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COMP3030J Software Engineering Project 2 Group 5 System Document

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June 2, 2023

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1 Overall System

We want to create a user-friendly, reliable and fully functional website for our customers that meets the needs of travelers and website management. For example, a website will be user-friendly with an easy-to-understand UI that even new customers and administrators can access quickly. Second, to expand the business, the site will be available in multiple languages, making it easier for travelers of different nationalities to use. Finally, to help answer any questions users may have when using the site, we provide a platform for direct communication. Our project includes two ports for two different types of users. The first type of users of this website are the customers of this travel agency. Customers can increase their travel booking by choosing planning tools and travel package. And can query destination, browse destination details and other operations. On the staff side, it is mainly able to add new destinations for customers, attractions and accommodations to help customers build more travel choices and get better game experience. Here is the class diagram we have drawn:

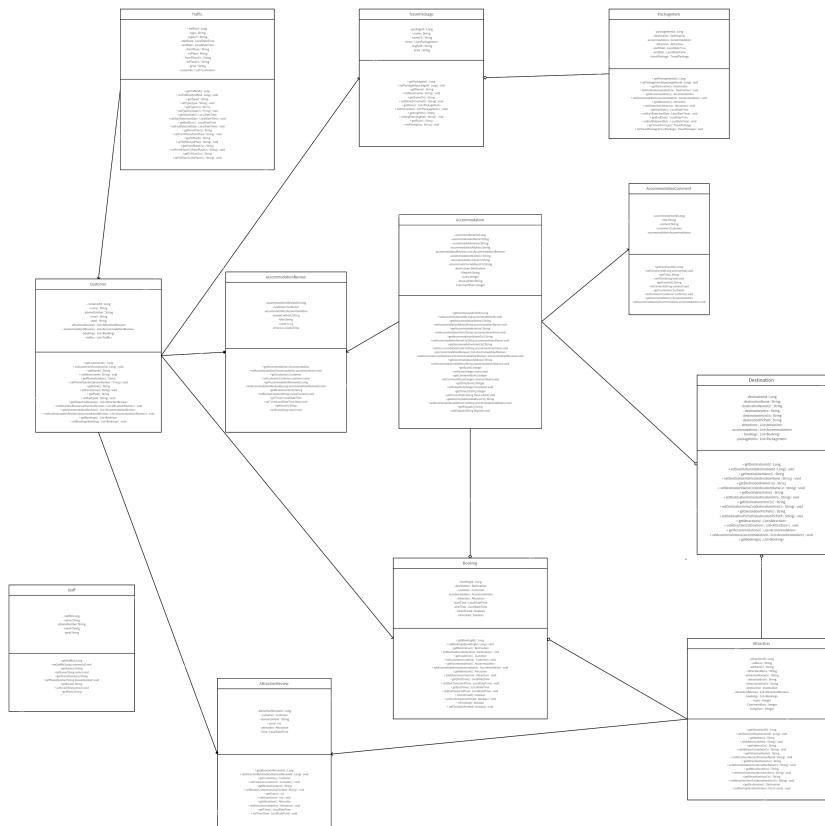


Figure 1: Class Diagram

2 Solution

We will adopt an Agile development approach to ensure that we deliver the website within the 4- month timeline while also being responsive to the client's needs. We will also prioritize features based on their importance to the client and deliver them incrementally to ensure that the website is functional and usable as soon as possible. Besides, Our team tends to test once or more after each feature development, and we will also test and evaluate the overall functionality and front-end page design before the official version is released to users to ensure that the application can meet the requirements of users. On the other hand, we will also control the efficiency of team cooperation in accordance with the team management charter, so as to ensure that the software development progress will be carried out according to the plan, even if unexpected risks occur, we can complete the program development within the planned time. Finally, we will discuss the new functions in the development process to ensure that the function of the program can better meet the needs of users. For each new function, we will also analyze its user requirements, test cases, development time, technology needed for development and other factors. To ensure that the quality and speed of software development is not compromised. Finally, we will develop a strict team management system to ensure the speed of information transmission, the efficiency of team cooperation, and explore ways to deal with difficulties in different situations (such as how to solve conflicts).

3 Plan

We created multiple work Spaces to manage our project plans

3.1 WP1: Staff Service

- The staff service will allow staff to create an account with an email address and a password
- The staff service should ensure that every account created has a unique email address
- The staff service will allow a staff to reset their password via their email address
- The staff service will allow a staff to delete their account
- The staff service will allow a staff to update their current password to a new password if they remember their current password
- The staff service will allow a staff to view their own settings

3.2 WP2: Planning Service

- The Planning service will allow a staff to query, add, modify, update and delete bookings in the system
- The Planning service will allow a staff to add new tourist destinations to the database, modify and delete information about tourist destinations
- The Planning service will allow a staff to change any part of how bookings are handled due to circumstances of force majeure
- The Planning service will allow a staff to adjust priorities of the bookings in the system
- The Planning service will allow a staff to track bookings in the system
- The system should display the booking information, including the booking customer, booking time and other details
- The system should update booking information from the customer portal in a timely manner

3.3 WP3: Planning Service

- The communication service will allow long-distance communication between users the system
- The system should provide translation between English and Chinese to improve the quality of communication and delete information about tourist destinations

3.4 WP4: Client Service

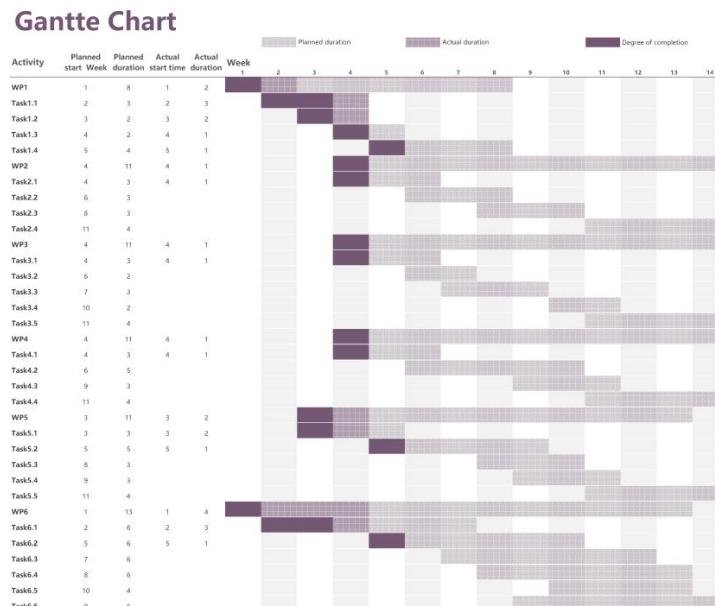
- The client service should allow clients to register by entering their own information, such as username, password, email address, etc
- The client service will send a confirmation email when a new user signs up and creates an account
- The client service will send a confirmation email when a new user signs up and creates an account
- The client service should ensure that every account created has a unique email address
- The client service will allow clients to reset their password via their email address
- The client service will allow clients to delete their account
- The client service will allow clients to update their current password to a new password if they remember their current password
- The user service will allow clients to view their own settings
- The user service will allow clients to retrieve their forgotten password by e-mail

