be blue and have a hexadecimal RGB color value of 0x0000FF.
- Only Managerial level employees have the right to view revenue data.
- The software system should be integrated with banking API
- The software system should pass Section 508 accessibility requirement.

What is Non-Functional Requirement?

- A non-functional requirement defines the quality attribute of a software system.
- They represent a set of standards used to judge the specific operation of a system. Example, how fast does the website load?
- A non-functional requirement is essential to ensure the usability and effectiveness of the entire software system.
- Failing to meet non-functional requirements can result in systems that fail to satisfy user needs.
- Non-functional Requirements allows you to impose constraints or restrictions on the design of the system across the various agile backlogs.
- Example, the site should load in 3 seconds when the number of simultaneous users are > 10000. Description of non-functional requirements is just as critical as a functional requirement.

What is Non-Functional Requirement?

- Examples of Non-functional requirements
- Here, are some examples of non-functional requirement:
- Users must change the initially assigned login password immediately after the first successful login. Moreover, the initial should never be reused.
- Employees never allowed to update their salary information. Such attempt should be reported to the security administrator.
- Every unsuccessful attempt by a user to access an item of data shall be recorded on an audit trail.
- A website should be capable enough to handle 20 million users with affecting its performance
- The software should be portable. So moving from one OS to other OS does not create any problem.
- Privacy of information, the export of restricted technologies, intellectual property rights, etc. should be audited.

Functional vs Non Functional Requirements

Parameters	Functional Requirement	Non-Functional Requirement
What it is	Verb	Attributes
Requirement	It is mandatory	It is non-mandatory
Capturing type	It is captured in use case.	It is captured as a quality attribute.
End-result	Product feature	Product properties
Capturing	Easy to capture	Hard to capture

Functional vs Non Functional Requirements

Objective	Helps you verify the functionality of the software.	Helps you to verify the performance of the software.
Area of focus	Focus on user requirement	Concentrates on the user's expectation.
Documentation	Describe what the product does	Describes how the product works
Type of Testing	Functional Testing like System, Integration, End to End, API testing, etc.	Non-Functional Testing like Performance, Stress, Usability, Security testing, etc.
Test Execution	Test Execution is done before non-functional testing.	After the functional testing
Product Info	Product Features	Product Properties

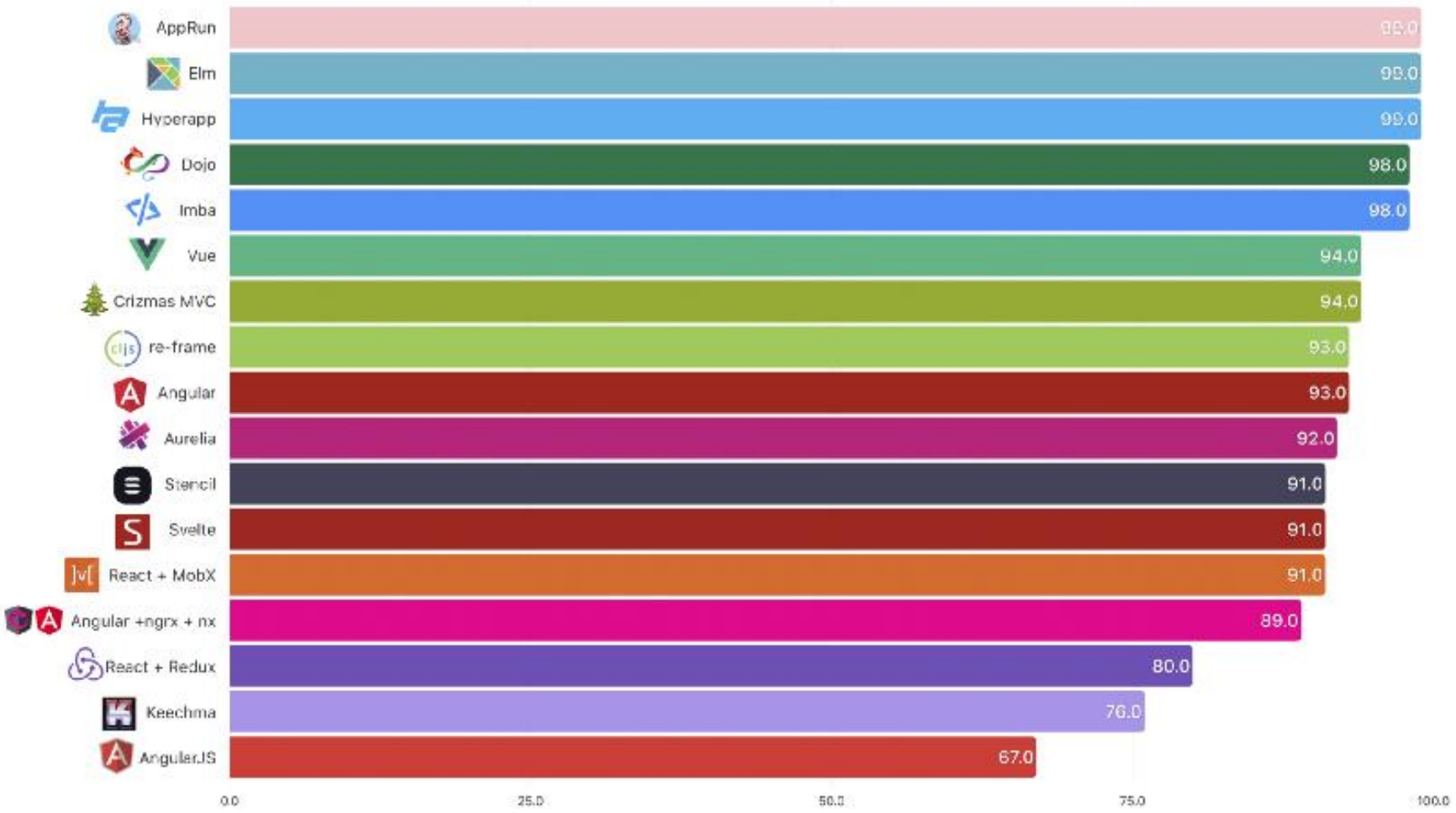
Advantages of Functional Requirement

- Here, are the pros/advantages of creating a typical functional requirement document-
- Helps you to check whether the application is providing all the functionalities that were mentioned in the functional requirement of that application
- A functional requirement document helps you to define the functionality of a system or one of its subsystems.
- Functional requirements along with requirement analysis help identify missing requirements. They help clearly define the expected system service and behavior.
- Errors caught in the Functional requirement gathering stage are the cheapest to fix.
- Support user goals, tasks, or activities for easy project management
- Functional requirement can be expressed in Use Case form or user story as they exhibit externally visible functional behavior.

Advantages of Non-Functional Requirement

- Benefits/pros of Non-functional testing are:
- The nonfunctional requirements ensure the software system follow legal and compliance rules.
- They ensure the reliability, availability, and performance of the software system
- They ensure good user experience and ease of operating the software.
- They help in formulating security policy of the software system.


cljs
RealWorld Comparison
]v[


AppRun
Elm
Hyperapp
Dojo
Imba
Vue
Crizmas MVC
re-frame
Angular
Aurelia
Stencil
Svelte
React + MobX
Angular +ngrx + nx
React + Redux
Keechma
AngularJS
99.0
99.0
98.0
98.0
94.0
94.0
93.0
93.0
92.0
91.0
91.0
91.0
89.0
80.0
76.0
67.0
0.0
25.0
50.0
75.0
100.0

	Community	Size	Ecosystem	Learnability
Angular.js	48,787 stars 1,449 contributors	80 kb	1,877 ngModules	Difficult
Backbone.js	24,650 stars 285 contributors	61 kb	257 backplugs	Easy
React.js	41,038 stars 666 contributors	450 kb	4,442 components	Difficult
Ember.js	16,115 stars 580 contributors	269 kb	725 emberaddons	Easy
Aurelia.js	5,958 stars 30 contributors	295 kb	12 plugins	Easy

mlsdev.com

1. React

- Usage Statistics
- 475k websites on the web are powered by React.
- 64.8% of javascript developers are currently using React.
- Ranked 1st most popular front-end javascript framework in State Of JS survey.
- Github – 120.5k stars, 21k forks and 1200 contributors.

1. React

- Why REACT Is One Of The Top JavaScript Frameworks For 2019?
- High performance – React is renowned for its high efficiency and flexibility. It can be easily integrated with other frameworks without any hassle. Can be used for both client side as well as server side.
- Abundant Resources – As react is maintained by Facebook, there is a huge trove of documentation and resources available on the web which makes learning curve of react much smoother than its chief rival AngularJS.
- Backward Compatibility – Transitioning or migrating from older to new versions is fairly easy in react using CodeMods.
- Easy to maintain component structure – Component based architecture of ReactJS helps in increasing the reusability of code and makes maintenance of large scale projects quite a bit easier.
- Rich community – React has close to 1300 contributors on GitHub which is more than any other library/framework.
- Unidirectional Data Flow – One way/Unidirectional downward only data binding in react via flux controls helps to make sure that any changes made to child element structure don’t affect the parent element structure

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1. React

- Cons Of Using REACT
- Bloated and complex – Many developers might find react too complex and bloated for their purpose as compared to Vue JS. Added complexity that coms align with react might be unnecessary for small scale projects
- JSX – The use of JSX adds another layer of complexity. JSX is a pre-processor, it adds XML syntax extension to JS. Although JSX helps to code react in a safer and faster manner, it is difficult to grasp for new developers.
- Need for Assembly-Tools – React requires a wide array of assembly tools to function properly and be compatible with other libraries and frameworks.
- SEO problems – webpages built with react are known to face issues with indexing by search engine crawlers/bots.

1.React

- PROMINENT USERS
- LambdaTest, Netflix, Yahoo, Airbnb, Instagram, Facebook, WhatsApp , Sberbank, PayPal, Microsoft, BBC,

2.Vue

- Usage Statistics
- 64k websites are powered by Vue.
- 28.8% of javascript developers are currently using vue.
- Ranked 2nd most popular front-end javascript framework in State Of JS survey.
- Github – 125k stars, 18k forks and 253 contributors.

2.Vue

- Why VUE.JS Is One Of The Top JavaScript Frameworks For 2019?
- Fast Configuration: Vue has an inbuilt MVC model which makes configuration quick and easy compared to angular and react.
- Flexibility: Flexibility and modular nature of Vue helps developers with past experiences on other frameworks and libraries to quickly adopt Vue with minimal effort.
- Easy Learning curve: Learning curve of Vue is much easier than Angular and react. Only knowledge of HTML and JavaScript is required.
- Lightweight Size: Vue is highly lightweight and compact in size compare to all other major JavaScript frameworks like angular and react. Compressed version of Vue is only 18 kb in size.
- Integration Capability: Vue can be used to build both SPAs and large-scale complex applications as well with easy integration with server-side frameworks like Laravel, Symfony Django etc.
- Transitions: Vue makes it easy to add transitions to elements when the are added or removed from the DOM.

2.Vue

- Cons Of Using VUE
- Poor Support: Vue doesn’t offer a big resource collection to new users on a scale similar to that of angular and react. Considering a comparatively lower market share, developers who are new to Vue js might not find adequate support and resources.
- Small Community:: A large chunk of Vue developer community is from non-English speaking eastern European countries. Community engagement used to be fairly low, However that is expected to change in 2019 as Vue saw a mammoth rise in popularity by the end of 2018.

2.Vue

- **PROMINENT CLIENTS**
- StackOverflow, 9gag, Adobe, Xiaomi, Grammarly, Alibaba.

3.Angular

- Usage Statistics
- 350k websites on the web are powered by AngularJS/Angular2+ versions.
- 23.9% of javascript developers are currently using Angular.
- Ranked 3rd most popular front-end javascript framework in State Of JS survey.
- Github – 44.5k stars, 11.5k forks and 840 contributors.

3.Angular

- Why ANGULAR Is One Of The Top JavaScript Frameworks For 2019?
- Data binding Apart from 2-way binding, angular 2 and beyond support 3 other types of data-binding namely – one-way property binding, event binding and interpolation.
- Enhanced RXJS has led to lightning fast compilation time of approx. 2.9 sec and modified start HttpClient.
- Abundant resources and support: Google offers a rich treasure trove of resources and rolls out new updates and improvements every 6 months.
- Support for Progressive web applications: Angular is the first framework to integrate features for development of progressive web applications.
- MVVM (Model-View-ViewModel) allows developers to work on the same application and data pool in isolation.
- Native mobile app: NativeScript powered by angular enables development of native mobile apps for both iOS and android.

3.Angular

- Difficult Syntax: Angular has made a big leap in terms of syntax complexity after adopting TypeScript in angular2 and beyond. Yet it poses a steep learning curve for anyone making a transition from vanilla JS or jQuery.
- Migration: It is complex to migrate from older angular version especially from AngularJS to angular 7.
- Steep learning curve: out of the three top javascript front-end frameworks, Angular has the steepest learning curve and suffers from a very high rate of abandonment. A large base of angular users has moved to Vue and react.
- Knowledge of MVC: A crucial prerequisite for using angular is the need to have a thorough understanding of model view controller architecture

3. Angular

- **PROMINENT CLIENTS**
- **Upwork, Freelancer, Udemy, YouTube, Paypal, Nike, Google, Telegram, Weather, iStockphoto, AWS, Crunchbase.**

4. Ember

- Usage Statistics
- 7k websites on the web are powered by Ember.
- 6.3% of javascript developers are currently using Ember. Its popularity has stagnated over the last few years.
- Ranked 4rd most popular front-end JavaScript framework in State Of JS survey.
- Github – 20k stars, 4k forks and 750 contributors.

4. Ember

- Why EMBER Is One Of The Top JavaScript Frameworks For 2019?
- Ember templates: One of the most striking features of ember is templates which help to create stunning UI. Templates are coded with Handlebars language which drastically reduces the necessary code. Templates are updated automatically as soon as moderation is made to their underlying data.
- Ember CLI: Ember-CLI is a command line addon that is packed alongside Ember stack. Ember-CLI provides support for techs like Sass/Less, CoffeeScript, Handlebars etc.
- Ember is shipped with Inspector tool to helps with debugging
- Convention over Configuration: Ember is based on Convention over Configuration (CoC). This helps devs to focus more on functionality and building apps faster and worrying less about planning High performance.

4. Ember

- Problems With Ember
- Losing Market share: Ember has seen massive stagnation over past 5 years and faces obscurity in future. Big companies like Netflix and Airbnb have dumped ember and moved to other frameworks like react.
- Lack of Up to date resources: Ember has a very poor support offering due to a shrinking community and is plagued with outdated resources.
- Too complex to be implemented in small projects. Takes too much time to configure and use which eats away into productivity.
- In comparison to react and Vue, ember is extremely complicated and difficult to learn especially for beginners.

4. Ember

- **PROMINENT USERS**
- Apple music, Groupon, Vine, Twitch, Chipotle, Atlas.io, sitepoint

5. Polymer

- **Usage Statistics**
- **4k websites on the internet are powered by Polymer.**
- **3.8% of javascript developers are currently using Polymer.**
- **Ranked 6th most popular front-end javascript framework in State Of JS survey.**
- **Github – 20k stars, 1.9k forks and 140 contributors.**

5. Polymer

- **Why POLYMER Is One Of The Top JavaScript Frameworks For 2019?**
- **Polymer.js enables developers to build their own custom HTML elements.**
- **Lightning Speed – compared to other front end JavaScript frameworks, polymer clocks lightning fast speed especially on chrome and safari browser.**
- **Supports both One-way and two-way data binding.**
- **Cross browser compatibility: polymer was designed especially with keeping cross browser compatibility testing in mind.**

5. Polymer

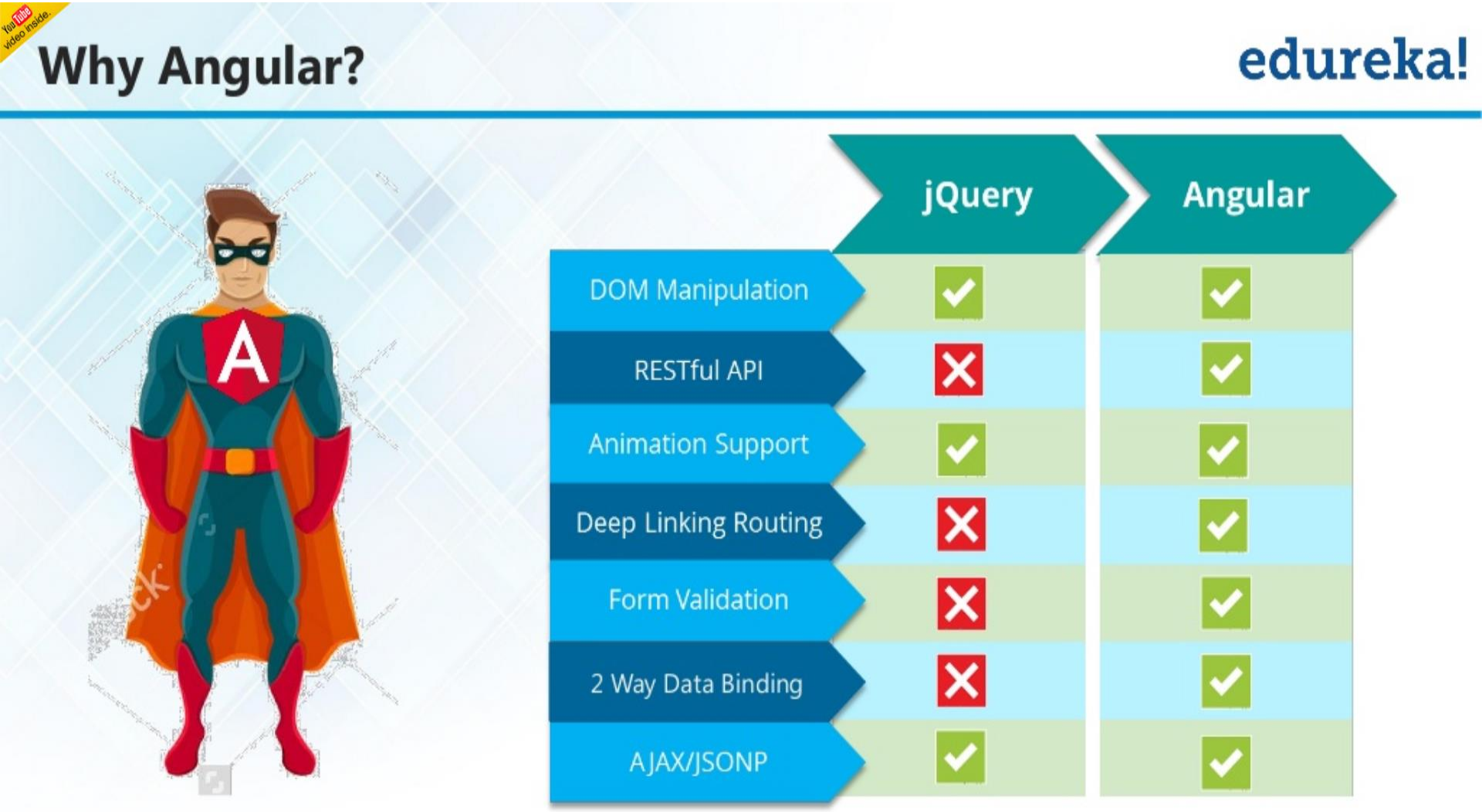
- **Problems With Polymer**
- **Unlike its peers, it lacks server-side rendering.**
- **Not abundant resources: As compared to react Vue and angular, polymer has scarce resources available on the net and has a very small community which has shunted its growth in popularity .**

5. Polymer

- **PROMINENT CLIENTS**
- **Google Apps like youtube, play music, Electronic Arts, ING, Coca Cola, McDonald's, IBM, General Electric**

YouTube video inside.

Why Angular?

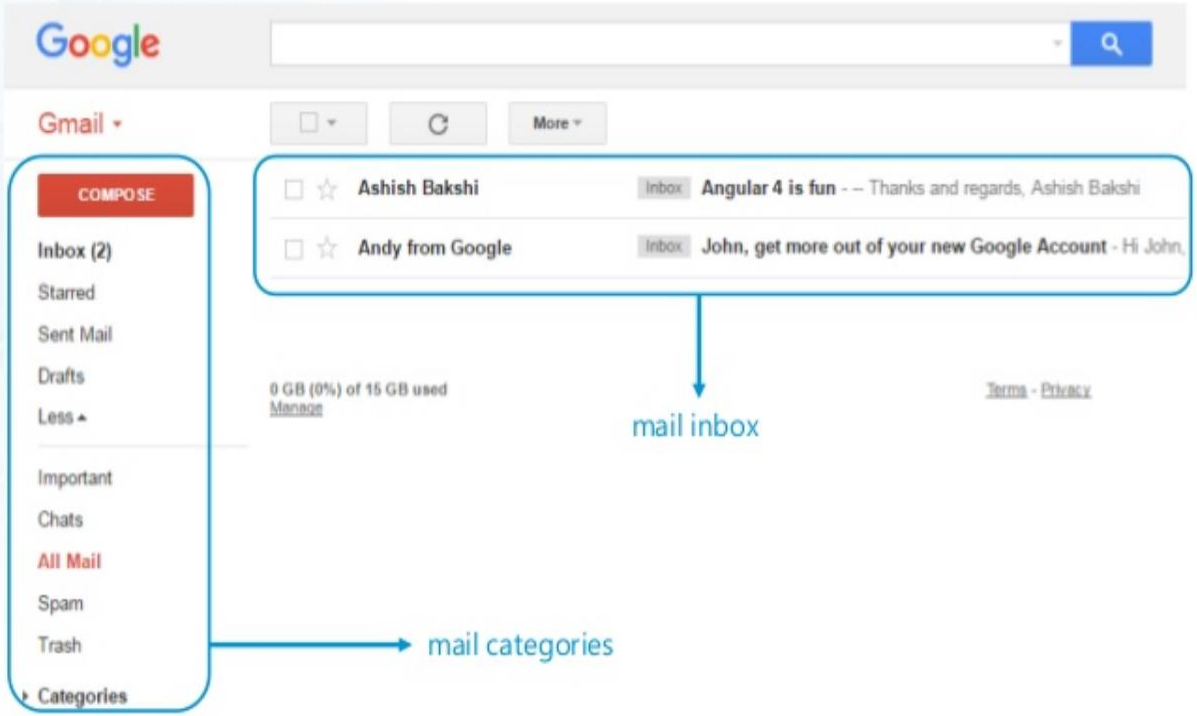

Why Angular?
edureka!
jQuery
Angular
DOM Manipulation
RESTful API
Animation Support
Deep Linking Routing
Form Validation
2 Way Data Binding
AJAX/JSONP

What is a Single Page Application?

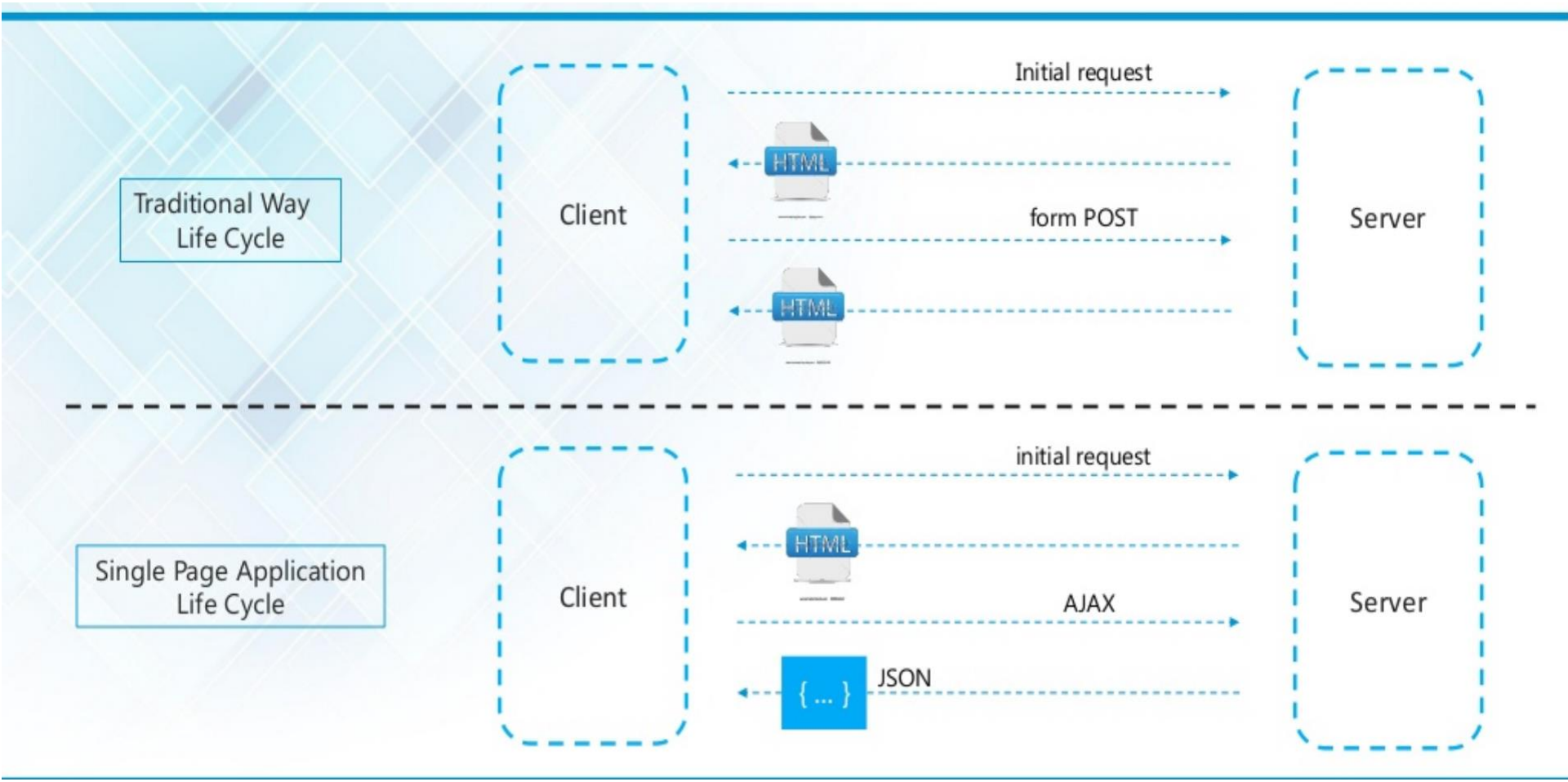
SPA

A Single Page Application is a web application that requires only a single page load in a web browser.

- Whole page is not reloaded every time
- Your browser fully renders the DOM once
- Later any server interactions is performed by JavaScript which modifies the view



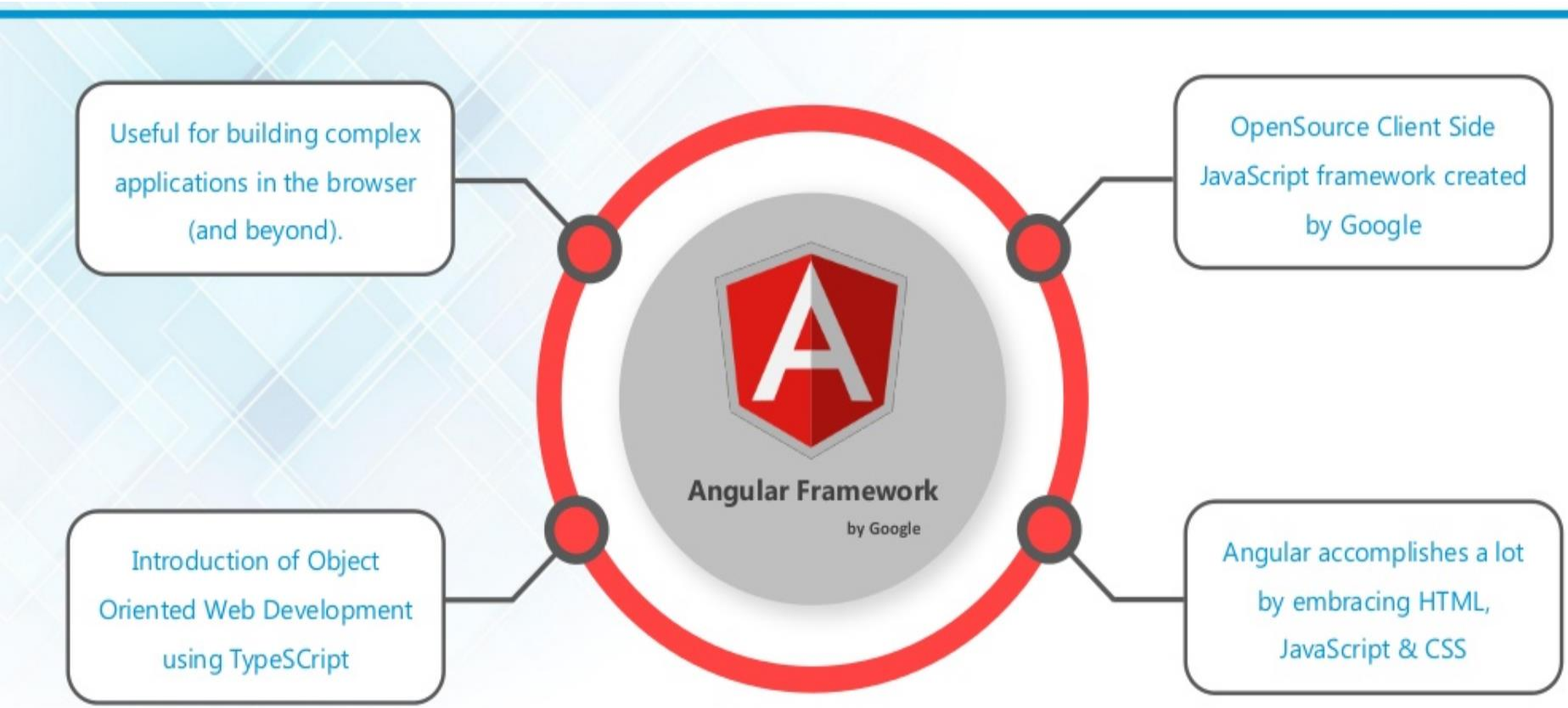
Traditional Vs SPA



YouTube video inside.

Angular Introduction

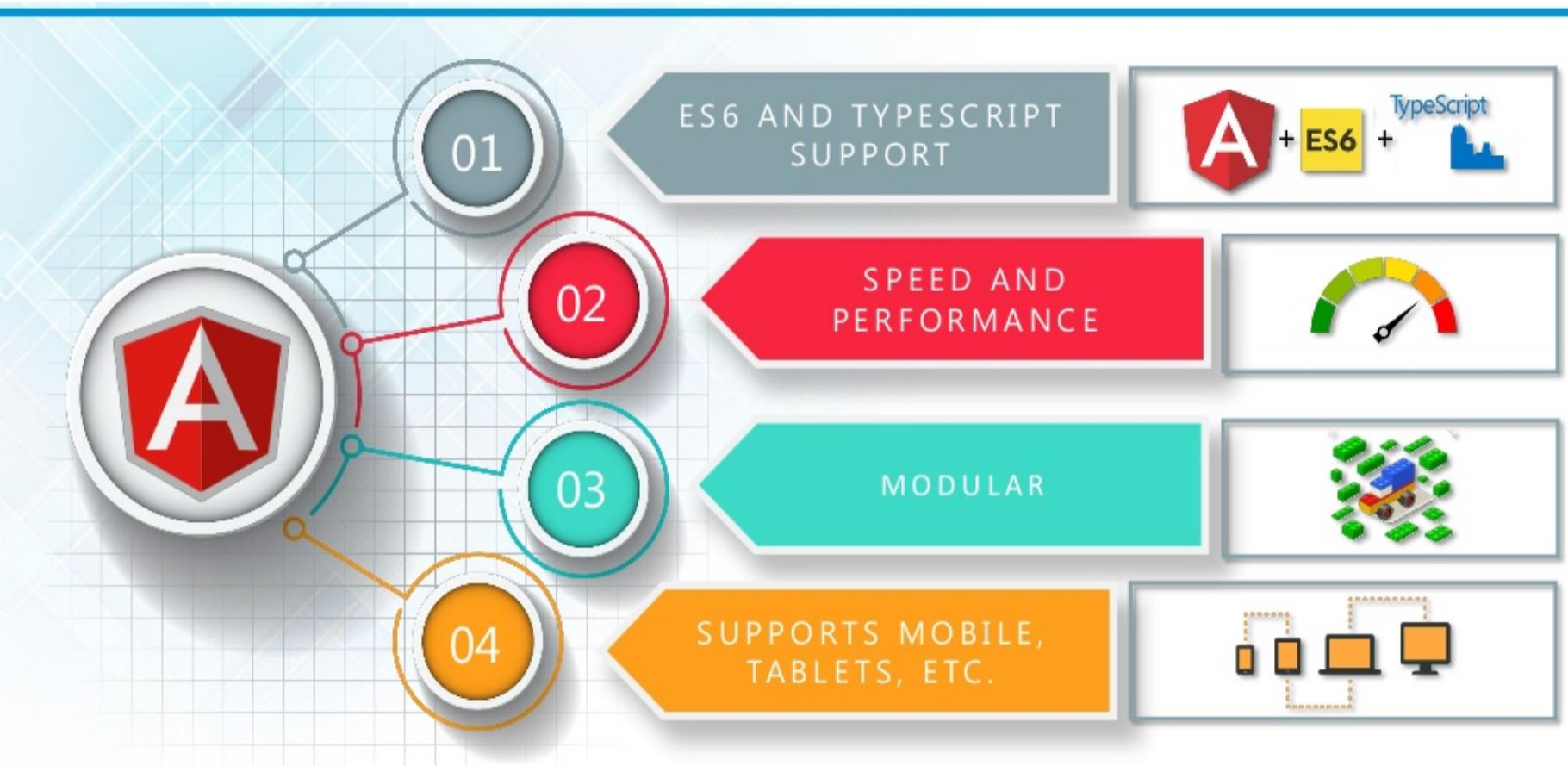
Angular Introduction



YouTube video inside.

Angular Features

Angular Features



Angular Installation

IDEs and Tools

IDEs

- Amexio Canvas Web Based Drag and Drop IDE by MetaMagic
  - Amexio Canvas is Drag and Drop Environment to create Fully Responsive Web and Smart Device HTML5/Angular Apps. Code will be auto generated and hot deployed by the Canvas for live testing. Out of the box 50+ Material Design Theme support. Commit your code to GitHub public or private repository.
- Angular IDE by Webclipse
  - Built first and foremost for Angular. Turnkey setup for beginners; powerful for experts.
- IntelliJ IDEA
  - Capable and Ergonomic Java * IDE
- Visual Studio Code
  - VS Code is a Free, Lightweight Tool for Editing and Debugging Web Apps.
- WebStorm
  - Lightweight yet powerful IDE, perfectly equipped for complex client-side development and server-side development with Node.js

IDEs and Tools

- Tooling
- Angular CLI
  - The official Angular CLI makes it easy to create and develop applications from initial commit to production deployment. It already follows our best practices right out of the box!
- Angular Playground
  - UI development environment for building, testing, and documenting Angular applications.
- Angular Universal
  - Server-side Rendering for Angular apps.
- Augury
  - A Google Chrome Dev Tools extension for debugging Angular applications.

IDEs and Tools

- Celerio Angular Quickstart
  - Generate an Angular CRUD application from an existing database schema
- Codelyzer
  - Static analysis for Angular projects.
- Compodoc
  - This tool generates dedicated documentation for Angular applications.
- Lite-server
  - Lightweight development only Node.js® server
- NinjaCodeGen - Angular CRUD Generator
  - Generate several types of CRUD apps complete with e2e testing using template-sets for Angular, Material Design, Bootstrap, Kendo UI, Ionic, ...

IDEs and Tools

- Nx
  - Nx (Nrwl Extensions for Angular) is an open source toolkit built on top of Angular CLI to help enterprise teams develop Angular at scale.
- Protractor
  - The official end to end testing framework for Angular apps
- UI-jar - Test Driven Style Guide Development
  - A drop in module to automatically create a living style guide based on the test you write for your components.
- Universal for ASP.NET
  - This package provides facilities for developers building Angular applications on ASP.NET.

IDEs and Tools

- Angular Fire
  - The official library for Firebase and Angular
- AngularCommerce
  - Angular Commerce is a solution for building modern e-commerce applications with power of Google Firebase. Set of components is design agnostic and allows to easily extend functionality.
- Apollo
  - Apollo is a data stack for modern apps, built with GraphQL.
- Meteor
  - Use Angular and Meteor to build full-stack JavaScript apps for Mobile and Desktop.
- ngrx
  - Reactive Extensions for Angular
- ngx-api-utils
  - ngx-api-utils is a lean library of utilities and helpers to quickly integrate any HTTP API (REST, Ajax, and any other) with Angular.

IDEs and Tools

- UI Components
- ag-Grid
  - A datagrid for Angular with enterprise style features such as sorting, filtering, custom rendering, editing, grouping, aggregation and pivoting.

- Amexio - Angular Extensions
  - Amexio (Angular MetaMagic EXtensions for Inputs and Outputs) is a rich set of Angular components powered by Bootstrap for Responsive Design.
  - UI Components include Standard Form Components, Data Grids, Tree Grids, Tabs etc. Open Source (Apache 2 License) & Free and backed by MetaMagic Global Inc

IDEs and Tools

- Angular Material
  - Material Design components for Angular
- Ant Design Mobile of Angular (ng-zorro-antd-mobile)
  - A set of enterprise-class mobile UI components based on Ant Design Mobile and Angular
- Material Community Components
  - Material components made by the community

IDEs and Tools

- Ant Design of Angular (ng-zorro-antd)
  - A set of enterprise-class UI components based on Ant Design and Angular
- Blox Material
  - A lightweight Material Design library for Angular, based upon Google's Material Components for the Web
- Clarity Design System
  - UX guidelines, HTML/CSS framework, and Angular components working together to craft exceptional experiences
- DevExtreme
  - 50+ UI components including data grid, pivot grid, scheduler, charts, editors, maps and other multi-purpose controls for creating highly responsive web applications for touch devices and traditional desktops.

