### What is Angular Framework?

Angular is a **TypeScript-based open-source** front-end platform that makes it easy to build applications with in web/mobile/desktop. The major features of this framework include declarative templates, dependency injection, end to end tooling, and many more other features are used to ease the development.

### What is the difference between AngularJS and Angular?

| **AngularJS** | **Angular** |
| --- | --- |
| It is based on MVC architecture | This is based on Service/Controller |
| This uses use JavaScript to build the application | Introduced the typescript to write the application |
| Based on controllers concept | This is a component based UI approach |
| Not a mobile friendly framework | Developed considering mobile platform |
| Difficulty in SEO friendly application development | Ease to create SEO friendly applications |

### What are the key components of Angular?

Angular has the below key components,

* 1. **Component:** These are the basic building blocks of angular application to control HTML views.
  2. **Modules:** An angular module is set of angular basic building blocks like component, directives, services etc. An application is divided into logical pieces and each piece of code is called as "module" which perform a single task.
  3. **Templates:** This represent the views of an Angular application.
  4. **Services:** It is used to create components which can be shared across the entire application.
  5. **Metadata:** This can be used to add more data to an Angular class.

### What are directives?

* Directives enhance the power of HTML elements.
* add behaviour to an existing DOM element or an existing component instance.

### What are components?

Components are the most basic UI building block of an Angular app which forms a tree of Angular components.

components always have a template and only one component can be instantiated per an element in a template. Let's see a simple example of Angular component

### What are the differences between Component and Directive?

In a short note, A component(@component) is a directive-with-a-template.

Some of the major differences are mentioned in a tabular form

| **Component** | **Directive** |
| --- | --- |
| To register a component we use @Component meta-data annotation | To register directives we use @Directive meta-data annotation |
| Components are typically used to create UI widgets | Directive is used to add behavior to an existing DOM element |
| Component is used to break up the application into smaller components | Directive is use to design re-usable components |
| Only one component can be present per DOM element | Many directives can be used per DOM element |
| @View decorator or templateurl/template are mandatory | Directive doesn't use View |

### What is a template?

A template is a HTML view where you can display data by binding controls to properties of an Angular component. You can store your component's template in one of two places. You can define it inline using the template property, or you can define the template in a separate HTML file and link to it in the component metadata using the @Component decorator's templateUrl property. **Using inline template with template syntax,**

### What is a module?

Modules are logical boundaries in your application and the application is divided into separate modules to separate the functionality of your application.

import { NgModule } from '@angular/core';

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

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

@NgModule ({

imports: [ BrowserModule ],

declarations: [ AppComponent ],

bootstrap: [ AppComponent ]

})

export class AppModule { }

The NgModule decorator has three options

* 1. The imports option is used to import other dependent modules. The BrowserModule is required by default for any web based angular application
  2. The declarations option is used to define components in the respective module
  3. The bootstrap option tells Angular which Component to bootstrap in the application

### What is a data binding?

Data binding is a core concept in Angular and allows to define communication between a component and the DOM, making it very easy to define interactive applications without worrying about pushing and pulling data. There are four forms of data binding(divided as 3 categories) which differ in the way the data is flowing.

* 1. **From the Component to the DOM:** **Interpolation:** {{ value }}: Adds the value of a property from the component

<li>Name: {{ user.name }}</li>

<li>Address: {{ user.address }}</li>

**Property binding:** [property]=”value”: The value is passed from the component to the specified property or simple HTML attribute

<input type="email" [value]="user.email">

* 1. **From the DOM to the Component:** **Event binding: (event)=”function”:** When a specific DOM event happens (eg.: click, change, keyup), call the specified method in the component

<button (click)="logout()"></button>

* 1. **Two-way binding:** **Two-way data binding:** [(ngModel)]=”value”: Two-way data binding allows to have the data flow both ways. For example, in the below code snippet, both the email DOM input and component email property are in sync

<input type="email" [(ngModel)]="user.email">

### What is metadata?

Metadata is used to decorate a class so that it can configure the expected behavior of the class. The metadata is represented by decorators

* 1. **Class decorators**, e.g. @Component and @NgModule

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

@Component({

selector: 'my-component',

template: '<div>Class decorator</div>',

})

export class MyComponent {

constructor() {

console.log('Hey I am a component!');

}

}

@NgModule({

imports: [],

declarations: [],

})

export class MyModule {

constructor() {

console.log('Hey I am a module!');

}

}

* 1. **Property decorators** Used for properties inside classes, e.g. @Input and @Output

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

@Component({

selector: 'my-component',

template: '<div>Property decorator</div>'

})

export class MyComponent {

@Input()

title: string;

}

* 1. **Method decorators** Used for methods inside classes, e.g. @HostListener

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

@Component({

selector: 'my-component',

template: '<div>Method decorator</div>'

})

export class MyComponent {

@HostListener('click', ['$event'])

onHostClick(event: Event) {

// clicked, `event` available

}

}

* 1. **Parameter decorators** Used for parameters inside class constructors, e.g. @Inject

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

import { MyService } from './my-service';

@Component({

selector: 'my-component',

template: '<div>Parameter decorator</div>'

})

export class MyComponent {

constructor(@Inject(MyService) myService) {

console.log(myService); // MyService

}

}

### What is angular CLI?

Angular CLI(**Command Line Interface**) is a command line interface to scaffold and build angular apps using nodejs style (commonJs) modules. You need to install using below npm command,

npm install @angular/cli@latest

Below are the list of few commands, which will come handy while creating angular projects

* 1. **Creating New Project:** ng new
  2. **Generating Components, Directives & Services:** ng generate/g The different types of commands would be,
  3. ng generate class my-new-class: add a class to your application
  4. ng generate component my-new-component: add a component to your application
  5. ng generate directive my-new-directive: add a directive to your application
  6. ng generate enum my-new-enum: add an enum to your application
  7. ng generate module my-new-module: add a module to your application
  8. ng generate pipe my-new-pipe: add a pipe to your application
  9. ng generate service my-new-service: add a service to your application
  10. **Running the Project:** ng serve

### What is the difference between constructor and ngOnInit?

TypeScript classes has a default method called constructor which is normally used for the initialization purpose. Whereas ngOnInit method is specific to Angular, especially used to define Angular bindings. Even though constructor getting called first, it is preferred to move all of your Angular bindings to ngOnInit method. In order to use ngOnInit, you need to implement OnInit interface as below,

export class App implements OnInit{

constructor(){

//called first time before the ngOnInit()

}

ngOnInit(){

//called after the constructor and called after the first ngOnChanges()

}

}

### What are lifecycle hooks available?

Angular application goes through an entire set of processes or has a lifecycle right from its initiation to the end of the application. The representation of lifecycle in pictorial representation as follows,

The description of each lifecycle method is as below,

* 1. **ngOnChanges:** When the value of a data bound property changes, then this method is called.
  2. **ngOnInit:** This is called whenever the initialization of the directive/component after Angular first displays the data-bound properties happens.
  3. **ngDoCheck:** This is for the detection and to act on changes that Angular can't or won't detect on its own.
  4. **ngAfterContentInit:** This is called in response after Angular projects external content into the component's view.
  5. **ngAfterContentChecked:** This is called in response after Angular checks the content projected into the component.
  6. **ngAfterViewInit:** This is called in response after Angular initializes the component's views and child views.
  7. **ngAfterViewChecked:** This is called in response after Angular checks the component's views and child views.
  8. **ngOnDestroy:** This is the cleanup phase just before Angular destroys the directive/component.

### What is a service?

A service is used when a common functionality needs to be provided to various modules. Services allow for greater separation of concerns for your application and better modularity by allowing you to extract common functionality out of components. Let's create a repoService which can be used across components,

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

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

@Injectable({ // The Injectable decorator is required for dependency injection to work

// providedIn option registers the service with a specific NgModule

providedIn: 'root', // This declares the service with the root app (AppModule)

})

export class RepoService{

constructor(private http: Http){

}

fetchAll(){

return this.http.get('https://api.github.com/repositories');

}

}

The above service uses Http service as a dependency.

### What is dependency injection in Angular?

Dependency injection (DI), is an important application design pattern in which a class asks for dependencies from external sources rather than creating them itself. Angular comes with its own dependency injection framework for resolving dependencies( services or objects that a class needs to perform its function).So you can have your services depend on other services throughout your application.

