

# Angular 2+

## Workshop. Routing.

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## Explanation of Colors

**Black color** is a snippet of code that you need to fully use to create a new file, and in combination with **green** or **red**, the snippet of code that was added earlier.

**Green** is the snippet of code that needs to be added.

**Red** is the snippet of code that needs to be removed.

## Task 01. Basic Setup. <base> Tag.

1. Add tag base to the file **src/index.html**

```
<title>Angular Routing</title>  
<base href="/">  
<meta name="viewport" content="width=device-width, initial-scale=1">
```

## Task 02. Components

1. Create 3 blank components **HomeComponent**, **AboutComponent**, **PageNotFoundComponent**. Run the following commands in command line from project root folder<sup>1</sup>:

```
>ng g c components/home2 --spec=false --skip-import=true3
>ng g c components/about --spec=false --skip-import=true
>ng g c components/page-not-found --spec=false --skip-import=true
```

2. Create file **app/components/index.ts** and add the following snippet of code to it:

```
export * from './about/about.component';
export * from './home/home.component';
export * from './page-not-found/page-not-found.component';
```

---

<sup>1</sup> All commands run from project root folder.

<sup>2</sup> Routed components don't use selector. You can leave or remove selector for such components.

<sup>3</sup> The meaning of the flags is following

**--spec=false** – don't generate unit tests files.

**--skip-import** – don't register components in a module.

## Task 03. Routes Config

1. Create file **app/app.routing.module.ts**<sup>4</sup>. Add the following snippet of code to it.

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

import { AboutComponent, HomeComponent, PageNotFoundComponent } from './components';

const routes: Routes = [
  {
    path: 'home',
    component: HomeComponent
  },
  {
    path: 'about',
    component: AboutComponent
  },
  {
    path: '',
    redirectTo: '/home',
    pathMatch: 'full'
  },
  {
    // The router will match this route if the URL requested
    // doesn't match any paths for routes defined in our configuration
    path: '**',
    component: PageNotFoundComponent
  }
];

export let appRouterComponents = [AboutComponent, HomeComponent, PageNotFoundComponent];

@NgModule({
  imports: [
    RouterModule.forRoot(routes)
  ],
  exports: [RouterModule]
})
export class AppRoutingModule {}
```

---

<sup>4</sup> According to styleguide, the name of this file is **app-routing.module.ts**, and the name of class is AppRoutingModule. But I have changed this name to **app.routing.module.ts** to place this file near the file **app.module.ts**.

## Task 04. Import Routes

1. Make changes to the **AppModule**. Use the following snippets of code:

```
// 1
import { Router } from '@angular/router';
import { AppRoutingModule, appRouterComponents } from './app.routing.module';

// 2
declarations: [
  AppComponent,
  appRouterComponents
],
imports: [
  BrowserModule,
  FormsModule,
  AppRoutingModule
]

// 3
constructor(router: Router) {
  console.log('Routes: ', JSON.stringify(router.config, undefined, 2));
}
```

## Task 05. <router-outlet>

1. Make changes to the **AppComponent template**. Use the following snippet of HTML:

```
<div class="container">
  <router-outlet
    (activate)='onActivate($event)'
    (deactivate)='onDeactivate($event)'>
  </router-outlet>
  <!-- Routed views go here -->
</div>
```

2. Make changes to the **AppComponent**. Use the following snippet of code:

```
onActivate($event) {
  console.log('Activated Component', $event);
}

onDeactivate($event) {
  console.log('Deactivated Component', $event);
}
```



## Task 06. routerLink

1. Make changes to the **AppComponent template**. Use the following snippet of HTML:

```
// 1
<a class="navbar-brand" routerLink="/home">Task Manager</a>

// 2
<a routerLink="/about">About</a>
```

## Task 07. routerLinkActive

1. Make changes to **AppComponent template**. Use the following snippet of HTML:

```
<li routerLinkActive="active">  
  <a routerLink="/about">About</a>  
</li>
```

## Task 08. Task Feature Module

1. Create module **TasksModule**. Run the following command from command line:

```
>ng g m tasks
```

2. Make changes to the **TasksModule**. Use the following snippet of code:

```
import { NgModule } from '@angular/core';
import { FormsModule } from '@angular/forms';
import { CommonModule } from '@angular/common';

@NgModule({
  declarations: [
  ],
  imports: [
    CommonModule,
    FormsModule
  ],
  providers: [
  ]
})
export class TasksModule {}
```

3. Create a **model of task**. Run the following command from command line:

```
>ng g cl tasks/models/task.model --spec=false
```

4. Replace the content of the class. Use the following snippet of code:

```
export class Task {
  constructor(
    public id: number,
    public action: string,
    public priority: number,
    public estHours: number,
    public actHours?: number,
    public done?: boolean
  ) {
    this.actHours = actHours || 0;
    this.done = done || false;
  }
}
```

5. Create service **TaskArrayService**. Run the the following command from command line:

```
>ng g s tasks/services/task-array --spec=false -m=tasks
```

6. Replace the content of service **TaskArrayService**. Use the following snippet of code:

```
import { Injectable } from '@angular/core';
import { Task } from './../../models/task.model';

const taskList = [
  new Task(1, 'Estimate', 1, 8, 8, true),
  new Task(2, 'Create', 2, 8, 4, false),
```

```

    new Task(3, 'Deploy', 3, 8, 0, false)
  ];

const taskListPromise = Promise.resolve(taskList);

@Injectable()
export class TaskArrayService {

  getTasks(): Promise<Task[]> {
    return taskListPromise;
  }

  getTask(id: number | string): Promise<Task> {
    return this.getTasks()
      .then(tasks => tasks.find(task => task.id === +id))
      .catch(() => Promise.reject('Error in getTask method'));
  }

  addTask(task: Task): void {
    taskList.push(task);
  }

  updateTask(task: Task): void {
    const i = taskList.findIndex(t => t.id === task.id);

    if (i > -1) {
      taskList.splice(i, 1, task);
    }
  }

  completeTask(task: Task): void {
    task.done = true;
  }
}

```

7. Create **TaskListComponent**. Run the following command from command line.

