

## TP 6 - Pruebas unitarias

```
caro@e14:~$ node -v
v20.17.0
caro@e14:~$ npm -v
10.8.2
caro@e14:~$ npm install -g @angular/cli

added 266 packages in 13s
49 packages are looking for funding
  run `npm fund` for details
npm notice
npm notice New patch version of npm available! 10.8.2 -> 10.8.3
npm notice Changelog: https://github.com/npm/cli/releases/tag/v10.8.3
npm notice To update run: npm install -g npm@10.8.3
npm notice
caro@e14:~$ ng version

Angular CLI
Angular CLI: 18.2.6
Node: 20.17.0
Package Manager: npm 10.8.2
OS: linux x64

Angular:
...

Package      Version
-----
@angular-devkit/architect    0.1802.6 (cli-only)
@angular-devkit/core         18.2.6 (cli-only)
@angular-devkit/schematics    18.2.6 (cli-only)
@schematics/angular          18.2.6 (cli-only)

caro@e14:~$ dotnet --version
8.0.108
```

### 4.1 Creación de una BD SQL Server para nuestra App

en la base sql que creaste > seguridad > redes  
y ahí puedo agregar otra dirección ip.

```
caro@e14:~$ docker ps -a
```

```
caro@e14:~$ docker run -e "ACCEPT_EULA=Y" -e "SA_PASSWORD=Anilorac.9" -p
15000:1433 -d mcr.microsoft.com/mssql/server:2022-latest
cea4c10063dbe6042e4656cb2e15ddd4aab50ee5507dee8562dcb4e654f7834e
```

```
caro@e14:~$ docker exec -it agitated_davinci /opt/mssql-tools18/bin/sqlcmd -S localhost -U
SA -P 'Anilorac.9' -C
1>
```

```

3> SET ANSI_NULLS ON
4> GO
1> SET QUOTED_IDENTIFIER ON
2> GO
1> CREATE TABLE [dbo].[Employees](
2> [Id] [int] IDENTITY(1,1) NOT NULL,
3> [Name] [nvarchar](max) NULL,
4> [CreatedDate] [datetime2](7) NOT NULL,
5> CONSTRAINT [PK_Employees] PRIMARY KEY CLUSTERED
6> (
7> [Id] ASC
8> FF, IGNORE_DUP_KEY = OFF, OPTIMIZE_FOR_SEQUENTIAL_KEY = OFF) ON [PRIMARY]
9> ) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
10> GO
1> SET IDENTITY_INSERT [dbo].[Employees] ON
2> GO
1> UES (1, N'Juan Perez', CAST(N'2024-09-05T00:00:00.0000000' AS DateTime2))
2> GO

(1 rows affected)
1> UES (2, N'Carla Ruiz', CAST(N'2024-09-05T22:22:47.4405720' AS DateTime2))
2> GO

(1 rows affected)
1> S (3, N'Carlos Gomez', CAST(N'2024-09-06T09:16:50.0709430' AS DateTime2))
2> GO

(1 rows affected)
1> (4, N'Joaquin Zarate', CAST(N'2024-09-06T09:19:37.8987160' AS DateTime2))
2> GO

(1 rows affected)
1> (5, N'Luis Rodriguez', CAST(N'2024-09-06T09:23:31.3244340' AS DateTime2))
2> GO

(1 rows affected)
1> SET IDENTITY_INSERT [dbo].[Employees] OFF
2> GO

```

SELECT \* FROM [dbo].[Employees];  
GO

```

1> SELECT * FROM [dbo].[Employees];
2> go
Id          Name
-----
CreatedDate
-----
1 Juan Perez
2024-09-05 00:00:00.0000000
2 Carla Ruiz
2024-09-05 22:22:47.4405720
3 Carlos Gomez
2024-09-06 09:16:50.0709430
4 Joaquin Zarate
2024-09-06 09:19:37.8987160
5 Luis Rodriguez
2024-09-06 09:23:31.3244340

(5 rows affected)
1> 

```

Para acceder nuevamente al contenedor:

```
caro@e14:~$ docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS
17a983084a91   mcr.microsoft.com/mssql/server:2022-latest  "/opt/mssql/bin/per..." 2 weeks ago   Created
cea4c10063db   mcr.microsoft.com/mssql/server:2022-latest  "/opt/mssql/bin/per..." 2 weeks ago   Exited (0) 2 weeks ago
760cfdc099c8   mcr.microsoft.com/mssql/server:2022-latest  "/opt/mssql/bin/per..." 4 weeks ago   Exited (137) 4 weeks ago
45d30f232c46   postgres:9.4                                "docker-entrypoint.s..." 4 weeks ago   Exited (137) 4 weeks ago
caro@e14:~$ docker start agitated_davinci
agitated_davinci
caro@e14:~$ docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
cea4c10063db   mcr.microsoft.com/mssql/server:2022-latest  "/opt/mssql/bin/per..." 2 weeks ago   Up 8 seconds   caccccc
caro@e14:~$ docker exec -it agitated_davinci /opt/mssql-tools18/bin/sqlcmd -S localhost -U SA -P 'Anilorac.9' -C
1>
```

## 4.2 Obtener nuestra App

### A. Clonar el repo

[https://github.com/ingsoft3ucc/Angular\\_WebAPINetCore8\\_CRUD\\_Sample.git](https://github.com/ingsoft3ucc/Angular_WebAPINetCore8_CRUD_Sample.git)

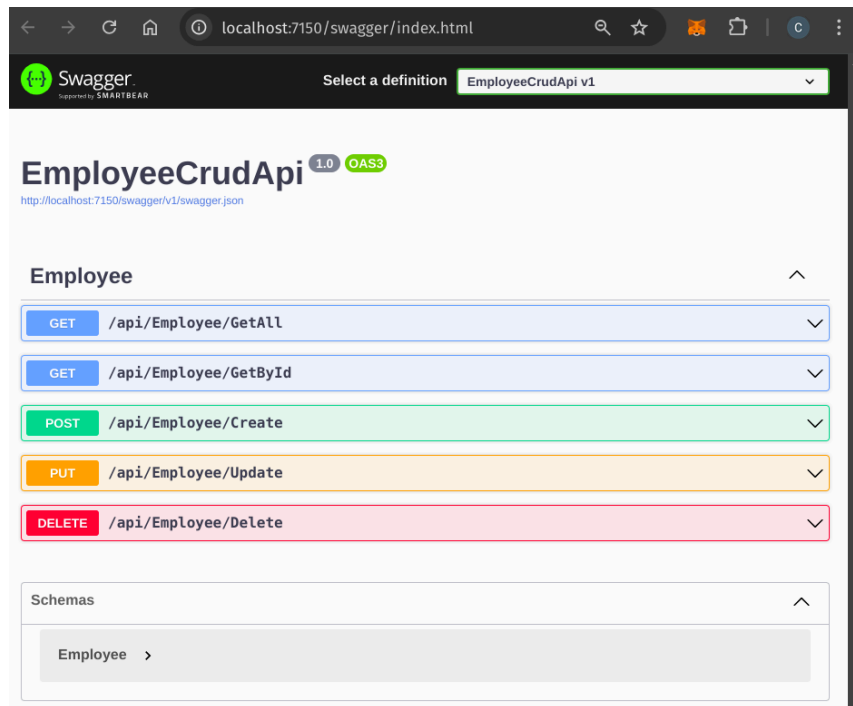
```
caro@e14:~/Documents/tp_ingsw3$ git clone git@github.com:ingsoft3ucc/Angular_WebAPINetCore8_CRUD_Sample.git
Cloning into 'Angular_WebAPINetCore8_CRUD_Sample'...
remote: Enumerating objects: 236, done.
remote: Counting objects: 100% (236/236), done.
remote: Compressing objects: 100% (124/124), done.
remote: Total 236 (delta 110), reused 227 (delta 103), pack-reused 0 (from 0)
Receiving objects: 100% (236/236), 486.02 KiB | 488.00 KiB/s, done.
Resolving deltas: 100% (110/110), done.
```

B. Seguir las instrucciones del README.md del repo clonado prestando atención a la modificación de la cadena de conexión en el appSettings.json para que apunte a la BD creada en 4.1

```
appsettings.json M x
EmployeeCrudApi > EmployeeCrudApi > {} appsettings.json > {} ConnectionStrings > DefaultConnection
1 {
2   "ConnectionStrings": {
3     "DefaultConnection": "Server=localhost,15000;Initial Catalog=master;Persist Security Info=False;User ID=SA;Password=Anilorac.9;MultipleActiveResultSets=False;Encrypt=False;TrustServerCertificate=False;Connection Timeout=30;"
4   },
5   "Logging": {
6     "LogLevel": {
7       "Default": "Information",
8       "Microsoft.AspNetCore": "Warning"
9     }
10  },
11  "AllowedHosts": "*"
12 }
```

```
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi$ dotnet run --urls "http://localhost:7150"
Building...
info: Microsoft.Hosting.Lifetime[14]
      Now listening on: http://localhost:7150
info: Microsoft.Hosting.Lifetime[0]
      Application started. Press Ctrl+C to shut down.
info: Microsoft.Hosting.Lifetime[0]
      Hosting environment: Development
info: Microsoft.Hosting.Lifetime[0]
      Content root path: /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi
```

C. Navegar a <http://localhost:7150/swagger/index.html> y probar uno de los controladores para verificar el correcto funcionamiento de la API.



