SALON MANAGEMENT SYSTEM

BY

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A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF INFORMATION SYSTEMS (HONOURS)

INFORMATION SYSTEMS ENGINEERING

Faculty of Information and Communication Technology

(Kampar Campus)

APRIL 2024

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FACULTY/INSTITUTE* OF INFORMATION AND COMMUNICATION TECHNOLOGY

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Signature : _________________________

Name : LIM JENG JACK__________

Date : 21th April 2024______________

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to my supervisor, Dr. Tan Joi San and my moderator , Dr. Chan Lee Kwun who has given me this bright opportunity to engage in a salon management system. It is my first step to explore in mobile application field. A million thanks to you.

ABSTRACT

In this modern globalization era, digitalization process is getting more and more common in our daily life. However, it is rare for a salon in Malaysia to implement salon management system in their business. A salon management system provides a lot of features to a salon to ease their daily operation. In addition, salon management system provides a platform for a salon to store and back up the databases of the whole salon. Hence, a salon should implement salon management to improve the efficiency of processes in salon and to manage the salon. To develop a salon management system, a few existing systems such as SalonAppy, MyCuts, DaySmart and Book & S applications have been reviewed in terms of module, functionalities, strengths and weaknesses. To solve most of the problems raised by the existing systems, project objectives have been discussed for the proposed system. Strengths from all the existing systems are adopted into the proposed system to further enhanced the system. Other than that, in the proposed salon management system, the modules provided are login module, appointment and scheduling module, review module, profile module, virtual queue management module, hairstylist and services module as well as virtual hairstyle try on module. Since there are three users which are customers and hairstylist and admin, mobile application is designed for customers and hairstylists while admin will be using web admin panel. The whole project utilized Rapid Application Development (RAD) methodology and used Flutter programming framework to develop a mobile and web salon management system. The main intention of developing the customer and hairstylist interface into mobile application because mobile device is used by almost everyone and is portable. Realtime database in Firebase is implemented for backend support in this project as appointment scheduling and queue management modules are cloud-based modules and need real-time database support. Furthermore, augmented reality (AR) is implemented in customers side where they can try out some of the virtual hairstyles. In the final stage of development, testing is to be performed to test the whole system after the integration of all the modules. After all modules have passed the testing, the salon management mobile application is ready to be commercialized and used by salon with customization.

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LIST OF ABBREVIATIONS

AR	Augmented Reality
OTP	One Time Password
CRUD	Create, Read, Update Delete
FIFO	First-In-First-Out
RAD	Rapid Application Development
SSD	Solid State Drive
RAM	Random Access Memory
ROM	Read Only Memory

Chapter 1 Introduction

1.1 Overview

In this chapter, introduction of the whole project is presented including problem statement, objective, project module, impact and contribution of the proposed system.

1.2 Introduction

A salon is a business shop that provides a variety of services for customers including professional hair cutting, treatment and hairstyling. A salon typically contains a reception desk, waiting area, hairdressing area, hair washing area and restrooms. Some salons also contain beauty areas as they provide waxing or hair removal and nail polishing for the customers. Selling products are usually displayed in waiting area to attract customers that are waiting for their turn. There are different positions in a salon which include administration and hairstylist. Most of the hairstylists in salon have been through professional training which is one of the reasons why salon charges higher service fees [1].

In general, a salon contains basic services that are provided by a barbershop such as haircuts, beard grooming and hair washing. Since haircut is the necessity of an individual, and normally, if someone is looking for a better haircut, hairstyling or services, he will choose to go for a salon instead of a barbershop. Stylists in salon always have a better sense and more experience compared to a barber [2]. Coffee or tea and magazines are provided for customers while they are doing lengthy hair procedures for example dying hair and hair perm. Besides, salon not only provides a variety of services, but also provides a better and cozy environment for their customers. However, the services and price offered are directly proportional as better services will result in higher prices.

One of the traditional appointments booking for customers to book a hairstylist at a salon is through phone calls or messages. This might cause trouble for both parties. Hence, a mobile application regarding salon management is proposed for the convenience of salon management, hairstylist and also customers. Customers can choose their preferable timeslot as well as their favorite hairstylist during appointment booking. Thus, with salon management application, it will reduce scheduling error and improve efficiency of the process [3]. In addition, a salon management application should also provide a virtual queueing system for the customers who walk in for services to queue in case there are many customers. Once it reaches their turn, the system will automatically notify the customers. Lastly, with a salon management system, it helps a salon manage all the appointment bookings and scheduling for hairstylists. This system integrates the user with the hairstylist in appointment booking system.

During the final stage of proposed system development, it should be able to provide a complete salon management mobile application system with two types of users, customers and salon employees. In the proposed system, modules that will be provided includes login module, appointment and scheduling module, review module, profile module, virtual queue management module and analysis module.

1.3 Problem Statement

Without a proper management system, it might be hard to keep track of everything of a salon. Many salons might have thought that a salon application is costly and lacks resources as to the application does not fit into the aspect of business [3]. Additionally, salons also think that some current applications that are used by some of the salons nowadays are facing a lot of challenges which causes most of the salons are not implementing it in their business needs. The challenges include traditional appointment booking, hairstylist rating system, communication barriers and physical queue management.

Traditional physical and online appointment booking

Nowadays, traditional procedure of booking a hairstylist from a salon is still manual and time-consuming. If a customer wishes to book a slot for any hair services, he or she has to contact the salon through calls or messages and there are possibilities where the hairstylist or front-desk admin takes a long time to get back to the customers. The salon might need to have extra employees to handle appointments from customers and resulting in the net profit of the salon being decreased. In addition, some salons are still implementing paper-based system where they still manage the appointments on paper while some salons use excel or open-source managing applications [4]. Even if some of the salons have implemented appointment booking system into their business, customers are unable to choose the hairstylist that they want. Moreover, some system does not provide cloud-based database where the customers can insert a lot of appointment booking deliberately without needing the hairstylist to accept the appointment.

Hairstylist rating system not available for customers

Usually, a customer is able to find out the review of a salon from Google as well as the ratings. However, it will not show the rating of each hairstylist and the reviews from past customers. On top of that, some reviews are not even real data which means they are not based on personal experience, credibility and social proof to post a review in Google [5]. Some salons that have already implemented a website or application system do not even provide hairstylist rating system as the rating might affect a hairstylist's reputation. But, in the customers aspect, they wish to know the rating as they want to find the most suitable hairstylist especially when they are changing their hairstyle.

Physical queue management

Overcrowded scenario in salon industry usually happens before festive seasons such as Hari Raya or Chinese New Year. Even if the pandemic situation has recovered over time, however, social distancing is still encouraged in indoor area to prevent the spread of Covid-19 virus. To prevent overcrowded situation from happening in salons, queue management is important to monitor the number of customers in line and the estimated time. But most of the salons implement old way of queue management which is the queue number ticket or writing down on paper. Therefore, customers will need to be there physically to monitor their turn.

1.4 Project Objective

With a salon management system, a salon can easily manage the salon in terms of features and functionalities. Proposed salon management system has enhanced a few weaknesses and adopted the strengths from the reviewed existing systems.

To identify the strengths and weaknesses of appointment scheduling modules from the existing systems to further enhance their features.

A cloud-based appointment system will be developed in order to provide a system for customers to book their hair salon appointment. They are able to choose the hairstylist based on their preference and also the hairstylist's ratings and expertise. The available slot for hairstylists will also be displayed to customers in order for them to choose their suitable appointment time. Additionally, it will require the selected hairstylist to accept the appointment booked by customers and notifications will send to the customers. Additionally, customers may cancel their booking in case they cannot attend the appointment. Cancellation of appointment booking is not available in any salon management system yet due to the system only providing account for salon employees.

To develop a review system for customers to rate the services of the hairstylist and salon in a salon management system.

Once a customer has done his/her appointment in the salon, he/she is able to provide feedback to the salon as well as the hairstylist. Ratings can be viewed by all customers and are not editable by hairstylists to make sure that the ratings are honest reviews. Hence, during appointment booking, the customers are able to view the average rating of each hairstylist.

To develop a virtual queueing management system for walk-ins customers to monitor the estimated waiting time.

By implementing a virtual queue system, customers can monitor the queue via mobile application. They do not need to be physically in the salon to wait for their turn. Notifications will be sent to them once it has reached their turn. Additionally, they are able to check on estimated waiting time which saves up their time. However, if the customer does not show up within 5 minutes, the hairstyle and admin have the rights to the customer's queue number and move on to the next customer.

1.5 Project Scope

The project scope outlines the key modules of the proposed project. In the proposed project, the system comprises a comprehensive module such as login module, appointment and scheduling module, review module, calendar module, notification module, managing banner, hairstylist and services module, virtual queue management module as well as virtual hairstyle try-on module. The key users of this proposed project include customers, hairstylist as well as administrators.

i. Login/ Sign Up module

On mobile application, existing customers and hairstylists are required to log in to their own account with their registered email address and password. For new customers, they are required to create a new account before using the system. Moreover, forget password function is provided where a email will be sent to their registered email to change their password.

ii. Appointment and Scheduling module

Appointment scheduling module is available in all users' side. Customers are able to book an appointment based on the availability of their preferred hairstylist or in case they are new to the salon, they can view the ratings of each hairstylist before making decision. While on the hairstylist side, they are able to approve or reject all the booking based on his or her availability. Customers and hairstylists are allowed to cancel their bookings, provided that they do so at least 24 hours in advance. While on the admin side, overview of all bookings is shown in calendar form.

iii. Review module

After each appointment, customers should be able to rate the experience of the services as well as rate the hairstylist. After customers have submitted the rating form, it will be revealed and updated in hairstylist profile side. The rating is transparency towards public where hairstylist cannot make changes after customers have submitted the ratings. Hairstylists can view their ratings through the mobile app, accessible from their personal accounts. On the other hand, administrators, have the capability to view all ratings of all hairstylists across the platform.

iv. Calendar module

The calendar module is integrated into both mobile application and web admin panel. Users, whether hairstylists or customers can access their personalized calendars upon logging in, allowing them to manage their appointments. Furthermore, administrators have access to an overarching view within the calendar , enabling them to keep track all the bookings. Bookings are visually represented with indicators on the calendar. Upon selecting a specific day, detailed list tiles containing booking specifics are displayed.

v. Notification Module

The Notification Module incorporates push notifications supported by Firebase Cloud Messaging towards mobile application users. It will be dispatched during key events such as booking requests, as well as updates of booking event. Additionally, notifications will be triggered during customer queue management, alerting customers when it's their turn for appointment to enhance overall efficiency and transparency of the scheduling system.

vi. Managing Banner, Hairstylist and Services module

Admin can modify, upload or publish/unpublish banners displayed on the main page of mobile application. Banners often serve as promotional tools for special offers, seasonal promotions, or highlighting specific services. This feature allows admin to keep the content current and capturing the attention of potential customers. While for hairstylists details and services, admin can manage easily through admin panel for CRUD operation.

vii. Virtual Queue Management module

During certain peak seasons when the salon experiences high customer demand, virtual queueing system will be helpful and easier for salon operation. Customers may queue virtually in the application and when it is their turn, they will be notified. On the other side, it is easier for admin to manage the queue as well and they are able to update, remove, and add the queue on admin panel. While for hairstylists, they are able to view current assigned customers and completed customers list of the queue. The system is built based on First-In-First-Out (FIFO) data-structure method to ensure efficiency and fairness among customers. Estimated time is provided for queueing customers for them to monitor the queue effectively.

viii. Virtual Hairstyle Try-on module

Virtual Hairstyle Try-on module implements augmented reality (AR) technology for customers to try out some of the virtual hairstyles. The AR technology is applied through real-time visualization by using front camera to interact with the customers. Customers may select different type of virtual hairstyles provided as well as different colors for them to chooses on to further customize their desired hairstyles. Furthermore, they can take images with the virtual hairstyles implemented and save it into their own local storage.