```
app>ng g c tasks/task-list --spec=false
```

8. Replace the content of **TaskListComponent**. Use the following snippet of code:

```

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

import { Task } from './../../models/task.model';
import { TaskArrayService } from './../../services/task-array.service';

@Component({
  templateUrl: './task-list.component.html',
  styleUrls: ['./task-list.component.css']
})
export class TaskListComponent implements OnInit {
  tasks: Array<Task>;

  constructor(
    private taskArrayService: TaskArrayService) { }

  ngOnInit() {
    this.getTasks().catch(err => console.log(err));
  }
}

```

```

    }

    completeTask(task: Task): void {
        this.taskArrayService.completeTask(task);
    }

    editTask(task: Task): void {

    }

    private async getTasks() {
        this.tasks = await this.taskArrayService.getTasks();
    }
}

```

9. Replace the content of **TaskListComponent template**. Use the following snippet of HTML:

```

<app-task
  *ngFor="let task of tasks"
  [task]="task"
  (complete)="completeTask($event)"
  (edit)="editTask($event)">
</app-task>

```

10. Create **TaskComponent**. Run the following command from command line:

```
>ng g c tasks/task --spec=false -cd=OnPush
```

11. Replace the content of **TaskComponent**. Use the following snippet of code:

```

import { Component, EventEmitter, Input, Output, ChangeDetectionStrategy } from '@angular/core';
import { Task } from '../models/task.model';

@Component({
  selector: 'app-task',
  templateUrl: './task.component.html',
  styleUrls: ['./task.component.css'],
  changeDetection: ChangeDetectionStrategy.OnPush
})
export class TaskComponent {
  @Input() task: Task;

  @Output() complete = new EventEmitter<Task>();
  @Output() edit = new EventEmitter<Task>();

  completeTask(): void {
    this.complete.emit(this.task);
  }

  editTask() {
    this.edit.emit(this.task);
  }
}

```

12. Replace the content of **TaskComponent template**. Use the following snippet of HTML:

```

<div class="panel panel-default">
  <div class="panel-heading">Task</div>

```

```

<div class="panel-body">
  <ul>
    <li>Action: {{task.action}}</li>
    <li>Priority: {{task.priority}}</li>
    <li>Estimate Hours: {{task.estHours}}</li>
    <li>Actual Hours: {{task.actHours}}</li>
    <li>Done: {{task.done}}</li>
  </ul>
  <button class="btn btn-primary btn-sm"
    (click)="completeTask()"
    [disabled]="task.done">
    Done
  </button>
  <button class="btn btn-warning btn-sm"
    (click)="editTask()">
    Edit
  </button>
</div>
</div>

```

13. Create file **tasks/index.ts**. Add the following snippet of code to it:

```

export * from './services/task-array.service';

export * from './task/task.component';
export * from './task-list/task-list.component';

```

14. Make changes to **TasksModule**. Use the following snippet of code:

```

import { TaskListComponent } from './task-list/task-list.component';
import { TaskComponent } from './task/task.component';
import { TaskArrayService } from './services/task-array.service';

import { TaskListComponent, TaskComponent, TaskArrayService } from '.';

```

## Task 09. Tasks Feature Route Configuration

1. Create file **tasks/tasks.routing.module.ts**. Use the following snippet of code:

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

import { TaskListComponent } from '.';

const routes: Routes = [
  {
    path: 'task-list',
    component: TaskListComponent
  }
];

@NgModule({
  imports: [
    RouterModule.forChild(routes)
  ],
  exports: [RouterModule]
})
export class TasksRoutingModule { }
```

## Task 10. Register Task Feature Routing

1. Make changes to **TaskModule**. Use the following snippet of code:

```
// 1
import { TasksRoutingModule } from './tasks.routing.module';

// 2
imports: [
  CommonModule,
  FormsModule,
  TasksRoutingModule
]
```



## Task 11. Register Tasks Feature Module

1. Make changes to **AppModule**. Use the following snippet of code:

```
// 1
import { TasksModule } from './tasks/tasks.module';

// 2
imports: [
  BrowserModule,
  FormsModule,
  TasksModule,
  AppRoutingModule
],
```

## Task 12. Tasks List on Home Page

1. Make changes to **TasksRoutingModule**. Use the following snippet of code:

```
const routes: Routes = [  
  {  
    path: 'task-list',  
    path: 'home',  
    component: TaskListComponent  
  }  
];
```

2. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
// 1  
import { AboutComponent, HomeComponent, PageNotFoundComponent } from './components';  
{  
  path: 'home',  
  component: HomeComponent  
},  
  
// 2  
export let appRouterComponents = [AboutComponent, HomeComponent, PageNotFoundComponent];
```

3. Make changes to file **app/components/index.ts**. Use the following snippet of code:

```
export * from './about/about.component';  
export * from './home/home.component';  
export * from './page-not-found/page-not-found.component';
```

4. Delete **HomeComponent** (folder components/home)

## Task 13. Navigate

1. Create **TaskFormComponent**. Run the following command from command line:

> **ng g c tasks/task-form --spec=false --skip-import=true**

2. Replace the content of **TaskFormComponent**. Use the following snippet of code:

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

import { Task } from '../models/task.model';
import { TaskArrayService } from '../services/task-array.service';

@Component({
  templateUrl: './task-form.component.html',
  styleUrls: ['./task-form.component.css']
})
export class TaskFormComponent implements OnInit {
  task: Task;

  constructor(
    private taskArrayService: TaskArrayService,
  ) { }

  ngOnInit(): void {
    this.task = new Task(null, '', null, null);
  }

  saveTask() {
    const task = {...this.task};

    if (task.id) {
      this.taskArrayService.updateTask(task);
    }
    else {
      this.taskArrayService.addTask(task);
    }
  }

  goBack(): void {
  }
}
```

3. Replace the content of **TaskFormComponent template**. Use the following snippet of HTML:

```
<div class="panel panel-default">
  <div class="panel-heading">
    <h4 class="panel-title">
      Task Form
    </h4>
  </div>
  <div class="panel-body">
    <form *ngIf="task" (ngSubmit)="saveTask()" id="task-form" #form="ngForm">
      <div class="form-group">
        <label for="action">Action</label>
        <input type="text"
          class="form-control"
          id="action" name="action"
          placeholder="Action"
          required
        >
      </div>
    </form>
  </div>
</div>
```

```

        [(ngModel)]="task.action">
    </div>
    <div class="form-group">
        <label for="priority">Priority</label>
        <input type="number"
            min="1" max="3"
            class="form-control"
            id="priority" name="priority"
            placeholder="Priority"
            [(ngModel)]="task.priority">
    </div>
    <div class="form-group">
        <label for="estHours">Est. Hours</label>
        <input type="number"
            min="0"
            step="2"
            class="form-control"
            id="estHours" name="estHours"
            placeholder="Est. Hours"
            [(ngModel)]="task.estHours">
    </div>
    <button
        type="submit"
        class="btn btn-primary"
        form="task-form"
        [disabled]="form.invalid" >Save
    </button>
    <button
        type="button"
        class="btn btn-primary"
        (click)="goBack()">Back
    </button>
</form>
</div>
</div>

```

4. Make changes to the file **tasks/index.ts**. Use the following snippet of code:

```

export * from './task/task.component';
export * from './task-form/task-form.component';
export * from './task-list/task-list.component';

```

5. Make changes to **TasksModule**. Use the following snippet of code:

```

import { TaskListComponent, TaskComponent, TaskFormComponent, TaskArrayService } from '.';

```

6. Make changes to **TasksRoutingModule**. Use the following snippet of code:

```

// 1
import { TaskListComponent, TaskFormComponent } from '.';

// 2
const routes: Routes = [
    {
        path: 'home',
        component: TaskListComponent
    },

```

```
{
  path: 'edit/:id',
  component: TaskFormComponent
}
];
```

7. Make changes to **TaskListComponent**. Use the following snippet of code:

```
// 1
import { Router } from '@angular/router';

// 2
constructor(
  private router: Router,
  private taskArrayService: TaskArrayService
) { }

// 3
editTask(task: Task) {
  const link = ['/edit', task.id];
  this.router.navigate(link);
}
```

