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Angular - Getting Started

Angular

- Angular is a framework for building modern single-page applications

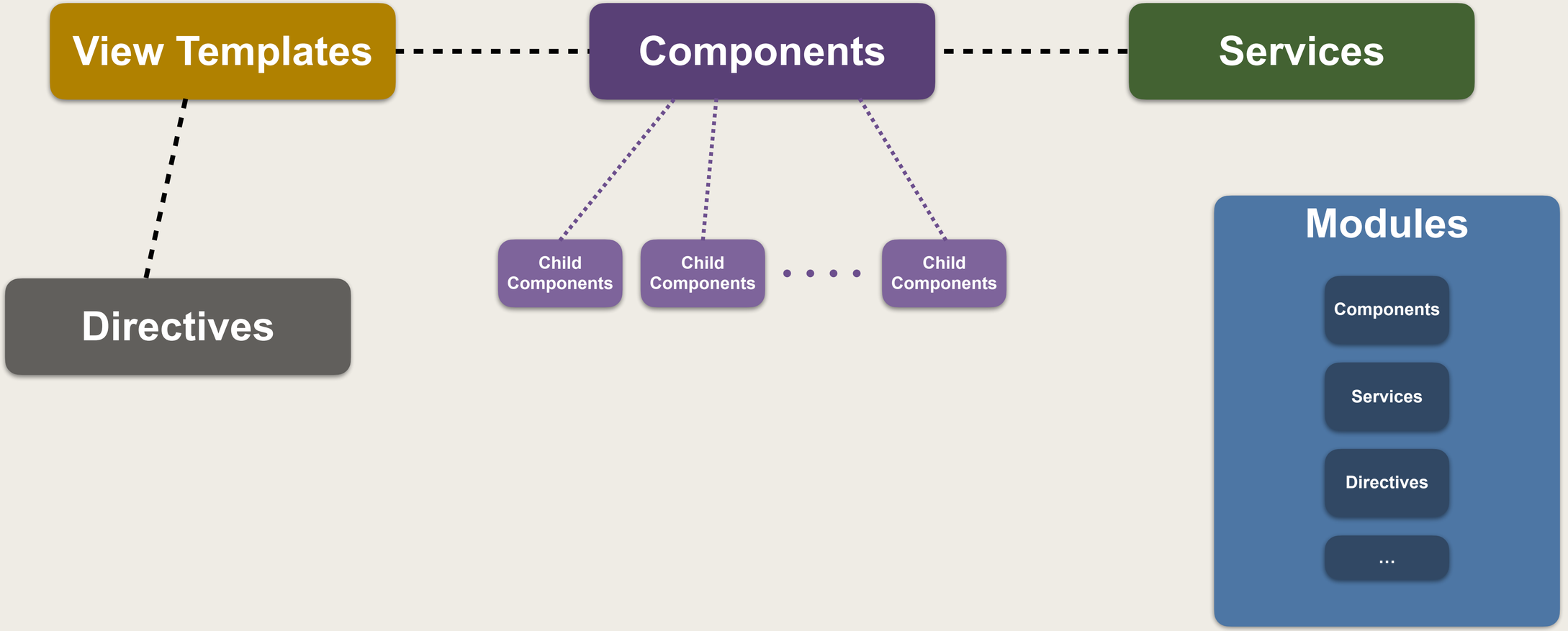
Official docs
Tutorials

www.angular.io

Angular Features

- Component-based framework
- Clean separation of template coding and application logic
- Built-in support for data-binding and dependency injection
- Supports responsive web design and modern frameworks
  - Bootstrap, Google Material Design (Angular Material) and others …

