.NET Backend Test Proposal

This is my solution to the provided problem.

While I aimed to adhere to the KISS principle, given that this is a test, I also take into consideration your focus on evaluating my configuration, framework usage and the use (not abuse) of patterns. Therefore, I made sure to include elements that I believe add value to the test.

Mario Codes

Mario Codes

Patterns

Retry pattern

As you mentioned you evaluate for pattern usage, I decided to implement a retry pattern. In my opinion, it keeps the overall code simple while being highly useful, especially since my API needs to connect to an external service (draliatest.azurewebsites.net). Given that this service may occasionally face connectivity issues, the retry pattern ensures resilience.

You may see this in action within Api.External.Consumer, specifically in the HttpService class and the HttpCallAsync method.

To test this pattern, simply modify the BaseUrl or AvailabilityEndpoint in the appsettings.json file to an incorrect value, which will cause the API to keep on trying (up to 3 times by default).

DTO pattern

I implemented the DTO pattern for the data objects that I send to (and receive from) draliatest.azurewebsites.net. My goal was to encapsulate and decouple data as much as possible from the API implementation.

This pattern allows me for easier adaptability if the API implementation changes in the future.

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Projects

- Api.Core - Main project. It works as the web server and communicates with Api.External.Consumer to retrieve or send data to draliatest.azurewebsites.net. The frontend should only interact with this project.
- Api.Core.Tests - Unit tests for Api.Core project.
- Api.External.Consumer - the only project which communicates to the external API draliatest.azurewebsites.net. All communication is done internally through Api.Core.
- Api.External.Consumer.Tests - Unit tests for the Api.External.Consumer project.

Config

The following is an example for my appsettings.json file

```json
{
    "Logging": {
        "LogLevel": {
            "Default": "Information",
            "Microsoft.AspNetCore": "Warning"
        }
    },
    "AuthConfig": {
        "User": "",
        "Password": ""
    },
    "CoreConfig": {
        "InputDateFormat": "yyyyMMdd",
        "ErrorMessages": {
            "InputDateSetInPast": "input date cannot be set in the past",
            "InputDateNotMonday": "input date is not monday. only mondays are
allowed as input",
            "InputDateWrongFormat": "couldn't parse specified date. please check it
has valid format with the following form",
            "InputDateGeneralError": "Error on get week availability",
            "ReserveSlotGeneralError": "Error on operation to reserve a slot"
        }
    },
    "ExternalApiConfig": {
        "BaseUrl": "https://draliatest.azurewebsites.net/api",
        "AvailabilityEndpoint": "/availability/GetWeeklyAvailability/",
        "TakeSlotEndpoint": "/availability/TakeSlot",
        "RetryAttempts": 3,
        "RetryTimespanInSeconds": 10,
        "ExternalApiDateFormat": "yyyyMMdd",
        "InvalidDataFromExternalApiError": "couldn't retrieve or parse data from
the external API'"
    }
}
```

To run the project the only thing you need to add (which I haven't commited to GIT) are the username and password for the external API (draliatest.azurewebsites.net). Please, set them into AuthConfig.

Aside from that , I've tried to make the API fully customizable. You can configure:

- The base URL and endpoints for the external API, in case they change
- The date format accepted by my API
- The date format sent to your API (in case they differ in the future)
- The number of retry attempt if the external API is temporarily unavailable
- The delay between retries for the retry mechanism
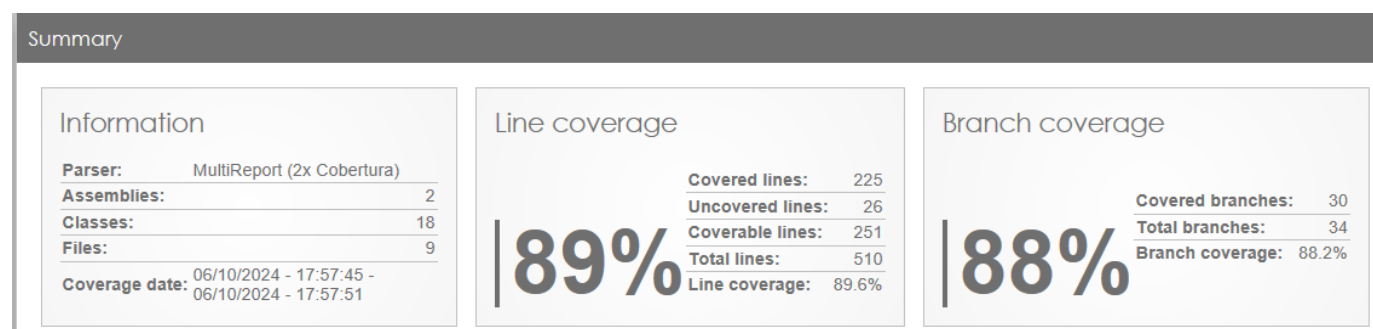- General error messages returned to front