## Task 14. Getting the route parameter

1. Make changes to **TaskFormComponent**. Use the following snippet of code:

```
// 1
import { ActivatedRoute, Params } from '@angular/router';

// rxjs
import { switchMap } from 'rxjs/operators';

// 2
constructor(
  private taskArrayService: TaskArrayService,
  private route: ActivatedRoute
) { }

// 3
ngOnInit(): void {
  this.task = new Task(null, '', null, null);

  // it is not necessary to save subscription to route.paramMap
  // it handles automatically
  this.route.paramMap
    .pipe(
      switchMap((params: Params) => this.taskArrayService.getTask(+params.get('id')))
    )
    .subscribe(
      task => this.task = {...task},
      err => console.log(err)
    );
}
```

## Task 15. Navigate Back

1. Make changes to **TaskFormComponent**. Use the following snippet of code:

```
// 1
import { Location } from '@angular/common';

// 2
constructor(
  private taskArrayService: TaskArrayService,
  private location: Location,
  private route: ActivatedRoute
) { }

// 3
goBack(): void {
  this.location.back();
}

// 4
if (task.id) {
  this.taskArrayService.updateTask(task);
}
else {
  this.taskArrayService.addTask(task);
}

this.goBack();
```

## Task 16. Secondary Router Outlet

1. Make changes to **AppComponent** template. Use the following snippet of HTML:

```
<div class="container">
  <router-outlet
    (activate)='onActivate($event)'
    (deactivate)='onDeactivate($event)'>
  </router-outlet>
  <!-- Routed views go here -->
</div>

<div class="container">
  <div class="col-md-10">
    <router-outlet
      (activate)='onActivate($event)'
      (deactivate)='onDeactivate($event)'>
    </router-outlet>
    <!-- Routed views go here -->
  </div>
  <div class="col-md-2">
    <router-outlet name="popup"></router-outlet>
  </div>
</div>
```

2. Create **CoreModule**. Run the following command from command line:

```
>ng g m core -m=app --spec=false
```

3. Replace the content of **CoreModule**. Use the following snippet of code:

```
import { NgModule, Optional, SkipSelf } from '@angular/core';
import { CommonModule } from '@angular/common';

@NgModule({
  imports: [
    CommonModule
  ],
  declarations: []
})
export class CoreModule {
  constructor(@Optional() @SkipSelf() parentModule: CoreModule) {
    if (parentModule) {
      throw new Error(`CoreModule is already loaded. Import it in the AppModule only.`);
    }
  }
}
```

4. Create **MessagesService**. Run the following command from command line

```
>ng g s core/services/messages --spec=false -m=core
```

5. Replace the content of **MessagesService**. Use the following snippet of code:

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

@Injectable()
```



```

export class MessagesService {
  isDisplayed = false;

  private messages: string[] = [];

  constructor() { }

  addMessage(message: string): void {
    const currentDate = new Date();
    this.messages.unshift(`${message} at ${currentDate.toLocaleString()}`);
  }

  getMessages(): Array<string> {
    return this.messages;
  }

  clearMessageList(): void {
    this.messages.length = 0;
  }
}

```

6. Create file **core/services/index.ts**. Use the following snippet of code:

```

export * from './messages.service';

```

7. Create **MessagesComponent**. Run the following command from command line:

```

>ng g c core/components/messages --spec=false -m=core

```

8. Replace the content of **MessagesComponent template**. Use the following snippet of code:

```

<div class="row">
  <h4 class="col-md-10">Message Log</h4>
  <span class="col-md-2">
    <a class="btn btn-default" (click)="close()">x</a>
  </span>
</div>
<div *ngFor="let message of messagesService.getMessages(); let i=index">
  <div class="message-row">
    {{message}}
  </div>
</div>

```

9. Replace the content of **MessagesComponent style**. Use the following snippet of CSS:

```

.message-row {
  margin-bottom: 10px;
}

```

10. Replace the content of **MessagesComponent**. Use the following snippet of code:

```

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

import { MessagesService } from './../../services';

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

```

```

constructor(
  public messagesService: MessagesService,
  private router: Router
) { }

ngOnInit() {
}

close() {
  this.router.navigate([{ outlets: { popup: null } }]);
  this.messagesService.isDisplayed = false;
}
}

```

11. Create file **core/components/index.ts**. Use the following snippet of code:

```
export * from './messages/messages.component';
```

12. Make changes to **CoreModule**. Use the following snippet of code:

```
import { MessagesComponent } from './components/messages/messages.component';
import { MessagesService } from './services/messages.service';
```

13. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
// 1
import { MessagesComponent } from './core/components';

// 2
{
  path: 'messages',
  component: MessagesComponent,
  outlet: 'popup'
},

```

14. Make changes to **AppComponent**. Use the following snippet of code:

```
import { MessagesService } from './core/services';

constructor(public messagesService: MessagesService) { }

```

15. Make changes to AppComponent template. Use the following snippet of HTML:

```
<div class="col-md-2">
  <button class="btn btn-success"
    *ngIf="!messagesService.isDisplayed"
    [routerLink]="[{outlets: {popup: ['messages']}}]">
    Show Messages
  </button>
  <router-outlet name="popup"></router-outlet>
</div>

```

Look at the result.

16. Make changes to **AppComponent**. Use the following snippet of code:

```
// 1
import { Router } from '@angular/router';
```

```
// 2
constructor(
    public messagesService: MessagesService,
    private router: Router
) { }

// 3
displayMessages(): void {
    this.router.navigate([{ outlets: { popup: ['messages'] } }]);
    this.messagesService.isDisplayed = true;
}
```

17. Make changes to **AppComponent template**. Use the following snippet of HTML:

```
<button class="btn btn-success"
    *ngIf="!messagesService.isDisplayed"
    [routerLink]="[{outlets: {popup: ['messages']}}]">
    Show Messages
</button>
<button class="btn btn-success"
    *ngIf="!messagesService.isDisplayed"
    (click)="displayMessages()">Show Messages</button>
```

## Task 17. Users Components

1. Create **UsersModule**. Run the following command in the command line:

```
>ng g m users
```

2. Make changes to **UsersModule**. Use the following snippet of code:

```
import { NgModule } from '@angular/core';
import { FormsModule } from '@angular/forms';
import { CommonModule } from '@angular/common';

@NgModule({
  imports: [
    CommonModule,
    FormsModule,
  ],
  declarations: [
  ],
  providers: [
  ]
})
export class UsersModule {}
```

3. Create a **model of user**. Run the following command from command line:

```
>ng g cl users/models/user.model --spec=false
```

4. Replace the content of the class. Use the following snippet of code:

```
export class User {
  constructor(
    public id: number,
    public firstName: string,
    public lastName: string
  ) {}
}
```

5. Create **UserArrayService**. Run the following command from command line:

```
>ng g s users/services/user-array --spec=false -m=users
```

