Not defining type of variable causes it to have type any

**let** a;

a = 1;

a = true;

a = 'a'

Define enum in typescript :

**enum** Color {

    Red,

    Green,

    Blue

}

**let** backColor = Color.Blue;

tsc main.ts | node main.js

Intellisense doesn’t work in this situation :

we should use type assertion to have intellisense :

(note the type is not changed after assertion in runtime and still it is any type)

**let** message;

message = 'abc';

**let** endsWithC = (<string>message).endsWith('c')

**let** endsWithCAlt = (message as string).endsWith('c')

a way of defining function in typescript :

**let** drawpoint = (x,y) **=>** {

}

drawpoint2({

    x:'1', y:'2'

})

It’s how to define custom type in typrscript:

**interface** Point {

    x: number,

    y: number

}

**let** drawPoint3 = (point: Point) **=>** {

}

In interface we can have functions and because they can access the properties we should not specify the paramaters

**interface** Point2 {

    x: number,

    y: number,

    draw : () **=>** void

}

The cohesion concept in OOP tells us that we should have Point type and function in the same place call Class: (without this they are hanging in the air somehow)- Class groups properties and functions that are highly related

**class** Point {

    x: number;

    y: number;

    draw() {

*// ...*

    }

    getDistance(another: Point) {

*// ...*

    }

}

Object creation in typescript :

**let** pointObj: Point = new Point();

**let** pointObj2 = new Point();   *// looks better*

pointObj.x = 2;

pointObj.y = 3;

pointObj.draw();

in typescript we can not have multiple constructors so here is the solution for creating object without default constructor :

**class** Point {

    x: number;

    y: number;

**constructor**(x?: number, y?: number) {

        this.x = x || 0;

        this.y = y || 0;

    }

    draw() {

        console.log('X: ' + this.x + ', Y:' + this.y)

    }

    getDistance(another: Point) {

*// ...*

    }

}

In typescript we have private – public and protected access modifiers :

(by default properties are public)

**class** Point3 {

**private** x: number;

**private** y: number;

**constructor**(x?: number, y?: number) {

        this.x = x || 0;

        this.y = y || 0;

    }

    draw() {

        console.log('X: ' + this.x + ', Y:' + this.y)

    }

    getDistance(another: Point) {

*// ...*

    }

}

*// in js*

**let** log = **function**(message) {

    console.log(message)

}

*// in ts*

**let** doLog = (message) **=>** {

    console.log(message)

}

**let** doLog2 = (message) **=>** console.log(message)

**let** doLog3 = () **=>** console.log()

**class** Point4 {

**constructor**(**private** x: number, **private** y: number) {

    }

    draw() {

        console.log('X: ' + this.x + ', Y:' + this.y)

    }

    getDistance(another: Point4) {

*// ...*

    }

}

Properties in typeScript :

**class** Point4 {

**constructor**(**private** \_x: number, **private** \_y: number) {

    }

    draw() {

        console.log('X: ' + this.x + ', Y:' + this.\_y)

    }

    getDistance(another: Point4) {

*// ...*

    }

**get** x() {

        return this.\_x;

    }

**set** x(value) {

        if (value < 0) {

            throw new Error('value cannot be less than 0.')

        }

        this.\_x = value;

    }

}

new Point4(2,4).x = 4;

when we use export in class definition we can have a module :

export **class** Point5 {

**constructor**(**private** \_x: number, **private** \_y: number) {

    }

    draw() {

        console.log('X: ' + this.x + ', Y:' + this.\_y)

    }

    getDistance(another: Point4) {

*// ...*

    }

**get** x() {

        return this.\_x;

    }

**set** x(value) {

        if (value < 0) {

            throw new Error('value cannot be less than 0.')

