Report

Project Description

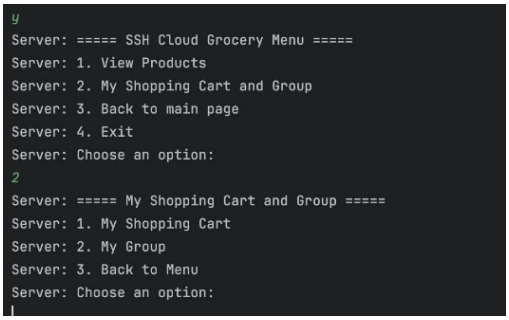
Our prototype is the grocery extension app for the student smart home company. The main feature of the app is the shared grocery order feature following upon Yan Lun's Engineering Design Review (EDR). Following this EDR, we follow the guidance of the database in the design review where we implement the specific tables mentioned in the EDR for the database with PostgreSQL.

The key pages:

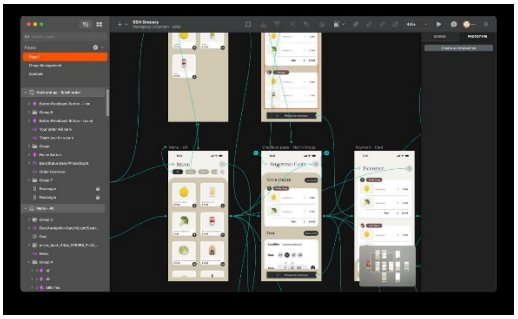
- Main page (displayed when user connects to the server),
- Register page (During register process, Java code will generate a short_id and store in database. A UUID will be generated by PostgreSQL database)
- Login page
- Menu page (The menu page display options for users to view products, shopping cart and group, go back to main page, or exit)
- Checkout page (includes the total price of order, payment method and success message)

The milestones defined in the EDR were followed closely where we began with first developing the backend logic for creating, updating, and managing shared order before moving onto the user interface. The prototype simplifies the EDR by removing the SSH Console implementation and the notification system to reduce complexity.
Apart from the Command line program, we have a basic GUI implementation using JavaFX. This version contains partial functions.

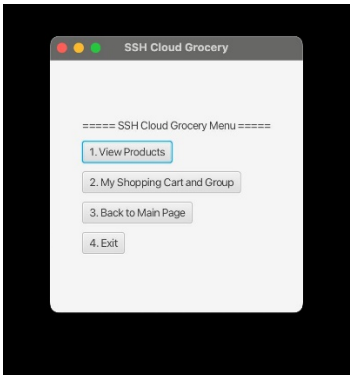
Other than the Java program, we also have a UI/UX prototype that does not come with backend, it was made with Sketch, a graphic design tool. This version of prototype aims to visualise the user interface and interaction flow.



Command-line interface



UI design in Sketch

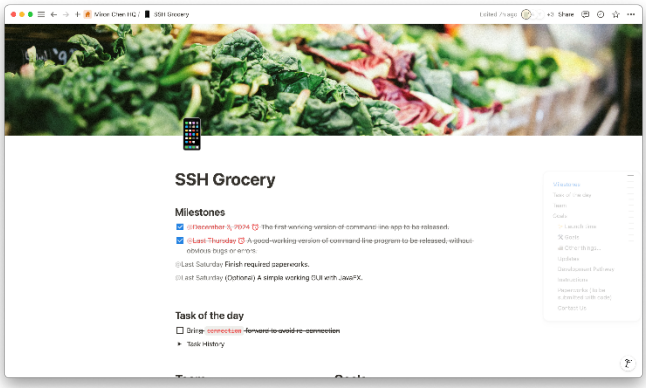


JavaFX GUI

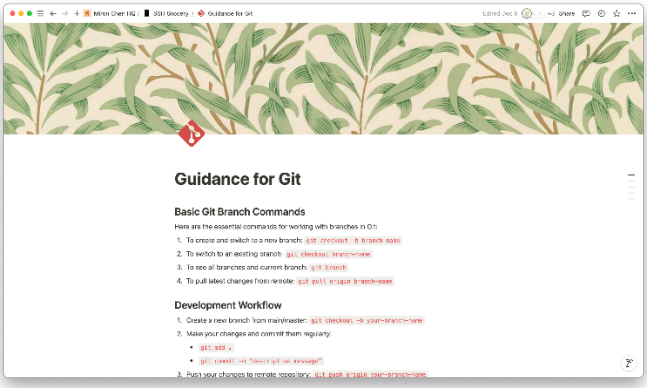
Everything in one place: Notion

We use notion as our main source of collaboration. We use it to assign tasks to team members, daily to-dos, milestones, communicate updates and to track bugs.