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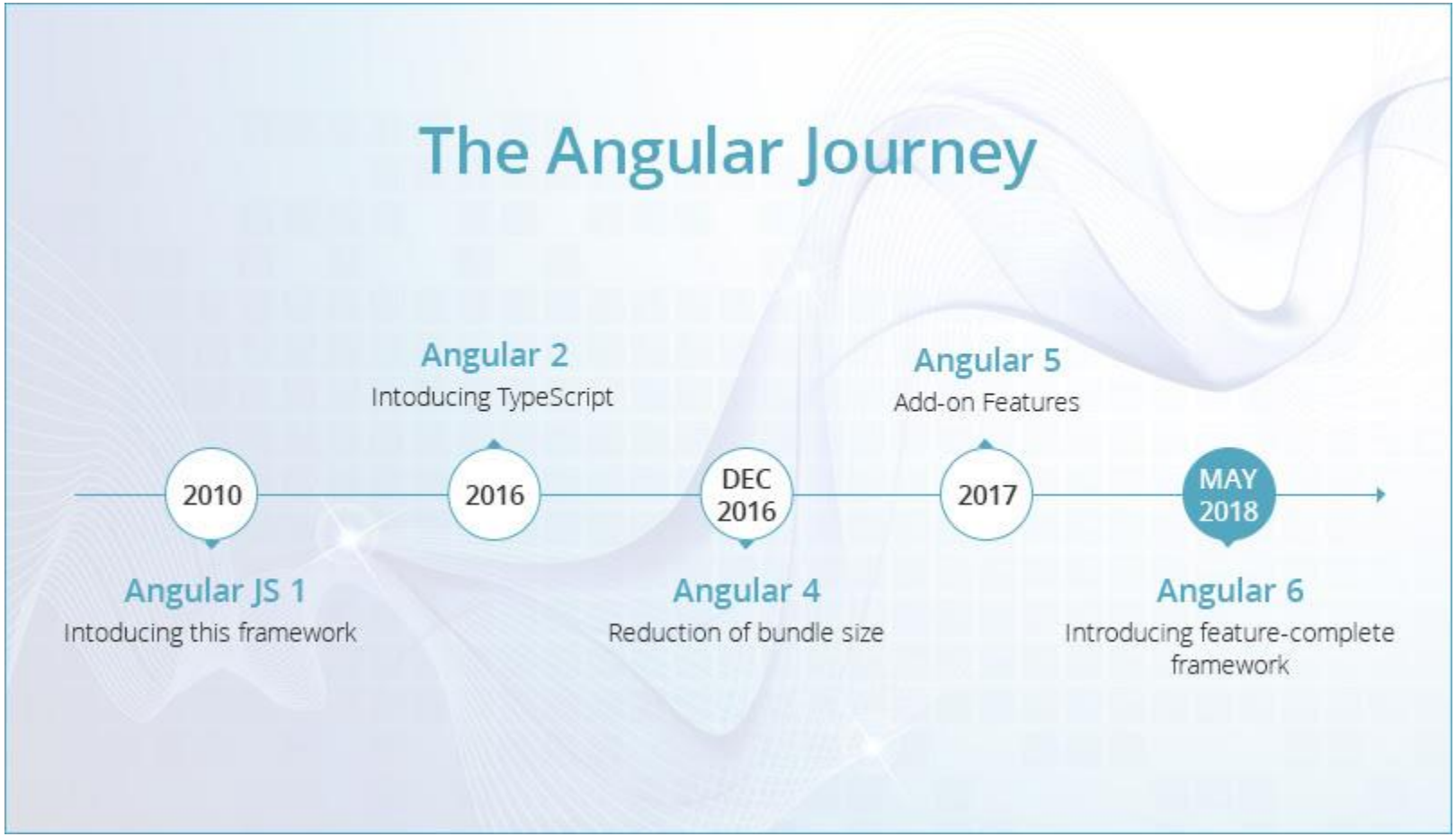
IDEs and Tools

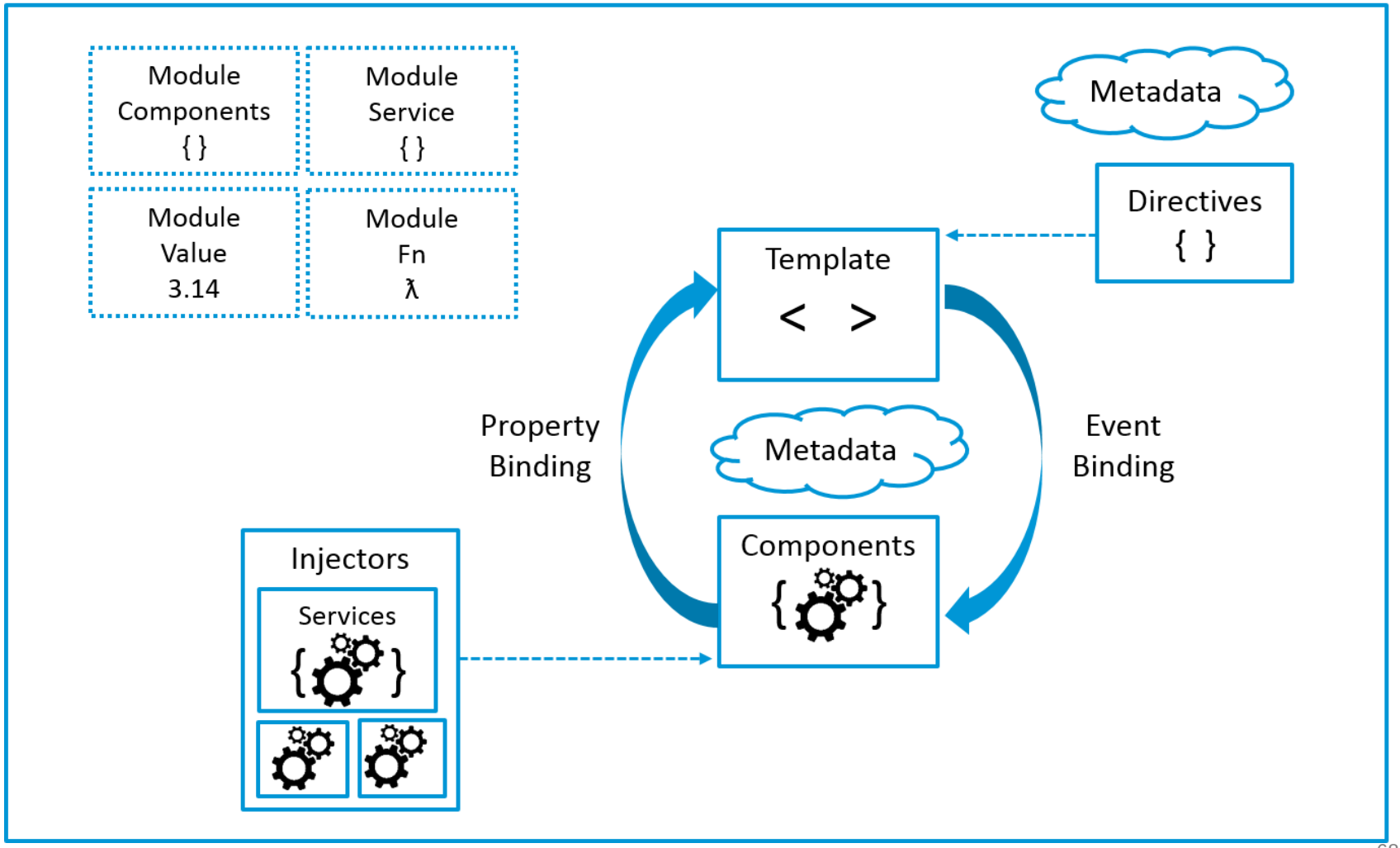
- Essential JS 2
  - Essential JS 2 for Angular is a collection modern TypeScript based true Angular Components. It has support for Ahead Of Time (AOT) compilation and Tree-Shaking. All the components are developed from the ground up to be lightweight, responsive, modular and touch friendly.
- Ignite UI for Angular
  - Ignite UI for Angular is a dependency-free Angular toolkit for building modern web apps.
- jQWidgets
  - Angular UI Components including data grid, tree grid, pivot grid, scheduler, charts, editors and other multi-purpose components
- Kendo UI
  - A professional grade library of Angular UI components written in TypeScript that includes our Data Grid, TreeView, Charts, Editors, DropDowns, DatePickers, and many more. Features include support for AOT compilation, Tree Shaking for high-performance, localization, and accessibility.

IDEs and Tools

- ng-bootstrap
  - The Angular version of the Angular UI Bootstrap library. This library is being built from scratch in Typescript using the Bootstrap 4 CSS framework.
- ng-lightning
  - Native Angular components & directives for Lightning Design System
- ngx-bootstrap
  - Native Angular directives for Bootstrap
- Onsen UI
  - UI components for hybrid mobile apps with bindings for both Angular & AngularJS.
- Prime Faces
  - PrimeNG is a collection of rich UI components for Angular


The Angular Journey
2010
Angular JS 1
Intoducing this framework
2016
Angular 2
Intoducing TypeScript
DEC 2016
Angular 4
Reduction of bundle size
2017
Angular 5
Add-on Features
MAY 2018
Angular 6
Introducing feature-complete framework

Architecture overview



Architecture overview

- Angular is a platform and framework for building client applications in HTML and TypeScript.
- Angular is written in TypeScript. It implements core and optional functionality as a set of TypeScript libraries that you import into your apps.
- The basic building blocks of an Angular application are NgModules, which provide a compilation context for components.
- NgModules collect related code into functional sets; an Angular app is defined by a set of NgModules.

Architecture overview

- An app always has at least a root module that enables bootstrapping, and typically has many more feature modules.
- Components define views, which are sets of screen elements that Angular can choose among and modify according to your program logic and data.
- Components use services, which provide specific functionality not directly related to views. Service providers can be injected into components as dependencies, making your code modular, reusable, and efficient.

Architecture overview

- Both components and services are simply classes, with decorators that mark their type and provide metadata that tells Angular how to use them.
- The metadata for a component class associates it with a template that defines a view. A template combines ordinary HTML with Angular directives and binding markup that allow Angular to modify the HTML before rendering it for display.
- The metadata for a service class provides the information Angular needs to make it available to components through dependency injection (DI).
- An app's components typically define many views, arranged hierarchically. Angular provides the Router service to help you define navigation paths among views. The router provides sophisticated in-browser navigational capabilities.

Architecture overview

- Modules
- Angular NgModules differ from and complement JavaScript (ES2015) modules.
- An NgModule declares a compilation context for a set of components that is dedicated to an application domain, a workflow, or a closely related set of capabilities.
- An NgModule can associate its components with related code, such as services, to form functional units.
- Every Angular app has a root module, conventionally named AppModule, which provides the bootstrap mechanism that launches the application.
- An app typically contains many functional modules.

Architecture overview

- Components
- Every Angular application has at least one component, the root component that connects a component hierarchy with the page document object model (DOM).
- Each component defines a class that contains application data and logic, and is associated with an HTML template that defines a view to be displayed in a target environment.
- The @Component() decorator identifies the class immediately below it as a component, and provides the template and related component-specific metadata.
- Decorators are functions that modify JavaScript classes. Angular defines a number of decorators that attach specific kinds of metadata to classes, so that the system knows what those classes mean and how they should work.

Architecture overview

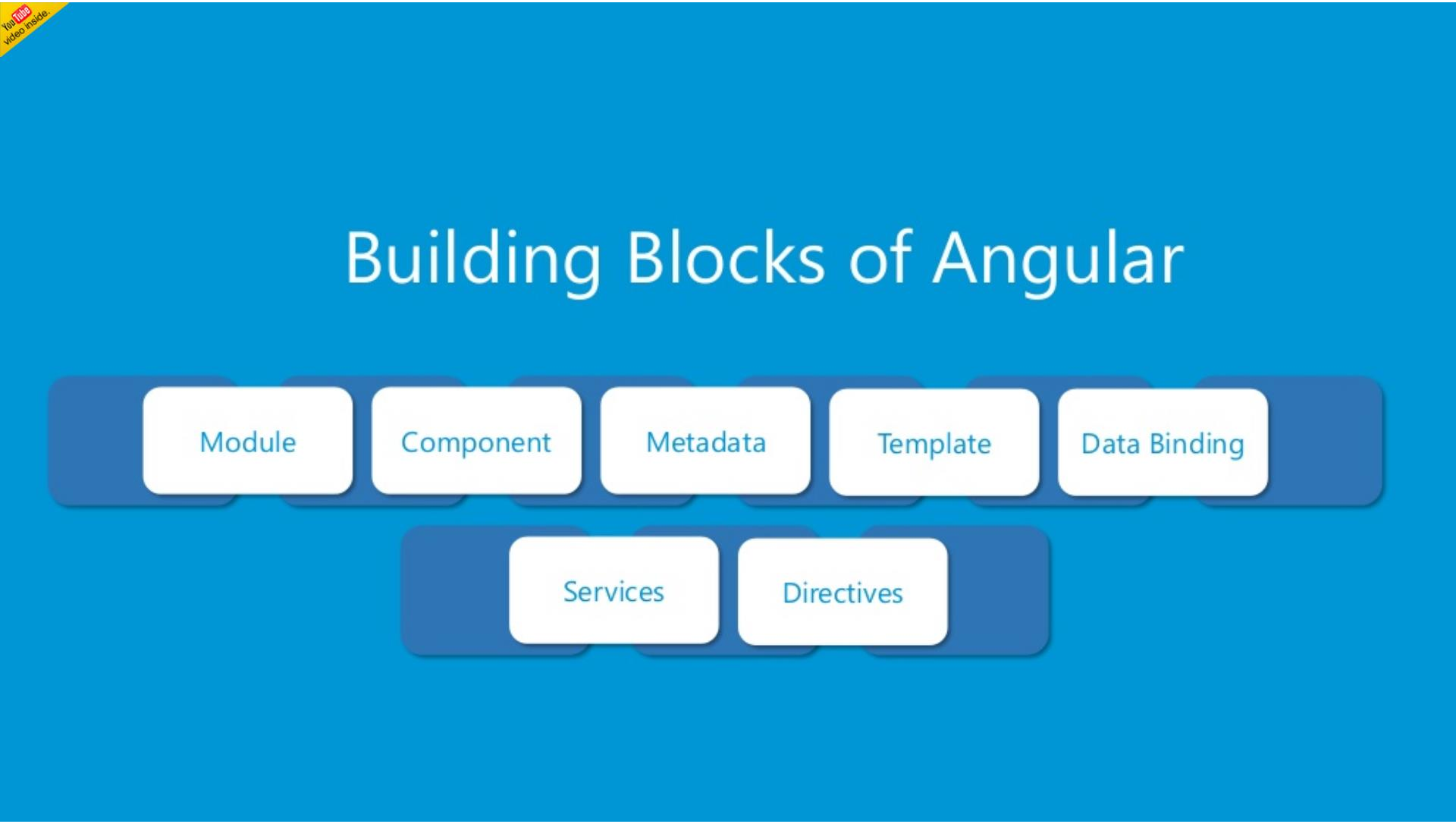
- Templates, directives, and data binding
- A template combines HTML with Angular markup that can modify HTML elements before they are displayed.
- Template directives provide program logic, and binding markup connects your application data and the DOM. There are two types of data binding:
- Event binding lets your app respond to user input in the target environment by updating your application data.
- Property binding lets you interpolate values that are computed from your application data into the HTML.

Architecture overview

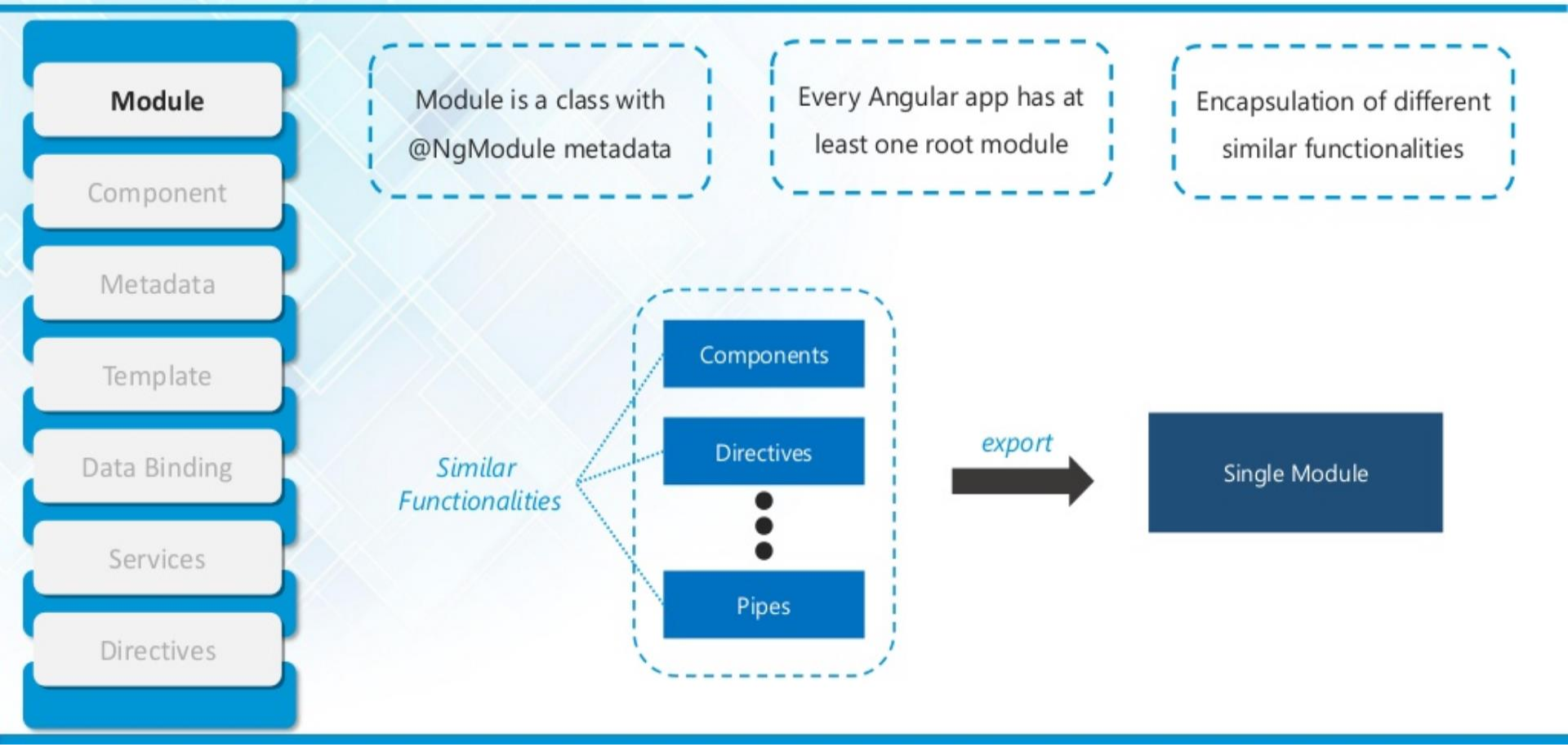
- Services and dependency injection
- For data or logic that isn't associated with a specific view, and that you want to share across components, you create a service class.
- A service class definition is immediately preceded by the @Injectable() decorator. The decorator provides the metadata that allows your service to be injected into client components as a dependency.
- Dependency injection (DI) lets you keep your component classes lean and efficient. They don't fetch data from the server, validate user input, or log directly to the console; they delegate such tasks to services.

Architecture overview

- Routing
- The Angular Router NgModule provides a service that lets you define a navigation path among the different application states and view hierarchies in your app. It is modeled on the familiar browser navigation conventions:
- Enter a URL in the address bar and the browser navigates to a corresponding page.
- Click links on the page and the browser navigates to a new page.
- Click the browser's back and forward buttons and the browser navigates backward and forward through the history of pages you've seen.


YouTube video inside.
Building Blocks of Angular
Module
Component
Metadata
Template
Data Binding
Services
Directives

Building Blocks of Angular



Building Blocks of Angular


```
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';
import { TaskComponent } from './task/task.component';

@NgModule({

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

Decorator

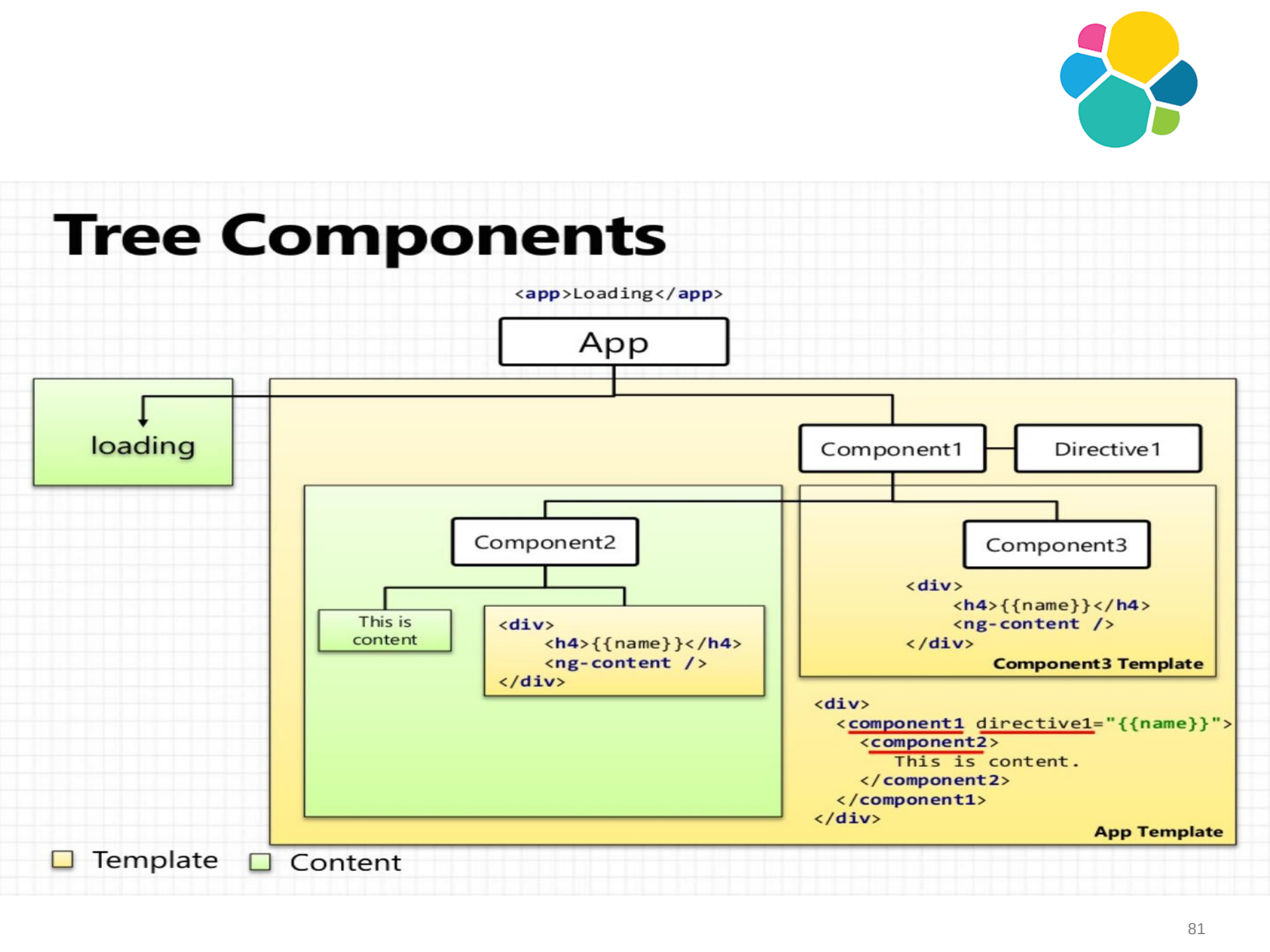
Declaring all the components

Importing Modules

Provide Services to all module's component

Building Blocks of Angular

- Module
- **Component**
- Metadata
- Template
- Data Binding
- Services
- Directives


Tree Components
<app>Loading</app>
App
loading
Component1
Directive1
Component2
Component3
This is content

<h4>{{name}}</h4>
<ng-content />

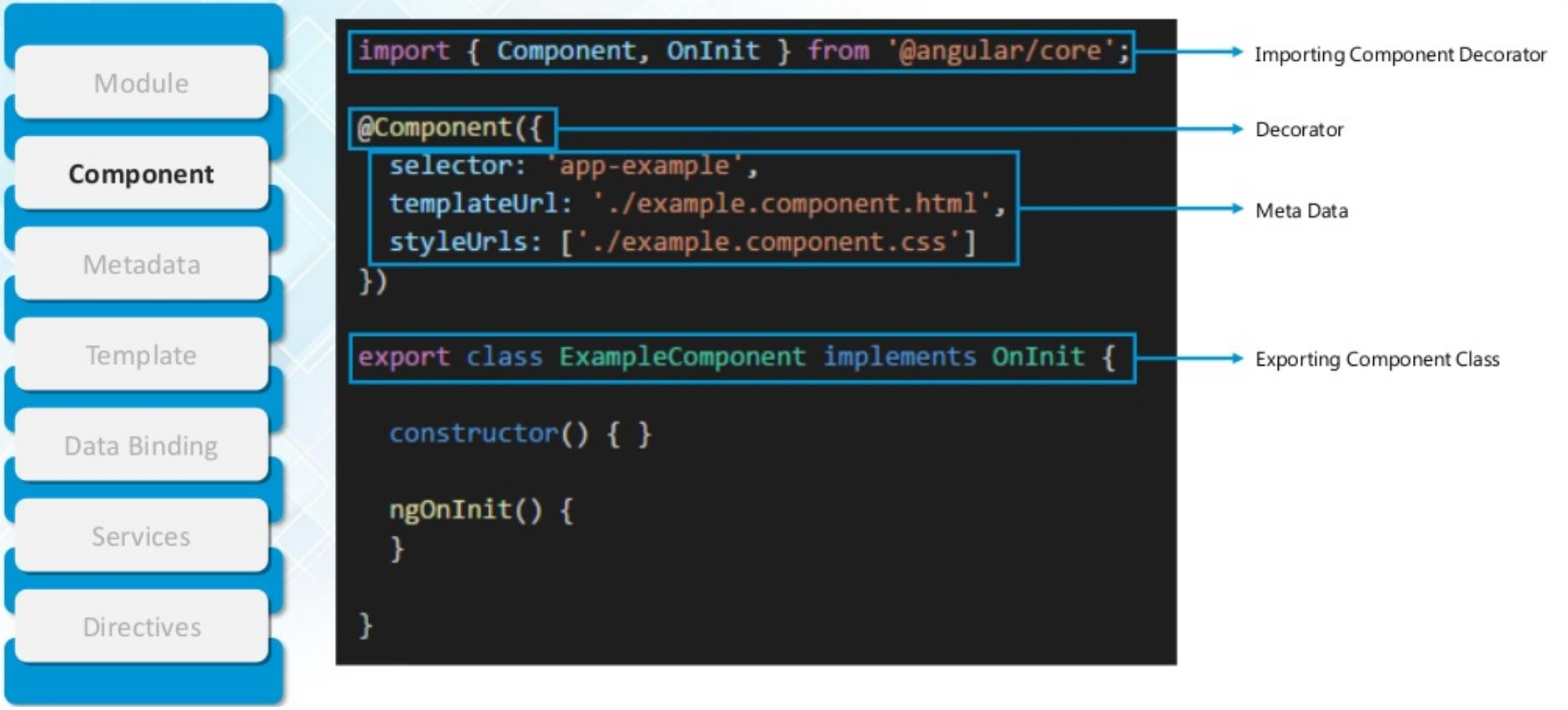
<h4>{{name}}</h4>
<ng-content />

Component3 Template

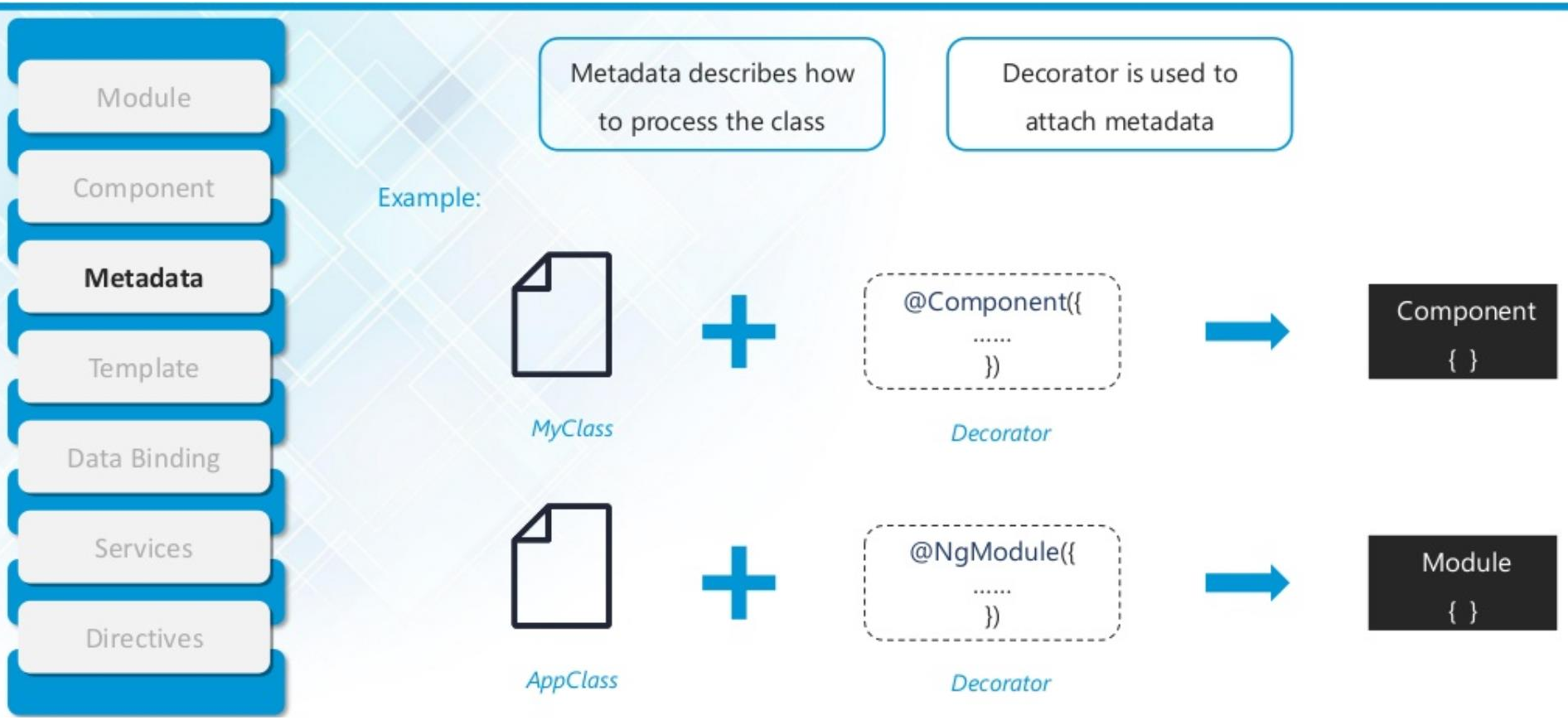
<component1 directive1="{{name}}">
<component2>
This is content.
</component2>
</component1>

App Template
Template
Content

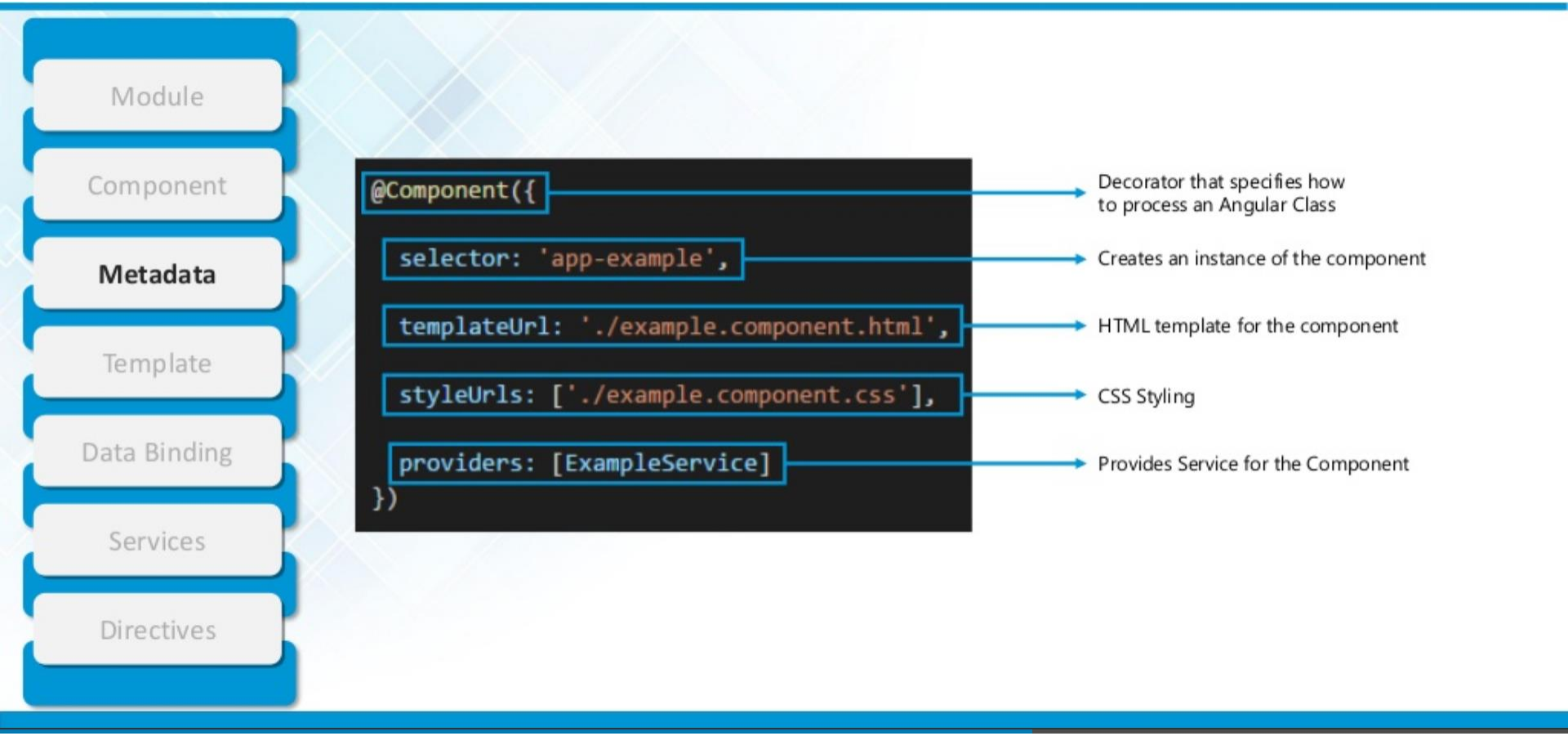
Building Blocks of Angular



Building Blocks of Angular

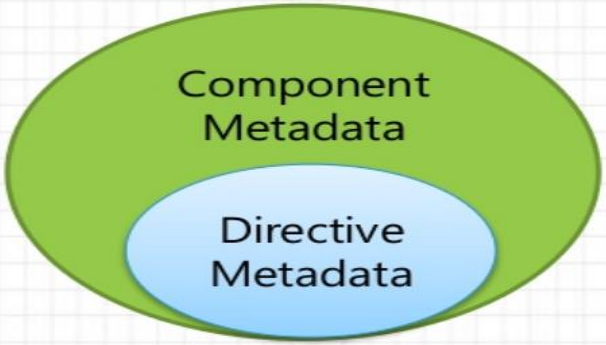


Building Blocks of Angular

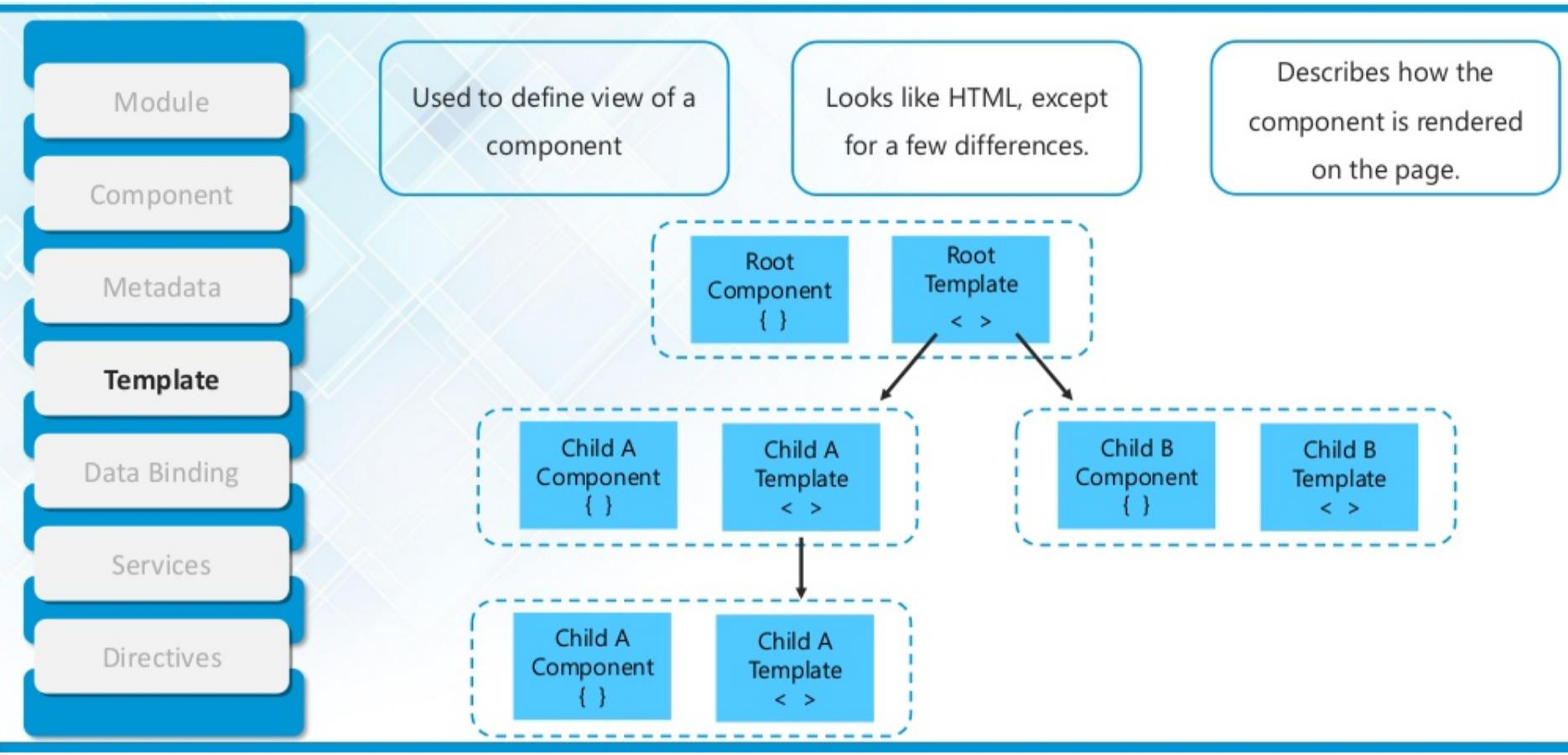


Component Metadata

- **Names:**
  - selector? : string
  - exportAs? : string
- **Binding:**
  - inputs? : string[]
  - outputs? : string[]
  - host? : {[key: string]: string}
  - changeDetection?: ChangeDetectionStrategy
- **Injector:**
  - providers? : any[]
  - viewProviders? : any[]
  - directives? : Array<Type | any[]>
  - pipes? : Array<Type | any[]>
  - queries? : {[key: string]: any}
- **View:**
  - templateUrl? : string
  - template? : string
  - styleUrls? : string[]
  - styles? : string[]
  - encapsulation?: ViewEncapsulation



Building Blocks of Angular



Building Blocks of Angular

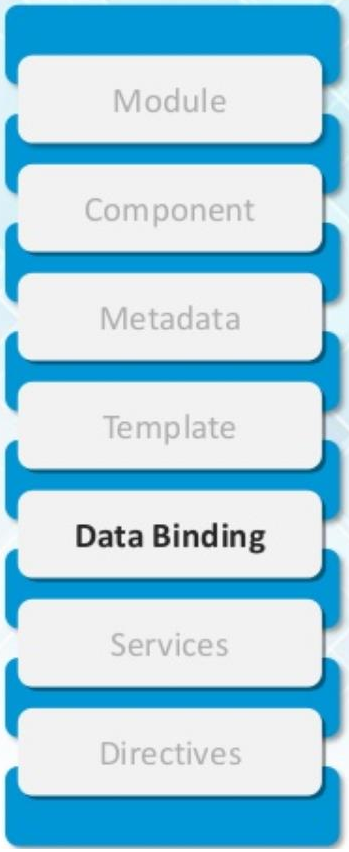
- Module
- Component
- Metadata
- Template
- **Data Binding**
- Services
- Directives

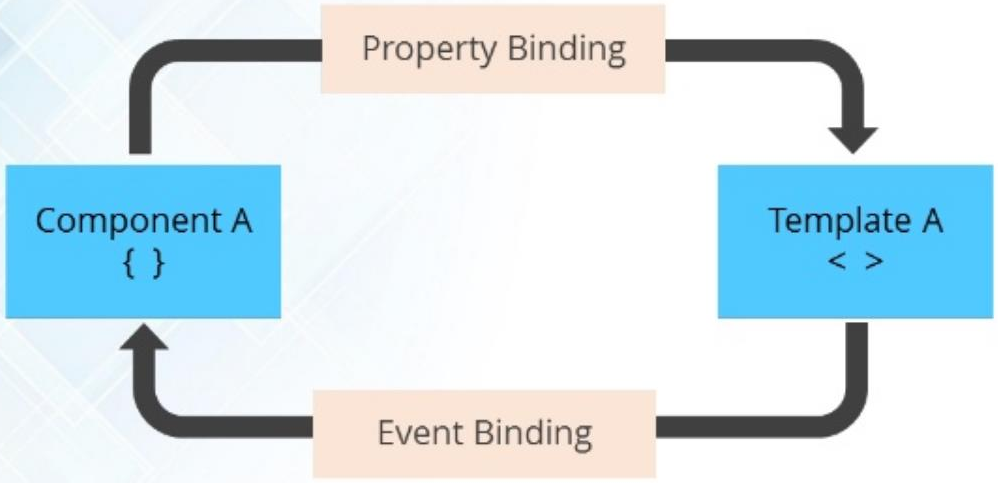
TYPES OF DATA BINDING

Data binding plays an important role in communication between a template and its component

INTERPOLATION	01	DOM	{{ value }}	COMPONENT
PROPERTY BINDING	02	DOM	[property] = "value"	COMPONENT
EVENT BINDING	03	DOM	(event) = "event handler"	COMPONENT
2 WAY DATA BINDING	04	DOM	[(ngModel)]	COMPONENT

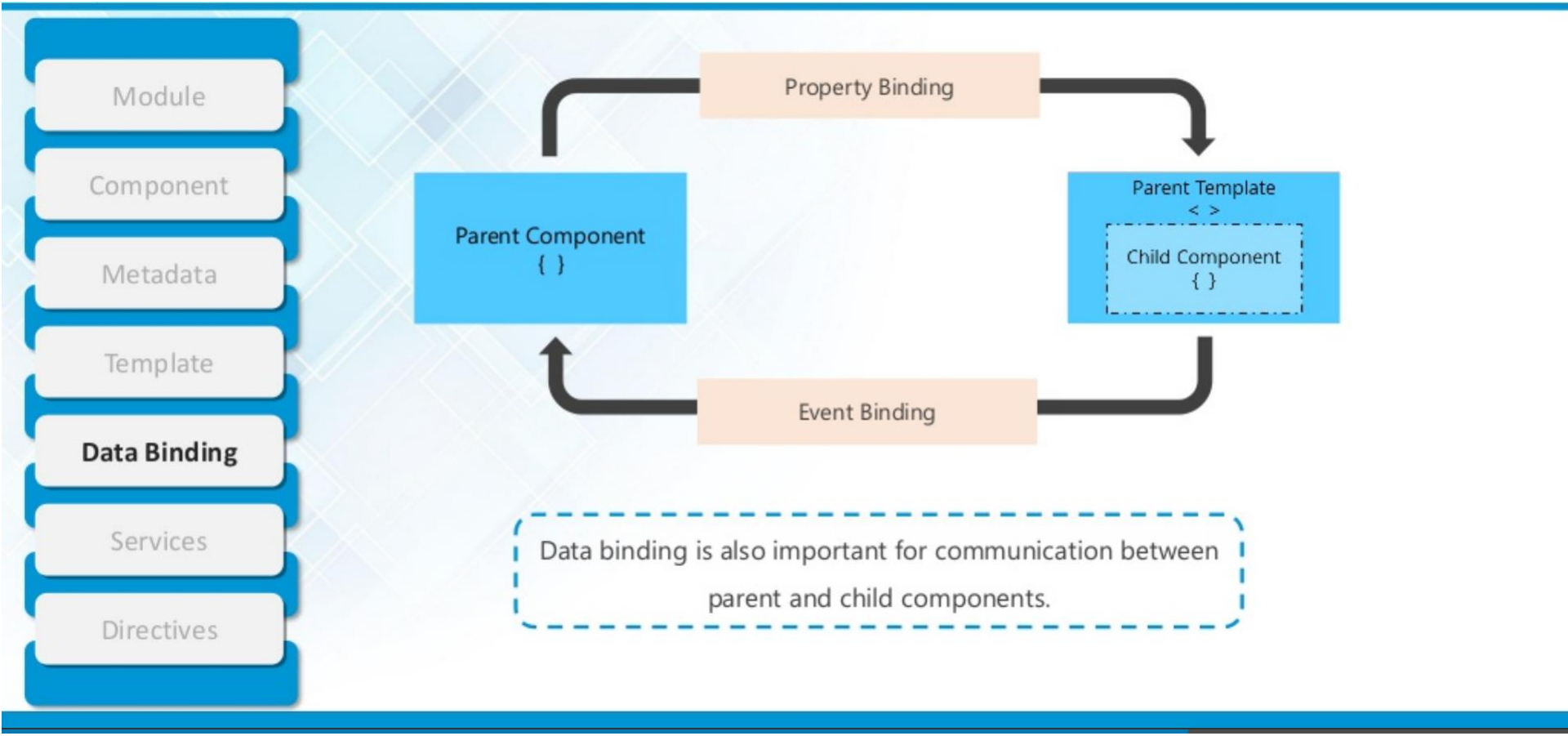
Building Blocks of Angular



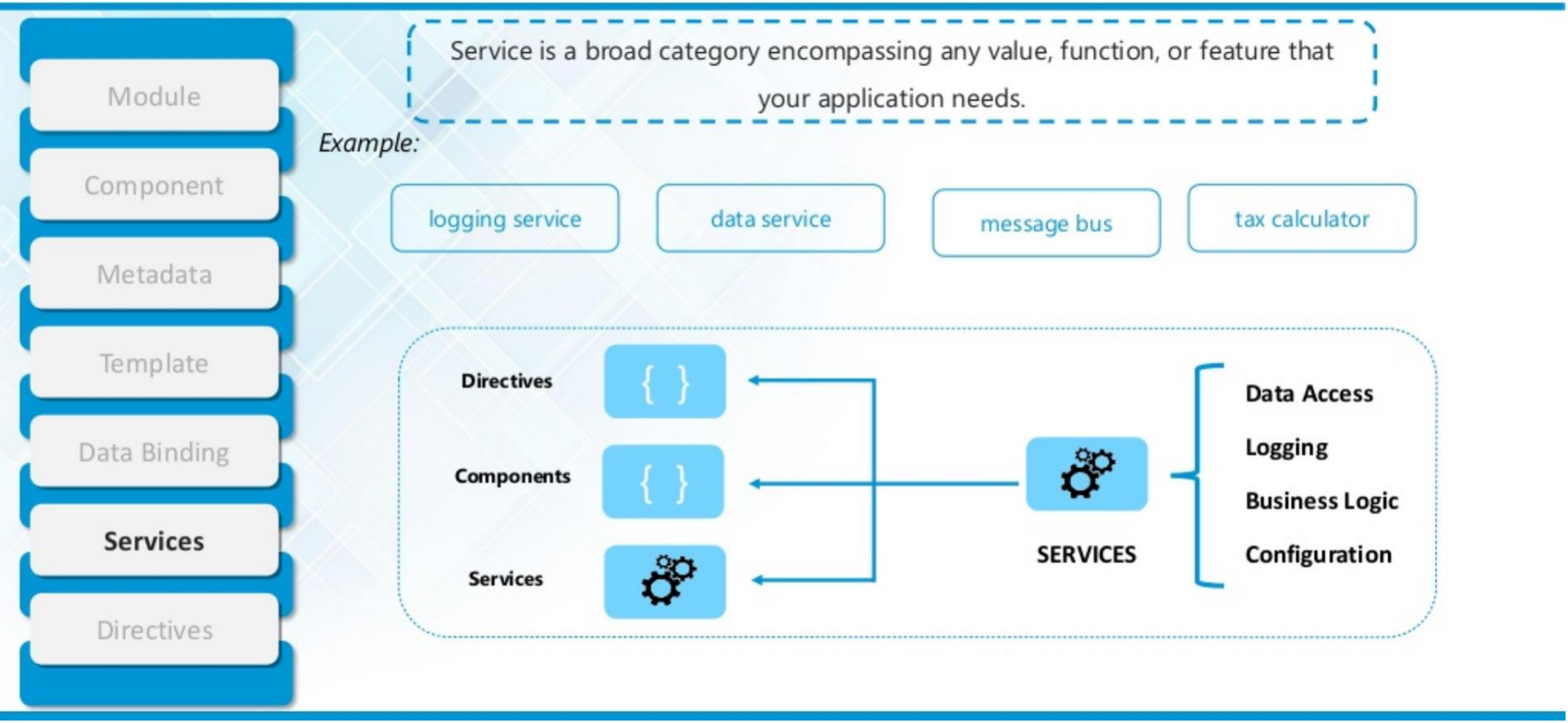


Data binding plays an important role in communication between a template and its component.

Building Blocks of Angular



Building Blocks of Angular



Building Blocks of Angular

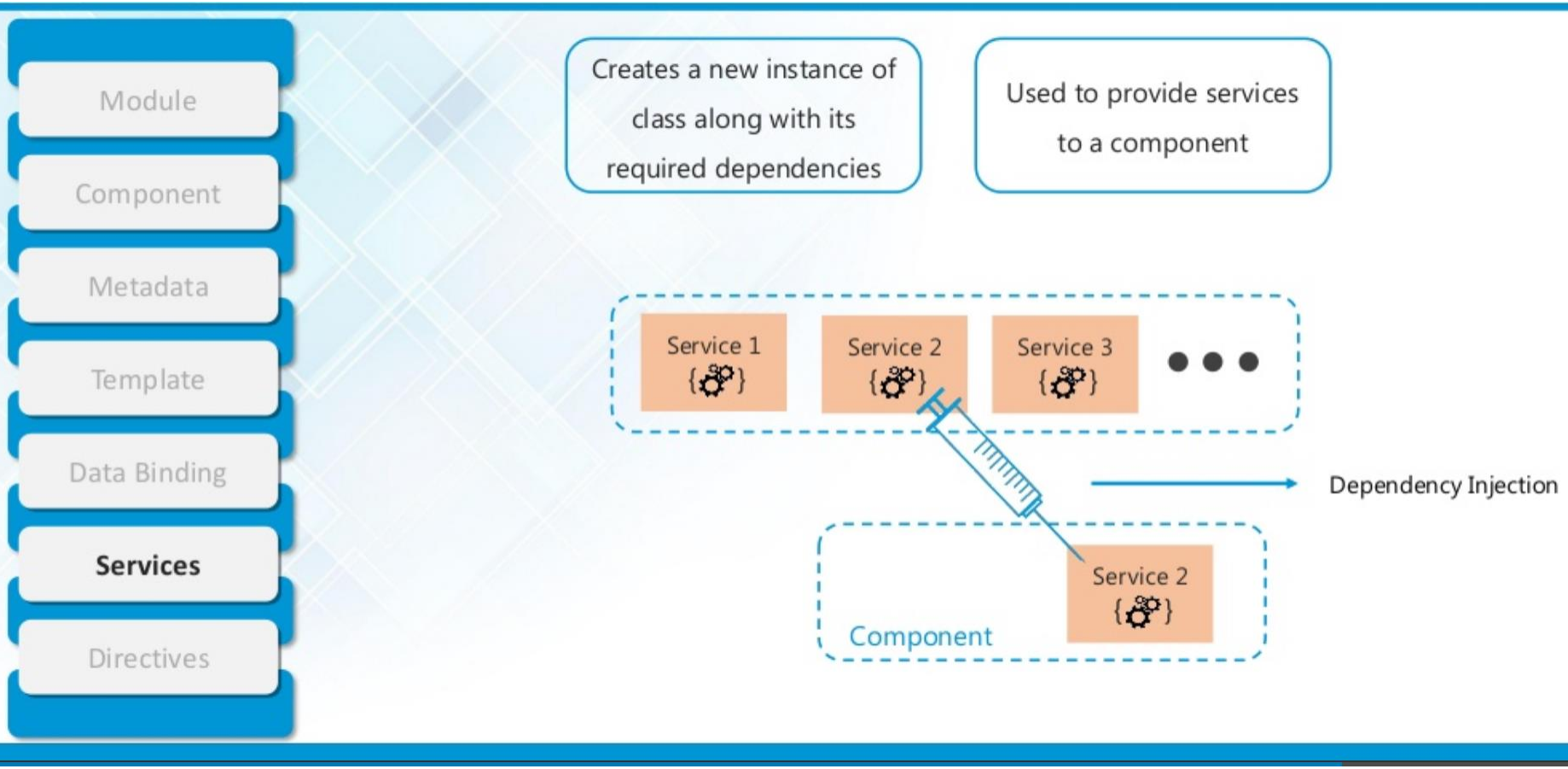
- Module
- Component
- Metadata
- Template
- Data Binding
- **Services**
- Directives

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

@Injectable()
export class ExampleService {

  movies: string[] = ["Inception", "Dark Knight", "Shutter Island"];

  constructor() { }

  getMovies(): string[]
  {
    return this.movies;
  }

}
```

