Angular 2+

Workshop. HttpClient.

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## Task 01. Import Modules

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

// 1

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

// 2

imports: [

…

// import HttpClientModule after BrowserModule

HttpClientModule,

AppRoutingModule

]

## Task 02. Simulating Web API

1. Run the following command from command line:

**>npm install -g json-server  
>npm install concurrently -D**

2. Create file **db\db.json (in project root folder).** Use the following snippet of code:

{

"tasks": [

{ "id": 1, "action": "Estimate", "priority": 1, "estHours": 8},

{ "id": 2, "action": "Create", "priority": 2, "estHours": 8},

{ "id": 3, "action": "Edit", "priority": 3, "estHours": 4},

{ "id": 4, "action": "Delete", "priority": 3, "estHours": 2},

{ "id": 5, "action": "Build", "priority": 1, "estHours": 4},

{ "id": 6, "action": "Deploy", "priority": 2, "estHours": 8}

],

"users": [

{ "id": 1, "firstName": "Anna", "lastName": "Borisova" },

{ "id": 2, "firstName": "Boris", "lastName": "Vlasov"},

{ "id": 3, "firstName": "Clara", "lastName": "Dmitrieva"},

{ "id": 4, "firstName": "Dariya", "lastName": "Egorova"},

{ "id": 5, "firstName": "Fatima", "lastName": "Georg"},

{ "id": 6, "firstName": "Hunna", "lastName": "Jackson"}

]

}

3. Make changes to **package.json** file.

Windows:

"start": "concurrently --kill-others \"ng serve -o\" \"json-server --watch db\\db.json\"",

Mac

"start": "concurrently --kill-others \"ng serve -o\" \"json-server --watch db\/db.json\""

"start": "ng serve",

4. Run project:

**>npm start**

## Task 03. Task Promise Service

1. Create **TaskPromiseService**. Use the following snippet of code:

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

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

import { firstValueFrom } from 'rxjs';

import type { TaskModel } from './../models/task.model';

@Injectable({

providedIn: 'any'

})

export class TaskPromiseService {

private tasksUrl = 'http://localhost:3000/tasks';

constructor(private http: HttpClient) {}

getTasks(): Promise<TaskModel[]> {

const request$ = this.http.get(this.tasksUrl);

return firstValueFrom(request$)

.then(response => response as TaskModel[])

.catch(this.handleError);

}

private handleError(error: any): Promise<any> {

console.error('An error occurred', error);

return Promise.reject(error.message || error);

}

}

1. Create file **tasks/services/index.ts**. Use the following snippet of code:

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

export \* from './task-promise.service';

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

export \* from './services';

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

// 1

import { TaskArrayService, TaskPromiseService } from './../../services/task-promise.service';

// 2

constructor(

…

private taskPromiseService: TaskPromiseService) { }

// 3

ngOnInit(): void {

this.tasks = this.taskArrayService.getTasks();

this.tasks = this.taskPromiseService.getTasks();

}

## Task 04. GetTask

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

getTask(id: NonNullable<TaskModel['id']> | string): Promise<TaskModel> {

const url = `${this.tasksUrl}/${id}`;

const request$ = this.http.get(url);

return firstValueFrom(request$)

.then(response => response as TaskModel)

.catch(this.handleError);

}

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

// 1

import { TaskArrayService, TaskPromiseService } from './../../services/task-array.service';

// 2

constructor(

…

private taskPromiseService: TaskPromiseService

) { }

// 3

this.route.paramMap

.pipe(

switchMap((params: ParamMap) =>

// notes about "!"

// params.get() returns string | null, but getTask takes string | number

// in this case taskID is a path param and can not be null

this.taskArrayServicetaskPromiseService.getTask(params.get('taskID')!)

