

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: [
  ...
  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 { 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);
  }
}
```

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

```
export * from './task-array.service';
export * from './task-promise.service';
```

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

```
export * from './services';
```

4. 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: number | 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);  
}
```

2. 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.taskArrayService.taskPromiseService.getTask(params.get('taskID')!)  
        ),  
        // transform undefined => {}  
        map(e1 => e1 ? e1 : {} 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 body = JSON.stringify(task);
  const options = {
    headers: new HttpHeaders({ 'Content-Type': 'application/json' })
  };
  const request$ = this.http.put(url, body, options);

  return firstValueFrom(request$)
    .then(response => response as TaskModel)
    .catch(this.handleError);
}
```

2. 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();
```

3. 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>
```

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

```
// 1
onCreateTask(): void {
  const link = ['/add'];
  this.router.navigate(link);
}
```

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

```
const routes: Routes = [
  ...
  {
    path: 'add',
    component: TaskFormComponent
  },
  {
    path: 'edit/:taskID',
    component: TaskFormComponent
  }
];
```

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

```
createTask(task: TaskModel): Promise<TaskModel> {
  const url = this.tasksUrl;
  const body = JSON.stringify(task);
  const options = {
    headers: new HttpHeaders({ 'Content-Type': 'application/json' })
  };

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

  return firstValueFrom(request$)
    .then(response => response as TaskModel)
    .catch(this.handleError);
}
```

5. 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);
        }
    })
  ),
),

```

6. 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));

```

7. 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>
```

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

```
// 1
@Output() deleteTask = new EventEmitter<TaskModel>();

// 2
onDeleteTask(): void {
  this.deleteTask.emit(this.task);
}
```

3. 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>
```

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

```
deleteTask(task: TaskModel): Promise<TaskModel> {
  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);
    }
}
```

5. 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'
});
```

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

```
import { Injectable, Inject } from '@angular/core';
import {
  HttpClient,
  HttpHeaders,
  HttpResponse,
  HttpErrorResponse
} from '@angular/common/http';

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

import { UserModel } from '../models/user.model';
import { UsersAPI } from '../users.config';

@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: number | string) {}

  updateUser(user: UserModel) {}

  createUser(user: UserModel) {}

  deleteUser(user: UserModel) {}

  private handleError(err: HttpErrorResponse) {
    // A client-side or network error occurred.
    if (err.error instanceof Error) {
      console.error('An error occurred:', err.error.message);
    } else {
      // The backend returned an unsuccessful response code.
    }
  }
}
```

```

        // The response body may contain clues as to what went wrong,
        console.error(`Backend returned code ${err.status}, body was: ${err.error}`);
    }

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

```

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

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

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

```

// 1
import { UserArrayService, UserObservableService } from './../../services/user-
array.service';
import { EMPTY, Observable } from 'rxjs';
import { catchError, switchMap } from 'rxjs/operators';

// 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: number | string): Observable<UserModel> {
  const url = `${this.usersUrl}/${id}`;

  return this.http.get<UserModel>(url)
    .pipe(
      retry(3),
      share(),
      catchError(this.handleError)
    );
}
```

2. 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)
  ...
}
```

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

```
// 1
import { EMPTY, Observable } 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 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) );
}
```

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

```
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 )
    );
}
```

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

```
// 1
import { Component, OnInit, OnDestroy } from '@angular/core';
import { Observable, Subscription } 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.router.navigate(['../..'], { relativeTo: this.route });
    this.location.back();
}

```

4. 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>

```

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

```

// 1
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>
```

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

```
// 1
@Output() deleteUser = new EventEmitter<UserModel>();

// 2
onDeleteUser(): void {
  this.deleteUser.emit(this.user);
}
```

3. 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>
```

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

```
// 1
import { concatMap, catchError, retry, share } from 'rxjs/operators';

// 2
deleteUser(user: UserModel): Observable<UserModel[]> {
  const url = `${this.usersUrl}/${user.id}`;

  return this.http.delete(url).pipe(
    concatMap(() => this.getUsers()),
    catchError(this.handleError)
  );
}
```

5. 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 (constructor: any) => {
    const original = constructor.prototype.ngOnDestroy;

    constructor.prototype.ngOnDestroy = function (): void {
      const sub = this[subName];

      sub?.unsubscribe();

      if (original && (typeof original === 'function')) {
        original.apply(this, arguments);
      }

      console.log(`Unsubscribe decorator is called. Subscription name is: ${subName}.`);
    };
  };
}
```

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

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

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

```
export * from './decorators';
```

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

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

Commented [VZ1]: Не работает в 9 версии в режиме AoT + Ivy – запрещено модифицировать хуки жизненного цикла компонента, хотя создавать другие методы можно.

Task 13. Interceptors

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

```
import { Injectable } from '@angular/core';
import { HttpEvent, HttpInterceptor, HttpHandler, HttpRequest, HttpResponse, HttpParams,
HttpEventType } from '@angular/common/http';

import { Observable } from 'rxjs';

@Injectable()
export class TsInterceptor implements HttpInterceptor {
  intercept(req: HttpRequest<any>, next: HttpHandler): Observable<HttpEvent<any>> {
    // request interceptor
    let clonedRequest;
    if (req.url.includes('users')) {
      clonedRequest = req.clone({
        params: new HttpParams()
          .set('ts_interceptor', Date.now().toString())
        // clear the body
        // body: null
      });
      console.log(clonedRequest);
    } else {
      clonedRequest = req;
    }

    return next.handle(clonedRequest);
  }
}
```

2. 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
  }
];
```

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

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

providers: [ httpInterceptorProviders ]
```

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

```
// 1
import { filter, map } from 'rxjs/operators';
```

```
// 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;
  })
);
```

6. Look in the console on the result of applying My interceptor.