Notion is also used for resources where we have separate pages for different sections for guidance which includes database information, product goals, technical goals, issues, processing units, command-line-design, guidance for git and the report. Having these different sections is useful because all members of the team can edit in live time, which helps to do the work collaboratively such as when editing the report and deciding upon the command line design.



The main page

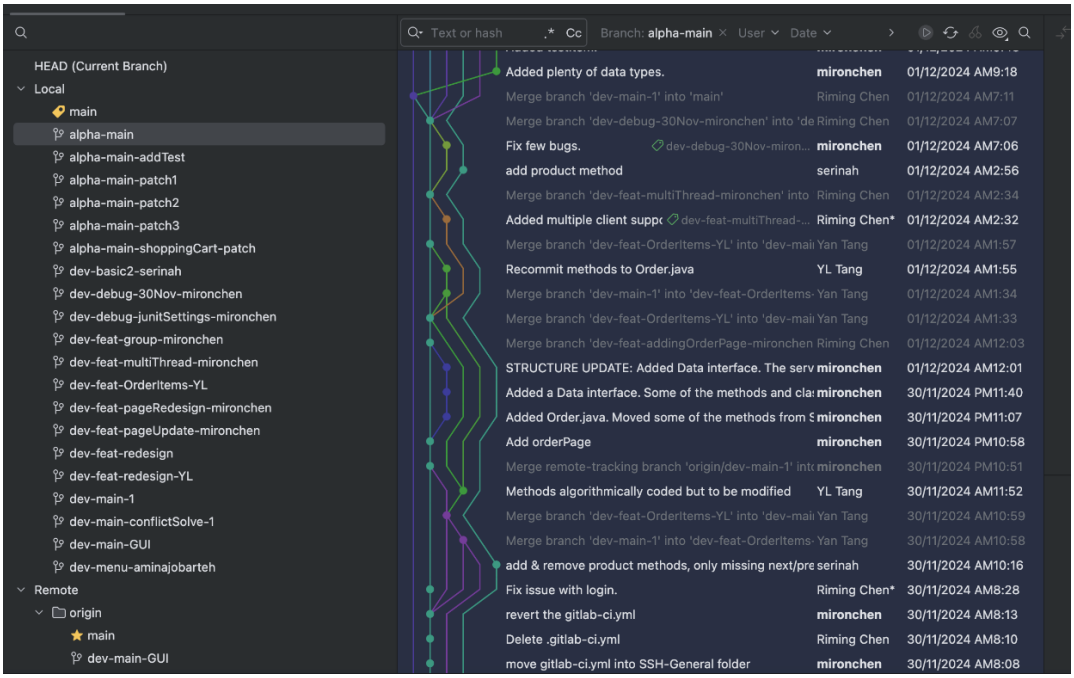


The guidance for git

Git

Version Control

Version control is the fundamental component of our development process, enabling the team to manage code changes systematically. Through this approach, we maintain a clear history while ensuring our updates are both frequent and meaningful.