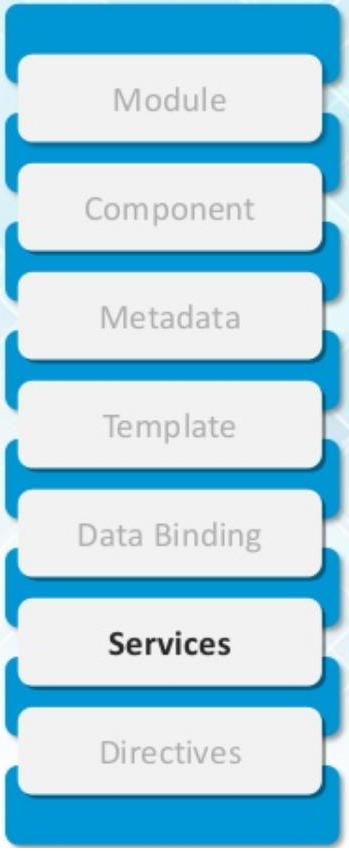
Service Class

Service Method for retrieving data

Building Blocks of Angular



Building Blocks of Angular



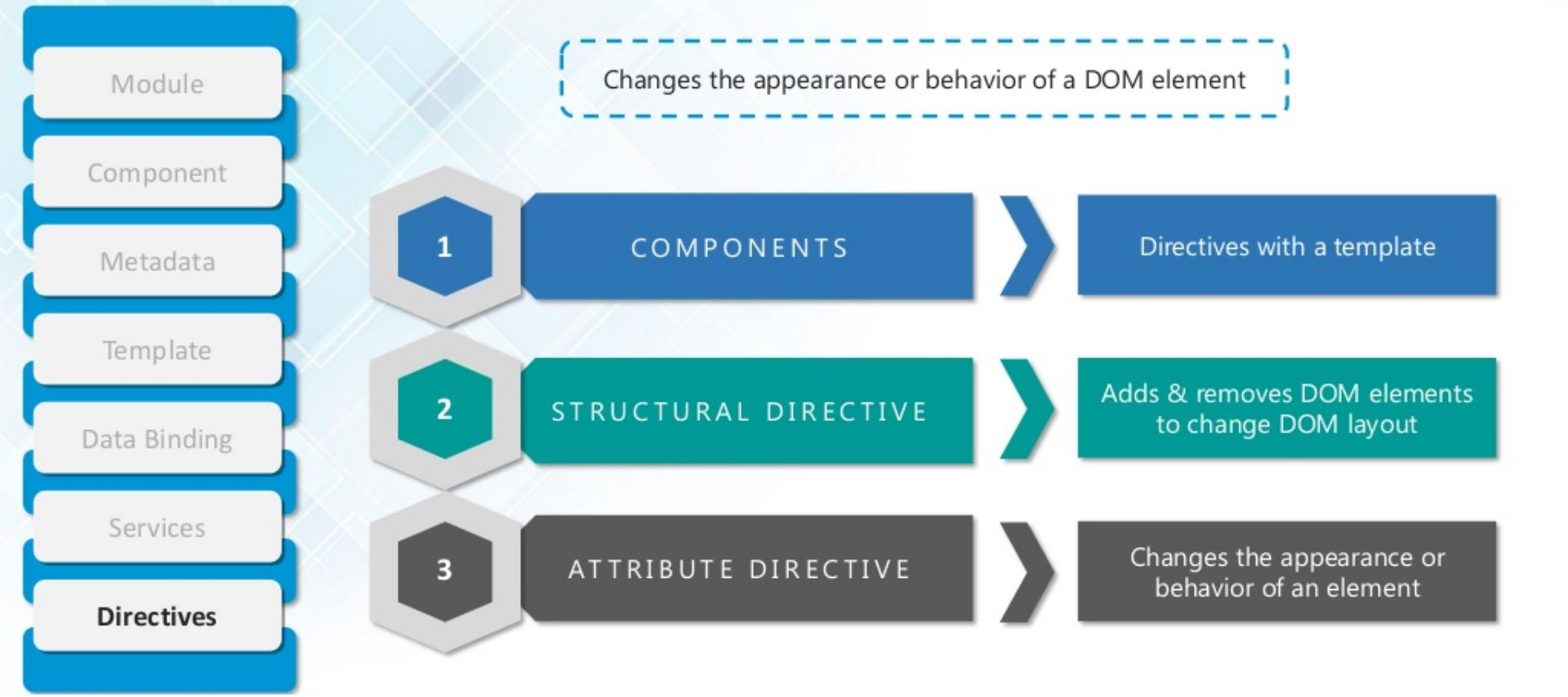

```
import { Component, OnInit } from '@angular/core';
import {ExampleService} from '../example.service';

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

  movies: string[];
  constructor(private exampleService: ExampleService) { }

  ngOnInit() {
      this.movies = this.exampleService.getMovies();
  }

}
```

Importing Service Class

Injecting Service into the Component

Retrieving data

Building Blocks of Angular

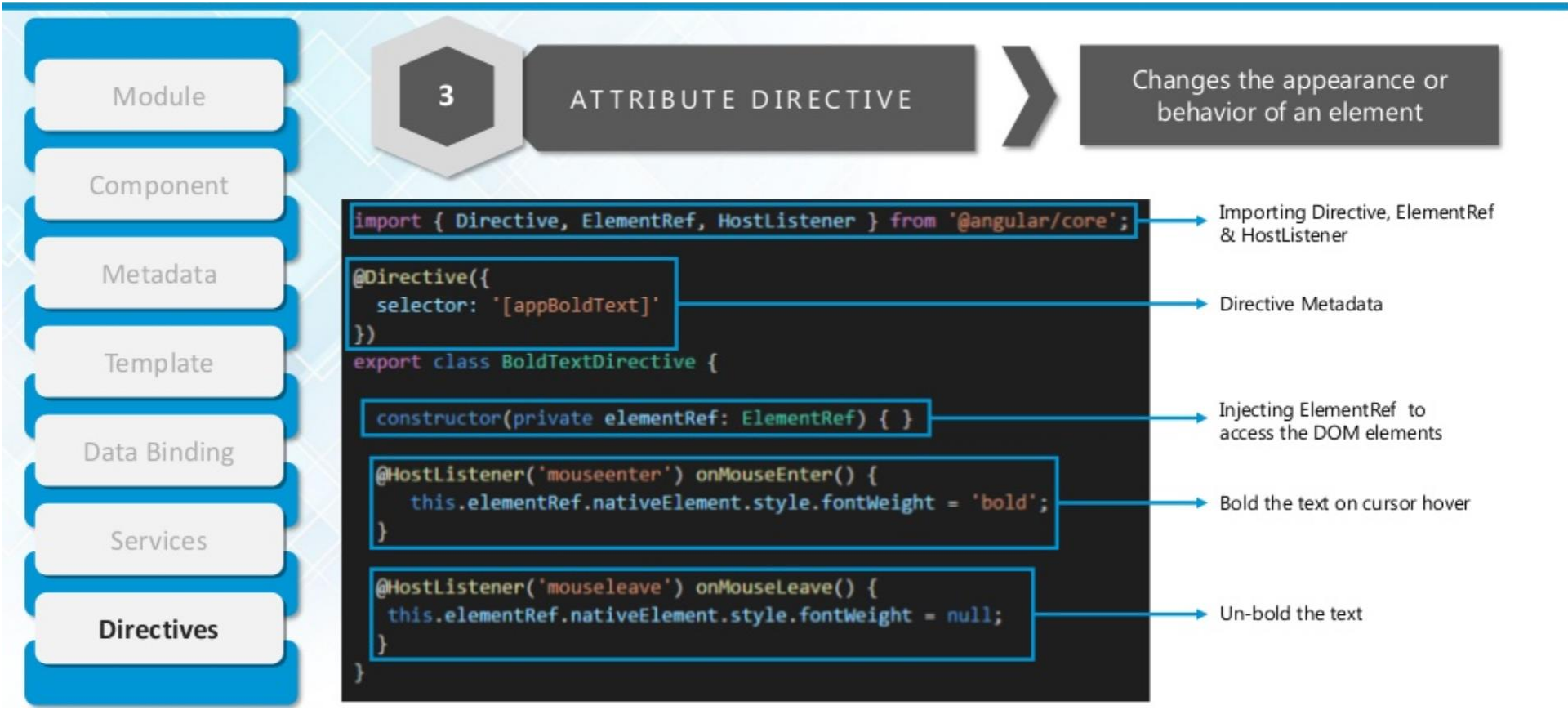


Building Blocks of Angular


```
<ul>
  <li *ngFor = "let movie of movies">{{movie}}</li>
</ul>
```

Iterating over the movies list

Building Blocks of Angular



Installation

- npm install -g @angular/cli
- npm install -g @angular/cli@8.3.21
- npm install -g @angular/cli@12.2.12
- ng new ecommerceapp
- ng serve

Lifecycle Hooks

- Angular calls lifecycle hook methods on directives and components as it **creates**, **changes**, and **destroys** them.

Creates:

- `OnInit`
- `AfterContentInit`
- `AfterViewInit`

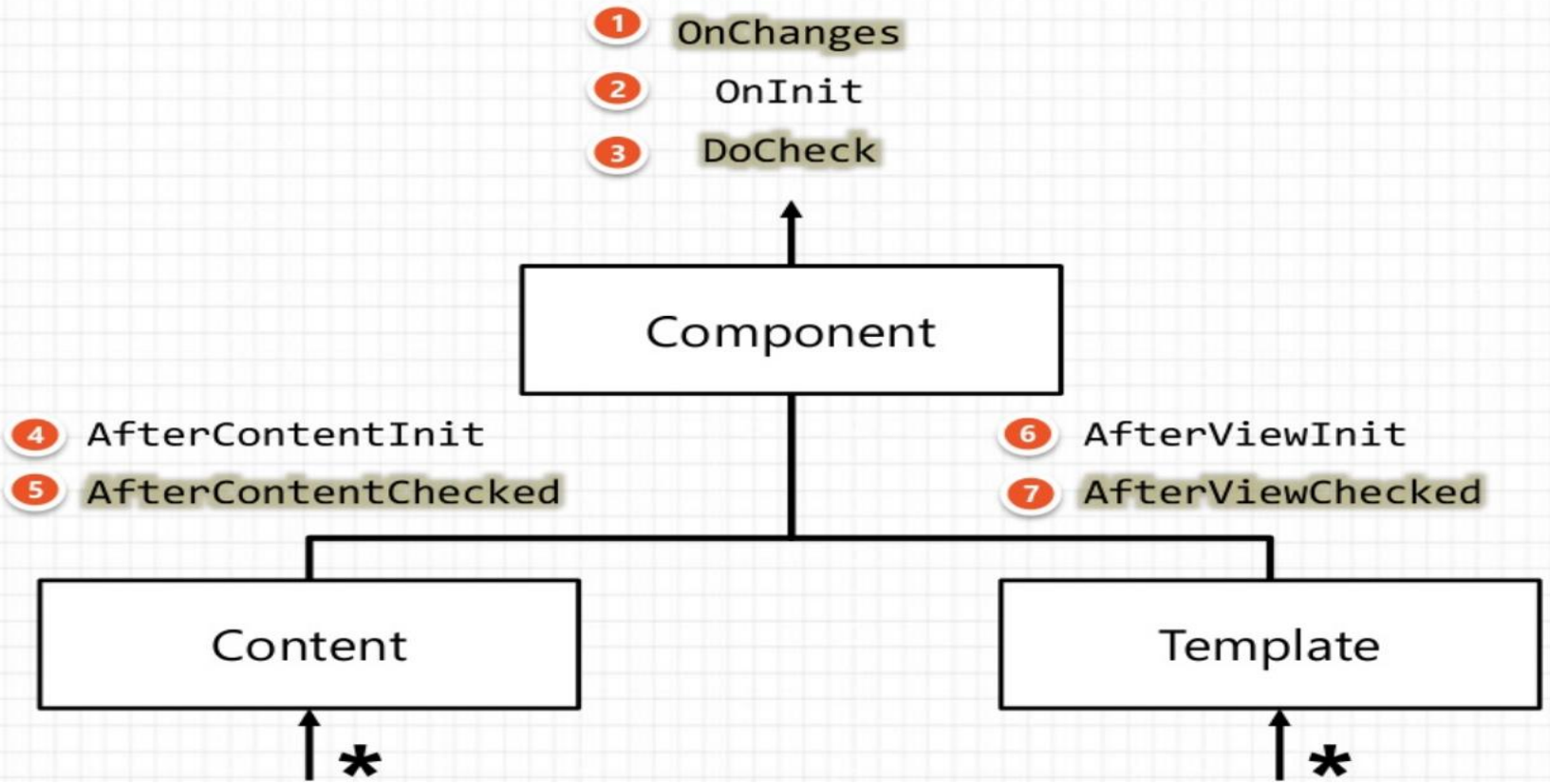
Changes:

- `DoCheck`
- `OnChanges`
- `AfterContentChecked`
- `AfterViewChecked`

Destroys:

- `OnDestroy`

Hooks Order


1 OnChanges
2 OnInit
3 DoCheck
Component
4 AfterContentInit
5 AfterContentChecked
6 AfterViewInit
7 AfterViewChecked
Content
Template
*
*

What Is View Encapsulation in Angular

Component level style

Emulated

- no Shadow DOM
- style encapsulation
- value : 0

Shadow DOM level Style

Native

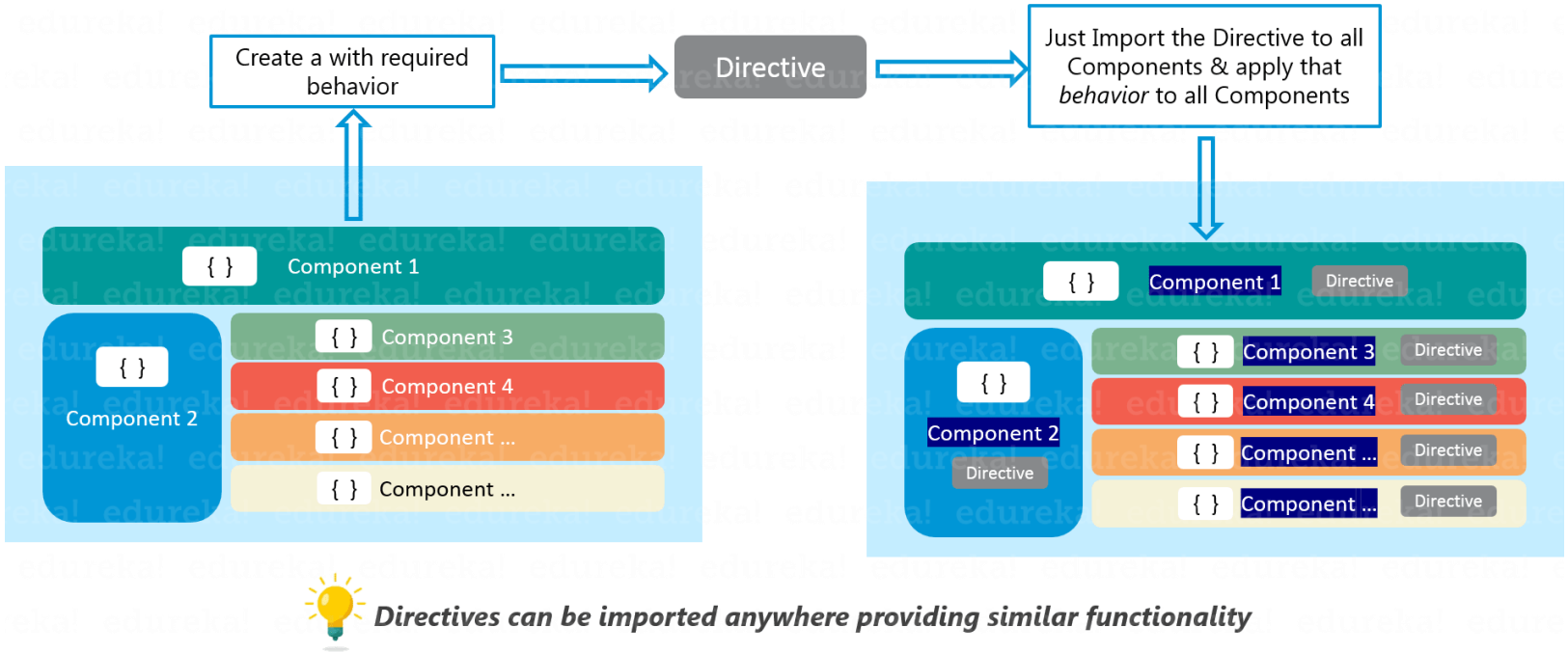
- Shadow DOM
- style encapsulation
- value : 1

Main Html level head section style

None

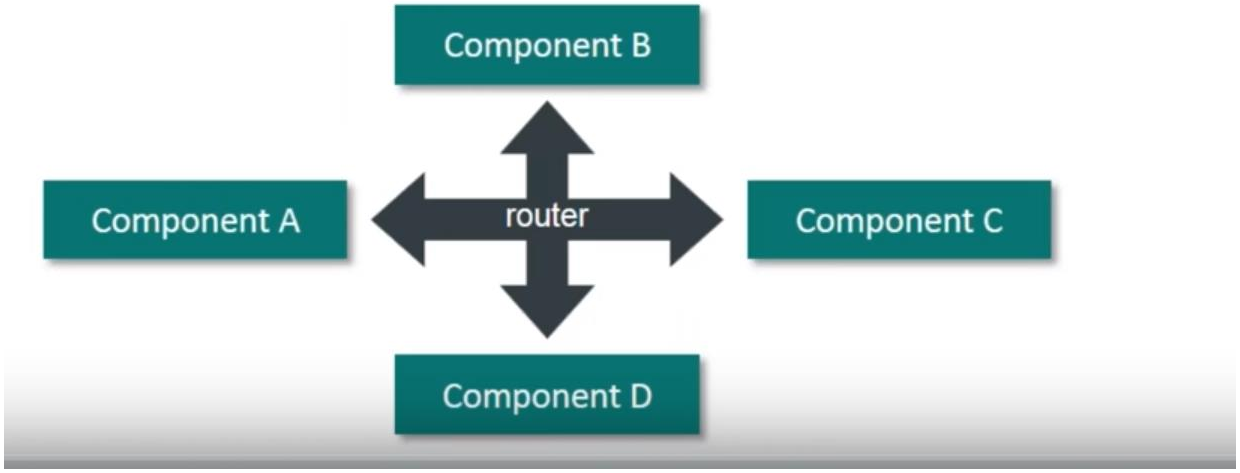
- no Shadow DOM
- no Style encapsulation
- value : 2

Angular Directives

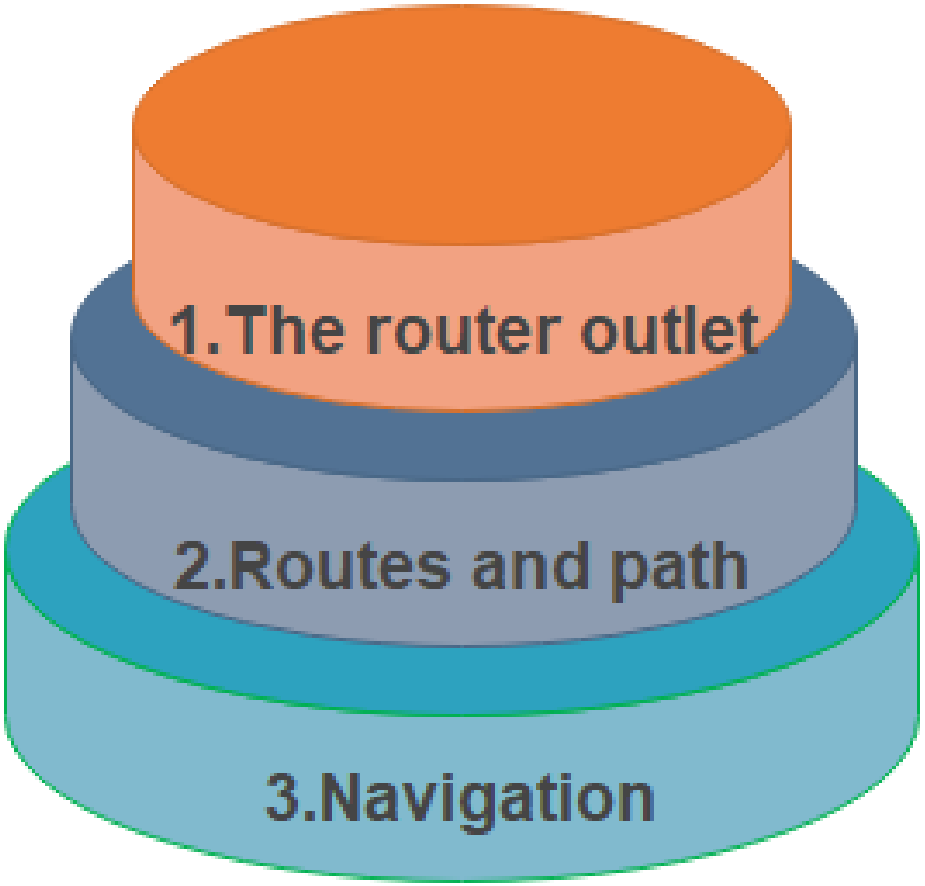


Directives can be imported anywhere providing similar functionality

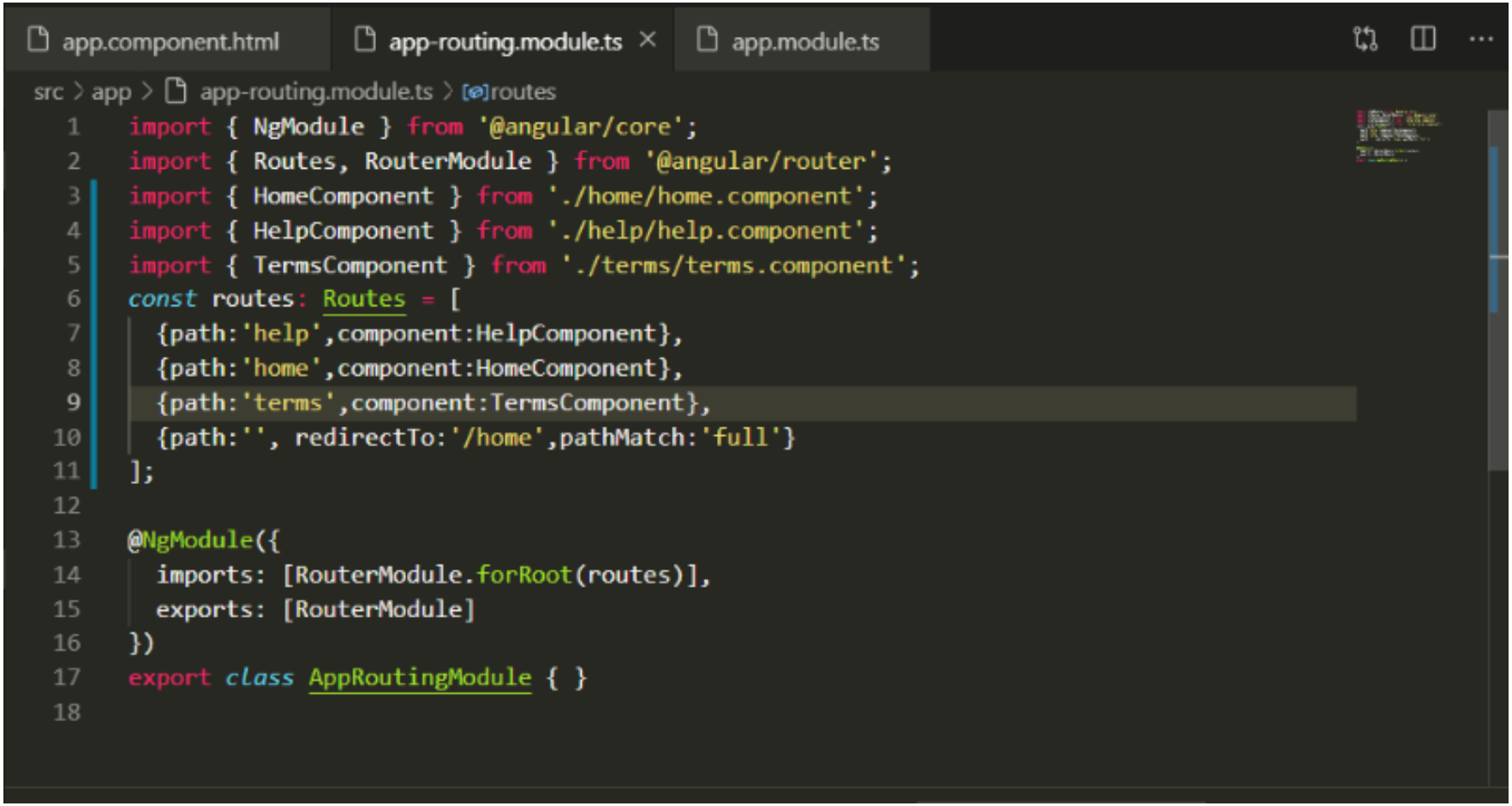
Angular Routing



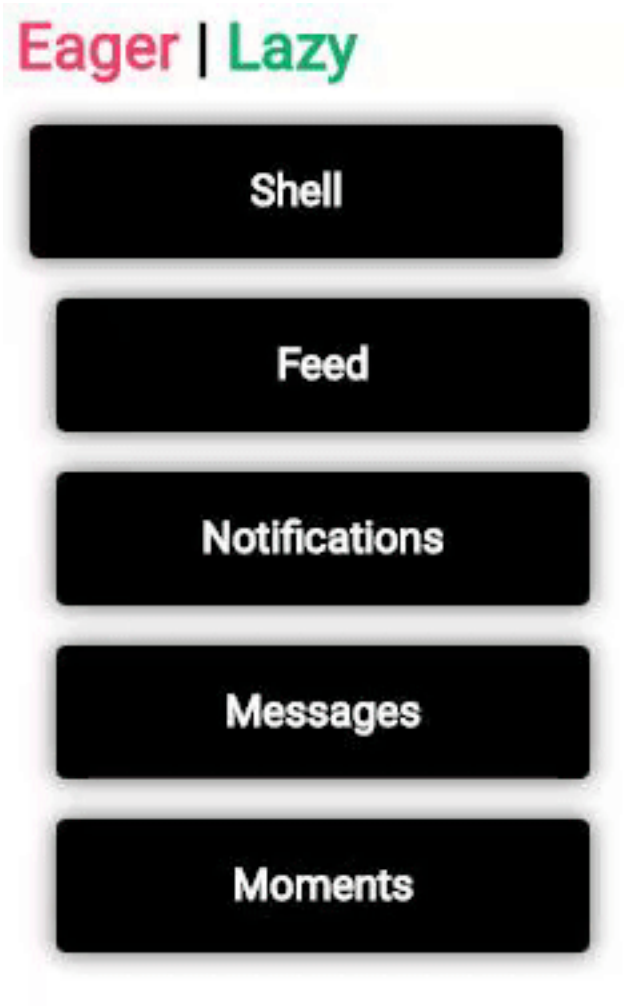
Angular Routing



Angular Routing



Lazy Loading



Lazy Loading

- * Inside of app-routing.module.ts > route > children */
- {
- path: 'notifications',
- loadChildren: () => import('./innerComponents/notifications/notifications.module').then(mod => mod.NotificationsModule),
- }