3.5 WP5: Booking Service

- The booking service will allow clients to choose pre-set tour packages or choose their own destinations and accommodation for travel agencies to plan travel for them
- The booking service will allow clients to enter keywords (such as Beijing, Great wall, etc.) to query attractions, accommodations, etc
- The booking service will allow clients to select categories to filter attractions, accommodations, tour packages, etc
- The booking service will allow clients to use planning tools to set up their own travel plans to set up new booking item
- The client service will allow clients to comment on travel destinations, attractions and accommodation
- The client service will allow clients to modify or delete their reviews
- The user service will allow clients to browse relevant information about the company
- The user service will help clients to calculate the cost of all their bookings

3.6 WP6: Test and Verification

- Test that user and staff logins and registrations are working properly
- Check if user and staff interfaces can be edited and saved
- Check whether the user reservation function can run successfully
- Check whether the staff can modify the information
- Check if users can comment and reply to comments
- Check if users can communicate with staff



4 Requirements Analysis

4.1 Functional Requirements

4.1.1 Staff Service

S/N	Requirements	Priority
F-SS-1	The staff service will allow a staff to create an account with an email address and a password	High
F-SS-2	The staff service will send a confirmation email when a new staff signs up and creates an account	High
F-SS-3	The staff service should ensure that every account created has a unique email address	High
F-SS-4	The staff service will allow a staff to reset their password via their email address	High
F-SS-5	The staff service will allow a staff to delete their account	Medium
F-SS-6	The staff service will allow a staff to update their current password to a new password if they remember their current password	Medium
F-SS-7	The staff service will allow a staff to view their own settings	Low

4.1.2 Planning Service

S/N	Requirements	Priority
F-PS-1	The Planning service will allow a staff to query, add, modify, update and delete bookings in the system	High
F-PS-2	The Planning service will allow a staff to add new tourist destinations to the database, modify and delete information about tourist destinations	High
F-PS-3	The Planning service will allow a staff to change any part of how bookings are handled due to circumstances of force majeure	High
F-PS-4	The Planning service will allow a staff to adjust priorities of the bookings in the system	Medium
F-PS-5	The Planning service will allow a staff to track bookings in the system	High
F-PS-6	The system should display the booking information, including the booking customer, booking time and other details	High
F-PS-7	The system should update booking information from the customer portal in a timely manner	High

4.1.3 Communication Service

S/N	Requirements	Priority
F-CM-1	The communication service will allow long-distance communication between users	High
F-CM-2	The system should provide translation between English and Chinese to improve the quality of communication	Medium

4.2 Non-functional Requirements

Non-functional requirements have been grouped according to quality attributes covered in the lectures.

4.2.1 Reliability Attribute

S/N	Requirements	Priority
NF-R-1	The system should ensure the data is being saved properly when a network error occurred	High
NF-R-2	Data is stored on the cloud server of UCD for access from anywhere via a browser without loss of data	High

4.2.2 Usability Attribute

S/N	Requirements	Priority
NF-U-1	The system should be able to persist the login session after page refreshes.	High
NF-U-2	The system should only record compilable submissions	Medium
NF-U-3	The website can be accessed on mobile	High
NF-U-4	Website interface display and interaction can be adaptive to different mobile devices	High

5 Design

Overall design:

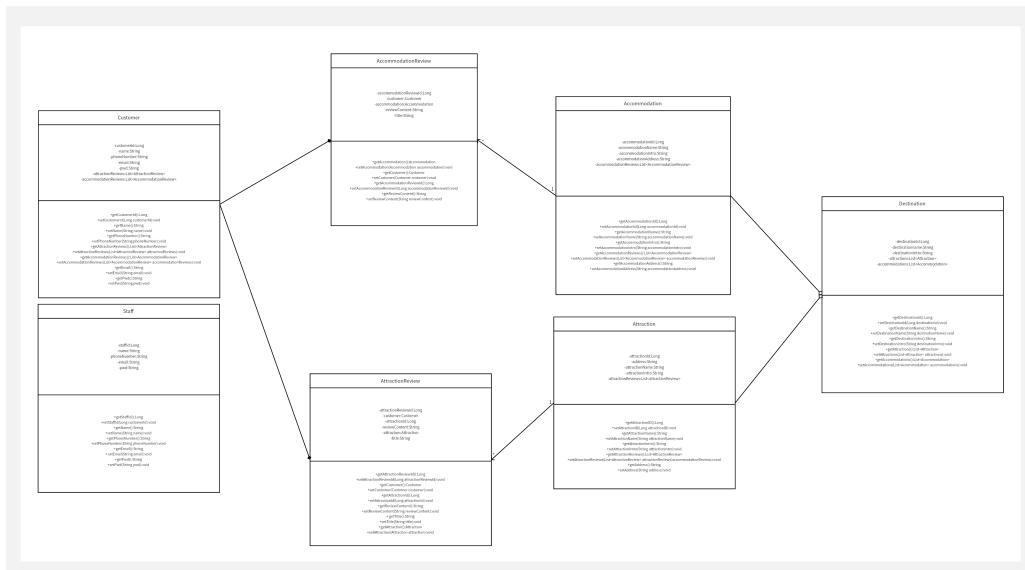


Figure 2: Class Diagram

5.1 User system

Register:

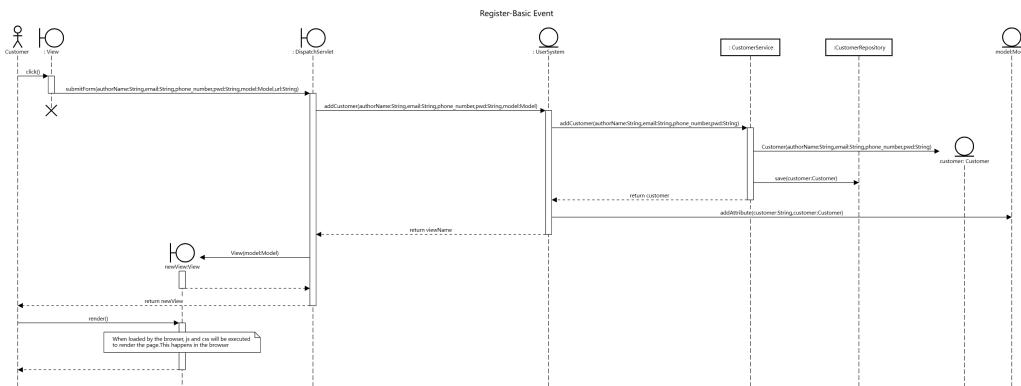


Figure 3: Register

Login:

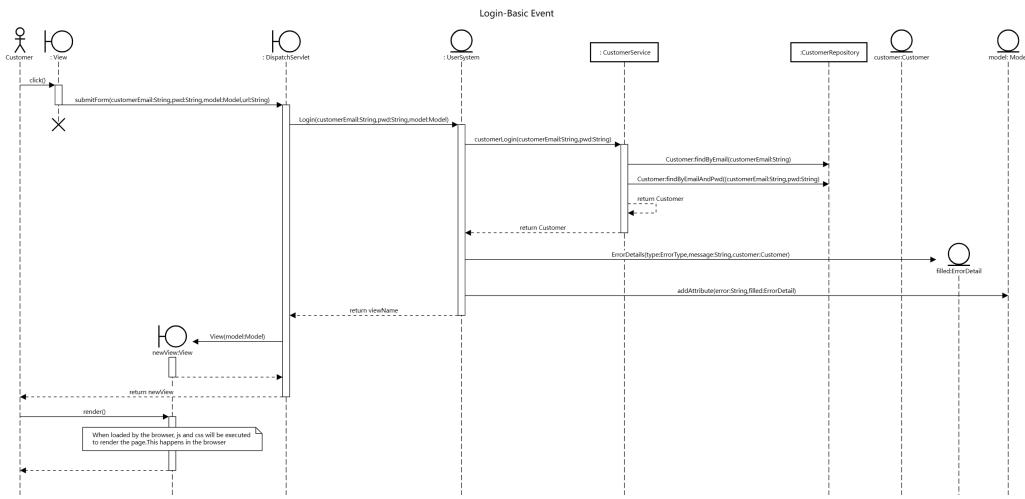


Figure 4: Login

5.2 Booking system

Add Destination:

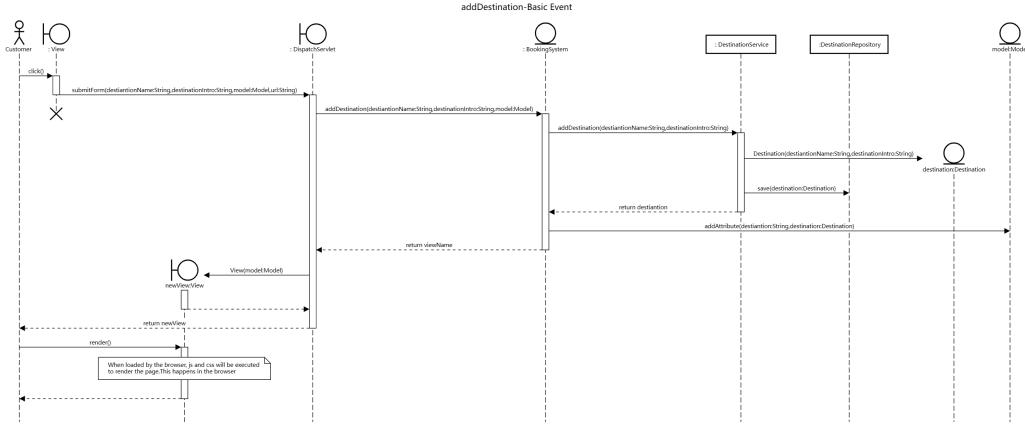


Figure 5: Addd Destination

Add Booking:

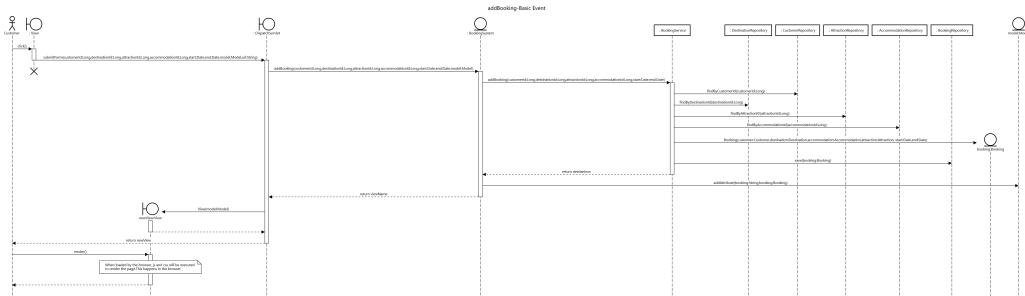


Figure 6: Add Booking

Add Attraction:

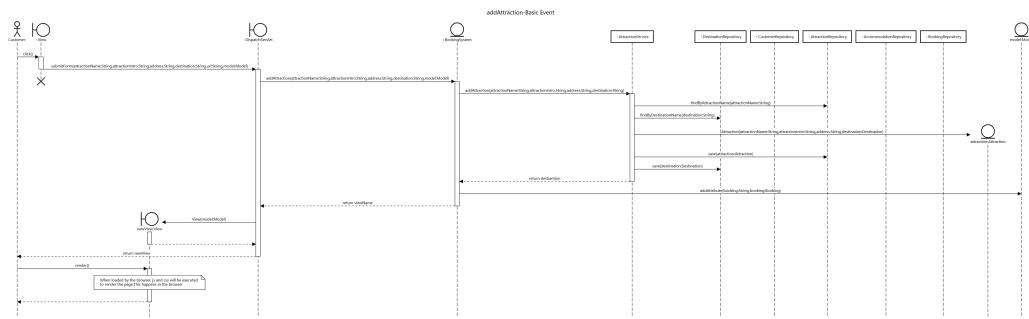


Figure 7: Add Attraction

Find Destination:

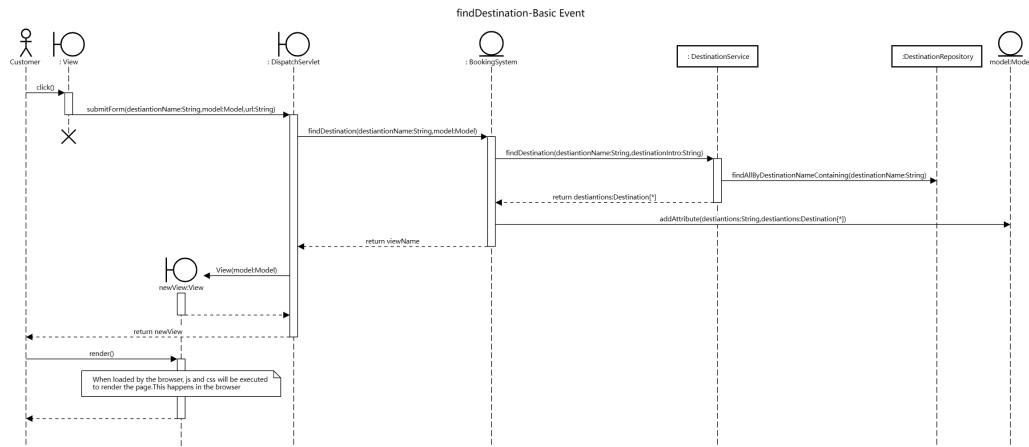


Figure 8: Find Destination

6 Software Process

6.1 Project requirement analysis and design

In this website development, we use the agile development mode to carry out. We first carried out the demand analysis to the user. customer requirements are divided into two modules: Customer end and staff end. After that, our team completed the preliminary establishment of the database model, the design and construction of the development environment and the preliminary design of the functions according to the requirements analysis.

6.2 Project realization

So far, in the customer end, we have focused on the data query and display function, and in the staff end, we have inherited the customer end function and completed the data addition function. In the future, we will improve the data deletion and modification function. In addition, on the front end, we have completed most of the prototype page, and some of the reusable components such as the navigation bar, lists, tables, etc. We will continue to refine each page and fill in more features and components. In order to better complete the user needs of the function.

6.3 Project test

In the aspect of software testing, we take advantage of the characteristics of agile development. Every time we add a new function or complete a new user demand, we will conduct black box testing by simulating users using the website. For each black box test, we also designed different test cases to ensure the stability and sustainability of the whole system. We also ensured the rapid transmission of test results and related information through division of labor and cooperation within our team, and ensured that team members would not receive superfluous information during front-end and back-end separation development, which would slow down the overall development quality and efficiency. In the next few weeks, we will also adjust our test plan according to the project progress to ensure that the development progress of the whole program will not be affected by the test.

7 Team Work

7.1 Group labor division

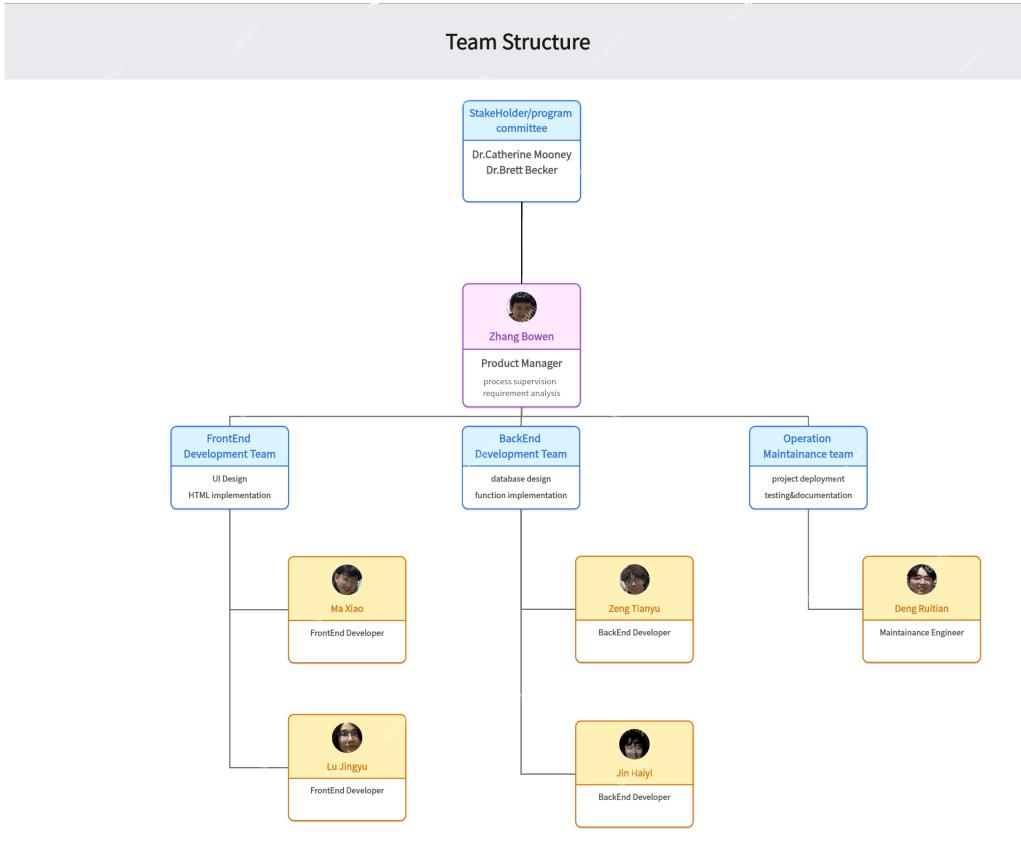


Figure 9: Group labor division

According to the requirement of the project, we divide our team in two three sub-team, the backend development team, the front-end development team and the Operation maintenance team. Each Team member is assigned and allocated with different responsibilities according to their own expertise. Besides the supervision of the development, the product manager would have to involved in all three parts development during the process.

- Back-end development team: This team is mainly in charge of the back-end function implementation. Work involves but not limited to database design and construction, Receiving requirements from the product manager, and integrating the project with the front-end development team.
- Front-end development team: The front-end development team is responsible for the front-end implementation. Work involves but not limited to the overall user interface design, front-end information calibration, receiving requirements from the product manager, and integrating the project with the back-end development team.
- Operation maintenance team: This team is responsible for the overall integration of the project and deployment of the project. Work mainly includes but is not limited to the docker deployment, function testing, testing analysis, project integration, and documentation.



Figure 10: Group

7.2 Management and Collaboration

- Team agreement

The specific details of the team agreement are written out early in the project. In the agreement, communication methods, decision-making methods, responsibilities and division of labour for each member are detailed. If there are no special circumstances, no subsequent changes are basically made.