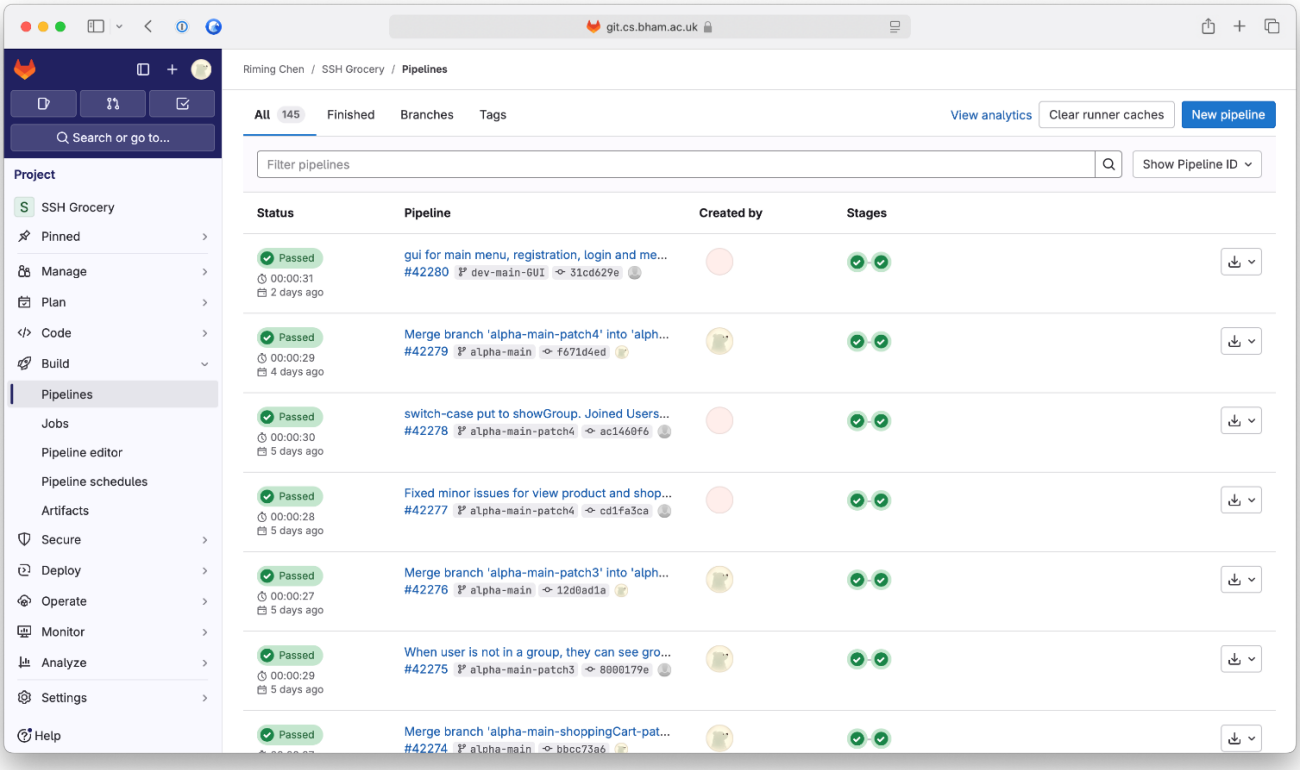
Collaboration

Each team member works on their own dedicated branch, members are not able to push their version of the code into the main branch for safety. Members can make merge requests which are reviewed thoroughly, and tested by GitLab Runner before it is merged to the main branch. This branching strategy is effective as members of the team can work on features and methods independently without causing disruptions to the main branch.

Testing

Regarding testing, we set up a GitLab runner in a Linux server which implements the test that is set up for the project. The main target is to avoid “unsafe” and mistaken pushes as well as merges. There was an instance we did avoid a mistaken merged request that could have compromised the entire program which was mitigated against with the test.

In addition, with the pipeline, the runner could check whether our modification could possibly harm the completeness of the codes.



The pipelines in GitLab

Containerisation

We deploy our PostgreSQL database and GitLab runner through docker to ensure that our database and CI/CD pipeline run in standardised environments, reducing "it works on my machine" issues. In fact, we also run the database in the online Linux server to make sure everyone are working on the same database.

Additionally, Docker's lightweight nature means we can quickly spin up new instances when needed. Containerising these components allows for minimal compatibility problems.

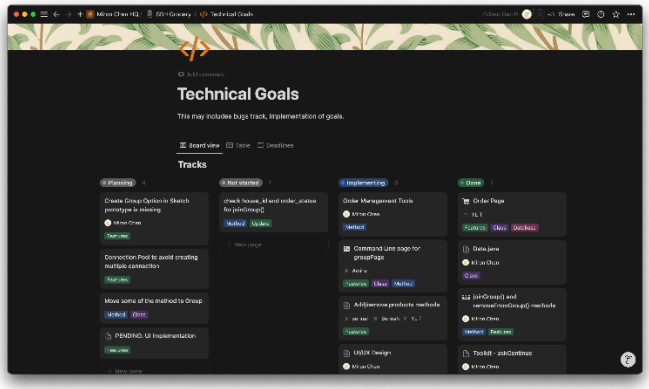
Dependency Management

The management of product dependencies is with maven. Maven is an excellent tool which simplifies the integration of external libraries and frameworks into the project by automatically resolving, downloading, and maintaining the required dependencies such as the javafx-controls, javafx-fxml and junit-jupiter which are specified in the pom.xml file. We streamline the building process through tools such as the Maven Compiler Plugin and JavaFX Maven plugin which helps automate tasks such as compilation and dependency resolution.