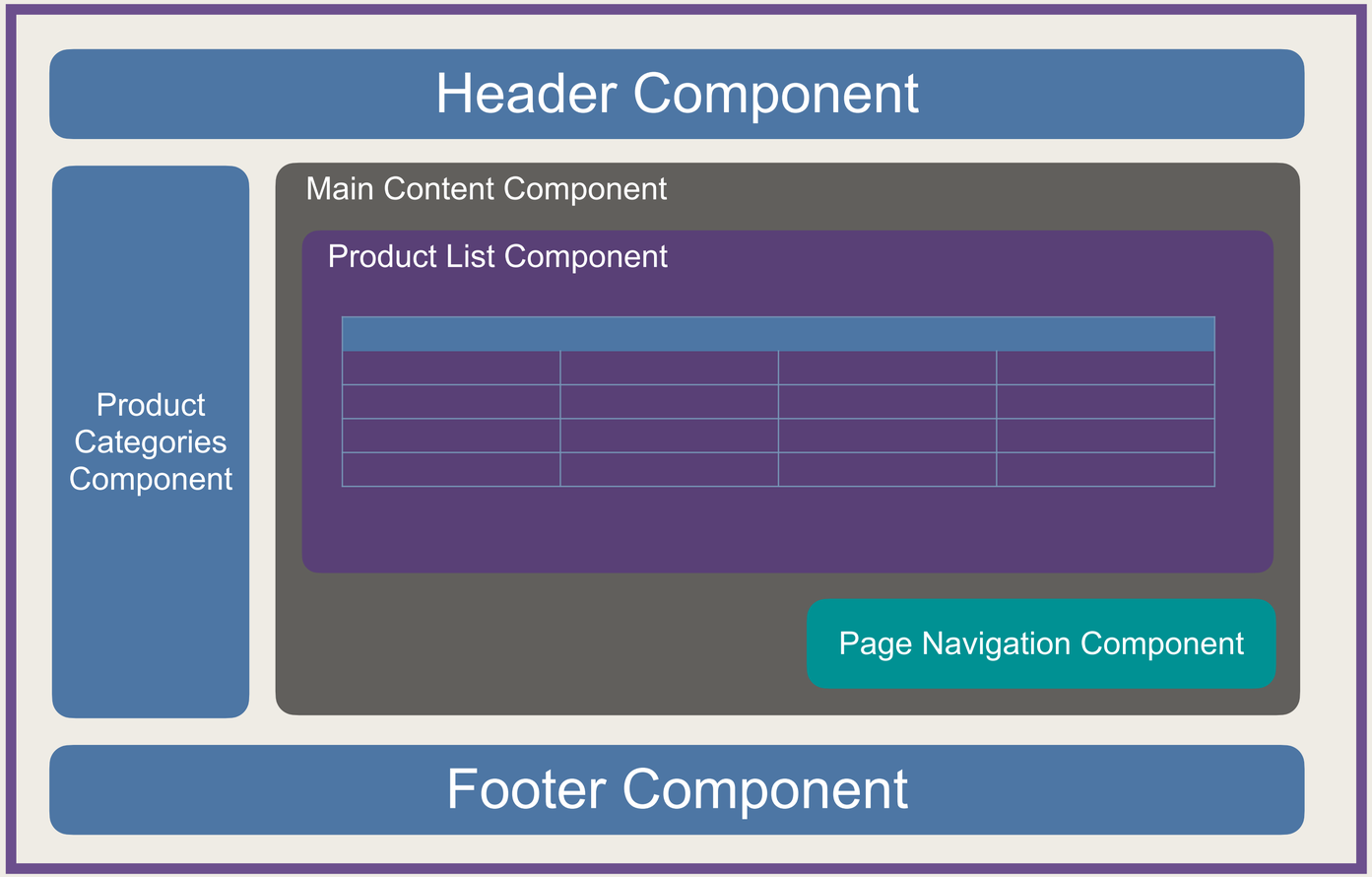
Angular Architecture



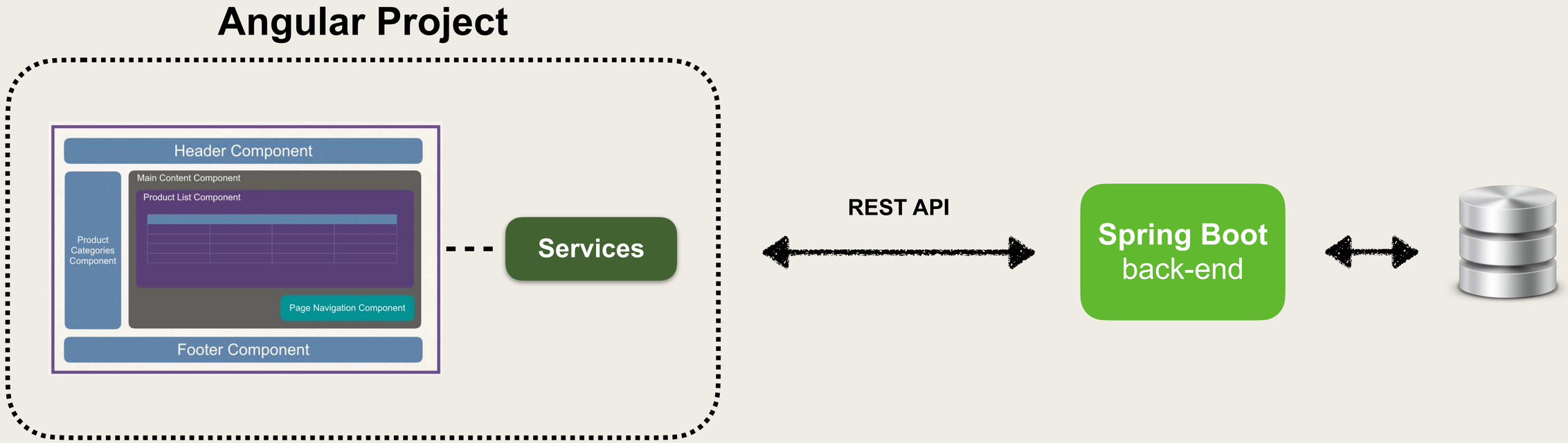
Key Terms

Term	Definition
Component	Main player in an Angular application. Has two parts: 1. View for user interface 2. Class that contains application logic / event handling for the view
View Template	The user interface for the component Static HTML with dynamic elements
Directive	Adds custom behavior to HTML elements Used for looping, conditionals etc
Service	Helper class that provides desired functionality Retrieving data from a server, performing a calculation, validation etc
Module	A collection of related components, directives, services etc

Application UI Composition



Application Interaction



Angular Project

- An Angular project is composed of multiple files

Creating an Angular Project

- Angular provides a command-line tool to generate a project
- Generates the starter files to help you bootstrap your project

http://cli.angular.io

Angular CLI

```
> npm install -g @angular/cli
```

```
> ng version
```

```
> ng help
```

Creating New Project with Angular CLI

```
> ng new <your-project-name>

> ng new my-first-angular-project
```

Running the Angular App

```
> cd <your-project

> cd my-first-angu
```

1. Builds the app (compile / transpile)
2. Starts the server
3. Watches the source files
4. Rebuilds the apps when source is updated (hot reload)

```
> ng serve
```