Conflict Handling

Conflict will be handled following the principle that the minority is subordinate to the majority. In case of disagreement, every member can discuss and debate with other team members in the offline meeting and finally vote to make the final decision. Convincing and logical ideas are encouraged in our team.

Decision Making

All ideas and directions will be kept open until a final consensus decision is made by the group during each formal meeting. Final ideas and decisions will be adopted if and only if all team members agree. If a conflict occurs, please refer to the "Conflict handling" section.

Responsibility

Members of the team are expected to finish all tasks by the due date that they are assigned. The workload would vary weekly from person to person but the overall workload is about the same. The tasks that are assigned would be accurate with measurable acceptance, otherwise, they will be required to be redefined and clarified. Any delay or low-quality commitment which has not been announced to all members in advance will be handled according to the Consequence items.

Participation

Gitlab would be used as the platform supporting the project and overleaf would be adopted to write the project report. Team members are required to leave their coding progress on Gitlab. In the case of the existence of the free rider, submissions should be guaranteed at least once per week per person. The workload would be assessed and evaluated by the others in the team.

Progress

Requirement analysis would be done prior. Our team uses the product to-do list as the development plan of the whole product, which will be constantly adjusted and optimized during the project process, making full use of the agile development concept. Based on the different functional modules, the development cycle is divided into several sprints, the group progress will be determined by the product to-do list and sprint to-do list.

Consequences

Consequences will be based on a strike program with three strikes resulting in a probationary status and four strikes resulting in informing lecturers of his/her non-contributing status. While on probation the team member must demonstrate his ongoing commitment to the team by writing an explanatory paper and requesting reinstatement to the team. Strike may be given for any one of the following reasons:

1. Missed offline meetings without communication 24 hours prior.

Figure 11: Team Agreement

- Weekly Meeting

Our group holds regular meetings three times a week. All team members are required to attend these

meetings. The team meetings focus on the week's development progress and the main issues in development. The first meeting of the week is held every Monday. The main purpose of this meeting includes identifying the requirements and tasks that need to be completed during the week and assigning tasks to each member according to the group division. The second meeting will take place on Thursday. The meeting is held to check the development progress. Each team member will have to report on his or her current level of completion and the problems they have encountered in the development process. The other team members should come together to discuss and help solve these problems. The third meeting is usually held on a Saturday. The purpose of the meeting is to summarise the week's work and to give a brief assignment and preview of what is to come the following week.

- Weekly Update

The weekly update is a document used to record the weekly development progress of the project and the contributions of each member. In addition, problems encountered during development and plans for the following week need to be recorded in this document.

- Weekly Team Leader

To better facilitate our team collaboration, instead of a single leader throughout the whole process, we have a take-turns team leader each week. The leader would be in charge of assessing individuals' work based on the work they have done. Feedback should be given on everyone's work weekly. **This decision has contributed to the better adjustment of the work division and greatly enhanced our working efficiency.**

Team members	Feedback	Weekly task/week	Evaluation(100%)	feedback on progress
Bowen Zhang	I further my learning in springboot and implement database using spring JF week3	1. general task: 1.1. create git repository to manage the project 2. Backend	100%	Well done, very efficient.
Haiyi Jin	I realise the register and login function successfully	1.1. create git repository to manage the project 1.2. learn springboot framework	90%	Overall completion is good, but it takes a long time to solve the problem.
Tianyu Zeng	I help with the deployment of the project. There are some problems left and I will fix them	2. Backend	100%	Well done, very efficient.
Xiao Ma	I have implemented the frontend page	2.1. Design and establish the database	95%	The completion is high and the text can be written better.
Ruitan Deng	I test the register and login function and write them into the user document	2.2. implement login and register function	90%	Did his best, but the deployment was still problematic
Jingyu Lu	I completed the deployment of the project on the cloud server through docker	3. frontend	100%	Well done, very efficient.
Bowen Zhang	I was involved in the implementation of the back end to add attractions and week4:	1.1. draw part of the sequence diagram according to user story	95%	It's a good drawing. There's a little problem.
Haiyi Jin	I help implement the back end of the add accommodation feature and store	1.2. refine the class diagram according to the requirements 2. Backend	90%	The finish is high, but the details are still questionable.
Tianyu Zeng	I drew a partial sequence diagram based on user story	2.1. implement the backend function of adding, and searching attractions, accommodations and destinations	100%	Well done, very efficient.
Xiao Ma	I further refined the class diagram according to the requirements	2.2. implement the function of uploading and storing weeks:	95%	Hard work, but still need to talk to TA for deployment issues.
Ruitan Deng	I finished the front-end work on the relevant features	general task: 1.1. complete the function to add a travel package	95%	High degree of completion
Jingyu Lu	I completed the deployment of the project on the cloud server through docker	1.2. complete pre-preparation for the communication function	100%	Well done, very efficient.
Bowen Zhang	I was involved in the function to add a travel package	2. Backend	90%	Basically complete the task, but some problems with database association.
Haiyi Jin	I have refined the table relationships in the database	2.1. add attraction details function	95%	Well done, some parts of the CSS are not fully displayed.
Tianyu Zeng	I completed the database data detection and front-end page and database connection use	2.2. refined table relationships in the database	100%	Well done, very efficient.
Xiao Ma	I have completed front-end user search accommodation and other functions of the page design	3. frontend	95%	Well done, very efficient.
Ruitan Deng	I have beautified the front-end pages	3.1. beautify all completed front-end pages	100%	Well done, very efficient.
Jingyu Lu	I completed the server upload project and tested the run and fixed errors	week6: 1. general task: 1.1. complete the order tracking function	95%	High degree of completion. Further testing is required.
Bowen Zhang	I wired some of the backend functionality and further designed the UML diagram according to the requirements	1.2. further adjusted the architecture of the project	100%	Well done, very efficient.
Haiyi Jin	I further improved the database design according to the requirements, and the data of the database was tested	2.1. implement the actual requirements	90%	Basically completed the task, but there are still minor problems.
Tianyu Zeng	I completed the front-end homepage design, and realized the back-end and front-end functional links	2. Backend	90%	Refined table relationships in the database
Xiao Ma	I further developed according to the backend of UML diagram and completed related functions of add booking	2.1. refined table relationships in the database	90%	Basically completed the task, but there are still minor problems.

Figure 12: Weekly Feedback

- Overleaf

We adopt overleaf as the online text editor. Through this platform, team members can write project documents and manuals together in the cloud, which is very convenient.