### What is the purpose of async pipe?

The AsyncPipe subscribes to an observable or promise and returns the latest value it has emitted. When a new value is emitted, the pipe marks the component to be checked for changes. Let's take a time observable which continuously updates the view for every 2 seconds with the current time.

@Component({

selector: 'async-observable-pipe',

template: `<div><code>observable|async</code>:

Time: {{ time | async }}</div>`

})

export class AsyncObservablePipeComponent {

time = new Observable(observer =>

setInterval(() => observer.next(new Date().toString()), 2000)

);

}

### What is the option to choose between inline and external template file?

You can store your component's template in one of two places. You can define it inline using the **template** property, or you can define the template in a separate HTML file and link to it in the component metadata using the **@Component** decorator's **templateUrl** property. The choice between inline and separate HTML is a matter of taste, circumstances, and organization policy. But normally we use inline template for small portion of code and external template file for bigger views. By default, the Angular CLI generates components with a template file. But you can override that with the below command,

ng generate component hero -it

### What is the purpose of ngFor directive?

We use Angular ngFor directive in the template to display each item in the list. For example, here we iterate over list of users,

<li \*ngFor="let user of users">

{{ user }}

</li>

The user variable in the ngFor double-quoted instruction is a **template input variable**

### What is the purpose of ngIf directive?

Sometimes an app needs to display a view or a portion of a view only under specific circumstances. The Angular ngIf directive inserts or removes an element based on a truthy/falsy condition. Let's take an example to display a message if the user age is more than 18,

<p \*ngIf="user.age > 18">You are not eligible for student pass!</p>

**Note:** Angular isn't showing and hiding the message. It is adding and removing the paragraph element from the DOM. That improves performance, especially in the larger projects with many data bindings.

### What happens if you use script tag inside template?

Angular recognizes the value as unsafe and automatically sanitizes it, which removes the **<script>** tag but keeps safe content such as the text content of the <script> tag. This way it eliminates the risk of script injection attacks. If you still use it then it will be ignored and a warning appears in the browser console. Let's take an example of innerHtml property binding which causes XSS vulnerability,

export class InnerHtmlBindingComponent {

// For example, a user/attacker-controlled value from a URL.

htmlSnippet = 'Template <script>alert("0wned")</script> <b>Syntax</b>';

}

### What is interpolation?

Interpolation is a special syntax that Angular converts into property binding. It’s a convenient alternative to property binding. It is represented by double curly braces({{}}). The text between the braces is often the name of a component property. Angular replaces that name with the string value of the corresponding component property. Let's take an example,

<h3>

{{title}}

<img src="{{url}}" style="height:30px">

</h3>

In the example above, Angular evaluates the title and url properties and fills in the blanks, first displaying a bold application title and then a URL.

### What are template expressions?

A template expression produces a value similar to any Javascript expression. Angular executes the expression and assigns it to a property of a binding target; the target might be an HTML element, a component, or a directive. In the property binding, a template expression appears in quotes to the right of the = symbol as in [property]="expression". In interpolation syntax, the template expression is surrounded by double curly braces. For example, in the below interpolation, the template expression is {{username}},

<h3>{{username}}, welcome to Angular</h3>

The below javascript expressions are prohibited in template expression

* 1. assignments (=, +=, -=, ...)
  2. new
  3. chaining expressions with ; or ,
  4. increment and decrement operators (++ and --)

### What are template statements?

A template statement responds to an event raised by a binding target such as an element, component, or directive. The template statements appear in quotes to the right of the = symbol like **(event)="statement"**. Let's take an example of button click event's statement

<button (click)="editProfile()">Edit Profile</button>

In the above expression, editProfile is a template statement. The below JavaScript syntax expressions are not allowed.

* 1. new
  2. increment and decrement operators, ++ and --
  3. operator assignment, such as += and -=
  4. the bitwise operators | and &
  5. the template expression operators

### How do you categorize data binding types?

Binding types can be grouped into three categories distinguished by the direction of data flow. They are listed as below,

* 1. From the source-to-view
  2. From view-to-source
  3. View-to-source-to-view

The possible binding syntax can be tabularized as below,

| **Data direction** | **Syntax** | **Type** |
| --- | --- | --- |
| From the source-to-view(One-way) | 1. {{expression}} 2. [target]="expression" 3. bind-target="expression" | Interpolation, Property,  Attribute, Class, Style |
| From view-to-source(One-way) | 1. (target)="statement" 2. on-target="statement" | Event |
| View-to-source-to-view(Two-way) | 1. [(target)]="expression" 2. bindon-target="expression" | Two-way |

### What are pipes?

A pipe takes in data as input and transforms it to a desired output. For example, let us take a pipe to transform a component's birthday property into a human-friendly date using **date** pipe.

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

@Component({

selector: 'app-birthday',

template: `<p>Birthday is {{ birthday | date }}</p>`

})

export class BirthdayComponent {

birthday = new Date(1987, 6, 18); // June 18, 1987

}

### What is a parameterized pipe?

A pipe can accept any number of optional parameters to fine-tune its output. The parameterized pipe can be created by declaring the pipe name with a colon ( : ) and then the parameter value. If the pipe accepts multiple parameters, separate the values with colons. Let's take a birthday example with a particular format(dd/mm/yyyy):

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

@Component({

selector: 'app-birthday',

template: `<p>Birthday is {{ birthday | date:'dd/mm/yyyy'}}</p>` // 18/06/1987

})

export class BirthdayComponent {

birthday = new Date(1987, 6, 18);

}

**Note:** The parameter value can be any valid template expression, such as a string literal or a component property.

### How do you chain pipes?

You can chain pipes together in potentially useful combinations as per the needs. Let's take a birthday property which uses date pipe(along with parameter) and uppercase pipes as below

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

@Component({

selector: 'app-birthday',

template: `<p>Birthday is {{ birthday | date:'fullDate' | uppercase}} </p>` // THURSDAY, JUNE 18, 1987

})

export class BirthdayComponent {

birthday = new Date(1987, 6, 18);

}

### What is a custom pipe?

Apart from built-inn pipes, you can write your own custom pipe with the below key characteristics,

* 1. A pipe is a class decorated with pipe metadata **@Pipe** decorator, which you import from the core Angular library For example,

@Pipe({name: 'myCustomPipe'})

* 1. The pipe class implements the **PipeTransform** interface's transform method that accepts an input value followed by optional parameters and returns the transformed value. The structure of pipeTransform would be as below,

interface PipeTransform {

transform(value: any, ...args: any[]): any

}

* 1. The @Pipe decorator allows you to define the pipe name that you'll use within template expressions. It must be a valid JavaScript identifier.

template: `{{someInputValue | myCustomPipe: someOtherValue}}`

### Give an example of custom pipe?

You can create custom reusable pipes for the transformation of existing value. For example, let us create a custom pipe for finding file size based on an extension,

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

@Pipe({name: 'customFileSizePipe'})

export class FileSizePipe implements PipeTransform {

transform(size: number, extension: string = 'MB'): string {

return (size / (1024 \* 1024)).toFixed(2) + extension;

}

}

Now you can use the above pipe in template expression as below,

template: `

<h2>Find the size of a file</h2>

<p>Size: {{288966 | customFileSizePipe: 'GB'}}</p>

`

### What is the difference between pure and impure pipe?

A pure pipe is only called when Angular detects a change in the value or the parameters passed to a pipe. For example, any changes to a primitive input value (String, Number, Boolean, Symbol) or a changed object reference (Date, Array, Function, Object). An impure pipe is called for every change detection cycle no matter whether the value or parameters changes. i.e, An impure pipe is called often, as often as every keystroke or mouse-move.

### What is a bootstrapping module?

Every application has at least one Angular module, the root module that you bootstrap to launch the application is called as bootstrapping module. It is commonly known as AppModule. The default structure of AppModule generated by AngularCLI would be as follows,

/\* JavaScript imports \*/

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

import { NgModule } from '@angular/core';

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

import { HttpClientModule } from '@angular/common/http';

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

/\* the AppModule class with the @NgModule decorator \*/

@NgModule({

declarations: [

AppComponent

],

imports: [

BrowserModule,

FormsModule,

HttpClientModule

],

providers: [],

bootstrap: [AppComponent]

})

export class AppModule { }

### What are observables?

Observables are declarative which provide support for passing messages between publishers and subscribers in your application. They are mainly used for event handling, asynchronous programming, and handling multiple values. In this case, you define a function for publishing values, but it is not executed until a consumer subscribes to it. The subscribed consumer then receives notifications until the function completes, or until they unsubscribe.

