

2023-10-18

An Undergraduate Internship/Project on Clippers

Rabby Mamud, Topu Rayhan

Independent University, Bangladesh

<https://ar.iub.edu.bd/handle/11348/695>

Downloaded from IUB Academic Repository



Clippers

By

Topu Rayhan Rabby Mamud

Student ID: **1930179**

Summer, 2023

Supervisor:

Md. Fahad Monir

Lecturer

Department of Computer Science & Engineering

Independent University, Bangladesh

October 18, 2023

Dissertation submitted in partial fulfillment for the degree of
Bachelor of Science in Computer Science and Engineering

Department of Computer Science & Engineering

Independent University, Bangladesh

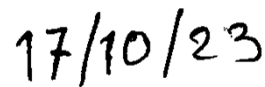
Attestation

I, Topu Rayhan Rabby Mamud (1930179), hereby attest that this report represents my own work in partial fulfillment for the degree of Bachelor of Science in Computer Science and Engineering. I acknowledge and have duly referenced all materials and sources used in this report.

Furthermore, I have received guidance and mentorship from my supervisor, Md. Fahad Monir and my organizational supervisor, MD. Khairul Bashar throughout my internship. I also affirm that all my work in the report is genuine and that I have not indulged in plagiarism.



Signature



Date

Topu Rayhan Rabby Mamud

Name

Acknowledgement

I want to start by thanking Almighty Allah, whose blessings have been my constant companions throughout my journey, and I am forever grateful for what & where I am today.

I am deeply thankful to Md. Mustakim Billah Khan, Manager of Helping Ants and MD. Khairul Bashar, Senior Web Developer of Helping Ants for giving me the opportunity to work in their company and gain valuable experience through the internship.

Furthermore, I would like to extend my heartfelt thanks to my supervisor, Md. Fahad Monir, for his unwavering support and guidance during my internship.

Finally, I will forever be indebted to my parents for their immense sacrifice and their enduring patience and support.

Letter of Transmittal

October 5, 2023

Md. Fahad Monir

Lecturer

Department of Computer Science and Engineering

Independent University, Bangladesh

Subject: Internship Report Submission of Summer, 2023

Dear Sir,

With due respect, I, Topu Rayhan Rabby Mamud (1930179) am pleased to submit my internship report titled “Clippers” as a partial fulfillment for the degree of Bachelor of Science in Computer Science and Engineering. This report summarizes my work during the internship. I completed my internship from Helping Ants which was for a period of 4 months i.e., from June 14, 2023, to October 14, 2023.

The report covers my contribution to the “Clippers” project, which aims to simplify the haircut experience in Bangladesh. It addresses common issues like long wait times and uncertainty of the salon quality. Alongside the project the report also includes my work at Helping Ants as a WordPress Developer, where I worked diligently and sincerely. I believe this experience and opportunity will help me in my future endeavors.

I would like to thank you for your guidance and mentorship during my internship. I will be delighted to know if the project accomplished its goal. I hope that this project can impact the people of Bangladesh for the better cause of saving time.

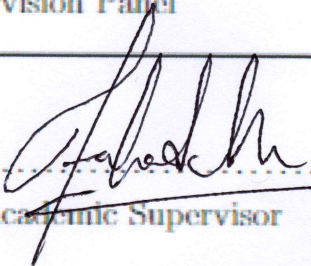
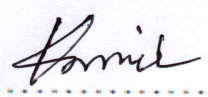
Sincerely,

Topu Rayhan Rabby Mamud

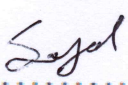
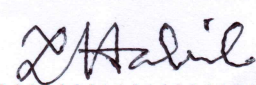
1930179

Evaluation Committee

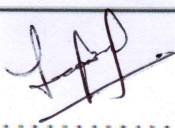
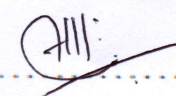
Supervision Panel

 Academic Supervisor	 Industry Supervisor
---	--

Panel Members

 Panel Member 1	 Panel Member 2
--	---

Office Use

 Program Coordinator	 Head of the Department
---	---

Abstract

Clippers is a mobile application designed to address the main problem of long waiting times for haircuts. The app offers a comprehensive solution for a swift and hassle-free haircut experience by leveraging technology to minimize wait times. Users can conveniently locate nearby barber shops through the integration of Google Maps API, and the app provides real-time information on wait times and queue sizes, allowing customers to plan their visits more efficiently. Additionally, Clippers enables users to access ratings and reviews of barbershops, empowering them to make informed decisions about where to get their haircuts. The project aims to enhance customer satisfaction while creating opportunities for local barbershops to flourish alongside their competitors. Key objectives include user registration, displaying nearby barbershops, providing wait time and queue size information, facilitating ratings and reviews, enabling appointment bookings and online payments, and allowing shop owners to update services and wait times. By addressing the main problem of long wait times, Clippers simplifies the haircut process, saves users' valuable time, and improves the overall customer experience. The app promotes competition among barbershops, leading to better pricing and service quality, and it opens up new job opportunities for developers. Clippers is a user-friendly, secure, and cross-platform application that transforms the haircut experience into a seamless and efficient process.

Keywords: mobile application, cross platform, real-time data management, location-based service, queue management, online appointment system, salon management system

Contents

Attestation	i
Acknowledgement	ii
Letter of Transmittal	iii
Evaluation Committee	iv
Abstract	v
Chapter 1	1
Introduction	1
1.1 Overview/Background of the Work	1
1.2 Objectives	1
1.2 Scopes	2
Chapter 2	4
Literature Review	4
2.1 Relationship with Undergraduate Studies	4
2.2 Related works	5
Chapter 3	7
Project Management & Financing	7
3.1 Work Breakdown Structure	7
3.2 Process/Activity wise Time Distribution	8
3.3 Gantt Chart	8
3.4 Process/Activity wise Resource Allocation	8
3.5 Estimated Costing	9
Chapter 4	10
Methodology	10
Chapter 5	11
Body of the Project	11
5.1 Work Description	11
5.2 Requirement Analysis	12
Functional and Nonfunctional requirements	13
Functional requirements	13
Nonfunctional Requirements	15
5.3 System Analysis	16
5.4 System Design	20

5.5 Implementation	28
5.6 Testing.....	33
Chapter 6.....	39
Results & Analysis.....	39
6.1 Development Progress	39
6.2 User Interface and Experience	39
6.3 Data Accuracy and Testing	40
6.4 Security and Payment Processing	40
Chapter 7.....	41
Project as Engineering Problem Analysis.....	41
7.1 Sustainability of the Project/Work.....	41
7.2 Social and Environmental Effects and Analysis	41
7.3 Addressing Ethics and Ethical Issues.....	42
Chapter 8.....	43
Lesson Learned	43
8.1 Problems Faced During this Period	43
8.2 Solution of those Problems	44
Chapter 9.....	46
Future Work & Conclusion.....	46
9.1 Future Works	46
9.2 Conclusion	46
Bibliography	48

List of Figures

Figure 3.1: Work Breakdown Structure of Clippers	7
Figure 3.2: Gantt Chart for Clippers	8
Figure 5.1: Rich Picture of Clippers	12
Figure 5.2: Use Case Diagram of Clippers	20
Figure 5.3: Sequence Diagram of Sign-Up	21
Figure 5.4: Sequence Diagram of Login	22
Figure 5.5: Sequence Diagram of Search Salon.....	23
Figure 5.6: Sequence Diagram of Book Appointment.....	24
Figure 5.7: Sequence Diagram of Payment	25
Figure 5.8: Sequence Diagram of Give Review.....	26
Figure 5.9: Architecture of Clippers	27
Figure 5.10: Welcome Screen.....	28
Figure 5.12: Login	28
Figure 5.11: Sign Up.....	28
Figure 5.13: Home	28
Figure 5.14: Map Screen.....	29
Figure 5.16: Salon Information.....	29
Figure 5.15: Search Salon	29
Figure 5.17: Salon Detail Information	29
Figure 5.18: Booking	30
Figure 5.20: Checkout.....	30
Figure 5.19: Appointments	30
Figure 5.21: Card Payment	30
Figure 5.22: Give Review	31
Figure 5.24: Profile Settings	31
Figure 5.23: Payment History	31
Figure 5.25: Update Profile.....	31
Figure 5.26: Update Password	32
Figure 5.27: Reset Password.....	32

List of Tables

Table 3.1: Time Distribution for Clippers	8
Table 3.2: Resource Allocation for Clippers	9
Table 3.3: Estimated Costing for Clippers	9
Table 5.1: User Sign Up.....	13
Table 5.2: User Login	13
Table 5.3: Search salon	13
Table 5.4: Book appointment.....	14
Table 5.5: Check wait time and queue size.....	14
Table 5.6: Give review	14
Table 5.7: Six Element Analysis of Clippers	17
Table 5.8: Inputs for test cases of Clippers	33
Table 5.9: Outputs for test cases of Clippers	35
Table 5.10: Test Cases of Clippers	36
Table 5.11: Test Cases results of Clippers	38

Chapter 1

Introduction

1.1 Overview/Background of the Work

Numerous parts of our everyday lives have changed as a result of the technological landscape's quick evolution. However, when it comes to ease and efficiency, several old procedures have fallen behind. One such area is the hairdressing and barber industry in Bangladesh, where long waiting times for haircuts have been a persistent issue. Clippers is a mobile application developed to tackle this problem head-on.

The goal of **Clippers** is to offer a complete solution for a swift and hassle-free haircut experience. It achieves this by providing users with real-time information on nearby barber shops, including wait times and queue sizes. By integrating the Google Maps API, users can conveniently locate barber shops in their vicinity. Additionally, Clippers empowers users by offering ratings and reviews of these establishments, enabling them to make informed decisions about where to get their haircuts. This chapter aims to look deeply into the background of the project, the objectives it aims to achieve, and the scope within which it operates.

1.2 Objectives

The primary objectives of the Clippers project are as follows:

Enhanced Customer Experience: This objective highlights the central aim of Clippers, which is to improve the customer experience. By reducing wait times and providing real-time information on queue sizes and wait times, the app makes the haircut experience more efficient and enjoyable for users.

Empowering Users: This objective emphasizes that Clippers empower users with information. By offering ratings and reviews of barbershops, the app helps users make informed decisions about where to get their haircuts, ensuring they have a positive experience.

Supporting Local Barbershops: Clippers doesn't just benefit users; it also supports local barbershops. It provides a platform for these businesses to update their services and wait times, fostering healthy competition and ultimately improving pricing and service quality.

Streamlined User Registration: Implement a user registration system to enhance user experiences and personalization. Users can create accounts to access personalized features and preferences within the app. Users can save their preferences and easily access their favorite barber shops, improving their overall experience.

1.2 Scopes

The scopes of the project are as follows:

User-Friendly Interface Design: The project places a strong emphasis on creating a user-friendly and intuitive interface. This design ensures that users, regardless of their technological proficiency, can effortlessly navigate and utilize the app, enhancing their overall experience.

Cross-Platform Accessibility: Clippers is meticulously designed to operate seamlessly on both Android and iOS devices. This cross-platform compatibility expands the app's accessibility, allowing a diverse range of users to benefit from its features, irrespective of their choice of mobile device.