D. Navegar a <http://localhost:4200> y verificar el correcto funcionamiento de nuestro front-end Angular

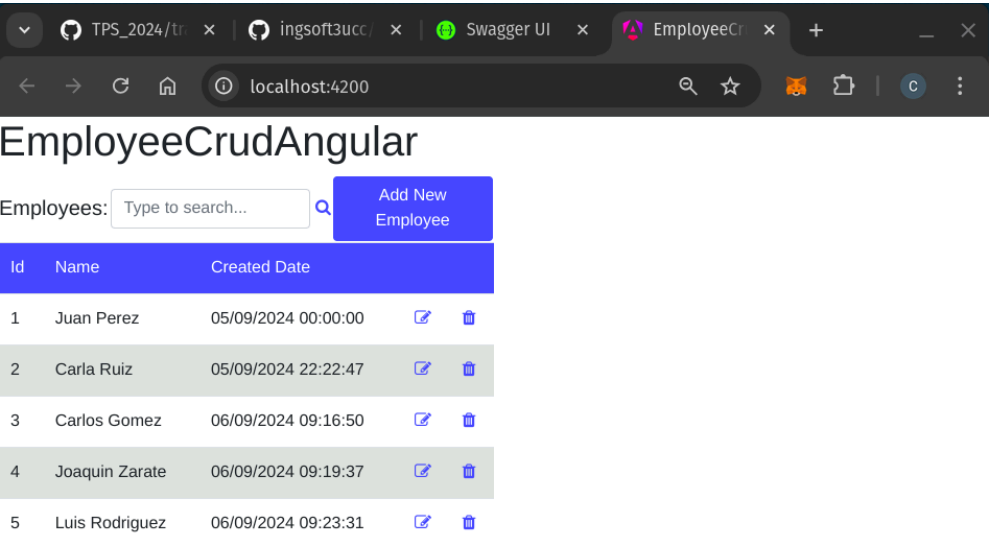
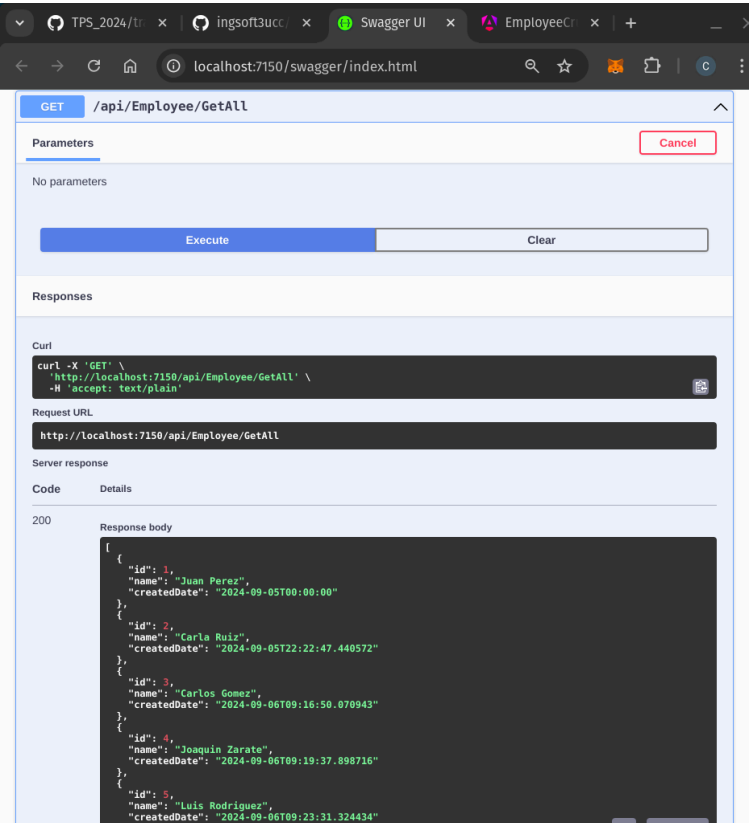
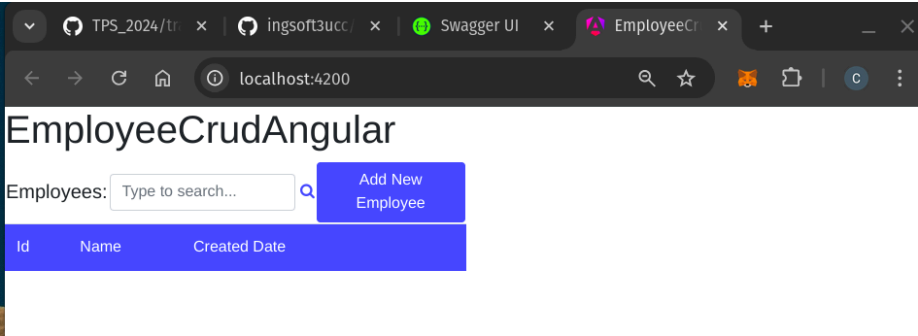
```
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCru
dAngular$ npm install
npm warn deprecated inflight@1.0.6: This module is not supported, and leaks m
emory. Do not use it. Check out lru-cache if you want a good and tested way t
o coalesce async requests by a key value, which is much more comprehensive an
d powerful.
npm warn deprecated rimraf@3.0.2: Rimraf versions prior to v4 are no longer s
upported
npm warn deprecated glob@7.2.3: Glob versions prior to v9 are no longer suppo

caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCru
dAngular$ ng serve -o
Initial chunk files | Names          | Raw size
styles.css          | styles         | 230.41 kB |
polyfills.js        | polyfills      | 88.12 kB  |
main.js             | main           | 15.03 kB  |

| Initial total | 333.56 kB

Application bundle generation complete. [1.235 seconds]

Watch mode enabled. Watching for file changes...
  → Local:   http://localhost:4200/
  → press h + enter to show help
█
```



E. Una vez verificado el correcto funcionamiento de la Aplicación procederemos a crear un proyecto de pruebas unitarias para nuestra API.

### 4.3 Crear Pruebas Unitarias para nuestra API

A. En el directorio raíz de nuestro repo crear un nuevo proyecto de pruebas unitarias para nuestra API

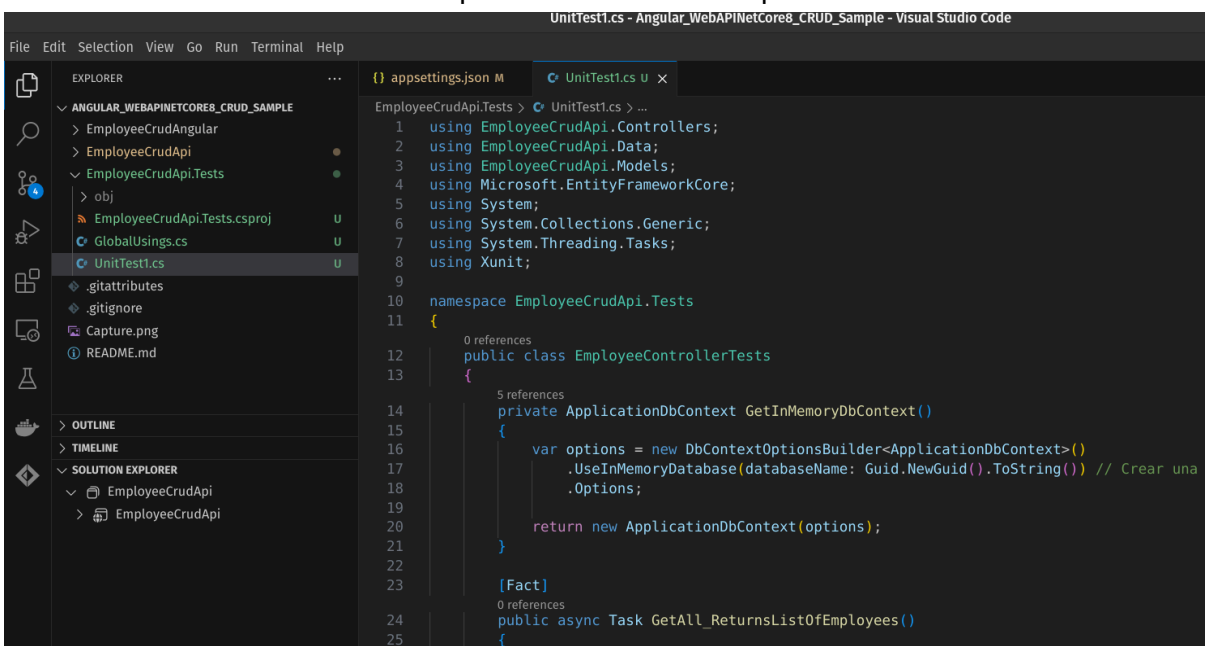
```
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample$ dotnet new xunit -n EmployeeCrudApi.Tests
The template "xUnit Test Project" was created successfully.

Processing post-creation actions...
Restoring /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/EmployeeCrudApi.Tests.csproj:
  Determining projects to restore...
  Restored /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/EmployeeCrudApi.Tests.csproj (in 7.13 sec).
Restore succeeded.
```