PreLoading


Eager | Preload | Lazy
Shell
Feed
Notifications
Messages
Moments

PreLoading

```
imports: [
  RouterModule.forRoot(
    routes,
    { preloadingStrategy: CustomPreloaderStrategy }
  )
]
```

Parameterized Routing

```
{ path: "product/:id", component:
ProductDetailComponent }
```

```
<h1>Products List</h1>
<ul>
  <li *ngFor="let product of products">
    <a [routerLink]="['/product',product.id]"></a>
  </li>
</ul>
```

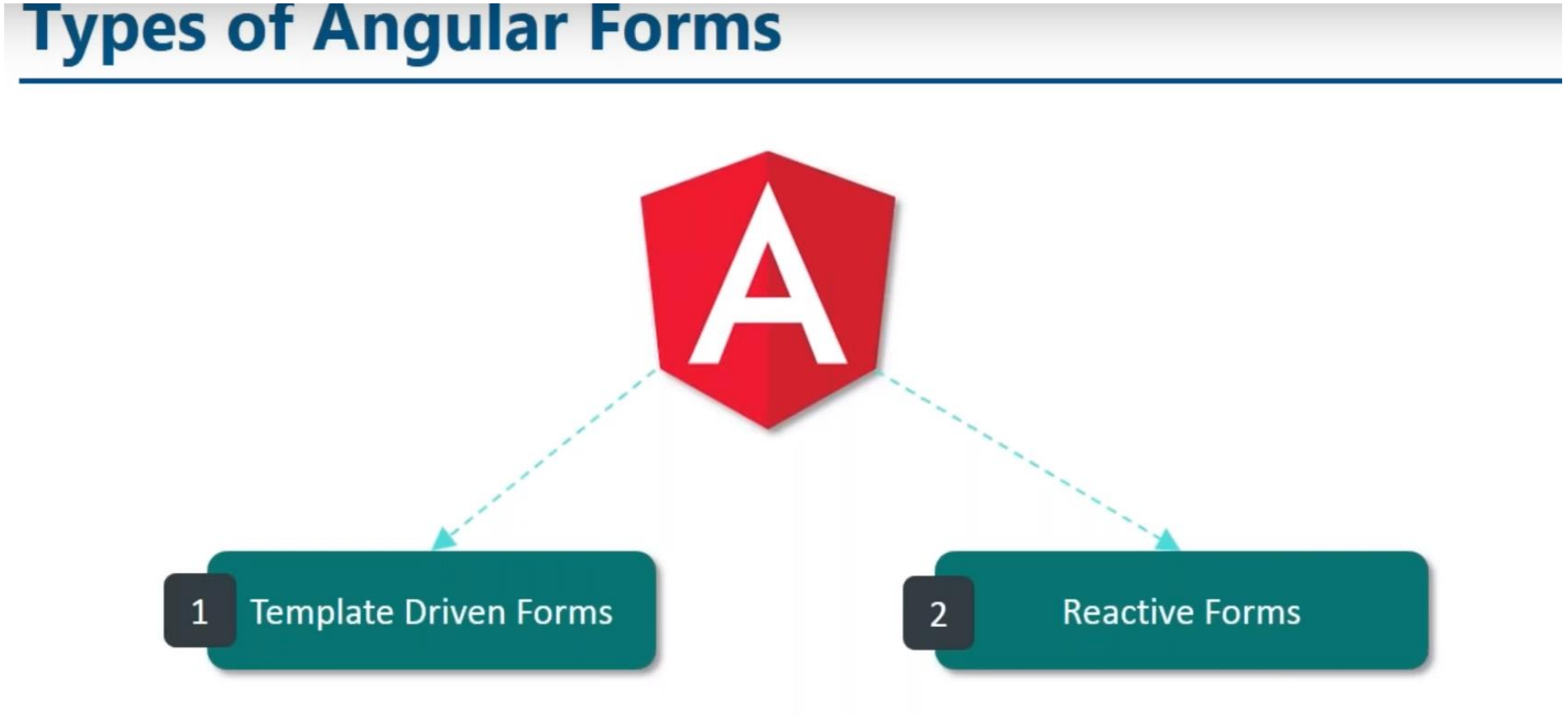
Parameterized Routing

```
import { ActivatedRoute } from '@angular/router';
constructor(private route: ActivatedRoute) {}
ngOnInit() {
    this.route.paramMap.subscribe(params => {
      this.products.forEach((p: Product) => {
        if (p.id == params.id) {
          this.product = p;
        }
      });
    });
  }
```

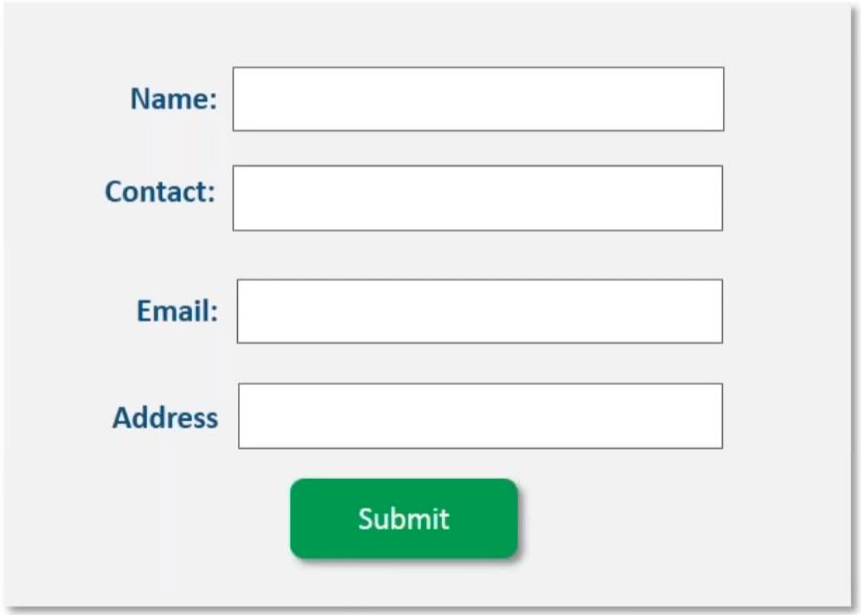
Routing Guards

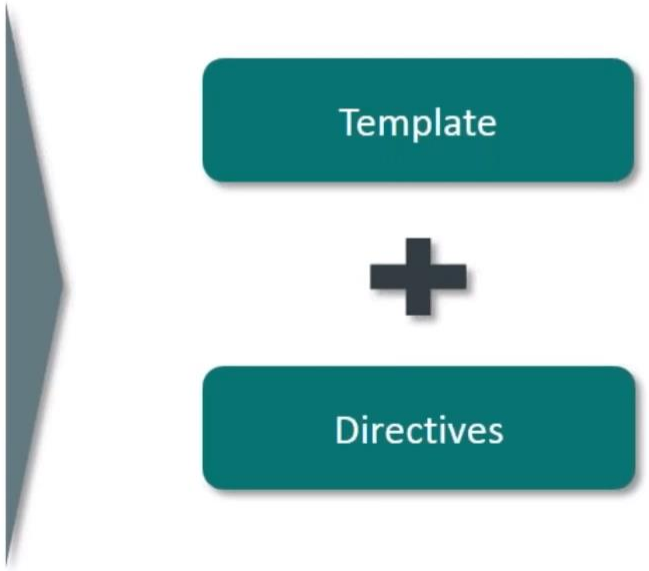
- Guard Types
- There are four different guard types we can use to protect our routes:
- CanActivate - Decides if a route can be activated
- CanActivateChild - Decides if children routes of a route can be activated
- CanDeactivate - Decides if a route can be deactivated
- CanLoad - Decides if a module can be loaded lazily

Angular Forms

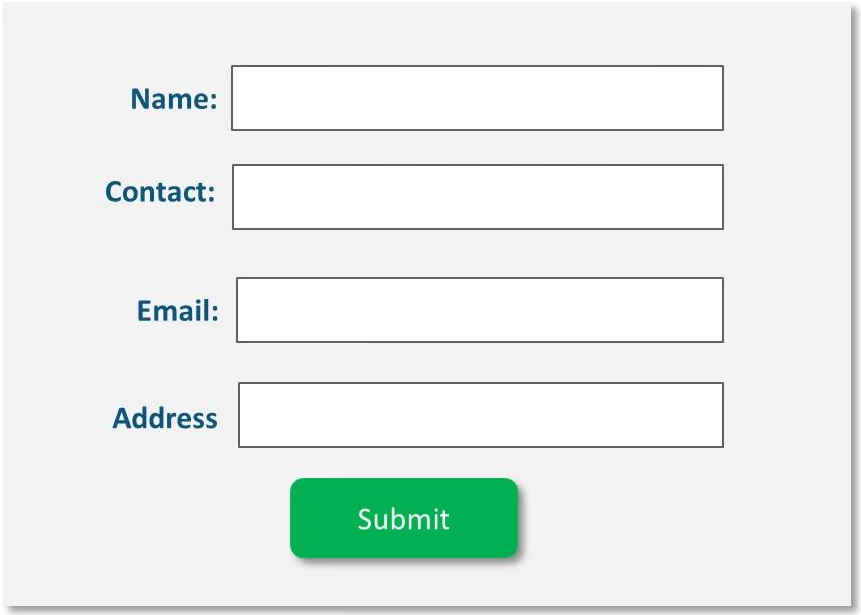


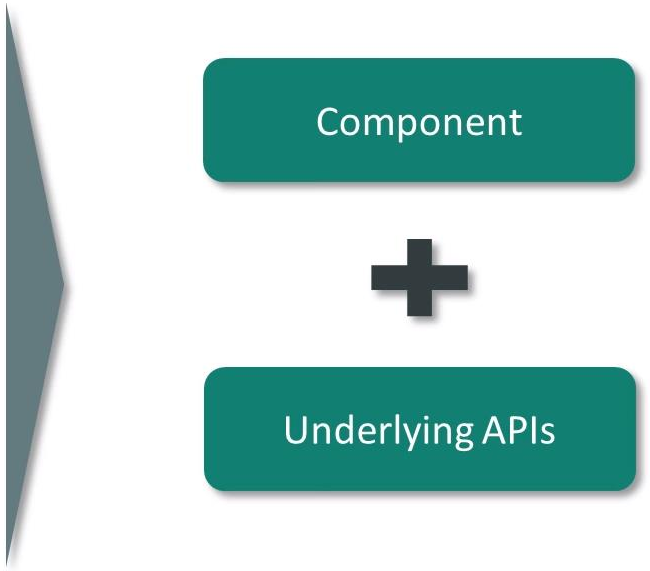
Template Driven Forms





Reactive Forms





Template vs Reactive Forms

- Template-driven forms make use of the "FormsModule", while reactive forms are based on "ReactiveFormsModule".
- Template-driven forms are asynchronous in nature, whereas Reactive forms are mostly synchronous.
- In a template-driven approach, most of the logic is driven from the template, whereas in reactive-driven approach, the logic resides mainly in the component or typescript code. Let us get started by generating a component and then we'll update our form code.

Reactive Forms vs. Template-driven Forms

Angular Forms

Template-driven

Easy to use

Similar to Angular 1

Two-way data binding ->
Minimal component code

Automatically tracks form and
input element state

Reactive

More flexible ->
more complex scenarios

Immutable data model

Easier to perform an action
on a value change

Reactive transformations ->
DebounceTime or DistinctUntilChanged

Easily add input elements dynamically

Easier unit testing

Observables

- Observables
- They are cold: Code gets executed when they have at least a single observer.
- Creates copy of data: Observable creates copy of data for each observer.
- Uni-directional: Observer can not assign value to observable(origin/master).

Subject

- They are hot: code gets executed and value gets broadcast even if there is no observer.
- Shares data: Same data get shared between all observers.
- bi-directional: Observer can assign value to observable(origin/master).
- If are using using subject then you miss all the values that are broadcast before creation of observer. So here comes Replay Subject

Replay Subject

- They are hot: code gets executed and value get broadcast even if there is no observer.
- Shares data: Same data get shared between all observers.
- bi-directional: Observer can assign value to observable(origin/master). plus
- Replay the message stream: No matter when you subscribe the replay subject you will receive all the broadcasted messages.
- In subject and replay subject you can not set the initial value to observable. So here comes Behavioral Subject

Behaviour Subject

- They are hot: code gets executed and value get broadcast even if there is no observer.
- Shares data: Same data get shared between all observers.
- bi-directional: Observer can assign value to observable(origin/master). plus
- Replay the message stream: No matter when you subscribe the replay subject you will receive all the broadcasted messages.
- You can set initial value: You can initialize the observable with default value.

Observable vs Subject Behaviour

Observable	BehaviorSubject/Subject
Is just a function, no state	Has state. Stores data in memory
Code run for each observer	Same code run only once for all observers
Creates only Observable (data producer alone)	Can create and also listen Observable (data producer and consumer)
Usage: Simple Observable with only one Obeserver.	Usage: * Store data and modify frequently * Multiple observers listen to data * Proxy between Observable and Observer

Observable vs Subject Behaviour

Observables	Subject	Replay Subject	Behavioral Subject
Cold	Hot	Hot	Hot
Creates copy of data	Shares data	Shares data	Shares data
Uni-directionall	bi-directional	bi-directional	bi-directional
-	-	Replay the message stream	Replay the message stream
-	-	-	You can set initial value

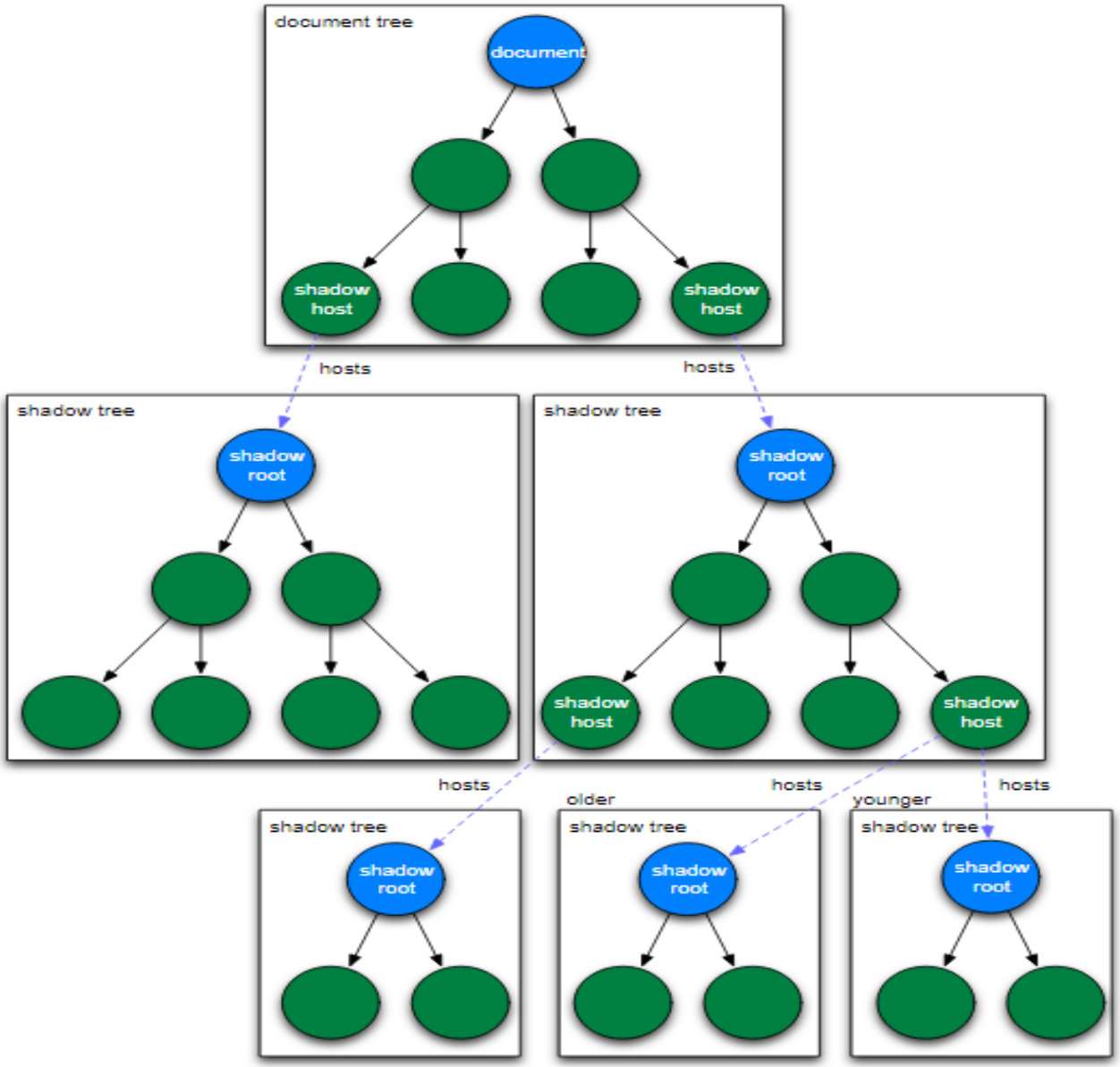
	Each next subscribers receive...
`Subject`	...only upcoming values
`BehaviorSubject`	...one previous value and upcoming values
`ReplaySubject`	...all previous values and upcoming values
`AsyncSubject`	...latest value when stream will close

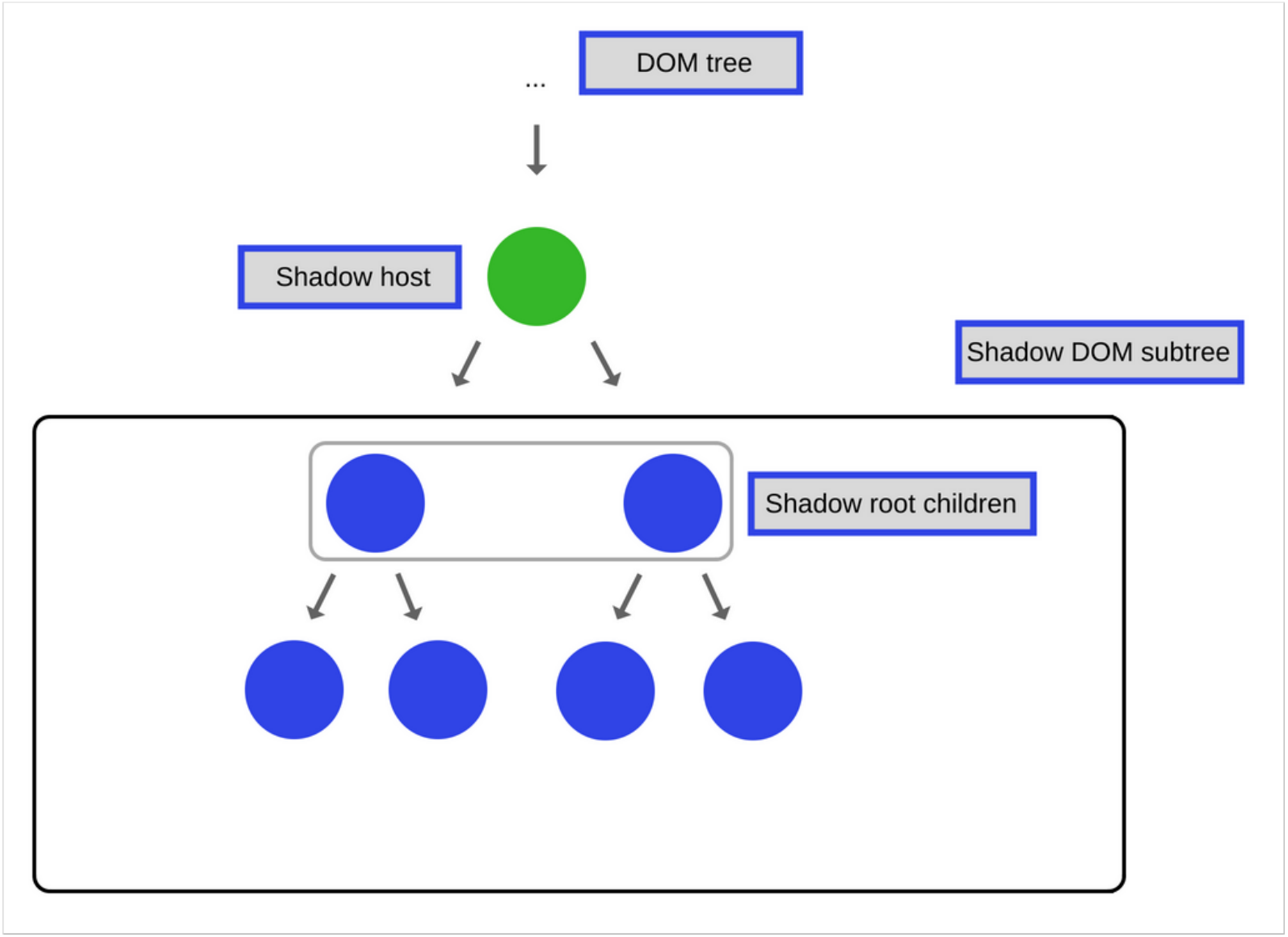
Angular JS	Angular 2
Released by Google in the year 2010.	Released in Sept 2016.
JavaScript-based framework for creating SPA.	Complete re-write of AngularJS version.
Still supported but no longer will be developed.	It's updated version regularly released because of Semantic Versioning.
The architecture of AngularJS is based on MVC.	The architecture of Angular 2 is based on service/controller.
AngularJS was not developed with a mobile base in mind.	Angular 2 is a mobile-oriented framework.
AngularJS code can write by using only ES5, ES6, and Dart.	We can use ES5, ES6, Typescript to write an Angular 2 code.
Based on controllers whose scope is now over.	Nowadays, the controllers are replaced by components, and Angular two is completely component based.
Factory, service, provider, value and constant are used for services	The class is the only method to define services in Angular2
Run on only client-side	Runs on client-side & server-side
ng-app and angular bootstrap function are used to initialize	bootstrapmodule() function is used to initialize

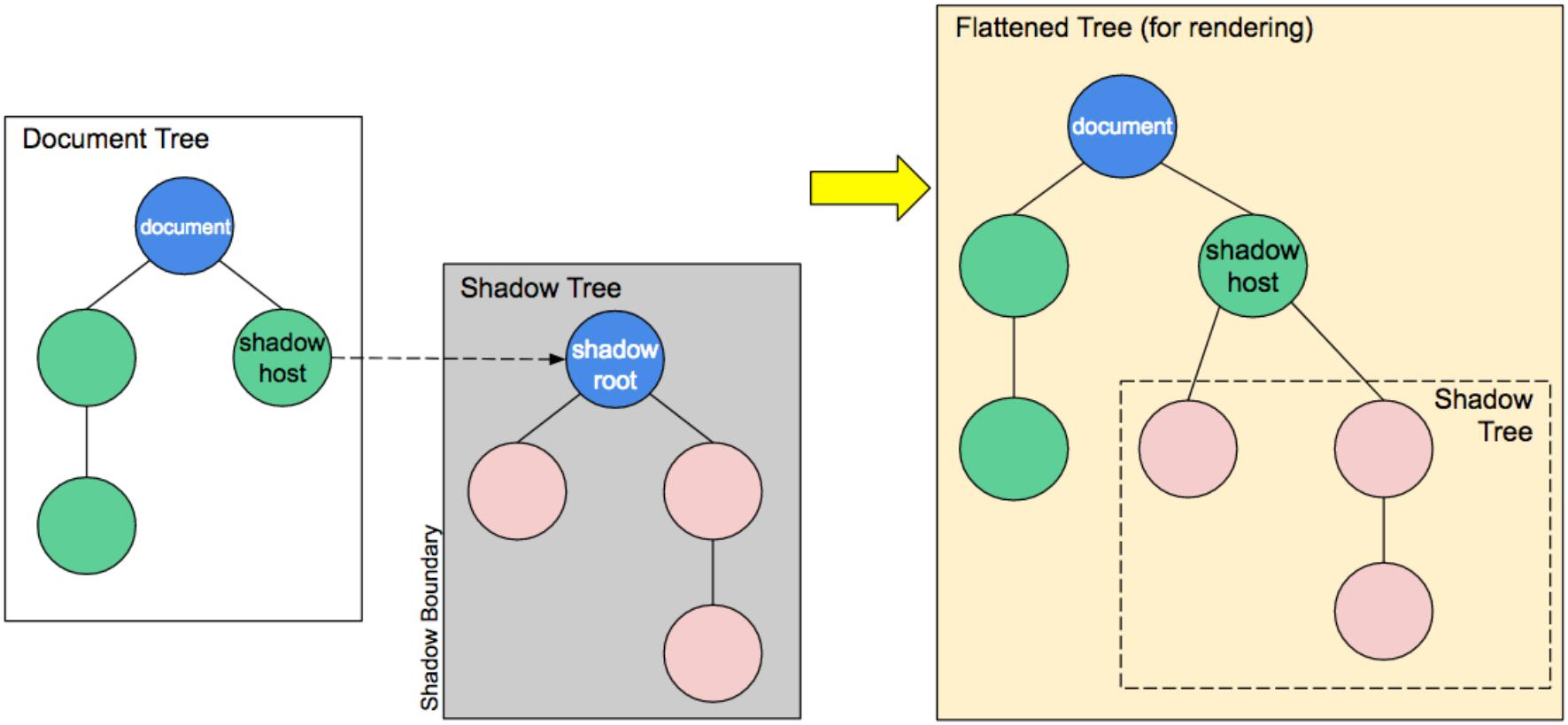
Angular 2	Angular 4
The code generated using Angular 2 is bigger, and the file size is also larger.	Angular 4.0 has reduced the bundled file size by 60%. Thus code generated is reduced which helps to accelerate the application performance.
Angular two is not backward compatible with Angular JS.	Angular four is backward compatible with Angular 2 for most applications.
There is no specific no proper disapproval phases to adjust codes.	There will be proper disapproval phases to allow developers to adjust their code
There is no animation feature offers in Angular 2.	Animation features are pulled out of @angular/core and included into their package

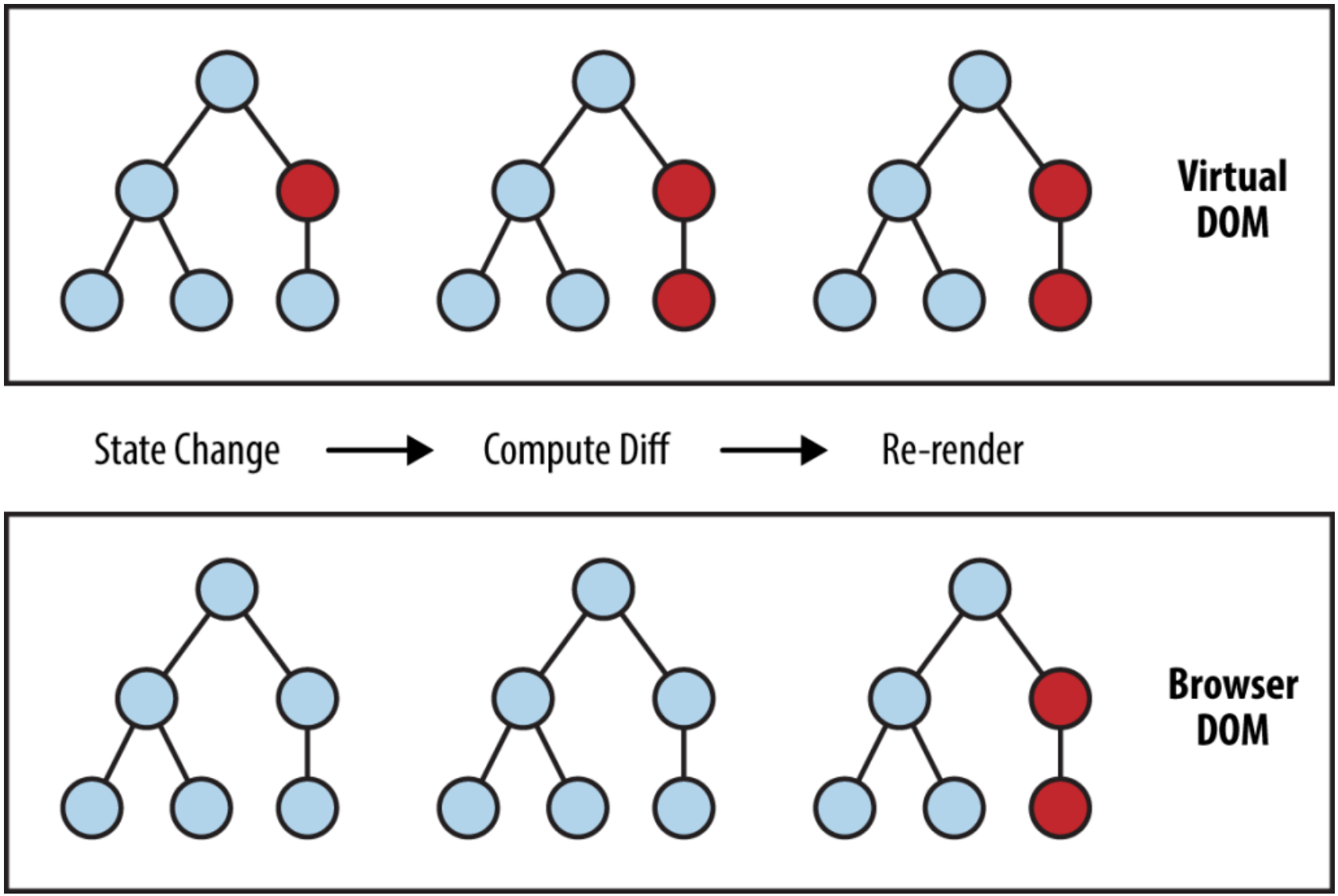
Angular 4	Angular 5
Support for Router ParamMap	New Router Lifecycle Event
Dynamic Components with NgComponentOutlet	Compiler Improvements
TypeScript 2.4 with this version that functions as a JavaScript superset that can be used for optional static typing, interfaces, and classes	Angular 5 comes with build optimizer which is a part of the platform's command like a tool.
HTTP Request Simplified	Optimization with HttpClient Feature
Includes Animation Package	Internationalized Date & Currency

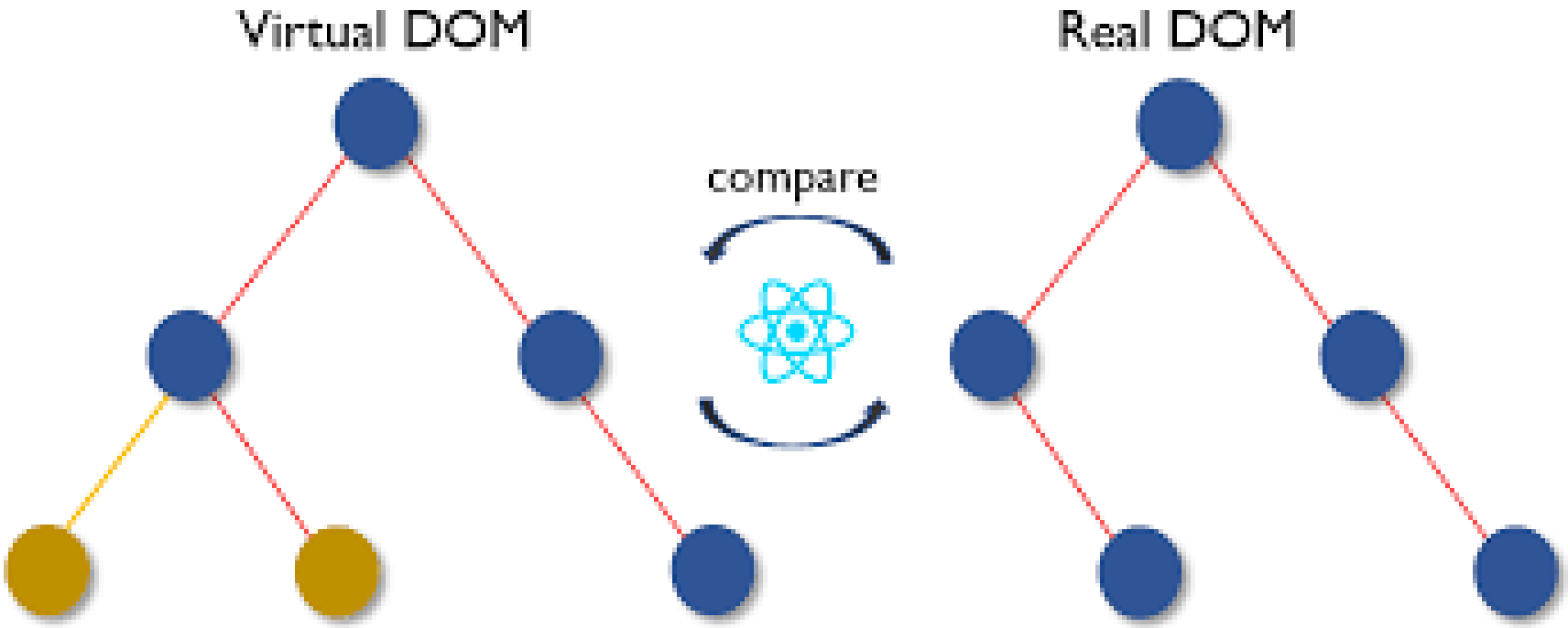
Technology	React	AngularJS	Angular 2
Author	Facebook community	Google	Google
Type	Open source JS library	Fully-featured MVC framework	Fully-featured MVC framework
Toolchain	High	Low	High
Language	JSX	JavaScript, HTML	TypeScript
Learning Curve	Low	High	Medium
Packaging	Strong	Weak	Medium
Rendering	Server Side	Client Side	Server Side
App Architecture	None, combined with Flux	MVC	Component-based
Data Binding	Uni-directional	Bi-directional	Bi-directional
DOM	Virtual DOM	Regular DOM	Regular DOM
Latest Version	15.4.0 (November 2016)	1.6.0	2.2.0 (November 2016)


document tree
document
shadow host
shadow host
hosts
hosts
shadow tree
shadow root
shadow tree
shadow root
shadow host
shadow host
hosts
older
hosts
younger
hosts
shadow tree
shadow root
shadow tree
shadow root
shadow tree
shadow root