Robust Security Measures: Security is of paramount importance, particularly when handling user data and financial transactions. The project incorporates comprehensive security measures to safeguard user information, guarantee the safety of online payments, and establish trust within the app.

Real-Time Data Integration: To provide users with accurate and up-to-date information, Clippers relies on real-time data. This scope ensures that users consistently have access to current information about wait times and queue sizes at barbershops, enabling them to make informed decisions and plan their visits effectively.

Enhanced Flexibility for Business Owners: Clippers doesn't only cater to users; it also offers valuable flexibility to barbershop owners. They can easily update their services and wait times within the app, allowing them to adapt swiftly to changing circumstances, manage their online presence effectively, and cater to customer needs efficiently.

User Registration and Personalized Profiles: Clippers will enable user registration, allowing users to create personalized profiles that enhance their overall experience and interaction with the app.

Locate Nearby Barber Shops: The app will feature a user-friendly function to locate nearby barber shops based on the user's location, simplifying the search for haircut services.

Ratings and Reviews Functionality: The app will incorporate functionality for ratings and reviews, enabling users to provide feedback and make informed choices about where to get their haircuts.

Appointment Booking and Secure Payments: Clippers will facilitate appointment booking and ensure secure online payments for haircut services, offering users a convenient and cashless experience.

Service Information Display: Detailed information about the services offered by barber shops, including service types and prices, will be available within the app, aiding users in making informed decisions.

Google Maps Integration: Clippers will integrate with Google Maps for location services, enabling users to find nearby barber shops on a map, adding to the app's user-friendliness.

Scalability Considerations: Clippers will be designed with scalability in mind to accommodate potential growth, particularly within specific regions, as the app gains popularity and more barber shops join the platform.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

Data Structure Course: Concepts from the Data Structure course have been essential in optimizing data storage and retrieval methods within the Clippers app, ensuring efficient handling of user information and real-time data.

Object-Oriented Programming (OOP) Course: Understanding of OOP principles has been crucial in the development of the Clippers app using React Native, which facilitates code organization, modularity, and reusability using components.

Mobile App Development Course: Skills and concepts from the mobile app development course have been applied to design and develop the Clippers app for Android and iOS platforms, focusing on user interface design, cross-platform development, and mobile user experience.

Database Management Course: While the Database Management course provided a strong foundation in relational database management systems (RDBMS), Clippers opted for a NoSQL database approach. However, the course's teachings on database design, SQL, and data security were invaluable in understanding data organization and ensuring secure data storage. This knowledge facilitated the implementation of user registration, personalized profiles, and data management within the Clippers app.

Web Application Course: Insights from the web application course were directly utilized to integrate Google Maps API for location services and real-time data updates within the Clippers app. Also helped in creating APIs for server calls to the database.

System Analysis and Design Course: Principles from the system analysis and design course guided the Clippers project's approach to planning, designing, and structuring the app, ensuring efficient and user-friendly functionality. As well as helped me with flow diagrams, UMLs, Functional and Nonfunctional requirements and activity diagrams.

Software Engineering and System Analysis: Concepts from the software engineering course played a significant role in the Clippers project by providing a structured approach to software

development, emphasizing software design, SDLCs, WBS, quality assurance, Gantt chart and project management practices.

2.2 Related works

The Clippers project aims to provide a virtual queuing and booking system for barbershops, enhancing the customer experience, and reducing wait times. To accomplish this, the project must assess and evaluate the strengths and drawbacks of existing projects or applications. This literature review will examine two such projects: QJunkie and QueueAdmin.

QJunkie is a cross-platform virtual queuing website and mobile app for barbershops, helping customers save time. According to [1], QJunkie allows customers to check the live feed of all barber queues, join the queue remotely, receive notifications when their turn is near, and rate their experience. It also offers features for barbershop owners and employees, such as managing staff schedules, services, promotions, reports, and notifications. The paper compares QJunkie with other similar systems and discusses its advantages and disadvantages. Some of the advantages are it is easy to use, it reduces customer frustration and anxiety, it increases customer loyalty and retention, and it provides valuable feedback for barbershops. Some of the disadvantages are it requires internet connection, it may not reflect the actual queue status due to no-shows or cancellations, it may not accommodate walk-in customers or special requests, and it may face privacy and security issues.

QueueAdmin is a database driven, online application to manage the different waiting lists of a barbershop. [2] Introduces QueueAdmin as a solution to improve the efficiency and effectiveness of barbershop administration. The paper describes the features and benefits of QueueAdmin, such as real-time queue updates, customer notifications, barber feedback, queue statistics, and queue optimization. The paper also evaluates the effects of QueueAdmin on barbershop administration and customer satisfaction. Some of the benefits are it eliminates manual queue management, it reduces human errors and conflicts, it enhances barber performance and motivation, it provides useful insights and analytics for barbershops, and it optimizes the queue allocation and service time.

In conclusion, the literature review has shown that there are two projects that are similar to Clippers in terms of providing a virtual queuing system for barbershops. Each project has its own features and benefits, as well as some limitations and challenges. The Clippers project can

learn from these projects and improve its own design and functionality to provide a better solution for both customers and barbershops.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

The Clippers project's WBS was developed to divide the project into smaller, more manageable parts, making it simpler to plan, carry out, and keep track of. It helps with responsibility distribution and gives a clear overview of the project's scope. The WBS is set up in a hierarchical manner, starting with the primary project goal and breaking it down into more compact, detailed tasks and subtasks. I took a top-down approach for Clippers' WBS.

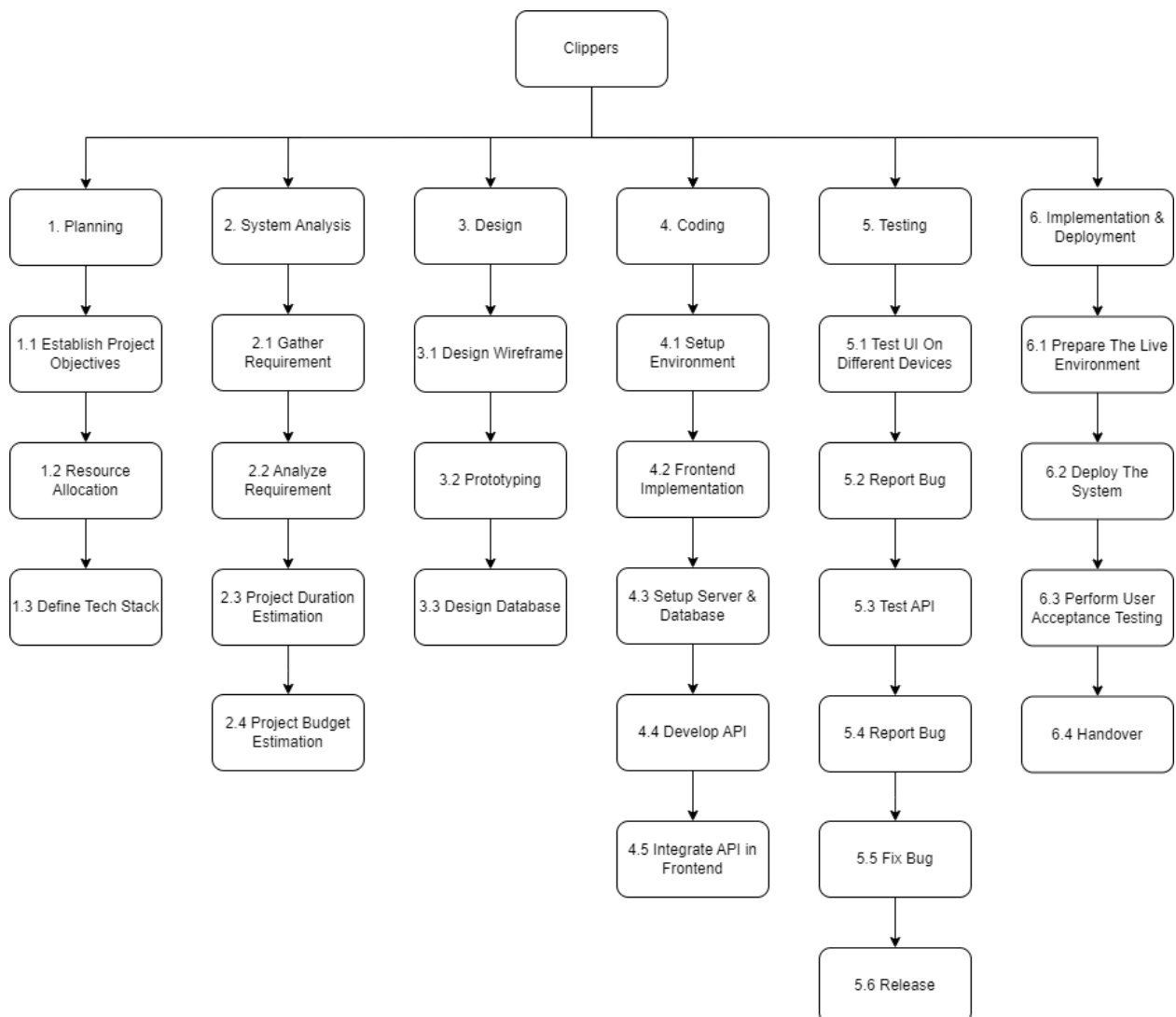


Figure 3.1: Work Breakdown Structure of Clippers

3.2 Process/Activity wise Time Distribution

Time was allotted for each of the subtasks listed in the Work Breakdown Structure so that the project could be finished by the deadline. The time allotments and work percentages for the project's subtasks are shown in the table below.

	Percentage	Days
Planning	10%	10
System Analysis	20%	20
Design	15%	15
Coding	30%	30
Testing	15%	15
Implementation and Deployment	10%	10
Total	100%	100

Table 3.1: Time Distribution for Clippers

3.3 Gantt Chart

A Gantt Chart is a visual representation of the project schedule or the WBS. It shows tasks, and the tasks' start and end dates, and dependencies between tasks. In the Clippers project, a Gantt Chart was used to display the timeline of activities, including milestones and deadlines.

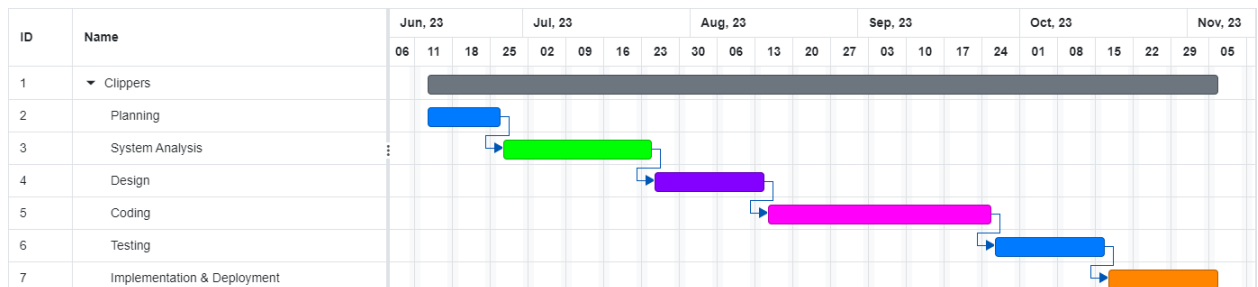


Figure 3.2: Gantt Chart for Clippers

3.4 Process/Activity wise Resource Allocation

I was solely in charge of all project phases for the Clippers project, including planning, system analysis, design, coding, testing, implementation, and deployment. I managed the project effectively as a lone developer by taking on a variety of roles and allocating resources efficiently. My own time and knowledge were used as resources for all project-related tasks, from initial planning and analysis to coding and deployment. As mentioned in the "Tools Used"

section, I used a variety of tools and technologies while working independently to speed up development and guarantee a successful project outcome.