By default listens on port 4200
http

```
> ng serve --open
```

Same as above ...
But also opens a web browser to
http://localhost:4200

Changing the Server Port

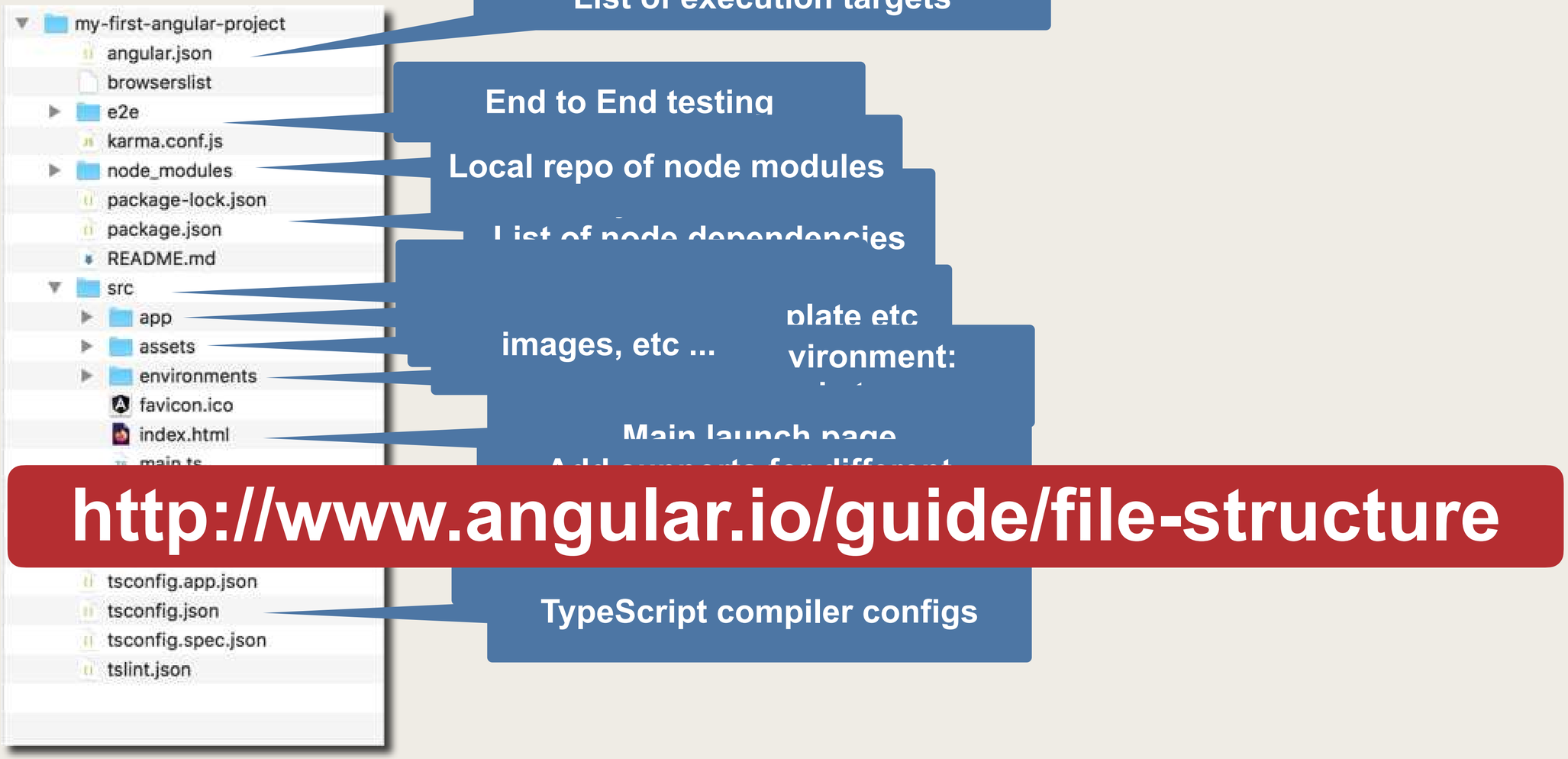
```
> ng serve --port 5100
```

Server listens on port 5100
http://localhost:5100

```
> ng serve --port 5100 --open
```

Same as above ...
But also opens a web browser to
http://localhost:5100

Project Files



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Angular - Behind the Scenes

Angular

- When we run the Angular app ... how is it loaded?

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>

</body>
</html>
```

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>

</body>
</html>
```

Replace this tag / selector
with the template of the component

(similar to an "include")

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>

</body>
</html>
```

1

File: src/app/app.component.ts

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

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'my-first-angular-project';
}
```

@Component is an Angular “Decorator”
Similar to
Annotations in Java

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>

</body>
</html>
```

1

2

File: src/app/app.component.ts

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

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'my-first-angular-project';
}
```

File: src/app/app.component.html

```
<span>{{ title }} app is running! YES YES SUCCESS!!!</span>
```

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>

</body>
</html>
```

1

File: src/app/app.component.ts

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

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'my-first-angular-project';
}
```

2

3

File: src/app/app.component.html

```
<span>{{ title }} app is running! YES YES SUCCESS!!!</span>
```

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>
```

1

File: src/app/app.component.ts

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

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'my-first-angular-project';
}
```

2

3

Read this property from the TypeScript class

File: src/app/app.component.html

```
<span>{{ title }} app is running! YES YES SUCCESS!!!</span>
```

Loading Angular App

File: src/index.html

```
<!doctype html>
<html lang="en">
...
<body>

  <app-root></app-root>

</body>
```

1

File: src/app/app.component.ts

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

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'my-first-angular-project';
}
```

2

3

4

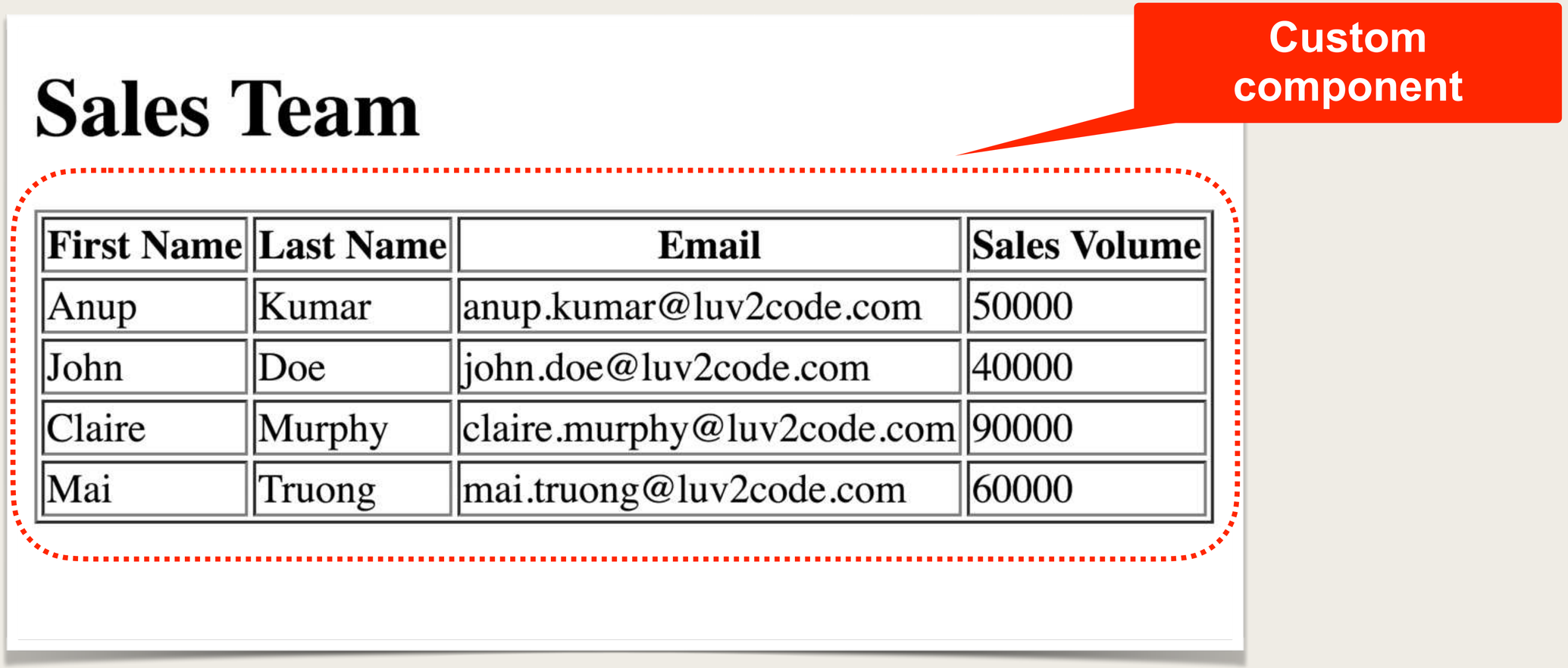
File: src/app/app.component.html

```
<span>{{ title }} app is running! YES YES SUCCESS!!!</span>
```

Angular - Create New Component

Our Goal

- Create a new Angular component to display a table of data



Development Process

1. Create a new project
2. Update main template page
3. Generate a new component
4. Add new component selector to app template page
5. Generate a SalesPerson class
6. In SalesPersonListComponent, create sample data
7. In sales-person-list template file, build HTML table by looping over data

Step 1: Create a new project