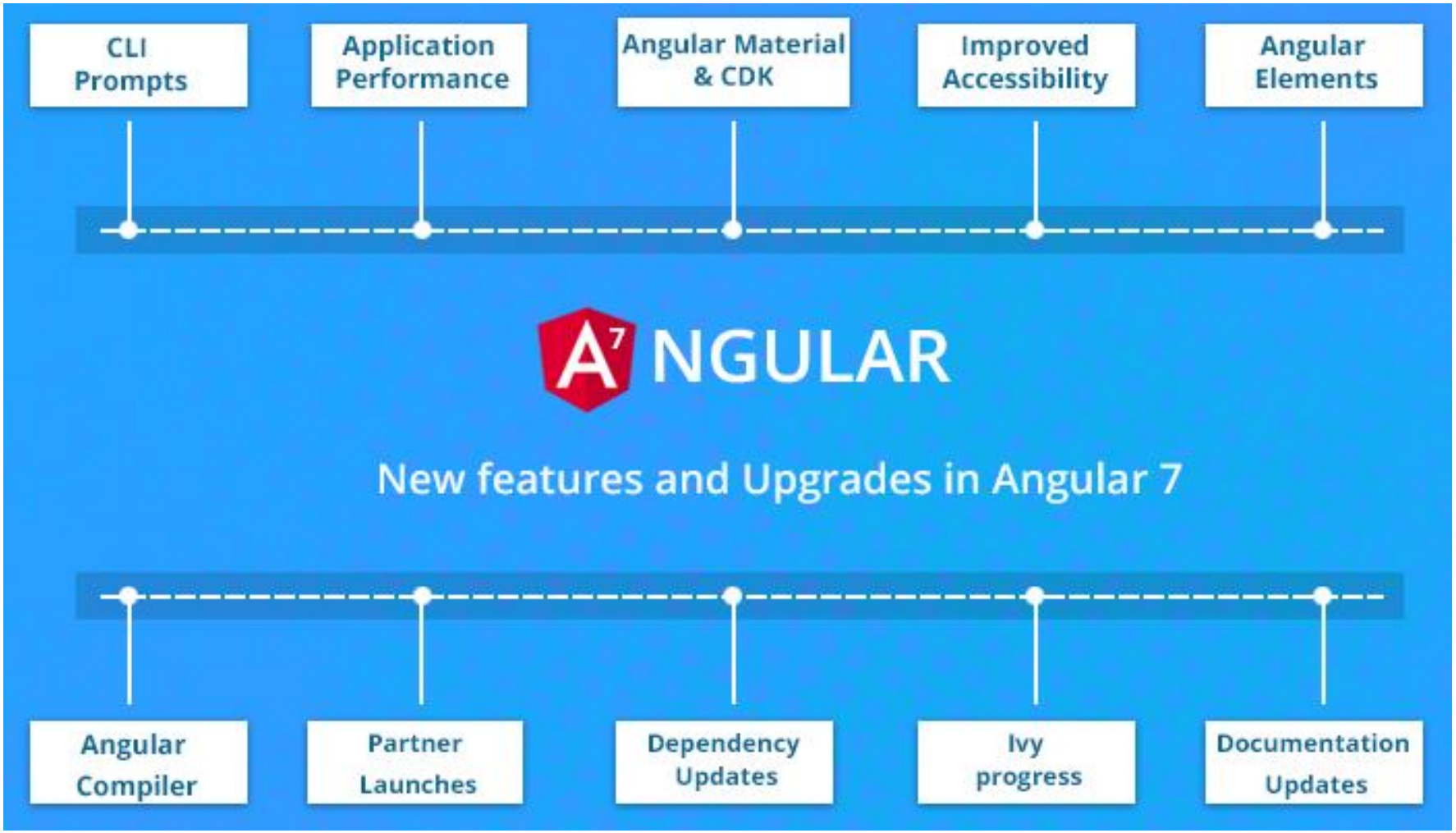

...
DOM tree
Shadow host
Shadow DOM subtree
Shadow root children


Document Tree
document
shadow host
Shadow Tree
shadow root
Shadow Boundary
Flattened Tree (for rendering)
document
shadow host
Shadow Tree

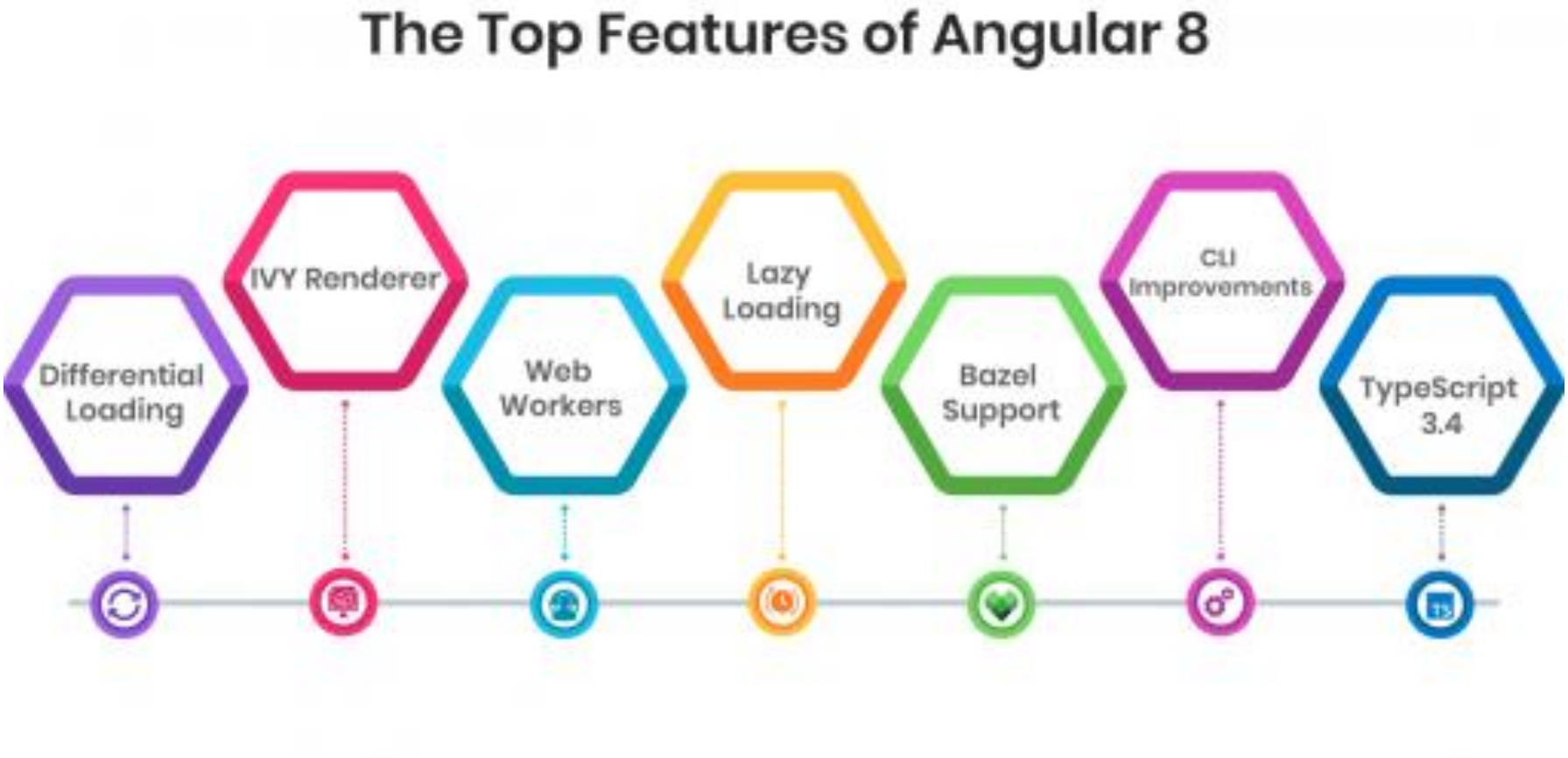

Virtual
DOM
State Change
Compute Diff
Re-render
Browser
DOM


Virtual DOM
compare
Real DOM

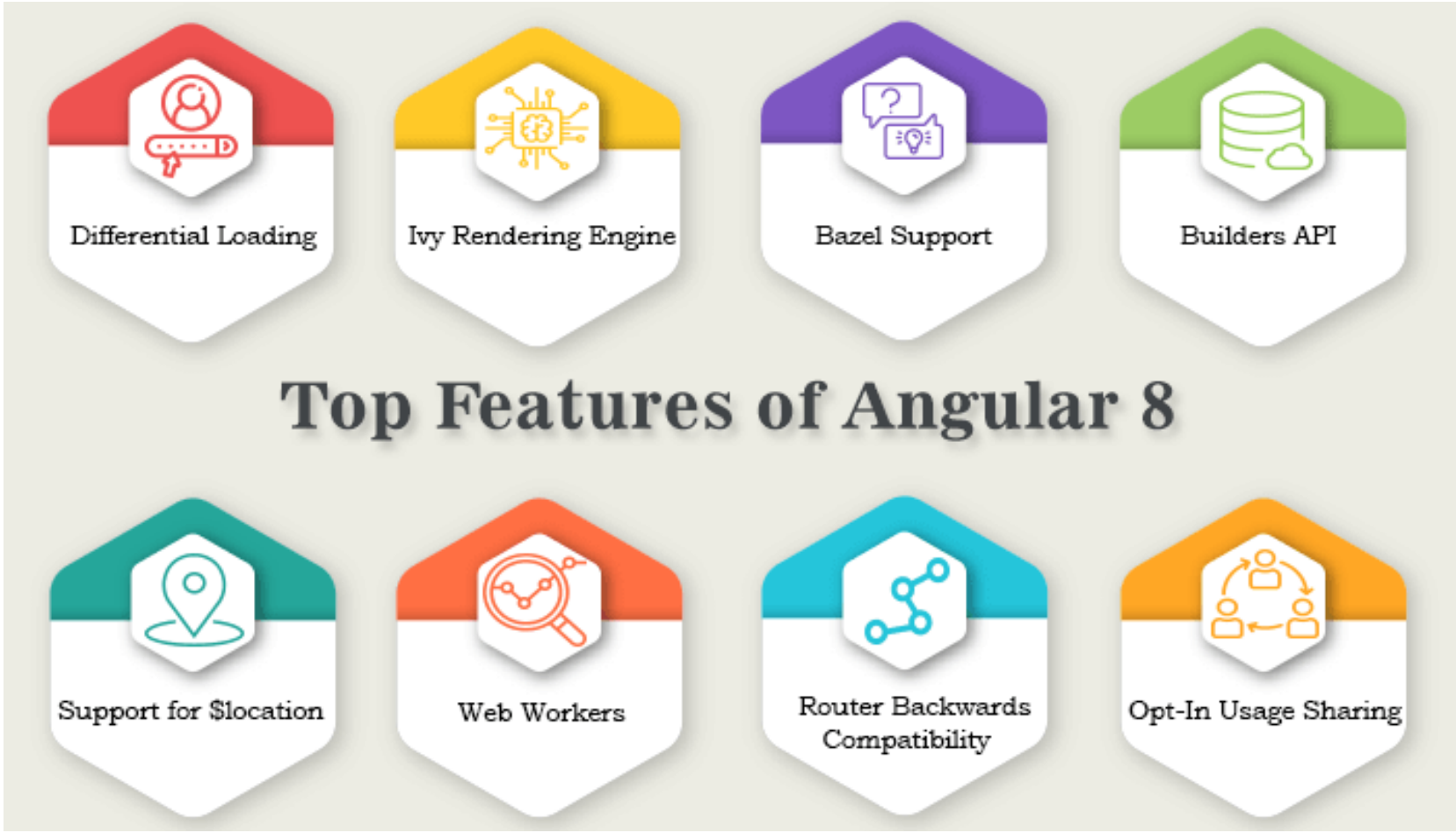
Angular 7


CLI Prompts
Application Performance
Angular Material & CDK
Improved Accessibility
Angular Elements
ANGULAR
New features and Upgrades in Angular 7
Angular Compiler
Partner Launches
Dependency Updates
Ivy progress
Documentation Updates

Angular 8


The Top Features of Angular 8
Differential Loading
IVY Renderer
Web Workers
Lazy Loading
Bazel Support
CLI Improvements
TypeScript 3.4

Angular 8


Differential Loading
Ivy Rendering Engine
Bazel Support
Builders API
Top Features of Angular 8
Support for $location
Web Workers
Router Backwards Compatibility
Opt-In Usage Sharing

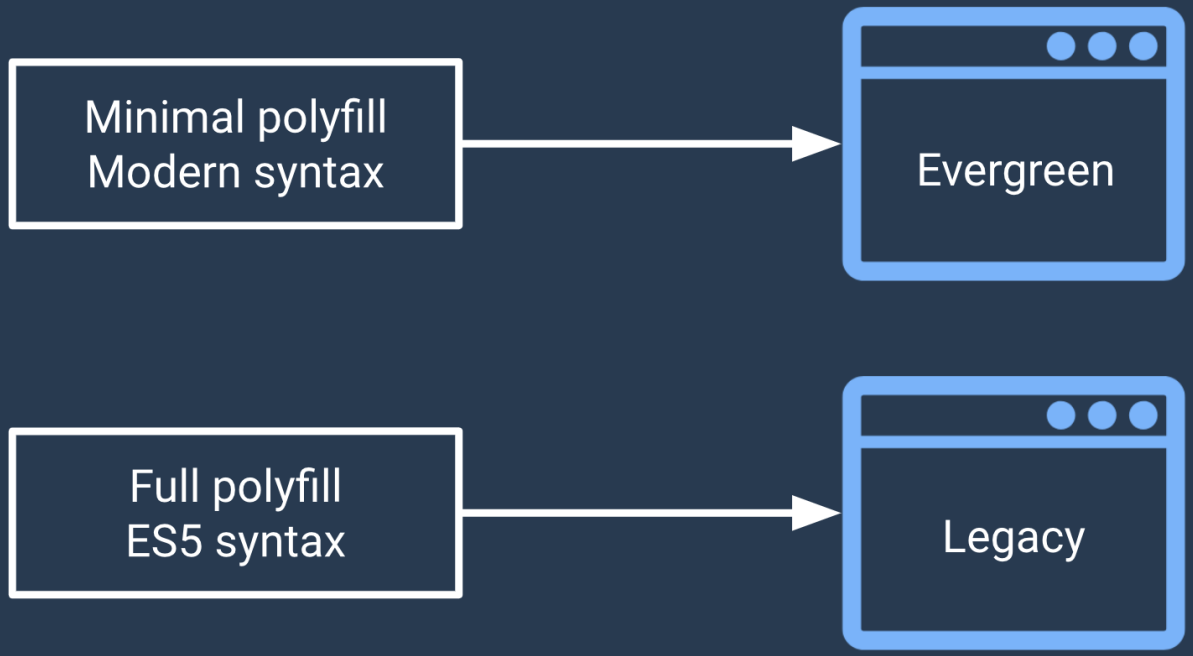
Angular 8

- Angular has a wide ecosystem including:
- High-quality and large community
- Deep Integration
- Fast-growing tools like Bazel
- State management libraries of different flavors
- Code Quality toolings, such as Codelyzer
- UI libraries, Components, Directives, Pipes, etc.
- Large IDE plugins repositories
- Testing Frameworks and utility libraries

Angular 8

- **Differential Loading**
- In spite of angular being a complete framework with its own package for a network request, form validation, and many more, Angular has one disadvantage-the app/bundle size.
- The challenge that we were facing with Angular 7 was the large bundle size due to the conversion of modern JS/TS code in JS. After the conversion, the final application bundle is created for all the browsers (new and old) concerning the app performance on all the browsers.
- This challenge of large bundle size was overcome in Angular 8 by reducing the bundle size by the concept of differential loading.
- When we build apps with ng build, two separate bundles are created for the production dedicated to the older and newer browsers respectively. The correct bundle gets loaded automatically by the browser, thus improving the performance for Angular 8 by loading less code by the newer browsers.

Smaller apps with Differential Loading




Differential Loading Savings
41Kb
7-20%
Before
After
For angular.io

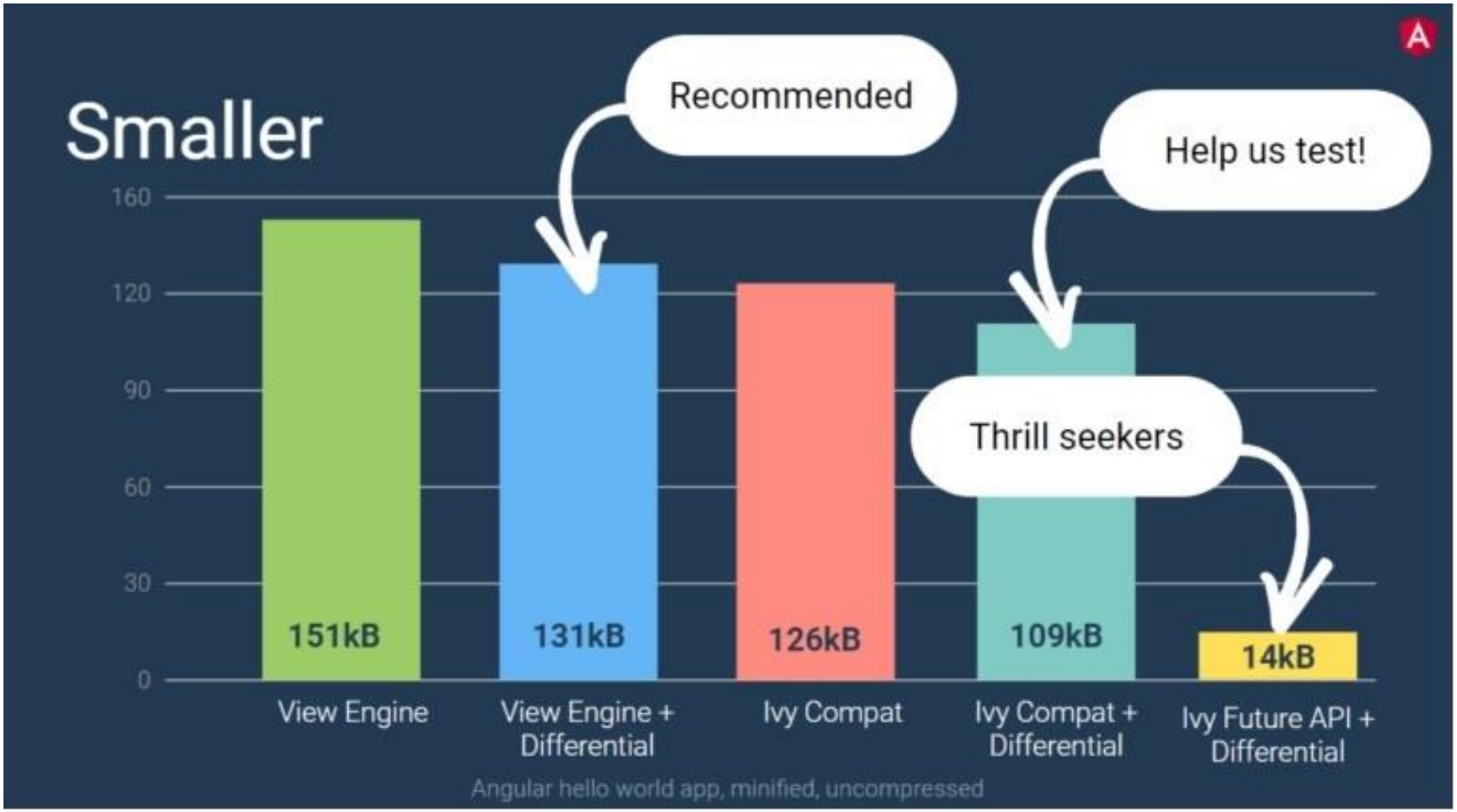
Angular 8

- Ivy Renderer
- According to a source, 63% of all US traffic comes from smartphones and tablets. It is further forecasted that the number will increase to 80% by the end of this year.
- One of the biggest challenges for a front end developer is increasing the loading speed of the website. Unfortunately, mobile devices always stay behind in this race either due to slow or bad internet connectivity thus making it more challenging for the developers.
- But we never run out of solutions. We can use CDN, PWA, and others for loading the application faster. But if you want to have some out of the box solution, then reducing the bundle size is the ultimate solution and thus, IVY comes into the picture.
- IVY is meant to build a next-generation rendering pipeline for Angular 8.0
- Ivy is an angular renderer that uses incremental DOM. Ivy modifies the working of the framework without any changes to the Angular applications. On completion of IVY, the angular applications become small, simple, and faster.

Angular 8

- IVY consists of two main concepts:
- 1.Tree Shakable 2. **Low Memory Footprint**:
- Tree shakable: To focus only on the code in use, the unused code is removed. This results in faster runtime and smaller bundles.
- Local: For a faster compilation, the changing components are recompiled.
- The benefits of Ivy are:
  - Bundles are smaller
  - Templates are debuggable
  - Tests are faster
  - Builds are faster
  - Lots of bugs fixed

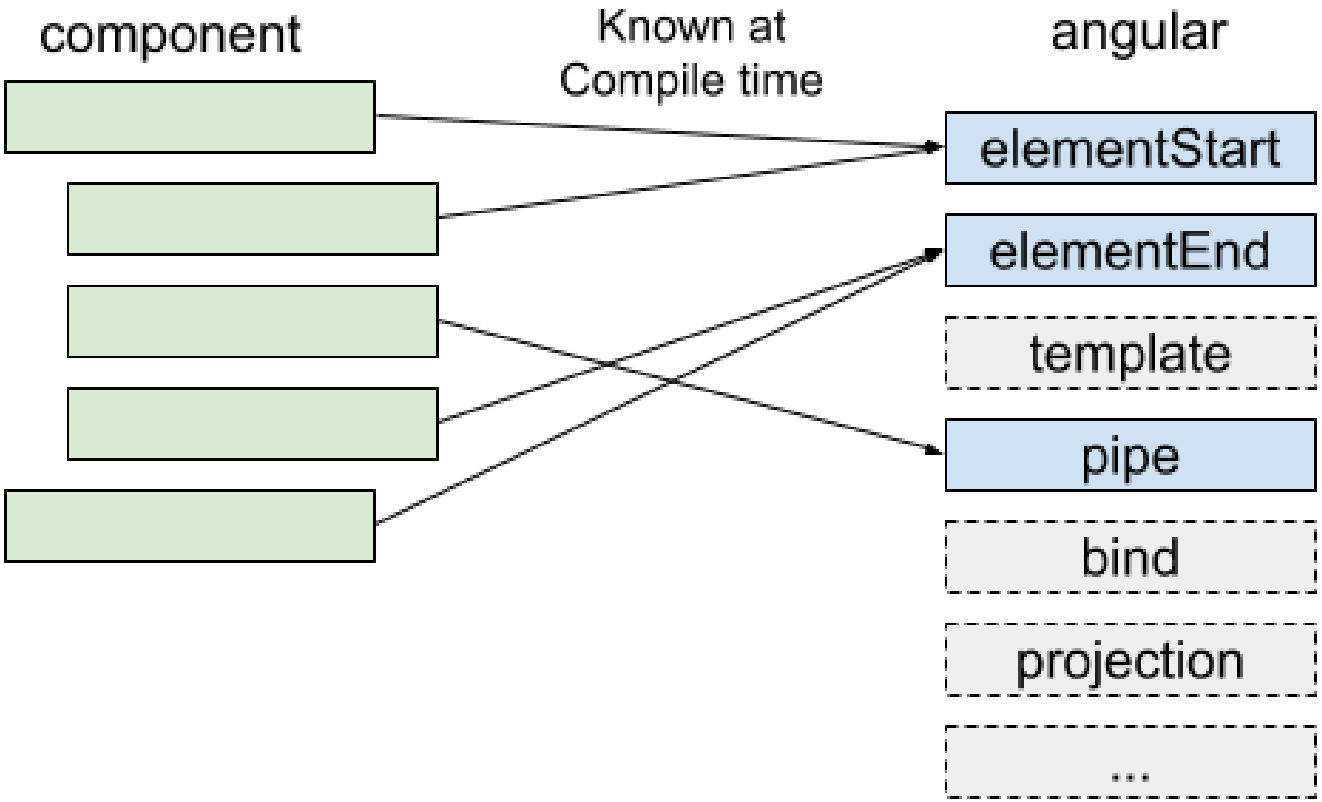
Angular 8


Smaller
Recommended
Help us test!
Thrill seekers
160
120
90
60
30
0
151kB
131kB
126kB
109kB
14kB
View Engine
View Engine + Differential
Ivy Compat
Ivy Compat + Differential
Ivy Future API + Differential
Angular hello world app, minified, uncompressed

Angular 8

- It rewrites the Angular compiler and runtime code to reach:
- Better compatibility with tree-shaking
- Improved build times
- Improvised build sizes
- Loaded with features like lazy loading of components rather than modules.

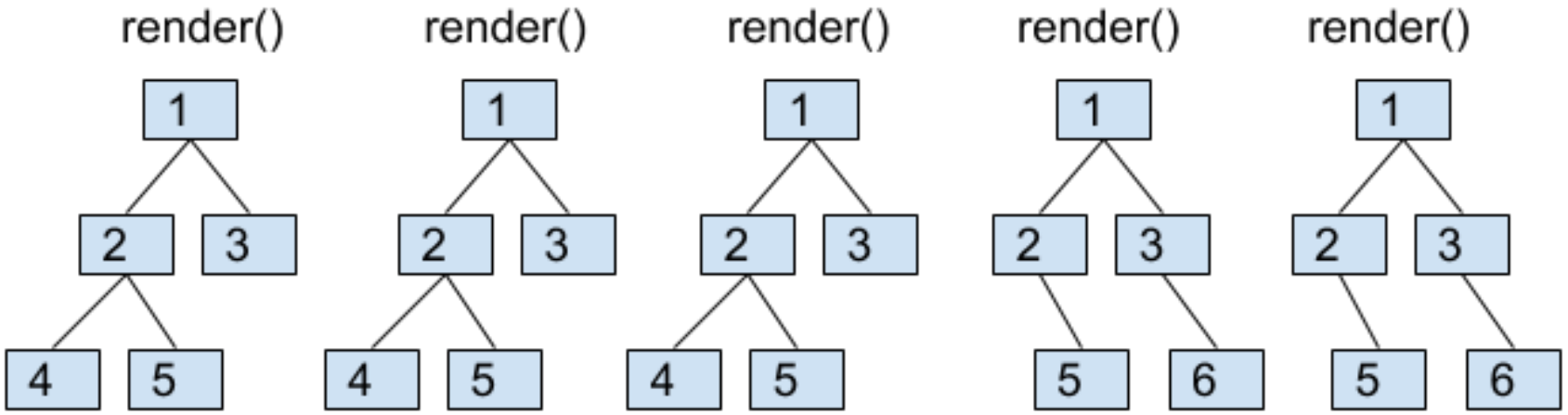
Angular 8


component
Known at
Compile time
angular
elementStart
elementEnd
template
pipe
bind
projection
...

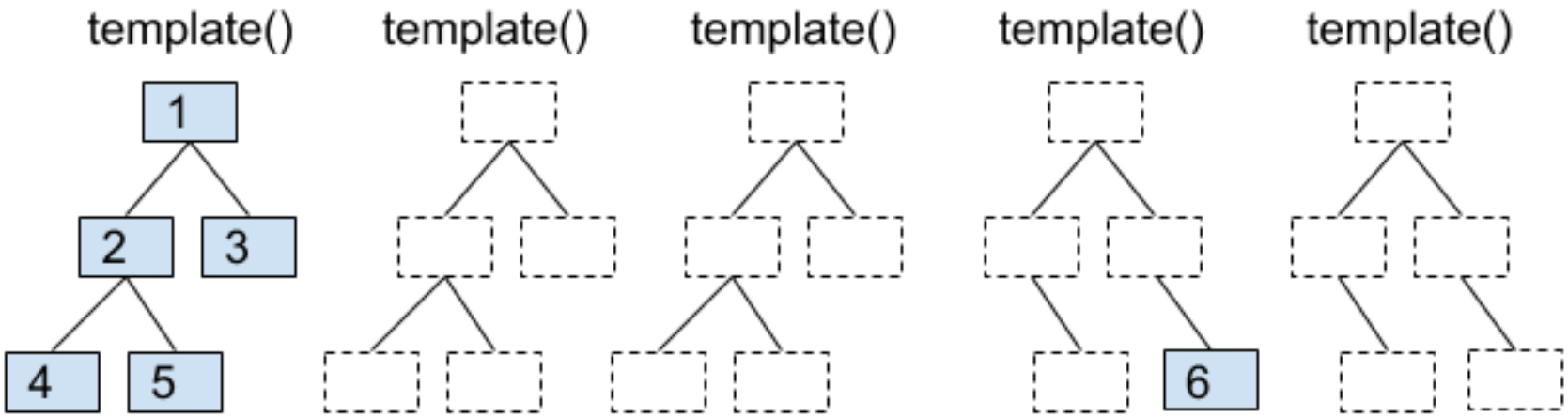
Angular 8

- **Low Memory Footprint**:
- Incremental DOM doesn’t need any memory to rerender the view if it doesn’t change the DOM so it allocates the memory when the DOM nodes are added or removed.
- since most of render/template calls don’t change anything result in huge memory savings.

Virtual DOM


render()
1
2
3
4
5
render()
1
2
3
4
5
render()
1
2
3
4
5
render()
1
2
3
5
6
render()
1
2
3
5
6

Why Incremental DOM Has Low Memory Footprint?



Angular 8

- If we want to include the Ivy for a new application, we can create new projects with enable-ivy options
- ng new ivy-project --enable-ivy
- This command intimate Angular CLI store the following configuration in the tsconfig.json file.
- "angularCompilerOptions": {
- "enableIvy": true
- }
- The above configuration can manually add in any existing angular application after the upgrade that application into Angular 8.
- One recommendation that if we want to use Ivy for our application, then run the application in debug mode with AOT compilation mode.
- ng serve --aot

Angular 8

- Web Workers
- With the newest release of Angular v8, web workers can now be easily integrated with Angular.
- “Web workers is an asynchronous system, or protocol, for web pages to execute tasks in the background, independently from the main thread and website UI.
- It is an isolated environment that is insulated from the window object, the document object, direct internet access and is best suited for long-running or demanding computational tasks.”
- Have you built an application that includes a lot of calculations on UI? Are you experiencing the UI to be slow?
- Having heavy calculations, data table manipulations, and other complex computations results in a laggy UI.
- JavaScript running on the main thread is not the only thing. Other things like calculations also run on it thus resulting in a bad user experience. Thus, web workers come into the picture to resolve this issue.

Angular 8

- Therefore you can say if your application is unresponsive while processing data, web workers are helpful.
- Due to JavaScript being single-threaded, there is a possibility of asynchronous data calls to take place.
- Facilitating to run the CPU intensive computations in the background thread, Web workers are used.
- This is achieved by freeing the main thread and updating the user interface.
- Put simply, web workers are useful if heavy computations are offloaded to another thread.

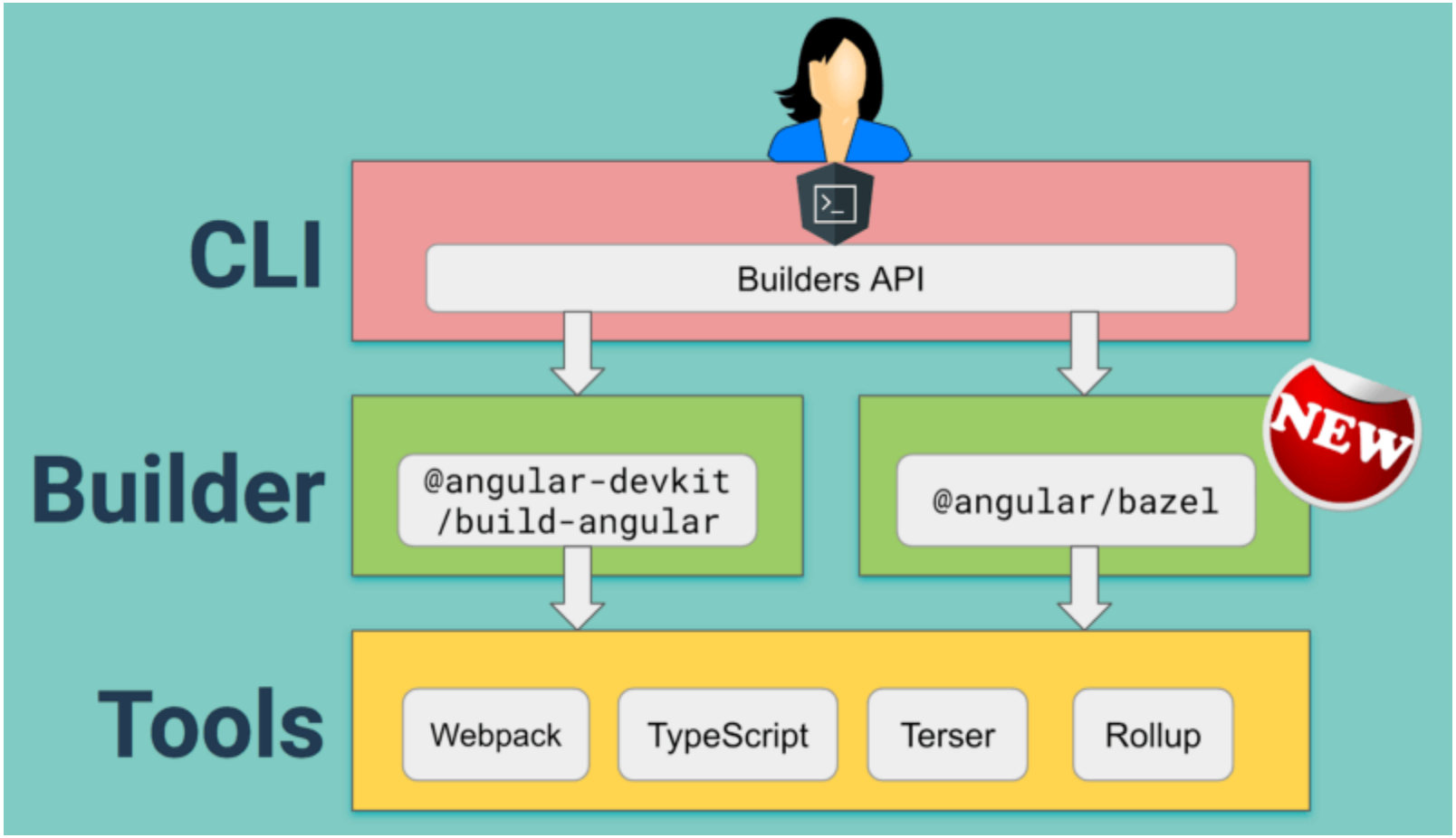
Angular 8

- Lazy Loading
- Lazy loading helps in bringing down the size of large files. The required files are lazily loaded.
- Previously in the older versions of Angular, @loadChildren property was used by the route configuration.
- This property accepts a string. If any typo occurred or any module name has been recorded wrong, Angular doesn’t consider this as wrong.
- It accepts the value that was there until we try building it.
- To overcome this, dynamic imports in router configuration is added in Angular 8 thus enabling the usage of import statement for lazy loading the module.
- Thus, errors will be easily recognized and we can put a stop on waiting till the build time to recognize the errors in the code.

Angular 8

- Bazel Support
- Now increase the possibilities to build your CLI application with Bazel.
- The Angular framework is built with Bazel. Since it is expected to be included in version 9, it is available as opt-in in Angular 8.
- The main advantages of Bazel are:
- Using the same tool in building backends and frontends.
- The build time is faster
- Incremental build for the modified part.
- Ejection of hidden Bazel files that are hidden by default.
- Cache on the build farm
- Dynamic imports for the lazy loaded modules.

Angular 8


CLI
Builders API
Builder
@angular-devkit
/build-angular
@angular/bazel
NEW
Tools
Webpack
TypeScript
Terser
Rollup

Bazel

- To opt-in an existing application, run
- ng add @angular/bazel
- To use Bazel in a new application, first install @angular/bazel globally
- npm install -g @angular/bazel
- then create the new application with
- ng new --collection=@angular/bazel
- ng build --leaveBazelFilesOnDisk

Angular 8

- CLI Improvements
- With continuous improvement in the Angular CLI, the ng build, ng test and ng run has accorded themselves by 3rd-party libraries and tools.
- For example, with the help of a deploy command, the new capabilities are already in use by AngularFire.
- Angular CLI is equipped with commands such as ng new, serve, test, build and add for quicker development experience.
- With the new ng deploy in the house, developers can deploy their final app to the cloud. Just a few clicks from their command-line interface and the work is done.
- One important thing to remember, add a builder as it accords your project's deployment capability to a specific hosting provider. But, this has to be done before using the command.
- With Angular 8, it has added new features to ngUpgrade. This new feature will make the life of developers easier for upgrading their Angular.js apps to Angular 8.

Angular 8

- TypeScript 3.4
- The most important part is TypeScript 3.4 as it is required to run your Angular 8 project.
- A new flag is introduced in TypeScript 3.4 known as –incremental.
- From the last compilation, the TypeScript is asked to save the information of the project graph by the incremental.
- Every time –incremental invokes TypeScript, it will utilize the information for detecting the cheapest way of type-checking and emit changes to your project.

Angular 8

- Dart-sass for Sass file
- To create the Sass file, Angular has finally discarded node-sass for dart-sass. Dart is perceived to be superfast by many experts and it’s now all set to replace Ruby – the legend for the reference implementation
- The generated Sass file would usually remain unchanged; however, there are possibilities of compiler becoming a bit strict. Moreover, with the fibers in place the speed could double too.
- Dart is the default now, which is a big change in itself. However, you can still use node-sass given that you install it explicitly.