),

// transform undefined => {}

map(el => el ? el : {} as TaskModel)

.subscribe(observer);

## Task 05. UpdateTask

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

// 1

import { HttpClient, HttpHeaders } from '@angular/http';

// 2

updateTask(task: TaskModel): Promise<TaskModel> {

const url = `${this.tasksUrl}/${task.id}`;

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

const request$ = this.http.put(url, task, options);

return firstValueFrom(request$)

.then(response => response as TaskModel)

.catch(this.handleError);

}

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

if (task.id) {

this.taskArrayService.updateTask(task);

this.taskPromiseService.updateTask(task)

.then( () => this.onGoBack() );

}

else {

this.taskArrayService.createTask(task);

this.onGoBack();

}

this.onGoBack();

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

// 1

import { TaskArrayService, TaskPromiseService } from './../../services';

// 2

constructor(

private router: Router,

private taskArrayService: TaskArrayService,

private taskPromiseService: TaskPromiseService

) { }

// 3

onCompleteTask(task: Task): void {

const updatedTask = { ...task, done: true };

this.taskArrayService.updateTask(updatedTask);

this.updateTask(task).catch(err => console.log(err));

}

// 4

private async updateTask(task: TaskModel) {

const updatedTask = await this.taskPromiseService.updateTask({

...task,

done: true

});

const tasks: TaskModel[] = await this.tasks;

const index = tasks.findIndex(t => t.id === updatedTask.id);

tasks[index] = { ...updatedTask };

}

## Task 06. CreateTask

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

<div>

<button class="btn btn-primary"

(click)="onCreateTask()">New Task</button>

<br><br>

<app-task

\*ngFor="let task of tasks | async"

[task]="task"

(completeTask)="onCompleteTask($event)"

(editTask)="onEditTask($event)">

</app-task>

</div>

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

// 1

onCreateTask(): void {

const link = ['/add'];

this.router.navigate(link);

}

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

const routes: Routes = [

…

{

path: 'add',

component: TaskFormComponent

},

{

path: 'edit/:taskID',

component: TaskFormComponent

}

];

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

createTask(task: TaskModel): Promise<TaskModel> {

const url = this.tasksUrl;

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

const request$ = this.http.post(url, task, options);

return firstValueFrom(request$)

.then(response => response as TaskModel)

.catch(this.handleError);

}

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

switchMap((params: ParamMap) =>

// notes about "!"

// params.get() returns string | null, but getTask takes string | number

// in this case taskID is a path param and can not be null

this.taskPromiseService.getTask(params.get('taskID')!);

),

switchMap((params: ParamMap) => {

// notes about "!"

// params.get() returns string | null, but getTask takes string | number

// in this case taskID is NOT a path param and can not be null

if (params.has('taskID')) {

return this.taskPromiseService.getTask(params.get('taskID')!);

} else {

return Promise.resolve(undefined);

}

}),

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

if (task.id) {

this.taskPromiseService.updateTask(task)

.then( () => this.onGoBack() );

}

else {

this.taskArrayService.createTask(task);

this.onGoBack();

}

const method = task.id ? 'updateTask' : 'createTask';

this.taskPromiseService[method](task)

.then(() => this.onGoBack())

.catch(err => console.log(err));

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

// 1‘

import { TaskArrayService, TaskPromiseService } from './../../services';

// 2

constructor(

private taskArrayService: TaskArrayService,

…

) { }

## Task 07. DeleteTask

1. Make changes to **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)="onCompleteTask()"

[disabled]="task.done">

Done

</button>

<button class="btn btn-warning btn-sm"

(click)="onEditTask()">

Edit

</button>

<button class="btn btn-danger btn-sm"

(click)="onDeleteTask()">

Delete

</button>

</div>

</div>

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

// 1

@Output() deleteTask = new EventEmitter<TaskModel>();

// 2

onDeleteTask(): void {

this.deleteTask.emit(this.task);

}

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

<app-task

\*ngFor="let task of tasks | async"

[task]="task"

(completeTask)="onCompleteTask($event)"

(editTask)="onEditTask($event)"

(deleteTask)="onDeleteTask($event)">

</app-task>

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

deleteTask(task: TaskModel): Promise<unknown> {

const url = `${this.tasksUrl}/${task.id}`;

const request$ = this.http.delete(url);

return firstValueFrom(request$)

// json-server return empty object

// so we don't use .then(...)