### What is HttpClient and its benefits?

Most of the Front-end applications communicate with backend services over HTTP protocol using either XMLHttpRequest interface or the fetch() API. Angular provides a simplified client HTTP API known as **HttpClient** which is based on top of XMLHttpRequest interface. This client is avaialble from @angular/common/http package. You can import in your root module as below,

import { HttpClientModule } from '@angular/common/http';

The major advantages of HttpClient can be listed as below,

* 1. Contains testability features
  2. Provides typed request and response objects
  3. Intercept request and response
  4. Supports Observalbe APIs
  5. Supports streamlined error handling

### Explain on how to use HttpClient with an example?

Below are the steps need to be followed for the usage of HttpClient.

* 1. Import HttpClient into root module:

import { HttpClientModule } from '@angular/common/http';

@NgModule({

imports: [

BrowserModule,

// import HttpClientModule after BrowserModule.

HttpClientModule,

],

......

})

export class AppModule {}

* 1. Inject the HttpClient into the application: Let's create a userProfileService(userprofile.service.ts) as an example. It also defines get method of HttpClient

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

import { HttpClient } from '@angular/common/http';

const userProfileUrl: string = 'assets/data/profile.json';

@Injectable()

export class UserProfileService {

constructor(private http: HttpClient) { }

getUserProfile() {

return this.http.get(this.userProfileUrl);

}

}

* 1. Create a component for subscribing service: Let's create a component called UserProfileComponent(userprofile.component.ts) which inject UserProfileService and invokes the service method,

fetchUserProfile() {

this.userProfileService.getUserProfile()

.subscribe((data: User) => this.user = {

id: data['userId'],

name: data['firstName'],

city: data['city']

});

}

Since the above service method returns an Observable which needs to be subscribed in the component.

### How can you read full response?

The response body doesn't may not return full response data because sometimes servers also return special headers or status code which which are important for the application workflow. Inorder to get full response, you should use observe option from HttpClient,

getUserResponse(): Observable<HttpResponse<User>> {

return this.http.get<User>(

this.userUrl, { observe: 'response' });

}

Now HttpClient.get() method returns an Observable of typed HttpResponse rather than just the JSON data.

### How do you perform Error handling?

If the request fails on the server or failed to reach the server due to network issues then HttpClient will return an error object instead of a successful reponse. In this case, you need to handle in the component by passing error object as a second callback to subscribe() method. Let's see how it can be handled in the component with an example,

fetchUser() {

this.userService.getProfile()

.subscribe(

(data: User) => this.userProfile = { ...data }, // success path

error => this.error = error // error path

);

}

It is always a good idea to give the user some meaningful feedback instead of displaying the raw error object returned from HttpClient.

### What is RxJS?

RxJS is a library for composing asynchronous and callback-based code in a functional, reactive style using Observables. Many APIs such as HttpClient produce and consume RxJS Observables and also uses operators for processing observables. For example, you can import observables and operators for using HttpClient as below,

import { Observable, throwError } from 'rxjs';

import { catchError, retry } from 'rxjs/operators';

### What is subscribing?

An Observable instance begins publishing values only when someone subscribes to it. So you need to subscribe by calling the **subscribe()** method of the instance, passing an observer object to receive the notifications. Let's take an example of creating and subscribing to a simple observable, with an observer that logs the received message to the console.

Creates an observable sequence of 5 integers, starting from 1

const source = range(1, 5);

// Create observer object

const myObserver = {

next: x => console.log('Observer got a next value: ' + x),

error: err => console.error('Observer got an error: ' + err),

complete: () => console.log('Observer got a complete notification'),

};

// Execute with the observer object and Prints out each item

myObservable.subscribe(myObserver);

// => Observer got a next value: 1

// => Observer got a next value: 2

// => Observer got a next value: 3

// => Observer got a next value: 4

// => Observer got a next value: 5

// => Observer got a complete notification

### What is an observable?

An Observable is a unique Object similar to a Promise that can help manage async code. Observables are not part of the JavaScript language so we need to rely on a popular Observable library called RxJS. The observables are created using new keyword. Let see the simple example of observable,

import { Observable } from 'rxjs';

const observable = new Observable(observer => {

setTimeout(() => {

observer.next('Hello from a Observable!');

}, 2000);

});

### What is an observer?

Observer is an interface for a consumer of push-based notifications delivered by an Observable. It has below structure,

interface Observer<T> {

closed?: boolean;

next: (value: T) => void;

error: (err: any) => void;

complete: () => void;

}

A handler that implements the Observer interface for receiving observable notifications will be passed as a parameter for observable as below,

myObservable.subscribe(myObserver);

**Note:** If you don't supply a handler for a notification type, the observer ignores notifications of that type.

### 39. What is the difference between promise and observable?

Below are the list of differences between promise and observable,

| **Observable** | **Promise** |
| --- | --- |
| Declarative: Computation does not start until subscription so that they can be run whenever you need the result | Execute immediately on creation |
| Provide multiple values over time | Provide only one |
| Subscribe method is used for error handling which makes centralized and predictable error handling | Push errors to the child promises |
| Provides chaining and subscription to handle complex applications | Uses only .then() clause |

### 40. What is multicasting?

Multi-casting is the practice of broadcasting to a list of multiple subscribers in a single execution. Let's demonstrate the multi-casting feature,

var source = Rx.Observable.from([1, 2, 3]);

var subject = new Rx.Subject();

var multicasted = source.multicast(subject);

// These are, under the hood, `subject.subscribe({...})`:

multicasted.subscribe({

next: (v) => console.log('observerA: ' + v)

});

multicasted.subscribe({

next: (v) => console.log('observerB: ' + v)

});

// This is, under the hood, `s

### 41. How do you perform error handling in observables?

You can handle errors by specifying an **error callback** on the observer instead of relying on try/catch which are ineffective in asynchronous environment. For example, you can define error callback as below,

myObservable.subscribe({

next(num) { console.log('Next num: ' + num)},

error(err) { console.log('Received an errror: ' + err)}

});

### What are observable creation functions?

RxJS provides creation functions for the process of creating observables from things such as promises, events, timers and Ajax requests. Let us explain each of them with an example,

* 1. Create an observable from a promise

import { from } from 'rxjs'; // from function

const data = from(fetch('/api/endpoint')); //Created from Promise

data.subscribe({

next(response) { console.log(response); },

error(err) { console.error('Error: ' + err); },

complete() { console.log('Completed'); }

});

* 1. Create an observable that creates an AJAX request

import { ajax } from 'rxjs/ajax'; // ajax function

const apiData = ajax('/api/data'); // Created from AJAX request

// Subscribe to create the request

apiData.subscribe(res => console.log(res.status, res.response));

* 1. Create an observable from a counter

import { interval } from 'rxjs'; // interval function

const secondsCounter = interval(1000); // Created from Counter value

secondsCounter.subscribe(n =>

console.log(`Counter value: ${n}`));

* 1. Create an observable from an event

import { fromEvent } from 'rxjs';

const el = document.getElementById('custom-element');

const mouseMoves = fromEvent(el, 'mousemove');

const subscription = mouseMoves.subscribe((e: MouseEvent) => {

console.log(`Coordnitaes of mouse pointer: ${e.clientX} \* ${e.clientY}`);

});

### What are the various kinds of directives?

There are mainly three kinds of directives.

* 1. **Components** — These are directives with a template.
  2. **Structural directives** — These directives change the DOM layout by adding and removing DOM elements.
  3. **Attribute directives** — These directives change the appearance or behavior of an element, component, or another directive.

### Give an example for attribute directives?

Let's take simple highlighter behavior as a example directive for DOM element. You can create and apply the attribute directive using below steps,

* 1. Create HighlightDirective class with the file name src/app/highlight.directive.ts. In this file, we need to import **Directive** from core library to apply the metadata and **ElementRef** in the directive's constructor to inject a reference to the host DOM element ,

import { Directive, ElementRef } from '@angular/core';

@Directive({

selector: '[appHighlight]'

})

export class HighlightDirective {

constructor(el: ElementRef) {

el.nativeElement.style.backgroundColor = 'red';

}

}

* 1. Apply the attribute directive as an attribute to the host element(for example,

)

<p appHighlight>Highlight me!</p>

* 1. Run the application to see the highlight behavior on paragraph element

ng serve

### What is Angular Router?

Angular Router is a mechanism in which navigation happens from one view to the next as users perform application tasks. It borrows the concepts or model of browser's application navigation.