	Assigned To	Tools Used
Planning	Topu Rayhan Rabby Mamud	Google Docs
System Analysis	Topu Rayhan Rabby Mamud	Google Docs, Draw.io, Google Sheets
Design	Topu Rayhan Rabby Mamud	Figma, Lucid Chart
Coding	Topu Rayhan Rabby Mamud	VS Code, Vercel, GitHub, Google Cloud Platform, Firebase
Testing	Topu Rayhan Rabby Mamud	Postman, Android & iOS Device
Implementation and Deployment	Topu Rayhan Rabby Mamud	Expo, Vercel

Table 3.2: Resource Allocation for Clippers

3.5 Estimated Costing

In the context of Clippers, the estimated costing primarily represents the hypothetical expenses associated with different project sectors if it were executed by a team of professional or involved hiring personnel for specific roles. However, it's essential to note that I completed this project independently, taking on multiple roles and responsibilities, which significantly reduced the actual cost.

	Estimated Cost (BDT) / month
Tech Lead & System Analyst	160000
Frontend Developers	60000
Backend Developers	80000
Quality Assurance Testers	70000
Tools and Services	50000
Total	420000

Table 3.3: Estimated Costing for Clippers

Chapter 4

Methodology

Due to the solo nature of the project, a focused and unique approach was taken when creating the Clippers mobile application. While many software development methodologies are created for team-based projects, the independent development of Clippers required flexibility and independence.

Individual Development: As a solo developer for the project, the methodology was centered on personal development initiatives. This included every aspect of the project, including planning and design as well as coding, testing, and deployment. The solo development strategy gave the project's owner total ownership and control over every aspect.

User-Centric Design: The project's methodology was based on the user-centric design philosophy. To make sure that the app's interface and features matched the requirements and expectations of potential users, independent user research, feedback, and usability testing were carried out. This strategy gave the user experience top priority and directed design choices.

Agile Solo Development: An adapted Agile methodology was used, despite the fact that Agile methodologies are typically associated with team collaboration. The project was divided into manageable features and tasks, which were dealt with iteratively. The app's functionality and usability were improved on a regular basis through evaluations and modifications.

Continuous Learning and Adaptation: Solo development made it possible to continuously learn and adapt. Solutions were independently researched and put into practice as new difficulties appeared, like integrating third-party APIs or dealing with technical problems.

Version Control and Documentation: Comprehensive version control and documentation practices were essential. The project's source code was managed, and changes were meticulously tracked using Git and GitHub. Clarity and maintainability were guaranteed by thorough documentation, which also included code comments.

Chapter 5

Body of the Project

5.1 Work Description

Throughout my internship with "Helping Ants," my main areas of work were WordPress and Elementor, and I actively participated in numerous projects using these platforms. In parallel, I started working on a project independently, creating the Clippers mobile app, which required a wide range of technologies and abilities.

I spent a lot of time working on WordPress projects while I was employed by "Helping Ants," specializing in feature implementation and content migration. This included transferring existing content from a client's older website into our unique layouts, which frequently required the incorporation of unique features made to meet the needs of particular clients. In addition, I was fortunate enough to work on developing brand-new layouts to facilitate websites catered to specific categories of clients to improve the company's services. Furthermore, I have also worked on the responsiveness of clients' websites following design specifications.

In parallel, I started the development process for Clippers, a mobile application that aims to transform the way people get haircuts in Bangladesh. This solo project demanded a thorough understanding of React Native mobile app development, as well as the use of crucial tools like Expo. I studied and put into practice technologies like MongoDB, NodeJS, and ExpressJS to support the backend of the app. With the help of these abilities, I was able to lay the groundwork for Clippers, ensuring that it could easily offer real-time details on nearby barbershops, ratings, and reviews, as well as simplify appointment scheduling and safe online transactions.

My work on Clippers was marked by a commitment to learning and mastering the requisite technologies. In addition to the mentioned technologies, I integrated Stripe for secure online payments, implemented REST APIs for seamless integration with MongoDB database, utilized JWT for secured API calls, leveraged Firebase for authentication, and seamlessly integrated Google Maps to enhance user-friendliness. These additions further enriched the Clippers application, making it a comprehensive and user-centric platform for haircut experiences.

5.2 Requirement Analysis

Rich Picture

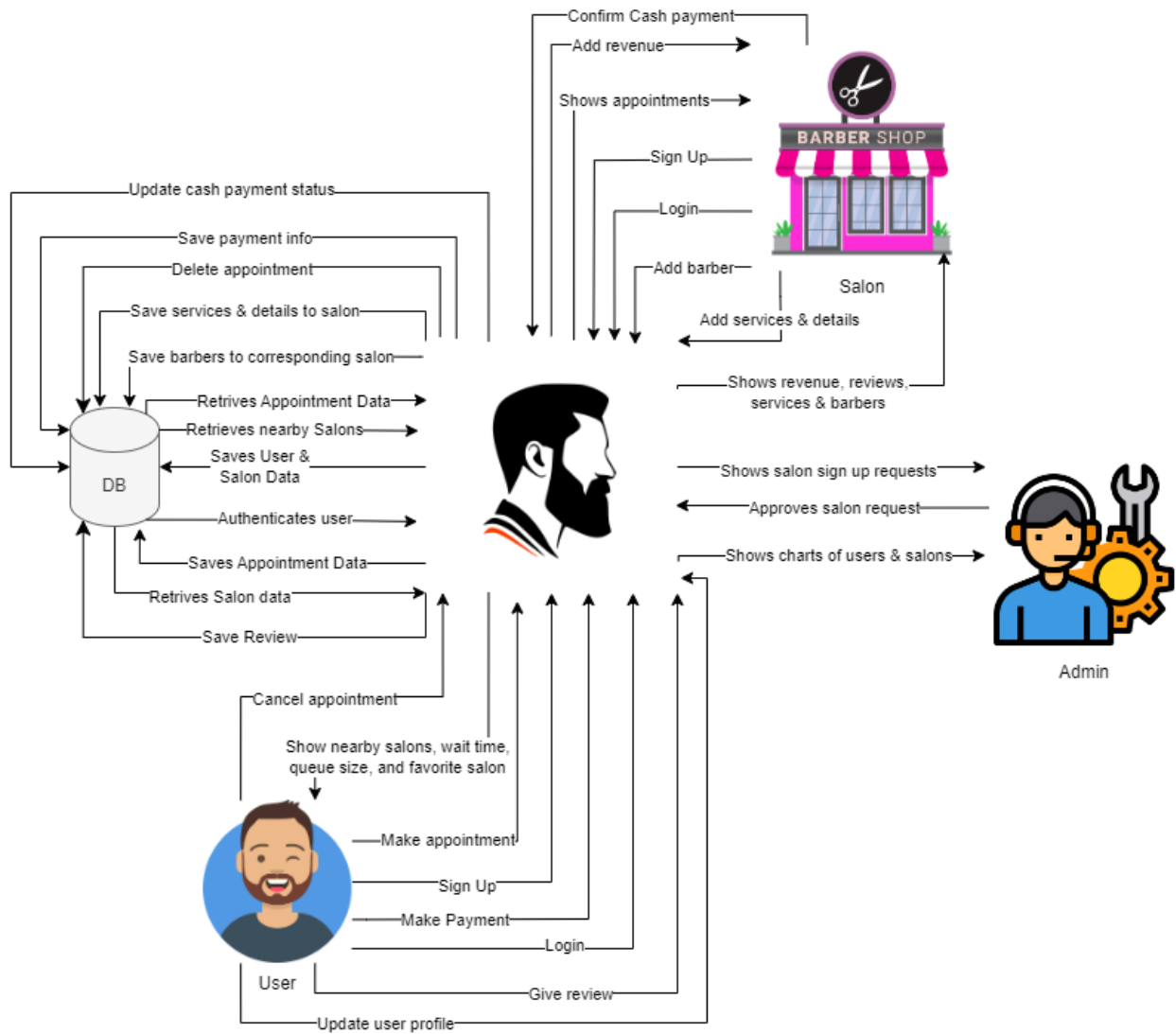


Figure 5.1: Rich Picture of Clippers

Functional and Nonfunctional requirements

Functional requirements

Function: Sign Up		
Input: Full name, email address, phone number, profile picture, email, and password.	Process: User's information gets saved in the database and a verification link is sent to the user's email address.	Output: User is created successfully.
Precondition: User doesn't have any account associated with the email entered.		
Postcondition: User has successfully registered for the app.		

Table 5.1: User Sign Up

Function: Login		
Input: Email address and password.	Process: User is authenticated with the credentials.	Output: User is logged in successfully.
Precondition: User have to have an account in the app.		
Postcondition: User is logged in to the app successfully.		

Table 5.2: User Login

Function: Search salon		
Input: Salon name.	Process: User input salon name is checked in database for match.	Output: Shows salons with similar names.
Precondition: User must be logged in.		
Postcondition: User will be able to view the search result.		

Table 5.3: Search salon

Function: Book appointment		
Input: Selects desired barber and services and clicks confirm.	Process: Services total is calculated, and appointment info is added to the database.	Output: Appointment has been successfully made.
Precondition: User must be logged in.		
Postcondition: User has successfully booked appointment.		

Table 5.4: Book appointment

Function: Check wait time and queue size		
Input: Clicks the map screen and click on one of the map markers.	Process: Fetch data of the corresponding salon which was clicked.	Output: Shows all information of the salon including wait time and queue.
Precondition: User must be logged in and turned on the GPS.		
Postcondition: User can view the wait time and queue and other information in a modal.		

Table 5.5: Check wait time and queue size

Function: Give review		
Input: Select rating for the shop, barber and writes a comment.	Process: Review add to the salon and the ratings are calculated & updated.	Output: Review added successfully.
Precondition: User must be logged in and should have a pending review.		
Postcondition: User will see a success message that the review is added.		

Table 5.6: Give review

Nonfunctional Requirements

Performance: Performance can be achieved by implementing efficient algorithms and providing faster load time. The system should be able to tackle thousands of responses at once. Implementing the system with faster database technologies will contribute to system performance.

Security: All users' data will be stored in a database which can't be accessed by normal users except administrators and developers. All passwords are encrypted and stored using the SHA-256 algorithm so users can rest assured about the security of the app. Two-factor authentication can be implemented to further improve security. Stripe is used for secured payment along with JWT for more secured API calls and authentication.

Reliability: The app will be tested with dummy data to ensure correct operation and later it will be launched to a smaller group for testing. So, the users will have a secure and reliable app at launch.

Usability: Providing a user-friendly interface will contribute towards better customer satisfaction and engagement. Keeping a relatively simple interface without overloading the UI with submenus will ensure greater usability.

Maintainability: The system should have proper documentation for both the system and the source code. Having proper documentation will result in easier maintainability.

Portability: The app can be used from anywhere irrespective of the location and device. The app will support both Android and iOS devices which are even low configured. So, these features will broaden the portability aspect of the application.