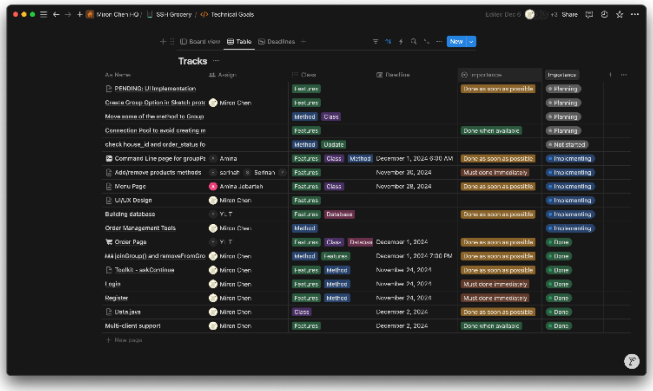
Project Management

Kanban (Broad View)

We use a Kanban board to manage the project visually. The board is divided into columns such as Planning, Implementing and Done (Achieved), providing a clear overview of the task pipeline.



Technical Goals Kanban lists all tasks with status



Technical Goals in Table View

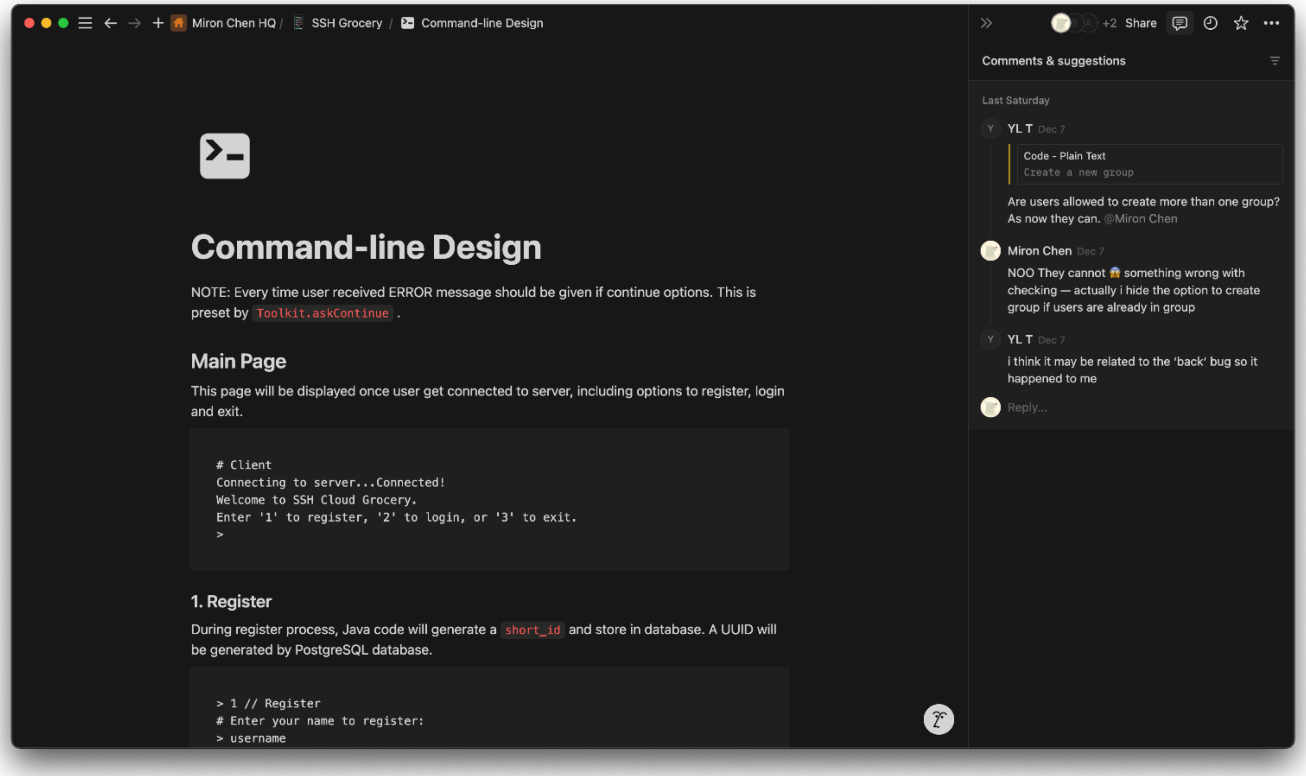
Waterfall

Requirement analysis

Based on the EDR we have, we realise that the original plan of using React Native as the app framework and Google Firebase as the database might not be ideal option for prototyping, as non of us had experience before. Hence, we chose Java command line and JavaFX GUI framework instead, to ensure we could finish on time.

Design

We outline the overall architecture of the prototype in our meetings and in Notion, where we decided on a client-server architecture which determines how the system communicates with each other and interacts with the database.
We then expanded on this by defining specific technical goals. To ensure codes developed by different members to meet the same expectation, we write a *Command-line Design* document, which outlines the expected format and behaviour of command-line interactions, ensuring consistency across the codebase. Everyone can add comments and ask questions, whenever they have concerns about implementation details.



Command-Line design page

The tasks are organised into three categories: planning, implementing, and completed (archived), along with a table view.

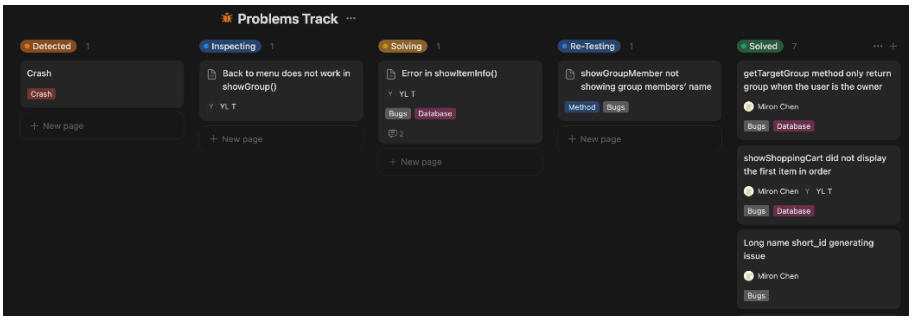
Implementation and testing phase

Implementation progress is tracked daily through Notion updates and daily goals. Team members first push their code to individual branches, then create merge requests. After thorough code reviews, approved changes are merged into the main branch and undergo continuous integration testing to ensure functionality. Most of the tests are done with CI/CD automation process.