1.6 User Roles

In the proposed salon management system, three distinct user roles play integral parts in ensuring smooth operations and enhancing the overall experience for customers and salon staff alike. **Customers**, the primary recipients of salon services, utilize the system to book appointments, access hairstylist ratings, provide feedback, and manage their appointments conveniently. **Hairstylists**, as service providers, leverage the system to manage their schedules, accept or reject appointments, monitor queues, and strive to improve service quality based on customer feedback. **Admins**, serving as overseers of the system, maintain the platform's functionality, oversee appointment scheduling, analyze feedback, and ensure the effective implementation of features like the virtual queue management system. Through collaboration among these user roles, the salon management system aims to streamline operations, optimize customer satisfaction, and elevate the salon experience for all stakeholders involved.

1.7 Project Impact, Contribution and Significance

By developing a new salon management system, it certainly improves the efficiency of all the processes in a salon as the queue management system has been applied and appointment scheduling functions are automated by using cloud-based approach. This management system will be beneficial for the users, customers and salon employees [6].

For salon hairstylist, it will be much easier for them after automation of processes. Hairstylists of the salon are able to accept and also reject appointments subjected to their schedule availability after logging in to their account. With an enhanced appointment management system, a salon’s appointment management can be recorded effectively. For customers, they are able to view all future appointment bookings as well as past history of appointments. Cancellation of appointments is available for customers to cancel their bookings so that they do not have to directly contact the salon through messages or calls. Once customers have done their appointment, they can rate the services provided and give feedback to salon management for further improvement. The average rating of the hairstylist will be displayed in each hairstylist's profile. Hence, in order for hairstylist to improve their ratings, they will have to provide better service to increase satisfactory of their customers. For the queue management system, the queue numbers are given towards the customers automatically which means that whenever all hairstylists are busy serving their customers, the walk-in customers can queue virtually in the mobile application. Hence, they can monitor the queue to know the estimated waiting time. Once it has reached his turn, a notification will be sent to notify the customer in case they are not waiting physically in the salon.

1.8 Summary

In the advancement of technology area, it has become imperative for every salon to embrace a salon management system as a pivotal tool for promoting their services and enhancing overall operational efficiency. By facilitating features such as a hairstylist rating system, virtual queue management, and modernized appointment booking processes, this innovative approach heralds an era of streamlined and customer-centric salon operations. The primary objectives of this proposed salon management system revolve around resolving the identified challenges and inefficiencies, offering a user-friendly interface that encompasses hairstylist rating integration, virtual queue management, and an advanced appointment scheduling module.

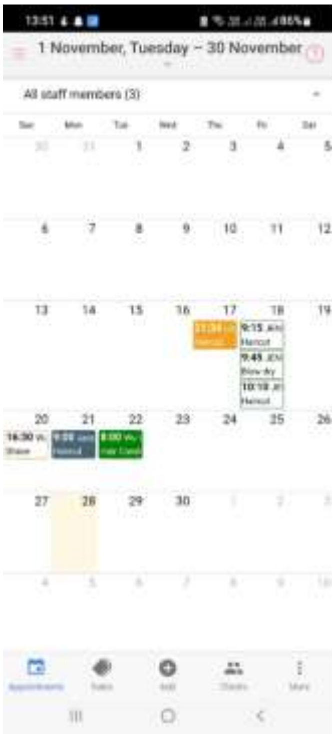
Chapter 2 Literature Review

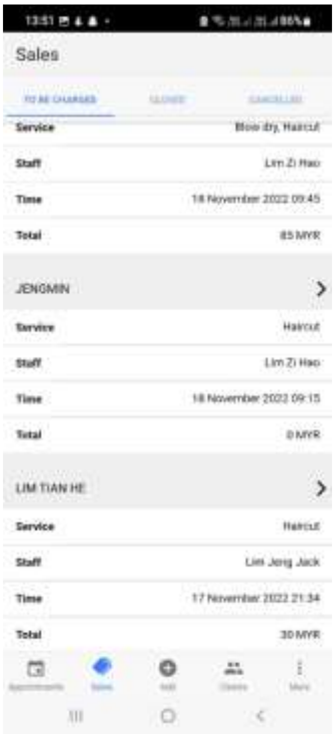
2.1 Overview

In this literature review chapter, existing mobile application as well as website with similar functionalities are analyzed and evaluated. The main intention of this chapter is to identify the strengths and weaknesses of each system and to further compare all of them for a summarization proposed system. Additionally, each module of the existing system will be criticized in terms of functionality and features. By gathering all the useful information from existing systems, it can strengthen the proposed system.

2.2 Existing System

2.2.1 SalonAppy Application [7]

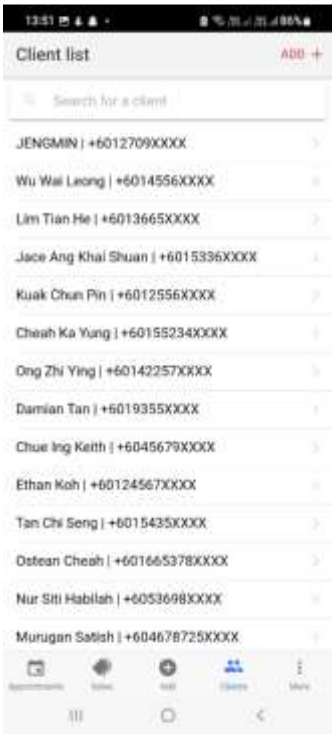




Service	Blow dry, Haircut
Staff	Lim Zi Hao
Time	18 November 2022 09:45
Total	85 MYR
JENGMIN	
Service	Haircut
Staff	Lim Zi Hao
Time	18 November 2022 09:15
Total	0 MYR
LIM TIAN HE	
Service	Haircut
Staff	Lim Jeng Jack
Time	17 November 2022 21:34
Total	30 MYR

Figure 2.2.1.1 Appointment module

Figure 2.2.1.2 Sales Module



JENGMIN | +6012709XXXX
Wu Wai Leong | +6014556XXXX
Lim Tian He | +6013665XXXX
Jace Ang Khai Shuan | +6015336XXXX
Kuak Chun Pin | +6012556XXXX
Cheah Ka Yung | +60155234XXXX
Ong Zhi Ying | +60142257XXXX
Damian Tan | +6019355XXXX
Chue Ing Keith | +6045679XXXX
Ethan Koh | +60124567XXXX
Tan Chi Seng | +6015435XXXX
Ostean Cheah | +601665378XXXX
Nur Siti Habilah | +6053698XXXX
Murugan Satish | +604678725XXXX

Figure 2.2.1.3 Client List

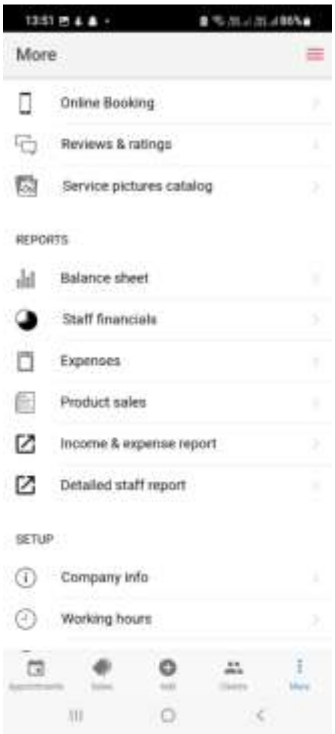


Figure 2.2.1.4 SalonAppy’s Module

SalonAppy is a mobile application from Kolay Randevu Internet Hizmetleri A. S. that is available in Android Playstore and Apple Appstore only and not available for Huawei mobile users. It has been downloaded more than 100 thousand times with a good review of 4.5 out of 5 ratings in Playstore and 4.8 out of 5 in Appstore. This means that most of the users are satisfied with the service and function provided by SalonAppy mobile application. SalonAppy application is a salon management system that supports multiple salon owners. This means that if the salon owner owns more than one salon, it can manage all their salons in the same application. This mobile application only provides one type of user which is employee of salon. Additionally, it provides a few feature for users which include online appointment / physical walk-in module, client & staff list module, sales & expenses module, and analysis report module. In overall, the interface design of SalonAppy is simple and unattractive.

For online appointment booking module of the SalonAppy mobile application, customers do not need to download the application to schedule an appointment. Instead, they can use the link provided by salon to book it in their web browser. They are able to choose the services that their want such as hair styling, haircuts, hair washing and others and they can view the total price of the bill. Once customers confirm the services, they will receive an OTP code to confirm the appointments. After validation, the booking is confirmed, and will notify the hairstylist and admin of the salon regarding the new appointment. Besides, customers can also walk in without any appointment to the salon. Salon staff can create a new walk-in in the application and record down which hairstylist is responsible for the customer so that all records can be tracked easily anytime. If an appointment is made but customers do not show up at the appointment time, “no-show” feature is provided.

In the client list module, salon employees are able to insert customer information into the list manually or through contact list inside the mobile device. It stores the data of customers like name, email, contact number gender and additional notes. While for the staff module, an admin of the system can insert a staff member into database so that the staff will be given a username and password through email. With the given username and password, the staff can log in to their account which will be the same functionalities and interface with the administrator. Moreover, the admin can choose the service provided by the staff and gender of customers.

The sales module in the application records the revenue earned by the salons through services provided or by selling products from the salon while for inventory module, it stores the list of inventory in the salon. Different services provided by salons will be charged differently and might be dissimilar for different gender. Some services and treatments will require certain inventory hence if the customer books his appointment online, the inventory required for the service will be deducted automatically. However, it requires salon staff to deduct the inventory manually if the customers do not have any appointment booking. Additionally, expenses such as ordering new stock can also be recorded in salon management system.

The analysis report module consists of different types of reports including balance sheets, staff financial reports, income and expenses reports, and detailed staff reports. With analysis reports, salon management is able to make management decisions on the salon. By the end of each month, the top management of salon can also generate monthly expenses and revenue to understand the salon's financial status.

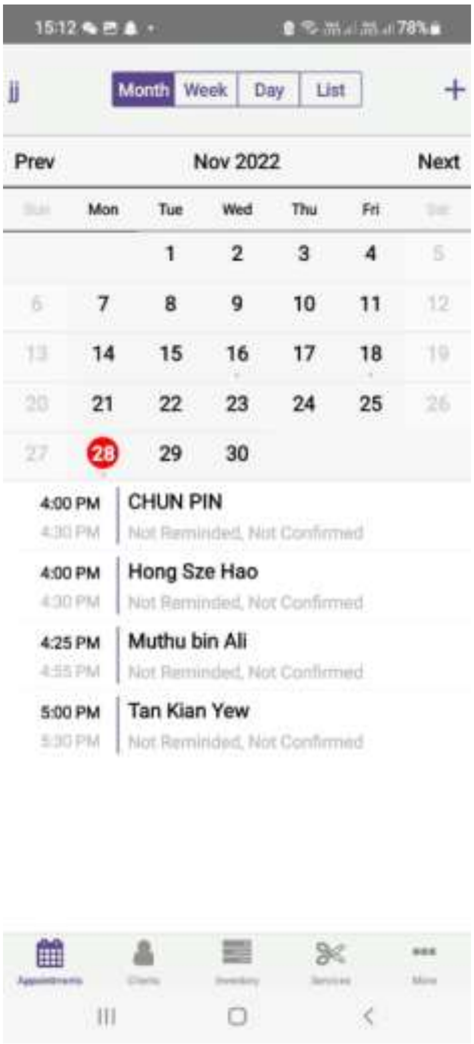
2.2.1.1 Strengths

- Owners with multiple salons can be managed in the same management system
- Provide very detail analysis report of a salon to be generated

2.2.1.2 Weakness

- Tracking back records is not available for customers.
- Customers are not able to view hairstylist ratings or give any feedback after appointments.
- Cancellation of booking is not available.