Next steps

These are things I would consider implementing as next steps, as I believe they would add value to the project. Howerver, I wanted to keep my current proposal simple, as this is after all, just a test.

- Add caching – the challenge here lies in how and when to invalidate the cache and refresh the values
- Add logging – This doesn't require much explanation
- Add middleware – move the authentication mechanism to a Middleware layer, ensuring it applies to every requests
- Add integration testing
- Integrate user secrets with .NET User Secret Manager – this would allow for the removal of the user and password from appsettings.json, making it more secure during development

Tests

I have done unit testing the majority of my code, covering what I believe are the most important cases. Only a few areas remain untested, primarily related to the HttpClient.

Summary

Information

Parser:	MultiReport (2x Cobertura)
Assemblies:	2
Classes:	18
Files:	9
Coverage date:	06/10/2024 - 17:57:45 - 06/10/2024 - 17:57:51

Line coverage

89%

Covered lines:	225
Uncovered lines:	26
Coverable lines:	251
Total lines:	510
Line coverage:	89.6%

Branch coverage

88%

Covered branches:	30
Total branches:	34
Branch coverage:	88.2%

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Framework usage

- Polly – retry mechanism for external API
- Swashbuckle – swagger
- Newtonsoft.Json - Easy serialization and deserialization
- Coverlet – to see code coverage and branch coverage during development
- FluentAssertions – makes assertions for tests more readable
- Moq – mocking for tests
- NUnit – general testing

How to execute the project

Go to Api.Core - project's configuration and add the external API user and password

Then go to Api.Core and execute

```
dotnet run
```

The default port is 5000 and swagger is active at http://localhost:5000/index.html.

I will also attach my postman collection next to this PDF.

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REST API examples

Check availability for a Monday

External API

I add the external API response to be able to see SlotDurationMinutes and compare Busy Slots with my response

GET
https://draliatest.azurewebsites.net/api/availability/GetWeeklyAvailability/20241104

```json
{
    "Facility": {
        "FacilityId": "c015550a-7dac-4904-bd83-ef6b48756bb8",
        "Name": "Las Palmeras",
        "Address": "Plaza de la independencia 36, 38006 Santa Cruz de Tenerife"
    },
    "SlotDurationMinutes": 10,
    "Monday": {
        "WorkPeriod": {
            "StartHour": 9,
            "EndHour": 17,
            "LunchStartHour": 13,
            "LunchEndHour": 14
        },
        "BusySlots": [
            {
                "Start": "2024-11-04T00:00:00",
                "End": "2024-11-04T00:00:00"
            },
            {
                "Start": "2024-11-04T00:00:00",
                "End": "2024-11-04T00:00:00"
            },
            {
                "Start": "2024-11-04T00:00:00",
                "End": "2024-11-04T00:00:00"
            },
            {
                "Start": "2024-11-04T00:00:00",
                "End": "2024-11-04T00:00:00"
            },
            {
                "Start": "2024-11-04T00:00:00",
                "End": "2024-11-04T00:00:00"
            }
        ]
    },
    "Wednesday": {
        "WorkPeriod": {
            "StartHour": 9,
            "EndHour": 17,
            "LunchStartHour": 13,
            "LunchEndHour": 14
        },
        "BusySlots": [
            {
                "Start": "2024-11-06T11:10:00",
                "End": "2024-11-06T11:20:00"
```