.catch(this.handleError);

}

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

onDeleteTask(task: TaskModel): void {

this.taskPromiseService

.deleteTask(task)

.then(() => (this.tasks = this.taskPromiseService.getTasks()))

.catch(err => console.log(err));

}

## Task 08. User Observable Service

1. Create file **users/users.config.ts.** Use the following snippet of code:

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

export const UsersAPI = new InjectionToken<string>('UsersAPI', {

providedIn: 'any',

factory: () => 'http://localhost:3000/users'

});

1. Create **UserObservableService.** Use the following snippet of code:

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

import { HttpClient, HttpHeaders, type HttpResponse, type HttpErrorResponse } from '@angular/common/http';

import { type Observable, throwError, catchError, retry, share } from 'rxjs';

import { UsersAPI } from './../users.config';

import { type UserModel } from './../models/user.model';

@Injectable({

providedIn: 'any'

})

export class UserObservableService {

constructor(

private http: HttpClient,

@Inject(UsersAPI) private usersUrl: string

) {}

getUsers(): Observable<UserModel[]> {

return this.http.get<UserModel[]>(this.usersUrl).pipe(

retry(3),

share(),

catchError(this.handleError)

);

}

getUser(id: NonNullable<UserModel['id']> | string) {}

updateUser(user: UserModel) {}

createUser(user: UserModel) {}

deleteUser(user: UserModel) {}

private handleError(error: HttpErrorResponse) {

if (error.status === 0) {

// A client-side or network error occurred. Handle it accordingly.

console.error('An error occurred:', error.error);

} else {

// The backend returned an unsuccessful response code.

// The response body may contain clues as to what went wrong.

console.error(

`Backend returned code ${error.status}, body was: `, error.error);

}

// Return an observable with a user-facing error message.

return throwError(() => new Error('Something bad happened; please try again later.'));

}

}

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

export \* from './user-observable.service';

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

// 1

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

import { EMPTY, Observable, catchError, switchMap } from 'rxjs';

// 2

constructor(

…

private userObservableService: UserObservableService

) { }

// 3

ngOnInit(): void {

this.users$ = this.userObservableService.getUsers();

this.users$ = this.userArrayService.users$

.pipe(

catchError(err => {

console.log(err);

return EMPTY;

})

);

…

}

## Task 09. GetUser

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

getUser(id: NonNullable<UserModel['id']> | string): Observable<UserModel> {

const url = `${this.usersUrl}/${id}`;

return this.http.get<UserModel>(url)

.pipe(

retry(3),

share(),

catchError(this.handleError)

);

}

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

// 1

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

// 2

constructor(

private userArrayService: UserArrayService,

private userObservableService: UserObservableService,

…

) {}

// 3

resolve(route: ActivatedRouteSnapshot): Observable<User> {

…

return this.userArrayService.getUser(id)

return this.userObservableService.getUser(id)

…

}

1. Make changes to method **ngOnInit** of **UserListComponent.** Use the following snippet of code:

// 1

import { EMPTY, Observable, switchMap } from 'rxjs';

import { UserArrayService, UserObservableService } from './../../services';

// 2

constructor(

…

private userArrayService: UserArrayService,

) { … }

// 2 ngOnInit

switchMap((params: ParamMap) => this.userArrayService.getUser(params.get('editedUserID')!))

switchMap((params: ParamMap) => {

return params.has('editedUserID')

? this.userObservableService.getUser(params.get('editedUserID')!)