2.2.2 MyCuts [8]



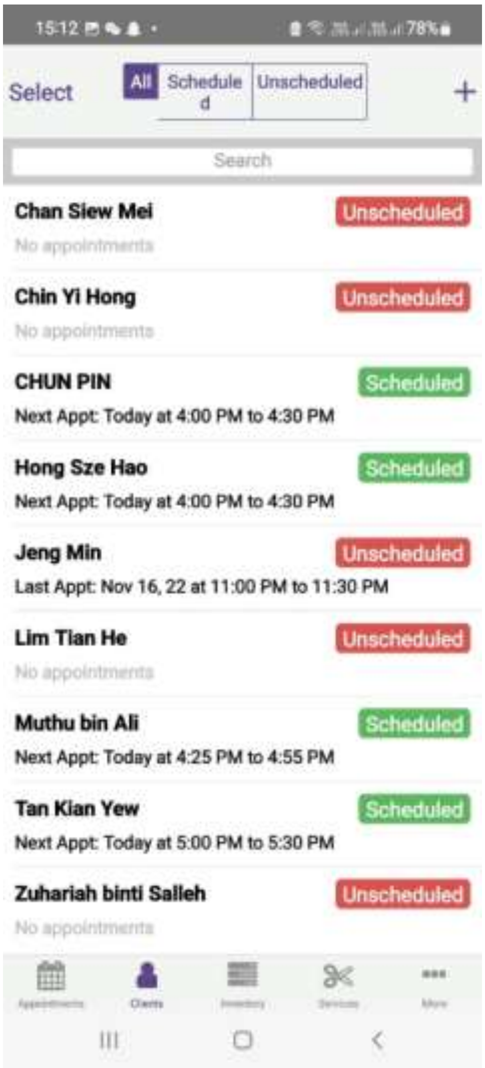
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

4:00 PM – 4:30 PM CHUN PIN
Not Reminded, Not Confirmed

4:00 PM – 4:30 PM Hong Sze Hao
Not Reminded, Not Confirmed

4:25 PM – 4:55 PM Muthu bin Ali
Not Reminded, Not Confirmed

5:00 PM – 5:30 PM Tan Kian Yew
Not Reminded, Not Confirmed



Chan Siew Mei — Unscheduled
No appointments

Chin Yi Hong — Unscheduled
No appointments

CHUN PIN — Scheduled
Next Appt: Today at 4:00 PM to 4:30 PM

Hong Sze Hao — Scheduled
Next Appt: Today at 4:00 PM to 4:30 PM

Jeng Min — Unscheduled
Last Appt: Nov 16, 22 at 11:00 PM to 11:30 PM

Lim Tian He — Unscheduled
No appointments

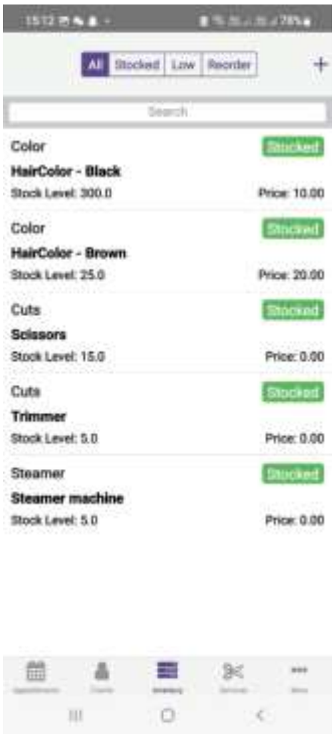
Muthu bin Ali — Scheduled
Next Appt: Today at 4:25 PM to 4:55 PM

Tan Kian Yew — Scheduled
Next Appt: Today at 5:00 PM to 5:30 PM

Zuhariah binti Salleh — Unscheduled
No appointments

Figure 2.2.2.1 Appointment Scheduling

Figure 2.2.2.2 Customer List



Color
Stocked
HairColor - Black
Stock Level: 300.0
Price: 10.00

Color
Stocked
HairColor - Brown
Stock Level: 25.0
Price: 20.00

Cuts
Stocked
Scissors
Stock Level: 15.0
Price: 0.00

Cuts
Stocked
Trimmer
Stock Level: 5.0
Price: 0.00

Steamer
Stocked
Steamer machine
Stock Level: 5.0
Price: 0.00

Figure 2.2.2.3 Inventory List

MyCuts is a hair salon management system that provides web and mobile applications to its clients. However, it is only available for Android users only. MyCuts provides a free version of salon management system, and it is free of charge with no additional hidden fees unless the salon wishes to upgrade from a free account to premium account. Additionally, the data is backed up to the database by the system every day to prevent any loss of data. Features that are provided by MyCuts are appointment scheduling, client management and inventory checking.

Since MyCuts only provide one user which is salon employees, hence customer appointments need to be added by salon staff manually into the system. This means that salon that uses MyCuts as management system are still using the traditional appointment booking system. However, MyCuts will contact the clients by sending them emails and messages to remind them about their appointments automatically by the system. With this feature, salon staff does not need to check on all appointments every day and contact the customers one by one. All customers' appointment can be checked through the calendar attached to the system by list view, day and month.

For the client management module, salon management is able to add a new client from the contact list of his device or manually insert a new customer by keying in the details such as allergies, hobbies, occupation and gender. Additionally, customers' emails will be recorded so that the salon management system can remind them about their appointments. MyCuts also provided a filtering function where salon management is able to view which client has scheduled any appointments in the future. Moreover, client history can be tracked by using the salon management system.

Appointment booking can only be done manually where salon staff will be adding any appointment into the management system. If customers wish to book any slot for a hairstylist, he has to contact salon staff to ask for an available slot. Then salon staff will be inserting the appointment manually into the system. This will cause trouble for both parties where customers are not able to view the available timeslot of their preferred hairstylist.

Lastly, inventory checking modules provide a list of stock in the salon. Salon staff can add, and deduct any inventory stored in the inventory module. Filtering function is provided where inventory stock can be grouped by stocked, low and reorder. Therefore, salon staff can filter out all the low-stock inventory where they can reorder again. Detail information such as model, supplier, and manufacturer can also be stored in the salon management system.

2.2.2.1 Strengths

- Provide web and mobile applications
- Automatically generate reminders to customers through emails and messages.

2.2.2.2 Weakness

- Conventional appointment booking system
- Customers do not have their accounts in the system to track back their records in the salon.
- Hairstylists review module is not provided

2.2.3 **DaySmart Salon [9]**

Figure 2.2.3.1 Loading Page

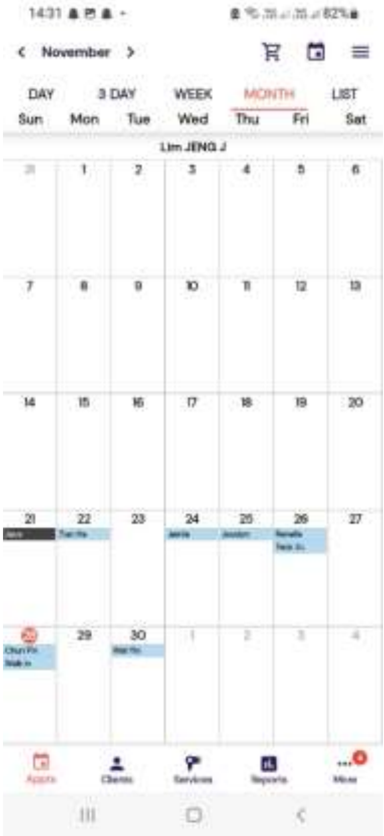
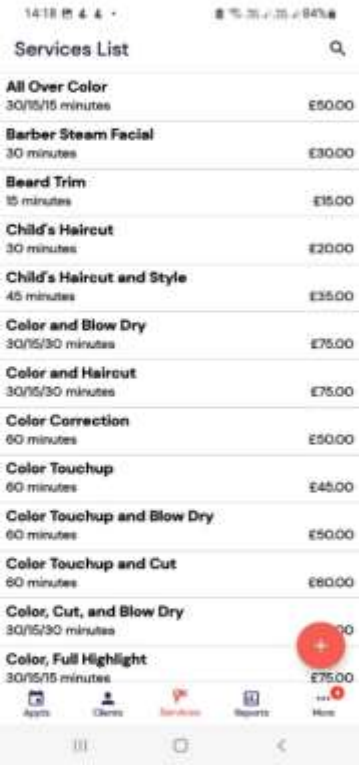
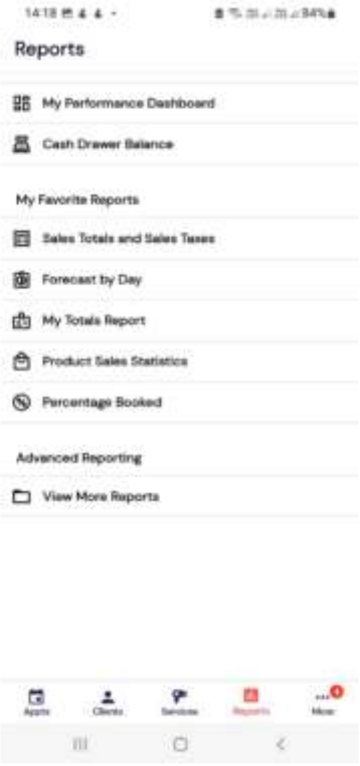


Figure 2.2.3.2 Appointment module page


Services List

All Over Color 30/15/15 minutes	£50.00
Barber Steam Facial 30 minutes	£30.00
Beard Trim 15 minutes	£15.00
Child's Haircut 30 minutes	£20.00
Child's Haircut and Style 45 minutes	£35.00
Color and Blow Dry 30/15/30 minutes	£75.00
Color and Haircut 30/15/30 minutes	£75.00
Color Correction 60 minutes	£50.00
Color Touchup 60 minutes	£45.00
Color Touchup and Blow Dry 60 minutes	£50.00
Color Touchup and Cut 60 minutes	£60.00
Color, Cut, and Blow Dry 30/15/30 minutes	0
Color, Full Highlight 30/15/15 minutes	£75.00

Figure 2.2.3.3 Services List


Reports

- My Performance Dashboard
- Cash Drawer Balance

My Favorite Reports

- Sales Totals and Sales Taxes
- Forecast by Day
- My Totals Report
- Product Sales Statistics
- Percentage Booked

Advanced Reporting

- View More Reports

Figure 2.2.3.4 List of other modules

DaySmart Salon Management system is a management system that supports cloud-based system. It supports payroll management, appointment scheduling module, employee management, client database, inventory management and point of Sale (POS). However, features provided on mobile application is lesser compared to web-based system and the interface for mobile application is slightly different from the browser version. Even though web based is provided, but the management system only supports one user which is salon owner.

Online Booking is one of the functions provided for customers to book their appointment online. Customers can book services online and choose their preferred timeslot and hairstylist. Additional comments can also be requested by customers if any. However, there will be duplicated records if customers use online to book their appointment because they do not need an account to register for their appointment. Hence, the customer list will be duplicated. Additionally, cancelation of booking is not provided online and the customer needs to contact salon management to cancel their booking.