- Gitlab

To maintain the code and facilitate online coding collaboration, Gitlab is used as the online code repository of our team. Through this platform, team members can write project documents and manuals together in the cloud, which is very convenient. Furthermore, this platform has a comprehensive method of dealing with code conflict which ensures the project safety.

- Tencent meetings

Considering staff mobility and geographical limitation, we adopt the Tencent meeting as our online meeting tool. It provides real-time online chatting with stable and free service, During team meetings on weekends, members can present, explain and exchange content through Tencent meetings.

7.3 Issues

- Difficulties in implementing front-end Description: The front end css styles, paging, and value jumps are complex and buggy. Solution: Find professional books and collect information and project cases on the Internet.
- Storage of pictures on server Description: The path of the image stored in the server will change, causing the path error. Solution: Asking TA for help.

- Database consistency Description: Databases are prone to many-to-many and data consistency problems.
Solution: Recheck models periodically

8 Technical Implementation

8.1 Project Architecture

8.1.1 Design Pattern

For the overall project architecture, we use the MVC architecture.

Model-view-controller (MVC) is a software design pattern commonly used to develop user interfaces, and the springboot framework we used in this project follows this pattern. We use this pattern to divide the related program logic into three interrelated elements. This is done to separate the internal representation of the information from the way it is presented and received to the user. This framework has traditionally been used for desktop graphical user interfaces (GUIs), and its widespread acceptance and use by programmers in the web development process has made it even more common. In addition, now popular programming languages also have MVC pattern to promote the implementation of various applications, which further enhances the pattern's generality.

- model

This is the central component of the pattern. It is an application's dynamic data structure, a component that manages the application's data, logic, and rules directly, independent of the user interface. In a common framework such as springboot, which we use, the model type typically represents a table in an application database, or more generally, a bridge between the back end and the front end to transfer data.

- view

This component represents a representation of any information, such as a chart, chart, or table. Multiple views of the same information can be implemented in this pattern, such as a bar chart for management and a table view for accountants. A view typically represents a complete user interface element, such as a menu or button, and receives input from the user. In springboot, the role of the view can be played by templates such as HTML, so in their pattern, the view specifies a user interface within the browser, rather than directly representing a user interface widget. (With this in mind, Django chooses to call such objects "templates.") This approach puts relatively little emphasis on small, composable views.

- controller

This component is used to take input and transform it into a model or view. Controllers handle user input events, such as button presses or mouse movements at any given time, and each controller has an associated view and model, although a model object may receive messages from many different controllers. Only one controller, the "active" controller, receives user input at any given time; The global Window Manager object is responsible for setting the current active controller. If the user input prompts the model to change, the controller signals the change to the model, but the model is then responsible for telling its view to update. Requests from the client to the server-side application are sent to a "router" that maps the request to a specific method for a specific controller. In this approach, the controller interacts with the request data and any associated model objects and prepares the response using the view. Typically, each model type has an associated controller; For example, if an application has a Client model, it will usually also have an associated Clients controller. However, developers are free to make other types of controllers if they wish

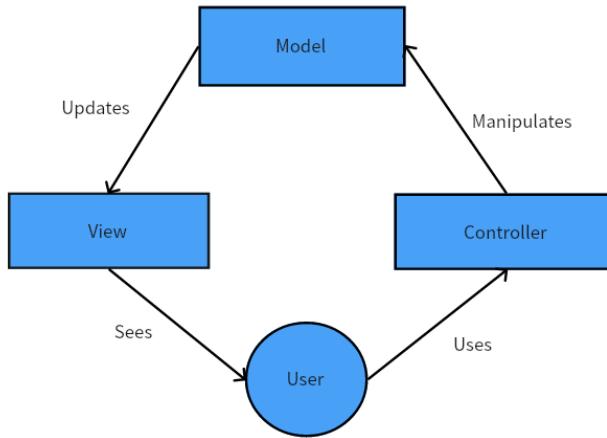


Figure 13: MVC Structure

8.1.2 Backend Framework: Springboot

We adopt Springboot as our backend framework. It is one of the spring family bucket technologies, a framework used by almost all javaWeb programming in enterprise development. Supported by the abundant library and maven resources with the automatic configuration feature, it could greatly improve development efficiency. The Spring Boot framework itself does not provide the core features and extension functions of the Spring framework. It is only used for the rapid and agile development of a new generation of applications based on the Spring framework. It is a tool closely combined with the Spring framework to improve the experience of Spring developers.

Advantages:

- It could quickly create stand-alone Spring projects and integrate with major frameworks.
- It has a lot of automatic configuration to simplify development.
- It can directly use the java main method to start the Springboot program on the embedded Tomcat server without deploying the war package file.
- It can load external library and resources using maven.
- It can completely not use XML configuration files, annotation configuration, and Java configuration.

8.2 Database and Data Management

8.2.1 Data Storage and maintenance

MySQL is an open source database; anyone can access the source code. This makes it possible for anyone to fix MySQL's flaws and for anyone to use the database for any purpose. MySQL is a freely available database.

- Cross-platform
MySQL runs not only on the Windows family of operating systems, but also on UNIX, Linux, and Mac OS. Since many websites choose UNIX and Linux as their web servers, the cross-platform nature of MySQL ensures its advantages in web applications. Free resource MySQL database is a free software, anyone can download the software from the official website of MySQL, and these community versions of MySQL are free to try.
- Powerful and Easy to Use
MySQL is a true multi-user, multi-threaded SQL database server. It can handle large amounts of data quickly, efficiently and securely. Compared to databases like Oracle, MySQL is very easy to use. MySQL's main goals are speed, robustness and ease of use.

In general, data maintenance has two important goals, the response efficiency and the development efficiency. Response efficiency depends mainly on the speed of response. In order to speed up data reading and writing, the contents of the database need to be invoked to a minimum in each request. Development efficiency depends primarily on front- and back-end data transfer. To speed up development efficiency, simpler, cleaner and less

labor-intensive frameworks with less SQL handwriting-mapping should be used. Here, we use Spring JPA to visit and maintain our database. It has the following advantages:

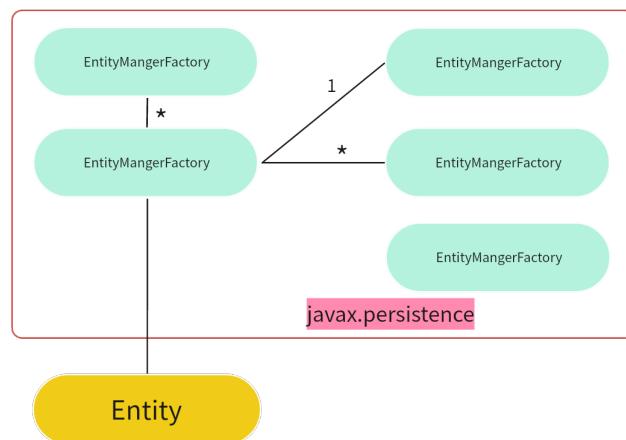


Figure 14: JPA-Class-Relationship

- Simplify programming

JPA is simpler, cleaner and less labor intensive than JDBC with SQL and handwritten mapping. In JPA, data is represented by objects and classes, while in JDBC, data is represented by tables and records. It uses POJO to represent persistent data, thus simplifying database programming.