### What is the purpose of base href tag?

The routing application should add element to the index.html as the first child in the tag inorder to indicate how to compose navigation URLs. If app folder is the application root then you can set the href value as below

<base href="/">

### What are the router imports?

The Angular Router which represents a particular component view for a given URL is not part of Angular Core. It is available in library named @angular/router to import required router components. For example, we import them in app module as below,

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

### What is router outlet?

The RouterOutlet is a directive from the router library and it acts as a placeholder that marks the spot in the template where the router should display the components for that outlet. Router outlet is used like a component,

<router-outlet></router-outlet>

<!-- Routed components go here -->

### What are router links?

The RouterLink is a directive on the anchor tags give the router control over those elements. Since the navigation paths are fixed, you can assign string values to router-link directive as below,

<h1>Angular Router</h1>

<nav>

<a routerLink="/todosList" >List of todos</a>

<a routerLink="/completed" >Completed todos</a>

</nav>

<router-outlet></router-outlet>

### What are active router links?

RouterLinkActive is a directive that toggles css classes for active RouterLink bindings based on the current RouterState. i.e, the Router will add CSS classes when this link is active and and remove when the link is inactive. For example, you can add them to RouterLinks as below

<h1>Angular Router</h1>

<nav>

<a routerLink="/todosList" routerLinkActive="active">List of todos</a>

<a routerLink="/completed" routerLinkActive="active">Completed todos</a>

</nav>

<router-outlet></router-outlet>

### What is router state?

RouterState is a tree of activated routes. Every node in this tree knows about the "consumed" URL segments, the extracted parameters, and the resolved data. You can access the current RouterState from anywhere in the application using the Router service and the routerState property.

@Component({templateUrl:'template.html'})

class MyComponent {

constructor(router: Router) {

const state: RouterState = router.routerState;

const root: ActivatedRoute = state.root;

const child = root.firstChild;

const id: Observable<string> = child.params.map(p => p.id);

//...

}

}

### What are router events?

During each navigation, the Router emits navigation events through the Router.events property allowing you to track the lifecycle of the route. The sequence of router events is as below,

* 1. NavigationStart,
  2. RouteConfigLoadStart,
  3. RouteConfigLoadEnd,
  4. RoutesRecognized,
  5. GuardsCheckStart,
  6. ChildActivationStart,
  7. ActivationStart,
  8. GuardsCheckEnd,
  9. ResolveStart,
  10. ResolveEnd,
  11. ActivationEnd
  12. ChildActivationEnd
  13. NavigationEnd,
  14. NavigationCancel,
  15. NavigationError
  16. Scroll

### What is activated route?

ActivatedRoute contains the information about a route associated with a component loaded in an outlet. It can also be used to traverse the router state tree. The ActivatedRoute will be injected as a router service to access the information. In the below example, you can access route path and parameters,

@Component({...})

class MyComponent {

constructor(route: ActivatedRoute) {

const id: Observable<string> = route.params.pipe(map(p => p.id));

const url: Observable<string> = route.url.pipe(map(segments => segments.join('')));

// route.data includes both `data` and `resolve`

const user = route.data.pipe(map(d => d.user));

}

}

### How do you define routes?

A router must be configured with a list of route definitions. You configures the router with routes via the RouterModule.forRoot() method, and adds the result to the AppModule's imports array.

const appRoutes: Routes = [

{ path: 'todo/:id', component: TodoDetailComponent },

{

path: 'todos',

component: TodosListComponent,

data: { title: 'Todos List' }

},

{ path: '',

redirectTo: '/todos',

pathMatch: 'full'

},

{ path: '\*\*', component: PageNotFoundComponent }

];

@NgModule({

imports: [

RouterModule.forRoot(

appRoutes,

{ enableTracing: true } // <-- debugging purposes only

)

// other imports here

],

...

})

export class AppModule { }

### What is the purpose of Wildcard route?

If the URL doesn't match any predefined routes then it causes the router to throw an error and crash the app. In this case, you can use wildcard route. A wildcard route has a path consisting of two asterisks to match every URL. For example, you can define PageNotFoundComponent for wildcard route as below

{ path: '\*\*', component: PageNotFoundComponent }

### Do I need a Routing Module always?

No, the Routing Module is a design choice. You can skip routing Module (for example, AppRoutingModule) when the configuration is simple and merge the routing configuration directly into the companion module (for example, AppModule). But it is recommended when the configuration is complex and includes specialized guard and resolver services.

### What is Angular Universal?

Angular Universal is a server-side rendering module for Angular applications in various scenarios. This is a community driven project and available under @angular/platform-server package. Recently Angular Universal is integrated with Angular CLI.

### What are different types of compilation in Angular?

Angular offers two ways to compile your application,

* 1. Just-in-Time (JIT)
  2. Ahead-of-Time (AOT)

### What is JIT?

Just-in-Time (JIT) is a type of compilation that compiles your app in the browser at runtime. JIT compilation is the default when you run the ng build (build only) or ng serve (build and serve locally) CLI commands. i.e, the below commands used for JIT compilation,

ng build

ng serve

### What is AOT?

Ahead-of-Time (AOT) is a type of compilation that compiles your app at build time. For AOT compilation, include the --aot option with the ng build or ng serve command as below,

ng build --aot

ng serve --aot

**Note:** The ng build command with the --prod meta-flag (ng build --prod) compiles with AOT by default.

### Why do we need compilation process?

The Angular components and templates cannot be understood by the browser directly. Due to that Angular applications require a compilation process before they can run in a browser. For example, In AOT compilation, both Angular HTML and TypeScript code converted into efficient JavaScript code during the build phase before browser runs it.

### What are the advantages with AOT?

Below are the list of AOT benefits,

* 1. **Faster rendering:** The browser downloads a pre-compiled version of the application. So it can render the application immediately without compiling the app.
  2. **Fewer asynchronous requests:** It inlines external HTML templates and CSS style sheets within the application javascript which eliminates separate ajax requests.
  3. **Smaller Angular framework download size:** Doesn't require downloading the Angular compiler. Hence it dramatically reduces the application payload.
  4. **Detect template errors earlier:** Detects and reports template binding errors during the build step itself
  5. **Better security:** It compiles HTML templates and components into JavaScript. So there won't be any injection attacks.

### What are the ways to control AOT compilation?

You can control your app compilation in two ways

* 1. By providing template compiler options in the tsconfig.json file
  2. By configuring Angular metadata with decorators

### What are the restrictions of metadata?

In Angular, You must write metadata with the following general constraints,

* 1. Write expression syntax with in the supported range of javascript features
  2. The compiler can only reference symbols which are exported
  3. Only call the functions supported by the compiler
  4. Decorated and data-bound class members must be public.

### What are the two phases of AOT?

The AOT compiler works in three phases,

* 1. **Code Analysis:** The compiler records a representation of the source
  2. **Code generation:** It handles the interpretation as well as places restrictions on what it interprets.
  3. **Validation:** In this phase, the Angular template compiler uses the TypeScript compiler to validate the binding expressions in templates.

### Dependencies vs DevDependencies in package.json?

* **"dependencies"**: Packages required by your application in production.
* **"devDependencies"**: Packages that are only needed for local development and testing.

### What is type narrowing?

The expression used in an ngIf directive is used to narrow type unions in the Angular template compiler similar to if expression in typescript. So \*ngIf allows the typeScript compiler to infer that the data used in the binding expression will never be undefined.

@Component({

selector: 'my-component',

template: '<span \*ngIf="user"> {{user.contact.email}} </span>'

})

class MyComponent {

user?: User;

}

### How do you describe various dependencies in angular application?

The dependencies section of package.json with in an angular application can be divided as follow,

* 1. **Angular packages:** Angular core and optional modules; their package names begin @angular/.
  2. **Support packages:** Third-party libraries that must be present for Angular apps to run.
  3. **Polyfill packages:** Polyfills plug gaps in a browser's JavaScript implementation.