Beside appointment booking module, analysis report module is provided too. It has similar functions with other salon management systems too. However, the DaySmart application provides a forecast report where the salon management can view the forecast report by analyzing future appointments. Additionally, the application provides advanced reporting where a lot of reports regarding salon management can be chosen. Some of the advanced reporting includes client spending reports, non-returning clients, performance overviews, percentage booked reports and many more.

For the client module, the system will show a list of active-only customers and all client lists. On each customer’s page, the system will show all the details of the customers and their history and future appointments or services. On top of that, client notes can be added by salon employees and past services photos can also be viewed in the system. Text message function in customer profile will be linked to message application in salon employee’s device and direction function will link to map application.

In DaySmart application, a calendar is attached where it will show all customers’ appointments and salon management can filter out appointments in a day, 3 days a week a month and in a list. The difference between calendar of the DaySmart application with other existing systems is that once customers have shown up in the salon, salon employees can check-in for the customers and the status in the calendar will be changed automatically. Once the customer has done his appointment, salon management can check out the appointment and get the total charges and receipt of the service. Additionally, tax charges have been applied to the total amount of services. After customers have done their payment, the status of the appointment in calendar will be changed.

2.2.3.1 Strength

- E-payment receipt will be provided.
- Provide detailed analysis reports for salon management.
- Useful scheduling calendar.

2.2.3.2 Weakness

- Cancellation of appointment cannot be done online.
- Ratings and reviews of the hairstylist module are not available.

2.2.4 **Salon Management App: Book & S [10]**

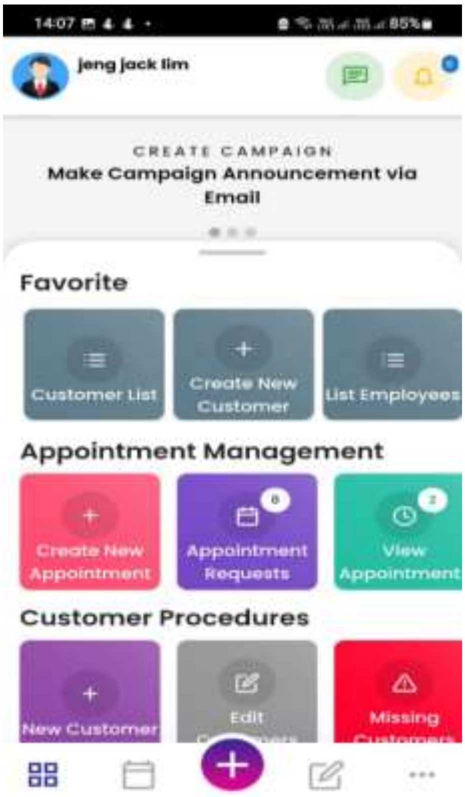


Figure 2.2.4.1 Home Page

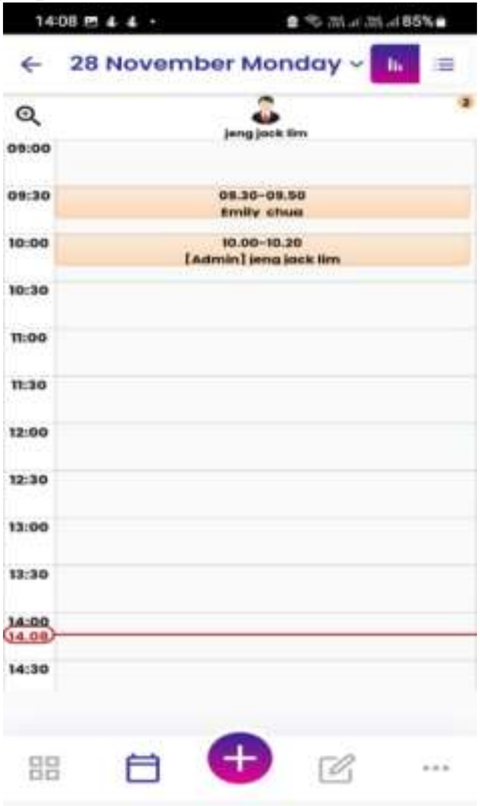
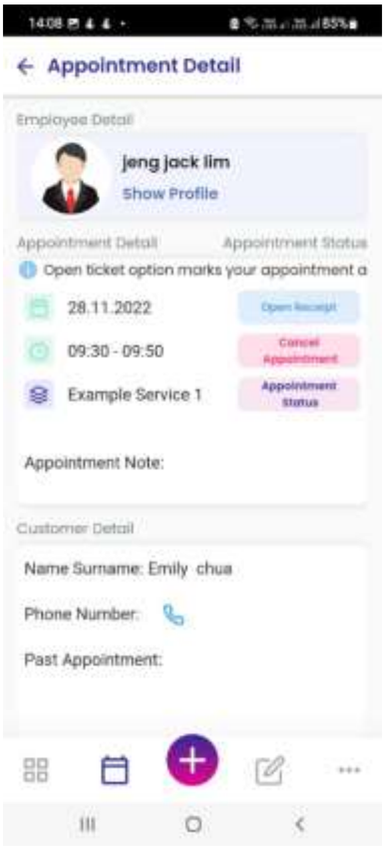


Figure 2.2.4.2 Appointment overview



jeng jack lim

Open ticket option marks your appointment a

28.11.2022

09:30 - 09:50

Example Service 1

Appointment Note:

Name Surname: Emily chua

Phone Number:

Past Appointment:

Figure 2.2.4.3 Appointment details

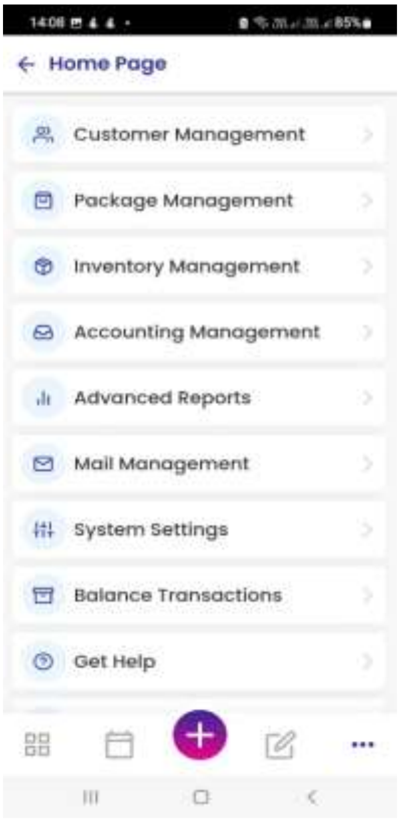


Figure 2.2.4.4 List of other modules

Book & S is a mobile application software of salon management system that provides similar functionalities to other salon management. It supports all operating systems such as Windows, iOS, Android and Huawei. Book & S provides an interactive interface and cloud-based booking solution for customers where the appointment booking will be synced with all users. The main feature provided by the applications is appointment management, customer, staff and branch management, stock control and reports.

Since Book & S supports cloud-based appointments, hence an appointment has been confirmed, the calendar will be synced automatically to all the users involved, which are the hairstylist and customer. Additionally, a notification will be sent to all user devices to inform them about the appointment. However, customers are not able to create an account in this salon management system. Hence it will cause trouble for them to view back all appointments or to cancel future appointments.

Management tools provided in Book & S are convenient and functional. In staff management tools, all the staffs are able to customize their own schedule and days that they work. Once they have updated the working days, a real-time scheduling alert will be sent out to all staff automatically. Other than that, they can view the list of employees as well as sort them and create a new employee. In the customers management system of the application, staffs can add new customers and show customer lists. Moreover, Book & S provides a feature to find out missing customers which means the module will show list of customers that do not repeat visiting the salon after last visit within a certain period of time. While for branch management, it supports multi branch management where if the salon owner owns a few salon branches, he or she can manage them in the same application.

Stock control modules record all the leftover stocks in the salon, and they can also manage the sales of products to the customers. Report modules contain a few types of reports such as company reports, staff reports, customer reports, service reports and product reports.

2.2.4.1 Strength

- Support cloud-based appointment booking
- Payment receipts can be generated for each booking.

2.2.4.2 Weakness

- Reviewing of the previous appointment is not available.
- Cancellation of appointment is not provided.
- Hairstylists reviewing system is not available.

2.4 Summary

In Chapter 2, four existing systems (SalonAppy, MyCuts, DaySmart Salon and Book & S) have been reviewed in terms of their feature. All the reviewed systems have their own strengths and weakness and all of them are compared and summarized in Table 2.3.1.

Table 2.3.1 Summarization table

	SalonAppy	**MyCuts**	**DaySmart Salon**	**Book & S**	**Proposed System**
Design of User Interface	Simple and unattractive design with white theme.	Simple Design with white and purple theme.	Simple Design with mainly black, white and orange theme.	Colorful design where many different colors are used.	Attractive design
Cloud-based appointment system	Only available for offline appointment	Only available for offline appointment	Only available for offline appointment	Available	Available
Hairstylist reviewing module	Not available	Not available	Not available	Not available	Available

Cancellation of appointment	Not available	Not available	Not available	Not available	Available
Hairstylist and Services module	Available	Not available	Available	Available	Available
User	One User - admin	One User - admin	One User - admin	One User - admin	Three users - Customers, Hairstylist and admin.
Queue management system	Not available	Not available	Not available	Not available	Available
Banner module	Not Available	Not Available	Not Available	Not Available	Available
Notification module	Available, it will be sent by messages.	Available, it will be sent through messages.	Not available	Available , it will be sent through email.	Available, through push notification by Firebase
AR Virtual Hairstyle	Not Available	Not Available	Not Available	Not Available	Available

CHAPTER 3 SYSTEM DESIGN

3.1 Overview

In this chapter, system designs like use-case and use-case description as well as development process with code have been discussed.