Mario Codes

```
            }
        ]
    },
    "Friday": {
        "WorkPeriod": {
            "StartHour": 8,
            "EndHour": 16,
            "LunchStartHour": 13,
            "LunchEndHour": 14
        }
    }
}
```

My API

GET http://localhost:5000/weeklyAvailability/20241104

```
{
    "facility": {
        "name": "Las Palmeras",
        "address": "Plaza de la independencia 36, 38006 Santa Cruz de Tenerife"
    },
    "monday": {
        "availableSlots": [
            {
                "startTime": "2024-11-04T09:00:00",
                "endTime": "2024-11-04T09:10:00"
            },
            {
                "startTime": "2024-11-04T09:10:00",
                "endTime": "2024-11-04T09:20:00"
            },
            {
                "startTime": "2024-11-04T09:20:00",
                "endTime": "2024-11-04T09:30:00"
            },
            {
                "startTime": "2024-11-04T09:30:00",
                "endTime": "2024-11-04T09:40:00"
            },
            {
                "startTime": "2024-11-04T09:40:00",
                "endTime": "2024-11-04T09:50:00"
            },
            {
                "startTime": "2024-11-04T09:50:00",
                "endTime": "2024-11-04T10:00:00"
            },
            {
                "startTime": "2024-11-04T10:00:00",
                "endTime": "2024-11-04T10:10:00"
            },
            {
                "startTime": "2024-11-04T10:10:00",
                "endTime": "2024-11-04T10:20:00"
            },
            {
                "startTime": "2024-11-04T10:20:00",
                "endTime": "2024-11-04T10:30:00"
            },
```

Mario Codes

```
{
    "startTime": "2024-11-04T10:30:00",
    "endTime": "2024-11-04T10:40:00"
},
{

    "startTime": "2024-11-04T10:40:00",
    "endTime": "2024-11-04T10:50:00"
},
{

    "startTime": "2024-11-04T10:50:00",
    "endTime": "2024-11-04T11:00:00"
},
{

    "startTime": "2024-11-04T11:00:00",
    "endTime": "2024-11-04T11:10:00"
},
{

    "startTime": "2024-11-04T11:10:00",
    "endTime": "2024-11-04T11:20:00"
},
{

    "startTime": "2024-11-04T11:20:00",
    "endTime": "2024-11-04T11:30:00"
},
{

    "startTime": "2024-11-04T11:30:00",
    "endTime": "2024-11-04T11:40:00"
},
{

    "startTime": "2024-11-04T11:40:00",
    "endTime": "2024-11-04T11:50:00"
},
{

    "startTime": "2024-11-04T11:50:00",
    "endTime": "2024-11-04T12:00:00"
},
{

    "startTime": "2024-11-04T12:00:00",
    "endTime": "2024-11-04T12:10:00"
},
{

    "startTime": "2024-11-04T12:10:00",
    "endTime": "2024-11-04T12:20:00"
},
{

    "startTime": "2024-11-04T12:20:00",
    "endTime": "2024-11-04T12:30:00"
},
{

    "startTime": "2024-11-04T12:30:00",
    "endTime": "2024-11-04T12:40:00"
},
{

    "startTime": "2024-11-04T12:40:00",
    "endTime": "2024-11-04T12:50:00"
},
{

    "startTime": "2024-11-04T12:50:00",
    "endTime": "2024-11-04T13:00:00"
},
```

```
    {
        "startTime": "2024-11-04T14:00:00",
        "endTime": "2024-11-04T14:10:00"
    },
    {
        "startTime": "2024-11-04T14:10:00",
        "endTime": "2024-11-04T14:20:00"
    },
    {
        "startTime": "2024-11-04T14:20:00",
        "endTime": "2024-11-04T14:30:00"
    },
    {
        "startTime": "2024-11-04T14:30:00",
        "endTime": "2024-11-04T14:40:00"
    },
    {
        "startTime": "2024-11-04T14:40:00",
        "endTime": "2024-11-04T14:50:00"
    },
    {
        "startTime": "2024-11-04T14:50:00",
        "endTime": "2024-11-04T15:00:00"
    },
    {
        "startTime": "2024-11-04T15:00:00",
        "endTime": "2024-11-04T15:10:00"
    },
    {
        "startTime": "2024-11-04T15:10:00",
        "endTime": "2024-11-04T15:20:00"
    },
    {
        "startTime": "2024-11-04T15:20:00",
        "endTime": "2024-11-04T15:30:00"
    },
    {
        "startTime": "2024-11-04T15:30:00",
        "endTime": "2024-11-04T15:40:00"
    },
    {
        "startTime": "2024-11-04T15:40:00",
        "endTime": "2024-11-04T15:50:00"
    },
    {
        "startTime": "2024-11-04T15:50:00",
        "endTime": "2024-11-04T16:00:00"
    },
    {
        "startTime": "2024-11-04T16:00:00",
        "endTime": "2024-11-04T16:10:00"
    },
    {
        "startTime": "2024-11-04T16:10:00",
        "endTime": "2024-11-04T16:20:00"
    },
    {
        "startTime": "2024-11-04T16:20:00",
        "endTime": "2024-11-04T16:30:00"
    },
```