```
> ng new sales-project

> cd sales-project
```

Remember, this generates all of the Angular starter files for our project

Step 2: Update main template page

File: src/app/app.component.html

```
<h1>Sales Team</h1>
```

Remove all of the
Angular "placeholder" content

Just add basic HTML header

Step 3: Generate a new component

```
> ng generate component sales-person-list

CREATE src/app/sales-person-list/sales-person-list.component.css (0 bytes)
CREATE src/app/sales-person-list/sales-person-list.component.html (32 bytes)
CREATE src/app/sales-person-list/sales-person-list.component.spec.ts (693 bytes)
CREATE src/app/sales-person-list/sales-person-list.component.ts (311 bytes)
UPDATE src/app/app.module.ts (436 bytes)
```

About the Generated Files

sales-person-list.component.ts: the component class

sales-person-list.component.html: the component template HTML

sales-person-list.component.css: the component private CSS

sales-person-list.component.spec.ts: the unit test specifications

UPDATE src/app/app.module.ts: Adds the component to the main application module

Main Application Module

```
...

UPDATE src/app/app.module.ts: Adds the component to the main application module
```

```
...

import { AppComponent } from './app.component';
import { SalesPersonListComponent } from './sales-person-list/sales-person-list.component';

@NgModule({
  declarations: [
    AppComponent,
    SalesPersonListComponent
  ],
  ...
})
export class AppModule { }
```

Our new component was automatically added by the `ng generate component ...` command

Step 4: Add new component selector to app template page

File: src/app/app.component.html

```
<h1>Sales Team</h1>

<app-sales-person-list></app-sales-person-list>
```

1

2

File: src/app/sales-person-list/sales-person-list.component.ts

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

@Component({
  selector: 'app-sales-person-list',
  templateUrl: './sales-person-list.component.html',
  styleUrls: ['./sales-person-list.component.css']
})
export class SalesPersonListComponent implements OnInit {

  constructor() { }

  ngOnInit() {
  }

}
```

Later on,
we'll add sample data here

File: src/app/sales-person-list/sales-person-list.component.html

```
<p>sales-person-list works!</p>
```

Later on,
we'll add HTML table here

Step 5: Generate a SalesPerson class

```
> ng generate class sales-person-list/SalesPerson
```

Creates a basic TypeScript class

File: src/app/sales-person-list/sales-person.ts

```
export class SalesPerson {

    constructor(public firstName: string,
                public lastName: string,
                public email: string,
                public salesVolume: number) {

    }
}
```

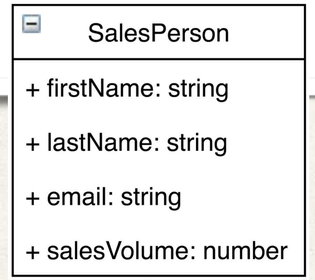
Step 5: Generate a SalesPerson class

```
> ng generate                                    lesPerson
```

Remember, these are Parameter Properties

File: src/app/sales-person-list/sales-person.ts

```
export class SalesPerson {

    constructor(public firstName: string,
                public lastName: string,
                public email: string,
                public salesVolume: number) {

    }
}
```



Declared by prefixing constructor argument with access modifier: `public`, `protected`, `private`, or `readonly`

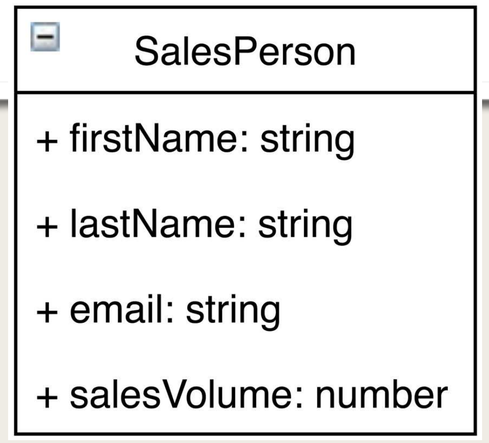
Declares properties and assigns properties automagically.

Minimizes boilerplate coding!

About "public" properties

File: src/app/sales-person-list/sales-person.ts

```
export class SalesPerson {

    constructor(public firstName: string,
                public lastName: string,
                public email: string,
                public salesVolume: number) {

    }
}
```



In Angular world, developers commonly use "public" properties

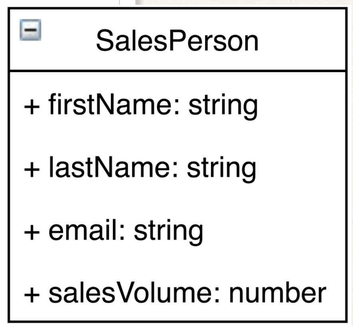
Step 6: In SalesPersonListComponent, create sample data

File: src/app/sales-person-list/sales-person-list.component.ts

```
import { Component, OnInit } from '@angular/core';
import { SalesPerson } from './sales-person';

@Component({
  selector: 'app-sales-person-list',
  templateUrl: './sales-person-list.component.html',
  styleUrls: ['./sales-person-list.component.css']
})
export class SalesPersonListComponent implements OnInit {

  // create an array of objects
  salesPersonList: SalesPerson[] = [
    new SalesPerson("Anup", "Kumar", "anup.kumar@luv2code.com", 50000),
    new SalesPerson("John", "Doe", "john.doe@luv2code.com", 40000),
    new SalesPerson("Claire", "Murphy", "claire.murphy@luv2code.com", 90000),
    new SalesPerson("Mai", "Truong", "mai.truong@luv2code.com", 60000)
  ]
  ...
}
```

Import our new class

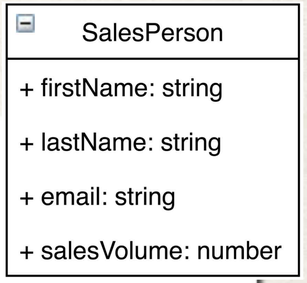
Create sample data



Step 7: In sales-person-list template file, build HTML table by looping over data

File: src/app/sales-person-list/sales-person-list.component.html

```
<table border="1">
    <thead>
        <tr>
            <th>First Name</th>
            <th>Last Name</th>
            <th>Email</th>
            <th>Sales Volume</th>
        </tr>
    </thead>

    <tbody>
        <tr *ngFor="let tempSalesPerson of salesPersonList">
            <td>{{ tempSalesPerson.firstName }}</td>
            <td>{{ tempSalesPerson.lastName }}</td>
            <td>{{ tempSalesPerson.email }}</td>
            <td>{{ tempSalesPerson.salesVolume }}</td>
        </tr>
    </tbody>
</table>
```




```
import { Component, OnInit } from '@angular/core';
import { SalesPerson } from './sales-person';

@Component({
  selector: 'app-sales-person-list',
  templateUrl: './sales-person-list.component.html',
  styleUrls: ['./sales-person-list.component.css']
})
export class SalesPersonListComponent implements OnInit {

  // create an array of objects
  salesPersonList: SalesPerson[] = [
    new SalesPerson("Anup", "Kumar", "anup.kumar@luv2code.com", 50000),
    new SalesPerson("John", "Doe", "john.doe@luv2code.com", 40000),
    new SalesPerson("Claire", "Murphy", "claire.murphy@luv2code.com", 90000),
    new SalesPerson("Mai", "Truong", "mai.truong@luv2code.com", 60000)
  ]
  ...
```

