Angular

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Angular Introduction

- Framework to build client side applications

- Used to develop SPAs (Single Page Applications)

- Modular approach

- Re-usable code (components)

- Quick and easier development

- Unit testable and easily maintainable

Angular History

- 2010 – AngularJS

- 2016 – Angular 2

- 2016 Dec – Angular 4

- 2017 Nov – Angular 5

- 2018 May – Angular 6

Development Environment

- Node

- NPM (installed as part of Node)

- Angular CLI

- IDE (Visual Studio Code/Atom/Sublime)

Checking Versions

- node –v

- npm –v

- ng -v

Angular CLI

- npm install –g @angular/cli

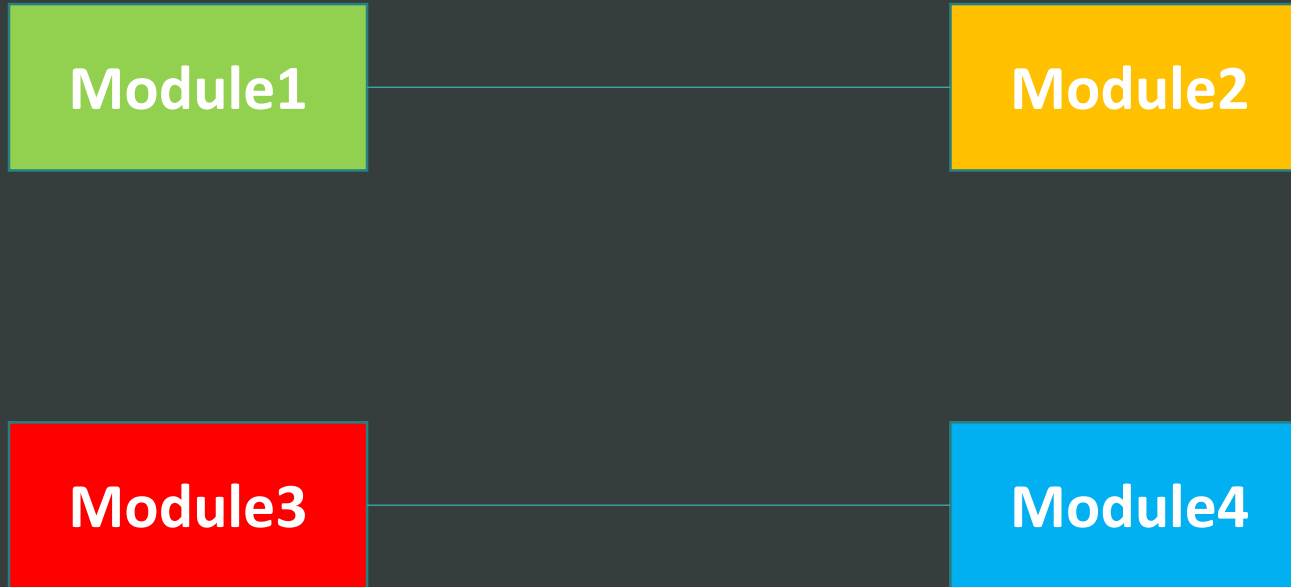- ng new my-app

- cd my-app

- ng serve

Architecture

- Modules
  - User, Admin
  - Root Module – App Module

Architecture

- Components
  - Part of modules
  - HTML & CSS (view) + Class (logic)
  - Components for different views
  - Navbar, sidebar, main content
  - Root component – App component

Modules

Modules

Component

Services

Services

- *Service* is a broad category encompassing
  any value,
  function, or
  feature
that your <u>application needs</u>
- Examples include:
  logging service
  data service
  message bus
  tax calculator
  application configuration

Dependency Injection

- *Dependency injection* is a way to supply a new instance of a class with the fully-formed dependencies it requires

- Most dependencies are services

- Angular uses dependency injection to provide new components with the services they need.