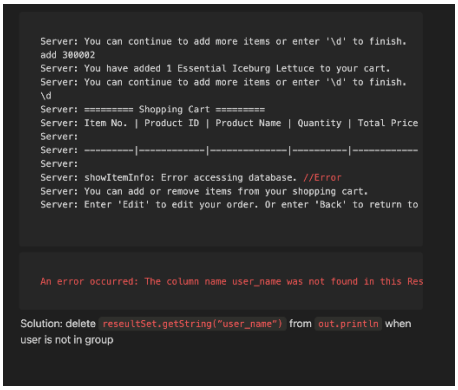
JavaFX: For building the user interface	Using `javafx.controls` and `javafx.fxml` for handling graphical components and the layout.
JDBC: To interact with the PostgreSQL database	The project requires java.sql for SQL operations and `org.postgresql.jdbc` for the database driver.
Apache Commons Codec: This library is used to simulate the password encryption.	Imported via `org.apache.commons.codec`.

Integration and system testing

We verify that system components work together through command-line testing before creating merge requests. Riming Chen manages the testing process, ensuring proper data flow between database and client-server interactions, and documents any identified issues in a Kanban, with detailed logs.



Problem Track Kanban



An error log

Operation and Maintenance

We maintain regular database backups and store essential information in Notion for all group members to access. The team continuously monitors client-server communication, with any bugs documented in Notion and assigned as tasks for resolution.

Reflection

Yan Lun Tang's reflections

Reflections about Riming (Miron)

Although we did not formally assign a group leader, Miron naturally took on a leadership role, guiding the team through the key stages of the project. His leadership was especially valuable during the initial stages. The ability to organise tasks and facilitate group discussions gave the team the structure and direction we needed to start the project effectively. Throughout the project, his forward-thinking approach ensured steady progress and helped keep the team focused on our objectives.