5.3 System Analysis

5.3.1 Six Element Analysis

Process	Human	Computing Hardware	Software	Database	Comm. & Net.
User Sign Up	User/Salon	Mobile device	Clippers	MongoDB	WAN
User Login	User/Salon	Mobile device	Clippers	MongoDB	WAN
Search Salon	User	Mobile device	Clippers	MongoDB	WAN
Book Appointment	User	Mobile device	Clippers	MongoDB	WAN
Cancel Appointment	User	Mobile device	Clippers	MongoDB	WAN
Make Payment	User	Mobile device	Clippers	MongoDB	WAN
Give Review	User	Mobile device	Clippers	MongoDB	WAN
View Nearby Salons	User	Mobile device	Clippers	MongoDB	WAN
View Appointments	User/Salon	Mobile device	Clippers	MongoDB	WAN
View Payment History	User/Salon	Mobile device	Clippers	MongoDB	WAN
Update Profile	User/Salon	Mobile device	Clippers	MongoDB	WAN
Update Password	User/Salon	Mobile device	Clippers	MongoDB	WAN
Reset Password	User/Salon	Mobile device	Clippers	MongoDB	WAN

Add Barber	Salon	Mobile device	Clippers	MongoDB	WAN
Add Services	Salon	Mobile device	Clippers	MongoDB	WAN
Confirm Cash Payment	Salon	Mobile device	Clippers	MongoDB	WAN
View Revenue	Salon	Mobile device	Clippers	MongoDB	WAN
Approve Salon	Admin	Mobile device	Clippers	MongoDB	WAN
View Charts	Admin	Mobile device	Clippers	MongoDB	WAN

Table 5.7: Six Element Analysis of Clippers

5.3.2 Feasibility Analysis

Technical Feasibility: From my perspective as the solo developer, the technical feasibility of the Clippers project was initially a concern. The project required proficiency in various technologies, including mobile app development, React Native, Expo, MongoDB, NodeJS, ExpressJS, Firebase, Google Maps integration, Stripe for secure payments, REST APIs, JWT authentication, and more. However, as I progressed through the project, I gained proficiency in these technologies, which ultimately assured me of its technical feasibility. This hands-on experience allowed me to overcome technical challenges and implement the necessary features effectively.

Operational Feasibility: The project's alignment with its goals was used to assess operational feasibility. Clippers aimed to streamline the haircut process, which addressed a real problem in Bangladesh. The project's user-friendly layout, cross-platform compatibility, and incorporation of necessary elements like real-time wait time, queues and secure payments all contributed to its operational viability.

Economic Feasibility: The project's potential return on investment (ROI) was taken into account when evaluating the project's economic viability. Costs were kept to a minimum because the project was developed independently by me. However, the likelihood that the app

will be used to generate income by neighborhood barbershops and its user-friendliness suggested a favorable economic feasibility. Introducing more features like AI integration for offers, recommendation and user preferences utilization will create opportunities for developers. Moreover, healthy competition will create opportunities for unknown salons to make an economic impact.

5.3.3 Problem Solution Analysis

The problem solution analysis examines how Clippers addresses the challenges related to getting haircuts in Bangladesh:

Locating Nearby Barber Shops: Clippers offers a solution by allowing users to easily locate nearby barber shops using their mobile devices. The integration of Google Maps simplifies the process and ensures that users can find a salon in their vicinity without relying on recommendations or struggling in unfamiliar areas.

Uncertainty About Shop Quality: Clippers offers ratings and reviews of barbershops to address this issue. Users can make informed decisions based on the experiences of others, helping them choose a better salon and avoid potential disappointments.

Unknown Wait Times: Clippers addresses the issue of unknown wait times by providing real-time information about queue sizes and wait times of salons. Users can check the app to determine the optimal time to book an appointment, reducing unnecessary waiting and saving valuable time.

The problem solution analysis confirms that Clippers effectively addresses common haircut-related challenges faced by individuals in Bangladesh.

5.3.4 Effect and Constraints Analysis

The effect and constraints analysis assesses the impact and limitations of the Clippers project:

Effect Analysis:

- **Positive User Experience:** Clippers enhances the user experience by simplifying the process of finding nearby barber shops, checking wait times, and making appointments.
- **Empowering Users:** Users are empowered with information through ratings, reviews, and detailed service information, enabling them to make informed choices.

- **Supporting Local Barbershops:** The platform supports local barbershops by increasing their visibility, enabling them to update services and wait times, and fostering competition.
- **Cross-Platform Accessibility:** Clippers' cross-platform compatibility ensures that a wide range of users can access and benefit from the app.

Constraints Analysis:

- **Resource Constraints:** Being a solo developer, there were limitations in terms of time and resources. Balancing the development of Clippers with other responsibilities posed a challenge.
- **Technical Learning Curve:** While the project provided an excellent opportunity to learn and apply new technologies, the need to acquire proficiency in technologies like React Native, Expo, MongoDB, NodeJS, ExpressJS, Firebase, and others added to the complexity of the project.
- **Device Responsiveness:** Ensuring that the app was responsive and user-friendly across a wide range of mobile devices and screen sizes presented a constraint. Achieving consistent performance and user experience on both Android and iOS platforms required careful consideration.
- **Limited Testing Resources:** As a solo developer, conducting comprehensive testing and quality assurance was constrained by the availability of test devices and diverse testing scenarios.

5.4 System Design

5.4.1 UML Diagrams

Several UML (Unified Modeling Language) diagrams were used in the system design phase of the Clippers project to visually represent various aspects of the application's architecture and functionalities. These illustrations were helpful for conceptualizing and explaining the system's design.