Dependency Injection
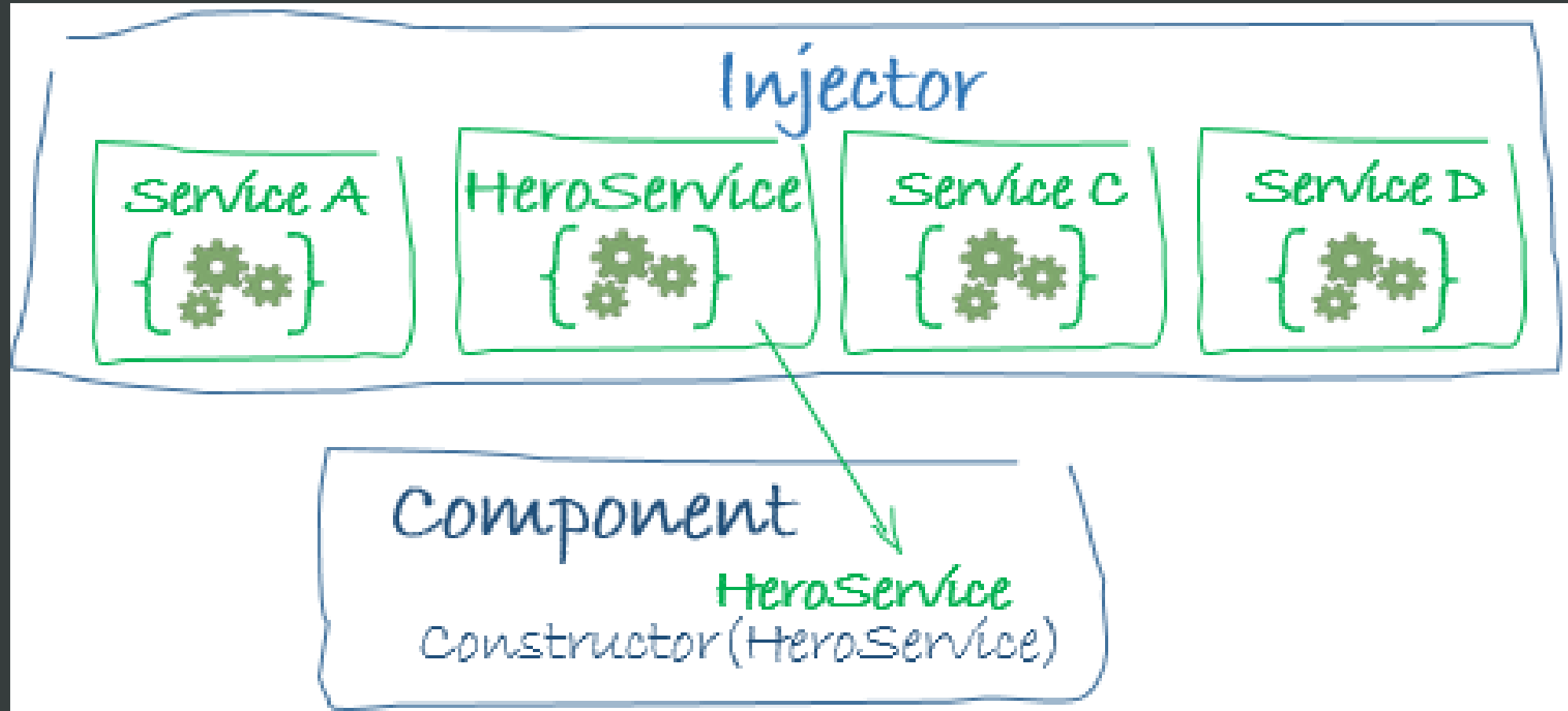
Client Code Without Dependency Injection

```java
public class Client {
        private ExampleService service;

        Client() {
                service = new ExampleService();
        }

        public String greet() {
                return service.getName();
        }
}
```

Interface Declaration

```
interface IService
{
        String doServe();
}
class ExampleService implements IService
{
        public String doServe() {
                return "What can I do for you?";
        }
}
```

Client Code With Dependency Injection

```
class Client {
        private IService serv;

        Client(IService serv) {
                this.serv = serv;
        }

        public String greet() {
                return serv.doServe();
        }
}
```

