TerraByte

# Testing Policy

A project for EPI-USE® by GeekGurusUnion

Demo 4

30 September 2024

# Table of Contents

## Testing Automation

To achieve the goal of having automated tests, we decided to go with the GitHub Action tools. Since our project is present on GitHub, integrating GitHub Actions eased the need for external tools such as Travis CI.

## Justification of testing tools

1. Presentation Layer Testing (Frontend Testing)
    a. For testing the frontend we have decided to go with Vitest. Since we can specify the testing environment in Vitest to Nuxt, which is the framework that we used for our application, it eases the need to learn a new testing framework for the project. It is also very suitable for writing unit tests for our applications.
2. Logic Layer Testing (Backend Testing):
    a. Majority of the backend for our application is written in Python which makes writing our unit tests in Pytest easier due to the easy mocking capabilities as well as familiar syntax and an abundance of libraries that can aid in the production of good unit tests.
3. Data Layer Testing:
    a. To test how the interactions between the database and application will perform under different circumstances we have used Postman and Vitest. Since our API is a big part of our system testing it is crucial. Postman allowed us to not only test our API thoroughly by allowing us to simulate plenty of API calls, but it also allowed us to test under different environments such as development, testing, and deployment environments.
    b. Vitest was used to test how the data reacts with parts of our application and test to see if the correct parts of our application responds when certain data is passed in.
4. End-to-End Testing:
    a. Cypress was our framework of choice for end-to-end testing due its fast and reliable performance. Its straightforward setup and configuration streamline test writing and execution. Key features like real-time reloading and in-browser debugging enhance the developer experience.Additionally, its headless execution capabilities ensure smooth CI/CD integration, improving development efficiency and delivering higher quality outcomes.

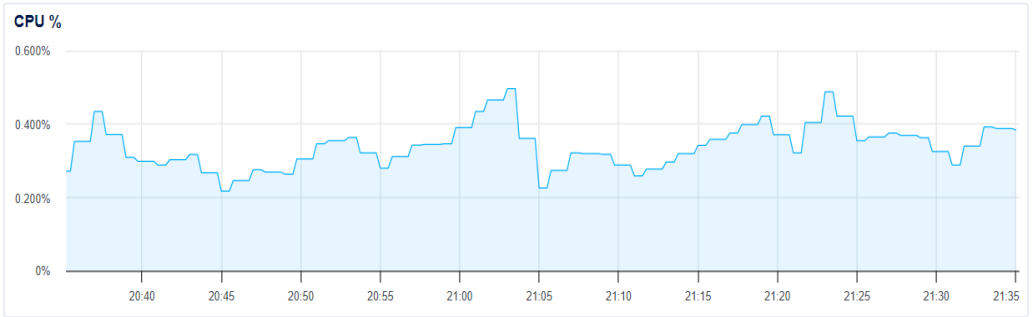
## Testing Procedure

For testing we decided to go with an agile testing methodology. This helps speed up our application development by periodically writing tests on all the components and procedures of our application to ensure that we are staying on track and so that no surprises are encountered when developing at a later stage, as such surprises could slow down our development at a later stage.

## Testing our Quality Requirements

- Testability:
    - Using the Process and tools mentioned above we ensure that our application remains well tested to have a clear distinction on areas that need major improvement.
- Efficiency:
    - To test the efficiency of our application and software we have used the graphs provided  by our Digital Ocean which provides us.

# Test Cases

- Efficiency
    - 

    - As shown in the graph above, we have a specified percentage of CPU usage that gives us a good indication of how efficient the processes are with them having an average of 38% CPU usage.

- Usability
    - We have given the application to some of our colleagues and family members to give feedback on how usable the application is.

- Testing for Frontend:

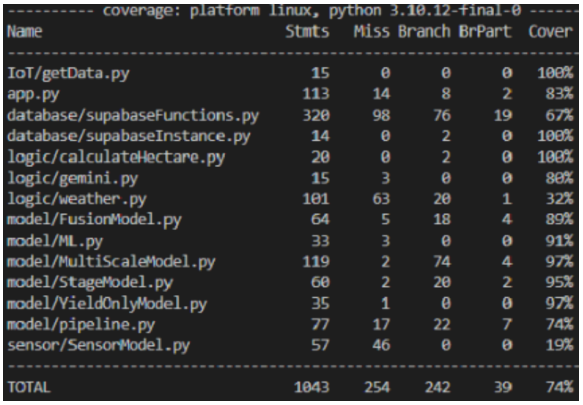
    - GitHub Repository: https://github.com/COS301-SE-2024/Crop-Prediction-System/tree/main/frontend/tests