### What is zone?

A Zone is an execution context that persists across async tasks. Angular relies on zone.js to run Angular's change detection processes when native JavaScript operations raise events

### What is the purpose of common module?

The commonly-needed services, pipes, and directives provided by @angular/common module. Apart from these HttpClientModule is available under @angular/common/http.

### What is codelyzer?

Codelyzer provides set of tslint rules for static code analysis of Angular TypeScript projects. ou can run the static code analyzer over web apps, NativeScript, Ionic etc. Angular CLI has support for this and it can be use as below,

ng new codelyzer

ng lint

### What is angular animation?

Angular's animation system is built on CSS functionality in order to animate any property that the browser considers animatable. These properties includes positions, sizes, transforms, colors, borders etc. The Angular modules for animations are **@angular/animations** and **@angular/platform-browser** and these dependencies are automatically added to your project when you create a project using Angular CLI.

### What are the steps to use animation module?

You need to follow below steps to implement animation in your angular project,

* 1. **Enabling the animations module:** Import BrowserAnimationsModule to add animation capabilities into your Angular root application module(for example, src/app/app.module.ts).

import { NgModule } from '@angular/core';

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

import { BrowserAnimationsModule } from '@angular/platform-browser/animations';

@NgModule({

imports: [

BrowserModule,

BrowserAnimationsModule

],

declarations: [ ],

bootstrap: [ ]

})

export class AppModule { }

* 1. **Importing animation functions into component files:** Import required animation functions from @angular/animations in component files(for example, src/app/app.component.ts).

import {

trigger,

state,

style,

animate,

transition,

// ...

} from '@angular/animations';

* 1. **Adding the animation metadata property:** add a metadata property called animations: within the @Component() decorator in component files(for example, src/app/app.component.ts)

@Component({

selector: 'app-root',

templateUrl: 'app.component.html',

styleUrls: ['app.component.css'],

animations: [

// animation triggers go here

]

})

### What are the differences between AngularJS and Angular with respect to dependency injection?

Dependency injection is a common component in both AngularJS and Angular, but there are some key differences between the two frameworks in how it actually works. | AngularJS | Angular | |---- | --------- | Dependency injection tokens are always strings | Tokens can have different types. They are often classes and sometimes can be strings. | | There is exactly one injector even though it is a multi-module applications | There is a tree hierarchy of injectors, with a root injector and an additional injector for each component. |

### What is Angular Ivy?

Angular Ivy is a new rendering engine for Angular. You can choose to opt in a preview version of Ivy from Angular version 8.

* 1. You can enable ivy in a new project by using the --enable-ivy flag with the ng new command

ng new ivy-demo-app --enable-ivy

* 1. You can add it to an existing project by adding enableIvy option in the angularCompilerOptions in your project's tsconfig.app.json.

{

"compilerOptions": { ... },

"angularCompilerOptions": {

"enableIvy": true

}

}

### What are the features included in ivy preview?

You can expect below features with Ivy preview,

* 1. Generated code that is easier to read and debug at runtime
  2. Faster re-build time
  3. Improved payload size
  4. Improved template type checking

### Can I use AOT compilation with Ivy?

Yes, it is a recommended configuration. Also, AOT compilation with Ivy is faster. So you need set the default build options(with in angular.json) for your project to always use AOT compilation.

{

"projects": {

"my-project": {

"architect": {

"build": {

"options": {

...

"aot": true,

}

}

}

}

}

}

### How do you select an element with in a component template?

You can use @ViewChild directive to access elements in the view directly. Let's take input element with a reference,

<input #uname>

and define view child directive and access it in ngAfterViewInit lifecycle hook

@ViewChild('uname') input;

ngAfterViewInit() {

console.log(this.input.nativeElement.value);

}

### How do you detect route change in Angular?

In Angular7, you can subscribe to router to detect the changes. The subscription for router events would be as below,

this.router.events.subscribe((event: Event) => {})

Let's take a simple component to detect router changes

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

import { Router, Event, NavigationStart, NavigationEnd, NavigationError } from '@angular/router';

@Component({

selector: 'app-root',

template: `<router-outlet></router-outlet>`

})

export class AppComponent {

constructor(private router: Router) {

this.router.events.subscribe((event: Event) => {

if (event instanceof NavigationStart) {

// Show loading indicator and perform an action

}

if (event instanceof NavigationEnd) {

// Hide loading indicator and perform an action

}

if (event instanceof NavigationError) {

// Hide loading indicator and perform an action

console.log(event.error); // It logs an error for debugging

}

});

}

}

### How do you pass headers for HTTP client?

You can directly pass object map for http client or create HttpHeaders class to supply the headers.

constructor(private \_http: HttpClient) {}

this.\_http.get('someUrl',{

headers: {'header1':'value1','header2':'value2'}

});

(or)

let headers = new HttpHeaders().set('header1', headerValue1); // create header object

headers = headers.append('header2', headerValue2); // add a new header, creating a new object

headers = headers.append('header3', headerValue3); // add another header

let params = new HttpParams().set('param1', value1); // create params object

params = params.append('param2', value2); // add a new param, creating a new object

params = params.append('param3', value3); // add another param

return this.\_http.get<any[]>('someUrl', { headers: headers, params: params })

### What is the purpose of differential loading in CLI?

From Angular8 release onwards, the applications are built using differential loading strategy from CLI to build two separate bundles as part of your deployed application.

* 1. The first build contains ES2015 syntax which takes the advantage of built-in support in modern browsers, ships less polyfills, and results in a smaller bundle size.
  2. The second build contains old ES5 syntax to support older browsers with all necessary polyfills. But this results in a larger bundle size.

**Note:** This strategy is used to support multiple browsers but it only load the code that the browser needs.

### Is Angular supports dynamic imports?

Yes, Angular 8 supports dynamic imports in router configuration. i.e, You can use the import statement for lazy loading the module using loadChildren method and it will be understood by the IDEs(VSCode and WebStorm), webpack, etc. Previously, you have been written as below to lazily load the feature module. By mistake, if you have typo in the module name it still accepts the string and throws an error during build time.

{path: ‘user’, loadChildren: ‘./users/user.module#UserModulee’},

This problem is resolved by using dynamic imports and IDEs are able to find it during compile time itself.

{path: ‘user’, loadChildren: () => import(‘./users/user.module’).then(m => m.UserModule)};

### What is lazy loading?

Lazy loading is one of the most useful concepts of Angular Routing. It helps us to download the web pages in chunks instead of downloading everything in a big bundle. It is used for lazy loading by asynchronously loading the feature module for routing whenever required using the property loadChildren. Let's load both Customer and Order feature modules lazily as below,

const routes: Routes = [

{

path: 'customers',

loadChildren: () => import('./customers/customers.module').then(module => module.CustomersModule)

},

{

path: 'orders',

loadChildren: () => import('./orders/orders.module').then(module => module.OrdersModule)

},

{

path: '',

redirectTo: '',

pathMatch: 'full'

}

];

### What are workspace APIs?

Angular 8.0 release introduces Workspace APIs to make it easier for developers to read and modify the angular.json file instead of manually modifying it. Currently, the only supported storage3 format is the JSON-based format used by the Angular CLI. You can enable or add optimization option for build target as below,

import { NodeJsSyncHost } from '@angular-devkit/core/node';

import { workspaces } from '@angular-devkit/core';

async function addBuildTargetOption() {

const host = workspaces.createWorkspaceHost(new NodeJsSyncHost());

const workspace = await workspaces.readWorkspace('path/to/workspace/directory/', host);

const project = workspace.projects.get('my-app');

if (!project) {

throw new Error('my-app does not exist');

}

const buildTarget = project.targets.get('build');

if (!buildTarget) {

throw new Error('build target does not exist');

}

buildTarget.options.optimization = true;

await workspaces.writeWorkspace(workspace, host);

}

addBuildTargetOption();

### How do you upgrade angular version?

The Angular upgrade is quite easier using Angular CLI ng update command as mentioned below. For example, if you upgrade from Angular 7 to 8 then your lazy loaded route imports will be migrated to the new import syntax automatically.