First Name	Last Name	Email	Sales Volume
Anup	Kumar	anup.kumar@luv2code.com	50000
John	Doe	john.doe@luv2code.com	40000
Claire	Murphy	claire.murphy@luv2code.com	90000
Mai	Truong	mai.truong@luv2code.com	60000

ngFor

- **ngFor** is a structural directive
- It renders a template for each item in a collection
- For complete documentation and examples, see:

http://angular.io/api/common/NgForOf

Integrate Angular with Bootstrap

Let's Make our Page Beautiful

Before

Sales Team

First Name	Last Name	Email	Sales Volume
Anup	Kumar	anup.kumar@luv2code.com	50000
John	Doe	john.doe@luv2code.com	40000
Claire	Murphy	claire.murphy@luv2code.com	90000
Mai	Truong	mai.truong@luv2code.com	60000

After

Sales Team

First Name	Last Name	Email	Sales Volume
Anup	Kumar	anup.kumar@luv2code.com	50000
John	Doe	john.doe@luv2code.com	40000
Claire	Murphy	claire.murphy@luv2code.com	90000
Mai	Truong	mai.truong@luv2code.com	60000

Bootstrap

Development Process

1. Get links for remote Bootstrap files

2. Add links to index.html

3. Apply Bootstrap CSS styles in component HTML template

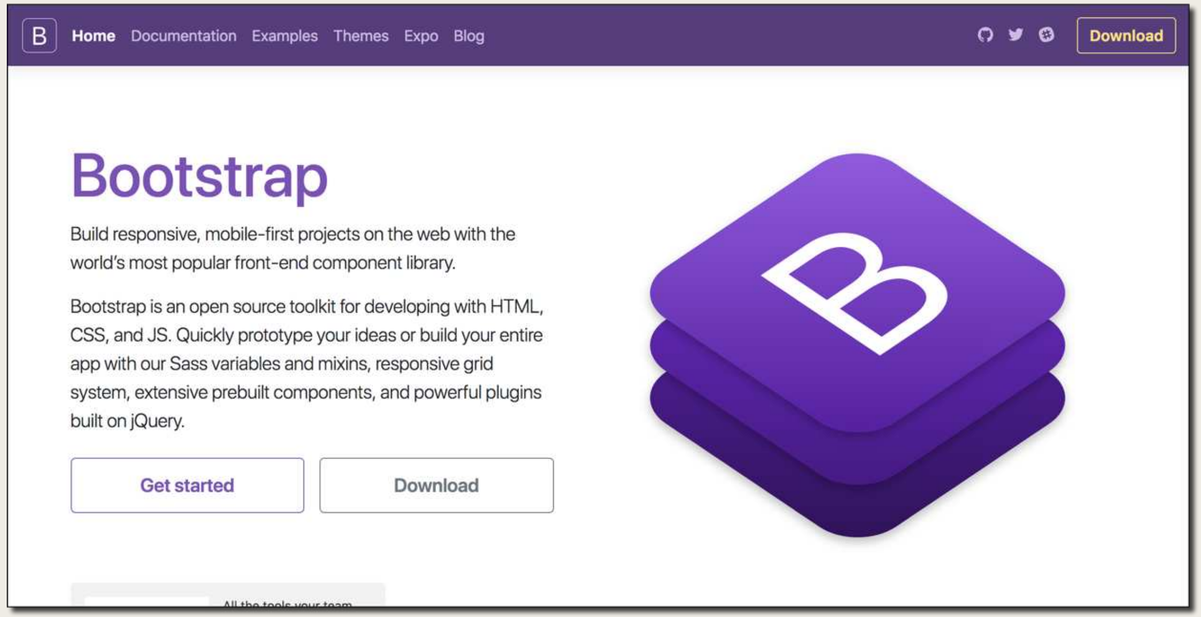
4. Apply Bootstrap CSS styles in component HTML table

5. Update TypeScript component file to reference Bootstrap HTML template

Step 1: Get links for remote Bootstrap files

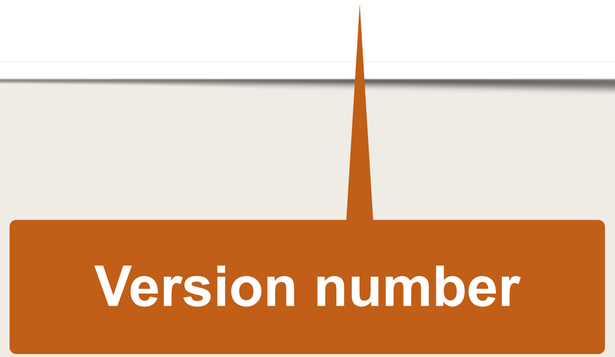
- Visit Bootstrap website: **`www.getbootstrap.com`**

- Website has instructions on how to **Get Started**



Step 2: Add links in index.html

```
<head>
    …
    <!-- Bootstrap CSS -->
    <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/x.y.z/css/bootstrap.min.css" …>
    …
</head>
```



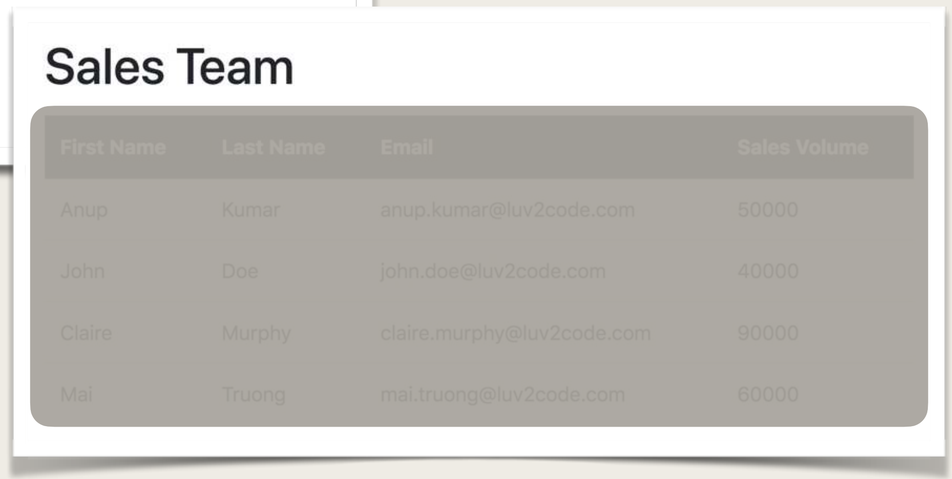
Step 3: Apply CSS in Component HTML template