3.2 Use-Case Diagram

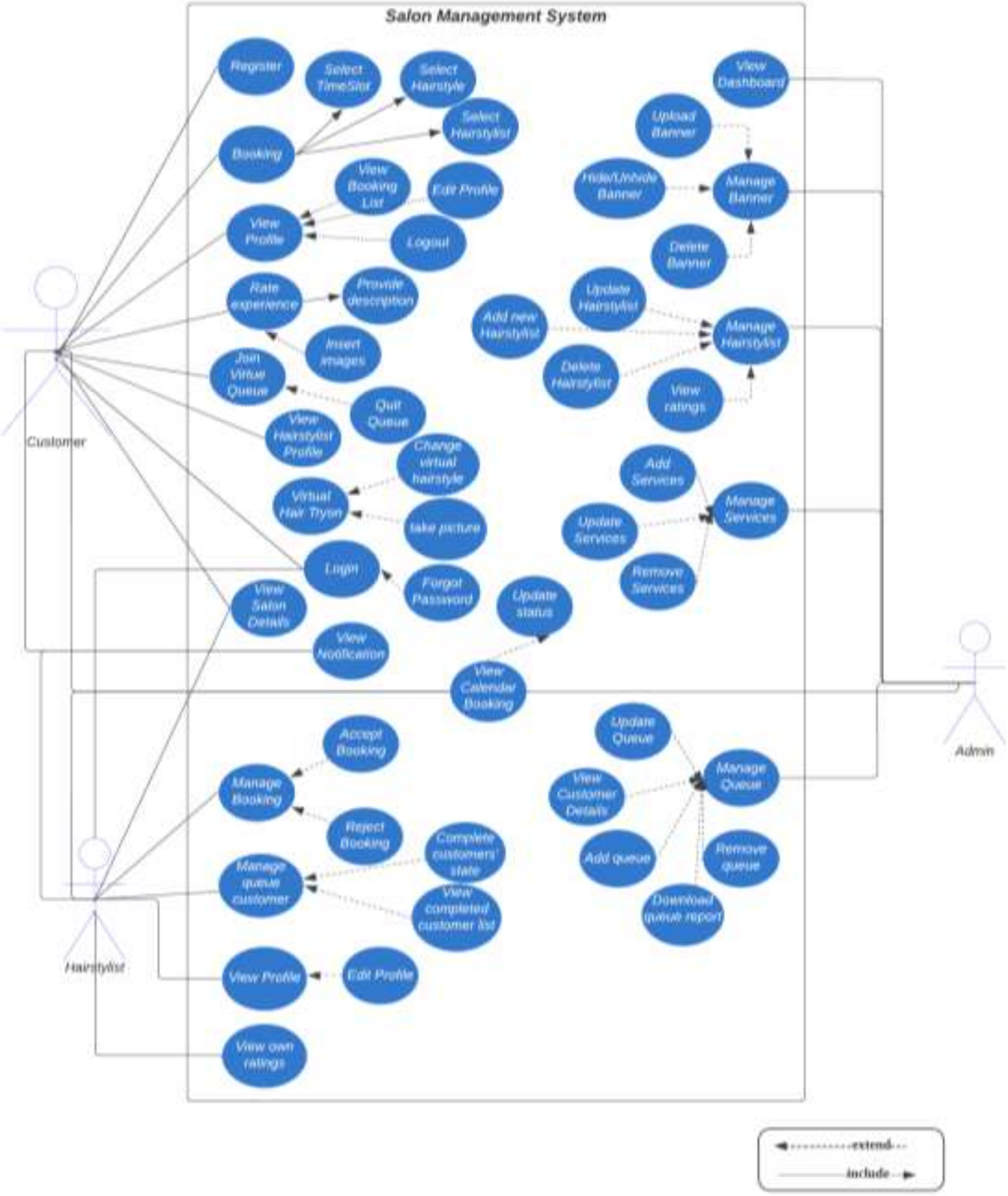


Figure 3.2.1 Use-case diagram

3.3 Use-Case Description

Table 3.3.1 Register Use-Case Description

Use Case ID	00001
Use Case Name	Register
Brief Description	Customers are able to create a new account.
Actor	Customer
Trigger	Go to register page of application
Precondition	Account must not exist in the system.
Normal flow of events	1. User will be navigated to registration page when clicking “Sign Up” button. 2. Users will need to key in required information such as username, email, gender, contact number and password. 3. Upon validated the entered information, user will be redirected to the home page under his or her account.
Sub Flows	-
Alternate Flows	2a. If the account exist, error message will prompt and ask user to login back to the registered account. 2b. If any field is empty, error message will prompt to remind user. 2c. If password is not strong enough, error message will prompt and ask user to re-enter password.

Table 3.3.2 Login Use-Case Description

Use Case ID	00002

Use Case Name	Login
Brief Description	Customers and Hairstylists are able to login to access to the application.
Actor	Customers , Hairstylists
Extends Use case	1. Forgot Password
Trigger	Go to login page of the mobile application
Precondition	Account must exist in the system and has not logged in yet.
Normal flow of events	1. Customers/Hairstylists fill in email and password. 2. The system validates the email and password filled. 3. Users will be redirected to their own account home page.
Sub Flows	1a. If Customers/Hairstylists forgot password, they could initiate the password recovery process. Then, an email will be sent to the account email for resetting password.
Alternate Flows	2a. If email or password is empty, account not found, or incorrect password is entered, system will displayed error message to user.

Table 3.3.3 Booking Use-Case Description

Use Case ID	00003
Use Case Name	Booking
Brief Description	Customers are able to reserve a booking slot.
Actor	Customer

Include Use Case	1. Select Hairstyle 2. Select Hairstylist 3. Select Timeslot
Trigger	Customer initiates the process of reserving a booking slot
Precondition	Customers must have logged in to their own user account.
Normal flow of events	1. Customers could reserve a slot through booking. 2. System will displayed confirmation page for customers to check once customers have selected all the details. 3. Customer can confirm the booking by clicking confirm button.
Sub Flows	1a. Customers need to select preferred hairstyle. 1b. Customers need to select preferred hairstylist. 1c. Customers need to select preferred available timeslot.
Alternate Flows	1a. If hairstyle, hairstylist and timeslots are not chosen, customers are not able to proceed to next step.

Table 3.3.4 View Customer Profile Use-Case Description

Use Case ID	00004
Use Case Name	View Customer Account
Brief Description	Customers may access to all his information as well as features in profile.
Actor	Customers
Extends Use Case	View Booking List, Edit Profile , Logout
Trigger	Go to profile page

Precondition	Customers must have logged in to their own user account.
Normal flow of events	1. Customers are able to view all the details such as username, email, contact number and numbers of booking.
Sub Flows	1a. Customers may access to their list of all bookings and sort it based on the status. 1b. Customers may edit their username and displayed image. 1c. Customers may choose to logout from their account.
Alternate Flows	-

Table 3.3.5 Rating Use-Case Description

Use Case ID	00005
Use Case Name	Rate Experience
Brief Description	Customers may rate the experience after completed a booking.
Actor	Customers
Extends Use Case	Insert images
Include Use Case	Provide description
Trigger	Customer initiates the process of rating after completed booking in salon physically.
Precondition	Customers must have logged in to their own user account and completed booking in salon.
Normal flow of events	1. After hairstylist has changed the status of booking to completed, customers are able to rate the experience.

	2. After completed all the necessary information, customers may submit the rating.
Sub Flows	1a. Ratings and description are compulsory to fill in before submitting. 1b. Customers may choose to upload images or not before submitting.
Alternate Flows	2a. If description is empty, error message will displayed to ask user to input description

Table 3.3.6 View Hairstylist Profile Use-Case Description

Use Case ID	00006
Use Case Name	View Hairstylist Profile
Brief Description	Customers are able to view the hairstylist profile including the ratings given by all customers.
Actor	Customers
Trigger	Customers clicked on specific hairstylist to view on their profile.
Precondition	Customers must have logged in to their own user account.
Normal flow of events	1. Customers click on any hairstylist that he / she wants to view. 2. Customers able to see all the details of the hairstylist such as description, average ratings and comments.
Sub Flows	-
Alternate Flows	-

Table 3.3.7 Join Virtual Queue Use-Case Description

Use Case ID	00007

Use Case Name	Join Virtual Queue
Brief Description	Customers are able to queue virtually online.
Actor	Customers
Extends Use Case	Quit queue
Trigger	Customers join the queue when it is available to be joined.
Precondition	Customers must have logged in to their own user account. Queue management must be activated by admin on admin panel.
Normal flow of events	1. Customers navigate to queue tab under navigation bar. 2. Customers are able to join queue virtually when press join button. 3. Customers are able to monitor the queue and information like queue number and estimated waiting time will be displayed. 4. Once reaches the customer’s turn, he will be notified, and details will be showing on queue screen. 5. Once the customer has completed, it will be showing completed page.
Sub Flows	3a. Customers are able to quit the queue if they have changed their mind.
Alternate Flows	-

Table 3.3.8 View Salon Details Use-Case Description

Use Case ID	00008
Use Case Name	View Salon Details

Brief Description	Customers/Hairstylists are able to view the details of salon.
Actor	Customers , Hairstylists
Trigger	Customers press on third icon on bottom navigation bar. Hairstylists enter the page from side navigation bar.
Precondition	Customers/Hairstylists must have logged in to their own user account.
Normal flow of events	1. Customers/Hairstylist view on salon details.
Sub Flows	1a. Customers/Hairstylists will be redirected to google map application when clicking the address. 1b. Customers/Hairstylists will be redirected to phone application with contact number of salon inserted. 1c. Customers/Hairstylists will be redirected to email application with email of salon inserted to submit for RFP form.
Alternate Flows	-

Table 3.3.9 View Notification Use-Case Description

Use Case ID	00009
Use Case Name	View Notification
Brief Description	Customers and hairstylist are able to view all the notification from notification page.
Actor	Customers , Hairstylists
Extends Use Case	-
Trigger	Customers and hairstylists press on small notification icon on homepage.

Precondition	Customers/Hairstylists must have logged in to their own user account.
Normal flow of events	1. Customers and hairstylist navigate to notification page to view all the notification.
Sub Flows	-
Alternate Flows	-

Table 3.3.10 View Calendar Use-Case Description

Use Case ID	00010
Use Case Name	View Calendar Booking
Brief Description	Customers, hairstylists and admin are able to view all the bookings in a calendar view.
Actor	Customers , Hairstylists , Admin
Extends Use Case	Update Status
Trigger	Customers / Hairstylists / Admin navigate to calendar tab.
Precondition	Customers / Hairstylists must have logged in to their own user account.
Normal flow of events	1. Customers and hairstylist navigate to calendar tab through navigation bar. 2. Customers/Hairstylists/Admin are able to view all the bookings in a calendar list. 3. Lists are shown when select to view specific date.
Sub Flows	2a. Customers/Hairstylists are able to cancel booking subjected to booking time is more than 2 hours before doing so. 2b. Hairstylists / Admin are able to update the status to completed or did not show up for each booking.

Alternate Flows	-

Table 3.3.11 Manage Booking Use-Case Description

Use Case ID	00011
Use Case Name	Manage Booking
Brief Description	Hairstylists have the capability to accept or reject the booking by customers.
Actor	Hairstylists
Trigger	Hairstylists navigate to booking page to view all the upcoming unconfirmed booking.
Precondition	Hairstylists must have logged in to their own user account
Normal flow of events	1. Hairstylists navigate to unconfirmed booking page. 2. Hairstylists can perform action on it
Sub Flows	2a. Hairstylist can accept booking by clicking tick icon. 2b. Hairstylist can reject booking by clicking cross icon. 2c. Hairstylist can accept all at one go by pressing button on top right.
Alternate Flows	-

Table 3.3.12 Manage Queue Customer Use-Case Description

Use Case ID	00012
Use Case Name	Manage Queue Customer

Brief Description	Hairstylists
Actor	Hairstylists
Trigger	Hairstylists navigate to queue management page.
Precondition	Hairstylists must have logged in to their own user account
Normal flow of events	1. Hairstylists navigate to queue management page. 2. Hairstylists can view current assigned customer and completed customer details.
Sub Flows	2a Hairstylists may update current in progress customer's status to completed.
Alternate Flows	-

Table 3.3.13 View Hairstylists Profile Use-Case Description

Use Case ID	00013
Use Case Name	View Hairstylists Account
Brief Description	Hairstylists may access to all his information in profile.
Actor	Hairstylists
Extends Use Case	Edit Profile
Trigger	Go to profile page
Precondition	Hairstylists must have logged in to their own user account.
Normal flow of events	1. Hairstylists are able to view all the details such as username, email, description, status.