Mario Codes

```
            {
                "startTime": "2024-11-04T16:30:00",
                "endTime": "2024-11-04T16:40:00"
            },
            {
                "startTime": "2024-11-04T16:40:00",
                "endTime": "2024-11-04T16:50:00"
            },
            {
                "startTime": "2024-11-04T16:50:00",
                "endTime": "2024-11-04T17:00:00"
            }
        ]
    },
    "wednesday": {
        "availableSlots": [
            {
                "startTime": "2024-11-06T09:00:00",
                "endTime": "2024-11-06T09:10:00"
            },
            {
                "startTime": "2024-11-06T09:10:00",
                "endTime": "2024-11-06T09:20:00"
            },
            {
                "startTime": "2024-11-06T09:20:00",
                "endTime": "2024-11-06T09:30:00"
            },
            {
                "startTime": "2024-11-06T09:30:00",
                "endTime": "2024-11-06T09:40:00"
            },
            {
                "startTime": "2024-11-06T09:40:00",
                "endTime": "2024-11-06T09:50:00"
            },
            {
                "startTime": "2024-11-06T09:50:00",
                "endTime": "2024-11-06T10:00:00"
            },
            {
                "startTime": "2024-11-06T10:00:00",
                "endTime": "2024-11-06T10:10:00"
            },
            {
                "startTime": "2024-11-06T10:10:00",
                "endTime": "2024-11-06T10:20:00"
            },
            {
                "startTime": "2024-11-06T10:20:00",
                "endTime": "2024-11-06T10:30:00"
            },
            {
                "startTime": "2024-11-06T10:30:00",
                "endTime": "2024-11-06T10:40:00"
            },
            {
                "startTime": "2024-11-06T10:40:00",
                "endTime": "2024-11-06T10:50:00"
            },
```

```json
    {
        "startTime": "2024-11-06T10:50:00",
        "endTime": "2024-11-06T11:00:00"
    },
    {
        "startTime": "2024-11-06T11:00:00",
        "endTime": "2024-11-06T11:10:00"
    },
    {
        "startTime": "2024-11-06T11:20:00",
        "endTime": "2024-11-06T11:30:00"
    },
    {
        "startTime": "2024-11-06T11:30:00",
        "endTime": "2024-11-06T11:40:00"
    },
    {
        "startTime": "2024-11-06T11:40:00",
        "endTime": "2024-11-06T11:50:00"
    },
    {
        "startTime": "2024-11-06T11:50:00",
        "endTime": "2024-11-06T12:00:00"
    },
    {
        "startTime": "2024-11-06T12:00:00",
        "endTime": "2024-11-06T12:10:00"
    },
    {
        "startTime": "2024-11-06T12:10:00",
        "endTime": "2024-11-06T12:20:00"
    },
    {
        "startTime": "2024-11-06T12:20:00",
        "endTime": "2024-11-06T12:30:00"
    },
    {
        "startTime": "2024-11-06T12:30:00",
        "endTime": "2024-11-06T12:40:00"
    },
    {
        "startTime": "2024-11-06T12:40:00",
        "endTime": "2024-11-06T12:50:00"
    },
    {
        "startTime": "2024-11-06T12:50:00",
        "endTime": "2024-11-06T13:00:00"
    },
    {
        "startTime": "2024-11-06T14:00:00",
        "endTime": "2024-11-06T14:10:00"
    },
    {
        "startTime": "2024-11-06T14:10:00",
        "endTime": "2024-11-06T14:20:00"
    },
    {
        "startTime": "2024-11-06T14:20:00",
        "endTime": "2024-11-06T14:30:00"
    },
```

```json
{
    "startTime": "2024-11-06T14:30:00",
    "endTime": "2024-11-06T14:40:00"
},
{
    "startTime": "2024-11-06T14:40:00",
    "endTime": "2024-11-06T14:50:00"
},
{
    "startTime": "2024-11-06T14:50:00",
    "endTime": "2024-11-06T15:00:00"
},
{
    "startTime": "2024-11-06T15:00:00",
    "endTime": "2024-11-06T15:10:00"
},
{
    "startTime": "2024-11-06T15:10:00",
    "endTime": "2024-11-06T15:20:00"
},
{
    "startTime": "2024-11-06T15:20:00",
    "endTime": "2024-11-06T15:30:00"
},
{
    "startTime": "2024-11-06T15:30:00",
    "endTime": "2024-11-06T15:40:00"
},
{
    "startTime": "2024-11-06T15:40:00",
    "endTime": "2024-11-06T15:50:00"
},
{
    "startTime": "2024-11-06T15:50:00",
    "endTime": "2024-11-06T16:00:00"
},
{
    "startTime": "2024-11-06T16:00:00",
    "endTime": "2024-11-06T16:10:00"
},
{
    "startTime": "2024-11-06T16:10:00",
    "endTime": "2024-11-06T16:20:00"
},
{
    "startTime": "2024-11-06T16:20:00",
    "endTime": "2024-11-06T16:30:00"
},
{
    "startTime": "2024-11-06T16:30:00",
    "endTime": "2024-11-06T16:40:00"
},
{
    "startTime": "2024-11-06T16:40:00",
    "endTime": "2024-11-06T16:50:00"
},
{
    "startTime": "2024-11-06T16:50:00",
    "endTime": "2024-11-06T17:00:00"
}
```