Injector Code

```java
public class Injector {
        public static void main(String[] args) {
                IService service = new ExampleService();

                Client client = new Client(service);

                System.out.println(client.greet());
        }
}
```
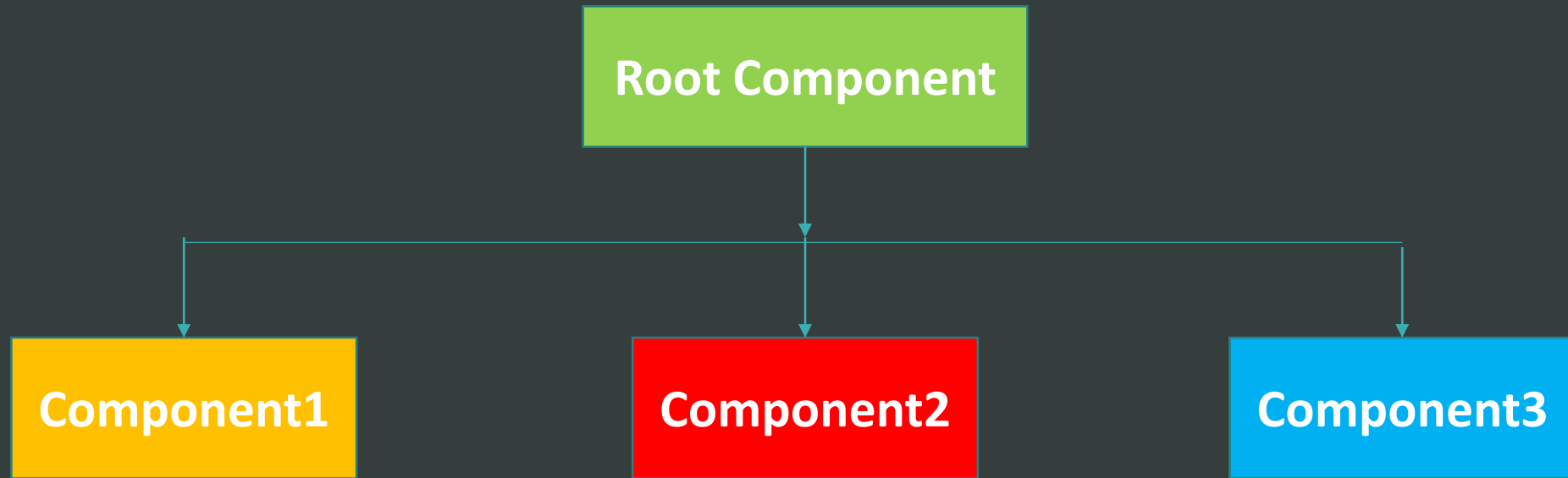
Architecture Summary

- Angular app – one or more modules

- Modules – one or more components and services

- Components – HTML + Class

- Services – Business logic

- Modules render the view in the browser

Angular Project Files

Filename	Description
main.ts	Entry point to the Angular app (renders AppModule which is root module)
package.json	All the metadata for the project and all the dependencies (project dependency + developer dependency)
node_modules	Installed modules in the project
app.module.ts	Root module of the application
app.component.ts	Root component of the application
app.component.html	View for app component

Angular Project Files

Filename	Description
app.component.css	Styles for app component
tsconfig.app.json	TypeScript configuration file
index.html	Home page
pollyfills.ts	Scripts to support different browsers
tslint.json	Configuration for tslint (linting i.e. grammar checking in editor)

NgModule

- Modules are a great way to organize an application and extend it with capabilities from external libraries

- Angular libraries are NgModules, such as FormsModule, HttpClientModule, and RouterModule

- Many third-party libraries are available as NgModules such as Material Design, Ionic, and AngularFire2

NgModule

- NgModules consolidate components, directives, and pipes into cohesive blocks of functionality, each focused on a feature area, application business domain, workflow, or common collection of utilities

- Modules can add services to the application (Such services might be internally developed or come from outside sources, such as the Angular router and HTTP client)

- Modules can be loaded eagerly when the application starts or lazy loaded asynchronously by the router

NgModule Metadata

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

NgModule Metadata

- **Declares** which components, directives, and pipes belong to the module

- Makes some of those components, directives, and pipes public (**exports modules**) so that other module's component templates can use them

- **Imports** other **modules** with the components, directives, and pipes that components in the current module need

- **Provides** **services** that the other application components can use

NgModule Class Vs. JavaScript Modules

1. An NgModule bounds declarable classes only. Declarables are the only classes that matter to the Angular compiler.

2. Instead of defining all member classes in one giant file as in a JavaScript module, you list the module's classes in the @NgModule.declarations list.

NgModule Class Vs. JavaScript Modules

3. An NgModule can only export the declarable classes it owns or imports from other modules. It doesn't declare or export any other kind of class.

4. Unlike JavaScript modules, an NgModule can extend the entire application with services by adding providers to the @NgModule.providers list.

