

Advanced Technology Attachment Programme (ATAP)

Final Project Report

at

Envision Digital Pte Ltd

Reporting Period:

Jan 2023 to Jun 2023

by

Kua Hong Peng, James

Department of Computer Science

School of Computing

National University of Singapore

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Project Title: Backend Engineer Intern

Project ID: AY221172387

Academic Supervisor: Prof Huang Zhiyong

SUMMARY

I took on the role of a Backend Engineer intern at Envision Digital, under the Buildings department. My job scope involves architecting solutions to problems identified, designing and maintaining efficient and reliable Java code to ensure the best performance and responsiveness of the applications.

My primary task was implementing features from the designed technical document, working alongside the product owners and QA teams, as well as writing unit and integration tests for the various features implemented to ensure that the code functions properly and covers edge cases. I was also involved in several ad-hoc tasks such as bug fixes, and doing some refactoring and migrations to clean up the codebase.

Subject Descriptors:

Software Engineering

Software Development Life Cycle

Keywords:

Software Engineering

ACKNOWLEDGEMENTS

First and foremost, I would like to use this opportunity to thank my supervisor, Kaiping, for the chance to intern at this company and also for also checking in on me on regular occasions, helping me to align on the goals that I want to achieve in the course of this internship.

I would also like to extend my gratitude to my fellow team members, who were especially hospitable and approachable, and always willing to clarify my doubts and render their assistance whenever I encountered difficulties. They also provided me with valuable insights and advice to help me improve my skills and approach to my tasks. I am grateful to have worked alongside a dedicated and professional team.

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INTRODUCTION

Background and Organisational Structure of Host Organisation

Background

Envision Digital provides software services such as artificial intelligence software to help governments and companies reach their net zero goals. Envision Digital was founded in 2017 and established its first office in Singapore in 2018, which also serves as its global headquarters. Through EnOS™, its proprietary Artificial Intelligence and Internet of Things (AIoT) operating system, Envision Digital has helped governments and companies across the world accelerate progress toward a net zero future and improve their citizens' quality of life.

Today, it has grown to become the world's leading AIoT software leader for net zero mission, employing close to 1000 employees from 29 nationalities across 13 offices globally. As the world's largest digital AIoT platform for decarbonization, EnOS™ now manages and connects more than 400GW of energy assets and 200 million smart devices across its EnOS™ Renewables, EnOS™ City and EnOS™ Ark solutions, enabling energy, machine and system efficiency for its customers.

Organisational Structure

Staff Backend Engineer → Me

Principal Activities of Host Organisation

Envision Digital provides software services such as artificial intelligence software to help governments and companies reach their net zero goals.

Training Programme within Host Organisation

- Senior team members would assign me tickets to work on, which could be implementing a new feature, researching on a topic or fixing bugs.
- I would work on these tickets, seeking help from my colleagues/supervisors along the way whenever I was stuck, and then update them on the progress.
- There was also the option to choose interested tickets to work on from the backlog, if there was spare capacity during the sprint.

Position of Host Unit within Host Organisation

- Buildings Team

TRAINING SCHEDULE AND ASSIGNMENTS

Training Schedule by Month for the Entire Training Period

Training Assignments Completed in 1st Month

- Onboarding and product familiarisation exercises
- Bug fixes

Training Assignments Completed in 2nd Month

- Developed a Azkaban batch job to automate deletion of files from the platform
- Investigated Jenkins scripts to fix pipelines due to an upgrade of Maven plugin upgrade.

Training Assignments Completed in 3rd Month

- Developed a Azkaban batch job to regularly delete old data from the database to improve query performance and reduce server costs.
- Implemented a role authorization system to authorize users for several selected protected endpoints
- Researched and implemented a compression scheme for headers for API calls, to allow the role authorization system to take effect.

Training Assignments Completed in 4th Month

- Developing a new feature to generate the health score for a system
- Writing a suite of tests for the feature above that involves both unit and integration tests
- Revamping the endpoint authorization scheme

Training Assignments Completed in 5th Month

- Developing a new feature to output measure points as part of fault detection and diagnostics
- Writing a suite of tests for the feature above that involves both unit and integration tests
- Centralising Postgres data sources and Flyway migration scripts into a common library for easier maintainability

Training Assignments Completed in 6th Month

- Designing and implementing test cases to improve code coverage
- Refactoring old tests to cover more scenarios and edge cases

KNOWLEDGE AND EXPERIENCE GAINED

Technical Knowledge Gained From Assignments

- Deepened understanding of the Spring Boot framework and advanced bash scripting
- Learning to design and implement unit and integration test cases
- Learning how to debug effectively from logs
- Got some insights into software architecture design
- Picked up best practices for clean and reusable code
- I also got to work with new tools and technologies such as Jenkins, Azkaban, Redis, Docker and Kubernetes.

Organisational/Industry Experience Gained From Assignments

- I also got to witness the Software Development Life Cycle at play, and the build-up towards project releases.
- I also got a chance to participate in Scrum methodology and attend daily stand-ups.
- I also got the chance to interact with different stakeholders, such as product owners, as well as quality assurance teams, to deliver features.
- Software engineering goes beyond just coding, the stage of gathering and understanding requirements and specifications for new features to be developed is also equally important.

Areas of Applicability of Knowledge and Experienced Gained

- I learnt to navigate through a large code base with large complexities.
- I learnt to realise new features through a product requirement document.
- I learnt how to design test cases to cover edge cases for automated testing.
- I also learnt to debug effectively through the use of logs to figure out the root issues.
- I also learnt to communicate confidently with my peers and stakeholders, learning to clarify the requirements of the tasks and to speak up in meetings.

CONCLUSION

Summary of Work

- Bug fixes
- Implementing an authorization scheme for the application
- Implementing new features from technical documents
- Designing and writing test cases for the implemented features
- Adding test cases to the codebase to improve code coverage
- Refactoring the existing codebase: removing legacy code and migrating code to a common utility library

Problems Faced

- Took me some time to understand the product and how it functions
- Data processing logic could sometimes be rather complex, and took time to understand
- Some of the features developed faced bugs and were only discovered during the phase of QA testing, which indicates that my designed test cases were not comprehensive and robust enough.
- Had some difficulties with Spring Boot framework at times
- Had to spend extra time to track and familiarise myself with the scrum board when I was the scrum master.

Assessment of Training Experience

- Internal documentation is updated frequently and open sharing culture across teams helped to reduce information silos, which was crucial in helping me understand the latest technical design and status of the product
- Team was supportive and provided sufficient guidance on the approach of the tasks.
- I was given ample opportunities to be involved in important discussions and my suggestions were also well taken into account, which made me feel valued as a team member.
- There was also a short sharing session every Friday, which is a nice opportunity to catch up with the latest technology trends.
- The tasks given were diverse in scope, which allowed me to work on different parts of the product, which helped to enhance my learning experience.