Miron also made significant contributions to the technical and collaborative aspects of the project. His work on the SSH backend components, including the Main Page, Register Page, and Login Page, and his testing management ensured the project met high standards. Moreover, his design for the SSH App UI using Sketch gave the team a clear visual direction.

One of Miron's notable strengths was his extensive knowledge of software engineering techniques, which he shared generously with the team. His implementation of GitLab for version control, CI/CD for build automation, containerisation using an online server and database, and team collaboration through Notion significantly boosted the efficiency and quality of our work.

However, an area for growth would be his tendency to take on a large portion of the workload. Whilst Miron's commitment was admirable, this sometimes made it difficult for other team members to keep up or contribute equally. Encouraging higher task delegation could enhance team engagement and help distribute a more balanced workload.

Miron's leadership and technical expertise were essential to the project's success. He can continue to grow as an even more effective team leader in future projects.

Reflections about Amina

Amina made significant contributions to the SSH backend development, particularly with the Menu and Checkout pages. Despite her unfamiliarity with Java, she demonstrated great adaptability and successfully implemented these crucial components, ensuring a smooth and functional user experience and contributing directly to the project's success. By establishing a foundation for the system's core functionality, she helped ensure that the project met its objectives and provided value to the users.

Also, Amina's work on the SSH GUI enhanced the command-line design, bringing us one step closer to implementing the App UI as envisioned in Sketch. This progression was key in moving the prototype forward.

One of Amina's strengths was her communication throughout the implementation process. She proactively sought clarification and shared updates, helping the team stay aligned. However, there is an opportunity to further improve by increasing the frequency of updates and being more detailed in her progress reports. This would help keep everyone on the same page and ensure that no aspects are missed during the development phase.

Amina was an invaluable team member, contributing technically and collaboratively. By improving her communication skills, she could make even greater contributions to future projects to keep the team informed and engaged.

Reflections about Serinah

Serinah played a key role in the add/remove product feature in the SSH backend development. This feature was critical to the system functionality, and her ability to implement it effectively allowed the project to progress smoothly. Her work on these core features ensured that the project moved forward as planned, which was essential for our overall success.

In addition to her backend work, Serinah was also responsible for writing the report. Her ability to communicate complex technical details in a clear and accessible manner was invaluable, ensuring that the report reflected the depth of the project and was easy to understand for all stakeholders.
As this was our first time working together, Serinah actively participated in discussions, helping us connect and making it easier for everyone to engage and get started on the project. This was particularly helpful when team dynamics and collaboration were key.

Whilst Serinah demonstrated excellent problem-solving skills, she did face some initial challenges with setting up the environment. However, her proactive approach to seeking help from the team ensured that these challenges were addressed quickly without causing significant delays. Focusing on time management and early issue resolution would help further streamline the process and reduce potential delays.

Serinah was a key contributor to the team. Her technical skills, communication ability, and openness to collaboration helped keep the project on track. By anticipating challenges and planning, she can reduce troubleshooting stress and improve efficiency.

Riming Chen’s reflections

Yan Lun Tang

Yan Lun's EDR laid the foundation for the entire project. Following his work, we made a few adjustments to align with our capabilities and the requirements of the SSH Grocery App prototype. The original EDR was a GUI-based app, but during the prototyping period, we managed to build a command-line program first to test methods and UX flow. Yan Lun supported my work on the command-line design, which included the interface, server-end debugging messages, and user commands.

Yan Lun also helped me improve the command-line design by enhancing the clarity of prompt messages and implementing robust error handling for edge cases. His thoughtful approach to user experience included detailed error messages and graceful fallbacks for unexpected inputs. Frankly speaking, Yan Lun always knows how to handle edge cases that I haven't thought of.

He has been consistently supportive throughout development. As a database engineer, Yan Lun built the entire database for SSH Grocery and set up samples for testing. He also wrote most of the SQL queries, demonstrating his expertise in database management.

Yan Lun actively participated in testing the database functionalities and helped identify edge cases in the SQL queries. His attention to detail during the testing phase ensured data integrity and proper handling of user interactions. He also helped document the database schema and provided clear explanations of the relationships between tables in a Notion page.