Angular production Deployment

Maven Repository: org.projectlo | React App | localhost:6070/getuserbyname/u | Angular - Deployment | Insuranceapp

lite-server

```
}

F:\daimlerang2019\insuranceapp>lite-server --baseDir="dist/insuranceapp" --port 7070
Did not detect a `bs-config.json` or `bs-config.js` override file. Using lite-server defaults...
** browser-sync config **
{
  injectChanges: false,
  files: [ './**/*.{html,htm,css,js}' ],
  watchOptions: { ignored: 'node_modules' },
  server: {
    baseDir: 'dist/insuranceapp',
    middleware: [ [Function], [Function] ]
  }
}
[Browsersync] Access URLs:
 ------------------------------------
       Local: http://localhost:3002
    External: http://172.29.53.177:3002
 ------------------------------------
          UI: http://localhost:3003
 UI External: http://localhost:3003
 ------------------------------------
[Browsersync] Serving files from: dist/insuranceapp
[Browsersync] Watching files...
19.11.11 21:06:38 200 GET /index.html
19.11.11 21:06:48 200 GET /runtime-es2015.js
19.11.11 21:06:50 200 GET /main-es2015.js
```

Type here to search

ENG 21:07 11/11/2019

Angular production Deployment – Lazy Loading

typescript - Angular fails routing | Router navigation with lazy loadi | Loanapp

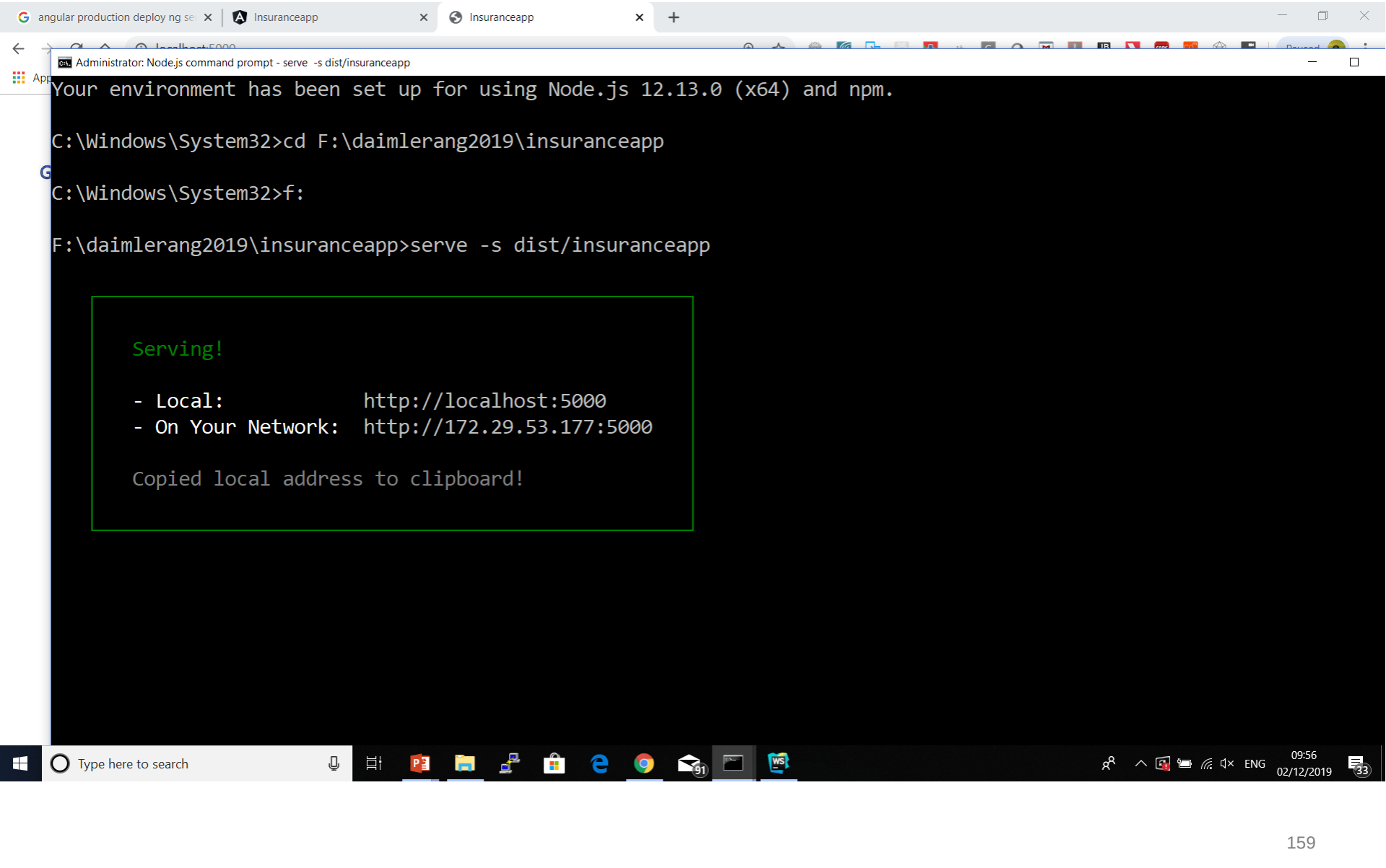
Administrator: Node.js command prompt - serve -s dist/loanapp

```
Terminate batch job (Y/N)? y

F:\boaangular2019\loanapp>ng build --prod --aot=false --build-optimizer=false

chunk {0} runtime.29aec890e643299bc23d.js (runtime) 1.46 kB [entry] [rendered]
chunk {1} main.912971f0dd802e03f334.js (main) 1.49 MB [initial] [rendered]
chunk {2} polyfills.8714ab24c2d3b182390c.js (polyfills) 118 kB [initial] [rendered]
chunk {3} polyfills-es5.c737fda53a8badc0ce78.js (polyfills-es5) 176 kB [initial] [rendered]
chunk {4} styles.fb20035854434f902908.css (styles) 225 kB [initial] [rendered]
Date: 2019-12-06T04:12:42.375Z - Hash: 1bb21304c0e8745b46c3 - Time: 34422ms

WARNING in budgets, maximum exceeded for initial. Budget 2 MB was exceeded by 1.09 kB.

F:\boaangular2019\loanapp>serve -s dist/loanapp


   Serving!

   - Local:            http://localhost:5000
   - On Your Network:  http://172.29.53.177:5000

   Copied local address to clipboard!
```

Type here to search

ENG 09:43 06/12/2019

Angular production Deployment



```
F:\aspireangular2020\mvpapp>npm install -g firebase-tools
C:\Users\Balasubramaniam\AppData\Roaming\npm\firebase -> C:\Users\Balasubramaniam\AppData\Roaming\npm\node_modules\fi
rebase-tools\lib\bin\firebase.js

> protobufjs@6.8.8 postinstall C:\Users\Balasubramaniam\AppData\Roaming\npm\node_modules\firebase-tools\node_modules\
protobufjs
> node scripts/postinstall

npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.2 (node_modules\firebase-tools\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.2: wanted {"os":"darwin","arch":"
any"} (current: {"os":"win32","arch":"x64"})

+ firebase-tools@7.12.1
added 515 packages from 321 contributors in 64.928s

F:\aspireangular2020\mvpapp>firebase login
i  Firebase optionally collects CLI usage and error reporting information to help improve our products. Data is colle
cted in accordance with Google's privacy policy (https://policies.google.com/privacy) and is not used to identify you
.

? Allow Firebase to collect CLI usage and error reporting information? Yes
i  To change your data collection preference at any time, run `firebase logout` and log in again.

Visit this URL on this device to log in:
```

```
F:\aspireangular2020\mvpapp>firebase login
i  Firebase optionally collects CLI usage and error reporting information to help improve our products. Data is colle
cted in accordance with Google's privacy policy (https://policies.google.com/privacy) and is not used to identify you
.

? Allow Firebase to collect CLI usage and error reporting information? No

Visit this URL on this device to log in:
https://accounts.google.com/o/oauth2/auth?client_id=563584335869-fgrhgmd47bqnekij5i8b5pr03ho849e6.apps.googleuserconte
nt.com&scope=email%20openid%20https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloudplatformprojects.readonly%20https%3A%2F
%2Fwww.googleapis.com%2Fauth%2Ffirebase%20https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform&response_type=code
&state=178659043&redirect_uri=http%3A%2F%2Flocalhost%3A9005

Waiting for authentication...

+  Success! Logged in as parameswaribala@gmail.com

F:\aspireangular2020\mvpapp>
```

Angular Universal

- A normal Angular application executes within the browser, rendering pages within the DOM in response to user actions.
- Angular Universal executes on the server, generating static application pages that later get bootstrapped on the consumer.
- This implies that the appliance usually renders additional quickly, giving users an opportunity to look at the appliance layout before it becomes totally interactive.

Walmart.com


SSR
CSR
Home Page
650 ms
1.25 s
1.31 s
1.70 s
1.70 s
1.81 s
767 ms
827 ms
1.48 s
1.85 s
1.86 s
1.92 s
Category Page
1.06 s
1.12 s
2.11 s
2.39 s
2.61 s
2.70 s
684 ms
764 ms
1.84 s
2.12 s
2.19 s
2.23 s
2.42 s
Search Page
798 ms
1.70 s
2.00 s
2.12 s
2.13 s
2.49 s
2.52 s
411 ms
1.22 s
1.30 s
1.62 s
1.64 s
2.02 s
2.04 s

Administrator: Node.js command prompt

```
Terminate batch job (Y/N)? y

F:\daimlerang2019\insuranceuniversalapp>ng add @nguniversal/express-engine --clientProject insuranceapp
Skipping installation: Package already installed
CREATE src/main.server.ts (361 bytes)
CREATE src/app/app.server.module.ts (427 bytes)
CREATE tsconfig.server.json (273 bytes)
CREATE webpack.server.config.js (1466 bytes)
CREATE server.ts (1980 bytes)
UPDATE package.json (2064 bytes)
UPDATE angular.json (4713 bytes)
UPDATE src/main.ts (451 bytes)
UPDATE src/app/app.module.ts (3325 bytes)
npm WARN @angular/platform-server@8.2.14 requires a peer of @angular/animations@8.2.14 but none is installed. You must
 install peer dependencies yourself.
npm WARN @angular/platform-server@8.2.14 requires a peer of @angular/common@8.2.14 but none is installed. You must ins
tall peer dependencies yourself.
npm WARN @angular/platform-server@8.2.14 requires a peer of @angular/compiler@8.2.14 but none is installed. You must i
nstall peer dependencies yourself.
npm WARN @angular/platform-server@8.2.14 requires a peer of @angular/core@8.2.14 but none is installed. You must insta
ll peer dependencies yourself.
npm WARN @angular/platform-server@8.2.14 requires a peer of @angular/platform-browser@8.2.14 but none is installed. Yo
u must install peer dependencies yourself.
npm WARN @angular/platform-server@8.2.14 requires a peer of @angular/platform-browser-dynamic@8.2.14 but none is insta
lled. You must install peer dependencies yourself.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\webpack-dev-server\node_modules\fsevents)
:
```

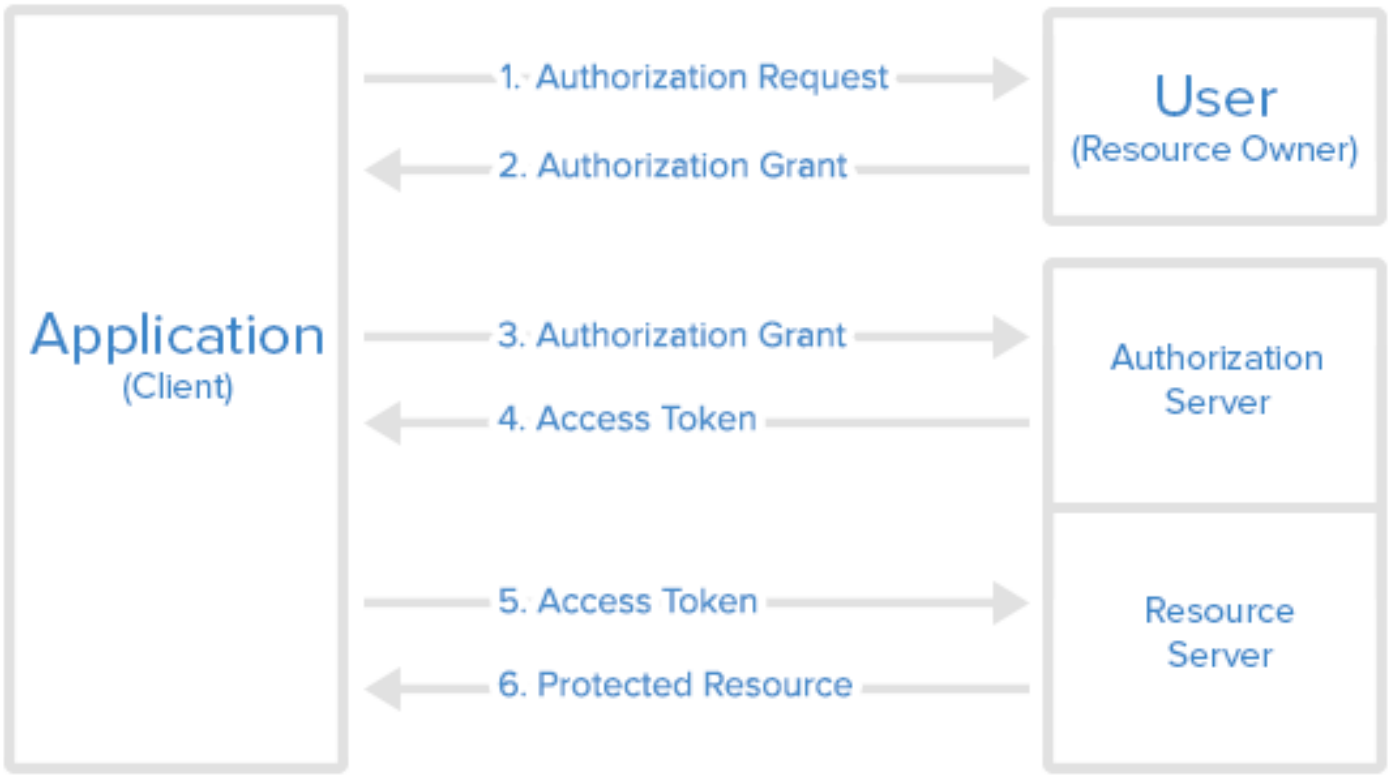
Administrator: Node.js command prompt

```
npm ERR!     C:\Users\Balasubramaniam\AppData\Roaming\npm-cache\_logs\2019-12-02T18_50_27_706Z-debug.log

F:\daimlerang2019\insuranceuniversalapp>npm run build:ssr

> insuranceuniversalapp@0.0.0 build:ssr F:\daimlerang2019\insuranceuniversalapp
> npm run build:client-and-server-bundles && npm run compile:server


> insuranceuniversalapp@0.0.0 build:client-and-server-bundles F:\daimlerang2019\insuranceuniversalapp
> ng build --prod && ng run insuranceapp:server:production --bundleDependencies all

Generating ES5 bundles for differential loading...
ES5 bundle generation complete.

chunk {2} polyfills-es2015.2987770fde9daa1d8a2e.js (polyfills) 36.4 kB [initial] [rendered]
chunk {3} polyfills-es5.6696c533341b95a3d617.js (polyfills-es5) 122 kB [initial] [rendered]
chunk {0} runtime-es2015.edb2fcf2778e7bf1d426.js (runtime) 1.45 kB [entry] [rendered]
chunk {0} runtime-es5.edb2fcf2778e7bf1d426.js (runtime) 1.45 kB [entry] [rendered]
chunk {1} main-es2015.8c0c5c281b25bdbd5035.js (main) 1.47 MB [initial] [rendered]
chunk {1} main-es5.8c0c5c281b25bdbd5035.js (main) 1.57 MB [initial] [rendered]
chunk {4} styles.f8bfe2e61b3f4fbc4a5c.css (styles) 226 kB [initial] [rendered]
Date: 2019-12-02T18:51:55.010Z - Hash: c8bc909a93cd5ce795f8 - Time: 27327ms

WARNING in budgets, maximum exceeded for initial. Budget 2 MB was exceeded by 550 kB.
Hash: ae0c42b588269b42afd2
Time: 14770ms
Built at: 12/03/2019 12:22:12 AM
```

Administrator: Node.js command prompt - node dist/server.js

```
F:\daimlerang2019\insuranceuniversalapp>node dist/server.js
Node Express server listening on http://localhost:4000
Angular is running in the development mode. Call enableProdMode() to enable the production mode.
```

OAuth2


Application
(Client)
1. Authorization Request
2. Authorization Grant
3. Authorization Grant
4. Access Token
5. Access Token
6. Protected Resource
User
(Resource Owner)
Authorization
Server
Resource
Server

Okta Account

- rpsconsultingeswaribala1995.okta.com
- Okta organization name: rpsconsulting-org-374070
  Okta
  homepage: https://rpsconsultingeswaribala1995.okta.com
  Okta username: parameswari.bala@rpsconsulting.in
  Temporary password: G99pOsNM Sign-in
  here: https://rpsconsultingeswaribala1995.okta.com
  This password can only be used once within 7 days.

OKTA ODIC CONNECTION

```
F:\boaangular2019\loanapp>cd..

F:\boaangular2019>cd loanappoauth

F:\boaangular2019\loanappoauth>npm i angular-oauth2-oidc@5.0.2
npm WARN axobject-query@2.1.1 requires a peer of eslint@^5 || ^6 but none is installed. You must install peer dependen
cies yourself.
npm WARN angular-oauth2-oidc@5.0.2 requires a peer of @angular/common@>=6.0.0 < 8.0.0 but none is installed. You must
install peer dependencies yourself.
npm WARN angular-oauth2-oidc@5.0.2 requires a peer of @angular/core@>=6.0.0 < 8.0.0 but none is installed. You must in
stall peer dependencies yourself.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\webpack-dev-server\node_modules\fsevents)
:
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\watchpack\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\karma\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\@angular\compiler-cli\node_modules\fseven
ts):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.2 (node_modules\fsevents):
```

Alternative approach OKTA ODIC CONNECTION

Administrator: Node.js command prompt

```
F:\boaangular2019\loanappoauth>npm i @okta/okta-angular@1.0.7
npm WARN angular-oauth2-oidc@5.0.2 requires a peer of @angular/common@>=6.0.0 < 8.0.0 but none is installed. You must
install peer dependencies yourself.
npm WARN angular-oauth2-oidc@5.0.2 requires a peer of @angular/core@>=6.0.0 < 8.0.0 but none is installed. You must in
stall peer dependencies yourself.
npm WARN axobject-query@2.1.1 requires a peer of eslint@^5 || ^6 but none is installed. You must install peer dependen
cies yourself.
npm WARN @okta/okta-angular@1.0.7 requires a peer of @angular/common@>=4 <7 but none is installed. You must install pe
er dependencies yourself.
npm WARN @okta/okta-angular@1.0.7 requires a peer of @angular/core@>=4 <7 but none is installed. You must install peer
 dependencies yourself.
npm WARN @okta/okta-angular@1.0.7 requires a peer of @angular/platform-browser@>=4 <7 but none is installed. You must
install peer dependencies yourself.
npm WARN @okta/okta-angular@1.0.7 requires a peer of @angular/router@>=4 <7 but none is installed. You must install pe
er dependencies yourself.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\webpack-dev-server\node_modules\fsevents)
:
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\watchpack\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.9 (node_modules\karma\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.9: wanted {"os":"darwin","arch":"a
ny"} (current: {"os":"win32","arch":"x64"})
```

Type here to search

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AOT

- Faster rendering With AOT, the browser downloads a pre-compiled version of the application. The browser loads executable code so it can render the application immediately, without waiting to compile the app first.
- Fewer asynchronous requests The compiler inlines external HTML templates and CSS style sheets within the application JavaScript, eliminating separate ajax requests for those source files.
- Smaller Angular framework download size There's no need to download the Angular compiler if the app is already compiled. The compiler is roughly half of Angular itself, so omitting it dramatically reduces the application payload.
- Detect template errors earlier The AOT compiler detects and reports template binding errors during the build step before users can see them.
- Better security AOT compiles HTML templates and components into JavaScript files long before they are served to the client. With no templates to read and no risky client-side HTML or JavaScript evaluation, there are fewer opportunities for injection attacks.

Choosing Compiler

- Choosing a compiler
- Angular offers two ways to compile your application:
  - Just-in-Time (JIT), which compiles your app in the browser at runtime.
  - Ahead-of-Time (AOT), which compiles your app at build time.

Choosing Compiler

- JIT compilation is the default when you run the ng build (build only) or ng serve (build and serve locally) CLI commands:
  - ng build
  - ng serve

  For AOT compilation, include the --aot option with the ng build or ng serve command:
  - ng build --aot
  - ng serve --aot

PWA

- ng add @angular/pwa --project onlinebanking
- ng build --prod
- http-server -p 8080 -c10 dist/<project-name>
- use Location Strategy
- lite-server --baseDir="./dist/onlinebanking"
- no change required

PWA

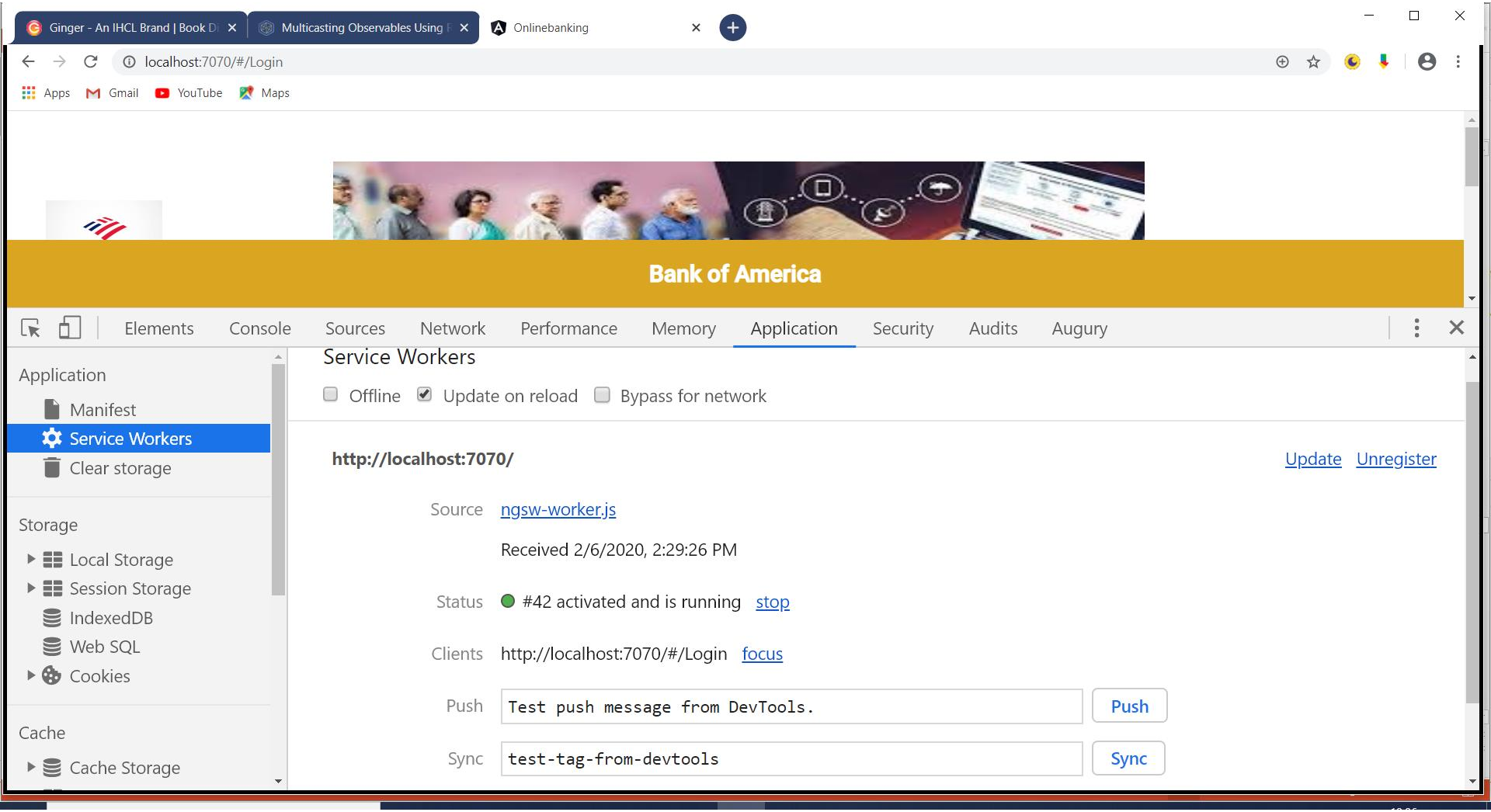
http-server

```
F:\boancrfeb2020\onlinebanking>http-server -p 7070 -c10 dist/onlinebanking
Starting up http-server, serving dist/onlinebanking
Available on:
  http://172.29.53.177:7070
  http://172.22.224.1:7070
  http://169.254.131.111:7070
  http://192.168.99.1:7070
  http://192.168.58.37:7070
  http://127.0.0.1:7070
Hit CTRL-C to stop the server
```

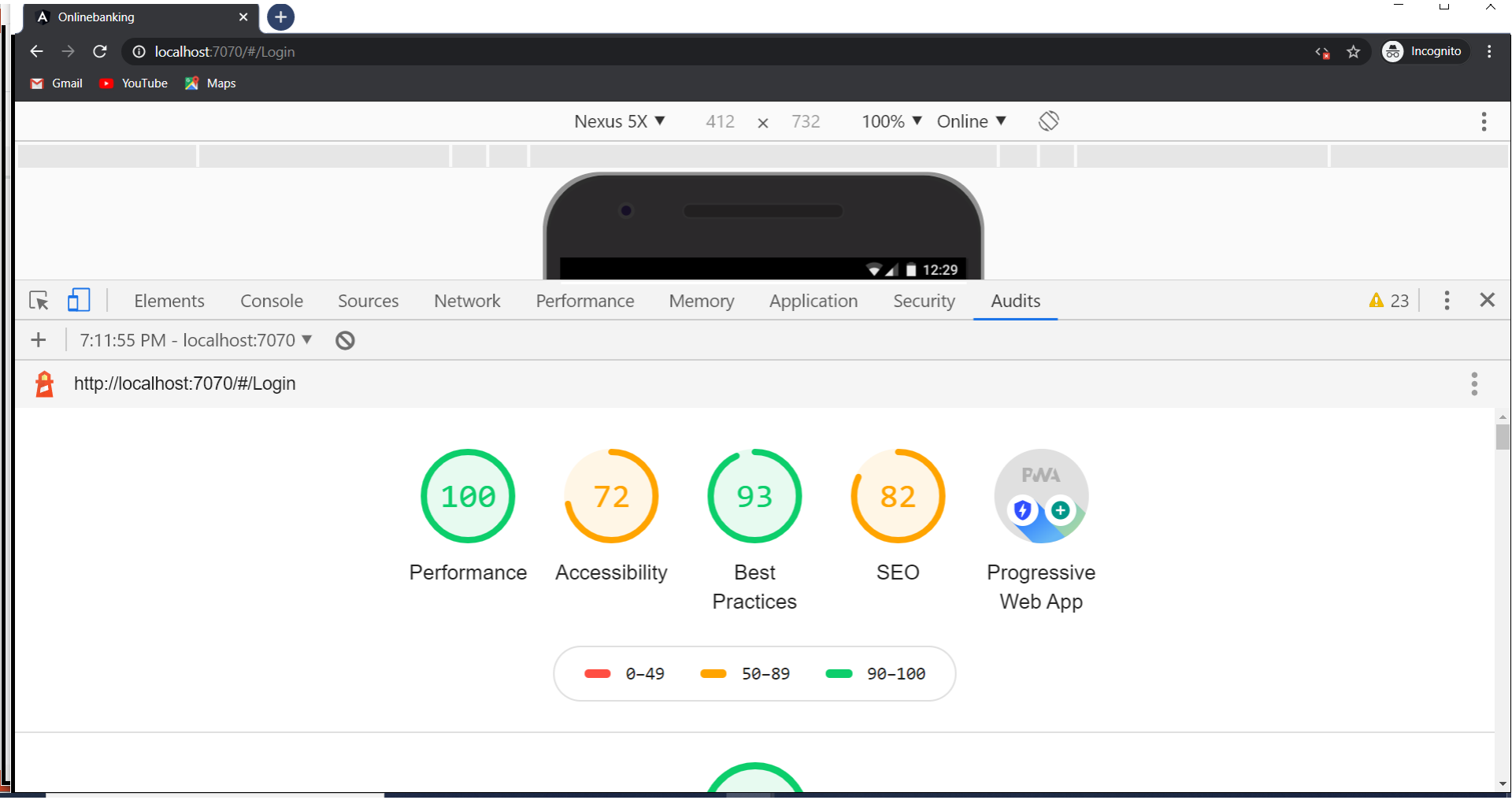
Type here to search

ENG 19:05 06/02/2020

PWA


Ginger - An IHCL Brand | Book D
Multicasting Observables Using F
Onlinebanking
localhost:7070/#/Login
Apps
Gmail
YouTube
Maps
Bank of America
Elements
Console
Sources
Network
Performance
Memory
Application
Security
Audits
Augury
Application
Manifest
Service Workers
Clear storage
Storage
Local Storage
Session Storage
IndexedDB
Web SQL
Cookies
Cache
Cache Storage
Service Workers
Offline
Update on reload
Bypass for network
http://localhost:7070/
Update
Unregister
Source
ngsw-worker.js
Received 2/6/2020, 2:29:26 PM
Status
#42 activated and is running
stop
Clients
http://localhost:7070/#/Login
focus
Push
Test push message from DevTools.
Push
Sync
test-tag-from-devtools
Sync

PWA


Onlinebanking
localhost:7070/#/Login
Incognito
Gmail
YouTube
Maps
Nexus 5X
412
732
100%
Online
12:29
Elements
Console
Sources
Network
Performance
Memory
Application
Security
Audits
23
7:11:55 PM - localhost:7070
http://localhost:7070/#/Login
100
Performance
72
Accessibility
93
Best Practices
82
SEO
PWA
Progressive Web App
0-49
50-89
90-100

How AOT Works

- The Angular AOT compiler extracts metadata to interpret the parts of the application that Angular is supposed to manage.
- You can specify the metadata explicitly in decorators such as @Component() and @Input(), or implicitly in the constructor declarations of the decorated classes.
- The metadata tells Angular how to construct instances of your application classes and interact with them at runtime.

How AOT Works

- The Angular compiler extracts the metadata once and generates a factory for TypicalComponent.
- When it needs to create a TypicalComponent instance, Angular calls the factory, which produces a new visual element, bound to a new instance of the component class with its injected dependency.

How AOT Works

- There are three phases of AOT compilation.
- Phase 1 is code analysis. In this phase, the TypeScript compiler and AOT collector create a representation of the source. The collector does not attempt to interpret the metadata it collects. It represents the metadata as best it can and records errors when it detects a metadata syntax violation.
- Phase 2 is code generation. In this phase, the compiler's StaticReflector interprets the metadata collected in phase 1, performs additional validation of the metadata, and throws an error if it detects a metadata restriction violation.
- Phase 3 is template type checking. In this optional phase, the Angular template compiler uses the TypeScript compiler to validate the binding expressions in templates. You can enable this phase explicitly by setting the fullTemplateTypeCheck configuration option;

Jquery in Angular

- npm install --save jquery
- angular.json
- "scripts": [
- "node_modules/jquery/dist/jquery.min.js"
-]

- app.component.html
-
- <h1>Welcome</h1>
-

Jquery in Angular

- app.component.ts
- import {Component, OnInit} from '@angular/core';
- declare var $: any;
- @Component({
- selector: 'app-root',
- templateUrl: './app.component.html',
- styleUrls: ['./app.component.css']
- })
- export class AppComponent implements OnInit {
- ngOnInit(): void {
- $(document).ready(() => {
- $('#elementId').css({'background-color': 'yellow', 'font-size': '200%'});
- });
- }
- }

Angular Optimization Techniques

- #1 Angular Command Line Interface (CLI)
- #2 Tree-shaking
- #3 JIT (Just-in-Time) Compilation
- #4 AOT (Ahead-of-Time) Compilation
- #5 Prod Flag
- #6 UglifyJS and Build Optimizer Flag
- #7 Build Optimizer and Vendor-Chunk
- #8 Package.json

Angular Optimization Techniques

- #9 Third-Party Tools (gulp and grunt)
- 10 .htaccess file

What is a Reusable Component?

- Angular was designed to promote code reuse. As a result, the recommended component architecture relies on two different kinds of components:
- Container components (or “smart” components) know how to get data and work with services
- Presentation components (“dumb” or “lazy” components) that have to be fed with data

What is a Reusable Component?

- Container components are tied to the business logic of your application.
- They are not meant to be shared or reused.
- Instead, what they do is get data from the server and pass it down to presentation components.

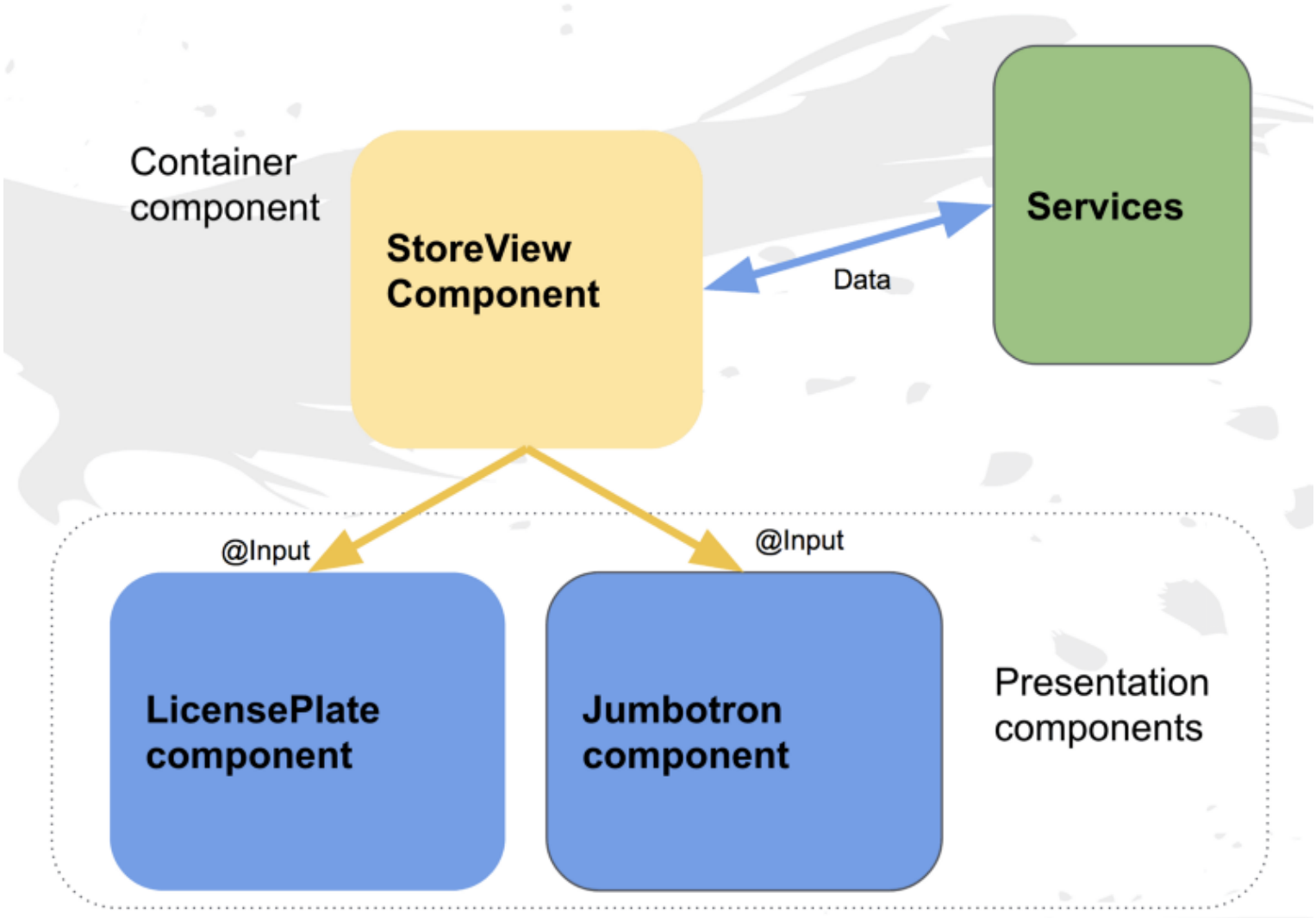
What is a Reusable Component?

- Presentation components do not know about any service.
- They are pure, simple UI components that just need some input data to render.
- Buttons, tabs, headers, tables are all great candidates to be used as presentation components.
- As a result, such components are reusable because they are coded in a way that is not tied to any runtime context.

What is a Reusable Component?

- Presentation components are really just an HTML template that has to be filled with data.
- They can also emit events that container components would catch in order to make the actual business logic happen.

What is a Reusable Component?



Sharable Components

- ng generate library [name of the library]
- ng generate component [component name] --project [name of library]
- public API of your library is defined in projects/[name of library]/src/public_api.ts.
- Update
- ng build [name of library]
- Npm login (eswaribala70, usual password)
- cd dist/[name of library]
- npm publish
- Ensure that package.json has unique name(otherwise 403 error)

Debugging Memory Leaks in An | Loanapp | Successfully published bankinglib | bankinglib - npm

npmjs.com/package/bankinglib

Apps | Insert title here | Empire | New Tab | How to use Asserti... | Browser Automatio... | node.js - How can I... | Freelancer-dev-810... | Courses | New Tab | hi | Airtel 4G Hotspot | nt8F83

bankinglib

0.0.1 • Public • Published an hour ago

Readme | Admin | 1 Dependency | 0 Dependents | 1 Versions

Bankinglib

This library was generated with Angular CLI version 8.2.14.

Code scaffolding

Run `ng generate component component-name --project bankinglib` to generate a new component. You can also use `ng generate directive|pipe|service|class|guard|interface|enum|module --project bankinglib` .

> Note: Don't forget to add `--project bankinglib` or else it will be added to the default project in your `angular.json` file.

install

```
> npm i bankinglib
```

version 0.0.1

license none

last publish

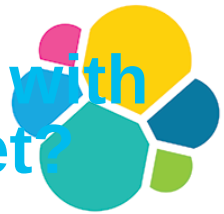
an hour ago

collaborators

Type here to search

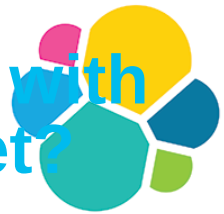
ENG 21:17 05/12/2019

What if I want to share my component locally with other applications, not publicly on the internet?



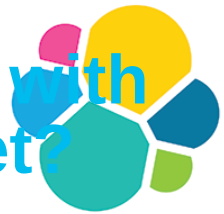
- Angular Multi-Application Project Creation
- A workspace is a set of Angular applications and libraries. The angular.json file at the root level of an Angular workspace provides workspace-wide and project-specific (application or library) configuration defaults for build and development tools.

What if I want to share my component locally with other applications, not publicly on the internet?



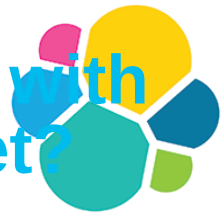
- Create a Workspace
- ng new angularworkspace --createApplication=false --directory=**frontend** --interactive=false
- cd frontend
- ng generate application administration --style=css --routing=true
- ng generate application gatling --style=css --routing=true

What if I want to share my component locally with other applications, not publicly on the internet?



- ng generate library tools
- ng generate library vendors
- Create a Shared Service
  - ng generate service userservice --project=tools
  - Update the AppComponent projects/administration/src/app/app.component.ts to use this service:
  - import {userservice } from 'projects/tools/src/lib/hello-world.service';

What if I want to share my component locally with other applications, not publicly on the internet?

