

Advanced Software Engineering

Course Project – RESTful API – Fall 2023

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EcoTrack: Environmental Monitoring and Reporting Platform

Application requirements

- I do not want you to be forced to use any programming language or technology. What is most important is that you always motivate your choices. You will have many occasions to do so, make use of the documentation and presentations.

Expose an API

- The backend exposes a dataset in the form of an API. One option is to use a **REST API**.
 - You can also consider other modern API methods, for instance **GraphQL**.

Project requirements

In the case of the project development process, you have a bit more requirements to follow

Project planning and version control

- Track your interaction activities for each of the phases of the project development. For this reason, you must use a **git** repository.
 - All the members of the team can work independently and merge the code every time a conflict occurs.
 - You are required to use at least a ``main`` branch and many development branches you need. One suggestion is to use the [git workflow] branching model, but you are not forced to use it. Instead, you are asked to use [pull requests] every time you want to merge the code with the ``main`` branch, to discuss and review potential changes with your collaborators.

Documentation (Wiki)

- I need a documentation of the whole overview, since you should have organized everything in **api's**. Anything useful to better understand your code will be appreciated. Also, mention the use of specific technologies and their motivation.
- You have then to maintain a wiki for the project. Every GitHub project has a parallel repository where you can store **Markdown** files to compose the wiki. I am expecting you

to describe your project, its architecture, and how to use it. In particular, I want to understand the motivation for all of your choices.

- You can use the wiki also to document the usage for the API of the backend.
 - As an alternative, you can use specific API documentation tools, such as [Swagger].
- The testing was part of your job. Report everything useful to describe the way you planned and performed the testing of your code.

Application Description:

In this project, you will develop a backend API for an environmental monitoring and reporting platform called "EcoTrack." The platform will enable users to collect, and share data related to environmental conditions, and climate change. This project will focus on creating a robust backend to handle data collection, and reporting. You can use one of these frameworks (Spring Boot, Node JS, Django).

Main Features:

- **Data Collection:** Users can submit environmental data from various sources, such as IoT sensors, manual observations, or data uploads. Data can include air quality, temperature, humidity, water quality, biodiversity metrics, and more. Uploaded data
- **User Profiles:** Users can create and manage profiles to track their contributions and environmental interests. They can also connect with others who share similar concerns or locations. Follows
- **Environmental Alerts:** Set up an alerting system that notifies users about significant changes or concerning trends in environmental data. Users can configure alert thresholds based on their interests.
- **Community Reporting:** Allow users to report environmental issues, such as pollution, deforestation, or wildlife endangerment.
- **Sustainability Score:** Develop a scoring system that assesses users' environmental contributions and sustainability efforts based on the data they provide and the actions they take.
- **Educational Resources:** Offer educational resources, articles, and guides on environmental topics to raise awareness and educate users on sustainable practices.
- **Open Data Access:** Provide APIs for researchers, scientists, and organizations to access the aggregated environmental data for research and analysis.

```
EnvironmentalReport:{
  EnvironmentalReportId,
  UserId,
  AirQuality,
  Temperature,
  Humidity,
  WaterQuality,
  BiodiversityMetrics
}
```

```
User:{
  UserId,
  username,
  password,
  location :{
    country,
    city
  }
}
```

```
Followers:{
  Id,
  FollowerUserId,
  FollowedUserId
}
```

External API Integration:

In addition to the main features, the API will make use of external APIs to provide additional functionality.

Mandatory Features:

- **CRUD Operations:** The API must implement basic CRUD operations on the MySQL database to enable the creation, retrieval, update, and deletion of application data applications.
- **API Documentation:** The API must be fully documented using tools such as Swagger or Postman to enable other developers to understand how to use the API.

Important Notes:

For the API project, there are some mandatory features that you must include in your API. These features will ensure that your API is functional. It is your responsibility to analyze the project requirements and identify the mandatory features. The details of these features will depend on your analysis and imagination.

In addition to the mandatory features, you have the flexibility to express your project ideas and add additional features to the API. We encourage you to think creatively and add features that would make your API stand out from others.

Keep in mind that when designing your API, you should consider the potential integration of external APIs to enhance the functionality of your platform. You can also think about how your API might integrate with other applications or platforms to create a more comprehensive platform experience.

Overall, this project offers a range of backend API development challenges and can be customized to fit your specific needs and interests of while providing them with the opportunity to learn how to integrate external APIs to enhance your platform.