During bug tracking, Yan Lun demonstrated strong analytical skills in identifying and resolving database-related issues. He collaborated effectively with us to diagnose complex issues, particularly those involving database connection and sql queries.

Serinah

Serinah is also supportive in writing helping methods to accelerate my development in larger and more complexity methods. She helped me refactor several complex methods into smaller, more manageable components, improving code readability and maintainability.

Before we started our work, Serinah shared her EDR as well. In that version, she managed to implement the project using React Native as the app framework and Google Firebase as the database. At early stage of our work, we tried building a very simple React Native app to check the possibility to finish prototype in time. Unfortunately, we found the implementation too challenging due to our limited JavaScript experience and had to abandon the plan. However, her EDR and our experience

during the process helped us better understand the project's challenges and requirements. Her React Native prototype, although not used in the final implementation, provided valuable insights into database integration patterns that we later applied to our command-line version.

Throughout the project, Serinah maintained excellent communication with the team. Though she was not familiar with git workflow and mistakenly made pushes to a wrong repository, she was very responsible in dealing with the issue. She provided detail history of her actions, which help us identify and resolve the issue quickly. Her detailed documentation of the incident helped prevent similar issues in the future and demonstrated her commitment to team collaboration.

She also worked hard on writing the paperworks, especially the report. I am grateful for her hard work in documenting our project journey in the report, and I am truly glad that our development pathway could be seen by others through the report.

Amina Jobarteh

Before we started coding with Java, Amina also worked on exploring React Native as a potential framework for our project. And database options other than PostgreSQL. She participated in our early discussions about using React Native and helped evaluate its feasibility. Yet a command-line Java application was eventually chosen to be our framework for prototyping, her early stage exploration of different technologies helped broaden our understanding of available options and their trade-offs. Her research into React Native and alternative databases contributed to our team's informed decision-making process when selecting the final tech stack.

Amina made valuable contributions to the codebase, particularly in implementing few core functionality for SSH App. Her code contributions focused on retrieving and displaying information from the database. She implemented methods to fetch and format data, ensuring clear and organised presentation of information to users.

While working on the project, Amina showed good attention to code organisation and documentation. She consistently added clear comments to her code and followed the established coding standards, making it easier for other team members to understand and work with her implementations.
After we finished implementing backend and testing the command line version, she started implementing the GUI, and made as much progress as possible within our tight schedule. Despite the time constraints, her works demonstrated her sense of responsibility and understanding of the overall architecture.

General speaking, she demonstrated strong technical adaptability and commitment to quality work throughout the project, making great contribution to both exploration and implementation phases.

Serinah Waheed's reflections

Reflection for Riming Chen

Riming was a fundamental member in this group project, he held the project and the group together. He was the one who started the project, recommended us an IDE (IntelliJ) to use and he also made a lot of helpful documentation for us to follow. Riming took on a leadership role and guided us all to success.

Riming is admirable and an amazing leader who reacted very well when I made a mistake. When using git, I accidentally pushed my code to the main branch instead of creating a merge request. Riming handled my mistake very well and was very sympathetic, helpful and kind about it, he managed it like a professional. Immediately after the mistake was made, he took the steps to fix it and spent hours to rectify the issue and kept me updated throughout the process on any updates.

Riming also set up the git for us all and created a "guidance for git" document for us which was extremely helpful. He made continuous integration tests for the git which helped to make sure that all code was of quality and functioned correctly. As well as this, he reviewed all merge requests to the main to make sure that nothing bad was being pushed into the main branch.

In conclusion, Riming was extremely valuable to the team, he designed and implemented numerous features whilst also continuously helping each team member in their own tasks at the same time.

Reflection for Yan Lun Tang

Yan Lun's expertise in the database area for an integral component for our project. Yan Lun took it upon himself to take the initiative to make the PostgreSQL database for our project which was extremely helpful of him. Yan Lun consistently played the helpful role; his database aided me when I made the functionality of the "add product" buttons and he helped to put it all together to integrate it effectively with the database.

Outside of his role on the database, he always made regular commits to the git and updates on what he was doing on notion. In terms of the command line design, Yan Lun contributed a vast amount, a notable example of this was with the order page, he collaborated with Riming to create the functionality of the shared order component.