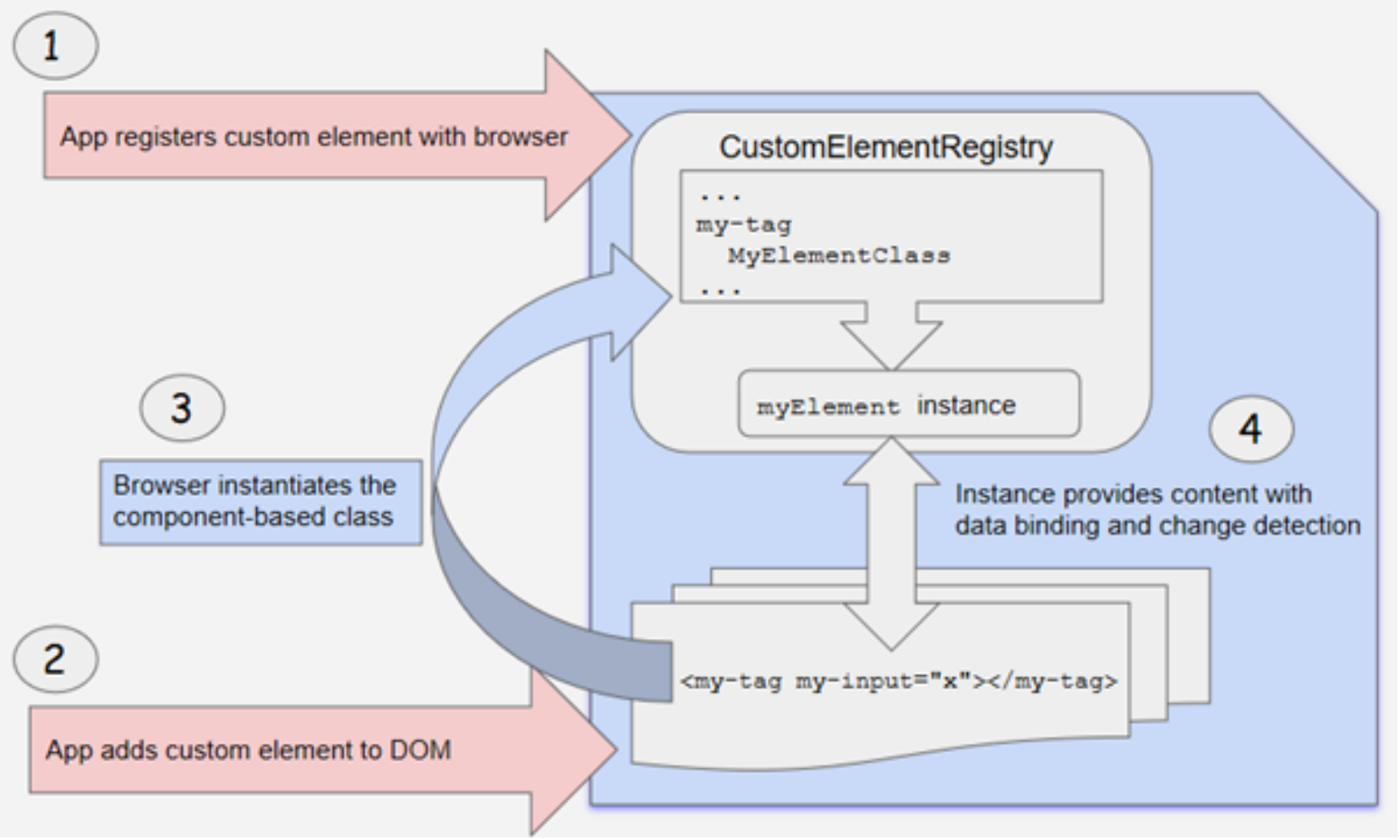


- Launch The Applications
- ng serve --project=administration

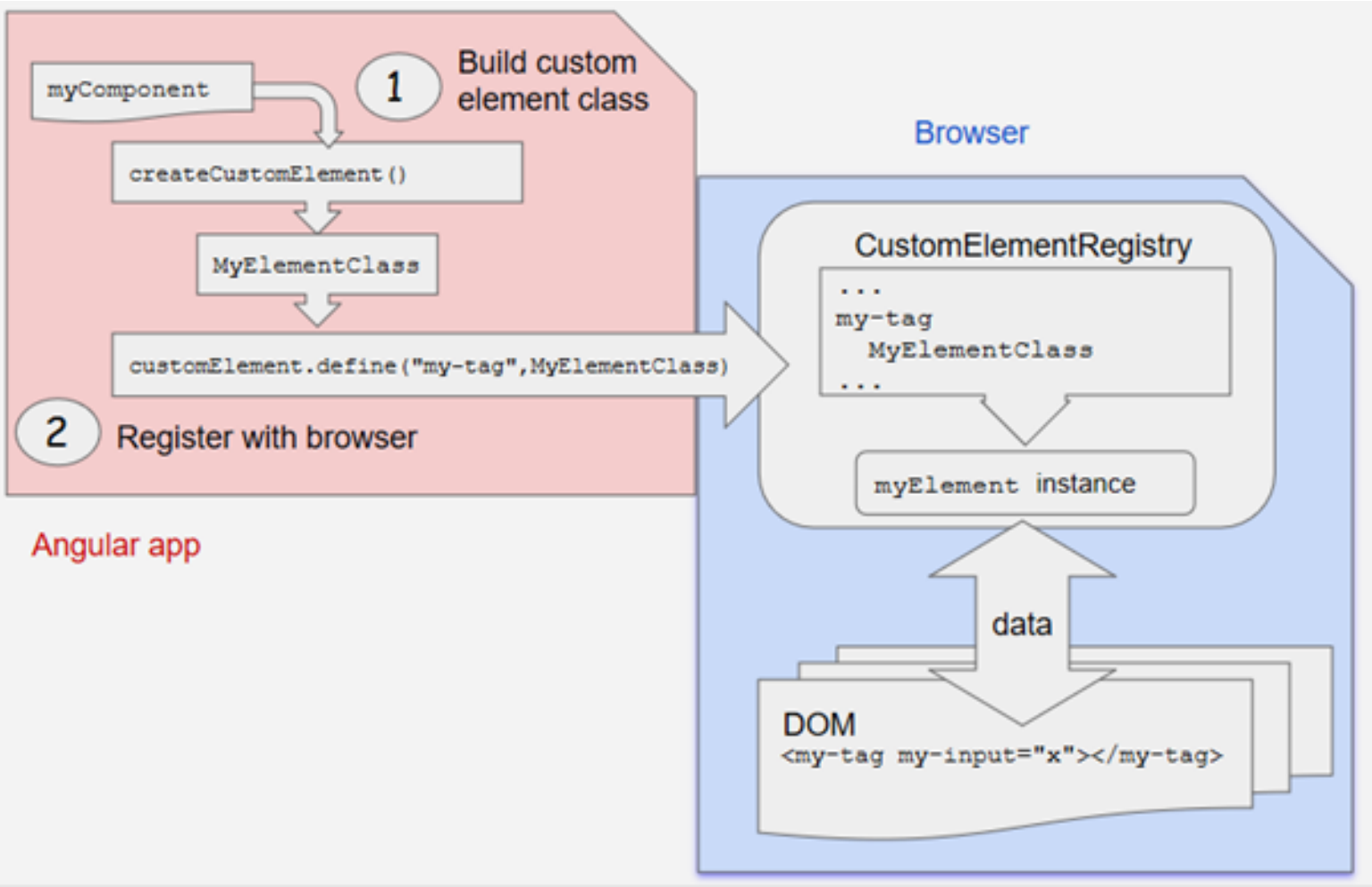
Angular Elements

- Angular Elements allow us to create reusable Angular components, which can be used outside of the Angular application.
- You can use an Angular Element in any other application such as normal HTML, React, etc.
- Essentially, Angular Elements are normal components, which are packaged as Custom Elements.

Angular Elements



Transforming Component to Custom Element



Angular Elements

- Step 1
- **npm install @angular/elements**
- To work with older browsers, we need polyfill. So, let us install that also as shown below:
- npm install @webcomponents/custom-elements
- After installing polyfill, open polyfills.ts file and add these two entries:
- import '@webcomponents/custom-elements/src/native-shim';
- import '@webcomponents/custom-elements/custom-elements.min';

Angular Elements

- Step 2:
- Create the Component
- Step 3:
- Register the Component
- Step 4:
- Create Element from the component
- Step 5:
- Use Custom Element
- ng build --prod --output-hashing none && node build-elements.js

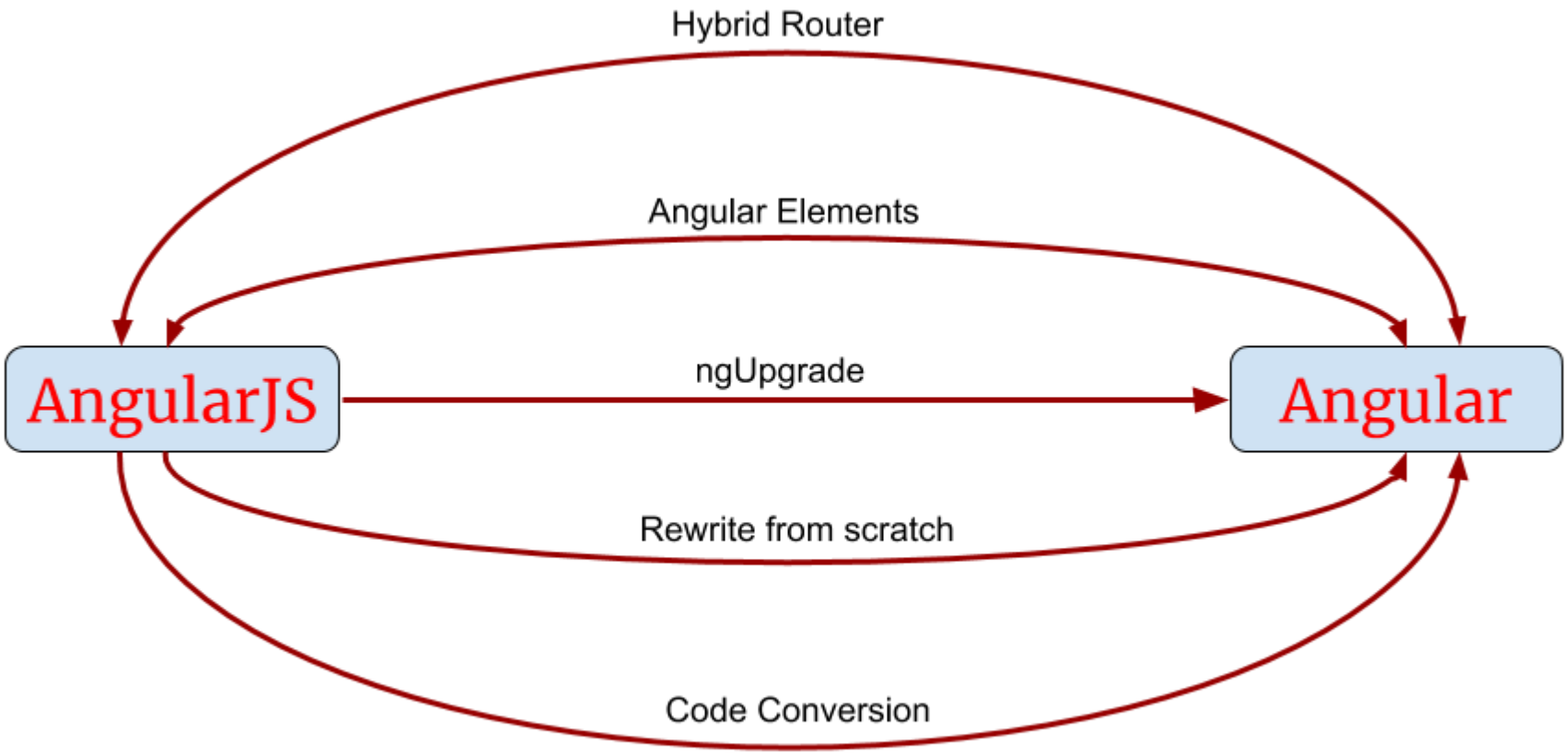
Angular Interceptors

- Interceptors are the mechanism where we can operate on the outgoing request and the incoming response.
- Interceptors are the layer between our Angular application and the back-end services.
- Whenever the request is made from the application, the interceptor catches the request, transforms it, and passes to the back end.
- The same happens with the response; whenever it receives the response, we can make changes to the response and use them in the application.

Angular Interceptors

- To set up interceptor, we need a class which will be injectable class and implementing the HttpInterceptor.
- When we implement this Interface, then we have a method called intercept which has the body like below.
- intercept(req: HttpRequest<any>, next: HttpHandler): Observable<HttpEvent<any>> {}
- It has two parameters "req" and "next" which are HttpRequest and HttpHandler respectively.

Migration Tools



Migration Tools

- **ngMigration Assistant**
- **ngMigration Forum**

Migration Tools

- **Installing Angular & ngUpgrade**
- Step 1: Removing Bootstrap from index.html
- Step 2: Changing the AngularJS Module
- Step 3: Creating the Angular App Module
- angular.module(MODULE_NAME, ['ngRoute'])
- Export
- Step 4: Bootstrapping in the Angular Module

Migration Tools

- **constructor(private upgrade: UpgradeModule){**
- **}**
- **ngDoBootstrap(){**
- **}**
- constructor(private upgrade: UpgradeModule) { }

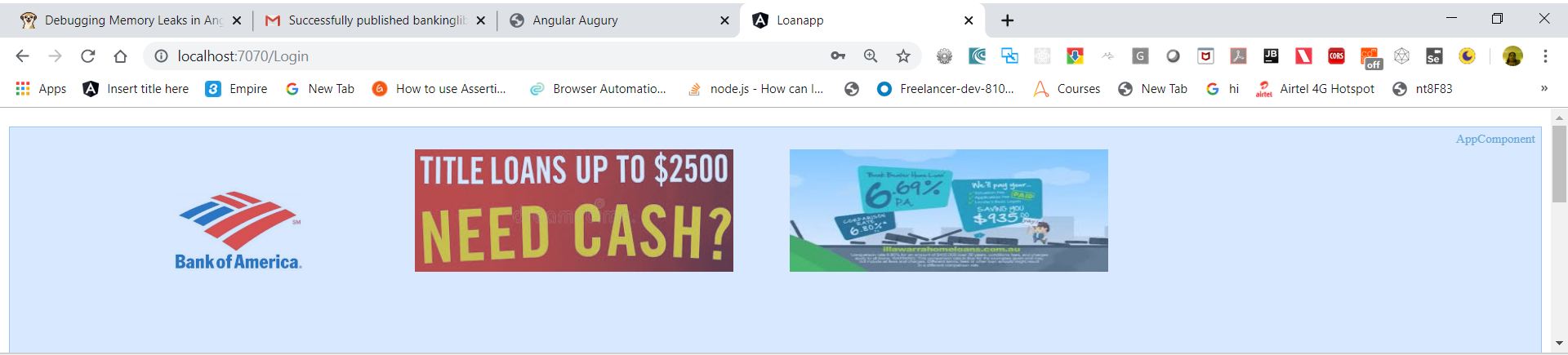
- ngDoBootstrap(){
- this.upgrade.bootstrap(document.documentElement, [moduleName], {strictDi: true});
- }

Migration Tools

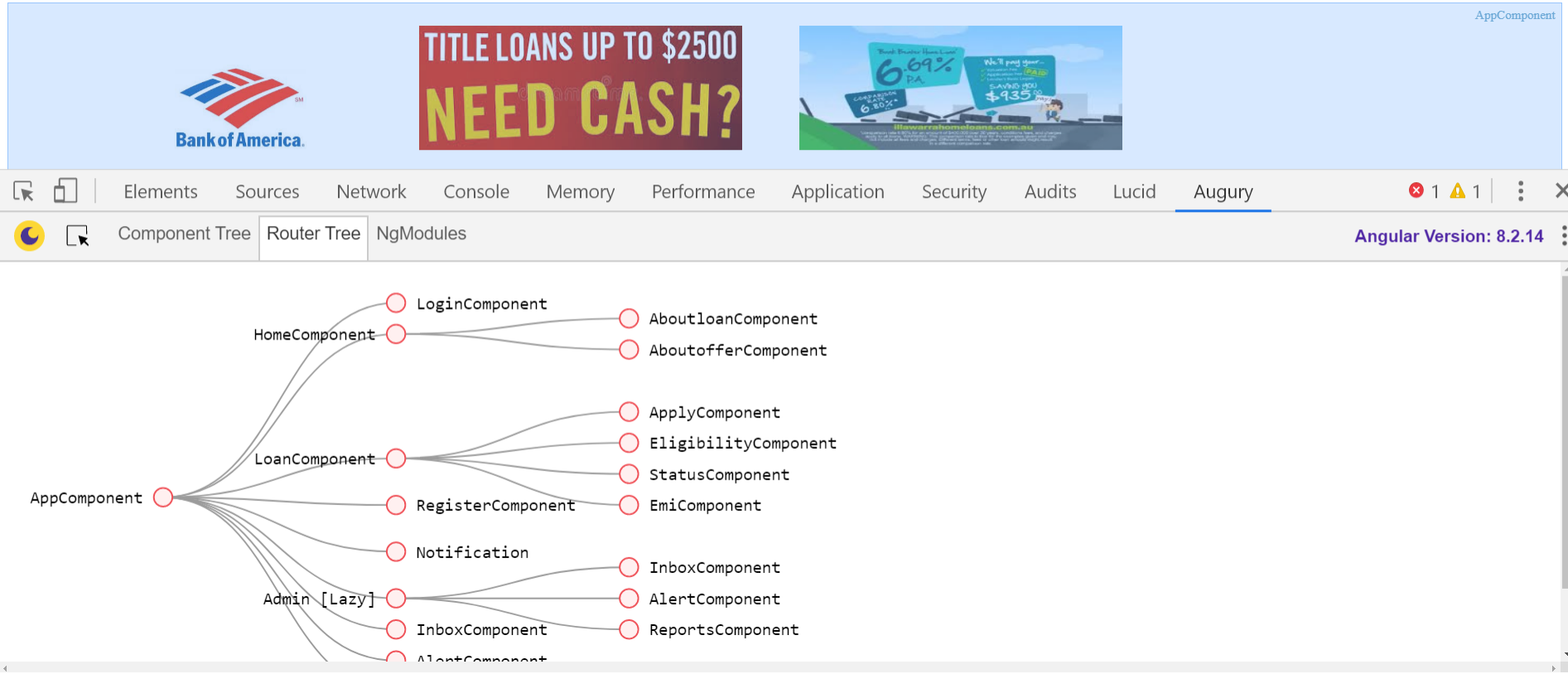
- **Step5: Creating main.ts**
- Step 6: Updating Webpack
- Testing the Application

Debugging

Augury


Debugging Memory Leaks in An
Successfully published bankinglit
Angular Augury
Loanapp
localhost:7070/Login
Apps
Insert title here
Empire
New Tab
How to use Asserti...
Browser Automatio...
node.js - How can I...
Freelancer-dev-810...
Courses
New Tab
hi
Airtel 4G Hotspot
nt8F83
AppComponent
Bank of America
TITLE LOANS UP TO $2500
NEED CASH?
Elements
Sources
Network
Console
Memory
Performance
Application
Security
Audits
Lucid
Augury
Component Tree
Router Tree
NgModules
Angular Version: 8.2.14
AppComponent
MenuComponent
Menubar
div
router-outlet
LoginComponent
a
form
MatFormField
input
label
div
MatFormField
MatButton
MatButton
Properties
Injector Graph
MenuComponent (View Source)
($$el in Console)
Change Detection: Default
State
menuService: {}
router: Object
_menuArr: Array[4]

Augury


AppComponent
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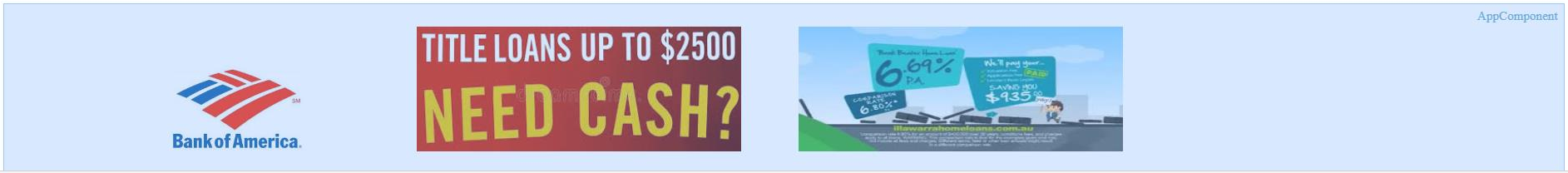
Component Tree
Router Tree
NgModules
Angular Version: 8.2.14
LoginComponent
HomeComponent
AboutloanComponent
AboutofferComponent
ApplyComponent
LoanComponent
EligibilityComponent
StatusComponent
AppComponent
RegisterComponent
EmiComponent
Notification
InboxComponent
Admin [Lazy]
AlertComponent
InboxComponent
ReportsComponent

Augury



Elements | Sources | Network | Console | Memory | Performance | Application | Security | Audits | Lucid | Augury

1 1

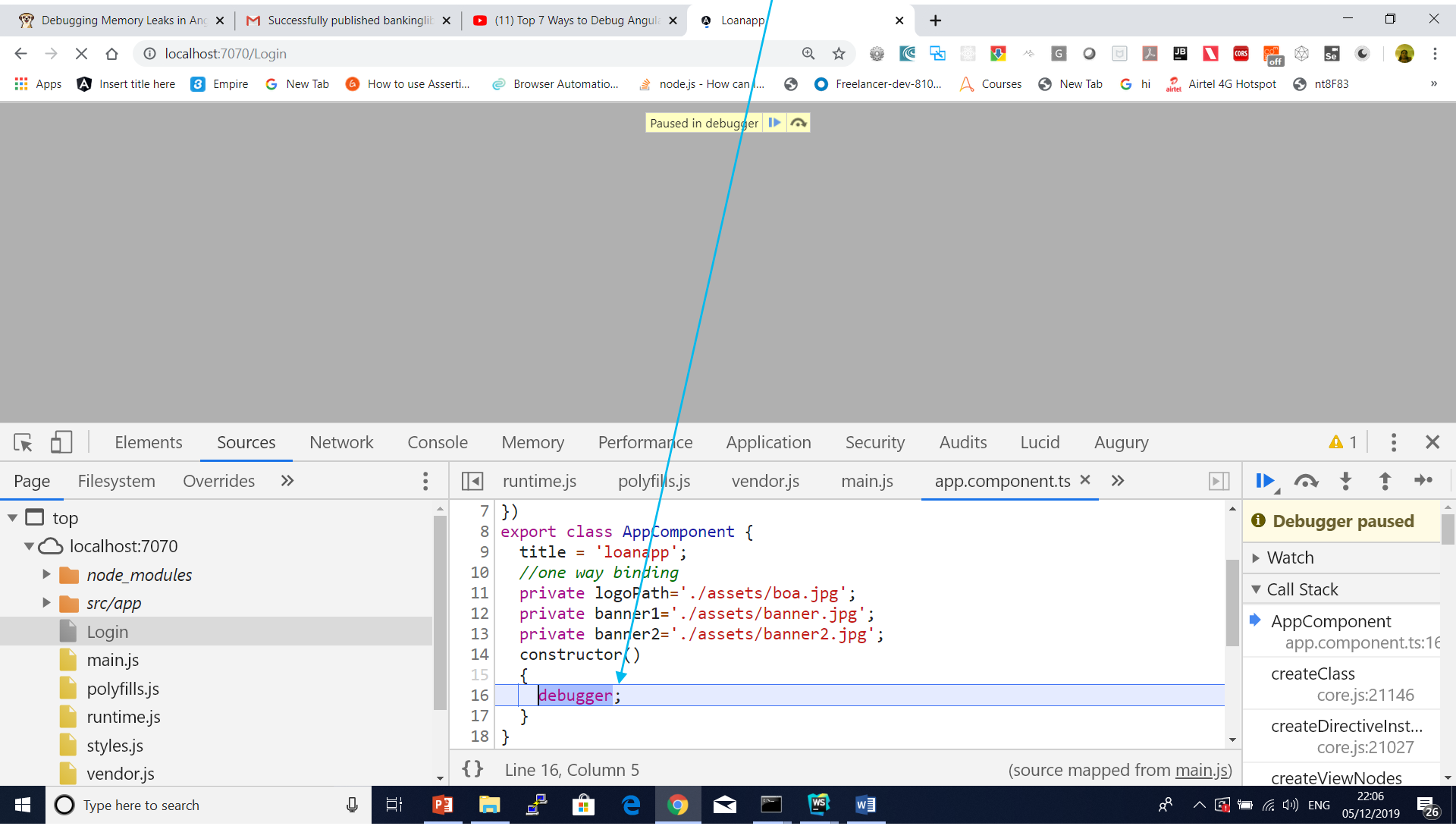
Component Tree | Router Tree | NgModules

Angular Version: 8.2.14

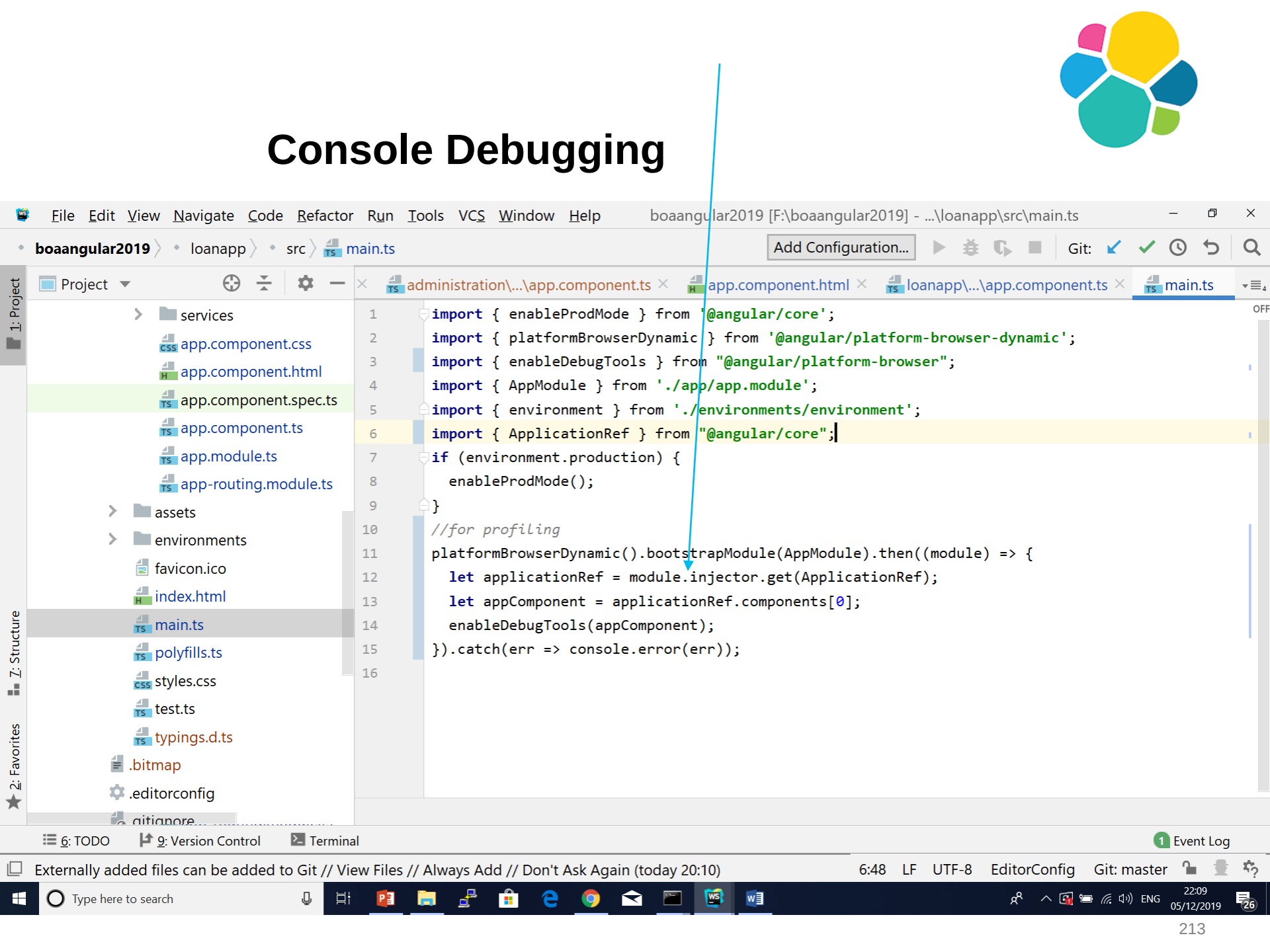
AppModule

Imports	Exports	Providers	Declarations	ProvidersInDeclarations
BrowserModule AppRoutingModule MenubarModule FormsModule ReactiveFormsModule HttpClientModule MatFormFieldModule MatInputModule BrowserAnimationsModule MatButtonModule MatIconModule FormsModule ReactiveFormsModule AdminModule	*None*	MenuService UserService LoginGuard AuthService	AppComponent MenuComponent HomeComponent AboutloanComponent AboutofferComponent LoanComponent ApplyComponent EligibilityComponent StatusComponent EmiComponent LoginComponent RegisterComponent NotificationComponent EqualValidator ParentComponent	*None*

Add debugger in ts file



Console Debugging



Profiling

- Angular offers a precious tool: ng.profiler

- ng.profiler.timeChangeDetection()
- ran 489 change detection cycles
- 1.02 ms per check
- You can see how many change detection cycles it ran (it should be at least 5 cycles or during at least 500ms), and the time per cycle.
- You can also record the CPU profile during these checks to analyze them with ng.profiler.timeChangeDetection({ record: true }).

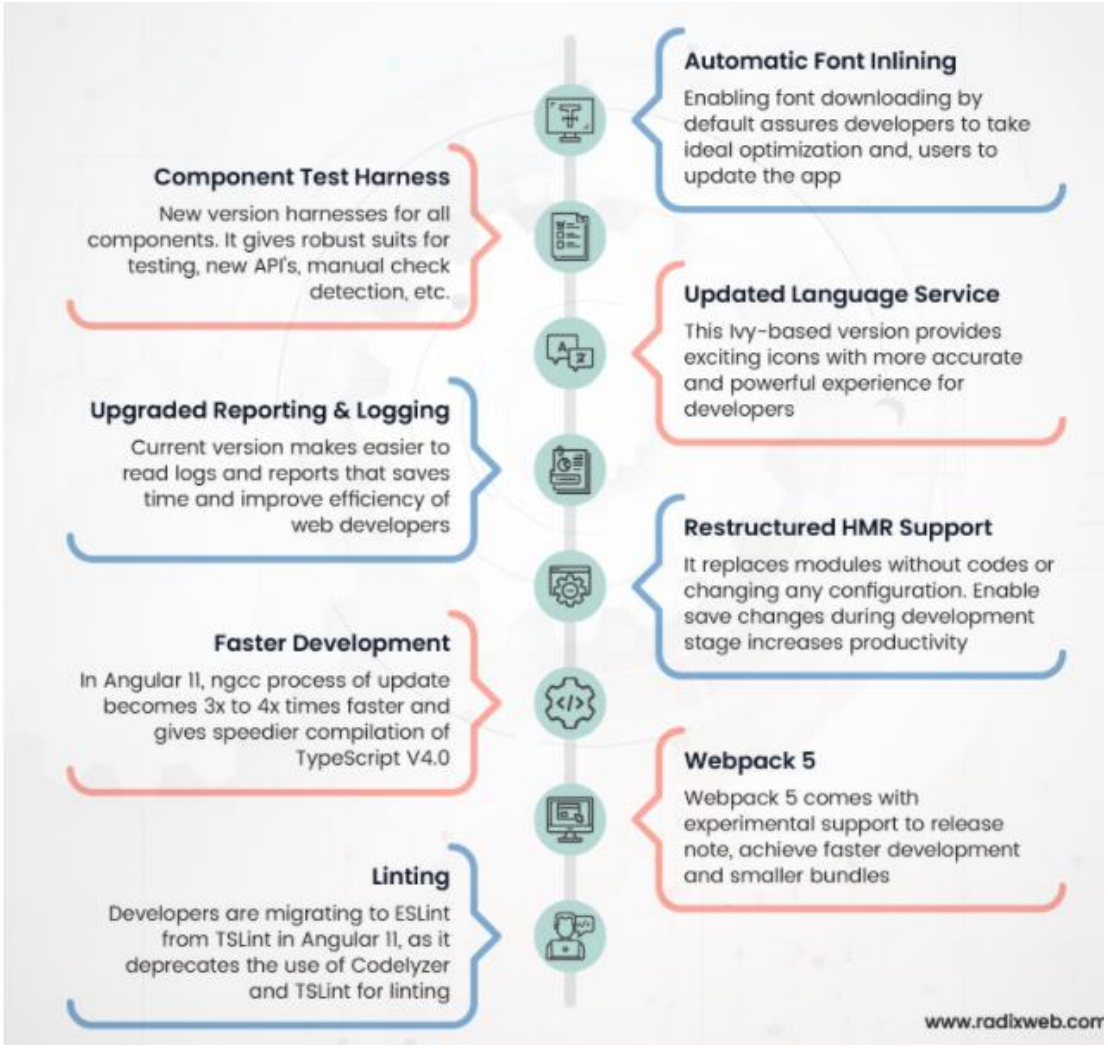
Elements | Console | Sources | Network | Memory | Performance | Application | Security | Audits | Lucid | Augury

2 1

top | Filter | Default levels | 1 hidden

```
[WDS] Live Reloading enabled.                                   client:52
▶ Uncaught TypeError: Cannot convert undefined or null to object   reactTraverser.js:6
    at Function.keys (<anonymous>)
    at reactTraverser.js:6
> ng.profiler()
▶ Uncaught TypeError: ng.profiler is not a function             VM8937:1
    at <anonymous>:1:4
> ng.profiler.timeChangeDetection()
ran 390 change detection cycles                                 platform-browser.js:2287
1.28 ms per check                                               platform-browser.js:2288
▼ ChangeDetectionPerfRecord {msPerTick: 1.283935897439593, numTicks: 390}
    msPerTick: 1.283935897439593
    numTicks: 390
  ▶ __proto__: Object
>
```

Angular 11 Features



Angular 11 Features

- Updated Hot Module Replacement (HMR) Support
  - Hot Module Replacement is a mechanism that allows the modules to be replaced without a full browser refresh.
  - ng serve –hmr
- Updates on Operation Byelog
- Automatic Inlining of Fonts

Angular 11 Features

- "configurations": {
- "optimization": true
- }
- You can disable this optimisation by changing the flag to below snippets
- "configurations": {
- "optimization": {
- "fonts": false
- }
- }

Angular 11 Features

- Update to get version 11
- ng update @angular/cli @angular/core
- Generate E2E test with async/wait
- ViewEncapsulation
  - Angular 11 changelog involves the removal of the ViewEncapsulation.Native. Instead, in this new release, we can use ViewEncapsulation.ShadowDom.
  - The ng update will automatically update the existing pages.

Angular 11 Features

- Browser Support/cleaning
  - The support for IE 9, 10, and IE mobile in angular 11 is removed.
  - They were only deprecated in the version 10 release, but they are discontinued in this version.
  - Angular however still supports IE11 as the only version.
  - Angular 11 also has removed obsolete API and several functions has been added to its deprecated list.

Angular 11 Features

- Pipes
  - Angular recent version has fixed the typing for date and number pipe which earlier used to take any type as input.
  - In the datetime, datepipe will round off the millisecond part to the nearest millisecond provided.
  - The async pipe will not return null anymore as a value for an undefined input.
  - This can cause compilation errors which is why it is still a breaking change, however, actually uncovers invalid usages.

Angular 11 Features

- TypeScript 4.0 Support
  - The angular team in version 11 has dropped the support for TypeScript 3.9 and only supports TypeScript 4.0, only to speed up the builds.
- Forms
  - Angular 11 has made amendments to improve the typing for validators and asyncValidators that were earlier not available.

Angular 12 Features

Angular 12 Features

- Ivy Everywhere
  - Angular 12 is the step in the Angular revolution.
- Deprecating support for IE11
  - Internet Explorer is undoubtedly in its last leg as the support for IE continues to dwindle.
- Nullish coalescing
  - Angular 12 allows nullish coalescing utilization for its templates.
  - By using nullish coalescing operators (??) developers can write cleaner code.