B. Instalar dependencias necesarias

```
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample$ cd EmployeeCrudApi.Tests
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ dotnet add package Moq
dotnet add package xunit
dotnet add package Microsoft.EntityFrameworkCore.InMemory
  Determining projects to restore...
  Writing /tmp/tmp1v1hhR.tmp
info : X.509 certificate chain validation will use the fallback certificate bundle at '/usr/lib/dotnet/sdk/8.0.108/trustedroots/codesignctl.pem'.
info : X.509 certificate chain validation will use the fallback certificate bundle at '/usr/lib/dotnet/sdk/8.0.108/trustedroots/codesignctl.pem'.
```

C. Editar archivo UnitTest1.cs reemplazando su contenido por:



D. Renombrar archivo UnitTest1.cs por EmployeeControllerUnitTests.cs

```
caro@e14: ~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ ls
EmployeeCrudApi.Tests.csproj GlobalUsings.cs obj UnitTest1.cs
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ mv UnitTest1.cs EmployeeControllerUnitTests.cs
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ ls
EmployeeControllerUnitTests.cs GlobalUsings.cs
EmployeeCrudApi.Tests.csproj obj
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$
```

E. Editar el archivo EmployeeCrudApi.Tests/EmployeeCrudApi.Tests.csproj para agregar una referencia a nuestro proyecto de EmployeeCrudApi reemplazando su contenido por:

```
EmployeeCrudApi.Tests.csproj - Angular_WebAPINetCore8_CRUD_Sample - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
ANGULAR_WEBAPINETCORE8_CRUD_SAMPLE
  EmployeeCrudAngular
  EmployeeCrudApi
  EmployeeCrudApi.Tests
    obj
    EmployeeControllerUnitTests.cs
    EmployeeCrudApi.Tests.csproj
    GlobalUsings.cs
  .gitattributes
  .gitignore
  Capture.png
  README.md
OUTLINE
TIMELINE
SOLUTION EXPLORER
  EmployeeCrudApi
    EmployeeCrudApi

EmployeeCrudApi.Tests.csproj
1 <Project Sdk="Microsoft.NET.Sdk">
2
3   <PropertyGroup>
4     <TargetFramework>net8.0</TargetFramework>
5     <ImplicitUsings>enable</ImplicitUsings>
6     <Nullable>enable</Nullable>
7
8     <IsPackable>false</IsPackable>
9     <IsTestProject>true</IsTestProject>
10  </PropertyGroup>
11
12  <ItemGroup>
13    <PackageReference Include="coverlet.collector" Version="6.0.0" />
14    <PackageReference Include="Microsoft.EntityFrameworkCore.InMemory" Version="8.0.8" />
15    <PackageReference Include="Microsoft.NET.Test.Sdk" Version="17.8.0" />
16    <PackageReference Include="Moq" Version="4.20.71" />
17    <PackageReference Include="xunit" Version="2.9.0" />
18    <PackageReference Include="xunit.runner.visualstudio" Version="2.5.3" />
19  </ItemGroup>
20
21  <ItemGroup>
22    <ProjectReference Include="..\EmployeeCrudApi\EmployeeCrudApi\EmployeeCrudApi.csproj" />
23  </ItemGroup>
24
25  <ItemGroup>
26    <Using Include="Xunit" />
27  </ItemGroup>
28
29 </Project>
30
```

F. Ejecutar los siguientes comandos para ejecutar nuestras pruebas

```
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ dotnet build
MSBuild version 17.8.5+b5265ef37 for .NET
Determining projects to restore...
Restored /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/EmployeeCrudApi.Tests.csproj (in 4.29 sec).
1 of 2 projects are up-to-date for build.
EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll
EmployeeCrudApi.Tests -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll

Build succeeded.
0 Warning(s)
0 Error(s)

Time Elapsed 00:00:07.23
```

```

caro@14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi$ dotnet test
Determining projects to restore...
All projects are up-to-date for restore.
EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll
EmployeeCrudApi.Tests -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll
Test run for /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll (.NETCoreApp,Version=v8.0)
Microsoft (R) Test Execution Command Line Tool Version 17.8.0 (x64)
Copyright (c) Microsoft Corporation. All rights reserved.

Starting test execution, please wait...
A total of 1 test files matched the specified pattern.

Passed! - Failed: 0, Passed: 5, Skipped: 0, Total: 5, Duration: 93 ms - EmployeeCrudApi.Tests.dll (net8.0)

```

G. Verificar que se hayan ejecutado correctamente las pruebas

Se ejecutaron correctamente y todas “passed”.

H. Verificar que no estamos usando una dependencia externa como la base de datos.

I. Modificar la cadena de conexión en el archivo appsettings.json para que use un usuario o password incorrecto y recompilar el proyecto EmployeeCrudApi

```

{} appsettings.json M ● EmployeeCrudApi.Tests.csproj U EmployeeCrudApi.sln
EmployeeCrudApi > EmployeeCrudApi > {} appsettings.json > {} ConnectionStrings > DefaultConnection
1
2
3 initial Catalog=master;Persist Security Info=False;User ID=SA;Password=cualquiera;Multi
4

```

```

dApi/EmployeeCrudApi$ dotnet build
MSBuild version 17.8.5+b5265ef37 for .NET
Determining projects to restore...
All projects are up-to-date for restore.
EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll

Build succeeded.
0 Warning(s)
0 Error(s)

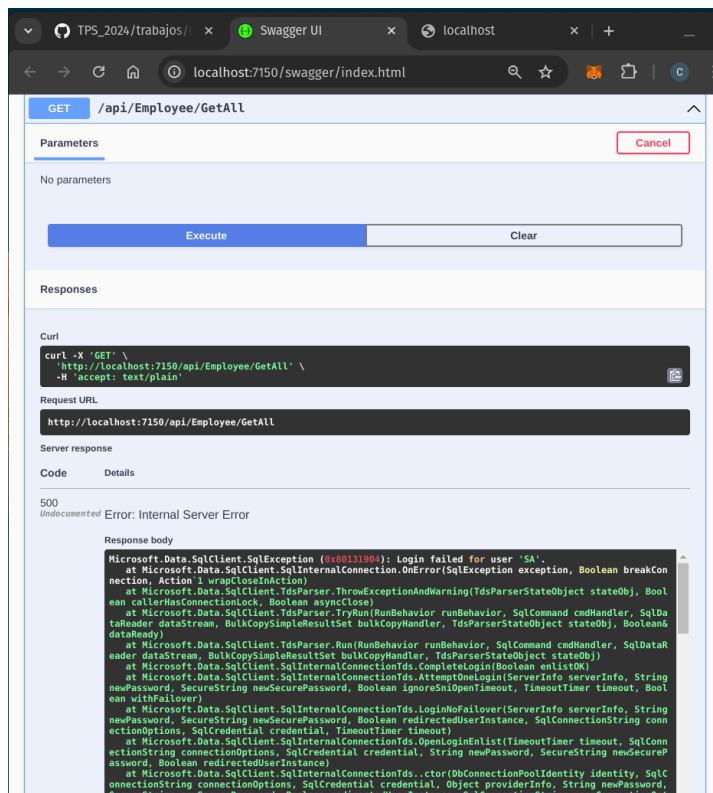
Time Elapsed 00:00:00.91
caro@14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi$ dotnet run --urls "http://localhost:7150"
Building...
info: Microsoft.Hosting.Lifetime[14]
      Now listening on: http://localhost:7150
info: Microsoft.Hosting.Lifetime[0]
      Application started. Press Ctrl+C to shut down.
info: Microsoft.Hosting.Lifetime[0]
      Hosting environment: Development
info: Microsoft.Hosting.Lifetime[0]
      Content root path: /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi
warn: Microsoft.AspNetCore.HttpsPolicy.HttpsRedirectionMiddleware[3]
      Failed to determine the https port for redirect.