$ ng update @angular/cli @angular/core

### What is Angular Material?

Angular Material is a collection of Material Design components for Angular framework following the Material Design spec. You can apply Material Design very easily using Angular Material. The installation can be done through npm or yarn,

npm install --save @angular/material @angular/cdk @angular/animations

(OR)

yarn add @angular/material @angular/cdk @angular/animations

It supports the most recent two versions of all major browsers. The latest version of Angular material is 8.1.1

### How do you upgrade location service of angularjs?

If you are using $location service in your old AngularJS application, now you can use LocationUpgradeModule(unified location service) which puts the responsibilities of $location service to Location service in Angular. Let's add this module to AppModule as below,

// Other imports ...

import { LocationUpgradeModule } from '@angular/common/upgrade';

@NgModule({

imports: [

// Other NgModule imports...

LocationUpgradeModule.config()

]

})

export class AppModule {}

### What is NgUpgrade?

NgUpgrade is a library put together by the Angular team, which you can use in your applications to mix and match AngularJS and Angular components and bridge the AngularJS and Angular dependency injection systems.

### How do you test Angular application using CLI?

Angular CLI downloads and install everything needed with the Jasmine Test framework. You just need to run ng test to see the test results. By default this command builds the app in watch mode, and launches the Karma test runner. The output of test results would be as below,

10% building modules 1/1 modules 0 active

...INFO [karma]: Karma v1.7.1 server started at http://0.0.0.0:9876/

...INFO [launcher]: Launching browser Chrome ...

...INFO [launcher]: Starting browser Chrome

...INFO [Chrome ...]: Connected on socket ...

Chrome ...: Executed 3 of 3 SUCCESS (0.135 secs / 0.205 secs)

**Note:** A chrome browser also opens and displays the test output in the "Jasmine HTML Reporter".

### How to use polyfills in Angular application?

The Angular CLI provides support for polyfills officially. When you create a new project with the ng new command, a src/polyfills.ts configuration file is created as part of your project folder. This file includes the mandatory and many of the optional polyfills as JavaScript import statements. Let's categorize the polyfills,

* 1. **Mandatory polyfills:** These are installed automatically when you create your project with ng new command and the respective import statements enabled in 'src/polyfills.ts' file.
  2. **Optional polyfills:** You need to install its npm package and then create import statement in 'src/polyfills.ts' file. For example, first you need to install below npm package for adding web animations (optional) polyfill.

npm install --save web-animations-js

and create import statement in polyfill file.

import 'web-animations-js';

### What are the ways to trigger change detection in Angular?

You can inject either ApplicationRef or NgZone, or ChangeDetectorRef into your component and apply below specific methods to trigger change detection in Angular. i.e, There are 3 possible ways,

* 1. ApplicationRef.tick(): Invoke this method to explicitly process change detection and its side-effects. It check the full component tree.
  2. NgZone.run(callback): It evaluate the callback function inside the Angular zone.
  3. ChangeDetectorRef.detectChanges(): It detects only the components and it's children.

### What are the differences of various versions of Angular?

There are different versions of Angular framework. Let's see the features of all the various versions,

* 1. Angular 1 • Angular 1 (AngularJS) is the first angular framework released in the year 2010. • AngularJS is not built for mobile devices. • It is based on controllers with MVC architecture.
  2. Angular 2 • Angular 2 was released in the year 2016. Angular 2 is a complete rewrite of Angular1 version. • The performance issues that Angular 1 version had has been addressed in Angular 2 version. • Angular 2 is built from scratch for mobile devices unlike Angular 1 version. • Angular 2 is components based.
  3. Angular 3 The following are the different package versions in Angular 2. • @angular/core v2.3.0 • @angular/compiler v2.3.0 • @angular/http v2.3.0 • @angular/router v3.3.0 The router package is already versioned 3 so to avoid confusion switched to Angular 4 version and skipped 3 version.
  4. Angular 4 • The compiler generated code file size in AOT mode is very much reduced. • With Angular 4 the production bundles size is reduced by hundreds of KB’s. • Animation features are removed from angular/core and formed as a separate package. • Supports Typescript 2.1 and 2.2.
  5. Angular 5 • Angular 5 makes angular faster. It improved the loading time and execution time. • Shipped with new build optimizer. • Supports Typescript 2.5.
  6. Angular 6 • It is released in May 2018. • Includes Angular Command Line Interface (CLI), Component Development KIT (CDK), Angular Material Package.
  7. Angular 7 • It is released in October 2018. • TypeScript 3.1 • RxJS 6.3 • New Angular CLI • CLI Prompts capability provide an ability to ask questions to the user before they run. It is like interactive dialog between the user and the CLI • With the improved CLI Prompts capability, it helps developers to make the decision. New ng commands ask users for routing and CSS styles types(SCSS) and ng add @angular/material asks for themes and gestures or animations.

### What are the security principles in angular?

* 1. You should avoid direct use of the DOM APIs.
  2. You should enable Content Security Policy (CSP) and configure your web server to return appropriate CSP HTTP headers.
  3. You should Use the offline template compiler.
  4. You should Use Server Side XSS protection.
  5. You should Use DOM Sanitizer.
  6. You should Preventing CSRF or XSRF attacks.

### What is the reason to deprecate Web Tracing Framework?

Angular has supported the integration with the Web Tracing Framework (WTF) for the purpose of performance testing. Since it is not well maintained and failed in majority of the applications, the support is deprecated in latest releases.

### What is the reason to deprecate web worker packages?

Both @angular/platform-webworker and @angular/platform-webworker-dynamic are officially deprecated, the Angular team realized it's not good practice to run the Angular application on Web worker .

### How do you find angular CLI version?

Angular CLI provides it's installed version using below different ways using ng command

ng v

ng version

ng -v

ng --version

and the output would be as below,

Angular CLI: 1.6.3

Node: 8.11.3

OS: darwin x64

Angular:

...

### What is the browser support for Angular?

Angular supports most recent browsers which includes both desktop and mobile browsers.

| **Browser** | **Version** |
| --- | --- |
| Chrome | latest |
| Firefox | latest |
| Edge | 2 most recent major versions |
| IE | 11, 10, 9 (Compatibility mode is not supported) |
| Safari | 2 most recent major versions |
| IE Mobile | 11 |
| iOS | 2 most recent major versions |
| Android | 7.0, 6.0, 5.0, 5.1, 4.4 |

### What is schematic?

It's a scaffolding library that defines how to generate or transform a programming project by creating, modifying, refactoring, or moving files and code. It defines rules that operate on a virtual file system called a tree.

### What is rule in Schematics?

In schematics world, it's a function that operates on a file tree to create, delete, or modify files in a specific manner.

### What is Schematics CLI?

Schematics come with their own command-line tool known as Schematics CLI. It is used to install the schematics executable, which you can use to create a new schematics collection with an initial named schematic. The collection folder is a workspace for schematics. You can also use the schematics command to add a new schematic to an existing collection, or extend an existing schematic. You can install Schematic CLI globally as below,

npm install -g @angular-devkit/schematics-cli

### What are the best practices for security in angular?

Below are the best practices of security in angular,

* 1. Use the latest Angular library releases
  2. Don't modify your copy of Angular
  3. Avoid Angular APIs marked in the documentation as “Security Risk.”

### What is Angular security model for preventing XSS attacks?

Angular treats all values as untrusted by default. i.e, Angular sanitizes and escapes untrusted values When a value is inserted into the DOM from a template, via property, attribute, style, class binding, or interpolation.

### What is the role of template compiler for prevention of XSS attacks?

The offline template compiler prevents vulnerabilities caused by template injection, and greatly improves application performance. So it is recommended to use offline template compiler in production deployments without dynamically generating any template.

### What are the various security contexts in Angular?

Angular defines the following security contexts for sanitization,

* 1. **HTML:** It is used when interpreting a value as HTML such as binding to innerHtml.
  2. **Style:** It is used when binding CSS into the style property.
  3. **URL:** It is used for URL properties such as [.](https://github.com/sudheerj/angular-interview-questions/blob/master)
  4. **[Resource URL:](https://github.com/sudheerj/angular-interview-questions/blob/master)**[It is a URL that will be loaded and executed as code such as <script src>.](https://github.com/sudheerj/angular-interview-questions/blob/master)

### What is Sanitization? Is angular supports it?

**Sanitization** is the inspection of an untrusted value, turning it into a value that's safe to insert into the DOM. Yes, Angular suppports sanitization. It sanitizes untrusted values for HTML, styles, and URLs but sanitizing resource URLs isn't possible because they contain arbitrary code.