        }

        this.\_x = value;

    }

}

import {Point5} from './point'

export **class** LikeComponent {

**constructor**(**private** \_likesCount: number, **private** \_isSelected: boolean) {

   }

   onClick() {

    this.\_likesCount += (this.\_isSelected) ? -1 : 1;

    this.\_isSelected = !this.\_isSelected

   }

**get** likesCount() {

      return this.\_likesCount;

   }

**get** isSelected(){

      return this.\_isSelected;

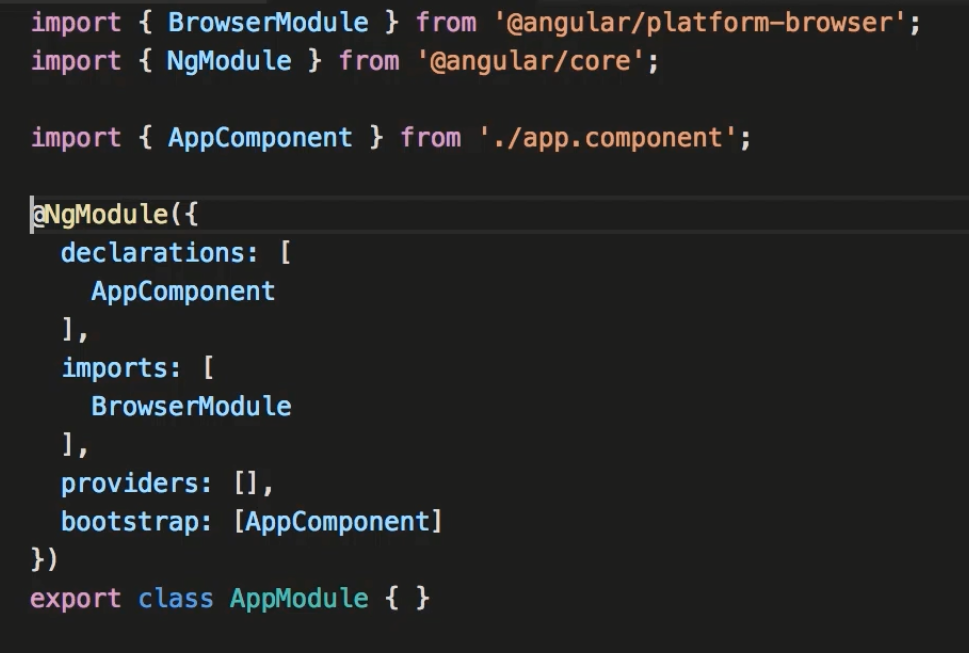
   }

}

We must register a component in a module to use it

Components are decorated with decorator functions @Component({}) and the templates and selector are assigned. In this way we can convert a plain typescript class to component

With decorator function @NgModule({}) we convert a plain typescript class to a angular module. In declaration property w specify components that are part of this module



Install auto import (steoates)

By using angular cli a component is created and added to module

ng g c course

this expression will be evaluated at runtime and the value of title field wii be inserted in the DOM

if the value of title field changes in the future Angular will automatically update the DOM

bind the view to a field in a component – this is called **string Interpolation**

<h2>{{ title }}</h2>

<h2>{{ "Title : " + title }}</h2> // simple javascript expression

<h2>{{ "Title : " + getTitle() }}</h2>

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

@Component({

  selector: 'app-course',

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

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

})

export **class** CourseComponent {

    title = 'List of courses'

    getTitle() {

      return this.title;

    }

  }

We use directives to manipulate a DOM element like removing or inserting or change a class of DOM element or it’s style (if we use directive that modifies DOM we should prefix it with asterisk)

<ul>

    <li \*ngFor="" ></li>

</ul>

<ul>

    <li \*ngFor="**let** course of courses" >

        {{course}}

    </li>

</ul>

We use a specific class called Service for implementing services in angular

In app module we should register any dependency that components in module are dependent upon

Angular will create a single object for entire module and will be injected (Singleton pattern)

ng g s courses

@NgModule({

  declarations: [

    AppComponent,

    CourseComponent

  ],

  imports: [

    BrowserModule

  ],

  providers: [

    CoursesService

  ],

  bootstrap: [AppComponent]

})

export **class** AppModule { }

here is how to consume the service via injection :

@Component({

  selector: 'app-course',

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

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

})

export **class** CourseComponent {

    title = 'List of courses'

    courses;

**constructor**(**private** service: CoursesService) {

      this.courses = service.getCourses();

    }

    getTitle() {

      return this.title;

    }

  }

This class in decorated with @Injectable function when it has dependency inside it’s constructors

@Injectable({

  providedIn: 'root'

})

export **class** MailService {

**constructor**(**private** service: LogService) {

    }

In case of component class it has injection inside component decorator function

ul>li will do the job

with Property binding we bind a property or attribute with a property or field in out component