Component

Template	Class	Metadata

View
in
HTML

Code
in
TypeScript

Information
as
Decorator

main.ts

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

if (environment.production) {
        enableProdMode();
}
platformBrowserDynamic().bootstrapModule(AppModule).catch(err =>
console.log(err));
```

index.html

```html
<!doctype html>
<html lang="en">
<head>
        <meta charset="utf-8">
        <title>FirstApp</title>
        <base href="/">  <meta name="viewport" content="width=device-width, initial-scale=1">
        <link rel="icon" type="image/x-icon" href="favicon.ico">
</head>
<body>
        <app-root></app-root>
</body>
</html>
```

app.module.ts

```typescript
import { BrowserModule } from '@angular/platform-browser';
import { NgModule }      from '@angular/core';
import { AppComponent } from './app.component';

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

export class AppModule { }
```

app.component.ts

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

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

export class AppComponent {
        title = 'My first Angular application';
}
```

```html
<div style="text-align:center">
    <h1>
        Welcome to {{ title }}.
    </h1>
</div>
```

Build and Deploy the App (ng serve)

Component Creation

- ng g c test

g – generate

c – component

test – component name

Component Decorator (Template)

test.component.ts

```
@Component({

    selector: 'app-test',

    template: "<div> This is an inline template",

    styleUrls: ['./test.component.css']

})
```

Component Template

test.component.ts

```
@Component ({

    selector: 'app-test',

    template: `<div>

            This is a test component

        </div>`,

    styleUrls: ['./test.component.css']

})
```

Backtick character

Component Selector (element)

test.component.ts

```
@Component ({

    selector: 'app-test',

    template: `<div>

                This is a test component

    </div>`,

    styleUrls: ['./test.component.css']

})
```

app.component.html

```html
<div style="text-align:center">

<h1>

    Welcome to {{ title }}!

</h1>

<app-test></app-test>

</div>
```

Component Selector (class)

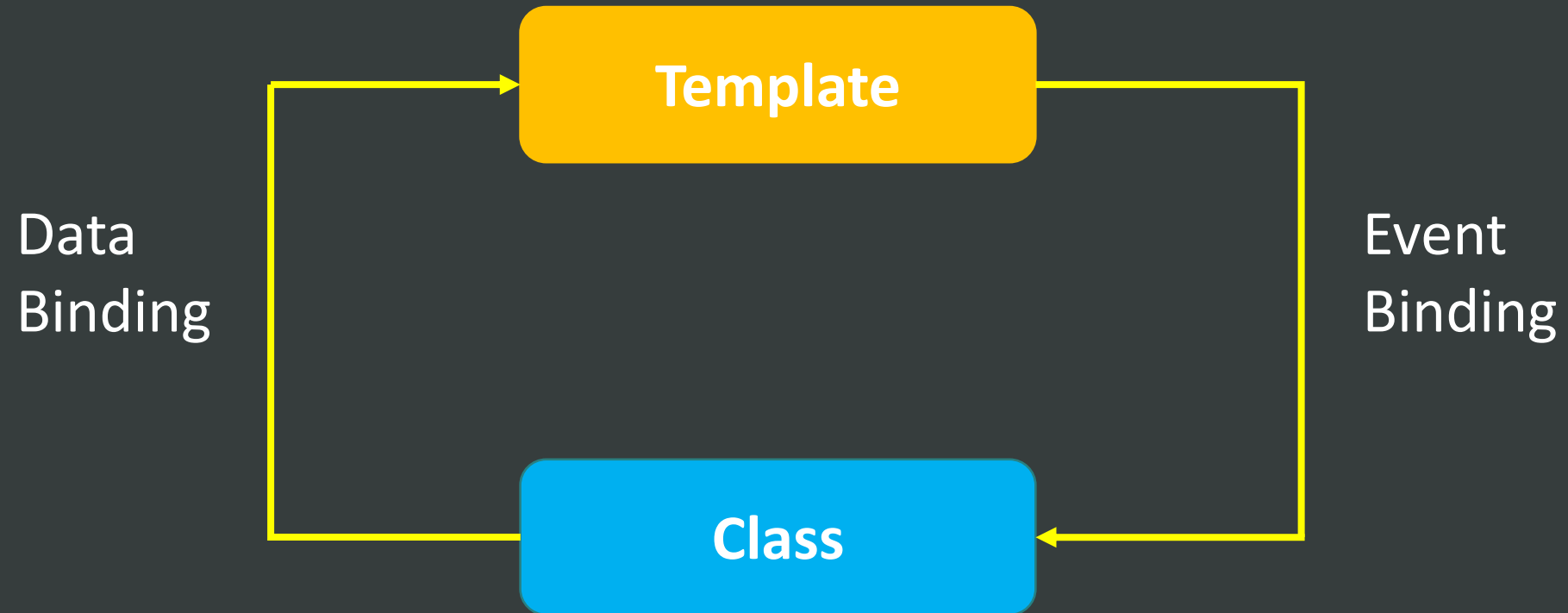test.component.ts

```
@Component ({

    selector: '.app-test',

    template: `<div>

                    This is a test component

        </div>`,

    styleUrls: ['./test.component.css']

})
```

app.component.html

```html
<div style="text-align:center">
        <h1>        Welcome to {{ title }}!</h1>
        <div class="app-test">
        </div>
</div>
```