```

J. Verificar que nuestro proyecto ya no tiene acceso a la BD navegando a

<http://localhost:7150/swagger/index.html> y probando uno de los controladores:





K. En la carpeta de nuestro proyecto `EmployeeCrudApi.Tests` volver a correr las pruebas  
 L. Verificar que se hayan ejecutado correctamente las pruebas inclusive sin tener acceso a la BD, lo que confirma que es efectivamente un conjunto de pruebas unitarias que no requieren de una dependencia externa para funcionar.

```

dApi.Tests$ dotnet build
MSBuild version 17.8.5+b5265ef37 for .NET
Determining projects to restore...
All projects are up-to-date for restore.
EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll

EmployeeCrudApi.Tests -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll

Build succeeded.
    0 Warning(s)
    0 Error(s)

Time Elapsed 00:00:01.37
caro@14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ dotnet test
Determining projects to restore...
All projects are up-to-date for restore.
EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll

EmployeeCrudApi.Tests -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll

Test run for /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll (.NETCoreApp,Version=v8.0)
Microsoft (R) Test Execution Command Line Tool Version 17.8.0 (x64)
Copyright (c) Microsoft Corporation. All rights reserved.

Starting test execution, please wait...
A total of 1 test files matched the specified pattern.

Passed! - Failed:    0, Passed:    5, Skipped:    0, Total:    5, Duration: 125 ms - EmployeeCrudApi.Tests.dll (net8.0)
caro@14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$

```

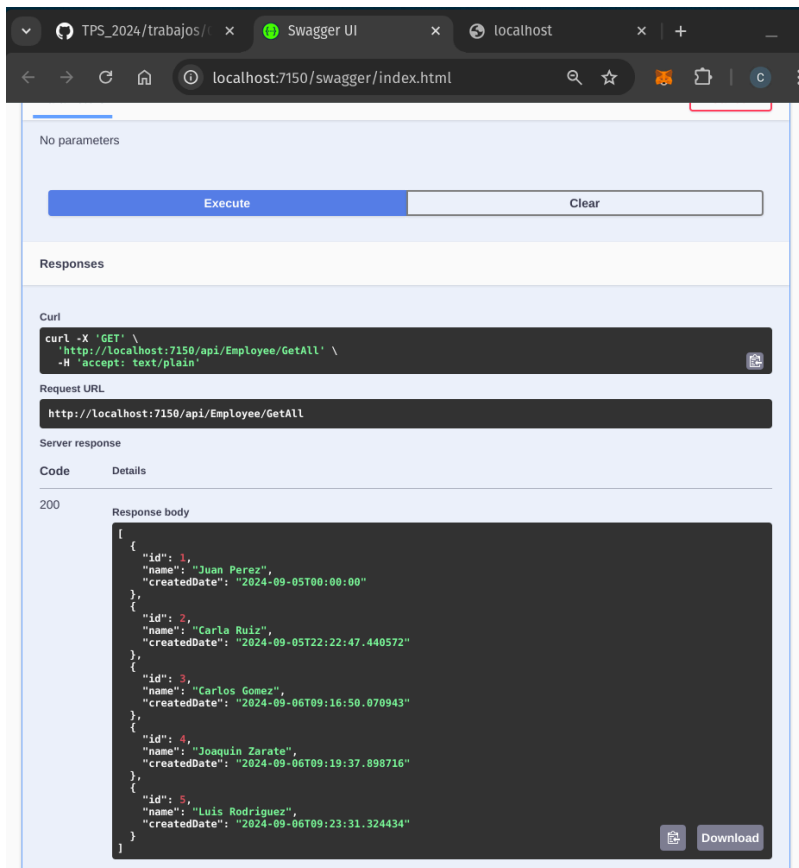
M. Modificar la cadena de conexión en el archivo `appsettings.json` para que use el usuario y password correcto y recompilar el proyecto `EmployeeCrudApi`

```
{ } appsettings.json M x EmployeeCrudApi.csproj EmployeeCrudApi.Tests.csproj U
EmployeeCrudApi > EmployeeCrudApi > { } appsettings.json > { } ConnectionStrings > DefaultConnection
1
2 : {
3 n": "Server=localhost,15000;Initial Catalog=master;Persist Security Info=False;User ID=SA;Password=Anilorac.9;Mult
4
5
6
```

dotnet build

dotnet run --urls "http://localhost:7150"

N. Verificar que nuestro proyecto vuelve a tener acceso a la BD navegando a <http://localhost:7150/swagger/index.html> y probando uno de los controladores:

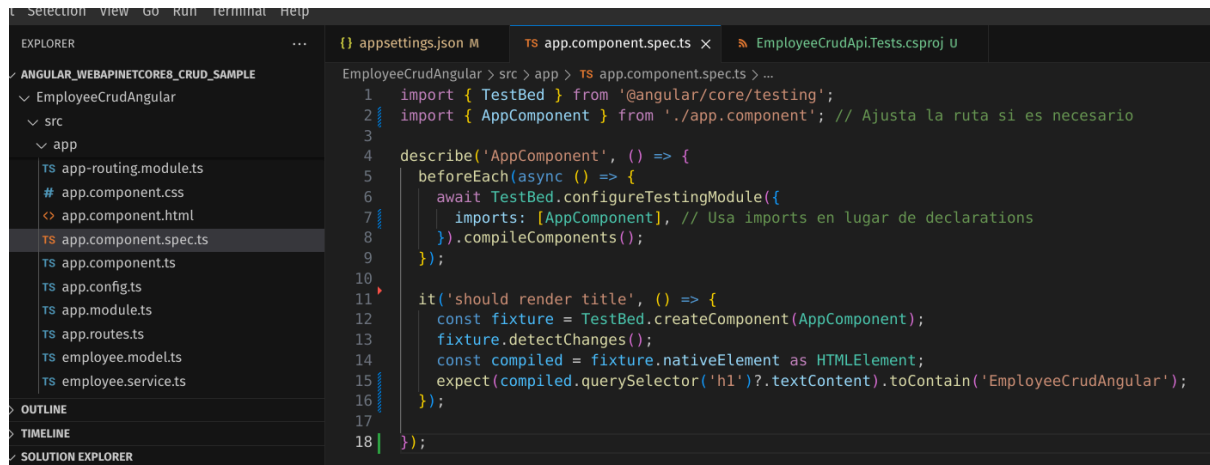


4.4 Creamos pruebas unitarias para nuestro front de Angular:

A. Nos posicionamos en nuestro proyecto de front, en el directorio EmployeeCrudAngular/src/app

```
caro@e14: ~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCr...
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCru
dAngular/src/app$ pwd
/home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCru
dAngular/src/app
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCru
dAngular/src/app$ ls
addemployee      app.component.ts  app-routing.module.ts
app.component.css app.config.ts     employee
app.component.html app.module.ts     employee.model.ts
app.component.spec.ts app.routes.ts     employee.service.ts
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCru
```

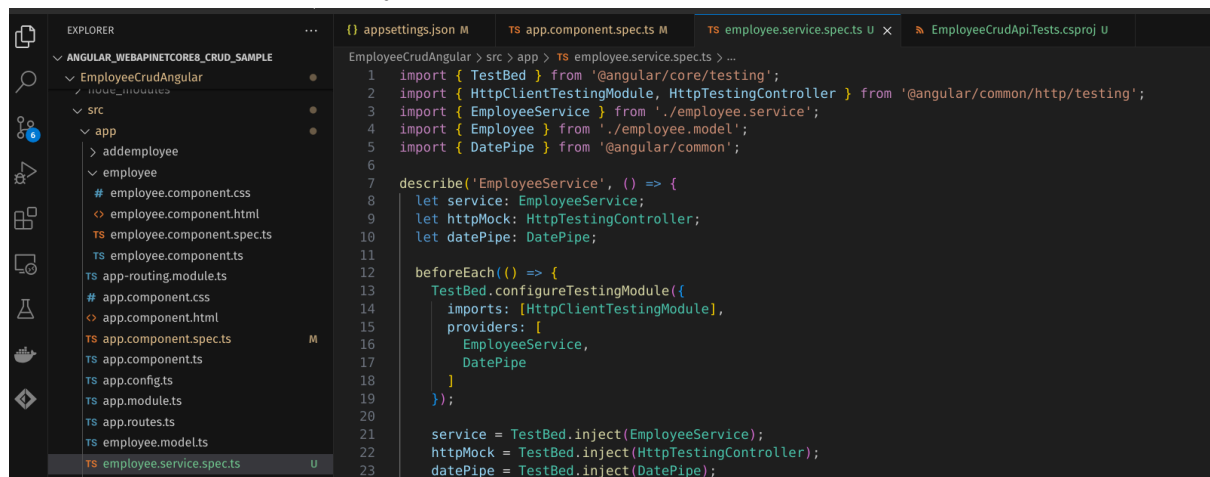
B. Editamos el archivo `app.component.spec.ts` reemplazando su contenido por:



The screenshot shows the Visual Studio Code editor with the Explorer sidebar on the left. The file `app.component.spec.ts` is selected under the `src/app` directory. The main editor displays the following TypeScript code:

```
1 import { TestBed } from '@angular/core/testing';
2 import { AppComponent } from '../app.component'; // Ajusta la ruta si es necesario
3
4 describe('AppComponent', () => {
5   beforeEach(async () => {
6     await TestBed.configureTestingModule({
7       imports: [AppComponent], // Usa imports en lugar de declarations
8     }).compileComponents();
9   });
10
11   it('should render title', () => {
12     const fixture = TestBed.createComponent(AppComponent);
13     fixture.detectChanges();
14     const compiled = fixture.nativeElement as HTMLElement;
15     expect(compiled.querySelector('h1')?.textContent).toContain('EmployeeCrudAngular');
16   });
17
18 });
```

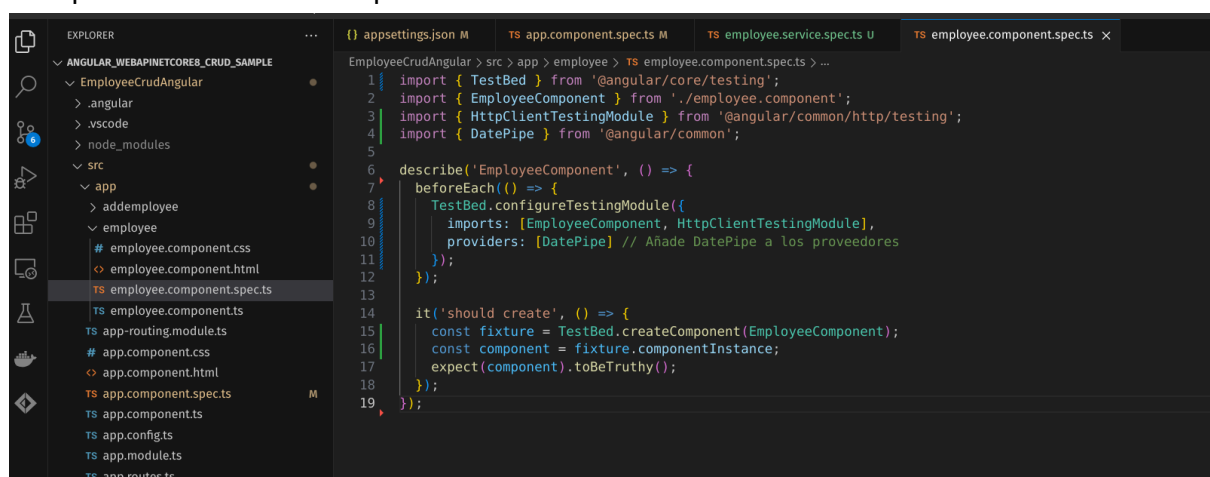
C. Creamos el archivo `employee.service.spec.ts` reemplazando su contenido por:



The screenshot shows the Visual Studio Code editor with the Explorer sidebar on the left. The file `employee.service.spec.ts` is selected under the `src/app/employee` directory. The main editor displays the following TypeScript code:

```
1 import { TestBed } from '@angular/core/testing';
2 import { HttpClientTestingModule, HttpTestingController } from '@angular/common/http/testing';
3 import { EmployeeService } from './employee.service';
4 import { Employee } from '../employee.model';
5 import { DatePipe } from '@angular/common';
6
7 describe('EmployeeService', () => {
8   let service: EmployeeService;
9   let httpMock: HttpTestingController;
10   let datePipe: DatePipe;
11
12   beforeEach(() => {
13     TestBed.configureTestingModule({
14       imports: [HttpClientTestingModule],
15       providers: [
16         EmployeeService,
17         DatePipe
18       ]
19     });
20
21     service = TestBed.inject(EmployeeService);
22     httpMock = TestBed.inject(HttpTestingController);
23     datePipe = TestBed.inject(DatePipe);
24   });
25
26   // ... (The rest of the test suite content is not visible in the image)
```

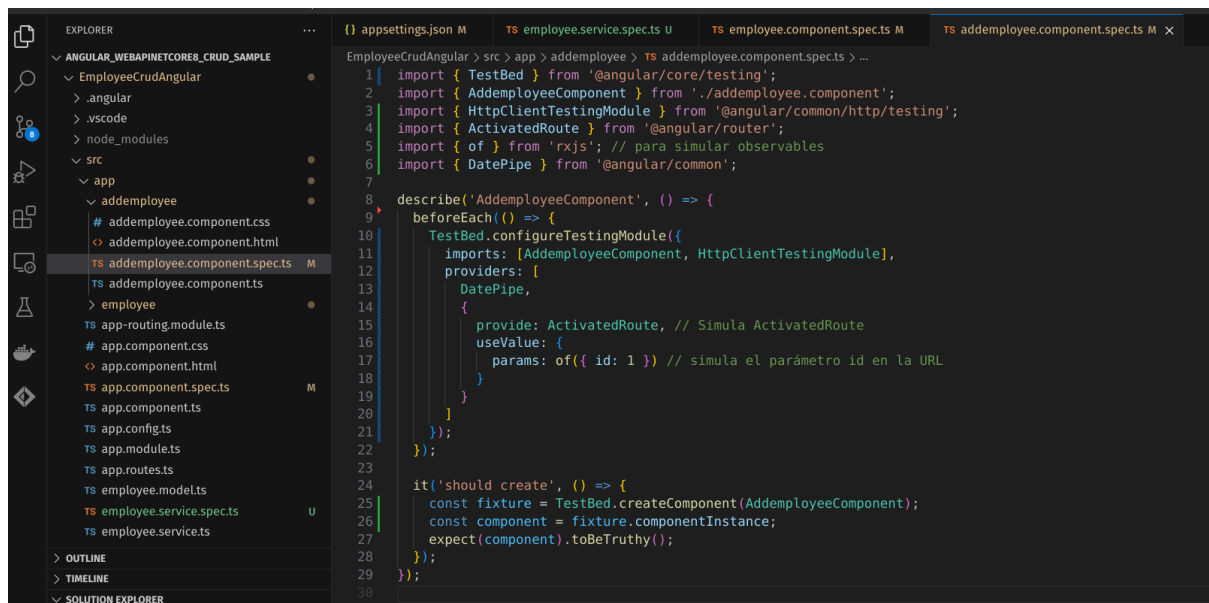
D. Editamos el archivo `employee.component.spec.ts` ubicado en la carpeta `employee` reemplazando su contenido por:



The screenshot shows the Visual Studio Code editor with the Explorer sidebar on the left. The file `employee.component.spec.ts` is selected under the `src/app/employee` directory. The main editor displays the following TypeScript code:

```
1 import { TestBed } from '@angular/core/testing';
2 import { EmployeeComponent } from './employee.component';
3 import { HttpClientTestingModule } from '@angular/common/http/testing';
4 import { DatePipe } from '@angular/common';
5
6 describe('EmployeeComponent', () => {
7   beforeEach(() => {
8     TestBed.configureTestingModule({
9       imports: [EmployeeComponent, HttpClientTestingModule],
10       providers: [DatePipe] // Añade DatePipe a los proveedores
11     });
12   });
13
14   it('should create', () => {
15     const fixture = TestBed.createComponent(EmployeeComponent);
16     const component = fixture.componentInstance;
17     expect(component).toBeTruhty();
18   });
19 });
```