Figure 5.2: Use Case Diagram of Clippers

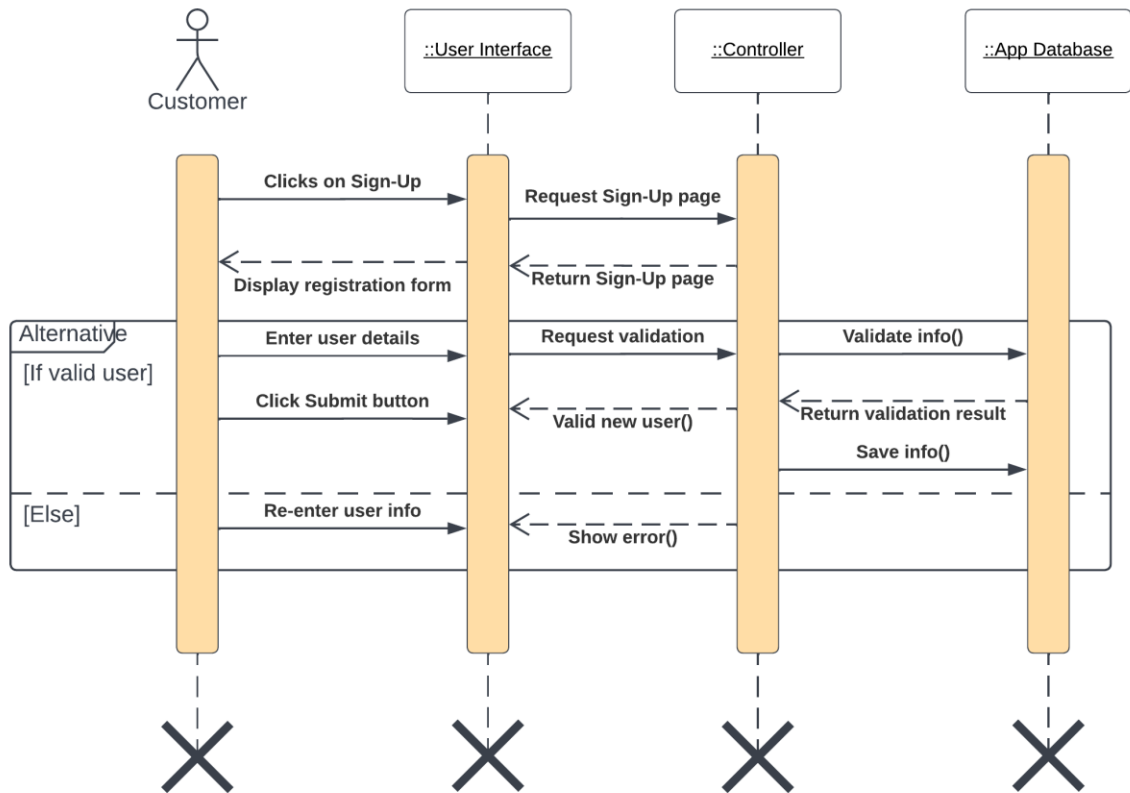


Figure 5.3: Sequence Diagram of Sign-Up

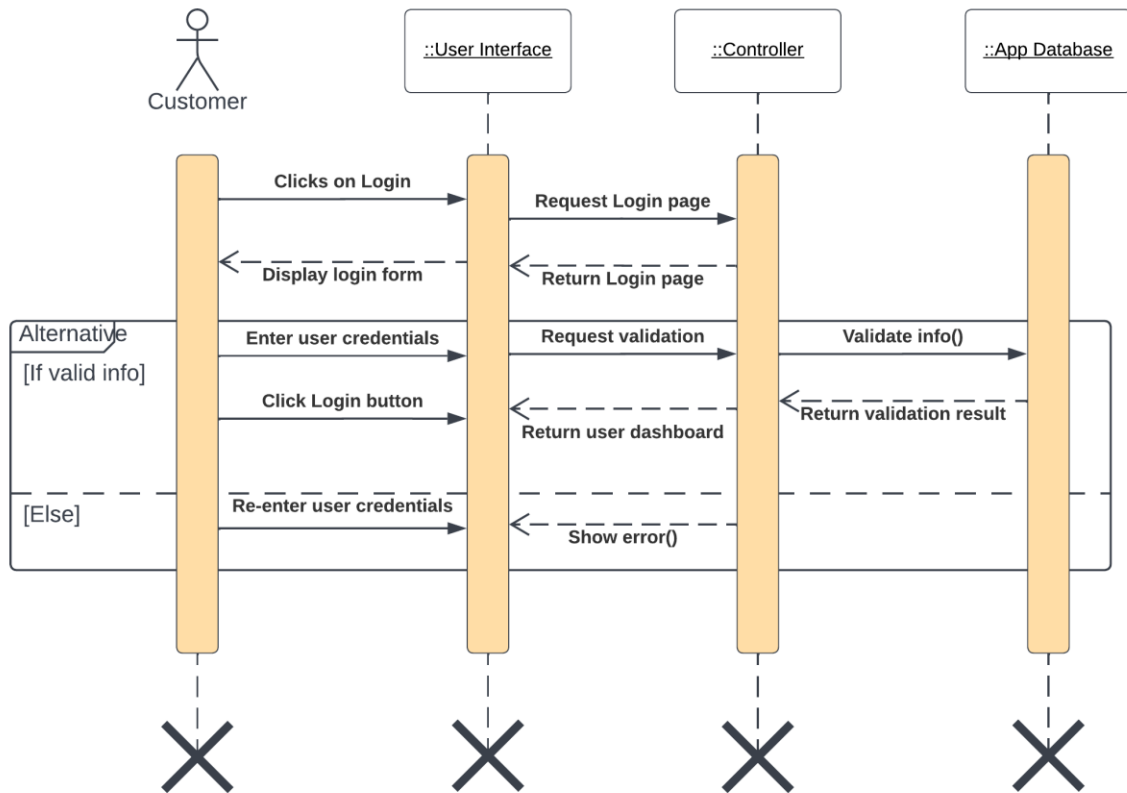


Figure 5.4: Sequence Diagram of Login

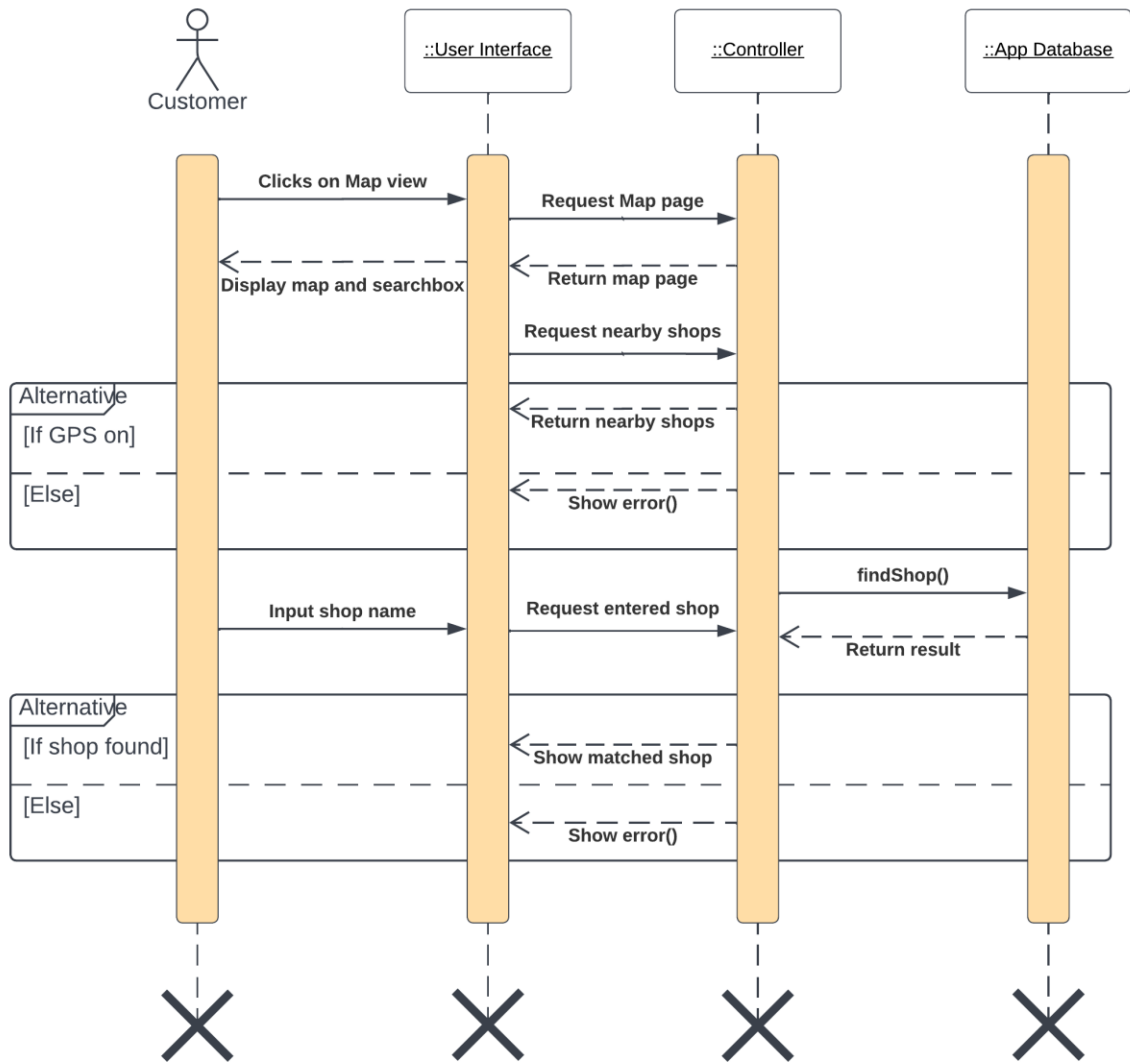


Figure 5.5: Sequence Diagram of Search Salon

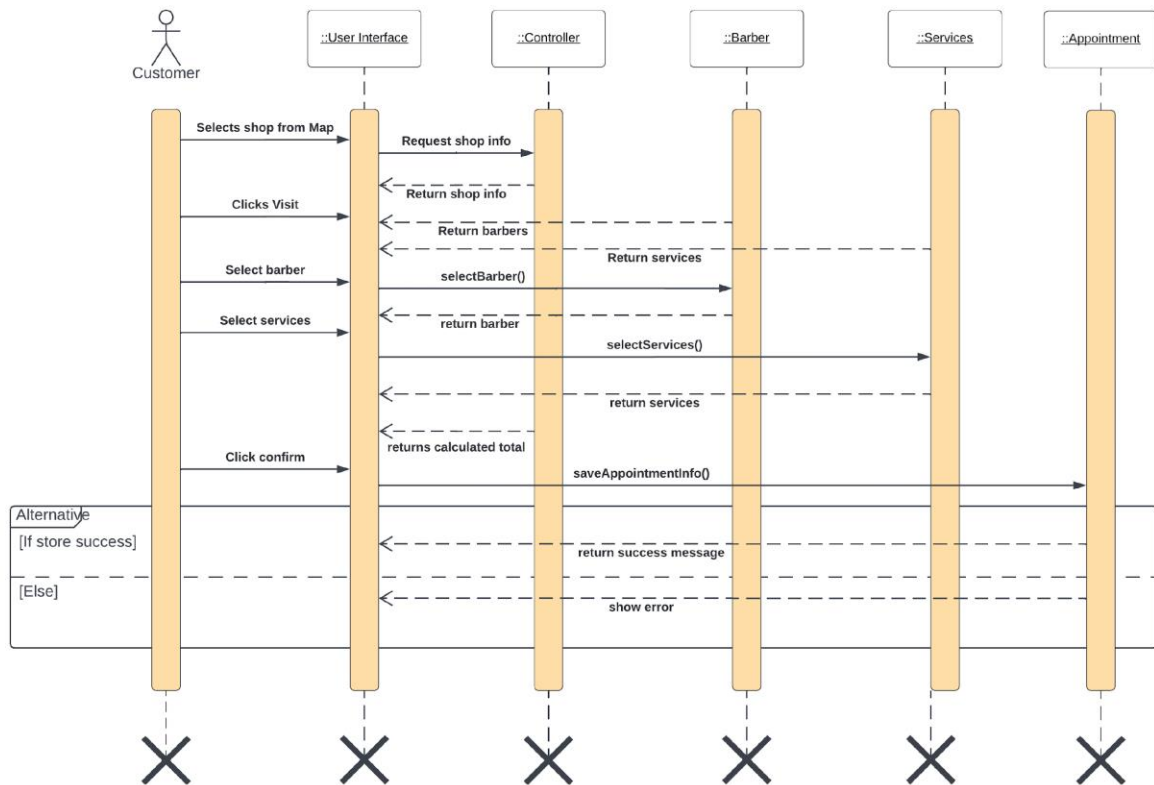


Figure 5.6: Sequence Diagram of Book Appointment

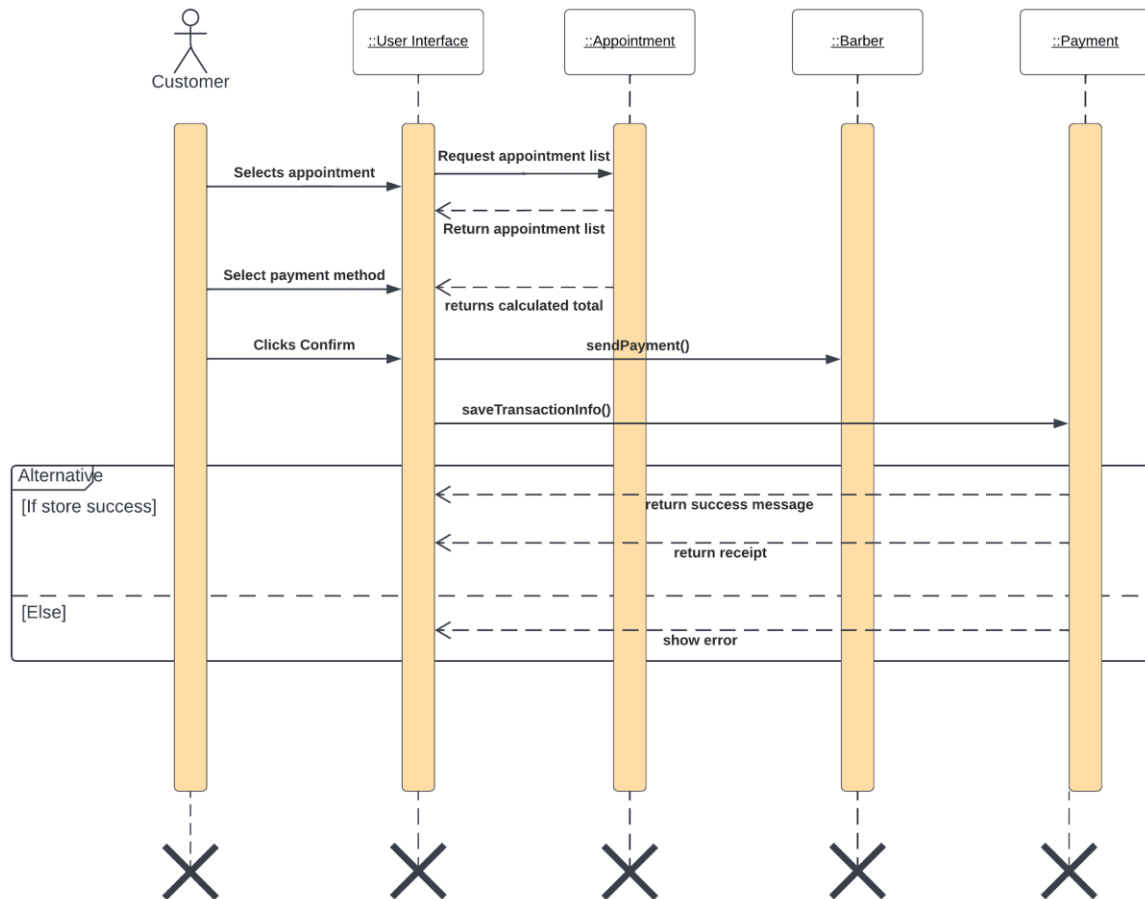


Figure 5.7: Sequence Diagram of Payment

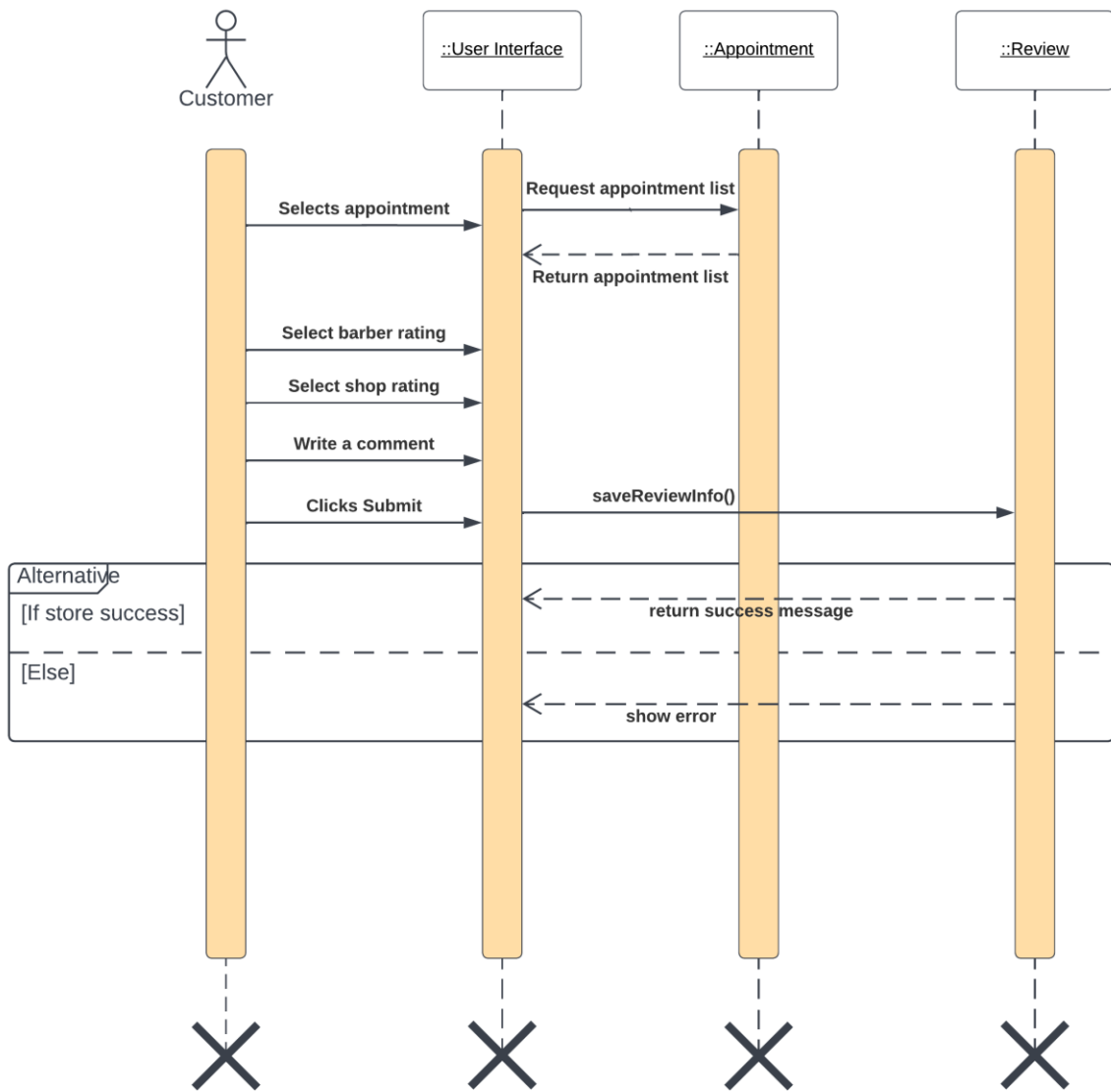


Figure 5.8: Sequence Diagram of Give Review

5.4.2 Architecture

The Clippers app follows the client-server architecture for its system. Client-server architecture separates the application into two primary components: the client side (front-end) and the server side (back-end).

Client (Frontend): Clippers' client-side, or frontend, is built using the React Native framework. React Native allows for the development of a single codebase that can operate seamlessly on both Android and iOS platforms. This choice minimizes code redundancy and simplifies maintenance, ensuring a consistent user experience across different devices. Moreover, it eliminates the need for writing two separate codes for each native device.

Server (Backend): The server-side, or backend, of the application is implemented using Node.js and Express.js for handling server logic. The server is deployed using Vercel, ensuring reliable hosting and scalability. On the other hand, MongoDB is used for better scalability and flexibility. This server-side architecture is responsible for managing user authentication, real-time data synchronization, and other essential functionalities.

The client-server architecture ensures efficient communication between the mobile application and the server, allowing users to access salon information, check wait times, make appointments, and receive real-time updates. This separation of concerns enhances the overall performance, scalability, and maintainability of the Clippers application for my case as a solo developer.