Sub Flows	1a. Hairstylists may update his or her information such as description so that customers will have latest information.
Alternate Flows	-

Table 3.3.14 View Hairstylist Profile Use-Case Description

Use Case ID	00014
Use Case Name	View Ratings
Brief Description	Hairstylists are able to view his or her ratings given by customers.
Actor	Hairstylists
Trigger	Hairstylists navigate to ratings page.
Precondition	Hairstylists must have logged in to their own user account.
Normal flow of events	1. Hairstylists navigate to ratings page to view all ratings given by customers.
Sub Flows	-
Alternate Flows	-

Table 3.3.15 Logout Use-Case Description

Use Case ID	00015
Use Case Name	Logout
Brief Description	Hairstylists are able to logout from his or her account.
Actor	Hairstylists

Trigger	Hairstylists logout through press logout from side navigation bar.
Precondition	Hairstylists must have logged in to their own user account.
Normal flow of events	1. Hairstylists can logout from his or her account and will be redirected to login page.
Sub Flows	-
Alternate Flows	-

Table 3.3.16 View Dashboard Use-Case Description

Use Case ID	00016
Use Case Name	View Dashboard
Brief Description	Dashboard will be showing summary information.
Actor	Admin
Trigger	Upon opening the web application, the default behavior is to trigger the display of the dashboard as the initial page.
Precondition	Web application running.
Normal flow of events	3. When admin execute web application, dashboard will automatically be displayed and show information such as monthly revenue, monthly booking, customers and hairstylist, as well as queue status.
Sub Flows	-
Alternate Flows	-

Table 3.3.17 Manage Banner Use-Case Description

Use Case ID	00017
Use Case Name	Manage Banner
Brief Description	Hairstylists have the capability to manage banners that are displayed on mobile application homepage.
Actor	Hairstylist
Extends Use Case	Upload Banner, Hide/Unhide Banner, Delete Banner
Trigger	Hairstylists navigate to manage banner tab through side navigation bar.
Precondition	Web application running.
Normal flow of events	1. Once hairstylists navigate to banner screen, upload banner section and list of banner are displayed.
Sub Flows	1a. Hairstylist can press on any banner to view the full image of the banner. 1b. Hairstylist can upload banner in image format. 1c. Hairstylist can publish or unpublish image to the homepage. 1d. Hairstylist can permanently delete the banner from database.
Alternate Flows	1a. Error will be displayed if no image or unsupported image file uploaded.

Table 3.3.18 Manage Hairstylist Use-Case Description

Use Case ID	00018
Use Case Name	Manage Hairstylist

Brief Description	Admin has the capability to manage hairstylist section such as editing, viewing and adding new hairstylist.
Actor	Admin
Extends Use Case	Update Hairstylist, Add new Hairstylist, Delete hairstylist, View Ratings
Trigger	Admin navigates to manage hairstylist tab through side navigation bar.
Precondition	Web application running.
Normal flow of events	1. Once hairstylists navigate to hairstylist screen, all hairstylist details will be loaded on screen. 2. Admin can perform actions on list of hairstylist.
Sub Flows	2a. Admin can update the status, name and description of hairstylist. 2b. Admin can view the list of rating from customers towards specific hairstylist. 2c. Admin can add new hairstylist by filling up all the details of new hairstylist.
Alternate Flows	1a. Hairstylist data cannot be loaded from database and will be keep on loading. 2a. If list of rating can't be loaded, error message will show on screen.

Table 3.3.19 Manage Services Use-Case Description

Use Case ID	00019
Use Case Name	Manage Services
Brief Description	Admin has the capability to manage services provided towards customers.

Actor	Admin
Extends Use Case	Add services, Update services, Remove services
Trigger	Admin navigates to services screen through side navigation bar.
Precondition	Web application running.
Normal flow of events	1. Once admin navigate to confirmation screen, all services details will be loaded on screen. 2. Admin can perform actions on services.
Sub Flows	2a. Admin can add new services by inputting name and the price. 2b. Admin can update services name and price. 2c. Admin can delete any of existing services.
Alternate Flows	2a. Error message will be displayed if price inputted is not number value.

Table 3.3.20 Manage Queue Use-Case Description

Use Case ID	00020
Use Case Name	Manage Queue
Brief Description	Admin has the capability to manage virtual queueing management system.
Actor	Admin
Extends Use Case	Update Customer Queue Status, View Customer Details, Add Queue, Remove Queue
Trigger	Admin navigates to queue screen through side navigation bar.

Precondition	Web application running.
Normal flow of events	1. Admin able to navigate to queue management screen. 2. Admin able to initiate the queue to be opened. 3. Admin able to close the queue.
Sub Flows	1a. If queue is not open for queueing, hairstylists able to initiate it. 1b. Admin can download reports on past queues. 2a. Admin can add customers by keying in name and contact number manually into the queue in case they do not have the mobile application. 2b. Admin can update the customer to next status such as in progress, did not show up or completed. 2c. Admin can view a customer details. 2d. Admin can remove customers from queueing list.
Alternate Flows	-

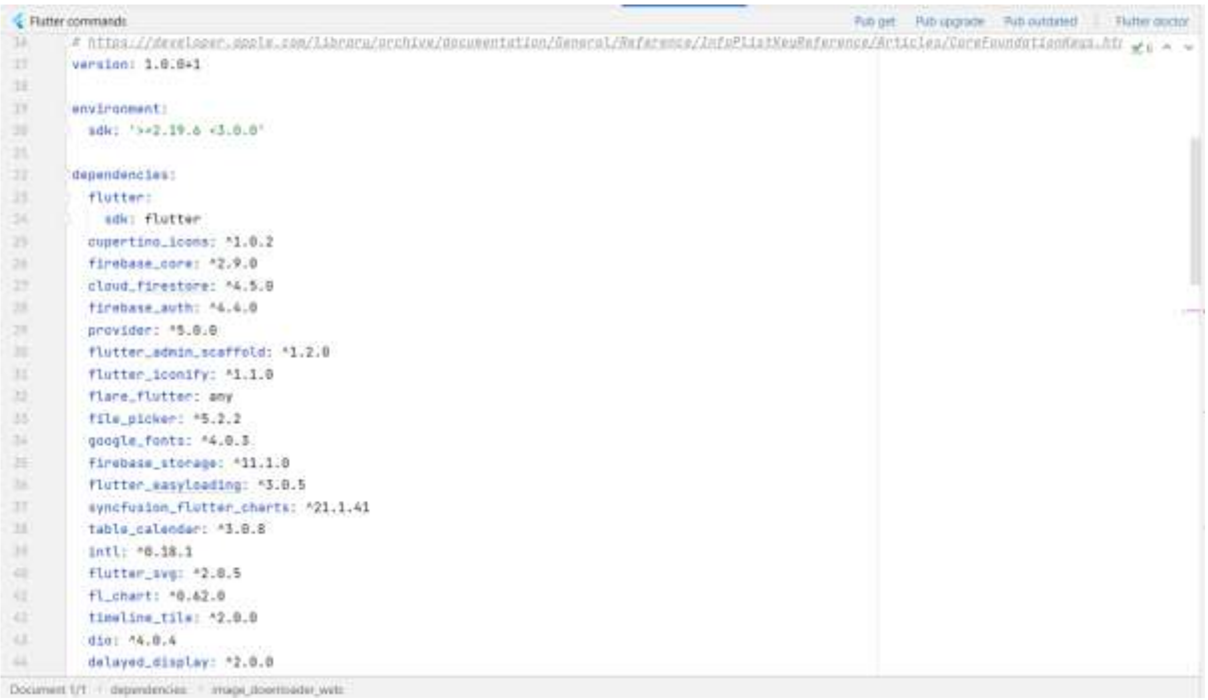
3.4 Program Development

3.4.1 Flutter framework

During the development of the salon management system, a range of technologies was employed to create both the mobile app and the web admin panel. The Flutter framework served as the core development tool, facilitating the creation of applications for multiple platforms. The Dart programming language, closely integrated with Flutter, was utilized to build the app's underlying functionality [11]. To manage the system's backend, Firebase was integrated, providing essential features such as real-time database capabilities, secure data storage, and user authentication as Firebase offers serverless cloud features. Real-time database capabilities provided by Firebase ensures that seamless data synchronization between different platforms [12]. By combining Flutter, Dart and Firebase, salon management system can be achieved and effectively fulfilling the project's objectives.

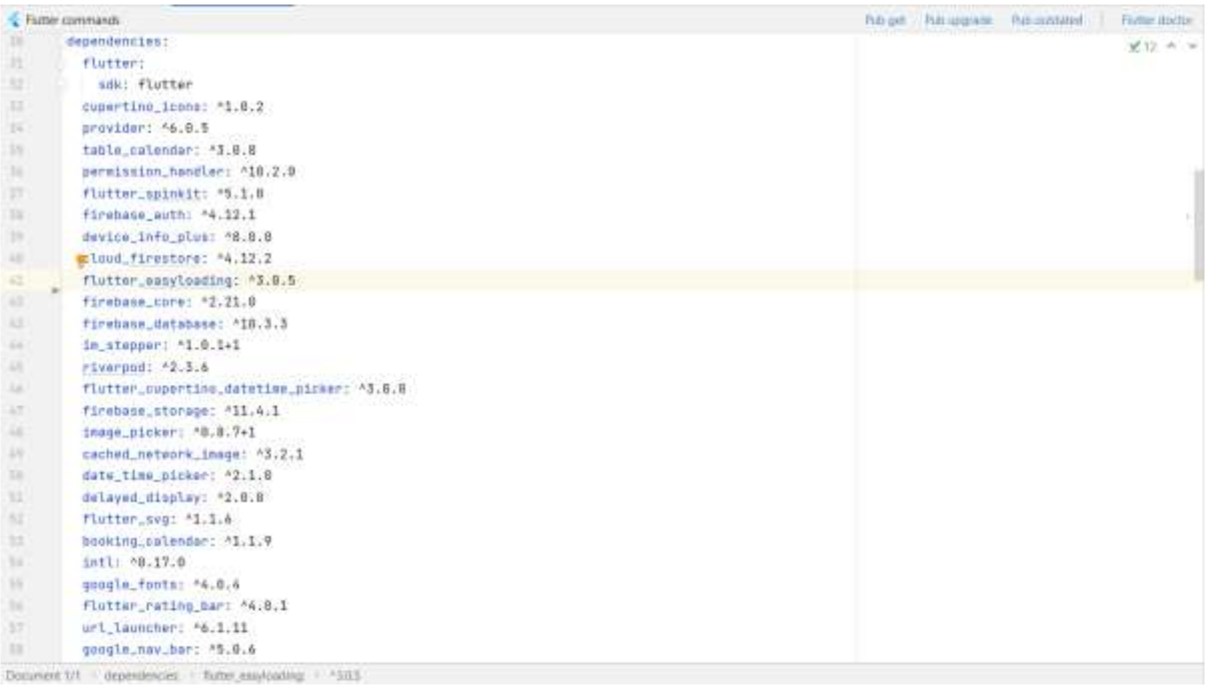
3.4.2 Flutter dependencies

In the development of mobile application and salon web admin panel, a wide range of packages were integrated into the project. Firebase packages, such as Firebase Core Cloud Firestore and Firebase Authentication have interconnected roles within the backend architecture, working together for efficient data management, real-time synchronization, and seamless communication between the salon management system's frontend and backend components. Alongside Firebase packages, a range of crucial tools were incorporated to enhance different functions and create a better user experience such as provider, table_calendar, shared_preferences , local notification and others.



```yaml
# https://developer.apple.com/library/archive/documentation/General/Reference/InfoPlistKeyReference/Articles/CoreFoundationKeys.ht
version: 1.0.0+1

environment:
  sdk: '>=2.19.6 <3.0.0'

dependencies:
  flutter:
    sdk: flutter
  cupertino_icons: ^1.0.2
  firebase_core: ^2.9.0
  cloud_firestore: ^4.5.0
  firebase_auth: ^4.4.0
  provider: ^5.0.0
  flutter_admin_scaffold: ^1.2.0
  flutter_iconify: ^1.1.0
  flare_flutter: any
  file_picker: ^5.2.2
  google_fonts: ^4.0.3
  firebase_storage: ^11.1.0
  flutter_easyloading: ^3.0.5
  syncfusion_flutter_charts: ^21.1.41
  table_calendar: ^3.0.8
  intl: ^0.18.1
  flutter_svg: ^2.0.5
  fl_chart: ^0.62.0
  timeline_tile: ^2.0.0
  dio: ^4.0.4
  delayed_display: ^2.0.0
```