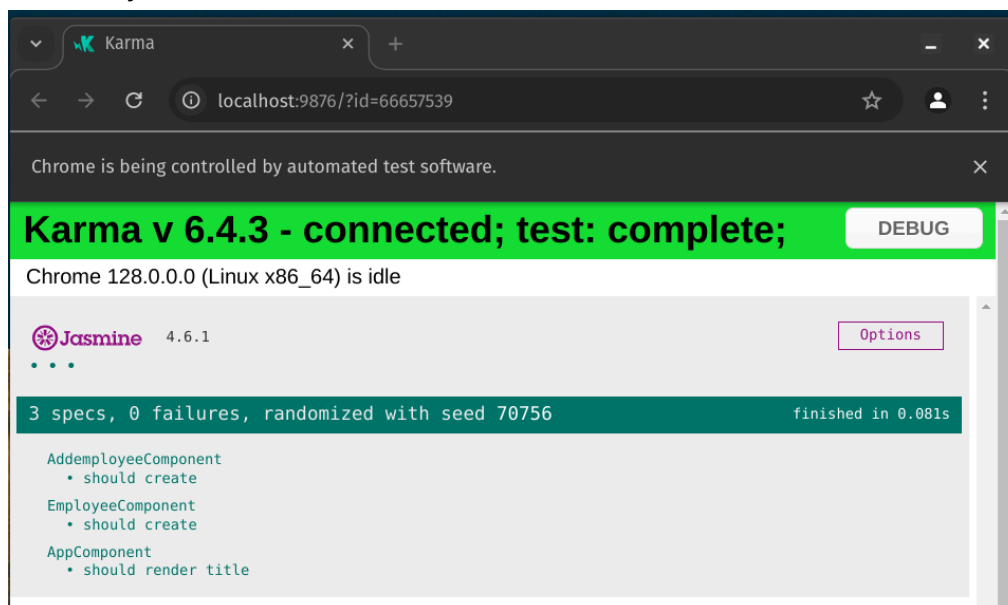
E. Editamos el archivo `addemployee.component.spec.ts` ubicado en la carpeta `addemployee` reemplazando su contenido por:



```
1 import { TestBed } from '@angular/core/testing';
2 import { AddemployeeComponent } from './addemployee.component';
3 import { HttpClientModule } from '@angular/common/http/testing';
4 import { ActivatedRoute } from '@angular/router';
5 import { of } from 'rxjs'; // para simular observables
6 import { DatePipe } from '@angular/common';
7
8 describe('AddemployeeComponent', () => {
9   beforeEach(() => {
10     TestBed.configureTestingModule({
11       imports: [AddemployeeComponent, HttpClientModule],
12       providers: [
13         DatePipe,
14         {
15           provide: ActivatedRoute, // Simula ActivatedRoute
16           useValue: {
17             params: of({ id: 1 }) // simula el parámetro id en la URL
18           }
19         }
20       ]
21     });
22   });
23
24   it('should create', () => {
25     const fixture = TestBed.createComponent(AddemployeeComponent);
26     const component = fixture.componentInstance;
27     expect(component).toBeTruthy();
28   });
29 });
```

F. En el directorio raíz de nuestro proyecto EmployeeCrudAngular ejecutamos el comando `ng test`

G. Vemos que se abre una ventana de Karma con Jasmine en la que nos indica que los tests se ejecutaron correctamente

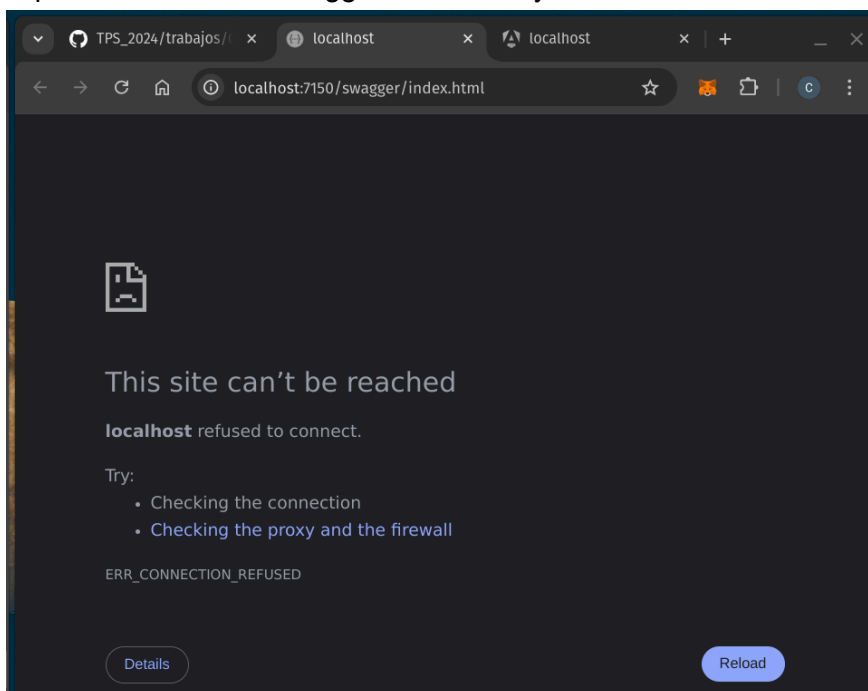


H. Vemos que los tests se ejecutaron correctamente:

```
Disconnected client disconnected from CONNECTED state (transport close)
caro@e14:~/Documents/tp_ingsw3/Angular/WebAPICore8_CRUD_Sample/EmployeeCrudAngular$ ng test
✓ Browser application bundle generation complete.

28 09 2024 19:52:52.355:WARN [karma]: No captured browser, open http://localhost:9876/
28 09 2024 19:52:52.363:INFO [karma-server]: Karma v6.4.3 server started at http://localhost:9876/
28 09 2024 19:52:52.363:INFO [launcher]: Launching browsers Chrome with concurrency unlimited
28 09 2024 19:52:52.365:INFO [launcher]: Starting browser Chrome
28 09 2024 19:52:52.976:INFO [Chrome 128.0.0.0 (Linux x86_64)]: Connected on socket qb_lmpDkuVzikW--AAAB with id 66657539
Chrome 128.0.0.0 (Linux x86_64): Executed 1 of 3 SUCCESS (0 secs / 0.048 secs)
Chrome 128.0.0.0 (Linux x86_64): Executed 2 of 3 SUCCESS (0 secs / 0.066 secs)
Chrome 128.0.0.0 (Linux x86_64): Executed 3 of 3 SUCCESS (0 secs / 0.071 secs)
Chrome 128.0.0.0 (Linux x86_64): Executed 3 of 3 SUCCESS (0.081 secs / 0.071 secs)
TOTAL: 3 SUCCESS
█
```

I. Verificamos que no esté corriendo nuestra API navegando a `http://localhost:7150/swagger/index.html` y recibiendo esta salida:



J. Los puntos G y H nos indican que se han ejecutado correctamente las pruebas inclusive sin tener acceso a la API, lo que confirma que es efectivamente un conjunto de pruebas unitarias que no requieren de una dependencia externa para funcionar.

4.5 Agregamos generación de reporte XML de nuestras pruebas de front.

A. Instalamos dependencia karma-junit-reporter

```
caro@e14: ~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCr...
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCr...$ npm install karma-junit-reporter --save-dev

added 2 packages, and audited 941 packages in 6s

120 packages are looking for funding
  run `npm fund` for details

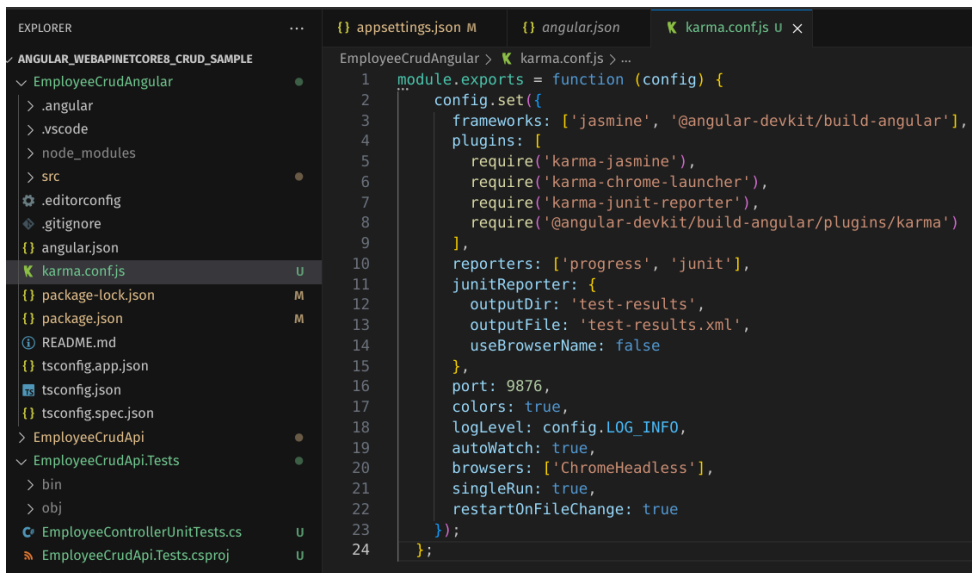
11 vulnerabilities (7 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
```

B. En el directorio raíz de nuestro proyecto (al mismo nivel que el archivo angular.json) creamos un archivo karma.conf.js con el siguiente contenido