6. Replace the content of **UserArrayService**. Use the following snippet of code:

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

// rxjs
import { Observable } from 'rxjs/Observable';
import { of } from 'rxjs/observable/of';
import { map, catchError } from 'rxjs/operators';

import { User } from '../models/user.model';

const userList: Array<User> = [
  new User(1, 'Anna', 'Borisova'),
  new User(2, 'Boris', 'Vlasov'),
  new User(3, 'Gennadiy', 'Dmitriev')
];
```

```

const userListObservable: Observable<Array<User>> = of(userList);

@Injectable()
export class UserArrayService {
  getUsers(): Observable<User[]> {
    return userListObservable;
  }

  getUser(id: number | string): Observable<User> {
    return this.getUsers()
      .pipe(
        map((users: Array<User>) => users.find(user => user.id === +id)),
        catchError(err => Observable.throw('Error in getUser method'))
      );
  }

  addUser(user: User): void {
    userList.push(user);
  }

  updateUser(user: User): void {
    const i = userList.findIndex(u => u.id === user.id);

    if (i > -1) {
      userList.splice(i, 1, user);
    }
  }
}

```

7. Create **UserListComponent**. Run the following command from command line:

```
>ng g c users/user-list --spec=false --skip-import
```

8. Replace the content of **UserListComponent**. Use the following snippet of code:

```

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

// rxjs
import { Observable } from 'rxjs/Observable';
import { catchError } from 'rxjs/operators';

import { User } from '../models/user.model';
import { UserArrayService } from '../services/user-array.service';

@Component({
  templateUrl: './user-list.component.html',
  styleUrls: ['./user-list.component.css']
})
export class UserListComponent implements OnInit {
  users$: Observable<Array<User>>;

  constructor(
    private userArrayService: UserArrayService,
  ) { }

  ngOnInit() {
    this.users$ = this.userArrayService.getUsers();
  }
}

```

9. Make changes to **UserListComponent template**. Use the following snippet of HTML:

```
<app-user
  *ngFor="let user of users$ | async"
  [user]="user">
</app-user>
```

10. Create **UserComponent**. Run the following command from command line:

```
>ng g c users/user --spec=false -cd=OnPush --skip-import
```

11. Replace the content of **UserComponent**. Use the following snippet of code:

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

import { User } from '../models/user.model';

@Component({
  selector: 'app-user',
  templateUrl: './user.component.html',
  styleUrls: ['./user.component.css'],
  changeDetection: ChangeDetectionStrategy.OnPush
})
export class UserComponent {
  @Input() user: User;

  editUser() {
  }
}
```

12. Make changes to **UserComponent template**. Use the following snippet of HTML:

```
<div class="panel panel-default">
  <div class="panel-heading">User</div>
  <div class="panel-body">
    <ul>
      <li>FirtsName: {{user.firstName}}</li>
      <li>LastName: {{user.lastName}}</li>
    </ul>
    <button class="btn btn-warning btn-sm"
      (click)="editUser()">
      Edit
    </button>
  </div>
</div>
```

13. Create **UserFormComponent**. Run the following command from the command line:

```
app>ng g c users/user-form --spec=false --skip-import
```

14. Replace the content of **UserFormComponent**. Use the following snippet of code:

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

// rxjs
import { switchMap } from 'rxjs/operators';
```

```
import { User } from '../models/user.model';
import { UserArrayService } from '../services/user-array.service';
```

```
@Component({
  templateUrl: './user-form.component.html',
  styleUrls: ['./user-form.component.css'],
})
export class UserFormComponent implements OnInit {
  user: User;
  originalUser: User;

  constructor(
    private userArrayService: UserArrayService,
    private route: ActivatedRoute,
  ) { }

  ngOnInit(): void {
    this.user = new User(null, '', '');

    // we should recreate component because this code runs only once
    const id = +this.route.snapshot.paramMap.get('userID');
    this.userArrayService.getUser(id)
      .subscribe(
        user => {
          this.user = {...user};
          this.originalUser = {...user};
        },
        err => console.log(err)
      );
  }

  saveUser() {
    const user = {...this.user};

    if (user.id) {
      this.userArrayService.updateUser(user);
    } else {
      this.userArrayService.addUser(user);
    }
    this.originalUser = {...this.user};
  }

  goBack() {
  }
}
```

15. Make changes to **UserFormComponent template**. Use the following snippet of HTML:

```
<div class="panel panel-default">
  <div class="panel-heading">
    <h4 class="panel-title">
      User Form
    </h4>
  </div>
  <div class="panel-body">
    <form *ngIf="user" (ngSubmit)="saveUser()" id="user-form" #form="ngForm">
      <div class="form-group">
        <label for="firstName">First Name</label>
        <input type="text">
```

```

        class="form-control"
        id="firstName" name="firstName"
        placeholder="First Name"
        required
        [(ngModel)]="user.firstName">
    </div>
    <div class="form-group">
        <label for="lastName">Last Name</label>
        <input type="text"
            class="form-control"
            id="lastName" name="lastName"
            placeholder="Last Name"
            [(ngModel)]="user.lastName">
    </div>
    <button
        type="submit"
        class="btn btn-primary"
        [disabled]="form.invalid"
        form="user-form">Save
    </button>
    <button class="btn btn-primary"
        type="button"
        (click)="goBack()">Back
    </button>
</form>
</div>
</div>

```

16. Create file **users/index.ts**. Add the following snippet of code to it:

```

export * from './services/user-array.service';

export * from './user/user.component';
export * from './user-form/user-form.component';
export * from './user-list/user-list.component';

```

17. Make changes to **UsersModule**. Use the following snippet of code:

```

import { UserArrayService } from './services/user-array.service';

import { UserComponent } from './user/user.component';
import { UserComponent, UserArrayService } from '.';

```



## Task 18. Users Feature Area

1. Create **UsersComponent**. Run the following command from the command line:

```
>ng g c users/users --spec=false --flat --skip-import
```

2. Remove selector from meta data of **UsersComponent**.
3. Make changes to **UsersComponent template**. Use the following snippet of HTML:

```
<h2>Users</h2>
```

4. Make changes to the file **users/index.ts**. Use the following snippet of code:

```
export * from './users.component';
```

5. Make changes to **AppModule**. Use the following snippet of code:

```
// 1
import { TasksModule } from './tasks/tasks.module';
import { UsersModule } from './users/users.module';

// 2
imports: [
  BrowserModule,
  FormsModule,
  CoreModule,
  TasksModule,
  UsersModule,
  AppRoutingModule
],
```

## Task 19. Users Nested Routing

1. Make changes to **AppComponent** template. Use the following snippet of HTML:

```
<div>
  <ul class="nav navbar-nav">
    <li routerLinkActive="active">
      <a routerLink="/users">Users</a>
    </li>
  </ul>
</div>
```

2. Make changes to **UsersComponent** template. Use the following snippet of HTML:

```
<h2>Users</h2>
<router-outlet></router-outlet>
```

3. Create **UsersRoutingModule**. Use the following snippet of code:

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

import { UsersComponent, UserListComponent, UserFormComponent } from '.';

const routes: Routes = [
  {
    path: 'users',
    component: UsersComponent,
    children: [
      {
        path: 'add',
        component: UserFormComponent
      },
      {
        path: 'edit/:userID',
        component: UserFormComponent,
      },
      {
        path: '',
        component: UserListComponent
      },
    ],
  }
];

export const usersRouterComponents = [UsersComponent, UserListComponent, UserFormComponent];

@NgModule({
  imports: [
    RouterModule.forChild(routes)
  ],
  exports: [RouterModule]
})
export class UsersRoutingModule { }
```