Figure 3.4.2.1 Web Admin Panel Dependencies

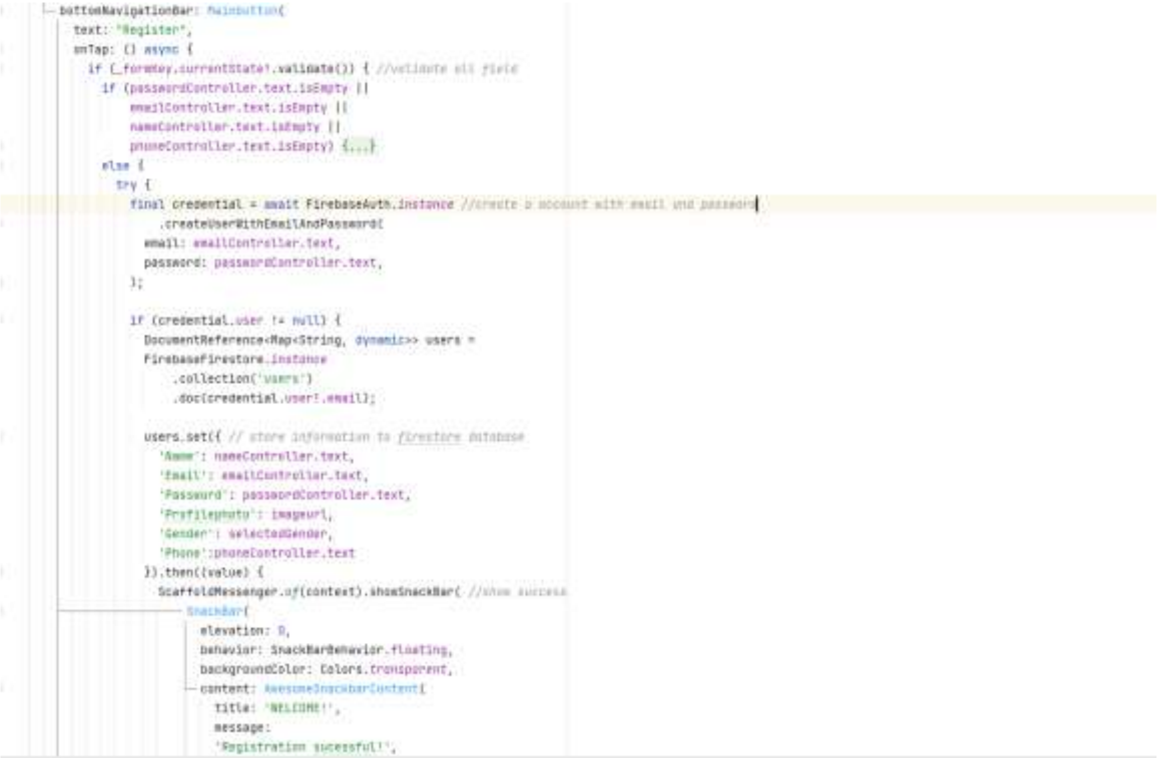


```
dependencies:
  flutter:
    sdk: flutter
  cupertino_icons: ^1.0.2
  provider: ^6.0.5
  table_calendar: ^3.0.8
  permission_handler: ^10.2.0
  flutter_spinkit: ^5.1.0
  firebase_auth: ^4.12.1
  device_info_plus: ^8.0.0
  cloud_firestore: ^4.12.2
  flutter_easyloading: ^3.0.5
  firebase_core: ^2.21.0
  firebase_database: ^10.3.3
  im_stepper: ^1.0.1+1
  riverpod: ^2.3.6
  flutter_cupertino_datetime_picker: ^3.0.0
  firebase_storage: ^11.4.1
  image_picker: ^0.8.7+1
  cached_network_image: ^3.2.1
  date_time_picker: ^2.1.0
  delayed_display: ^2.0.0
  flutter_svg: ^1.1.6
  booking_calendar: ^1.1.9
  intl: ^0.17.0
  google_fonts: ^4.0.4
  flutter_rating_bar: ^4.0.1
  url_launcher: ^6.1.11
  google_nav_bar: ^5.0.6
```

Figure 3.4.2.2 Mobile Application Dependencies

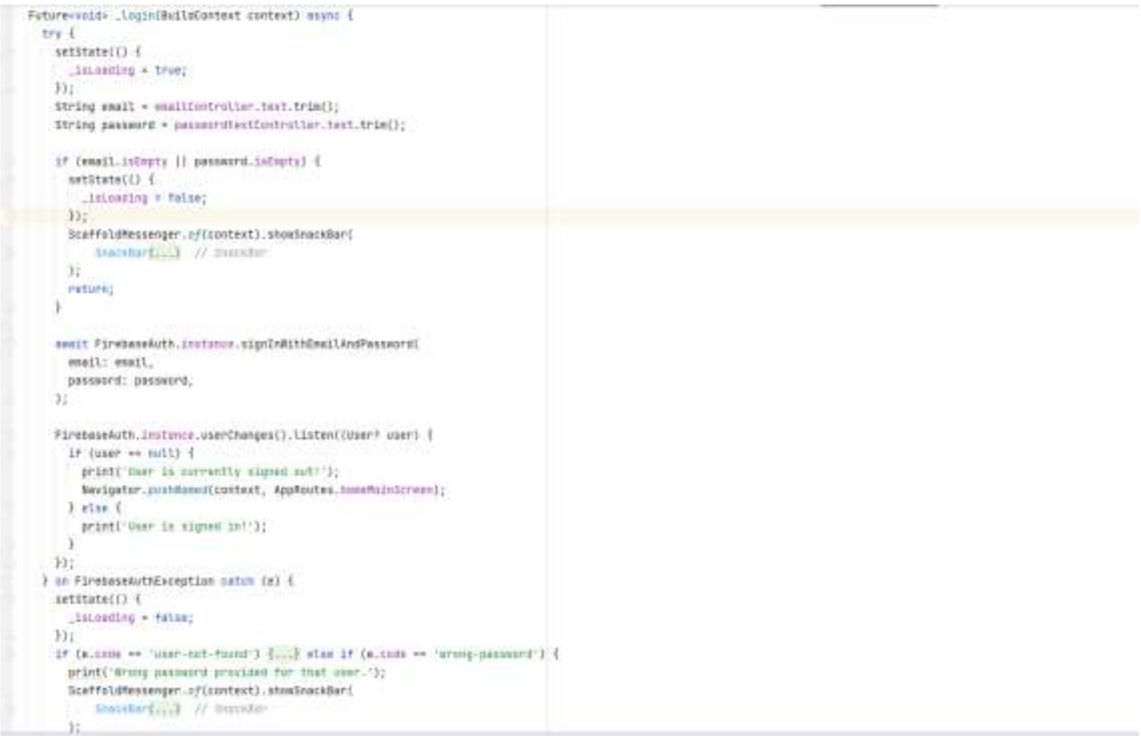
3.4.3 Mobile Application Sign Up / Login Development

Firebase Authentication is optimized for user interactions within sign-up and login modules. By integrating with Firebase as backend of whole system, customers are able to create an account by filling in their personal details. Customers are required to fill in their username, email, phone number and gender. During login process, hairstylists or customers required to provide their registered email and password. This information is transmitted to Firebase Authentication and verifies the credential by using ‘*signInWithEmailAndPassword*’ method. Additionally, if users forgot their password, an email will be sent to the associated account for the process of resetting password.



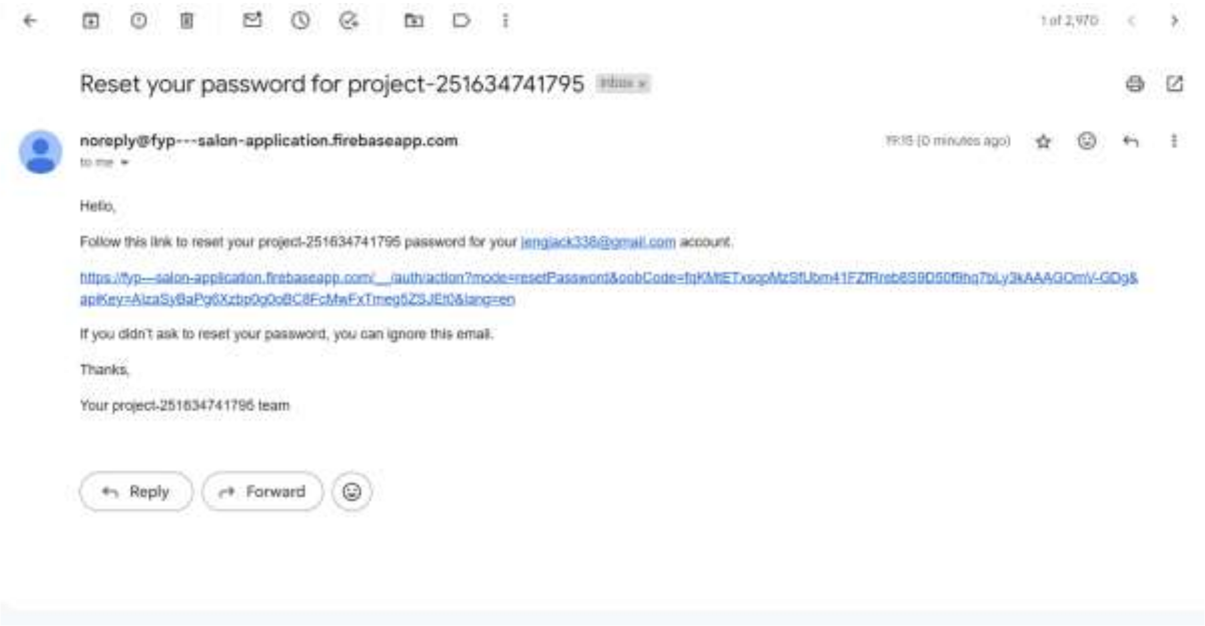
```
bottomNavigationBar: Mainbutton(
  text: "Register",
  onTap: () async {
    if (_formKey.currentState!.validate()) { //validate all field
      if (passwordController.text.isEmpty ||
          emailController.text.isEmpty ||
          nameController.text.isEmpty ||
          phoneController.text.isEmpty) {...}
      else {
        try {
          final credential = await FirebaseAuth.instance //create a account with email and password
              .createUserWithEmailAndPassword(
            email: emailController.text,
            password: passwordController.text,
          );

          if (credential.user != null) {
            DocumentReference<Map<String, dynamic>> users =
            FirebaseFirestore.instance
                .collection('users')
                .doc(credential.user!.email);

            users.set({ // store information to firestore database
              'Name': nameController.text,
              'Email': emailController.text,
              'Password': passwordController.text,
              'Profilephoto': imageurl,
              'Gender': selectedGender,
              'Phone':phoneController.text
            }).then((value) {
              ScaffoldMessenger.of(context).showSnackBar( //show success
                SnackBar(
                  elevation: 0,
                  behavior: SnackBarBehavior.floating,
                  backgroundColor: Colors.transparent,
                  content: AwesomeSnackbarContent(
                    title: 'WELCOME!',
                    message:
                    'Registration sucessful!',
```

Figure 3.4.3.1 Sign up through Firebase Authentication Service



```dart
Future<void> _login(BuildContext context) async {
  try {
    setState(() {
      _isLoading = true;
    });
    String email = emailController.text.trim();
    String password = passwordTextController.text.trim();

    if (email.isEmpty || password.isEmpty) {
      setState(() {
        _isLoading = false;
      });
      ScaffoldMessenger.of(context).showSnackBar(
          SnackBar(...)  // SnackBar
      );
      return;
    }

    await FirebaseAuth.instance.signInWithEmailAndPassword(
      email: email,
      password: password,
    );

    FirebaseAuth.instance.userChanges().listen((User? user) {
      if (user == null) {
        print('User is currently signed out!');
        Navigator.pushNamed(context, AppRoutes.homeMainScreen);
      } else {
        print('User is signed in!');
      }
    });
  } on FirebaseAuthException catch (e) {
    setState(() {
      _isLoading = false;
    });
    if (e.code == 'user-not-found') {...} else if (e.code == 'wrong-password') {
      print('Wrong password provided for that user.');
      ScaffoldMessenger.of(context).showSnackBar(
          SnackBar(...)  // SnackBar
      );
```

Figure 3.4.3.2 Login through Firebase Authentication Service



Reset your password for project-251634741795

noreply@fyp---salon-application.firebaseapp.com

Hello,

Follow this link to reset your project-251634741795 password for your jengjack338@gmail.com account.

https://fyp---salon-application.firebaseapp.com/__/auth/action?mode=resetPassword&oobCode=fqKMtETxsopMzSfUbm41FZfRreb8S9D50f8hq7bLy3kAAAGOmV-GDg&apiKey=AIzaSyBaPg6Xzbp0g0oBC8FcMwFxTmeg5ZSJEt0&lang=en

If you didn't ask to reset your password, you can ignore this email.