Bootstrap CSS style

Bootstrap CSS styles

File: src/app/app.component.html

```
<div class="container">

  <h1 class="mt-3 mb-3">Sales Team</h1>

  <app-sales-person-list></app-sales-person-list>

</div>
```



Step 4: Apply CSS in Component HTML Table

File: src/app/sales-person-list/sales-person-list-bootstrap.component.html

```
<table class="table table-hover">

    <thead class="thead-dark">
        <tr>
            <th>First Name</th>
            <th>Last Name</th>
            <th>Email</th>
            <th>Sales Volume</th>
        </tr>
    </thead>

    <tbody>
      ... ...
    </tbody>
</table>
```

Bootstrap CSS styles

First Name	Last Name	Email	Sales Volume
Anup	Kumar	anup.kumar@luv2code.com	50000
John	Doe	john.doe@luv2code.com	40000
Claire	Murphy	claire.murphy@luv2code.com	90000
Mai	Truong	mai.truong@luv2code.com	60000

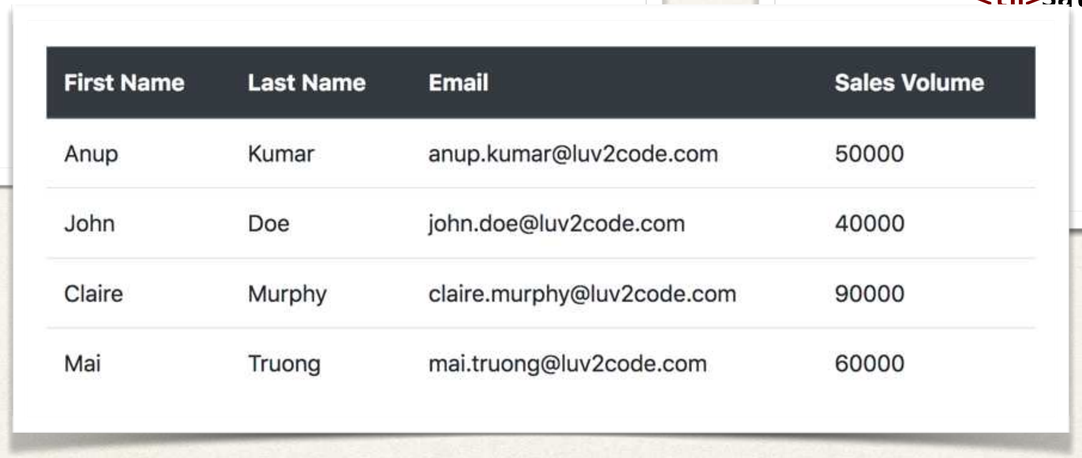
Step 5: Update TypeScript component file

File: src/app/sales-person-list/sales-person-list.component.ts

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

@Component({
  selector: 'app-sales-person-list',
  templateUrl: './sales-person-list-bootstrap.component.html',
  styleUrls: ['./sales-person-list.component.css']
})
export class SalesPersonListComponent implements OnInit {

  ... ...

}
```

File: src/app/sales-person-list/sales-person-list-bootstrap.component.html

```
<table class="table table-hover">

    <thead class="thead-dark">
        <tr>
            <th>First Name</th>
            <th>Last Name</th>
            <th>Email</th>
            <th>Sales Volume</th>
```

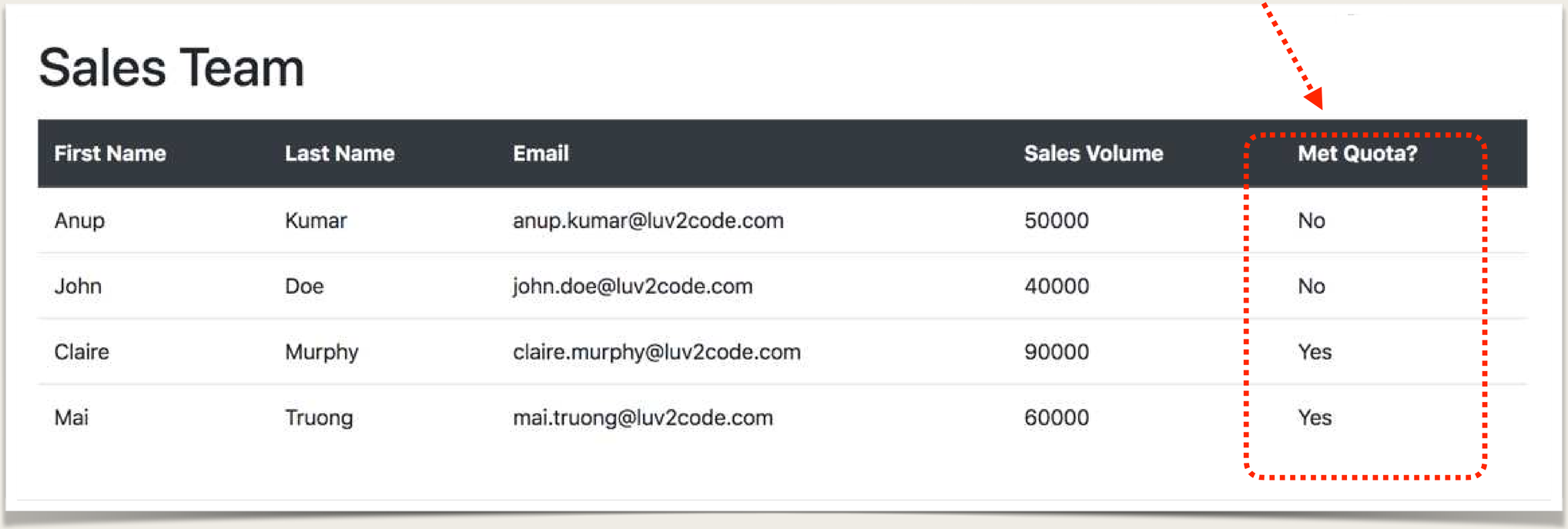


First Name	Last Name	Email	Sales Volume
Anup	Kumar	anup.kumar@luv2code.com	50000
John	Doe	john.doe@luv2code.com	40000
Claire	Murphy	claire.murphy@luv2code.com	90000
Mai	Truong	mai.truong@luv2code.com	60000

Angular: Conditionals and Formatting

Goal

- Add a new column to check if a sales person has met their quota



Conditional: ngIf

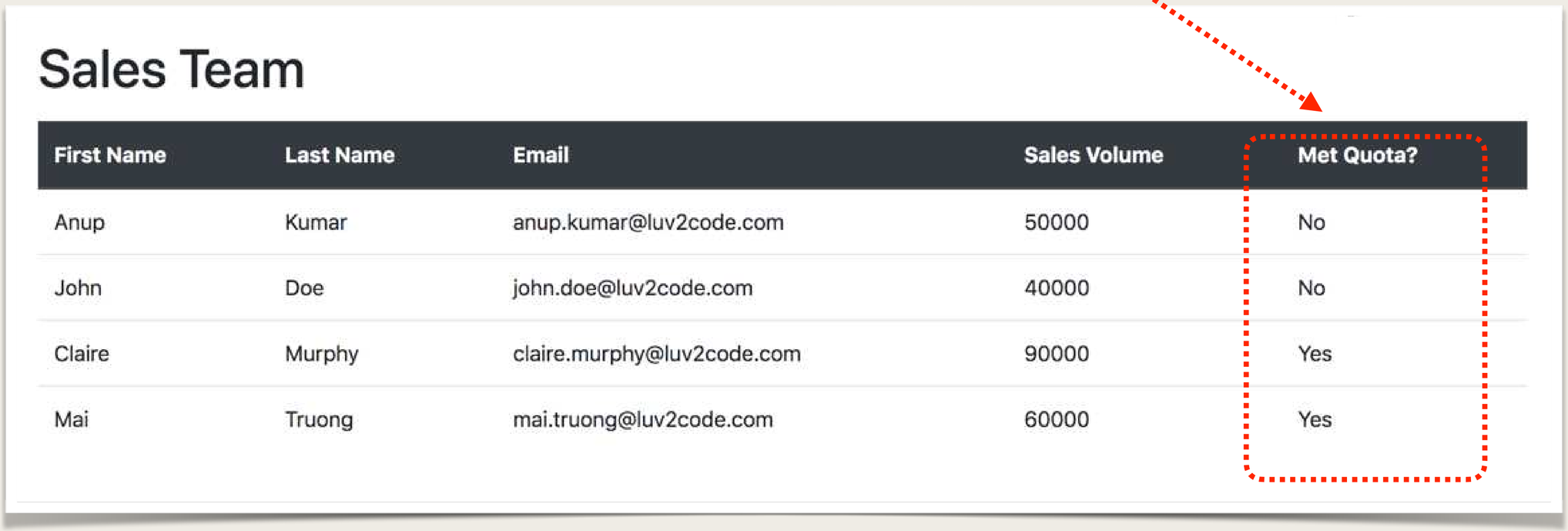
- Angular provides a structural directive: `ngIf`
- Show content based on a condition / boolean expression