4. Make changes to **UsersModule**. Use the following snippet of code:

```
import { UsersRoutingModule, usersRouterComponents } from './users.routing.module';
```

```
imports: [  
  CommonModule,  
  FormsModule,  
  UsersRoutingModule  
],  
declarations: [  
  usersRouterComponents,  
  UserComponent,  
]
```

## Task 20. Relative Navigation

1. Make changes to **UserComponent**. Use the following snippet of code:

```
// 1
import { Component, Input, ChangeDetectionStrategy, Output, EventEmitter } from '@angular/core';

// 2
@Output() edit = new EventEmitter<User>();

// 3
editUser() {
  this.edit.emit(this.user);
}
```

2. Make changes to **UserListComponent template**. Use the following snippet of HTML:

```
<app-user
  *ngFor='let user of users$ | async'
  [user]="user"
  (edit)="editUser($event)">
</app-user>
```

3. Make changes to **UserListComponent**. Use the following snippet of code:

```
// 1
import { Router, ActivatedRoute } from '@angular/router';

// 2
constructor(
  private userArrayService: UserArrayService,
  private router: Router,
  private route: ActivatedRoute
) { }

// 3
editUser(user: User) {
  const link = ['/users/edit', user.id];
  this.router.navigate(link);
  // or
  // const link = ['edit', user.id];
  // this.router.navigate(link, {relativeTo: this.route});
}
```

4. Make changes to **UserFormComponent**. Use the following snippet of code:

```
// 1
import { ActivatedRoute, Params, Router } from '@angular/router';

// 2
constructor(
  private userArrayService: UserArrayService,
  private route: ActivatedRoute,
  private router: Router
) { }

// 3
if (user.id) {
  this.userArrayService.updateUser(user);
}
```

```
} else {  
    this.userArrayService.addUser(user);  
}  
this.originalUser = {...this.user};  
this.goBack();  
  
// 4  
goBack() {  
    this.router.navigate(['../..'], { relativeTo: this.route});  
}
```

## Task 21. Optional Parameters

1. Make changes to the method **saveUser** of **UserFormComponent**. Use the following snippet of code:

```
if (user.id) {
  this.userArrayService.updateUser(user);
  this.router.navigate(['/users', {editedUserID: user.id}]);
} else {
  this.userArrayService.addUser(user);
  this.goBack();
}
this.originalUser = {...this.user};
this.goBack();
```

2. Make changes to **UserListComponent**. Use the following snippet of code:

```
// 1
import { ActivatedRoute, Params } from '@angular/router';
import { catchError, switchMap } from 'rxjs/operators';

// 2
private editedUser: User;

// 3
constructor(
  ...
  private route: ActivatedRoute
) { }

// 4
ngOnInit() {
  this.userArrayService.getUsers()
    .then(users => this.users = [...users])
    .catch(err => console.log(err));

  this.route.paramMap
    .pipe(
      switchMap((params: Params) => this.userArrayService.getUser(+params.get('editedUserID')))
    )
    .subscribe(
      (user: User) => {
        this.editedUser = {...user};
        console.log(`Last time you edited user ${JSON.stringify(this.editedUser)}`);
      },
      err => console.log(err)
    );
}

// 5
isEdited(user: User) {
  if (this.editedUser) {
    return user.id === this.editedUser.id;
  }
  return false;
}
```

3. Make changes to **UserListComponent template**. Use the following snippet of HTML:

```
<app-user
```

```
*ngFor='let user of users'  
[user]="user"  
(edit)="editUser($event)"  
[class.edited]="isEdited(user)">  
</app-user>
```

4. Make changes to **UserComponent style**. Use the following snippet of CSS:

```
:host.edited > div {  
  border: 2px dotted red;  
}
```

## Task 22. Admin Feature Area

1. Create **AdminModule** and **AdminRoutingModule**. Run the following command from command line:

```
>ng g m admin --routing=true -m=app
```

2. Rename the file **admin/admin-routing.modue.ts** to **admin/admin.routing.module.ts**.
3. Create the following blank components:
  - a. **AdminDashboardComponent**,
  - b. **ManageTasksComponent**,
  - c. **ManageUsersComponent**,
  - d. **AdminComponent**

Run the following commands from command line:

```
app> ng g c admin/admin-dashboard --spec=false --skip-import
app> ng g c admin/manage-tasks --spec=false --skip-import
app> ng g c admin/manage-users --spec=false --skip-import
app> ng g c admin/admin --spec=false --flat --skip-import
```

4. Make changes to **AdminComponent template**. Use the following snippet of HTML:

```
<h3>Admin</h3>
<nav>
  <ul class="nav nav-tabs">
    <li routerLinkActive="active" [routerLinkActiveOptions]="{ exact: true }">
      <a routerLink="./">Dashboard</a>
    </li>
    <li routerLinkActive="active">
      <a routerLink="./tasks">Manage Tasks</a>
    </li>
    <li routerLinkActive="active">
      <a routerLink="./users">Manage Users</a>
    </li>
  </ul>
</nav>
<router-outlet></router-outlet>
```

5. Create the file **admin/index.ts**. Use the following snippet of code:

```
export * from './admin.component';
export * from './admin-dashboard/admin-dashboard.component';
export * from './manage-tasks/manage-tasks.component';
export * from './manage-users/manage-users.component';
```

6. Replace the content of **AdminRoutingModule**. Use the following snippet of code:

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

import { AdminComponent, AdminDashboardComponent, ManageTasksComponent, ManageUsersComponent } from
'.';

const routes: Routes = [
  {
    path: 'admin',
    component: AdminComponent,
```



```

    children: [
      {
        path: '',
        children: [
          { path: 'users', component: ManageUsersComponent },
          { path: 'tasks', component: ManageTasksComponent },
          { path: '', component: AdminDashboardComponent }
        ]
      }
    ]
  }
];

export let adminRouterComponents = [AdminComponent, AdminDashboardComponent, ManageTasksComponent,
ManageUsersComponent];

@NgModule({
  imports: [
    RouterModule.forChild(routes)
  ],
  exports: [RouterModule]
})
export class AdminRoutingModule { }

```

7. Make changes to **AdminModule**. Use the following snippet of code:

```

// 1
import { AdminRoutingModule, adminRouterComponents } from './admin.routing.module';

// 2
declarations: [
  adminRouterComponents
],
imports: [
  CommonModule,
  AdminRoutingModule
]

```

8. Make changes to **AppComponent** template. Use the following snippet of HTML:

```

<li routerLinkActive="active">
  <a routerLink="/users">Users</a>
</li>

<li routerLinkActive="active">
  <a routerLink="/admin">Admin</a>
</li>

```

## Step\_23. canActivate Guard

1. Create **AuthGuard**. Run the following command from command line:

```
>ng g g core/guards/auth --spec=false -m=core
```

2. Make changes to the method **canActivate**. Use the following snippet of code:

```
canActivate(  
  next: ActivatedRouteSnapshot,  
  state: RouterStateSnapshot): Observable<boolean> | Promise<boolean> | boolean {  
  console.log('CanActivateGuard is called');  
  return true;  
}
```

3. Make changes to **AdminRoutingModule**. Use the following snippet of code:

```
import { AuthGuard } from '../core/guards/auth.guard';  
  
const adminRoutes: Routes = [  
  {  
    path: 'admin',  
    component: AdminComponent,  
    canActivate: [AuthGuard],  
    children: [  
      {  
        path: '',  
        children: [  
          { path: 'users', component: ManageUsersComponent },  
          { path: 'tasks', component: ManageTasksComponent },  
          { path: '', component: AdminDashboardComponent }  
        ]  
      }  
    ]  
  }  
];
```

## Task 24. Auth Service

1. Create **AuthService**. Run the following command from command line:

```
ng g s core/services/auth --spec=false -m=core
```

2. Make changes to the file **core/services/index.ts**. Use the following snippet of code:

```
export * from './auth.service';
```

3. Make changes to **CoreModule**. Use the following snippet of code:

```
import { AuthService } from './services/auth.service';
import { AuthService, MessagesService } from './services';
```

4. Replace the content of **AuthService**. Use the following snippet of code:

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

import { Observable } from 'rxjs/Observable';
import { of } from 'rxjs/observable/of';
import { delay, tap } from 'rxjs/operators';

@Injectable()
export class AuthService {
  isLoggedIn = false;

  // store the URL so we can redirect after logging in
  redirectUrl: string;

  login(): Observable<boolean> {
    return of(true).pipe(
      delay(1000),
      tap(val => this.isLoggedIn = true)
    );
  }

  logout(): void {
    this.isLoggedIn = false;
  }
}
```

5. Make changes to **AuthGuard**. Use the following snippet of code:

```
//
import { CanActivate, ActivatedRouteSnapshot, RouterStateSnapshot, Router } from '@angular/router';
import { AuthService } from '../services/auth.service';

// 2
constructor(
  private authService: AuthService,
  private router: Router
) {}

// 3
private checkLogin(url: string): boolean {
  if (this.authService.isLoggedIn) { return true; }

  // Store the attempted URL for redirecting
  this.authService.redirectUrl = url;
```

```
// Navigate to the login page
this.router.navigate(['/login']);
return false;
}
```

6. Make changes to method **canActivate of AuthGuard**. Use the following snippet of code:

```
canActivate(next: ActivatedRouteSnapshot, state: RouterStateSnapshot): Observable<boolean> | Promise
<boolean> | boolean {
  console.log('CanActivateGuard is called');
  const { url } = state;
  return this.checkLogin(url);
return true;
}
```

## Task 25. Login Component

1. Create **LoginComponent**. Run the following command from command line:

```
>ng g c core/components/login --spec=false -m=core
```

2. Make changes to the file **core/components/index.ts**. Use the following snippet of code:

```
export * from './login/login.component';
export * from './messages/messages.component';
```

3. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
// 1
import { MessagesComponent, LoginComponent } from './core/components';

// 2
{
  path: 'about',
  component: AboutComponent
},
{
  path: 'login',
  component: LoginComponent
},
```

4. Make changes to **LoginComponent**. Use the following snippet of code:

```
// 1
import { Router } from '@angular/router';
import { AuthService } from './../../services/auth.service';

// 2
message: string;

// 3
constructor(
  public authService: AuthService,
  public router: Router
) { }

// 4
private setMessage() {
  this.message = 'Logged ' + (this.authService.isLoggedIn ? 'in' : 'out');
}

login() {
  this.message = 'Trying to log in ...';
  this.authService.login().subscribe(() => {
    this.setMessage();
    if (this.authService.isLoggedIn) {
      // Get the redirect URL from our auth service
      // If no redirect has been set, use the default
      const redirect = this.authService.redirectUrl ? this.authService.redirectUrl : '/admin';
      // Redirect the user
      this.router.navigate([redirect]);
    }
  });
}
```

```

logout() {
  this.authService.logout();
  this.setMessage();
}

// 5
ngOnInit() {
  this.setMessage();
}

```

5. Replace the content of **LoginComponent template**. Use the following snippet of HTML:

```

<h2>LOGIN</h2>
<p>State: {{message}}</p>
<p>
  <button (click)="login()" *ngIf="!authService.isLoggedIn">Login</button>
  <button (click)="logout()" *ngIf="authService.isLoggedIn">Logout</button>
</p>

```

6. Make changes to **AppComponent template**. Use the following snippet of code:

```

<li routerLinkActive="active">
  <a routerLink="/admin">Admin</a>
</li>
<li routerLinkActive="active">
  <a routerLink="/login">Login</a>
</li>

```

## Task 26. canActivateChild Guard

1. Make changes to **AuthGuard**. Use the following snippet of code:

```
// 1
import {CanActivate, CanActivateChild, ActivatedRouteSnapshot, RouterStateSnapshot, Router } from
'@angular/router';

// 2
export class AuthGuard implements CanActivate, CanActivateChild {
  ...
}

// 3
canActivateChild(next: ActivatedRouteSnapshot, state: RouterStateSnapshot): Observable<boolean> |
Promise<boolean> | boolean {
  console.log('CanActivateChild Guard is called');
  const { url } = state;
  return this.checkLogin(url);
}
```

2. Make changes to **AdminRoutingModule**. Use the following snippet of code:

```
{
  path: '',
  canActivateChild: [AuthGuard],
  children: [
    { path: 'users', component: ManageUsersComponent },
    { path: 'tasks', component: ManageTasksComponent },
    { path: '', component: AdminDashboardComponent }
  ]
}
```

## Task 27. canDeactivate Guard

1. Create **SharedModule**. Run the following command from command line:

```
>ng g m shared -m=app
```

2. Create **DialogService**. Run the following command from command line:

```
>ng g s shared/services/dialog --spec=false -m=shared
```

3. Replace the content of **DialogService**. Use the following snippet of code:

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

@Injectable()
export class DialogService {

  confirm(message?: string): Promise<boolean> {
    return new Promise<boolean>(resolve => {
      resolve(window.confirm(message || 'Is it OK?'));
    });
  }
}
```

4. Create **interface CanComponentDeactivate**. Run the following command from command line:

```
>ng g i shared/interfaces/can-component-deactivate.interface
```

5. Replace the content of **CanComponentDeactivate interface**. Use the following snippet of code:

```
import { Observable } from 'rxjs/Observable';

export interface CanComponentDeactivate {
  canDeactivate: () => Observable<boolean> | Promise<boolean> | boolean;
}
```

6. Create **CanDeactivateGuard**. Run the following command from command line:

```
>ng g g shared/guards/can-deactivate --spec=false -m=shared
```

7. Replace the content of **CanDeactivateGuard**. Use the following snippet of code:

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

import { CanComponentDeactivate } from '../interfaces/can-component-deactivate.interface';