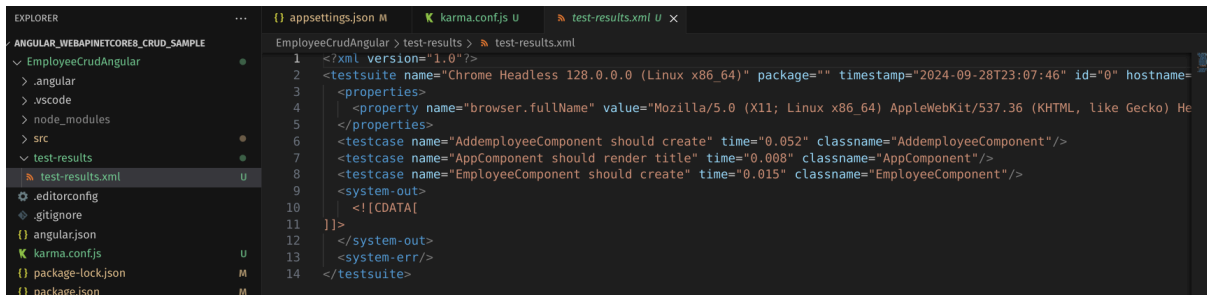


```
module.exports = function (config) {
  config.set({
    frameworks: ['jasmine', '@angular-devkit/build-angular'],
    plugins: [
      require('karma-jasmine'),
      require('karma-chrome-launcher'),
      require('karma-junit-reporter'),
      require('@angular-devkit/build-angular/plugins/karma')
    ],
    reporters: ['progress', 'junit'],
    junitReporter: {
      outputDir: 'test-results',
      outputFile: 'test-results.xml',
      useBrowserName: false
    },
    port: 9876,
    colors: true,
    logLevel: config.LOG_INFO,
    autoWatch: true,
    browsers: ['ChromeHeadless'],
    singleRun: true,
    restartOnFileChange: true
  });
};
```

C. Ejecutamos nuestros test de la siguiente manera:

```
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCr...$ ng test --karma-config=karma.conf.js --watch=false --browsers ChromeHeadless
✓ Browser application bundle generation complete.
28 09 2024 20:07:44.620:INFO [karma-server]: Karma v6.4.3 server started at http://localhost:9876/
28 09 2024 20:07:44.623:INFO [launcher]: Launching browsers ChromeHeadless with concurrency unlimited
28 09 2024 20:07:44.627:INFO [launcher]: Starting browser ChromeHeadless
28 09 2024 20:07:45.102:INFO [Chrome Headless 128.0.0.0 (Linux x86_64)]: Connected on socket fCC_2hEiOesA_co5AAAB with id 27012082
Chrome Headless 128.0.0.0 (Linux x86_64): Executed 0 of 3 SUCCESS (0 secs / 0
Chrome Headless 128.0.0.0 (Linux x86_64): Executed 1 of 3 SUCCESS (0 secs / 0
Chrome Headless 128.0.0.0 (Linux x86_64): Executed 2 of 3 SUCCESS (0 secs / 0
Chrome Headless 128.0.0.0 (Linux x86_64): Executed 3 of 3 SUCCESS (0 secs / 0
Chrome Headless 128.0.0.0 (Linux x86_64): Executed 3 of 3 SUCCESS (0.082 secs / 0.075 secs)
TOTAL: 3 SUCCESS
```

D. Verificamos que se creo un archivo test-result.xml en el directorio test-results que está al mismo nivel que el directorio src

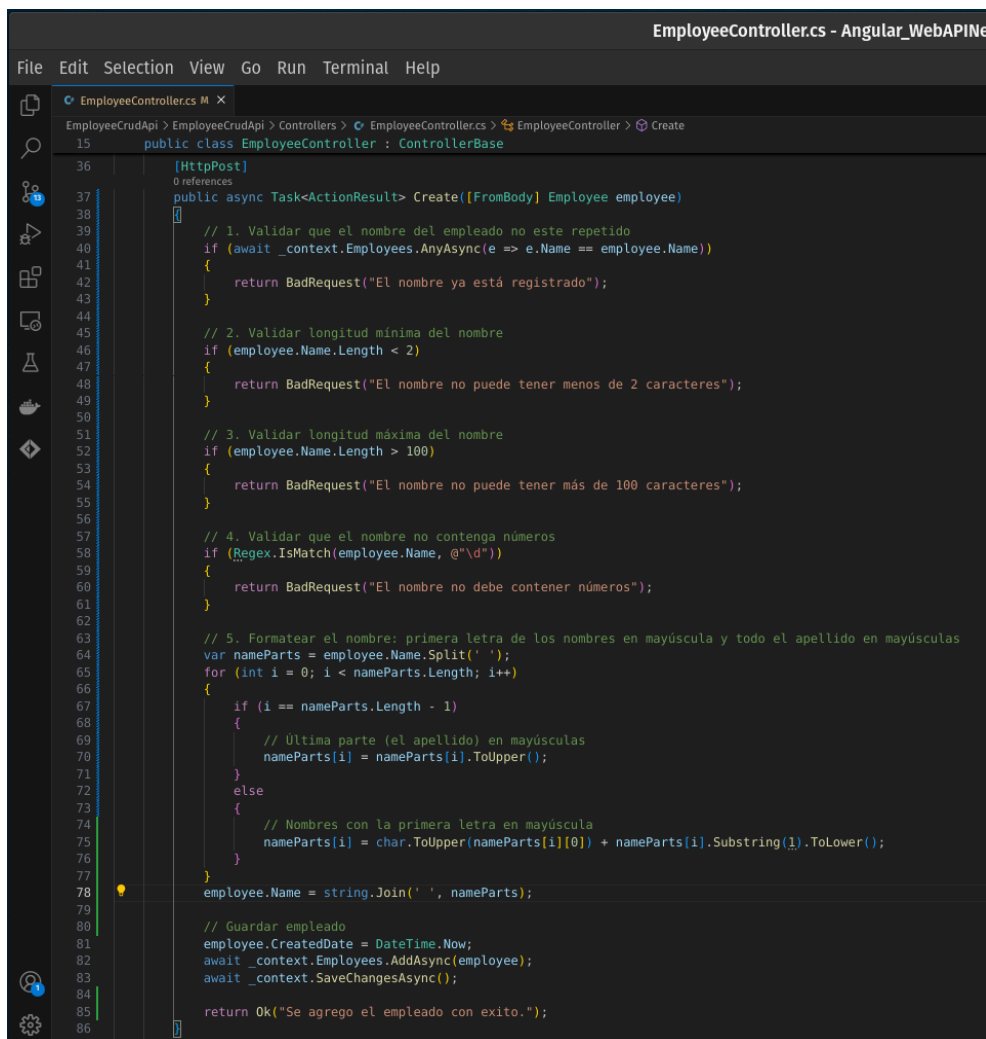
A screenshot of the Visual Studio Code editor. The Explorer sidebar on the left shows a project structure for 'ANGULAR\_WEBAPINETCORE8\_CRUD\_SAMPLE' with folders like 'angular', 'src', and 'test-results'. The 'test-results.xml' file is selected and open in the main editor. The XML content shows a test suite for 'Chrome Headless' with several test cases, including 'AddEmployeeComponent should create' and 'EmployeeComponent should create'.

```
<?xml version="1.0"?>
<testsuite name="Chrome Headless 128.0.0.0 (Linux x86_64)" package="" timestamp="2024-09-28T23:07:46" id="0" hostname=
  <properties>
    <property name="browser.fullName" value="Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) He
  </properties>
  <testcase name="AddEmployeeComponent should create" time="0.052" classname="AddEmployeeComponent"/>
  <testcase name="AppComponent should render title" time="0.008" classname="AppComponent"/>
  <testcase name="EmployeeComponent should create" time="0.015" classname="EmployeeComponent"/>
  <system-out>
    <![CDATA[
  ]]>
  </system-out>
  <system-err/>
</testsuite>
```

#### 4.6 Modificamos el código de nuestra API y creamos nuevas pruebas unitarias:

A. Realizar al menos 5 de las siguientes modificaciones sugeridas al código de la API:

- Al agregar y al editar un empleado, controlar que el nombre del empleado no esté repetido.
- Validar que el nombre tenga un número mínimo de caracteres, por ejemplo, al menos dos caracteres para evitar entradas inválidas como "A".
- La longitud máxima del nombre y apellido del empleado debe ser de 100 caracteres.
- Verificar que el nombre no contenga números, ya que no es común en los nombres de empleados.
- Almacenar el nombre en la BD siempre con la primera letra de los nombres en Mayuscula y todo el apellido en Mayusculas. Ejemplo, si recibo juan carlos chamizo, se debe almacenar como Juan Carlos CHAMIZO.

