

Angular 2+

Workshop. HttpClient.

## Contents

Task 01. Import Modules .....	2
Task 02. Simulating Web API.....	3
Task 03. Task Promise Service.....	4
Task 04. GetTask.....	5
Task 05. UpdateTask .....	6
Task 06. CreateTask.....	8
Task 07. DeleteTask.....	10
Task 08. User Observable Service .....	12
Task 09. GetUser .....	14
Task 10. UpdateUser and CreateUser .....	15
Task 11. DeleteUser .....	18
Task 12. AutoUnsubscribe Decorator.....	19
Task 13. Interceptors.....	20

### 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 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 { TaskModel } from '../models/task.model';
import { TasksServicesModule } from '../tasks-services.module';

@Injectable({
  providedIn: TasksServicesModule
})
export class TaskPromiseService {
  private tasksUrl = 'http://localhost:3000/tasks';

  constructor(private http: HttpClient) {}

  getTasks(): Promise<TaskModel[]> {
    return this.http
      .get(this.tasksUrl)
      .toPromise()
      .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() {
  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): Promise<TaskModel> {  
    const url = `${this.tasksUrl}/${id}`;  
  
    return this.http  
        .get(url)  
        .toPromise()  
        .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) =>  
            this.taskArrayService.getTask(+params.get('taskID'))  
            this.taskPromiseService.getTask(+params.get('taskID'))  
        )  
    ).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' })
  };

  return this.http
    .put(url, body, options)
    .toPromise()
    .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() {
  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' })
  };

  return this.http
    .post(url, body, options)
    .toPromise()
    .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) => this.taskPromiseService.getTask(+params.get('taskID')))
```



```

switchMap((params: ParamMap) => {
  return params.get('taskId')
    ? this.taskPromiseService.getTask(+params.get('taskId'))
    // when Promise.resolve(null) => task = null => {...null} => {}
    : Promise.resolve(null);
})

```

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() {
  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}`;

  return (
    this.http
```

```
        .delete(url)
        .toPromise()
        // 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) {
  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';

const usersBaseUrl = 'http://localhost:3000/users';
export const UsersAPI = new InjectionToken<string>('UsersAPI');

export const UsersAPIProvider = {
  provide: UsersAPI,
  useValue: usersBaseUrl
};
```

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 } from 'rxjs/operators';

import { UserModel } from '../models/user.model';
import { UsersAPI } from '../users.config';
import { UsersServicesModule } from '../users-services.module';

@Injectable({
  providedIn: UsersServicesModule
})
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),
      catchError(this.handleError)
    );
  }

  getUser(id: number) {}

  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) {
```

**Commented [VZ1]:** После `retry(3)` добавить `publishLast()`, `refCount()` для того, чтобы сделать Observable горячим. И так сделать для всех запросов

```
publish() + refCount() = share()
publishReplay(1) + refCount() = shareReplay(1)
```

Статья  
<https://blog.thoughttram.io/angular/2016/06/16/cold-vs-hot-observables.html>

```

        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('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 **UsersModule**. Use the following snippet of code:

```
// 1
import { UsersAPIProvider } from './users.config';

// 2
providers: [
    UsersAPIProvider
]
```

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

```
// 1
import { UserArrayService, UserObservableService } from './../../services/user-
array.service';

// 2
constructor(
    ...
    private userObservableService: UserObservableService
) { }

// 3
ngOnInit() {
    this.users$ = this.userObservableService.getUsers();
    this.users$ = this.userArrayService.getUsers();
    ...
}
```

### Task 09. GetUser

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

```
getUser(id: number): Observable<UserModel> {  
  const url = `${this.usersUrl}/${id}`;  
  
  return this.http.get<UserModel>(url)  
    .pipe(  
      retry(3),  
      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 { Observable, of } 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.get('editedUserID')  
    ? this.userObservableService.getUser(+params.get('editedUserID'))  
    : of(null);  
})
```

### 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 {
  if (this.sub) {
    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() {
  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() {
  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() {
  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 } from 'rxjs/operators';

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

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

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

```
onDeleteUser(user: UserModel) {
  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 () {
      const sub = this[subName];

      if (sub) {
        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 {
    if (this.sub) {
      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 { 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: HttpResponse<any>) => {
    // do stuff with response
    if (event.url.includes('users')) {
      console.log('Response Interceptor:');
      console.log(event);
      console.log(event.body);
    }
    return event;
  })
);
```

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