@Injectable()
export class CanDeactivateGuard implements CanDeactivate<CanComponentDeactivate> {
  canDeactivate(component: CanComponentDeactivate) {
    return component.canDeactivate();
  }
}
```

8. Create file **shared/index.ts**. Use the following snippet of code:

```
export * from './guards/can-deactivate.guard';
export * from './interfaces/can-component-deactivate.interface';
export * from './services/dialog.service';
```



9. Make changes to **UserFormComponent**. Use the following snippet of code:

```
// 1
import { Observable }    from 'rxjs/Observable';
import { DialogService, CanComponentDeactivate } from './../shared';

// 2
export class UserFormComponent implements OnInit, OnDestroy, CanComponentDeactivate {

// 3
  constructor(
    ...
    private dialogService: DialogService
  ) { }

// 4
  canDeactivate(): Observable<boolean> | Promise<boolean> | boolean {
    const flags = Object.keys(this.originalUser).map(key => {
      if (this.originalUser[key] === this.user[key]) {
        return true;
      }
      return false;
    });

    if (flags.every(el => el)) {
      return true;
    }

    return this.dialogService.confirm('Discard changes?');
  }
}
```

10. Make changes to **UsersRoutingModule**. Use the following snippet of code:

```
import { CanDeactivateGuard } from './../shared';

{
  path: 'edit/:id',
  component: UserFormComponent,
  canDeactivate: [CanDeactivateGuard]
}
```

## Task 28. resolve Guard

1. Create **UserResolveGuard**. Run the following command from command line:

```
>ng g g users/guards/user-resolve --spec=false -m=users
```

2. Make changes to file users/index.ts. Use the following snippet of code:

```
export * from './guards/user-resolve.guard';
```

3. Make changes to **UsersModule**. Use the following snippet of code:

```
import { UserComponent, UserArrayService, UserResolveGuard } from '.';
import { UserResolveGuard } from './guards/user-resolve.guard';
```

4. Replace the content of **UserResolveGuard**. Use the following snippet of code:

```
import { Injectable } from '@angular/core';
import { Router, Resolve, ActivatedRouteSnapshot } from '@angular/router';

// rxjs
import { Observable } from 'rxjs/Observable';
import { of } from 'rxjs/observable/of';
import { catchError } from 'rxjs/operators';

import { User } from './../../models/user.model';
import { UserArrayService } from './../../services/user-array.service';

@Injectable()
export class UserResolveGuard implements Resolve<User> {

  constructor(
    private userArrayService: UserArrayService,
    private router: Router
  ) {}

  resolve(route: ActivatedRouteSnapshot): Observable<User> | null {
    console.log('UserResolve Guard is called');
    const id = +route.paramMap.get('userID');

    if (id) {
      return this.userArrayService.getUser(id)
        .pipe(
          catchError(() => {
            this.router.navigate(['/users']);
            return of(null);
          })
        );
    } else {
      return of(new User(null, '', ''));
    }
  }
}
```

5. Make changes to **UsersRoutingModule**. Use the following snippet of code:

```
// 1
import { UserResolveGuard } from './../../guards/user-resolve.guard';
import { UsersComponent, UserListComponent, UserFormComponent, UserResolveGuard } from '.';
```

```
// 2
{
  path: 'edit/:id',
  component: UserFormComponent,
  canActivate: [CanDeactivateGuard],
  resolve: {
    user: UserResolveGuard
  }
}
```

6. Make changes to **UserFormComponent**. Use the following snippet of code:

```
ngOnInit(): void {
  this.user = new User(null, '', '');

  this.route.data.subscribe(data => {
    this.user = {...data.user};
    this.originalUser = {...data.user};
  });

const id = +this.route.snapshot.paramMap.get('id');
this.userArrayService.getUser(id)
.then(user => {
  this.user = Object.assign({}, user);
  this.originalUser = Object.assign({}, user);
});
.catch(err => console.log(err));
}
```

## Task 29. Query Parameters and Fragment

1. Make changes to **AuthGuard**. Use the following snippet of code:

```
// 1
import { CanActivate, CanActivateChild, Router,
  ActivatedRouteSnapshot, RouterStateSnapshot, NavigationExtras
} from '@angular/router';

// 2
private checkLogin(url: string): boolean {
  if (this.authService.isLoggedIn) { return true; }

  // Store the attempted URL for redirecting
  this.authService.redirectUrl = url;

  // Create a dummy session id
  const sessionId = 123456789;

  const navigationExtras: NavigationExtras = {
    queryParams: { 'session_id': sessionId },
    fragment: 'anchor'
  };

  // Navigate to the login page with extras
  this.router.navigate(['/login'], navigationExtras);
  return false;
}
```

2. Make changes to **LoginComponent**. Use the following snippet of code:

```
// 1
import { Router, NavigationExtras } from '@angular/router';

// 2
if (this.authService.isLoggedIn) {
  const redirect = this.authService.redirectUrl
    ? this.authService.redirectUrl : '/admin';

  const navigationExtras: NavigationExtras = {
    queryParamsHandling: 'preserve',
    preserveFragment: true
  };

  // Redirect the user
  this.router.navigate([redirect], navigationExtras);
}
```

3. Make changes to **AdminDashboardComponent template**. Use the following snippet of HTML:

```
<p>Session ID: {{ sessionId | async }}</p>
<a id="anchor"></a>
<p>Token: {{ token | async }}</p>
```

4. Make changes to **AdminDashboardComponent**. Use the following snippet of code:

```
// 1
import { Component, OnInit } from '@angular/core';
```

```

import { ActivatedRoute } from '@angular/router';
import { Observable } from 'rxjs/Observable';
import { map } from 'rxjs/operators';

// 2
sessionId: Observable<string>;
token: Observable<string>;

// 3
constructor(
  private route: ActivatedRoute
) { }

// 4
ngOnInit() {
  // Capture the session ID if available
  this.sessionId = this.route
    .queryParamsMap
    .pipe(
      map(params => params.get('session_id') || 'None')
    );

  // Capture the fragment if available
  this.token = this.route
    .fragment
    .pipe(
      map(fragment => fragment || 'None')
    );
}

```

5. Make changes to **AdminComponent template**. Use the following snippet of HTML:

```

<nav>
  <ul class="nav nav-tabs">
    <li routerLinkActive="active" [routerLinkActiveOptions]="{ exact: true }">
      <a routerLink="." queryParamsHandling="preserve" preserveFragment>Dashboard</a>
    </li>
    <li routerLinkActive="active">
      <a routerLink="./tasks" queryParamsHandling="preserve" preserveFragment>Manage Tasks</a>
    </li>
    <li routerLinkActive="active">
      <a routerLink="./users" queryParamsHandling="preserve" preserveFragment>Manage Users</a>
    </li>
  </ul>
</nav>

```

## Task 30. Lazy-Loading Route Configuration

1. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
{
  path: 'admin',
  loadChildren: 'app/admin/admin.module#AdminModule'
},
{
  path: 'users',
  loadChildren: 'app/users/users.module#UsersModule'
},
```

2. Make changes to **AdminRoutingModule**. Use the following snippet of code:

```
const routes: Routes = [
  {
    path: 'admin',
    path: '',
    component: AdminComponent,
    canActivate: [AuthGuard],
    children: [
      ...
    ]
  }
];
```