- End-to-End Testing:
    - GitHub Repository: https://github.com/COS301-SE-2024/Crop-Prediction-System/tree/main/frontend/cypress

- Unit Testing for Backend:
    - GitHub Repository: https://github.com/COS301-SE-2024/Crop-Prediction-System/tree/main/backend/test

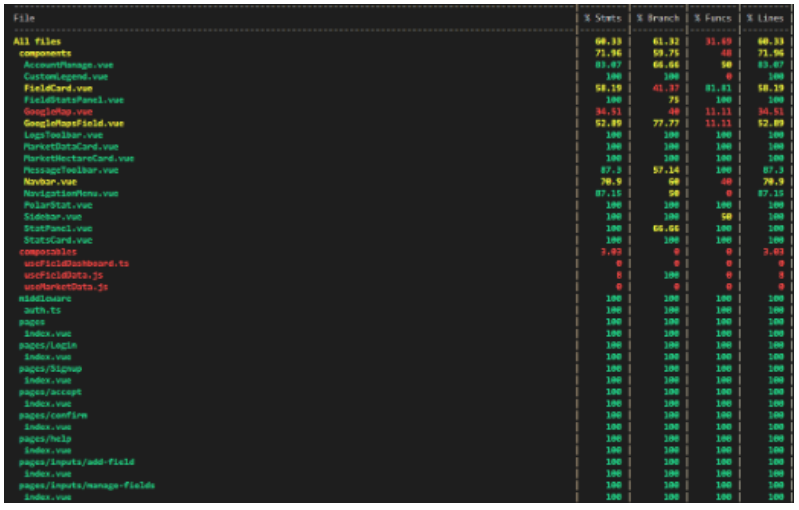
# Testing Reports

- Backend Unit Tests

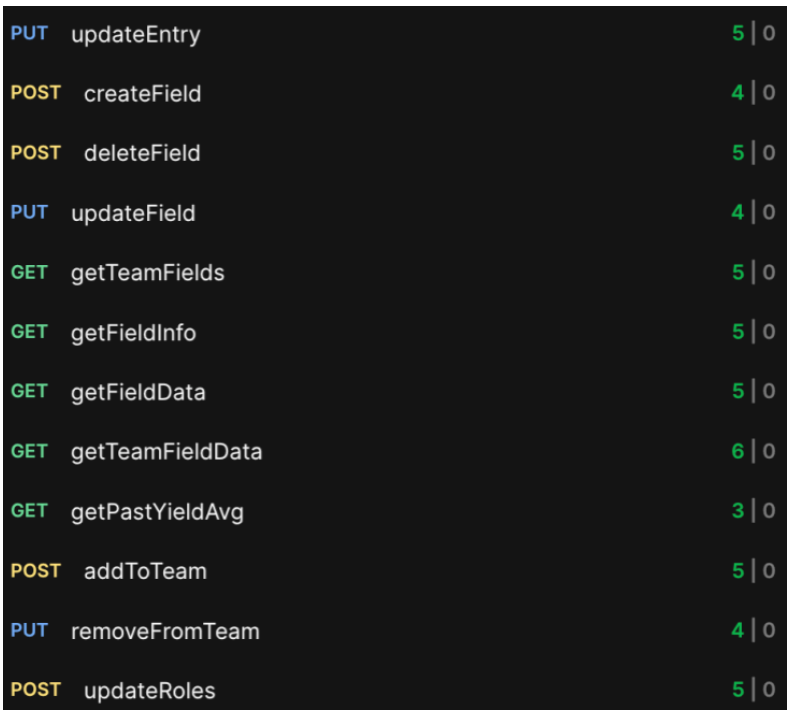


```
---------- coverage: platform linux, python 3.10.12-final-0 ----------
Name                                Stmts   Miss Branch BrPart  Cover
-------------------------------------------------------------------
IoT/getData.py                         15      0      0      0   100%
app.py                                113     14      8      2    83%
database/supabaseFunctions.py         320     98     76     19    67%
database/supabaseInstance.py           14      0      2      0   100%
logic/calculateHectare.py              20      0      2      0   100%
logic/gemini.py                        15      3      0      0    80%
logic/weather.py                      101     63     20      1    32%
model/FusionModel.py                   64      5     18      4    89%
model/ML.py                            33      3      0      0    91%
model/MultiScaleModel.py              119      2     74      4    97%
model/StageModel.py                    60      2     20      2    95%
model/YieldOnlyModel.py                35      1      0      0    97%
model/pipeline.py                      77     17     22      7    74%
sensor/SensorModel.py                  57     46      0      0    19%
-------------------------------------------------------------------
TOTAL                                1043    254    242     39    74%
```

- Frontend Unit Tests



- Integration Tests (Postman)




- End-to-End Tests