### What is the purpose of innerHTML?

The innerHtml is a property of HTML-Elements, which allows you to set it's html-content programatically. Let's display the below html code snippet in a

tag as below using innerHTML binding,

<div [innerHTML]="htmlSnippet"></div>

and define the htmlSnippet property from any component

export class myComponent {

htmlSnippet: string = '<b>Hello World</b>, Angular';

}

Unfortunately this property could cause Cross Site Scripting (XSS) security bugs when improperly handled.

### What is the difference between interpolated content and innerHTML?

The main difference between interpolated and innerHTML code is the behavior of code interpreted. Interpolated content is always escaped i.e, HTML isn't interpreted and the browser displays angle brackets in the element's text content. Where as in innerHTML binding, the content is interpreted i.e, the browser will convert < and > characters as HTMLEntities. For example, the usage in template would be as below,

<p>Interpolated value:</p>

<div >{{htmlSnippet}}</div>

<p>Binding of innerHTML:</p>

<div [innerHTML]="htmlSnippet"></div>

and the property defined in a component.

export class InnerHtmlBindingComponent {

htmlSnippet = 'Template <script>alert("XSS Attack")</script> <b>Code attached</b>';

}

Even though innerHTML binding create a chance of XSS attack, Angular recognizes the value as unsafe and automatically sanitizes it.

### How do you prevent automatic sanitization?

Sometimes the applications genuinely need to include executable code such as displaying <iframe> from an URL. In this case, you need to prevent automatic sanitization in Angular by saying that you inspected a value, checked how it was generated, and made sure it will always be secure. Basically it involves 2 steps, i. Inject DomSanitizer: You can inject DomSanitizer in component as parameter in constructor ii. Mark the trusted value by calling some of the below methods

* 1. bypassSecurityTrustHtml
  2. bypassSecurityTrustScript
  3. bypassSecurityTrustStyle
  4. bypassSecurityTrustUrl
  5. bypassSecurityTrustResourceUrl

For example,The usage of dagerous url to trusted url would be as below,

constructor(private sanitizer: DomSanitizer) {

this.dangerousUrl = 'javascript:alert("XSS attack")';

this.trustedUrl = sanitizer.bypassSecurityTrustUrl(this.dangerousUrl);

### Is safe to use direct DOM API methods in terms of security?

No,the built-in browser DOM APIs or methods don't automatically protect you from security vulnerabilities. In this case it is recommended to use Angular templates instead of directly interacting with DOM. If it is unavoidable then use the built-in Angular sanitization functions.

### What is DOM sanitizer?

DomSanitizer is used to help preventing Cross Site Scripting Security bugs (XSS) by sanitizing values to be safe to use in the different DOM contexts.

### How do you support server side XSS protection in Angular application?

The server-side XSS protection is supported in an angular application by using a templating language that automatically escapes values to prevent XSS vulnerabilities on the server. But don't use a templating language to generate Angular templates on the server side which creates a high risk of introducing template-injection vulnerabilities.

### Is angular prevents http level vulnerabilities?

Angular has built-in support for preventing http level vulnerabilities such as as cross-site request forgery (CSRF or XSRF) and cross-site script inclusion (XSSI). Even though these vulnerabilities need to be mitigated on server-side, Angular provides helpers to make the integration easier on the client side.

* 1. HttpClient supports a token mechanism used to prevent XSRF attacks
  2. HttpClient library recognizes the convention of prefixed JSON responses(which non-executable js code with ")]}',\n" characters) and automatically strips the string ")]}',\n" from all responses before further parsing

### What are Http Interceptors?

Http Interceptors are part of @angular/common/http, which inspect and transform HTTP requests from your application to the server and vice-versa on HTTP responses. These interceptors can perform a variety of implicit tasks, from authentication to logging. The syntax of HttpInterceptor interface looks like as below,

interface HttpInterceptor {

intercept(req: HttpRequest<any>, next: HttpHandler): Observable<HttpEvent<any>>

}

You can use interceptors by declaring a service class that implements the intercept() method of the HttpInterceptor interface.

@Injectable()

export class MyInterceptor implements HttpInterceptor {

constructor() {}

intercept(req: HttpRequest<any>, next: HttpHandler): Observable<HttpEvent<any>> {

...

}

}

After that you can use it in your module,

@NgModule({

...

providers: [

{

provide: HTTP\_INTERCEPTORS,

useClass: MyInterceptor,

multi: true

}

]

...

})

export class AppModule {}

### What are the applications of HTTP interceptors?

The HTTP Interceptors can be used for different variety of tasks,

* 1. Authentication
  2. Logging
  3. Caching
  4. Fake backend
  5. URL transformation
  6. Modifying headers

### Is multiple interceptors supported in Angular?

Yes, Angular supports multiple interceptors at a time. You could define multiple interceptors in providers property:

providers: [

{ provide: HTTP\_INTERCEPTORS, useClass: MyFirstInterceptor, multi: true },

{ provide: HTTP\_INTERCEPTORS, useClass: MySecondInterceptor, multi: true }

],

The interceptors will be called in the order in which they were provided. i.e, MyFirstInterceptor will be called first in the above interceptors configuration.

### How can I use interceptor for an entire application?

You can use same instance of HttpInterceptors for the entire app by importing the HttpClientModule only in your AppModule, and add the interceptors to the root application injector. For example, let's define a class that is injectable in root application.

@Injectable()

export class MyInterceptor implements HttpInterceptor {

intercept(

req: HttpRequest<any>,

next: HttpHandler

): Observable<HttpEvent<any>> {

return next.handle(req).do(event => {

if (eventt instanceof HttpResponse) {

// Code goes here

}

});

}

}

After that import HttpClientModule in AppModule

@NgModule({

declarations: [AppComponent],

imports: [BrowserModule, HttpClientModule],

providers: [

{ provide: HTTP\_INTERCEPTORS, useClass: MyInterceptor, multi: true }

],

bootstrap: [AppComponent]

})

export class AppModule {}

### How does Angular simplifies Internationalization?

Angular simplifies the below areas of internationalization,

* 1. Displaying dates, number, percentages, and currencies in a local format.
  2. Preparing text in component templates for translation.
  3. Handling plural forms of words.
  4. Handling alternative text.

### How do you manually register locale data?

By default, Angular only contains locale data for en-US which is English as spoken in the United States of America . But if you want to set to another locale, you must import locale data for that new locale. After that you can register using registerLocaleData method and the syntax of this method looks like below,

registerLocaleData(data: any, localeId?: any, extraData?: any): void

For example, let us import German locale and register it in the application

import { registerLocaleData } from '@angular/common';

import localeDe from '@angular/common/locales/de';

registerLocaleData(localeDe, 'de');

### What are the four phases of template translation?

The i18n template translation process has four phases:

* 1. **Mark static text messages in your component templates for translation:** You can place i18n on every element tag whose fixed text is to be translated. For example, you need i18n attribue for heading as below,

<h1 i18n>Hello i18n!</h1>

* 1. **Create a translation file:** Use the Angular CLI xi18n command to extract the marked text into an industry-standard translation source file. i.e, Open terminal window at the root of the app project and run the CLI command xi18n.

ng xi18n

The above command creates a file named messages.xlf in your project's root directory. **Note:** You can supply command options to change the format, the name, the location, and the source locale of the extracted file.

* 1. **Edit the generated translation file:** Translate the extracted text into the target language. In this step, create a localization folder (such as locale)under root directory(src) and then create target language translation file by copying and renaming the default messages.xlf file. You need to copy source text node and provide the translation under target tag. For example, create the translation file(messages.de.xlf) for German language

<trans-unit id="greetingHeader" datatype="html">

<source>Hello i18n!</source>

<target>Hallo i18n !</target>

<note priority="1" from="description">A welcome header for this sample</note>

<note priority="1" from="meaning">welcome message</note>

</trans-unit>

* 1. **Merge the completed translation file into the app:** You need to use Angular CLI build command to compile the app, choosing a locale-specific configuration, or specifying the following command options. 1. --i18nFile=path to the translation file 2. --i18nFormat=format of the translation file 3. --i18nLocale= locale id

### What is the purpose of i18n attribute?

The Angular i18n attribute marks translatable content. It is a custom attribute, recognized by Angular tools and compilers. The compiler removes it after translation. **Note:** Remember that i18n is not an Angular directive.