: EMPTY;

})

## Task 10. UpdateUser and CreateUser

1. Make changes to the method **updateUser** of **UserObservableService.** Use the following snippet of code:

updateUser(user: UserModel): Observable<UserModel> {

const url = `${this.usersUrl}/${user.id}`;

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

return this.http

.put<UserModel>(url, user, options)

.pipe( catchError(this.handleError) );

}

1. Make changes to the method **createUser** of **UserObservableService.** Use the following snippet of code:

createUser(user: UserModel): Observable<UserModel> {

const url = this.usersUrl;

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

return this.http

.post<UserModel>(url, user, options)

.pipe(

catchError( this.handleError )

);

}

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

// 1

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

import { type Observable, type Subscription, map } from 'rxjs;

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

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

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

// 2

export class UserFormComponent implements OnInit, OnDestroy, CanComponentDeactivate {

// 3

private sub!: Subscription;

// 4

constructor(

private userArrayService: UserArrayService,

private userObservableService: UserObservableService,

private location: Location,

…

) { }

// 5

ngOnDestroy(): void {

this.sub?.unsubscribe();

}

// 6 onSaveUser method

if (user.id) {

this.userArrayService.updateUser(user);

// optional parameter: http://localhost:4200/users;editedUserID=2

this.router.navigate(['users', {editedUserID: user.id}]);

}

else {

this.userArrayService.createUser(user);

this.onGoBack();

}

this.originalUser = {...this.user};

const method = user.id ? 'updateUser' : 'createUser';

const observer = {

next: (savedUser: UserModel) => {

this.originalUser = { ...savedUser };

user.id

? // optional parameter: http://localhost:4200/users;editedUserID=2

this.router.navigate(['users', { editedUserID: user.id }])

: this.onGoBack();

},

error: (err: any) => console.log(err)

};

this.sub = this.userObservableService[method](user).subscribe(observer);

// 7

onGoBack(): void {

this.onGoBackClick = true;

this.router.navigate(['./../../'], { relativeTo: this.route });

this.location.back();

}

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

<h2>Users</h2>

<button class="btn btn-primary"

(click)="onCreateUser()">New User</button>

<br><br>

<router-outlet></router-outlet>

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

// 1

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

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

// 2

constructor(

private router: Router

) { }

// 3

onCreateUser(): void {

const link = ['/users/add'];

this.router.navigate(link);

}

## Task 11. DeleteUser

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

<button class="btn btn-warning btn-sm"

(click)="onEditUser()">

Edit

</button>

<button class="btn btn-danger btn-sm"

(click)="onDeleteUser()">

Delete

</button>

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

// 1

@Output() deleteUser = new EventEmitter<UserModel>();

// 2

onDeleteUser(): void {

this.deleteUser.emit(this.user);

}

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

<user

\*ngFor='let user of users'

[user]="user"

[class.edited]="isEdited(user)"

(editUser)="onEditUser($event)"

(deleteUser)="onDeleteUser($event)">

</user>

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

// 1

import { Observable, throwError, catchError, retry, share, concatMap } from 'rxjs';

// 2

deleteUser(user: UserModel): Observable<UserModel[]> {

const url = `${this.usersUrl}/${user.id}`;

return this.http.delete(url).pipe(

concatMap(() => this.getUsers()),

catchError(this.handleError)

);

}

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

onDeleteUser(user: UserModel): void {

this.users$ = this.userObservableService.deleteUser(user);

}

## Task 12. AutoUnsubscribe Decorator

1. Create file **app/core/decorators/auto-unsubscribe.decorator.ts.** Use the following snippet of code:

export function AutoUnsubscribe(subName: string = 'sub') {

return (target: Function | object, propName?: string) => {

let constructor;

if (typeof target === 'function') {

constructor = target;

console.log(`AutoUnsubscribe class decorator is called. Subscription name is: ${propName ?? subName}.`);

} else {

constructor = target.constructor;

console.log(`AutoUnsubscribe property decorator is called. Subscription name is: ${propName ?? subName}.`);

}

const original = constructor.prototype.ngOnDestroy;

constructor.prototype.ngOnDestroy = function(): void {

const sub = this[propName ?? subName];

sub?.unsubscribe();

if (original && (typeof original === 'function')) {

original.apply(this);

}

};

};

}

1. Create file **app/core/decorators/index.ts.** Use the following snippet of code:

export \* from './auto-unsubscribe.decorator';

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

export \* from './decorators';

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

// 1

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

import { AutoUnsubscribe, DialogService, type CanComponentDeactivate } from './../../../core';

// 2

@Component({

templateUrl: './user-form.component.html',

styleUrls: ['./user-form.component.css'],

})