- Java Entity Expression Query

JPA avoids writing DDL using the database-specific dialect of SQL. instead, it allows mapping in XML or using Java annotations. JPA allows us to save and load Java objects without using any DML language at all. When we need to execute a query JPQL, it allows us to express the query in Java entities instead of SQL tables and columns.

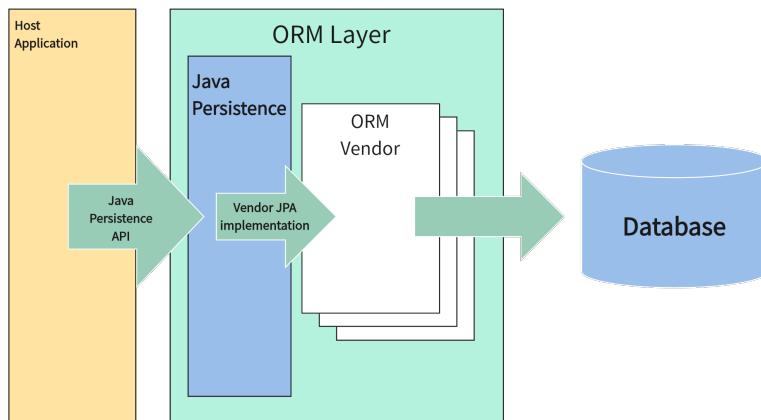


Figure 15: ORM

- Object-Relational Mapping (ORM)

In ORM, the mapping between Java objects and database tables is called Object-Relational Mapping. The ORM mapping acts as a bridge between the relational database (tables and records) and the Java application (classes and objects). The ORM layer exists between the application and the database. It transforms Java classes and objects so that they can be stored and managed in a relational database. By default, the persistent name will be the name of the table and the fields will be the columns. Once the application is built, each table row corresponds to an object.

8.3 Project Deployment

8.3.1 Deployment

This section gives a description of the deployment of our project, covering the deployment method of applying docker for automated deployment and the reverse proxy of ngnix.

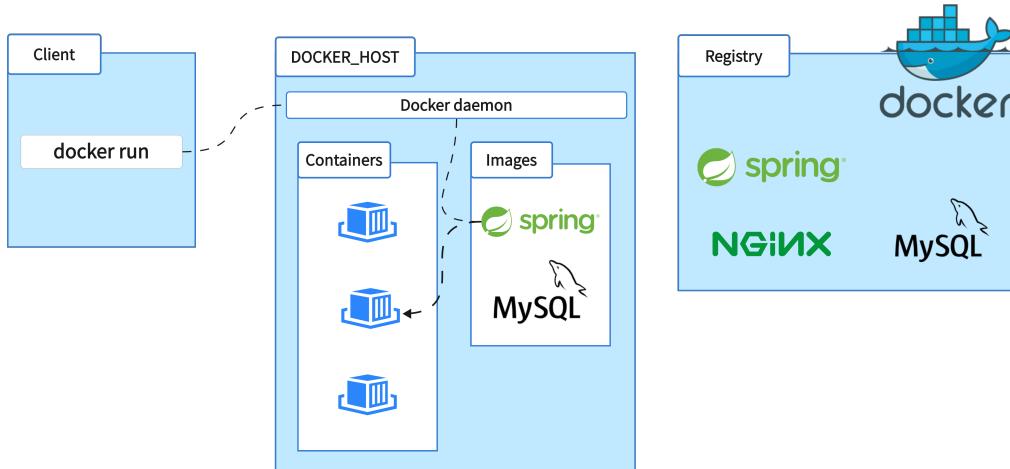


Figure 16: Docker

8.3.2 Basic Deploy

Since we have already set up the docker environment on the server and refined the relevant configuration files, you can simply run sudo docker-compose up –build on the server to get the project up and running with one click

8.3.3 More Detail

Due to the use of docker for automated deployment, the manual download of the required dependencies is not required.

We use docker-compose to define and run multi-container Docker applications. With Compose, we used a YML file to configure all the services required by the application. Then, using sudo docker-compose up –build command to create and start all the services from the YML file configuration.

For the ngnix proxy, we did not choose to configure it as a docker container, but used nginx independently of Docker, managed by our operating system (Ubuntu). As our springboot project exposes port 5000 and publishes it to the host in docker-compose.yaml, we finally configure nginx to reverse proxy incoming traffic to the published port. So after you have run the sudo docker-compose up –build command, you can access our project in any browser via <http://csi420-01-vm5.ucd.ie>.

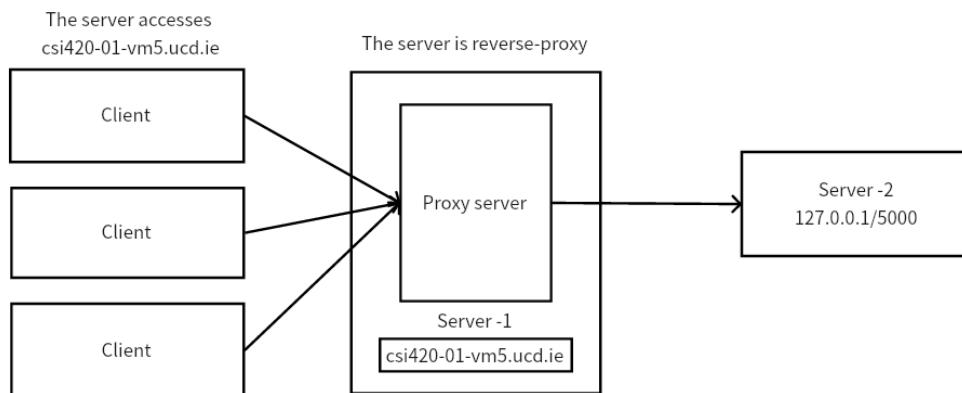


Figure 17: Access Process

8.4 Reference Techniques

8.4.1 Web Socket

To implement the communication function, we adopt the WebSocket. The WebSocket API is an advanced technology that makes it possible to open a two-way interactive communication session between the user's browser and a server. The hypertext transfer protocol (HTTP) is a traditional transfer protocol that is used to transfer data. However, since it is a typically request-response protocol, the server would only respond to the client once they receive the request. It would be hard and a waste of resources to use the timer to check frequently whether there is a new request from the client. Different from HTTP, the establishment of the websocket is based on the HTTP. WebSocket allows two-way interactive communication without limitation, which means the client could send messages to the server while the server could also send messages to the client.