3. Make changes to **UsersRoutingModule**. Use the following snippet of code:

```
const routes: Routes = [
  {
    path: 'users',
    path: '',
    component: UsersComponent,
    children: [
      ...
    ]
  }
];
```

4. Make changes to **AppModule**. Use the following snippet of code:

```
import { AdminModule } from './admin/admin.module';
import { UsersModule } from './users/users.module';

imports: [
  ...
  UsersModule,
  AdminModule,
  AppRoutingModule
]
```

## Task 31. canLoad Guard

1. Make changes to **AuthGuard**. Use the following snippet of code:

```
// 1
import {
  CanActivate, CanActivateChild, CanLoad, Router, Route,
  ActivatedRouteSnapshot, RouterStateSnapshot, NavigationExtras
} from '@angular/router';

// 2
export class AuthGuard implements CanActivate, CanActivateChild, CanLoad {

// 3
  canLoad(route: Route): Observable<boolean> | Promise<boolean> | boolean {
    console.log('CanLoad Guard is called');
    const url = `/${route.path}`;
    return this.checkLogin(url);
  }
}
```

2. Create file **core/index.ts**. Use the following snippet of code:

```
export * from './components';
export * from './guards/auth.guard';
export * from './services';
```

3. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
// 1
import { MessagesComponent, LoginComponent, AuthGuard } from './core/components';

// 2
{
  path: 'admin',
  canLoad: [AuthGuard],
  loadChildren: 'app/admin/admin.module#AdminModule'
},
```

## Task 32. Default Preloading Strategy

1. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
// 1
import { Routes, RouterModule, PreloadAllModules, ExtraOptions } from '@angular/router';

// 2
const extraOptions: ExtraOptions = {
  preloadingStrategy: PreloadAllModules,
  enableTracing: true // Makes the router log all its internal events to the console.
};

// 3
@NgModule({
  imports: [
    RouterModule.forRoot(routes, extraOptions)
  ]
})
```



## Task 33. Custom Preloading Strategy

1. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
{
  path: 'users',
  loadChildren: 'app/users/users.module#UsersModule',
  data: { preload: true }
},
```

2. Create **CustomPreloadingStrategyService**. Run the following command from command line:

```
>ng g s core/services/custom-preloading-strategy --spec=false -m=core
```

3. Replace the content of **CustomPreloadingStrategyService**. Use the following snippet of code:

```
import { Injectable } from '@angular/core';
import { PreloadingStrategy, Route } from '@angular/router';

// rxjs
import { Observable } from 'rxjs/Observable';
import { of } from 'rxjs/observable/of';

@Injectable()
export class CustomPreloadingStrategyService implements PreloadingStrategy {
  private preloadedModules: string[] = [];

  preload(route: Route, load: () => Observable<any>): Observable<any> {
    if (route.data && route.data['preload']) {
      this.preloadedModules.push(route.path);
      return load();
    } else {
      return of(null);
    }
  }
}
```

4. Make changes to **CoreModule**. Use the following snippet of code:

```
import { CustomPreloadingStrategyService } from './services/custom-preloading-strategy.service';
import { AuthService, MessagesService, CustomPreloadingStrategyService } from './services';
```

5. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
// 1
import { Routes, RouterModule, PreloadAllModules, ExtraOptions } from '@angular/router';
import { MessagesComponent, LoginComponent, AuthGuard, CustomPreloadingStrategyService } from
'./core';

// 2
const extraOptions: ExtraOptions = {
  preloadingStrategy: PreloadAllModules CustomPreloadingStrategyService,
  // enableTracing: true // Makes the router log all its internal events to the console.
};
```

## Task 34. Router Events and Title Service

1. Make changes to **AppRoutingModule**. Use the following snippet of code:

```
const routes: Routes = [
  {
    path: 'about',
    component: AboutComponent,
    data: { title: 'About' }
  },
  {
    path: 'login',
    component: LoginComponent,
    data: { title: 'Login' }
  },
  {
    path: 'admin',
    canActivate: [AuthGuard],
    loadChildren: 'app/admin/admin.module#AdminModule',
    data: { title: 'Admin' }
  },
  {
    path: 'users',
    loadChildren: 'app/users/users.module#UsersModule',
    data: {
      preload: true,
      title: 'Users'
    }
  },
  {
    path: '',
    redirectTo: '/home',
    pathMatch: 'full'
  },
  {
    // The router will match this route if the URL requested
    // doesn't match any paths for routes defined in our configuration
    path: '**',
    component: PageNotFoundComponent,
    data: { title: 'Page Not Found' }
  }
];
```

2. Make changes to **TasksRoutingModule**. Use the following snippet of code:

```
const routes: Routes = [
  {
    path: 'home',
    component: TaskListComponent,
    data: { title: 'Task Manager' }
  },
  {
    path: 'edit/:id',
    component: TaskFormComponent
  }
];
```

3. Make changes to **AppComponent**. Use the following snippet of code:

```
// 1
import { Component, OnInit, OnDestroy } from '@angular/core';
```

```

import { Title } from '@angular/platform-browser';
import { Router, NavigationEnd } from '@angular/router';

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

// 2
export class AppComponent implements OnInit, OnDestroy

// 3
private sub: Subscription;

constructor(
  public messagesService: MessagesService,
  private titleService: Title,
  private router: Router
) { }

ngOnInit() {
  this.setPageTitles();
}

ngOnDestroy() {
  this.sub.unsubscribe();
}

private setPageTitles() {
  this.sub = this.router.events
    .pipe(
      filter(event => event instanceof NavigationEnd),
      map(() => this.router.routerState.root),
      map(route => {
        while (route.firstChild) {
          route = route.firstChild;
        }
        return route;
      }),
      filter(route => route.outlet === 'primary'),
      switchMap(route => route.data)
    )
    .subscribe(
      data => this.titleService.setTitle(data['title'])
    );
}

```

## Task 35. Meta Service (Meta only available in 4.X)

1. Make changes to **TasksRoutingModule**. Use the following snippet of code:

```
const routes: Routes = [
  {
    path: 'home',
    component: TaskListComponent,
    data: { title: 'Task Manager' }
    data: {
      title: 'Task Manager',
      meta: [{
        name: 'description',
        content: 'Task Manager Application. This is an ASP application'
      },
      {
        name: 'keywords',
        content: 'Angular 4 tutorial, SPA Application, Routing'
      }]
    }
  },
];
```

2. Make changes to **AppComponent**. Use the following snippet of code:

```
// 1
import { Title, Meta } from '@angular/platform-browser';

// 2
constructor(
  public messagesService: MessagesService,
  private titleService: Title,
  private metaService: Meta,
  private router: Router
) { }

// 3
Rename method setPageTitles to setPageTitlesAndMeta

// 4
ngOnInit() {
  this.setPageTitles();
  this.setPageTitlesAndMeta();
}

// 5
.subscribe(
  data => this.titleService.setTitle(data['title'])
  data => {
    this.titleService.setTitle(data['title']);
    this.metaService.addTags(data['meta']);
  }
);
```