@AutoUnsubscribe()

export class UserFormComponent implements OnInit, OnDestroy, CanComponentDeactivate {

// 3

ngOnDestroy(): void {

this.sub?.unsubscribe();

}

## Task 13. Interceptors

1. Create file **app/core/interceptors/ts.interceptor.ts**. Use the following snippet of code:

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

import { HttpHeaders, HttpEventType } from '@angular/common/http';

import type {

HttpEvent,

HttpInterceptor,

HttpHandler,

HttpRequest,

HttpResponse

} from '@angular/common/http';

import { type Observable } from 'rxjs';

@Injectable()

export class TsInterceptor implements HttpInterceptor {

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

// request interceptor

let clonedRequest;

if (req.method === 'POST' || (req.method === 'PUT')) {

console.log('req.method:', req.method);

clonedRequest = req.clone({

headers: new HttpHeaders({

'Content-Type': 'application/json',

'Authorization': 'user-token'

})

});

console.log(clonedRequest);

} else {

clonedRequest = req;

}

return next.handle(clonedRequest);

}

}

1. Create file **app/core/interceptors/index.ts.** Use the following snippet of code:

import { HTTP\_INTERCEPTORS } from '@angular/common/http';

import { TsInterceptor } from './ts.interceptor';

export const httpInterceptorProviders = [

{

provide: HTTP\_INTERCEPTORS,

useClass: TsInterceptor,

multi: true

}

];

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

import { httpInterceptorProviders } from './core/interceptors';

providers: [ httpInterceptorProviders ]

1. Look at the requests in the browser console. Ensure that only the user requests are processed by TsInterceptor.
2. Make changes to **TaskPromiseService.** Use the following snippet of code:

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

updateTask(task: TaskModel): Promise<TaskModel> {

const url = `${this.tasksUrl}/${task.id}`;

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

const request$ = this.http.put(url, task, options);

return firstValueFrom(request$)

.then(response => response as TaskModel)

.catch(this.handleError);

}

createTask(task: TaskModel): Promise<TaskModel> {

const url = this.tasksUrl;

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

const request$ = this.http.post(url, task, options);

return firstValueFrom(request$)

.then(response => response as TaskModel)

.catch(this.handleError);

}

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

updateUser(user: UserModel): Observable<UserModel> {

const url = `${this.usersUrl}/${user.id}`;

const body = JSON.stringify(user);

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

return this.http

.put<UserModel>(url, body, options)

.pipe(catchError(this.handleError));

}

createUser(user: UserModel): Observable<UserModel> {

const url = this.usersUrl;

const body = JSON.stringify(user);

const options = {

headers: new HttpHeaders({ 'Content-Type': 'application/json' })

};

return this.http

.post<UserModel>(url, body, options)

.pipe(catchError(this.handleError));

}

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

// 1

import { type Observable, filter, map } from 'rxjs';

// 2

return next.handle(clonedRequest);

// response interceptor

return next.handle(clonedRequest).pipe(

filter((event: HttpEvent<any>) => event.type === HttpEventType.Response),

map((event: HttpEvent<any>) => {

// do stuff with response

if ((event as HttpResponse<any>).url!.includes('users')) {

console.log('Response Interceptor:');

console.log(event);

console.log((event as HttpResponse<any>).body);

}

return event;

})

);

1. Look in the console on the result of applying TsInterceptor.
2. Make changes to **UserObservableService.** Use the following snippet of code

// 1

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

// 2

export const interceptorTOKEN = new HttpContextToken(() => 'Some Default Value');

// 3

getUsers(): Observable<UserModel[]> {

const httpOptions = {

context: new HttpContext().set(interceptorTOKEN, 'Some Value')

};

return this.http.get<UserModel[]>(this.usersUrl, httpOptions).pipe(

retry(3),

share(),

catchError(this.handleError)

);

}

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

// 1

import { interceptorTOKEN } from './../../users';

// 2

// request interceptor

const contextValue = req.context.get(interceptorTOKEN);

console.log('contextValue:', contextValue);