### What is the purpose of custom id?

When you change the translatable text, the Angular extractor tool generates a new id for that translation unit. Because of this behavior, you must then update the translation file with the new id every time. For example, the translation file messages.de.xlf.html has generated trans-unit for some text message as below

<trans-unit id="827wwe104d3d69bf669f823jjde888" datatype="html">

You can avoid this manual update of id attribute by specifying a custom id in the i18n attribute by using the prefix @@.

<h1 i18n="@@welcomeHeader">Hello i18n!</h1>

### What happens if the custom id is not unique?

You need to define custom ids as unique. If you use the same id for two different text messages then only the first one is extracted. But its translation is used in place of both original text messages. For example, let's define same custom id myCustomId for two messages,

<h2 i18n="@@myCustomId">Good morning</h3>

<!-- ... -->

<h2 i18n="@@myCustomId">Good night</p>

and the translation unit generated for first text in for German language as

<trans-unit id="myId" datatype="html">

<source>Good morning</source>

<target state="new">Guten Morgen</target>

</trans-unit>

Since custom id is the same, both of the elements in the translation contain the same text as below

<h2>Guten Morgen</h2>

<h2>Guten Morgen</h2>

### Can I translate text without creating an element?

Yes, you can achieve using <ng-container> attribute. Normally you need to wrap a text content with i18n attribute for the translation. But if you don't want to create a new DOM element just for the sake of translation, you can wrap the text in an element.

<ng-container i18n>I'm not using any DOM element for translation</ng-container>

Remember that <ng-container> is transformed into an html comment

### How can I translate attribute?

You can translate attributes by attaching i18n-x attribute where x is the name of the attribute to translate. For example, you can translate image title attribute as below,

<img [src]="example" i18n-title title="Internationlization" />

By the way, you can also assign meaning, description and id with the i18n-x="|@@" syntax.

### List down the pluralization categories?

Pluralization has below categories depending on the language.

* 1. =0 (or any other number)
  2. zero
  3. one
  4. two
  5. few
  6. many
  7. other

### What is select ICU expression?

ICU expression is is similar to the plural expressions except that you choose among alternative translations based on a string value instead of a number. Here you define those string values. Let's take component binding with residenceStatus property which has "citizen", "permanent resident" and "foreigner" possible values and the message maps those values to the appropriate translations.

<span i18n>The person is {residenceStatus, select, citizen {citizen} permanent resident {permanentResident} foreigner {foreigner}}</span>

### How do you report missing translations?

By default, When translation is missing, it generates a warning message such as "Missing translation for message 'somekey'". But you can configure with a different level of message in Angular compiler as below,

* 1. **Error:** It throws an error. If you are using AOT compilation, the build will fail. But if you are using JIT compilation, the app will fail to load.
  2. **Warning (default):** It shows a 'Missing translation' warning in the console or shell.
  3. **Ignore:** It doesn't do anything. If you use AOT compiler then you need to perform changes in configurations section of your Angular CLI configuration file, angular.json.

"configurations": {

...

"de": {

...

"i18nMissingTranslation": "error"

}

}

If you use the JIT compiler, specify the warning level in the compiler config at bootstrap by adding the 'MissingTranslationStrategy' property as below,

import { MissingTranslationStrategy } from '@angular/core';

import { platformBrowserDynamic } from '@angular/platform-browser-dynamic';

import { AppModule } from './app/app.module';

platformBrowserDynamic().bootstrapModule(AppModule, {

missingTranslation: MissingTranslationStrategy.Error,

providers: [

// ...

]

});

### How do you provide build configuration for multiple locales?

You can provide build configuration such as translation file path, name, format and application url in configuration settings of Angular.json file. For example, the German version of your application configured the build as follows,

"configurations": {

"de": {

"aot": true,

"outputPath": "dist/my-project-de/",

"baseHref": "/fr/",

"i18nFile": "src/locale/messages.de.xlf",

"i18nFormat": "xlf",

"i18nLocale": "de",

"i18nMissingTranslation": "error",

}

### What is an angular library?

An Angular library is an Angular project that differs from an app in that it cannot run on its own. It must be imported and used in an app. For example, you can import or add service worker library to an Angular application which turns an application into a Progressive Web App (PWA). **Note:** You can create own third party library and publish it as npm package to be used in an Application.

### What is AOT compiler?

The AOT compiler is part of a build process that produces a small, fast, ready-to-run application package, typically for production. It converts your Angular HTML and TypeScript code into efficient JavaScript code during the build phase before the browser downloads and runs that code.

### How do you select an element in component template?

You can control any DOM element via ElementRef by injecting it into your component's constructor. i.e, The component should have constructor with ElementRef parameter,

constructor(myElement: ElementRef) {

el.nativeElement.style.backgroundColor = 'yellow';

}

### What is TestBed?

TestBed is an api for writing unit tests for Angular applications and it's libraries. Even though We still write our tests in Jasmine and run using Karma, this API provides an easier way to create components, handle injection, test asynchronous behaviour and interact with our application.

### What is protractor?

Protractor is an end-to-end test framework for Angular and AngularJS applications. It runs tests against your application running in a real browser, interacting with it as a user would.

npm install -g protractor

### What is collection?

Collection is a set of related schematics collected in an npm package. For example, @schematics/angular collection is used in Angular CLI to apply transforms to a web-app project. You can create your own schematic collection for customizing angular projects.

### How do you create schematics for libraries?

You can create your own schematic collections to integrate your library with the Angular CLI. These collections are classified as 3 main schematics,

* 1. **Add schematics:** These schematics are used to install library in an Angular workspace using ng add command. For example, @angular/material schematic tells the add command to install and set up Angular Material and theming.
  2. **Generate schematics**: These schematics are used to modify projects, add configurations and scripts, and scaffold artifacts in library using ng generate command. For example, @angular/material generation schematic supplies generation schematics for the UI components. Let's say the table component is generated using ng generate @angular/material:table .
  3. **Update schematics:** These schematics are used to update library's dependencies and adjust for breaking changes in a new library release using ng update command. For example, @angular/material update schematic updates material and cdk dependencies using ng update @angular/material command.

### How do you use jquery in Angular?

You can use jquery in Angular using 3 simple steps,

* 1. Install the dependency: At first, install the jquery dependency using npm

npm install --save jquery

* 1. Add the jquery script: In Angular-CLI project, add the relative path to jquery in the angular.json file.

"scripts": [

"node\_modules/jquery/dist/jquery.min.js"

]

* 1. Start using jquery: Define the element in template. Whereas declare the jquery variable and apply CSS classes on the element.

<div id="elementId">

<h1>JQuery integration</h1>

</div>

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

declare var $: any; // (or) import \* as $ from 'jquery';

@Component({

selector: 'app-root',

templateUrl: './app.component.html',

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

})

export class AppComponent implements OnInit {

ngOnInit(): void {

$(document).ready(() => {

$('#elementId').css({'text-color': 'blue', 'font-size': '150%'});

});

}

}

### What is router state?

The RouteState is an interface which represents the state of the router as a tree of activated routes.

interface RouterState extends Tree {

snapshot: RouterStateSnapshot

toString(): string

}

You can access the current RouterState from anywhere in the Angular app using the Router service and the routerState property.

### How can I use SASS in angular project?

When you are creating your project with angular cli, you can use ng newcommand. It generates all your components with predefined sass files.

ng new My\_New\_Project --style=sass

But if you are changing your existing style in your project then use ng set command,

ng set defaults.styleExt scss

### What is the purpose of hidden property?

The hidden property is used to show or hide the associated DOM element, based on an expression. It can be compared close to ng-show directive in AngularJS. Let's say you want to show user name based on the availability of user using hidden property.

<div [hidden]="!user.name">

My name is: {{user.name}}

</div>

### What is the difference between ngIf and hidden property?

The main difference is that \*ngIf will remove the element from the DOM, while [hidden] actually plays with the CSS style by setting display:none. Generally it is expensive to add and remove stuff from the DOM for frequent actions.

### What is slice pipe?

The slice pipe is used to create a new Array or String containing a subset (slice) of the elements. The syntax looks like as below,

{{ value\_expression | slice : start [ : end ] }}