 <img [src]="imageUrl" >

export **class** AuthorsComponent {

  authors;

  imageUrl : string = '/assets/angular.png'

**constructor**(**private** service: AuthorsService) {

    this.authors = service.getAuthors();

  }

**Property binding** is on way binding meaning if user changes DOM the underline fields or properties inside ts file wont get updated. But string interpolation is two way binding

<img  src= {{imageUrl}}  />

**Attribute binding**

There are some properties that html elements have but they don’t exist in DOM element inside memory and vice versa for example colSpan of td element is not in the DOM but in the html . Property binding in angular works for the properties that are in the DOM. We should prefix the propert with attr. In order it to work and not get error. This is called attribute binding

<table>

    <tr>

        <td colspan="attr.colSpan"></td>

    </tr>

</table>

export **class** CourseComponent {

    title = 'List of courses'

    courses;

    colSpan = 2;

in order to install bootstrap we use

npm install bootstrap –save

to install it in node\_modules folder and save it as dependency in package.json file

by listing the dependency in package.json when someone check out the project the dependency can be installed

in styles.css we import the reference of bootstrap folder in node\_module

@import "~bootstrap/dist/css/bootstrap.css";

body {

  padding:20px;

}

<button class="btn btn-primary">Save</button>

**Class binding** in angular : if value is true the class will be added if not the class will be removed

For this purpose we use a variation of property binding

<button class="btn btn-primary" [class.active]="isActive">Save</button>

export **class** CourseComponent {

    title = 'List of courses'

    courses;

    colSpan = 2;

    isActive = true;

**Style binding**

<button [style.backgroundColor]="isActive ? 'blue' : 'white'" >Save</button>

List of style binding can be found on w3school

Variation of property binding : class , attribute, style binding

**Event binding**

For handling the events raised by the DOM and instead of brackets we use parathesis

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

Sometimes we want to get access to the event object that was raised in the event handler for example in the event object of a mouse movement we can access the x and y coordinates

We do it by sending $event parameter

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

export **class** CoursesComponent {

  onSave($event) {

    console.log("Button was clicked", $event)

  }

}

**Event bubbling**

If a DOM event is fired is will bubble up all the way up and passess all the parrent elements

In this case after clicking the button the vent of the parent div will b fired.

<div (click)="onDivClicked()">

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

</div>

export **class** CoursesComponent {

  onDivClicked() {

    console.log("div clicked");

  }

  onSave($event) {

    console.log("Button was clicked", $event)

  }

}

We can stop propogation and bubbling up :

onSave($event) {

    $event.stopPropogation();

    console.log("Button was clicked", $event)

  }

Event filter

<input (keyup)="onKeyUp($event)" />

 onKeyUp($event) {

    if($event.keyCode === 13) console.log("Enter was pressed")

  }

There is a better way for doing this : (by eventfilter) :

<input (keyup.enter)="onKeyUp($event)" />

 onKeyUp($event) {

     console.log("Enter was pressed")

  }

**Template variable**

We can refere to the input field by target property of $event

console.log($event.target.value)

declare a variable in the template that refer to the inputfield

<input #email (keyup.enter)="onKeyUpNew(email.value)" />

  onKeyUpNew(email) {

    console.log(email)

 }

In property binding the direction of binding is from component in the view hence it is one way binding and changing it from the view doesn’t change the value in the log

<input [value]="email" (keyup.enter)="onKeyVer2()" />

export **class** CoursesComponent {

  email = "me@email.com";

 onkeyUpVer2() {

    console.log(this.email)

  }

}

**Two way binding with banana in the box**

<input [value]="email" (keyup.enter)="email = $event.target.value; onkeyUpVer2()" />

**Instead of above method :**

We can use a built-in angular directive called ngModule inside [()] for implementing two way binding

We should add FormsModule :

@NgModule({

  declarations: [

    AppComponent,

    CourseComponent,

    AuthorsComponent,

    CoursesComponent

  ],

  imports: [

    BrowserModule,

    FormsModule

  ],

<input [(ngModel)]="email" (keyup.enter)="onkeyUpVer2()"  />

Actually we bind to ngModule

**Pipes**

We use pipes to format data

Angular has some built-in types like uppercase and number(decimal)

{{course.title | uppercase}}

{{course.students | number }} <br/>

Pipes can be changed

{{course.title | uppercase  | lowercase }}

Number pipe can have parameter for number of integer and min and max number of precision