A screenshot of the Visual Studio Code editor showing the 'EmployeeController.cs' file. The file is part of the 'EmployeeCrudApi' project. The code implements a 'Create' method for the 'EmployeeController' class. It includes five validation steps: 1. Check if the name already exists in the database. 2. Check if the name length is at least 2 characters. 3. Check if the name length is at most 100 characters. 4. Check if the name contains any digits. 5. Format the name by capitalizing the first letter of each word and the last letter of the last word. The code uses LINQ for database queries and string manipulation for name formatting.

```
public class EmployeeController : ControllerBase
{
    [HttpPost]
    public async Task<ActionResult> Create([FromBody] Employee employee)
    {
        // 1. Validar que el nombre del empleado no este repetido
        if (await _context.Employees.AnyAsync(e => e.Name == employee.Name))
        {
            return BadRequest("El nombre ya está registrado");
        }

        // 2. Validar longitud mínima del nombre
        if (employee.Name.Length < 2)
        {
            return BadRequest("El nombre no puede tener menos de 2 caracteres");
        }

        // 3. Validar longitud máxima del nombre
        if (employee.Name.Length > 100)
        {
            return BadRequest("El nombre no puede tener más de 100 caracteres");
        }

        // 4. Validar que el nombre no contenga números
        if (Regex.IsMatch(employee.Name, @"\d"))
        {
            return BadRequest("El nombre no debe contener números");
        }

        // 5. Formatear el nombre: primera letra de los nombres en mayúscula y todo el apellido en mayúsculas
        var nameParts = employee.Name.Split(' ');
        for (int i = 0; i < nameParts.Length; i++)
        {
            if (i == nameParts.Length - 1)
            {
                // Última parte (el apellido) en mayúsculas
                nameParts[i] = nameParts[i].ToUpper();
            }
            else
            {
                // Nombres con la primera letra en mayúscula
                nameParts[i] = char.ToUpper(nameParts[i][0]) + nameParts[i].Substring(1).ToLower();
            }
        }
        employee.Name = string.Join(' ', nameParts);

        // Guardar empleado
        employee.CreatedDate = DateTime.Now;
        await _context.Employees.AddAsync(employee);
        await _context.SaveChangesAsync();

        return Ok("Se agrego el empleado con exito.");
    }
}
```



B. Crear las pruebas unitarias necesarias para validar las modificaciones realizadas en el código

```
102 [Fact]
103 0 references
104 public async Task AddEmployee_ExistingName()
105 {
106     // Arrange
107     var context = GetInMemoryDbContext();
108     var controller = new EmployeeController(context);
109
110     var employee1 = new Employee {Name = "Caro"};
111     var employee2 = new Employee {Name = "Caro"};
112     await controller.Create(employee1);
113
114     // Act
115     var result = await controller.Create(employee2);
116
117     // Assert
118     Assert.IsType<BadRequestObjectResult>(result);
119     var badRequestResult = result as BadRequestObjectResult;
120     Assert.Equal("El nombre ya esta registrado", badRequestResult.Value);
121 }
122
123 [Fact]
124 0 references
125 public async Task Create_AddsEmployee_LongestName()
126 {
127     //Arrange
128     var context = GetInMemoryDbContext();
129     var controller = new EmployeeController(context);
130
131     var longestName = new string('F', 100);
132     var newEmployee = new Employee(Id = 2, Name = longestName);
133
134     // Act
135     var result = await controller.Create(newEmployee);
136
137     // Assert
138     var employee = await context.Employees.FindAsync(2);
139     Assert.NotNull(employee);
140     Assert.Equal(longestName, employee.Name);
141 }
142
```

```
143 [Fact]
144 0 references
145 public async Task Create_AddsEmployee_NameTooShort()
146 {
147     // Arrange
148     var context = GetInMemoryDbContext();
149     var controller = new EmployeeController(context);
150
151     var newEmployee = new Employee(Id = 2, Name = "A");
152
153     // Act
154     var result = await controller.Create(newEmployee);
155
156     // Assert
157     Assert.IsType<BadRequestObjectResult>(result);
158 }
159
160 [Fact]
161 0 references
162 public async Task AddEmployee_NameWithNumbers()
163 {
164     var context = GetInMemoryDbContext();
165     var controller = new EmployeeController(context);
166
167     var newEmployee = new Employee(Name = "Caro3");
168
169     // Act
170     var result = await controller.Create(newEmployee);
171
172     // Assert
173     Assert.IsType<BadRequestObjectResult>(result);
174 }
175
```



```

caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ dotnet build
MSBuild version 17.8.5+b5265ef37 for .NET
  Determining projects to restore...
  All projects are up-to-date for restore.
  EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll
  EmployeeCrudApi.Tests -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll

Build succeeded.
    0 Warning(s)
    0 Error(s)

Time Elapsed 00:00:01.24
caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests$ dotnet test
  Determining projects to restore...
  All projects are up-to-date for restore.
  EmployeeCrudApi -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi/EmployeeCrudApi/bin/Debug/net8.0/EmployeeCrudApi.dll
  EmployeeCrudApi.Tests -> /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll
Test run for /home/caro/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudApi.Tests/bin/Debug/net8.0/EmployeeCrudApi.Tests.dll (.NETCoreApp,Version=v8.0)
Microsoft (R) Test Execution Command Line Tool Version 17.8.0 (x64)
Copyright (c) Microsoft Corporation. All rights reserved.

Starting test execution, please wait...
A total of 1 test files matched the specified pattern.

Passed! - Failed:    0, Passed:    9, Skipped:    0, Total:    9, Duration: 112 ms - EmployeeCrudApi.Tests.dll (net8.0)

```

#### 4.7 Modificamos el código de nuestro Front y creamos nuevas pruebas unitarias:

```

caro@e14:~/Documents/tp_ingsw3/Angular_WebAPINetCore8_CRUD_Sample/EmployeeCrudAngular$ npm install ngx-toastr --save

added 1 package, and audited 942 packages in 5s

120 packages are looking for funding
  run `npm fund` for details

11 vulnerabilities (7 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.

```

Importamos módulos ToastrModule y BrowserAnimationsModule, en src/app/app.config.ts

```
File Edit Selection View Go Run Terminal Help
TS app.config.ts M X
EmployeeCrudAngular > src > app > TS app.config.ts > ...
1 import { ApplicationConfig } from '@angular/core';
2 import { provideRouter } from '@angular/router';
3
4 import { routes } from './app.routes';
5 import { provideHttpClient, withInterceptors } from '@angular/common/http';
6 import { DatePipe } from '@angular/common';
7 import { provideAnimations } from '@angular/platform-browser/animations';
8 import { provideToastr } from 'ngx-toastr';
9
10 export const appConfig: ApplicationConfig = {
11   providers: [
12     provideRouter(routes),
13     provideHttpClient(),
14     provideAnimations(),
15     provideToastr(),
16     DatePipe
17   ],
18 };
```

y agregamos estilo en styles.css

```
File Edit Selection View Go Run Terminal Help
TS app.config.ts M # styles.css M X
EmployeeCrudAngular > src > # styles.css > toast-warning
1 /* You can add global styles to this file, and also import other style files */
2
3 .toast {
4   border-radius: 5px;
5   max-width: 80vw;
6   display: flex;
7   flex-wrap: nowrap;
8   align-items: center;
9   justify-content: space-between;
10  background-color: #444444;
11  color: #FFF;
12  position: fixed;
13  bottom: 10px;
14  left: 10px;
15  font-size: 90%;
16  z-index: 5100;
17
18  transform: translateY(calc(100% + 10px));
19  transition: transform 0.2s ease-in-out;
20 }
21
22 .toast.inview {
23   transform: translateY(0);
24 }
25
26 .text {
27   padding: 20px;
28   flex-basis: 100%;
29   margin-right: 10px;
30 }
31
32 button {
33   padding: 20px;
34   cursor: pointer;
35   font-weight: bold;
36   color: inherit;
37 }
38
39 .buttons {
40   display: flex;
41 }
42
43 .toast-error {
44   background-color: #BD362F;
45 }
46
47 .toast-info {
48   background-color: #2F96B4;
49 }
50
51 .toast-warning {
52   background-color: #F89406;
53 }
```

A. Realizar en el código del front las mismas modificaciones hechas a la API.

B. Las validaciones deben ser realizadas en el front sin llegar a la API, y deben ser mostradas en un toast como por ejemplo:

<https://stackblitz.com/edit/angular12-toastr?file=src%2Fapp%2Fapp.component.ts>

o

<https://stackblitz.com/edit/angular-error-toast?file=src%2Fapp%2Fcore%2Frxjsops.ts>

C. Crear las pruebas unitarias necesarias en el front para validar las modificaciones realizadas en el código del front.