Mario Codes

```json
            ]
    },
    "friday": {
        "availableSlots": [
            {
                "startTime": "2024-11-08T08:00:00",
                "endTime": "2024-11-08T08:10:00"
            },
            {
                "startTime": "2024-11-08T08:10:00",
                "endTime": "2024-11-08T08:20:00"
            },
            {
                "startTime": "2024-11-08T08:20:00",
                "endTime": "2024-11-08T08:30:00"
            },
            {
                "startTime": "2024-11-08T08:30:00",
                "endTime": "2024-11-08T08:40:00"
            },
            {
                "startTime": "2024-11-08T08:40:00",
                "endTime": "2024-11-08T08:50:00"
            },
            {
                "startTime": "2024-11-08T08:50:00",
                "endTime": "2024-11-08T09:00:00"
            },
            {
                "startTime": "2024-11-08T09:00:00",
                "endTime": "2024-11-08T09:10:00"
            },
            {
                "startTime": "2024-11-08T09:10:00",
                "endTime": "2024-11-08T09:20:00"
            },
            {
                "startTime": "2024-11-08T09:20:00",
                "endTime": "2024-11-08T09:30:00"
            },
            {
                "startTime": "2024-11-08T09:30:00",
                "endTime": "2024-11-08T09:40:00"
            },
            {
                "startTime": "2024-11-08T09:40:00",
                "endTime": "2024-11-08T09:50:00"
            },
            {
                "startTime": "2024-11-08T09:50:00",
                "endTime": "2024-11-08T10:00:00"
            },
            {
                "startTime": "2024-11-08T10:00:00",
                "endTime": "2024-11-08T10:10:00"
            },
            {
                "startTime": "2024-11-08T10:10:00",
                "endTime": "2024-11-08T10:20:00"
            },
```