{{course.rating | number: '1.2-2'}}

{{course.rating | number: '2.2-3'}}

{{course.price | currency : 'AUD'}} <br/>

{{course.price | currency }} <br/>

{{course.price | currency : 'AUD': true:'3.2-2'}}

{{course.releaseDate | date:'shortDate'}}

When we Import the browser module it also import commonmodule

**Custom pipes**

Just like components we should register pipes in module

{{ text | summary }}

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

@Pipe({

    name: 'summary'

})

export **class** SummaryPipe **implements** PipeTransform {

    transform(value: string, args?: any) {

        if(!value) {

            return null;

        }

        return value.substring(0, 50) + '...';

    }

}

@NgModule({

  declarations: [

    AppComponent,

    CourseComponent,

    AuthorsComponent,

    CoursesComponent,

    SummaryPipe

  ],

We can supply parameter in custom pipe :

{{ text | summary : 10}}

In angular we can change the parameter in method signature of an implemented interface

    transform(value: string, args?: any) {

transform(value: string, limit?: number) {

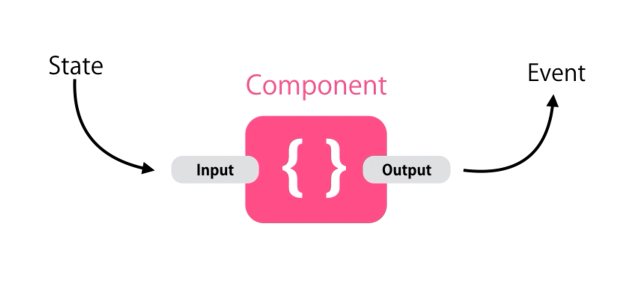
even we can have another parameters

transform(value: string, limit?: number, another?: number) {

Added to Github

In angular if you want to use a field as a property you should mark it as an input field

And if we want to have event binding we need to define speacial property named output property



The combination of input and output of a component is what we call public api of a component



We annotate the field with @Input() decorator now this field is exposed to outside and we can bind it to a property somewhere else

 @Input() isFavorite: boolean;

<favorite  [isFavorite]="post.isFavorite" ></favorite>

With alias we can set another name for input properties

  @Input('is-favorite') isFavorite: boolean;

<favorite  [is-favorite]="post.isFavorite" ></favorite>

It’s good because if we change the name of variable all the places have to be renamed

Output properties

 @Output() change = new EventEmitter();

<favorite  [isFavorite]="post.isFavorite" (change)="onFavoriteChanged()"></favorite>

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

@Component({

  selector: 'favorite',

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

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

})

export **class** FavoriteComponent **implements** OnInit {

  @Input('isFavorite') isFavorite: boolean;

  @Output() change = new EventEmitter();

**constructor**() {}

  ngOnInit(): void {}

  onClick() {

    this.isFavorite = !this.isFavorite;

    this.change.emit();

  }

}

export **class** AppComponent {

  title: string = 'Angular demo';

  post = {

    title: "Title",

    isFavorite: true

  }

  onFavoriteChanged() {

    console.log("Favorite changed")

  }

}

Passing event data :

App componenet here is the subscriber of change event :

<favorite  [isFavorite]="post.isFavorite" (change)="onFavoriteChanged()"></favorite>

  onClick() {

    this.isSelected = !this.isSelected;

    this.change.emit(this.isSelected);

  }

onFavoriteChanged(isFavorite) {

    console.log("Favorite changed", isFavorite)

  }

The value will be emitted to all subscribers of event (by rasing event we see when the state of component changes)

<favorite  [isFavorite]="post.isFavorite" (change)="onFavoriteChanged($event)"></favorite>

$event is a built-in object in angular previously $event when clicking buttons whas syandard dom event object but here in the custom component is anything that we pass when raising an event

In case we want to supply object in emit method

    this.change.emit({ newValue: this.isSelected});

now $event object represent actual javascript object that has property called newValue

<favorite  [isFavorite]="post.isFavorite" (change)="onFavoriteChanged($event)"></favorite>

  onFavoriteChanged(eventArgs) {

    console.log("Favorite changed", eventArgs)

  }

We can use interface for input parametr of method :