```
<div *ngIf="some boolean expression">

  Show this content if the boolean expression is true

</div>
```

https://angular.io/api/common/NgIf

Example

- Our example: if salesVolume >= 60000, display **Yes** ... else **No**



Conditional with ngIf

```
<table class="table table-hover">
    <thead class="thead-dark">
        <tr>
            ...
            <th>Sales Volume</th>
            <th>Met Quota?</th>
        </tr>
    </thead>

    <tbody>
        <tr *ngFor="let tempSalesPerson of salesPerso
            ...
            <td>{{ tempSalesPerson.salesVolume }}</td>
            <td>
                <div *ngIf="tempSalesPerson.salesVolume >= 60000; else myElseBlock">Yes</div>
                <ng-template #myElseBlock>No</ng-template>
            </td>
        </tr>
    </tbody>
</table>
```

Conditional

Case of false

Case of true

Sales Team

First Name	Last Name	Email	Sales Volume	Met Quota?
Anup	Kumar	anup.kumar@luv2code.com	50000	No
John	Doe	john.doe@luv2code.com	40000	No
Claire	Murphy	claire.murphy@luv2code.com	90000	Yes
Mai	Truong	mai.truong@luv2code.com	60000	Yes

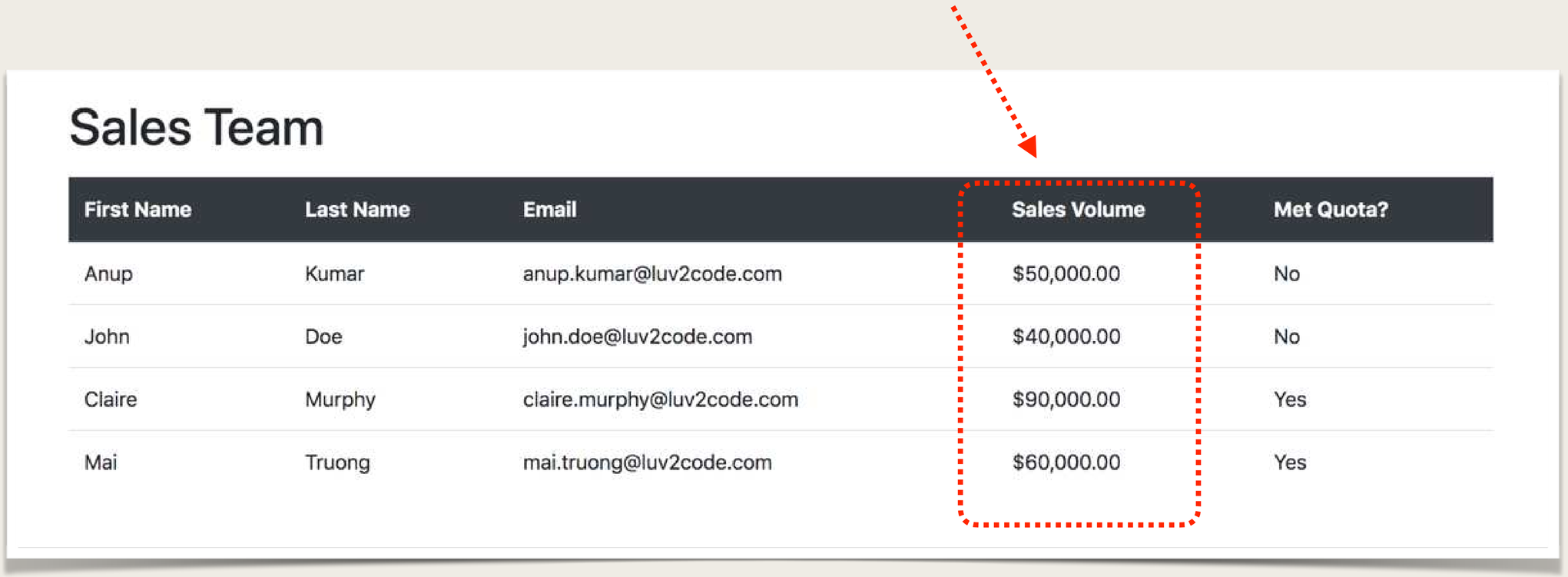
Angular Structural Directives

- Most commonly used structural directives: `ngFor` and `ngIf`
- Also there other such as `ngSwitch`, `ngStyle` etc ...
- See the documentation for details

https://angular.io/api/common#directives

Goal

- Format the Sales Volume as a currency, U.S. Dollars

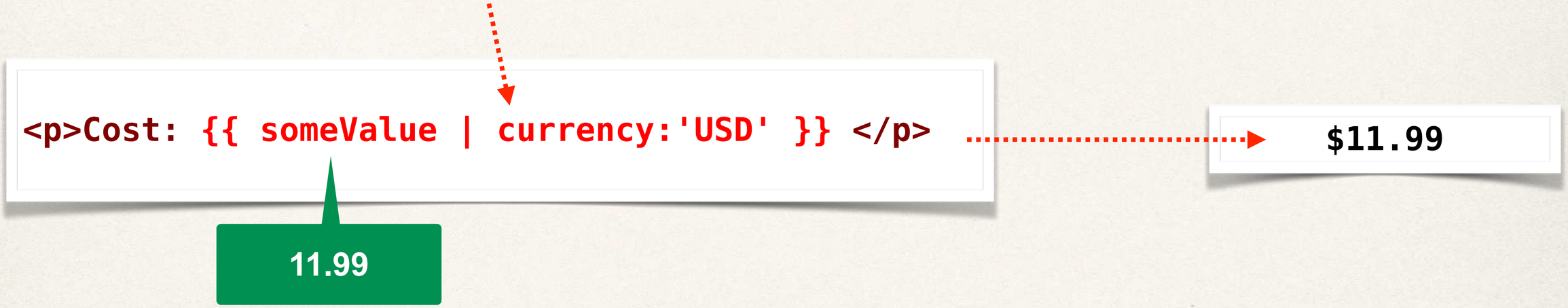


Sales Team