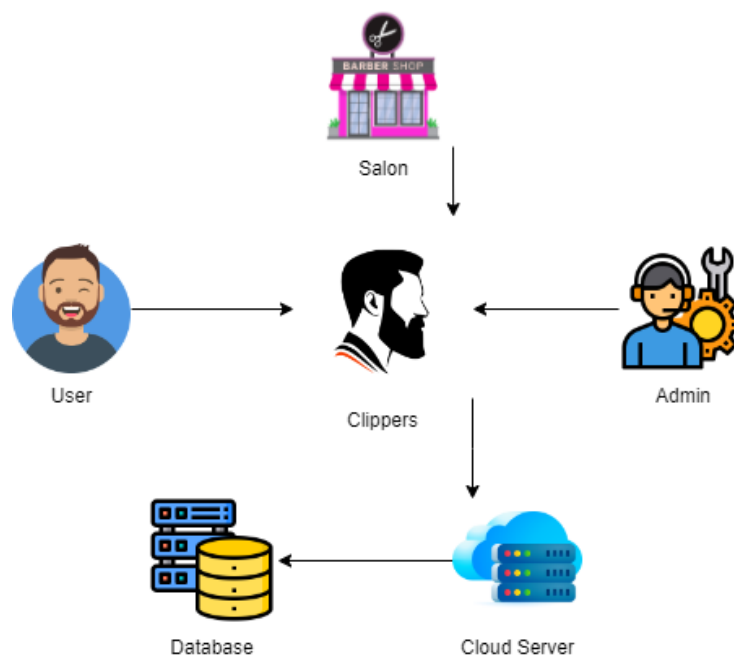


Figure 5.9: Architecture of Clippers

5.5 Implementation



Figure 5.10: Welcome Screen

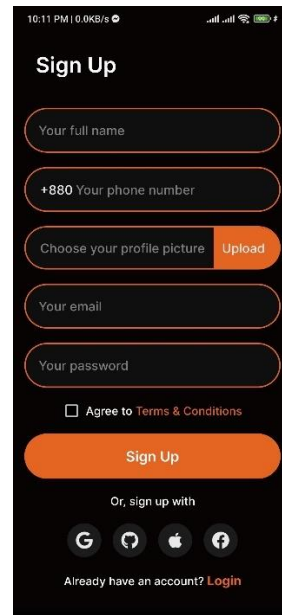


Figure 5.11: Sign Up

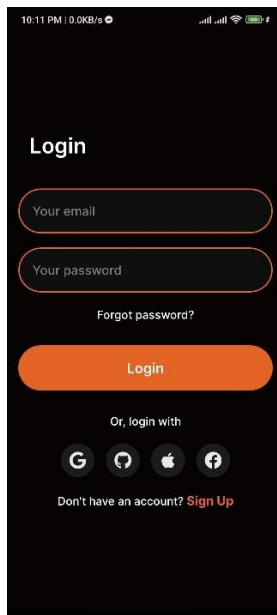


Figure 5.12: Login

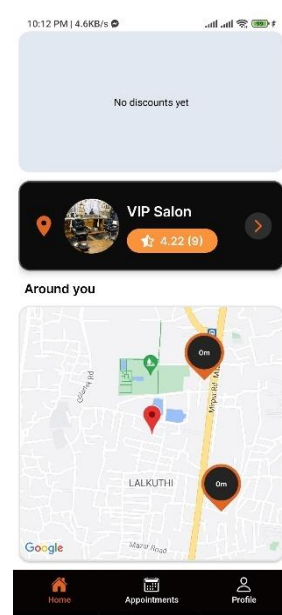


Figure 5.13: Home

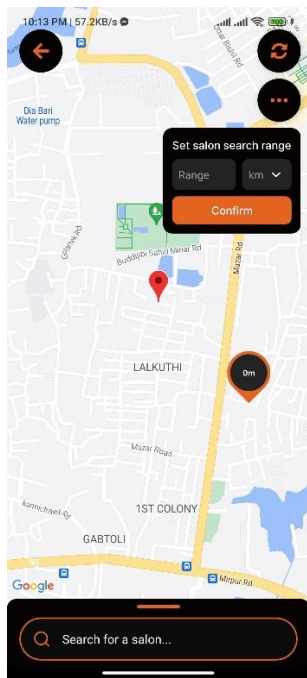


Figure 5.14: Map Screen

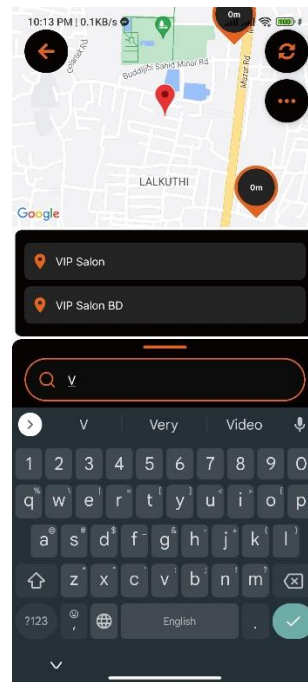


Figure 5.15: Search Salon

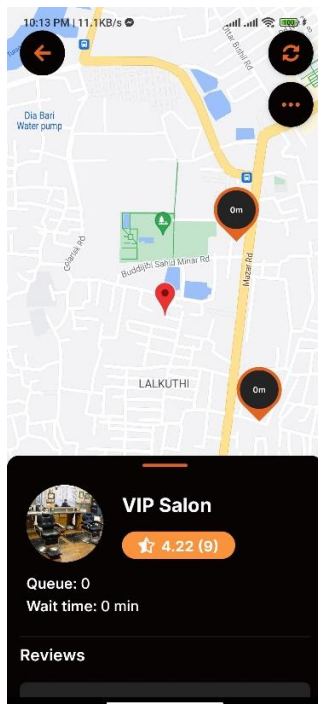


Figure 5.16: Salon Information

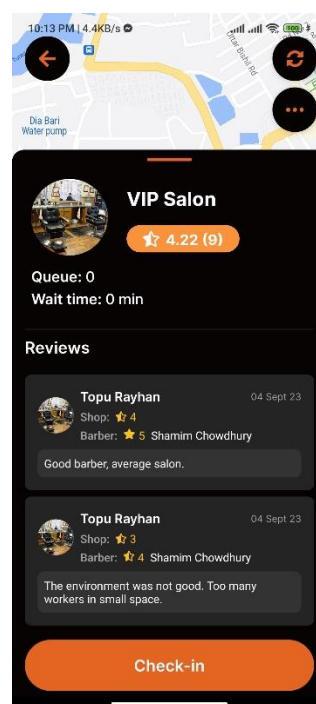


Figure 5.17: Salon Detail Information

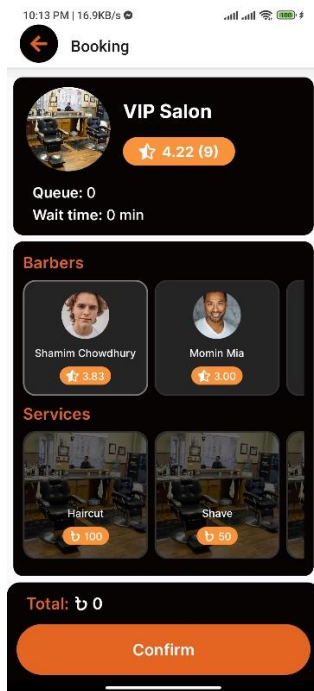


Figure 5.18: Booking

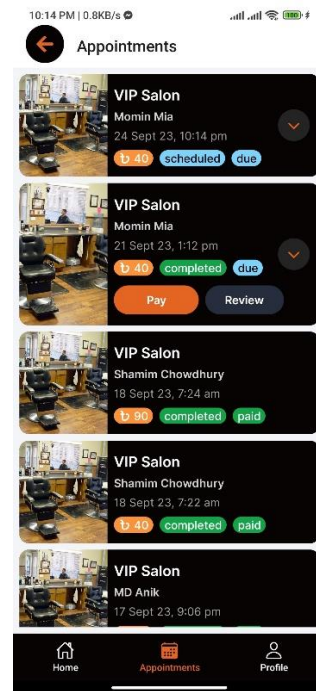


Figure 5.19: Appointments

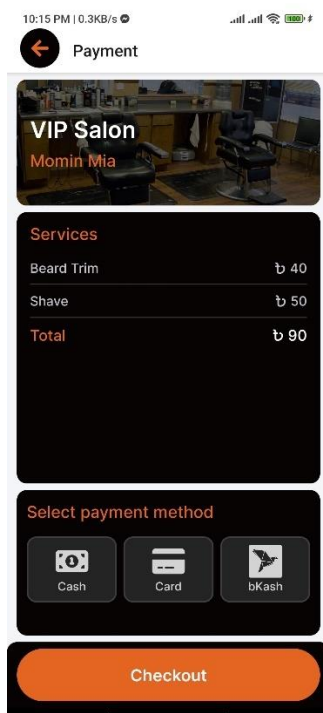


Figure 5.20: Checkout



Figure 5.21: Card Payment

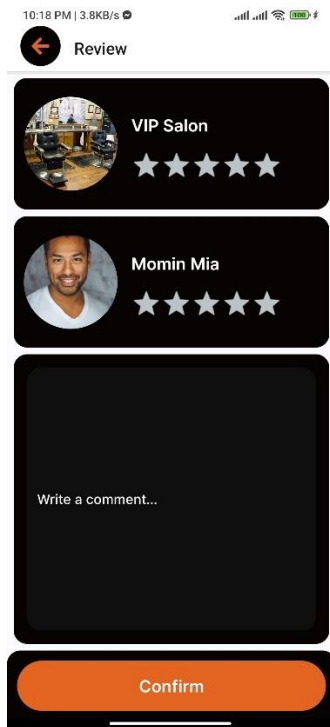


Figure 5.22: Give Review

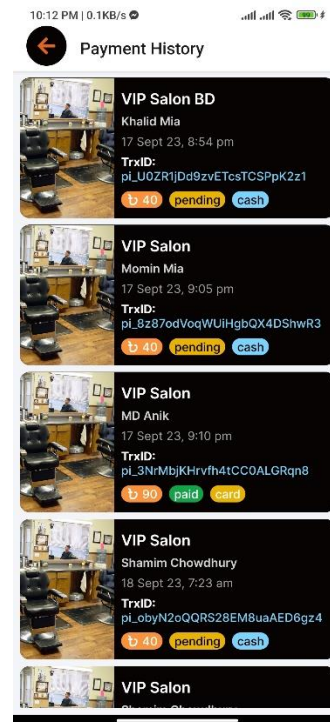


Figure 5.23: Payment History

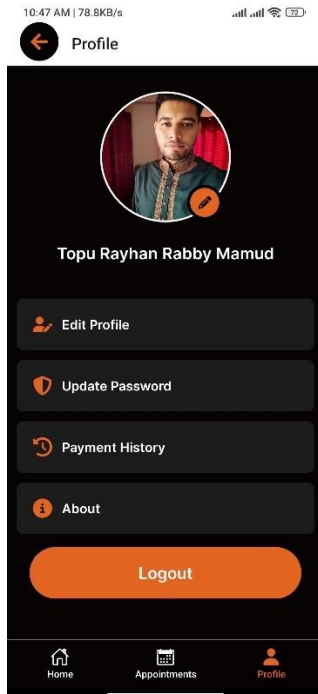


Figure 5.24: Profile Settings

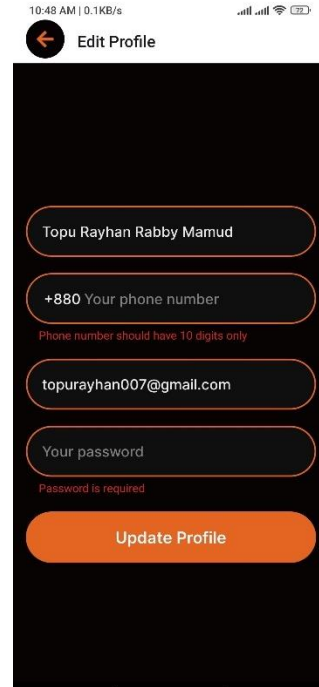


Figure 5.25: Update Profile

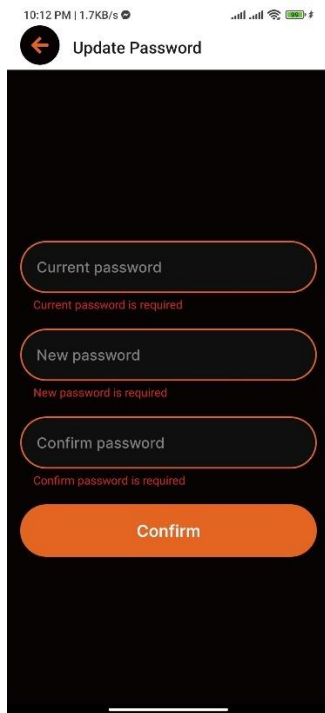


Figure 5.26: Update Password

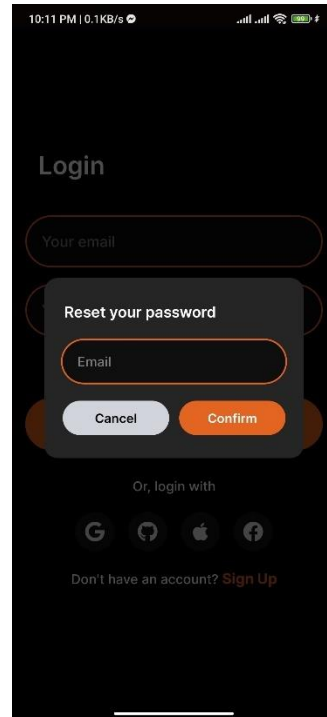


Figure 5.27: Reset Password

5.6 Testing

5.6.1 Input

Process	Field
User Sign Up	Full name, email, phone number, profile picture, password
User Login	Email, password
Search Salon	Salon name
Book Appointment	Services, Barber
Cancel Appointment	AppointmentID
Make Payment	Card number, expiry date, CVV, Post code
Give Review	Ratings, comment
View Nearby Salons	Location coordinate, search range
View Appointments	UserID
View Payment History	UserID
Update Profile	Full name, email, phone number, profile picture, password
Update Password	Old password, new password, confirm password
Reset Password	Email
Add Barber	Full name, profile picture
Add Services	Service name, service photo, price, estimate service time
Confirm Cash Payment	AppointmentID
View Revenue	SalonID
Approve Salon	SalonID
View Charts	SalonID

Table 5.8: Inputs for test cases of Clippers

5.6.2 Output

Process	Result
User Sign Up	Success: Redirects to Login screen. Failure: Show corresponding error.
User Login	Success: Redirects to Home screen. Failure: Show corresponding error.
Search Salon	Success: Show matched results. Failure: Display message for no match.
Book Appointment	Success: Shows confirmation message. Failure: Show corresponding error.
Cancel Appointment	Success: Show success message. Failure: Show error message.
Make Payment	Success: Shows confirmation message. Failure: Show corresponding error.
Give Review	Success: Shows success message. Failure: Show corresponding error.
View Nearby Salons	Success: Shows nearby salon markers on map. Failure: Show corresponding error.
View Appointments	Success: Shows list of appointments. Failure: Show corresponding error.
View Payment History	Success: Shows list of payments made. Failure: Show corresponding error.
Update Profile	Success: Redirects to Profile Settings. Failure: Show corresponding error.
Update Password	Success: Redirects to Profile Settings. Failure: Show corresponding error.
Reset Password	Success: Shows success message. Failure: Show corresponding error.
Add Barber	Success: Shows success message. Failure: Show corresponding error.
Add Services	Success: Shows success message. Failure: Show corresponding error.

Confirm Cash Payment	Success: Shows success message. Failure: Show corresponding error.
View Revenue	Success: Shows current date's total revenue. Failure: Show corresponding error.
Approve Salon	Success: Shows success message. Failure: Show corresponding error.
View Charts	Success: Shows multiple statistics charts. Failure: Show corresponding error.

Table 5.9: Outputs for test cases of Clippers

5.6.3 Designing Test Cases

Test ID	Test Case Title	Pre-condition/ Test data	Test Steps	Expected Results
T1	Sign Up with valid information	Full name, email, phone number, profile picture, password.	1. Go to Sign Up screen. 2. Input all necessary information. 3. Tap Sign Up button.	User will see a success message and redirected to login screen.
T2	Login with correct credentials	Email, password	1. Go to Login screen. 2. Input all necessary information. 3. Tap Login button.	User will be redirected to home screen.

T3	Search salon with non-existent salon name	Salon name	<ol style="list-style-type: none"> 1. Go to Map screen. 2. Input a non-existent salon name. 3. Tap Search button. 	User will see a message “No salons found!”.
T4	Book Appointment by selecting one or many services	Must select at least one service.	<ol style="list-style-type: none"> 1. Go to the Booking screen. 2. Select any barber and one or many services. 3. Tap Confirm button. 	User will be redirected to a confirmation screen with success message and the wait time.
T5	Card Payment with valid card details	Card number, expiry date, CVV, post code	<ol style="list-style-type: none"> 1. Go to Payment screen and select card and press confirm. 2. Input all necessary information of a valid card. 3. Tap Confirm button. 	User will be redirected to a confirmation screen with success message and transaction ID.