**interface** FavoriteChangedEventArgs {

  newValue: boolean

}

@Component({

  selector: 'app-root',

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

  styleUrls: ['./app.component.css']

})

export **class** AppComponent {

  title: string = 'Angular demo';

  post = {

    title: "Title",

    isFavorite: true

  }

  onFavoriteChanged(eventArgs: FavoriteChangedEventArgs) {

    console.log("Favorite changed", eventArgs.newValue)

  }

We can export this interface in Favorite component

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

 @Component({

  selector: 'favorite',

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

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

})

export **class** FavoriteComponent **implements** OnInit {

  @Input('isFavorite') isSelected: boolean;

  @Output() change = new EventEmitter();

**constructor**() {}

  ngOnInit(): void {}

  onClick() {

    this.isSelected = !this.isSelected;

    this.change.emit(this.isSelected);

    this.change.emit({ newValue: this.isSelected});

  }

}

export **interface** FavoriteChangedEventArgs {

  newValue: boolean

}

Output alias :

  @Output('change') click = new EventEmitter();

There are no separate request for server to download templates all of theme are bundled with javascript

Styles in angular : if we have small component we can declare the style in styles array

 @Component({

  selector: 'favorite',

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

  styleUrls: ['./favorite.component.css'],

  styles:[

    `

    `

  ]

})

export **class** FavoriteComponent {

  @Input('isFavorite') isSelected: boolean;

  @Output('change') click = new EventEmitter();

Also we can specify style in html file :

<style>

</style>

<app-course></app-course>

<app-authors></app-authors>

<app-courses></app-courses>

<favorite  [isFavorite]="post.isFavorite" (change)="onFavoriteChanged($event)"></favorite>

<title-case></title-case>

Based on the priority of definition in decorator function styles priority will be specified and previous stylee will be completely ignored

 @Component({

  selector: 'favorite',

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

  styleUrls: ['./favorite.component.css'],

  styles:[

    `

      .glyphicon {

    color: green;

    }

    `

  ]

})

Shadow DOM

Allows us to apply scoped styles to elements without bleeding out to the outer world

@Component({

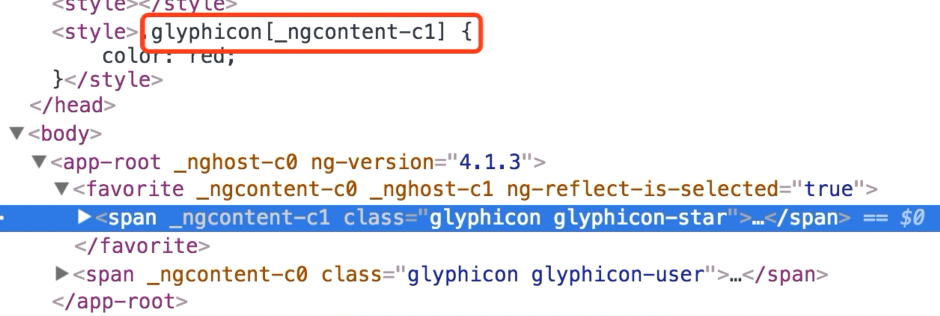
  selector: 'app-root',

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

  styleUrls: ['./app.component.css'],

  encapsulation: ViewEncapsulation.Emulated

})



In this way angular add atrribute to the class and use theme in styles to have unique styles for each component

encapsulation: ViewEncapsulation.ShadowDom

if we set to ShadowDOM it uses the default shadowdom in browsres thar most browsers don’t support

**ngContent**

<div class="panel panel-default">

    <div class="panel-heading">

        <ng-content select=".heading"></ng-content>

    </div>

    <div class="panel-body">

        <ng-content select=".body"></ng-content>

    </div>

</div>

<bootstrap-panel>

    <div class="heading">Heading</div>

    <div class="body">

        <h2>Body</h2>

        <p>Some content here...</p>

    </div>

</bootstrap-panel>

**We don’t need selector if we use just one ng-content**

**ng-container**

**this is an angular custom built-in element and at runtime angular is going to take the content of this ng container (not div or any element in the DOM but only the content)**

