Foreword

Of course we could use a better and a complicated architecture like microservices with Message broker and API Gateway with different databases for each microservice, but for more simplicity I've decided to create this project as a Monolithic application. I've recently created a simple microservice application with *RabbitMQ*, *Ocelot* and *Docker*. here is its github link.

In a real-world scenario, we have to use a caching system like *Redis Cache*, and we also have to handle concurrency while manipulating leaderboard data, but I've skipped these for more simplicity.

In a real-world application it's a good idea to use *AutoMapper* and *FluentValidation* frameworks to map and validate data and make program process more regular, but for simplicity, I've ignored these frameworks.

Backend Architecture

Backend architecture is based on the Clean Architecture. There are four projects in the solution to handle the architecture: API, Application, Domain and Infrastructure project.

API project is based on .NET 5.0. It is the UI layer and is the entry point for the application. I've tried to keep API project as thin as possible, for it doesn't handle business logic. I've used *swagger* to simplify API test and development. For API security, I've used JWT authenticatio. So before running the project be sure to use proper port number for JWT, I've used 44386 port number in *Startup.cs* and *AuthController.cs* files to configure JWT.

Application Project is based on .NET Standard 2.1. This project contains the main business logic abstractions. This project includes abstractions for operations that will be performed using Infrastructure.

Infrastructure Project is based on .NET Standard 2.1. The Infrastructure project typically includes data access implementations include the Entity Framework (EF) DbContext, any EF Core Migration objects that have been defined, and data access implementation classes. The Infrastructure project should also contain implementations of abstractions defined in the Application project.

Domain Project is based on .NET Standard 2.1, and includes business Entity models and DTOs.

Design Patterns: Unit of work, Generic Repository Pattern

Running the Backend Project

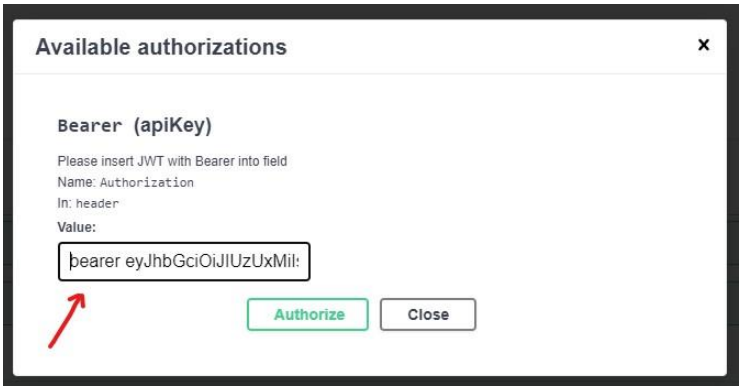
To run the backend project, you have to first try to generate the database, so in visual studio, you need to select *API* project as the startup project, then through the package manager console, select the *Infrastructure* project as the default project, and then run *Update-Database* command.

Make sure database is created in the SQL Server's *LocalDb*, and try to run the project preferably with IIS Express. There is a seed method in the *Program.cs* to seed the database after the first run, It'll insert lots

of data into the tables. After database is seeded, you can try the API with swagger to see the data. There are lots of users created in the database after the seed that their password is 654321, so you can login with swagger to call API functions.

In order to login, use this api:

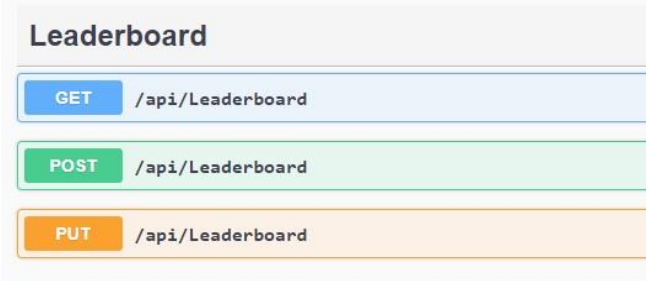
After login, you'll get a token, copy it and click on the Authorize button on the top of the page.



After this, you can freely test the API and fetch/post data from/into different tables.

The API

- Allows race times to be posted to the leaderboard given the logged in user ID, a race ID, and a race time in milliseconds.
- Allows the logged in user to improve on its existing time.
- Offers a means of retrieving the leaderboard entries for a specific race ID, ordered by time ascending, for display on a website or in-game.

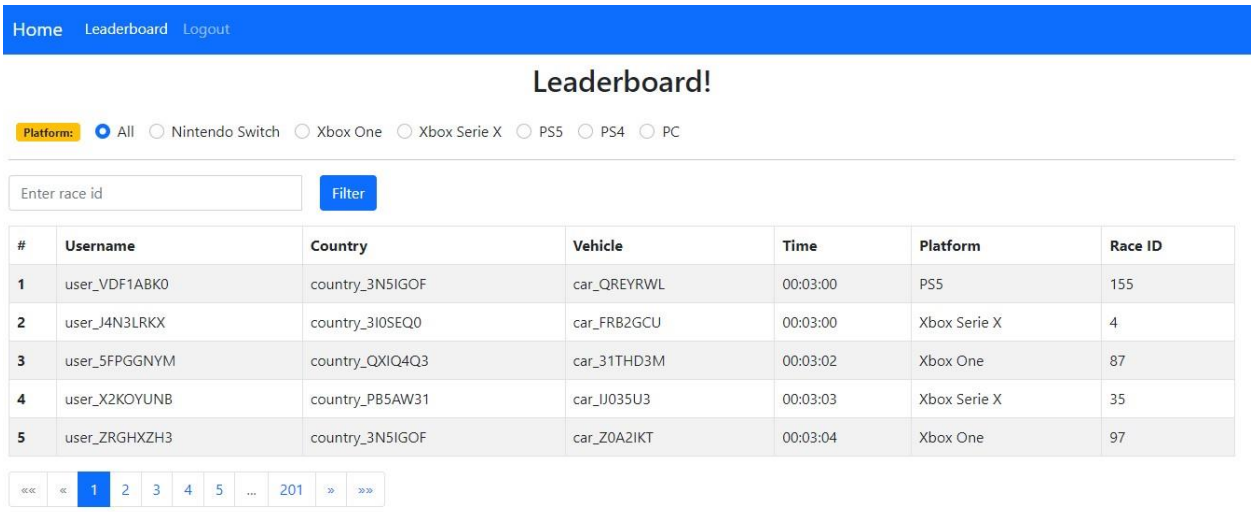


Running the Client Project

I've used Angular 8 framework for the client application. Although I understand React, I've decided to create the client with Angular since I'm more convenient with it. There's nothing special about the client, I've used auth guard, interceptor and different components, models, services to interact with the server side.

In order to run the client, open the *constants.ts* file and make sure BASE_URL value is sync with server address. After that, just run *npm install* command in the root of the project, and then run *ng serve* command to run the project on port 4200.

Then you can work with client and see the leaderboard and other related stuff. Here is the picture leaderboard page:



Thank you for your time.