Angular 12 Features

- {{age !== null && age !== undefined ? age : calculateAge() }}

- {{age ?? calculateAge() }}

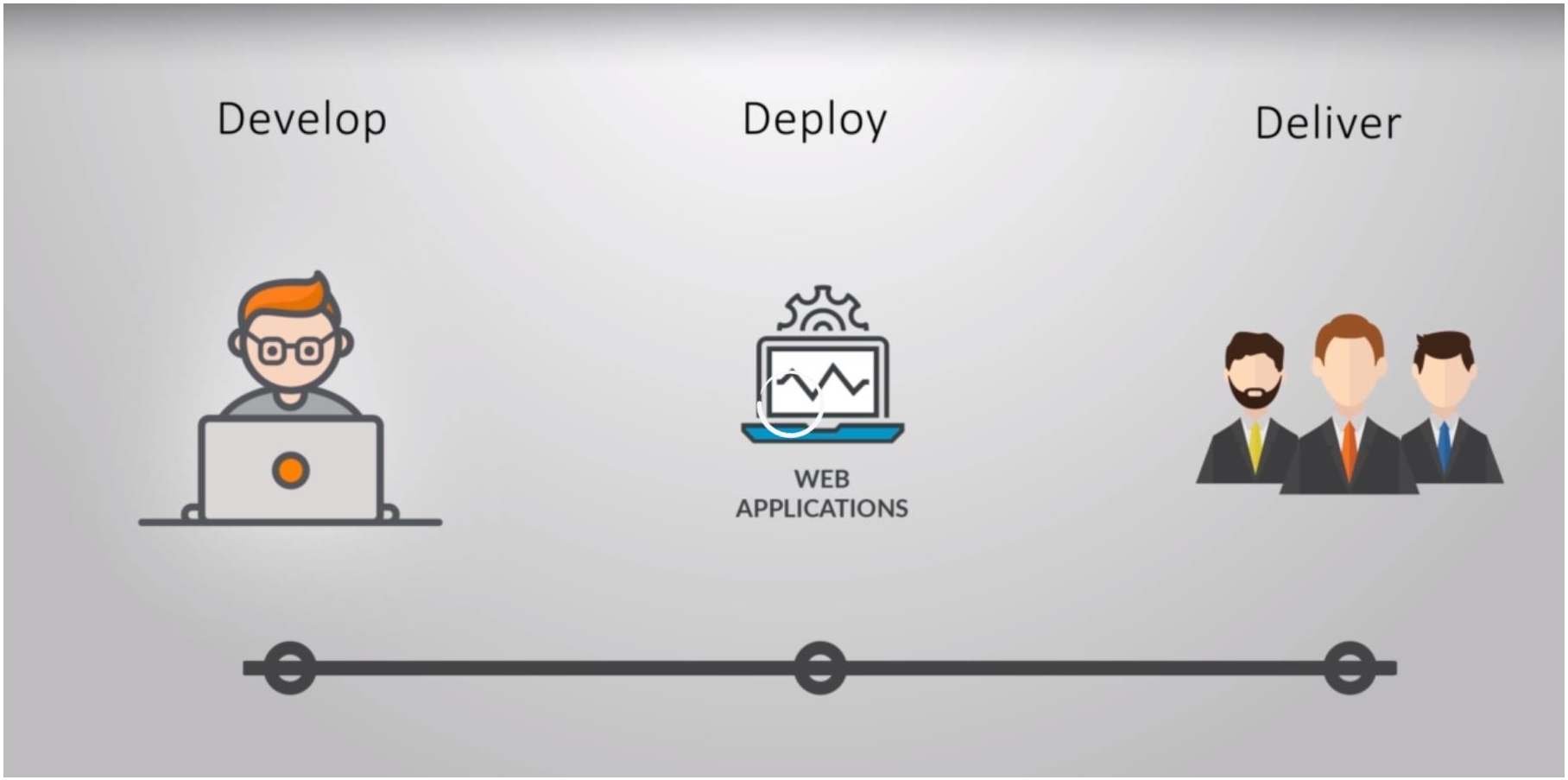
Administrator: Node.js command prompt

```
10% building 4/4 modules 0 activei ℹ｢wds｣: Project is running at http://localhost:4200/webpack-dev-server/
i ｢wds｣: webpack output is served from /
i ｢wds｣: 404s will fallback to //index.html

chunk {main} main.js, main.js.map (main) 152 kB [initial] [rendered]
chunk {polyfills} polyfills.js, polyfills.js.map (polyfills) 336 kB [initial] [rendered]
chunk {polyfills-es5} polyfills-es5.js, polyfills-es5.js.map (polyfills-es5) 655 kB [initial] [rendered]
chunk {runtime} runtime.js, runtime.js.map (runtime) 6.15 kB [entry] [rendered]
chunk {styles} styles.js, styles.js.map (styles) 733 kB [initial] [rendered]
chunk {vendor} vendor.js, vendor.js.map (vendor) 7.75 MB [initial] [rendered]
Date: 2019-12-06T01:53:12.483Z - Hash: 0d56f2be39a138c9fbab - Time: 16267ms
** Angular Live Development Server is listening on localhost:4200, open your browser on http://localhost:4200/ **
i ｢wdm｣: Compiled successfully.
[07:23:12] I/launcher - Running 1 instances of WebDriver
[07:23:12] I/direct - Using ChromeDriver directly...

DevTools listening on ws://127.0.0.1:64842/devtools/browser/ef029325-9f3e-47d3-a08c-abc92bc024ef
Jasmine started

  workspace-project App
    √ should display welcome message

Executed 1 of 1 spec SUCCESS in 3 secs.
[07:23:23] I/launcher - 0 instance(s) of WebDriver still running
[07:23:23] I/launcher - chrome #01 passed

F:\boaangular2019\loanapp>
```

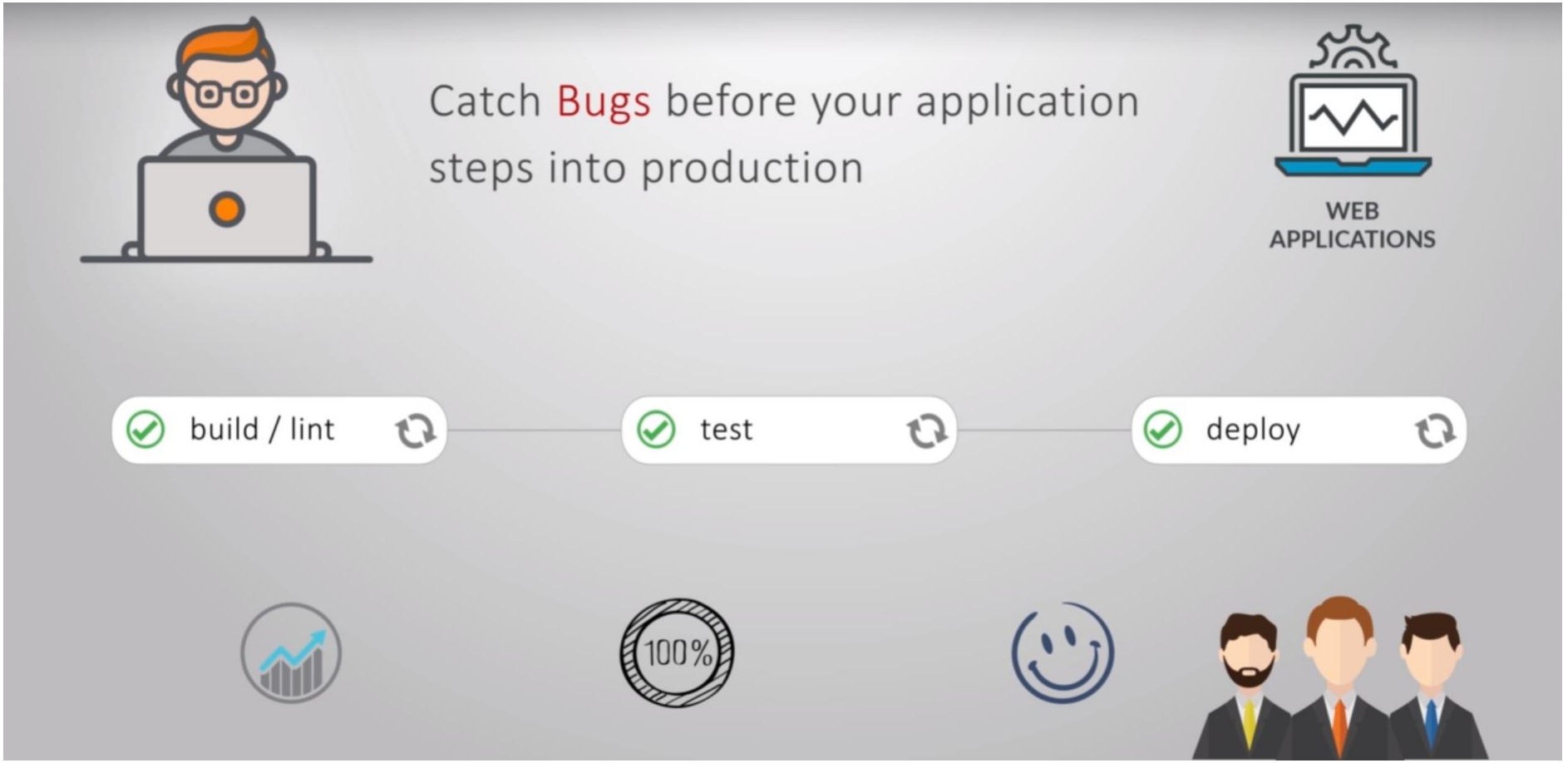
Type here to search

ENG 07:23 06/12/2019

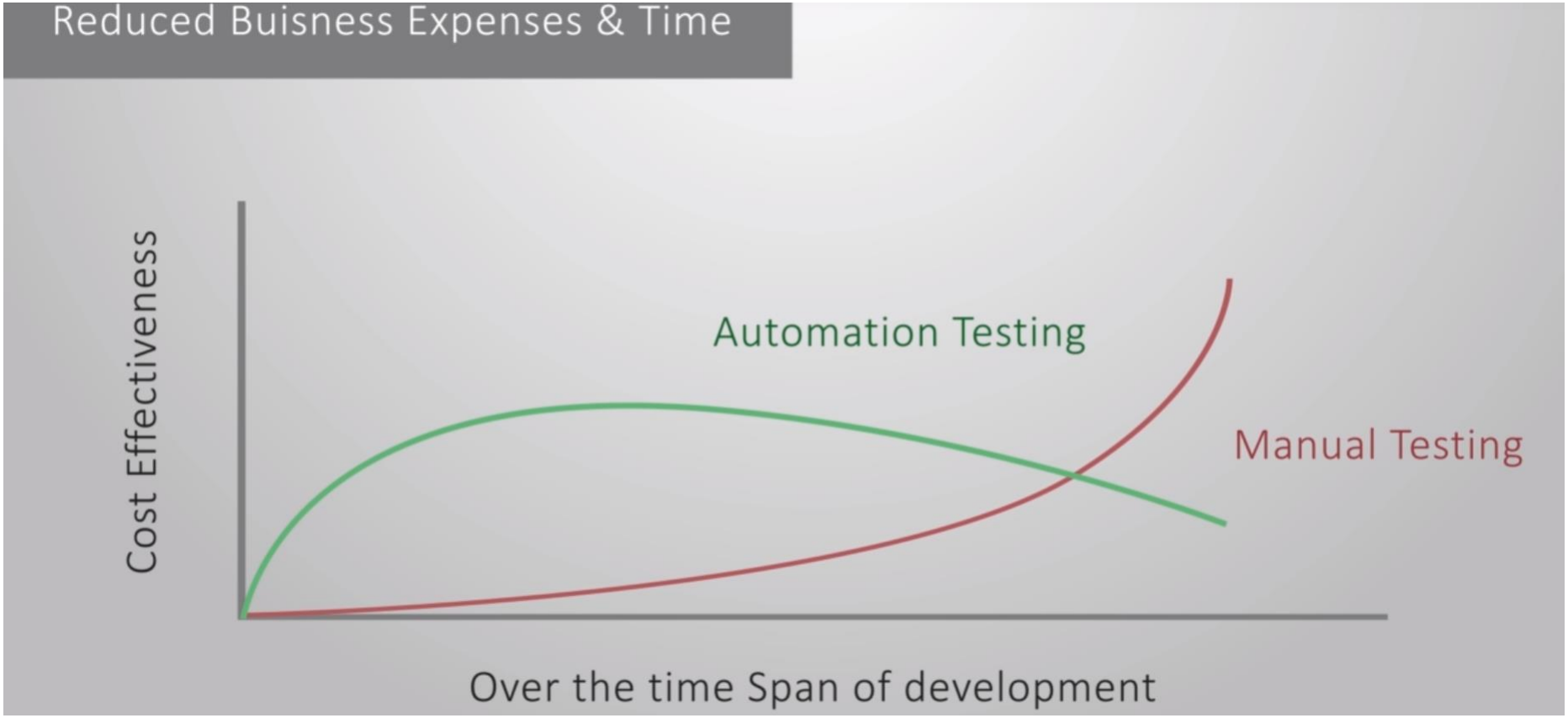
Automation Testing



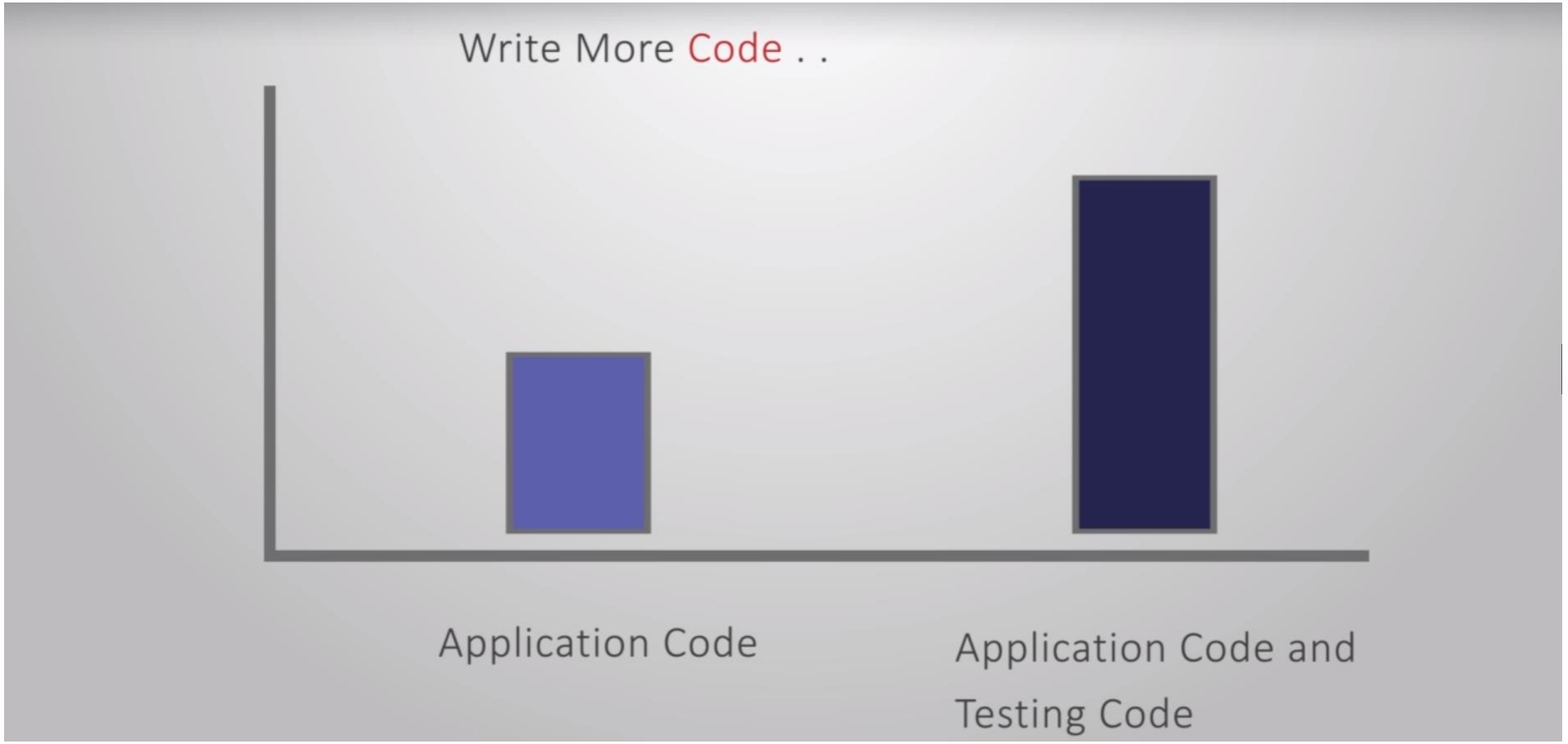
Automation Testing



Automation Testing



Automation Testing



Automation Testing

Automation Testing

Jasmine Unit Testing

- Jasmine is one of the popular JavaScript unit testing frameworks which is capable of testing synchronous and asynchronous JavaScript code.
- It is used in BDD (behavior-driven development) programming which focuses more on the business value than on the technical details

Suite

- A Jasmine suite is a group of test cases that can be used to test a specific behavior of the JavaScript code (a JavaScript object or function).
- This begins with a call to the Jasmine global function describe with two parameters – first parameter represents the title of the test suite and second parameter represents a function that implements the test suite.
- //This is test suite
- describe("Test Suite", function() {
- //.....
- });

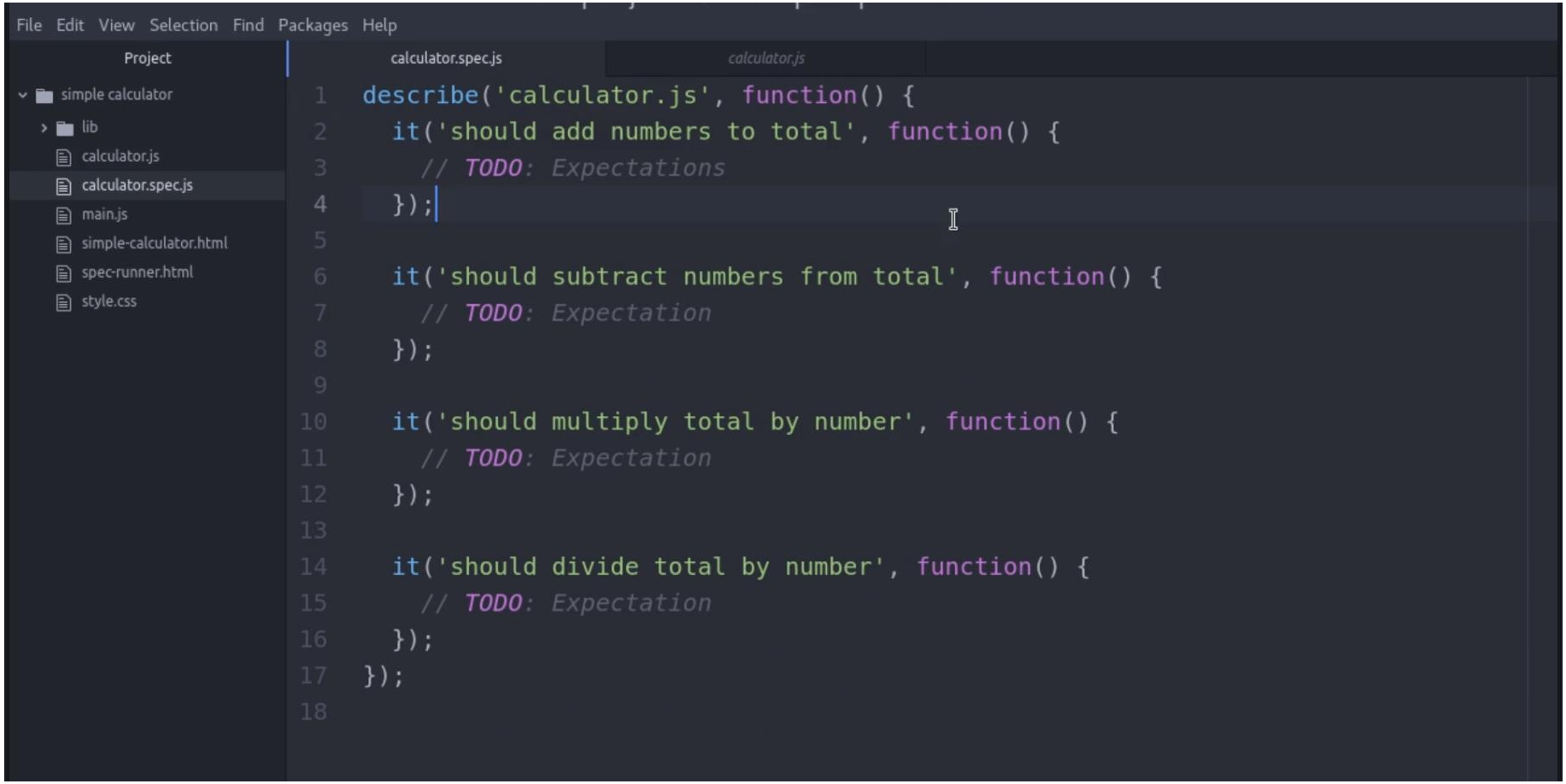
Spec

- A Jasmine spec represents a test case inside the test suite.
- This begins with a call to the Jasmine global function it with two parameters – first parameter represents the title of the spec and second parameter represents a function that implements the test case.
- In practice, spec contains one or more expectations.
- Each expectation represents an assertion that can be either true or false.
- In order to pass the spec, all of the expectations inside the spec have to be true. If one or more expectations inside a spec is false, the spec fails.

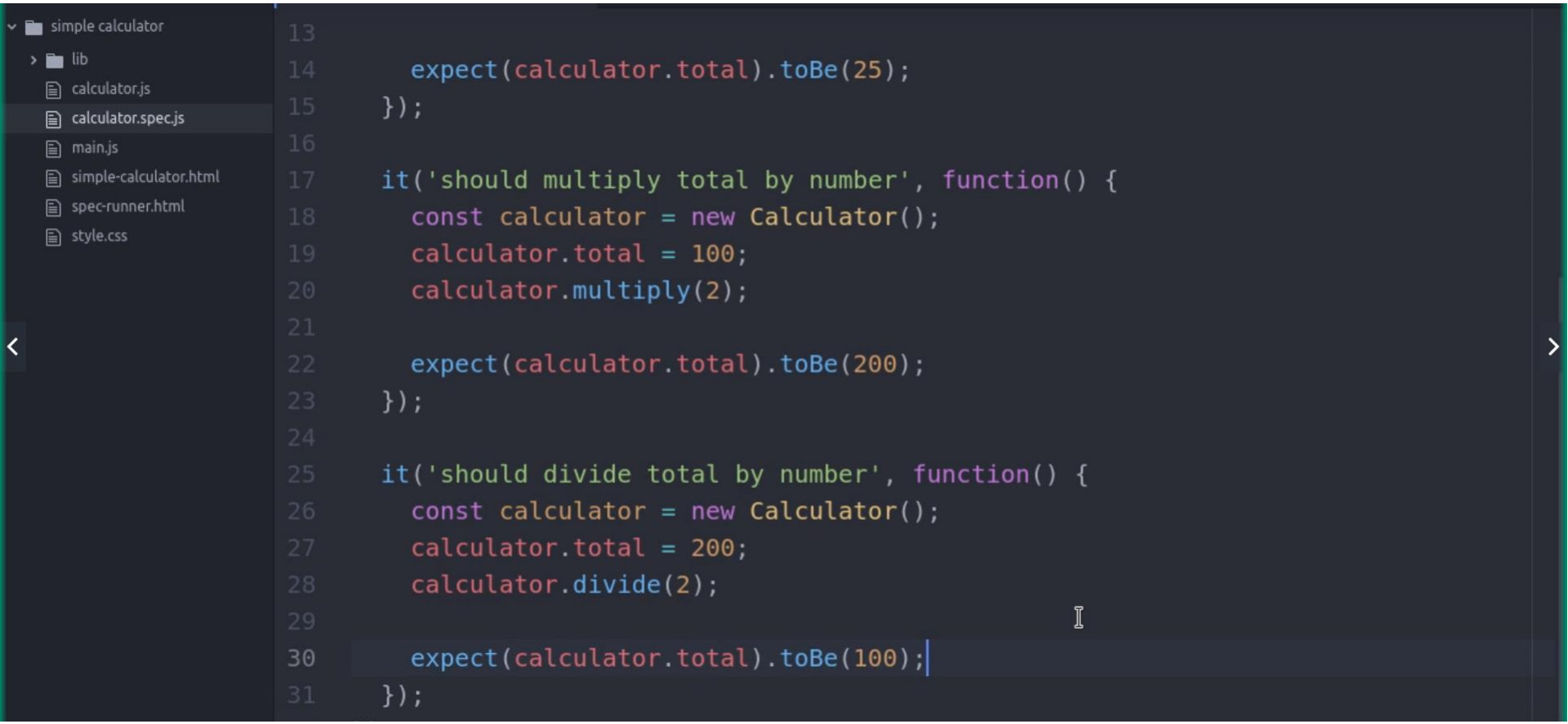
Spec

```
//This is test suite
describe("Test Suite", function() {
    it("test spec", function() {
        expect( expression ).toEqual(true);
    });
});
```

Spec


File Edit View Selection Find Packages Help
Project
simple calculator
lib
calculator.js
calculator.spec.js
main.js
simple-calculator.html
spec-runner.html
style.css
calculator.spec.js
calculator.js
describe('calculator.js', function() {
it('should add numbers to total', function() {
// TODO: Expectations
});
it('should subtract numbers from total', function() {
// TODO: Expectation
});
it('should multiply total by number', function() {
// TODO: Expectation
});
it('should divide total by number', function() {
// TODO: Expectation
});
});

Spec


simple calculator
lib
calculator.js
calculator.spec.js
main.js
simple-calculator.html
spec-runner.html
style.css
13
14 expect(calculator.total).toBe(25);
15 });
16
17 it('should multiply total by number', function() {
18 const calculator = new Calculator();
19 calculator.total = 100;
20 calculator.multiply(2);
21
22 expect(calculator.total).toBe(200);
23 });
24
25 it('should divide total by number', function() {
26 const calculator = new Calculator();
27 calculator.total = 200;
28 calculator.divide(2);
29
30 expect(calculator.total).toBe(100);
31 });

Jasmine functions

- Suite (describe):

Groups related specs.

- Spec (it):

Groups expectations.

- Expectations (expect):

Test the state of the code.

```
describe('test.js', function() {
        it('Should be true', () => {
                expect(true).toBe(true);
        });
});
```

Setup and Teardown

- For setup and tear down purpose, Jasmine provides two global functions at suite level i.e. beforeEach() and afterEach().
- beforeEach()
- The beforeEach function is called once before each spec in the describe() in which it is called.
- afterEach()
- The afterEach function is called once after each spec.

```
What is a matcher?

* it is just a function

* Implements a boolean comparison between the actual value and
the expected value.

expect(/*Actual value*/calculator.total)
  .toBe(/*expected value*/5);

  -> boolean comparison -> true / false
  -> actual value with the expected value
  (calculator.total === 5) -> true / false

* A matcher is responsible for reporting to jasmine if the
expectation is true or false. -> passing or failing spec.
```

Jasmine Matchers

MATCHER	PURPOSE
toBe()	passed if the actual value is of the same type and value as that of the expected value. It compares with === operator
toEqual()	works for simple literals and variables; should work for objects too
toMatch()	to check whether a value matches a string or a regular expression
toBeDefined()	to ensure that a property or a value is defined
toBeUndefined()	to ensure that a property or a value is undefined

Jasmine Matchers

toBeNull()	to ensure that a property or a value is null.
toBeTruthy()	to ensure that a property or a value is true
ToBeFalsy()	to ensure that a property or a value is false
toContain()	to check whether a string or array contains a substring or an item.
toBeLessThan()	for mathematical comparisons of less than
toBeGreaterThan()	for mathematical comparisons of greater than
toBeCloseTo()	for precision math comparison
toThrow()	for testing if a function throws an exception
toThrowError()	for testing a *specific* thrown exception

calculator.spec.js

```
  it('should divide total by number', function() {
    const calculator = new Calculator();
    calculator.total = 200;
    calculator.divide(2);

    expect(calculator.total).toBe(100);
  });

  // toBe

  it('should initialize the total', function() {
    const calculator = new Calculator();

    expect(calculator.total).toBe(0);
  });
});
```

```
Deep equality comparison:

* Equal keys and Equal values

{ someKey: 'some value', ... }
{ someKey: 'some value'  ... }

=> true
```

```
    expect(calculator.total).toBe(100);
  });

  it('should initialize the total', function() {
    const calculator = new Calculator();

    expect(calculator.total).toBe(0);
  });

  it('has constructor', function() {
    const calculator = new Calculator();
    const calculator2 = new Calculator();

    expect(calculator).toEqual(calculator2);
  });
});
```

Disable Suites and Specs

```
1  Disabled spec: A spec that will report as pending
2  and will not be executed.
3
4  2 Common cases!
5
6  1. Changes in the code.
7  2. TDD -> Test driven development.
```

Jasmine matchers

- toBe():

Expects the actual value to be equal (===) to the expected value.

- toEqual():

Similar to the toBe method but it uses deep equality comparison.

- toBeFalsy():

Expects the actual value to be falsy.

```
describe('test.js', function() {
   it('is true', function() {
      expect(true).toBe(true);
   });

   it('has same keys and values', function() {
      expect(obj1).toEqual(obj2);
   });

   it('is falsy', function() {
      expect(0).toBeFalsy();
   });
});
```

Jasmine matchers

- toBeTruthy():

Expects the actual value to be truthy.

- toBeNull():

Expects the actual value to be null.

- toBeDefined():

Expects the actual value to be defined.

```
describe('test.js', function() {
        it('is truthy', function() {
                expect({}).toBeTruthy();
        });

        it('is null', function() {
                expect(result).toBeNull();
        });

        it('is defined', function() {
                expect(result).toBeDefined();
        });
});
```

Jasmine matchers

- toThrow():

Expects a function to throw something.

- toThrowError():

Expects a function to throw an error.

- toMatch():

Expects the actual value to match a regular expression.

```
describe('test.js', function() {
        it('throws', function() {
                const err = function(message) {
                        throw new Error(message);
                };
                expect(err).toThrow();
        });

        it('throws an error', function() {
                const err = function(message) {
                        throw new Error();
                };
                expect(err).toThrowError();
        });

        it('matches regex', function() {
                const STR = 'my string';
                expect(STR).toMatch(/string$/);
        });
});
```

Jasmine functions

- Disabled suite (xdescribe):

Any specs inside the disabled suite are skipped.

- Pending spec (xit):

A pending spec does not run, but it will show up in the results as pending.

```
xdescribe('test.js', function() {
      xit('Should be true', () => {
            expect(true).toBe(true)
      });
});
```

Disable Suites and Specs

- //disable suite
- xdescribe("MathUtils", function() {
-
- });
- describe("MathUtils", function() {
- 	//Spec for sum operation
- //disable spec
- 	xit("should be able to calculate the sum of two numbers", function() {
- 		expect(10).toBeSumOf(7, 3);
- 	});
- });

Working with Jasmine Spies

- Jasmine has test double functions called spies.
- A spy can stub any function and tracks calls to it and all arguments.
- A spy only exists in the describe or it block in which it is defined, and will be removed after each spec.
- To create a spy on any method, use spyOn(object, 'methodName') call.
- There are two matchers toHaveBeenCalled and toHaveBeenCalledWith which should be used with spies.

Working with Jasmine Spies

- toHaveBeenCalled matcher will return true if the spy was called; and toHaveBeenCalledWith matcher will return true if the argument list matches any of the recorded calls to the spy.

Working with Jasmine Spies

TRACKING PROPERTY	PURPOSE
.calls.any()	returns false if the spy has not been called at all, and then true once at least one call happens.
.calls.count()	returns the number of times the spy was called
.calls.argsFor(index)	returns the arguments passed to call number index
.calls.allArgs()	returns the arguments to all calls
.calls.all()	returns the context (the this) and arguments passed all calls
.calls.mostRecent()	returns the context (the this) and arguments for the most recent call
.calls.first()	returns the context (the this) and arguments for the first call
.calls.reset()	clears all tracking for a spy

Organizing your specs

- beforeAll():

Runs **once** before all of the specs in the describe are run.

- afterAll():

Runs **once** after all of the specs in the describe are run.

```
describe('test.js', function() {
   beforeAll(function() {
        this.boolean = true;
   });

   afterAll(function() {
        this.boolean = false;
   });

   describe('someMethod()', function() {
      it('is true', function() {
         expect(this.boolean).toBe(true);
      });
   })
});
```

Jasmine organizing your specs

- beforeEach():

Runs before each of the specs in the describe in which it is called.

- afterEach():

Runs after each of the specs in the describe in which it is called.

```
describe('test.js', function() {
  describe('someMethod()', function() {
      beforeEach(function() {
        this.boolean = true;
      });

      afterEach(function() {
        this.boolean = false;
      });

      it('is true', function() {
        expect(this.boolean).toBe(true);
      });
  })
});
```

Angular Test bed

- . The TestBed creates a dynamically-constructed Angular test module that emulates an Angular @NgModule
- The TestBed.configureTestingModule() method takes a metadata object that can have most of the properties of an @NgModule.

ComponentFixture

- The ComponentFixture is a test harness for interacting with the created component and its corresponding element.
- Access the component instance through the fixture and confirm it exists with a Jasmine expectation:

- content_copy
- const component = fixture.componentInstance;
- expect(component).toBeDefined();

Properties	Description
componentInstance	The instance of the component class created by TestBed.createComponent.
debugElement	The DebugElement associated with the root element of the component. The debugElement provides insight into the component and its DOM element during test and debugging. It's a critical property for testers. The most interesting members are covered below.
nativeElement	The native DOM element at the root of the component.
changeDetectorRef	The ChangeDetectorRef for the component. The ChangeDetectorRef is most valuable when testing a component that has the ChangeDetectionStrategy.OnPush method or the component's change detection is under your programmatic control.

Methods	Description
detectChanges	Trigger a change detection cycle for the component. Call it to initialize the component (it calls ngOnInit) and after your test code, change the component's data bound property values. Angular can't see that you've changed personComponent.name and won't update the name binding until you call detectChanges. Runs checkNoChanges afterwards to confirm that there are no circular updates unless called as detectChanges(false);
autoDetectChanges	Set this to true when you want the fixture to detect changes automatically. When autodetect is true, the test fixture calls detectChanges immediately after creating the component. Then it listens for pertinent zone events and calls detectChanges accordingly. When your test code modifies component property values directly, you probably still have to call fixture.detectChanges to trigger data binding updates. The default is false. Testers who prefer fine control over test behavior tend to keep it false.
checkNoChanges	Do a change detection run to make sure there are no pending changes. Throws an exceptions if there are.
isStable	If the fixture is currently *stable*, returns true. If there are async tasks that have not completed, returns false.
whenStable	Returns a promise that resolves when the fixture is stable. To resume testing after completion of asynchronous activity or asynchronous change detection, hook that promise. See above.
destroy	Trigger component destruction.

Code Coverage

- Ng test –code-coverage

Fragile Test

- Expect(result).tocontain(expectedvalue)

TestBed with Services

- let service: ValueService;

- beforeEach(() => {
- TestBed.configureTestingModule({ providers: [ValueService] });
- });

TestBed with Services

- beforeEach(() => {
- TestBed.configureTestingModule({ providers: [ValueService] });
- service = TestBed.get(ValueService);
- });

Spec Parallel Execution

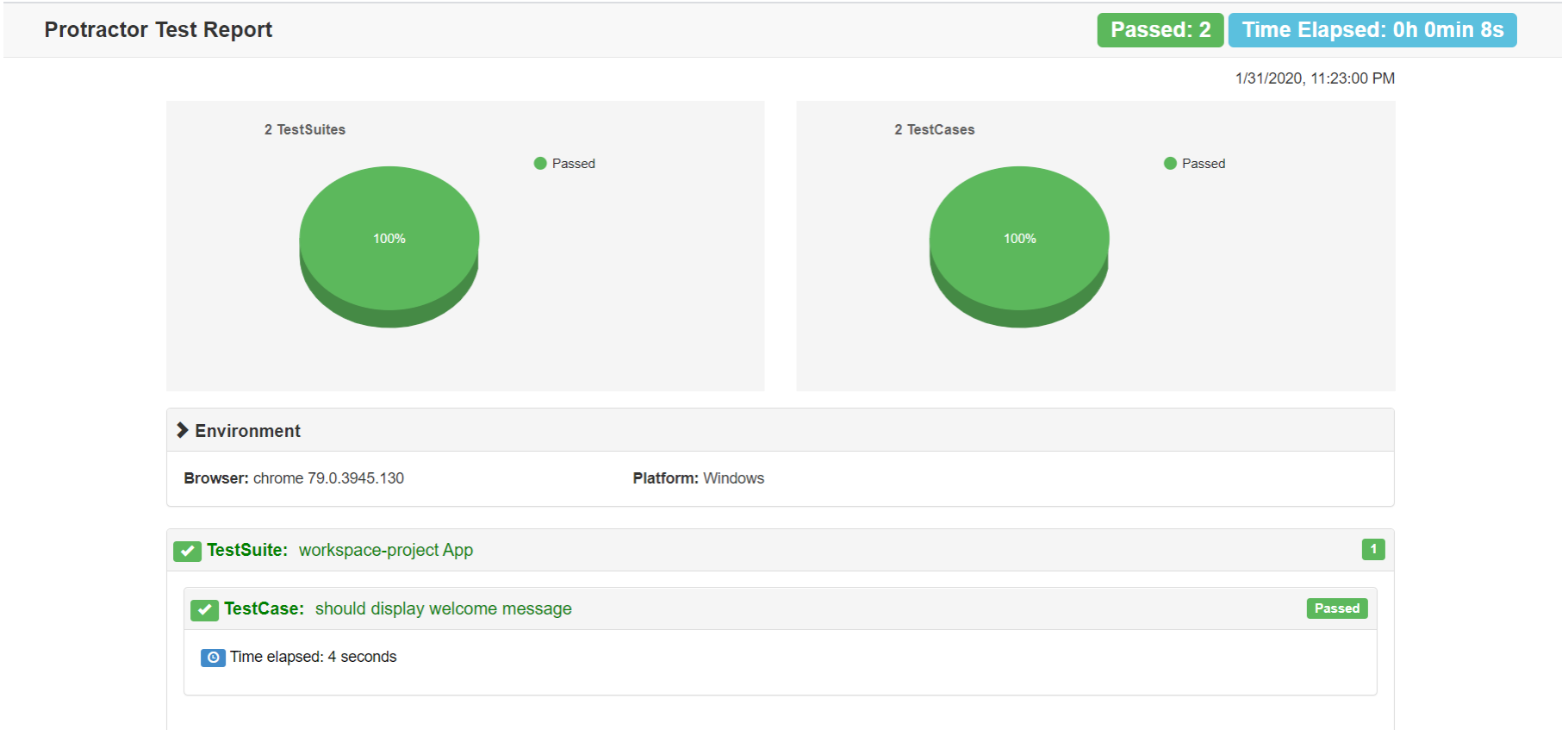
- capabilities: {
- browserName: 'chrome',
- 'shardTestFiles': true,
- 'maxInstances': 2
- },
-

Spec Parallel Execution

Administrator: Node.js command prompt

```
F:\aspireangular2020\mvpapp>ng e2e --devServerTarget="" --webdriver-update=false --host=localhost --port=5000

[02:24:32] I/launcher - Running 2 instances of WebDriver

DevTools listening on ws://127.0.0.1:58793/devtools/browser/7acf24ec-3414-40e7-839a-a4be87776ee7

DevTools listening on ws://127.0.0.1:58799/devtools/browser/20d8948c-689d-43df-a96b-61bcc1d7e35a
.[02:25:20] I/testLogger -
----------------------------------

[02:25:20] I/testLogger - [chrome #01-0] PID: 25644
[chrome #01-0] Specs: F:\aspireangular2020\mvpapp\e2e\src\app.e2e-spec.ts
[chrome #01-0]
[chrome #01-0] [02:24:33] I/direct - Using ChromeDriver directly...
[chrome #01-0] Jasmine started
[chrome #01-0] Jasmine started
[chrome #01-0] {
[chrome #01-0]   baseUrl: 'http://localhost:5000',
[chrome #01-0]   default: { baseUrl: 'http://localhost:5000' }
[chrome #01-0] }
[chrome #01-0]
[chrome #01-0]   workspace-project App
[chrome #01-0]     √ should display welcome message
[chrome #01-0]
[chrome #01-0]   workspace-project App
[chrome #01-0]     √ should display welcome message
[chrome #01-0]
```

HTML Report


Protractor Test Report
Passed: 2
Time Elapsed: 0h 0min 8s
1/31/2020, 11:23:00 PM
2 TestSuites
Passed
100%
2 TestCases
Passed
100%
Environment
Browser: chrome 79.0.3945.130
Platform: Windows
TestSuite: workspace-project App
1
TestCase: should display welcome message
Passed
Time elapsed: 4 seconds

Skip current project deployment with ng e2e

ng e2e --devServerTarget="" --webdriver-update=false --host=localhost --port=5000

```
F:\aspireangular2020\mvpapp>ng e2e --devServerTarget="" --webdriver-update=false --host=localhost --port=5000
[20:57:17] I/launcher - Running 1 instances of WebDriver
[20:57:18] I/direct - Using ChromeDriver directly...

DevTools listening on ws://127.0.0.1:50559/devtools/browser/d8c00351-5d76-4941-a046-45e67fc910d8
Jasmine started
{
  baseUrl: 'http://localhost:5000',
  default: { baseUrl: 'http://localhost:5000' }
}

  workspace-project App
    √ should display welcome message

  workspace-project App
    √ it should navigate after successful login

Executed 2 of 2 specs SUCCESS in 12 secs.
[20:58:40] I/launcher - 0 instance(s) of WebDriver still running
[20:58:40] I/launcher - chrome #01 passed

F:\aspireangular2020\mvpapp>
```

Apollo Client

- npm install --save apollo-angular \
- apollo-angular-link-http \
- apollo-link \
- apollo-client \
- apollo-cache-inmemory \
- graphql-tag \
- graphql

Questions