<bootstrap-panel>

    <ng-container class="heading">Heading</ng-container>

    <div class="body">

        <h2>Body</h2>

        <p>Some content here...</p>

    </div>

</bootstrap-panel>

<div class="panel panel-default">

    <div class="panel-heading">

        <ng-content select=".heading"></ng-content>

    </div>

    <div class="panel-body">

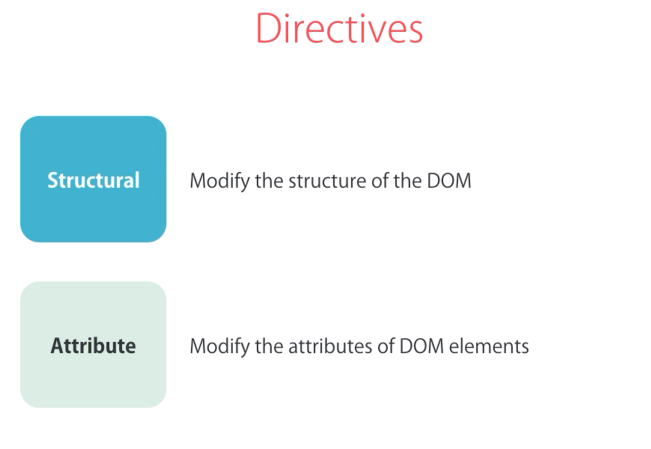
        <ng-content select=".body"></ng-content>

    </div>

</div>

**Directives**

**We use the directive to modify the DOM**

****

**Structural directives are prefix with asterisk:**

**ngIf :**

<div \*ngIf="courses.length > 0">

    List of courses

</div>

<div \*ngIf="courses.length == 0">

    No courses yet

</div>

**Other div will not be added in the DOM**

**We can implement it with template variable (use with hashtag) and ng-template :**

<div \*ngIf="courses.length > 0; else noCourses">

    List of courses

</div>

<ng-template #noCourses>

    No courses yet

</ng-template>

**Even we can implement in another way :**

<div \*ngIf="courses.length > 0; then coursesList else noCourse"></div>

<ng-template #coursesList>

    List of courses

</ng-template>

<ng-template #noCourse>

    List of courses

</ng-template>

**We can use hidden proeprty of html element**

<div hidden>

    List of courses

</div>

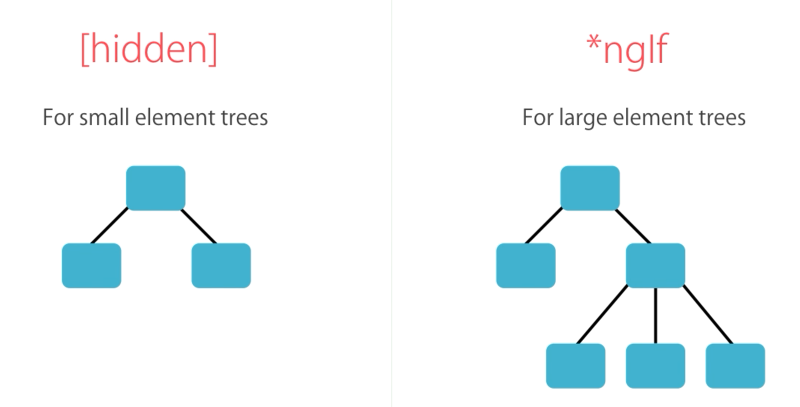
**And even we can bind it by property binding :**

<div [hidden]="courses.length == 0">

    List of courses

</div>

**Here elemenets are in the DOM but hidden not like ngIf**

****

**ngSwitchCase :**

<div [ngSwitch]="viewMode">

    <div \*ngSwitchCase="'map'">Map View Content </div>

    <div \*ngSwitchCase="'list'">List View Content </div>

    <div \*ngSwitchDefault>Otherwise</div>

</div>

  viewMode = 'map';

 changeViewMode(value: string) {

    this.viewMode = value;

  }

**ngFor :**

<ul>

    <li \*ngFor="let course of courses">{{course.name}}</li>

</ul>

  courses = [

    { id : 1, name:'course1' },

    { id : 2, name:'course2' },

    { id : 3, name:'course3' }

  ]