Mario Codes

```json
{
    "startTime": "2024-11-08T10:20:00",
    "endTime": "2024-11-08T10:30:00"
},
{

    "startTime": "2024-11-08T10:30:00",
    "endTime": "2024-11-08T10:40:00"
},
{

    "startTime": "2024-11-08T10:40:00",
    "endTime": "2024-11-08T10:50:00"
},
{

    "startTime": "2024-11-08T10:50:00",
    "endTime": "2024-11-08T11:00:00"
},
{

    "startTime": "2024-11-08T11:00:00",
    "endTime": "2024-11-08T11:10:00"
},
{

    "startTime": "2024-11-08T11:10:00",
    "endTime": "2024-11-08T11:20:00"
},
{

    "startTime": "2024-11-08T11:20:00",
    "endTime": "2024-11-08T11:30:00"
},
{

    "startTime": "2024-11-08T11:30:00",
    "endTime": "2024-11-08T11:40:00"
},
{

    "startTime": "2024-11-08T11:40:00",
    "endTime": "2024-11-08T11:50:00"
},
{

    "startTime": "2024-11-08T11:50:00",
    "endTime": "2024-11-08T12:00:00"
},
{

    "startTime": "2024-11-08T12:00:00",
    "endTime": "2024-11-08T12:10:00"
},
{

    "startTime": "2024-11-08T12:10:00",
    "endTime": "2024-11-08T12:20:00"
},
{

    "startTime": "2024-11-08T12:20:00",
    "endTime": "2024-11-08T12:30:00"
},
{

    "startTime": "2024-11-08T12:30:00",
    "endTime": "2024-11-08T12:40:00"
},
{

    "startTime": "2024-11-08T12:40:00",
    "endTime": "2024-11-08T12:50:00"
},
```

```
        {
            "startTime": "2024-11-08T12:50:00",
            "endTime": "2024-11-08T13:00:00"
        },
        {

            "startTime": "2024-11-08T14:00:00",
            "endTime": "2024-11-08T14:10:00"
        },
        {

            "startTime": "2024-11-08T14:10:00",
            "endTime": "2024-11-08T14:20:00"
        },
        {

            "startTime": "2024-11-08T14:20:00",
            "endTime": "2024-11-08T14:30:00"
        },
        {

            "startTime": "2024-11-08T14:30:00",
            "endTime": "2024-11-08T14:40:00"
        },
        {

            "startTime": "2024-11-08T14:40:00",
            "endTime": "2024-11-08T14:50:00"
        },
        {

            "startTime": "2024-11-08T14:50:00",
            "endTime": "2024-11-08T15:00:00"
        },
        {

            "startTime": "2024-11-08T15:00:00",
            "endTime": "2024-11-08T15:10:00"
        },
        {

            "startTime": "2024-11-08T15:10:00",
            "endTime": "2024-11-08T15:20:00"
        },
        {

            "startTime": "2024-11-08T15:20:00",
            "endTime": "2024-11-08T15:30:00"
        },
        {

            "startTime": "2024-11-08T15:30:00",
            "endTime": "2024-11-08T15:40:00"
        },
        {

            "startTime": "2024-11-08T15:40:00",
            "endTime": "2024-11-08T15:50:00"
        },
        {

            "startTime": "2024-11-08T15:50:00",
            "endTime": "2024-11-08T16:00:00"
        }
    ]
  }
}
```

Reserve slot

External API

POST https://draliatest.azurewebsites.net/api/availability/TakeSlot

Mario Codes

Payload

```
{
    "FacilityId": "c015550a-7dac-4904-bd83-ef6b48756bb8",
    "Start": "2024-11-04 09:00:00",
    "End": "2024-11-04 09:10:00",
    "Comments": "my knee hurts sometimes when it's about to rain",
    "Patient": {
        "Name": "Mario",
        "SecondName": "Neta",
        "Email": "MarioNeta123@gmail.com",
        "Phone": "+34617109293"
    }
}
```

Response: 200 OK

My API

POST http://localhost:5000/reserveSlot

Payload

```
{
    "FacilityId": "c015550a-7dac-4904-bd83-ef6b48756bb8",
    "Start": "2024-11-04 09:00:00",
    "End": "2024-11-04 09:10:00",
    "Comments": "my knee hurts sometimes when it's about to rain",
    "Patient": {
        "Name": "Mario",
        "SecondName": "Neta",
        "Email": "MarioNeta123@gmail.com",
        "Phone": "+34617109293"
    }
}
```

Response: 200 OK