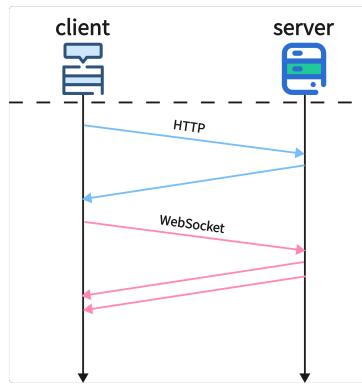


Figure 18: WebSocket

8.5 Three.js

We adopt threejs to construct and present the 3-dimensional view for the accommodation. Different from WebGL which requires a long-term development period and sophisticated shader language, threejs not only encapsulates WebGL, simplifying the complex interface but also is based on the thought of object-oriented programming. The utilization of this technique aims to respond to the feedback of providing detailed pictures of the accommodation

8.6 Translation API

Baidu Translation API is used to translate the subway station name simultaneously when clicking on it. This makes full use of the translation API and the ajax. It meets the requirements of free, high responsiveness, and provides satisfying accuracy. In addition, since it is achieved by means of requesting results from the web server, no external jar file and configurations are required to deploy the function. As the administrator, Baidu also provides the monitor screening the usage and changes of the dosage. The records could also be uploaded automatically as the cloud backup.

8.7 Voice Input API

To implement the voice input function, considering the multi-language and real-time high responsiveness requirements, we integrate XunFei voice input API, which provides free and real-time voice input functions. Different from the current mainstream voice recognition API which requires the specification of languages, XunFei API could automatically recognize different languages according to the speaking.

8.8 Stanford CoreNLP

Stanford CoreNLP is a natural language process model proposed and released by Stanford University, it provides a set of natural language analysis tools written in Java. It can take raw human language text input and give the base forms of words, their parts of speech, whether they are names of companies, people, etc., normalize and interpret dates, times, and numeric quantities, mark up the structure of sentences in terms of phrases or word dependencies, and indicate which noun phrases refer to the same entities.

- Free and easy to deploy

Different from the most existing open API provided by several companies, the Stanford CoreNLP library is completely free (no commerce usage) with detailed documentation giving guidance on its usage. In addition, this library is implemented using java where most of the NLP model is implemented using java, no efforts are required to adapt the model into the program.

- Multi-language support

It was originally developed for English, but now also provides varying levels of support for (Modern Standard) Arabic, (mainland) Chinese, French, German, Hungarian, Italian, and Spanish. Stanford CoreNLP is an integrated framework, which makes it very easy to apply a bunch of language analysis tools to a piece of text.



Figure 19: Stanford CoreNLP

9 Challenge

This section identifies the challenge that we encountered during the development process. This section is added and supplemented to respond to the feedback

- Virtual mapping issue

Due to the self-protective and memory mechanism, the uploaded picture would only appear after restarting the program. This is a unique problem in spring boot. Each time you run the project, springboot compiles the current project and generates a jar package to run. However, the uploaded picture is stored in the original project structure, therefore the system couldn't find the uploaded resources.

To deal with the problem, we spend a lot of time using the configuration of the virtual mapping address, redirecting the call of the picture back to our program address instead of finding the resources in the generated jar file.

- Docker Deployment issue

Different from most of the other groups using flask as their framework, we adopt springboot and use docker to deploy our project. Initially, we planned to use nginx as a container to implement reverse proxy. However, due to the lack of the access to docker virtual environment, we cannot modify the configuration file in nginx container. Eventually, we use the docker independent as an alternate approach to deal with this issue. (Ubuntu)

- Server Storage issue

Since our project refers to a large semantic analysis model, our project size was larger than expected, which resulted in insufficient server storage space. we communicated with Eddie, the person in charge of the server of UCD, provided relevant proof of insufficient storage space, and obtained permission to expand the storage space of the server. Sincerely thanks for Eddie's help.

10 Conclusion

10.1 Reflection on problem-based learning and Collaboration

Looking back at the development and collaboration process, our team adopted the RACI model for project management to define and clarify the responsibilities and participation levels of each team member during different stages of development. Despite encountering various challenges during the development phase, we successfully overcame them by fully leveraging the strengths of each team member, conducting thorough requirement analysis, continuously acquiring new skills, seamlessly integrating functionalities, distributing responsibilities effectively, fostering a good working relationship, and applying professional project management techniques. We are extremely grateful for the guidance and support provided by Dr. Catherine, Dr. Brett, and Dr. Eddie throughout this project, which played a crucial role in its successful completion.

10.2 Future improvements

In future work, we aim to upgrade our project using enterprise-level technologies. In the deployment phase, we have already adopted Docker, a commonly used enterprise deployment tool, and it has proven to be successful. Moving forward, we plan to utilize Vue as our frontend framework, enabling us to achieve modularization of the frontend code and build more robust applications using the extensive Vue ecosystem. Additionally, we plan to replace MySQL with Redis as our backend database. Redis, with its data storage in memory, provides fast read and write speeds, making it suitable for handling a large volume of read and write operations. Moreover, benefiting from its powerful caching functionality, Redis allows us to store frequently accessed data in memory, reducing the workload on the database and improving the performance and responsiveness of our application.

10.3 Acknowledgements

To begin with, we sincerely appreciate Dr.Catherine and Dr.Brett's continuous support and guidance. With your assistance, we have successfully completed this outstanding project.

In addition, Our heartfelt thanks to the teaching assistant and two head two assistants. Thanks for your patience in answering our problems while giving us advice.

Furthermore, many thanks to the help from Eddie. Since we use different techniques where no tutorials available, Eddie has offered us great help in the whole process, assisting us in handling with different problems.

Eventually, thanks to all the team members in Group 5. It is a satisfying and enjoyable experience collaborating with these excellent team members.

11 Reference

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