Component Selector (attribute)

test.component.ts

```
@Component ({
    selector: '[app-test]',
    template: `<div>
                This is a test component
            </div>`,
    styleUrls: ['./test.component.css']
})
```

```html
<div style="text-align:center">

    <h1>        Welcome to {{ title }}!</h1>

    <div app-test>

    </div>
</div>
```

Interpolation ({{ ... }})

```
export class TestComponent implements OnInit {

        public name: string = "PMJ"

        constructor() { }

        ngOnInit() {}

        public sayHello():string {

                return "Hello"

        }

}
```

Interpolation

test.component.ts

```
@Component ({

        selector: 'app-test',

        template: `<h2>

{{name.length}}{{ sayHello() }} {{ name }} {{ 1+1 }}

{{ "a = 2 + 2 assignment will not work in interpolation"}}

{{ "window.location.href will not work. Can be used in class method"}}

                                </h2>`,

        styleUrls: ['./test.component.css']

})
```

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

HTML Attribute Vs. DOM Property

- **Attributes** are defined by **HTML**

- **Properties** are defined by the **DOM** (Document Object Model)

- A few HTML attributes have **1:1 mapping** to properties. **id** is one example.

- Some HTML attributes don't have corresponding properties. **colspan** is one example.

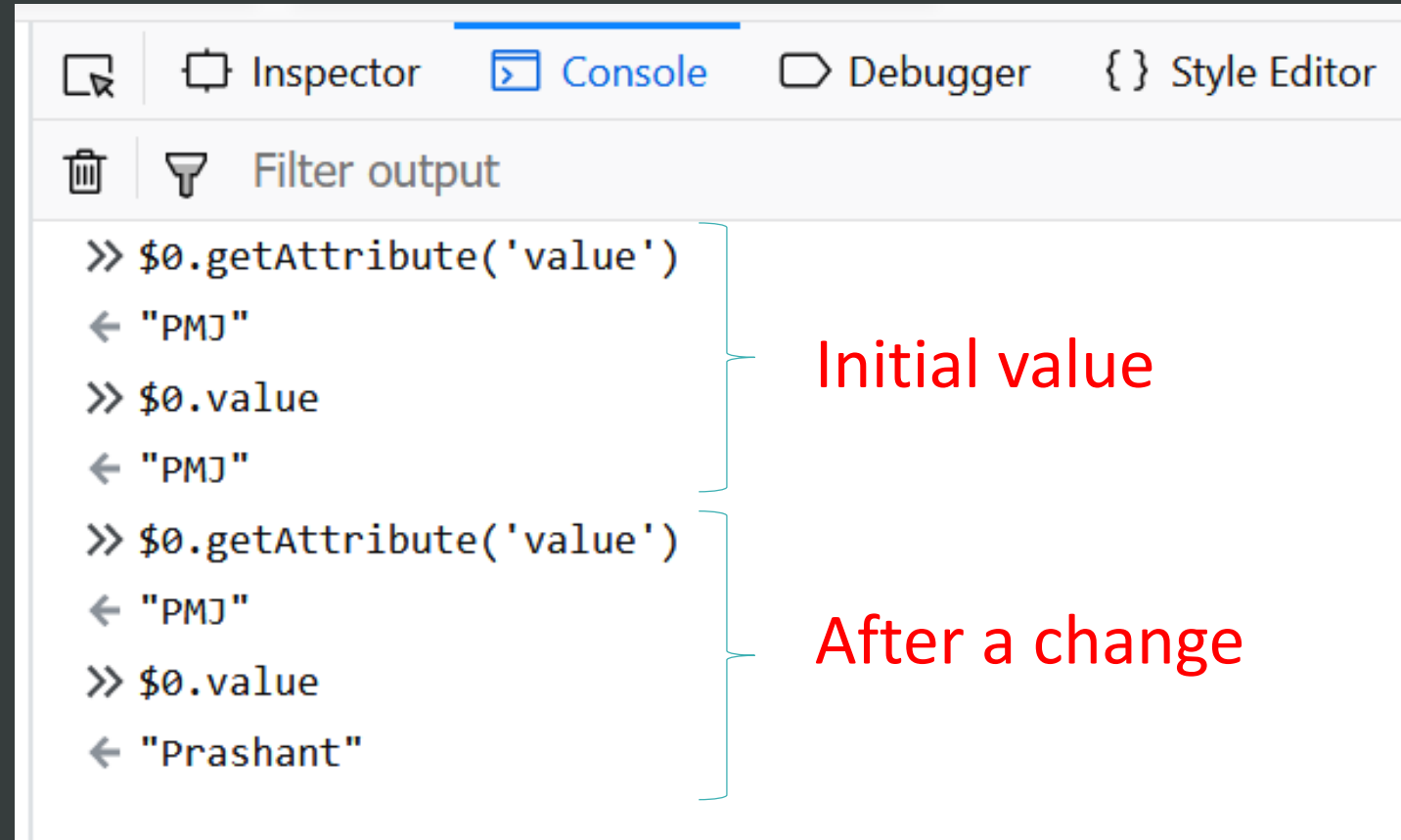- Some DOM properties don't have corresponding attributes. **textContent** is one example.