First Name	Last Name	Email	Sales Volume	Met Quota?
Anup	Kumar	anup.kumar@luv2code.com	$50,000.00	No
John	Doe	john.doe@luv2code.com	$40,000.00	No
Claire	Murphy	claire.murphy@luv2code.com	$90,000.00	Yes
Mai	Truong	mai.truong@luv2code.com	$60,000.00	Yes

Currency Formatting

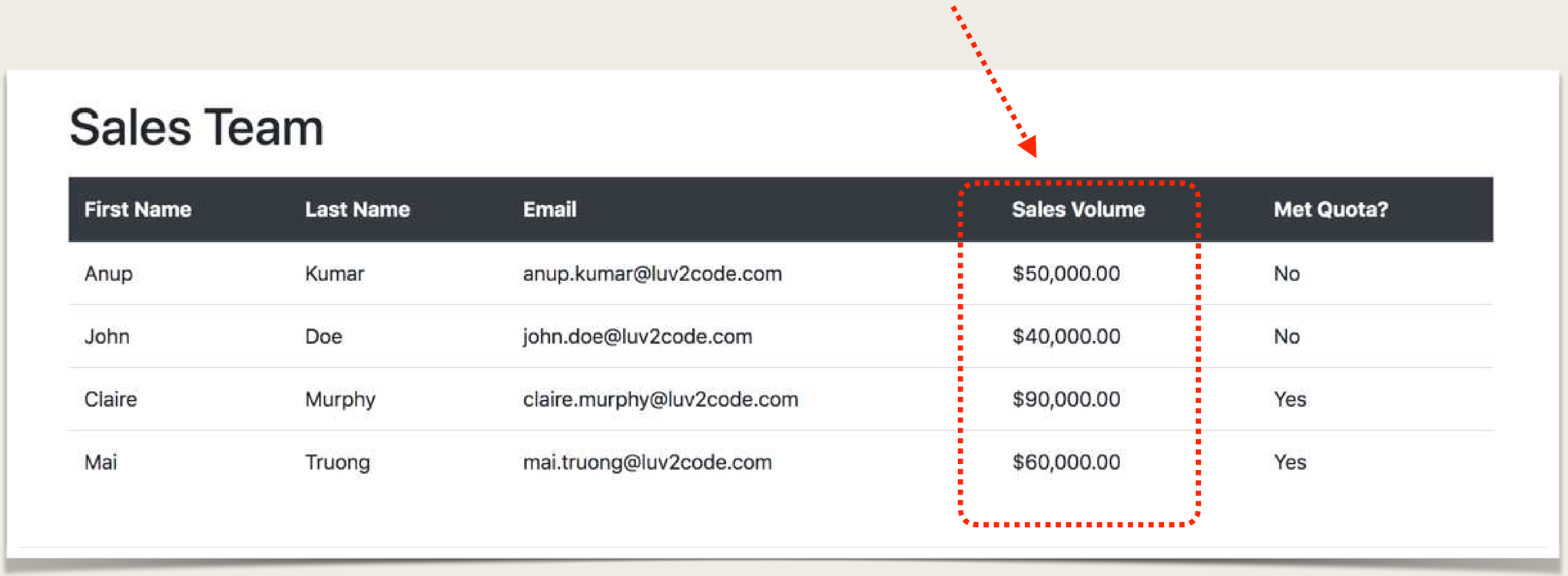
- Angular provides currency formatting using *Angular Pipes*
- You send data to a pipe for formatting



https://angular.io/api/common/CurrencyPipe

Example

- Our example: format sales volume as currency, U.S. Dollars



Sales Team

First Name	Last Name	Email	Sales Volume	Met Quota?
Anup	Kumar	anup.kumar@luv2code.com	$50,000.00	No
John	Doe	john.doe@luv2code.com	$40,000.00	No
Claire	Murphy	claire.murphy@luv2code.com	$90,000.00	Yes
Mai	Truong	mai.truong@luv2code.com	$60,000.00	Yes

Formatting with Currency Pipe

```
<table class="table table-hover">
    ...
    <tbody>
        <tr *ngFor="let tempSalesPerson of salesPersonList">
            ...
            <td>{{ tempSalesPerson.salesVolume | currency:'USD' }}</td>
            ...
       </tr>
    </tbody>
</table>
```

Formatting

Sales Team

First Name	Last Name	Email	Sales Volume	Met Quota?
Anup	Kumar	anup.kumar@luv2code.com	$50,000.00	No
John	Doe	john.doe@luv2code.com	$40,000.00	No
Claire	Murphy	claire.murphy@luv2code.com	$90,000.00	Yes
Mai	Truong	mai.truong@luv2code.com	$60,000.00	Yes

Angular Pipes

- Other pipes available such as `DatePipe`, `DecimalPipe`, etc ...
- See the documentation for details

https://angular.io/api/common#pipes