Yan Lun had his impressive qualities; however, I think that something he needs to improve on his communication with the rest of the group. He was short of expressing his thoughts and ideas on the project with other team members, I would have liked to hear more of his thoughts as I am sure he had a lot more interesting things to perhaps add to discussions. However, it is also correct to say that Yan

Lun always regularly updated his contributions to the git and documented them on notion for all team members to see and reflect upon.

In summary, Yan Lun’s technical expertise significantly contributed to the success of our project. While there is room for improvement in his verbal communication within the team, his reliability and meticulous documentation on Git and Notion ensured we were all aligned.

Reflection for Amina Jobarteh

Amina was a lovely person to work with and she was always transparent and clear in what she was working on when asked. She primarily worked on the menu of the command line interaction, and she also did the checkout implementation; she did all these tasks in a timely manner and met all deadlines that she was given. The checkout implementation was impressive due to the fact that she completed the entire process independent of any help whilst being under a very tight deadline. Her dedication was evident as she managed her tasks seamlessly, never compromising on the quality of her output.

However, like all of us, Amina had some areas for growth. Additionally, while Amina was always willing to help, there were moments when her focus on her tasks made it challenging for her to delegate or collaborate as effectively as she might have. An area of improvement for her would be to become more involved in the project outside of her designated tasks.

Overall, Amina's contributions were invaluable, and her commitment to excellence was evident in everything she did.

Amina Jobarteh's reflections

Riming

Riming was the quality control and testing developer, who spearheaded the workflow and structure of the group. Riming was understanding of our pace in contributing to the project based on experience level. He also tested commits, handled merge requests, and gave us suggestions and feedback on our progress. These actions he carried out demonstrated strong leadership skills and initiative that helped the group stay consistent.

Riming had profound organizational skills when setting up the environment and workflow for our project. He provided comprehensible instructions and knowledge on how to use Git and IntelliJ, which reduced the confusion and faults behind saving our progress. His willingness to help fellow developers and answer questions made teamwork and collaboration effective.

Riming also had strong communication skills, as he never shied away from asking about our progress and giving us detailed updates. He always participated in our discussions which aided in the improvement of our work. He was always willing to give me feedback on the menu page and ways to improve its unity with the order page and server-client interaction. He also suggested manageable deadlines for us to work with.

Riming could practice more of his project management skills by allowing members to take on tasks equally. Overall, Riming's technical and project management abilities contributed greatly to the success of the team.

Yan Lun

Yan Lun was the database engineer and was in control of the data for our prototype. Particularly, the glue to our content and ability to work with it. Yan Lun was always consistent in his progress and took the initiative to fix bugs and enhance the PostgreSQL database. He also showed extensive use of version control which allowed all members to observe his progress. This is evident through the amount of commits he's made since the start of the project. His ability to maintain accuracy in the design of his SQL statements significantly contributed to the functionality of our program.

Yan Lun also showed leadership skills in handling merge requests, contributing to the command-line design, and helping fix issues in the pages of our code. He also did a great job collaborating with the other developers in reviewing and testing code. His debugging skills contributed significantly to the success of the team.

I admire the way Yan Lun shows diligence in a very modest manner, I think participating in discussions more frequently could be something he could work on. Mainly to see the invaluable suggestions/ feedback he could provide for the team. Overall, Yan Lun demonstrated an advanced level of database management, which promoted accuracy for user interaction.

Serinah

Serinah was a developer and technical writer for our prototype. She contributed to the GUI features of our code, giving us a visual and functional representation of our prototype. Along with the backend features of the prototype. She also utilized our documentation, repository history, and workflow to construct our results in writing.

Serinah was always willing to expand her tasks and help other developers as she developed the add/remove product feature and collaborated with Riming in creating the GUI version of the command line program. Even with tight deadlines, she was committed to making sure our prototype could be enhanced further. She was a big participant in our discussions and constantly bounced ideas off with the other developers for suggestions and feedback.

Serinah created the project report efficiently, providing extensive detail of the project and our goals clearly and concisely. She was also committed to revising her work to meet the appropriate technical writing standards. Her breakdown of each software we used during the project demonstrated a high understanding of observability. She was also able to describe how we used Notion for collaboration and workflow.

Serinah could practice more version control principles such as making more commits and merge requests. Overall, her commitment and efforts were apparent and greatly significant to the team.