Table 5.10: Test Cases of Clippers

5.6.4 Test Results

Test ID	Test Case Title	Pre-condition/ Test data	Test Steps	Expected Results	Actual Results	Test Case Status
T1	Sign Up with valid information	Full name, email, phone number, profile picture, password.	1. Go to Sign Up screen. 2. Input all necessary information. 3. Tap Sign Up button.	User will see a success message and redirected to login screen.	Success message shown and redirected to login screen.	Pass
T2	Login with correct credentials	Email, password	1. Go to Login screen. 2. Input all necessary information. 3. Tap Login button.	User will be redirected to home screen.	Redirected to home screen.	Pass
T3	Search salon with non-existent salon name	Salon name	1. Go to Map screen. 2. Input a non-existent salon name. 3. Tap Search button.	User will see a message “No salons found!”.	“No salons found” message received.	Pass
T4	Book Appointment by selecting one or many services	Must select at least one service.	1. Go to the Booking screen. 2. Select any barber and one or many services.	User will be redirected to a confirmation screen with success message and	Redirected to confirmation screen with success message and the wait time.	Pass

			3. Tap Confirm button.	the wait time.		
T5	Card Payment with valid card details	Card number, expiry date, CVV, post code	1. Go to Payment screen and select card and press confirm. 2. Input all necessary information of a valid card. 3. Tap Confirm button.	User will be redirected to a confirmation screen with success message and transaction ID.	Redirected to confirmation screen along with success message shown and transaction ID.	Pass

Table 5.11: Test Cases results of Clippers

Chapter 6

Results & Analysis

In this chapter, I will present the results and analysis of Clippers from my perspective as the solo developer. It's important to note that since the app has not yet been deployed in production, the results are based on testing with dummy data and represent the state of the project up to this point.

6.1 Development Progress

My main attention has been on the development stage as the project's sole developer. The findings and analysis below speak to the development's advancement.

The project has reached several critical development milestones, including the implementation of core features such as user registration, salon listings, appointment scheduling, and payment processing. The app's features have undergone extensive development and testing using dummy data. User authentication, salon registration, and payment integration have been individually validated for functionality. I carried out extensive testing during development to find and fix bugs and problems. The debugging procedure has improved the codebase and increased the stability of the app.

6.2 User Interface and Experience

User interface and user experience play a vital role in the success of any mobile application. The following results and analysis focus on UI/UX aspects.

I have designed the user interface to be intuitive and user-friendly, ensuring that users can easily navigate through the app's various screens. While user testing has been limited to a few people, feedback from this testing phase has been valuable in identifying areas for UI/UX improvement, resulting in iterative design enhancements.

6.3 Data Accuracy and Testing

Since the app relies on real-time data synchronization between users and salons, testing the accuracy of data retrieval and display has been crucial. Dummy data testing has revealed that the app can successfully fetch and display salon information, including wait times, queue sizes, and service details. Data accuracy has been maintained throughout the testing process.

6.4 Security and Payment Processing

Payment processing is a fundamental aspect of Clippers, and security measures have been a top priority. Payment processing with dummy data has been thoroughly tested to verify that users can make secure and successful transactions within the app. While Stripe makes it easier for a secured payment method to facilitate better customer privacy while dealing with sensitive data like card information. The security measures implemented during payment processing have undergone testing, and no data breaches or payment fraud have been detected.

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

The sustainability of the Clippers project is a fundamental consideration that encompasses both its technical and social aspects:

Technical Sustainability: From a technical perspective, the sustainability of the project revolves around its long-term viability and adaptability. Since the project is based on cutting-edge technologies, its sustainability depends on regular updates and maintenance to ensure compatibility with evolving mobile platforms, databases, and security standards. Additionally, continuous monitoring and troubleshooting are essential to address unforeseen technical challenges that may arise after deployment.

Social Sustainability: The societal sustainability of Clippers is closely tied to its ability to meet the needs of users and salon owners over time. To ensure long-term societal sustainability, the app must maintain its user-friendly interface, real-time data accuracy, and security measures. This involves addressing user feedback and adapting to changing user preferences and requirements.

7.2 Social and Environmental Effects and Analysis

Social Effects: Clippers has the potential to bring about several positive social effects. It addresses common challenges faced by individuals seeking haircuts by providing a convenient and efficient solution. By reducing wait times and improving access to salon information, the app contributes to time-saving, which is particularly valuable in a busy society like Bangladesh. Moreover, Clippers fosters healthy competition among salons, potentially leading to better service quality and pricing.

Environmental Effects: While Clippers is primarily a digital solution, its use of location services through Google Maps API may have environmental implications. Increased reliance on navigation apps can contribute to higher energy consumption on mobile devices, which, in

turn, may have a slight environmental impact which very minial. To mitigate this effect, the app can promote responsible use of location services, such as encouraging users to turn off GPS when not needed.

7.3 Addressing Ethics and Ethical Issues

Ethical Aspects: As Clippers is a digital platform, it raises ethical considerations related to user data privacy, fairness, and transparency. It's crucial to uphold ethical principles by ensuring that user data is collected, stored, and processed securely, with user consent and transparency. The app should also be fair and unbiased in its treatment of salon listings and user reviews, preventing any form of discrimination or favoritism.

Solving Ethical Issues: To address ethical issues, Clippers can implement the following measures:

- **Data Privacy:** Strictly adhere to data privacy regulations and obtain explicit user consent for data collection. Implement encryption and secure storage practices to protect user data.
- **Fairness and Transparency:** Establishing clear guidelines for salon listings and user reviews, ensuring unbiased and transparent representation. Implementing content moderation to prevent fraudulent or malicious activities.
- **Accessibility:** Ensure that the app remains accessible to users with disabilities, adhering to accessibility standards and guidelines.
- **User Education:** Educate users about responsible and environmentally conscious use of the app's features, such as location services.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

During the development of the Clippers mobile application, several challenges and problems were encountered. As a solo developer, I had to address these issues independently:

- **Technical Learning Curve:** The project required learning and implementing various technologies such as React Native, Firebase, MongoDB, Node.js, Express.js, and others. The initial learning curve for these technologies posed a challenge in terms of time and effort.
- **Design Complexity:** Crafting an intuitive and visually appealing user interface presented design challenges. Balancing aesthetics with functionality while adhering to platform-specific design guidelines was a learning process.
- **Debugging:** As I was working on the project alone, the project required me to work with a unique set of requirements which might not have been implemented previously. Therefore, to work with these requirements I had to go through a lot of errors. Furthermore, the errors were very hard to identify as React Native in my opinion doesn't have a beginner friendly troubleshooting measure or I might be unaware of.
- **Data Management:** Managing user data, salon information, appointments, and reviews in real-time with MongoDB required a deep understanding of NoSQL databases and data synchronization.
- **External Service Integration:** Integrating third-party services like Google Maps and Stripe for location-based services and payments required meticulous configuration and testing. This possessed the most challenging part for me as I was required to have a Google Cloud Platform account to avail the free trial of the Google Maps API key. Therefore, I needed an international card to create the account, which I didn't have. I tried to get help for someone who would help me with their card, but luck didn't persist.

One of my supervisors from my company gave a card for a week and in the meantime, I had to get a card of my own.

- **Personal Problems:** One of the biggest problems I faced was travelling between my office and my home, which required me to move up and down between Mirpur and Uttara. Moreover, to maintain punctuality between a 9 to 6 job and considering the travel time I had to wake up early. Being tired from work and travelling I had trouble finding time to work on the project. On the other hand, due to increased screen time of digital devices, caused eye strains. Furthermore, I had developed conjunctivitis, which required me to take rest causing more project work delays.

8.2 Solution of those Problems

To overcome these challenges, several strategies and solutions were employed:

- **Technical Learning Curve:** To conquer the technical learning curve, I dedicated significant time to self-study and online courses. I leveraged documentation and community resources to gain proficiency in the required technologies. Hands-on coding and experimentation played a pivotal role in mastering these tools.
- **Design Complexity:** I adopted an iterative design approach. Feedback from user testing and design revisions were essential in enhancing the app's usability and appearance. Additionally, I referred to design guidelines for Android and iOS to ensure a consistent and familiar user experience. I took inspiration from Dribbble for better UI/UX experience.
- **Debugging:** I had surf through the documentation as well as explore forums like Stack Overflow and Discord React Native servers to seek help regarding my specific problems. I also took the help of ChatGPT to address some issues which were in its capabilities.
- **Data Management:** Extensive testing and debugging were conducted to ensure data consistency and synchronization. I relied on MongoDB's real-time capabilities to handle data updates efficiently. Regular monitoring and error handling mechanisms were implemented to maintain data integrity.
- **External Service Integration:** Integrating external services involved meticulous configuration, testing, and documentation reading. I followed best practices and consulted official documentation to ensure smooth integration. Regular testing and

monitoring helped identify and resolve any integration issues. As for the API key I had to get my own card to avail it from Google Cloud Platform.

- **Personal Problems:** To solve my time constraints, I had to work more on weekends to meet deadlines. As for my medical condition, like anyone else would do visit a doctor and apply medicine until my eye gets better.

Chapter 9

Future Work & Conclusion

9.1 Future Works

The development of the Clippers mobile application has laid a strong foundation, and there are several scopes for future enhancements and expansions:

- **AI-Powered User Preferences:** Implementing AI algorithms to analyze user preferences and behavior can enhance the app's recommendation system. By suggesting salons, services, and promotions tailored to individual users, the app can provide a more personalized experience.
- **Dual Language Support:** Introducing dual-language support, including Bengali, will make the app more inclusive and user-friendly for a wider audience in Bangladesh. This feature will cater to users who are more comfortable with their native language.
- **Phone Number Sign-Up:** To accommodate users who may not have email addresses but do have phone numbers, integrating phone number-based sign-up and authentication can simplify the registration process and expand the user base.
- **Efficient Wait Time Algorithms:** Enhancing the wait time prediction algorithms can provide users with even more accurate estimates, reducing uncertainty and optimizing their salon visit experience.

9.2 Conclusion

In conclusion, the Clippers mobile application represents a significant step forward in addressing common challenges faced by individuals seeking haircuts in Bangladesh. By providing real-time salon information, user reviews, and queue data, Clippers streamlines the haircut process and empowers users to make informed decisions.

Throughout the development process, I, as the solo developer, gained valuable insights and experience in mobile app development, database management, and external service integration.

The project showcased the feasibility of creating a cross-platform mobile app that leverages technologies like React Native, Firebase, and MongoDB.

While the app has not yet entered production, extensive testing with dummy data confirmed its functionality and potential to transform the haircut experience in Bangladesh. The future holds promising opportunities for further improvements, including AI-driven personalization, dual language support, phone number sign-up, and enhanced wait time algorithms.

The Clippers project has been a valuable learning experience and demonstrates the potential for technology to address everyday challenges. With future enhancements and a commitment to user satisfaction, Clippers has the potential to become an indispensable tool for individuals seeking efficient and hassle-free haircuts in Bangladesh.

Bibliography

- [1] H. N. H. A. Maryani, "Prototype Development For Online Reservation System in Barbershop and Salon Industry," IEEE Xplore, [Online]. Available:
<https://ieeexplore.ieee.org/document/8843836>.
- [2] K. K. Gosha, "QUEUEADMIN: THE ADVANCE QUEUE MANAGEMENT SYSTEM FOR BARBERSHOP ADMINISTRATION," auburn.edu, [Online]. Available:
https://etd.auburn.edu/bitstream/handle/10415/74/GOSHA_KINNIS_25.pdf?sequence=1.



An Undergraduate Internship/Project on Clippers

By

Topu Rayhan Rabby Mamud

Student ID: 1930179

Summer, 2023

Consent from Supervisor

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during and/or before final viva, and the department can use this version for archiving as well as the OBE course material for CSE499.

This internship report is checked with Turnitin and plagiarism checker, and the score is:

Turnitin Score (%): 5%

Md. Fahad Monir

Lecturer

Department of Computer Science & Engineering

Independent University, Bangladesh