HTML Attribute Vs. DOM Property

- Attributes initializes the DOM properties

- Attribute values cannot change once they are initialized

- Property values however can change

HTML Attribute Vs. DOM Property

Property Binding

test.component.ts

```
@Component ({

    selector: 'app-test',

    template: `<div [id]="myId" >Some text </div>

                <div id={{myId}} >Some text </div>`,

    styles: [`

#testId { font-size: 20px;    color: red;    padding: 20px; }

    `]

})
```

Property Binding

test.component.ts

```
export class TestComponent implements OnInit {

    public myId: string = "testId"

    constructor() { }

    ngOnInit() {      }

}
```

Property Binding

- Property binding works with string only

- It will not work if the property is of other type, say Boolean

e.g.

           `<input disabled type="text" value="PMJ">`

- We cannot write disabled="false"

- So using property binding method, we write:

`<input [disableed]="isDisabled" type="text" value="PMJ">`

`<input bind-disabled="isDisabled" type="text" value="PMJ">`

Class Binding

```
template: `   <h2 class="success">DDU</h2>

         <h2 [class]="resClass">DDU</h2>

         <h2 [class.failure]="hasError">DDU</h2>

         <h2 [ngClass]="textClasses">DDU</h2>            `,
styles: [`      .success {   color: green;      }

         .failure {   color : red;      }

         .special {   font-style : italic;      }              `]
```

Class Binding

```
export class TestComponent implements OnInit {

    public resClass:string = "success"

    public hasError:boolean = true;

    public isSpecial : boolean = true;

    public textClasses = {

            success : !this.hasError,

            failure : this.hasError,

            special : this.isSpecial

    }
        …
}
```

Style Binding

```
template: `

<h2 [style.color]="'blue'">Style Binding 1</h2>

<h2 [style.color]="hasError ? 'red' : 'blue'">Style Binding 2</h2>

<h2 [style.color]="highlightColor">Style Binding 3</h2>

<h2 [ngStyle]="titleStyles">Style Binding 4</h2>

`
```

Style Binding

```
export class TestComponent implements OnInit {

    public hasError:boolean = true

    public highlightColor : string = "yellow"

    public titleStyles = {

        color : "gray",

        fontStyle : "italic"

    }

    ...

}
```

Event Binding ((event))

template:

"<button (click) = "onSave()">Save</button>"

OR

"<button on-click = "onSave()">Save</button>"

Canonical Form

OR

"<button on-click = "onSave($event)">Save</button>"

Event Binding ((event))

template:

"<button (click) = "name = 'pmj'">Save</button>"

Event Binding ((event))

```
export class TestComponent implements OnInit {

        ...

        public onSave(event):void {

                console.log(event)

                console.log(event.type)

                console.log(event.target)

        }

        ...

}
```

Template Reference Variable

template: `

      `<input #myId type="text">`

      `<button (click)="logName(myId)">`

         Log Element

      `</button>`

      `<button (click)="logName(myId.value)">`

         Log Value

      `</button>`

   `

Template Reference Variable

```
export class TestComponent implements OnInit {

    ...

    public logName(value):void {

        console.log(value)

    }

    ...

}
```

References

- https://angular.io/docs

- https://www.tutorialspoint.com/angular4/