**Exported values in for :**

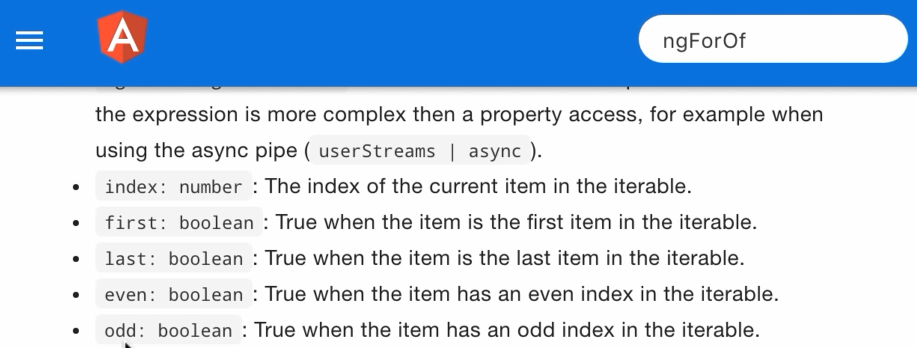
<ul>

    <li \*ngFor="let course of courses; index as i">

        {{ i }} - {{course.name}}

    </li>

</ul>

****

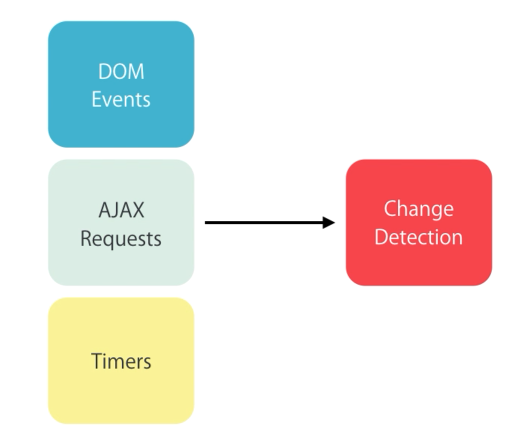
<ul>

    <li \*ngFor="let course of courses; even as isEven">

        {{course.name}} <span \*ngIf="isEven">EVEN</span>

    </li>

</ul>

****

<ul>

    <li \*ngFor="let course of courses; even as isEven">

        {{course.name}} <span \*ngIf="isEven">EVEN</span>

        <button (click)="onRemove(course)">remove</button>

    </li>

</ul>

  onRemove(course) {

**let** index = this.courses.indexOf(course);

    this.courses.splice(index, 1);

  }

**After removing the element angular will execute it’s change detection mechanism and realize one of the object in courses array is no longer there so it removes the corresponding ListItem in the DOM**

    <li \*ngFor="let course of courses; even as isEven">

        {{course.name}} <span \*ngIf="isEven">EVEN</span>

        <button (click)="onRemove(course)">remove</button>

        <button (click)="onChange(course)">Change</button>

    </li>

  onChange(course) {

    course.name = 'UPDATED';

  }

**After updating the value also angular will run it’s change detection mechanism**

At a high level, Angular walks your components from top to bottom, looking for changes. Angular runs its change detection mechanism periodically so that changes to the data model are reflected in an application’s view. Change detection can be triggered either manually or through an asynchronous event (for example, a user interaction or an XMLHttpRequest completion).

**F**

<button (click)="loadCourses()">Load Courses</button>

 loadCourses() {

    this.coursesForBtn = [

      { id : 1, name:'course1' },

      { id : 2, name:'course2' },

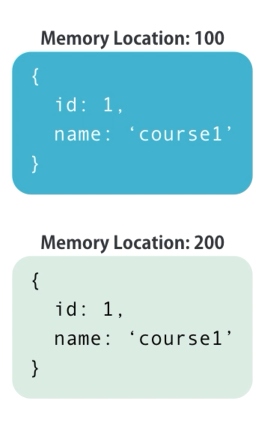
      { id : 3, name:'course3' }

    ]

  }

**When we click the load button several times tha angular will get the objects with same content from the server and populate the ul with same content but objects are different from the previous one in the memory so angular will reconstruct the DOM tree.**

**In ngFor we have this ability to specify how angular will track the objects by default it itracks them based on object identity (reference) in the memory**

****

**So we use different mechannism other than object identity in the memory and use their id’s for example :**

<ul>

    <li \*ngFor="let course of coursesForBtn; trackBy: trackCourse">

        {{course.name}}

    </li>

</ul>

  trackCourse(index, course) {

    return course ? course.id : undefined;

*// if we have a course object we want to return it's id otherwise we want to return undefined*

  }

**If we deal with large list using trackBy will have benefit but not with small list**