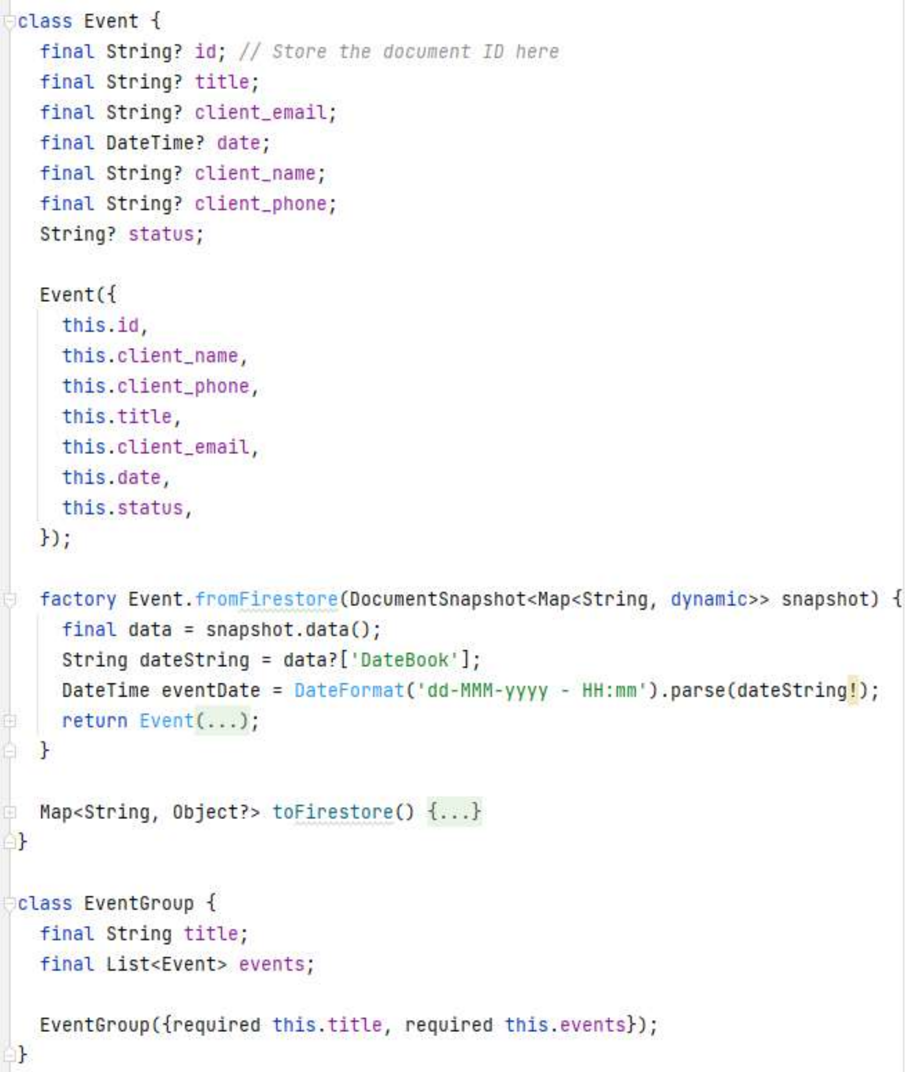
Thanks,

Your project-251634741795 team

Figure 3.4.3.3 Reset Password Email

3.4.4 Calendar Module

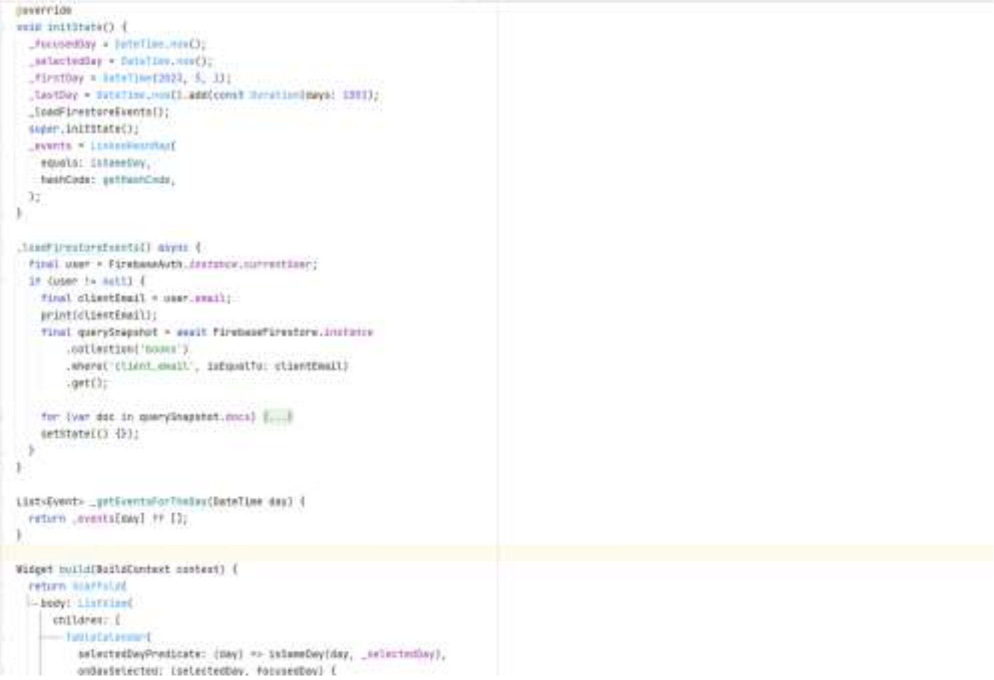
In both mobile application and web admin panel, calendar view has been integrated by using ‘table_calendar’ packages. For mobile application, customers and hairstylists may navigate to calendar screen through bottom navigation bar and home page respectively while for web admin panel, admin may navigate to the page by side navigation bar. Events are fetched from Firebase and displayed on the calendar. In the admin panel, events are grouped based on different hairstylists using a class called EventGroup. This class helps to organize bookings that belong to the same hairstylist, providing a clearer overview of their schedule.



```
class Event {
  final String? id; // Store the document ID here
  final String? title;
  final String? client_email;
  final DateTime? date;
  final String? client_name;
  final String? client_phone;
  String? status;

  Event({
    this.id,
    this.client_name,
    this.client_phone,
    this.title,
    this.client_email,
    this.date,
    this.status,
  });

  factory Event.fromFirestore(DocumentSnapshot<Map<String, dynamic>> snapshot) {
    final data = snapshot.data();
    String dateString = data?['DateBook'];
    DateTime eventDate = DateFormat('dd-MMM-yyyy - HH:mm').parse(dateString!);
    return Event(...);
  }

  Map<String, Object?> toFirestore() {...}
}

class EventGroup {
  final String title;
  final List<Event> events;

  EventGroup({required this.title, required this.events});
}
```

Figure 3.4.4.1 Event and EventGroup Class

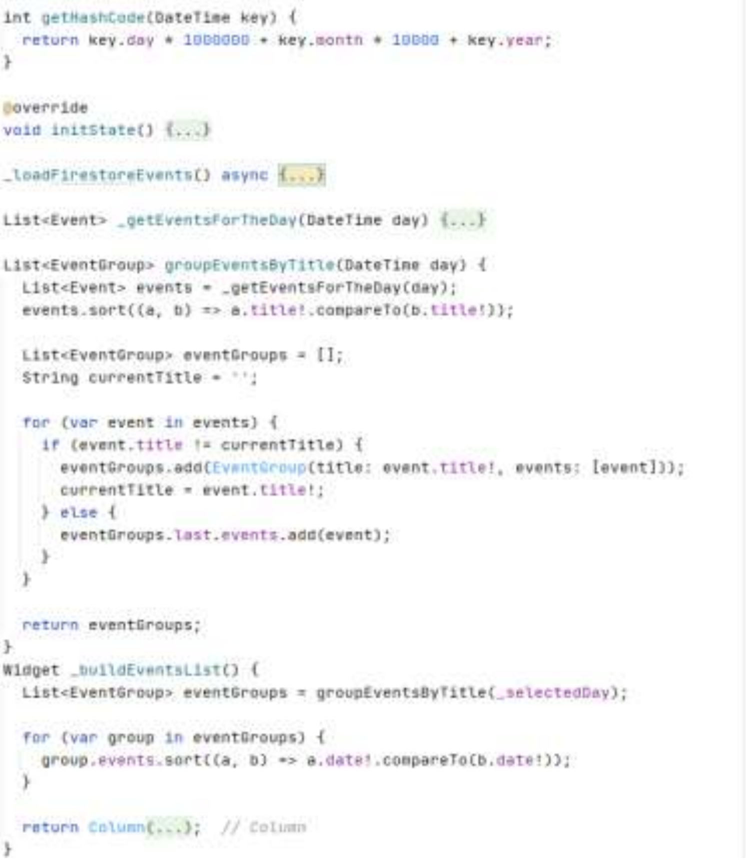
Mobile application Calendar:



```
@override
void initState() {
  _focusedDay = DateTime.now();
  _selectedDay = DateTime.now();
  _firstDay = DateTime(2023, 5, 1);
  _lastDay = DateTime.now().add(const Duration(days: 1000));
  _loadFirestoreEvents();
  super.initState();
  _events = LinkedHashMap(
    equals: isSameDay,
    hashCode: getHashCode,
  );
}

_loadFirestoreEvents() async {
  final user = FirebaseAuth.instance.currentUser;
  if (user != null) {
    final clientEmail = user.email;
    print(clientEmail);
    final querySnapshot = await FirebaseFirestore.instance
        .collection('books')
        .where('client_email', isEqualTo: clientEmail)
        .get();

    for (var doc in querySnapshot.docs) {...}
    setState(() {});
  }
}

List<Event> _getEventsForTheDay(DateTime day) {
  return _events[day] ?? [];
}

Widget build(BuildContext context) {
  return Scaffold(
    body: ListView(
      children: [
        TableCalendar(
          selectedDayPredicate: (day) => isSameDay(day, _selectedDay),
          onDaySelected: (selectedDay, focusedDay) {
```

Figure 3.4.4.2 Mobile Application Calendar Module

Admin Panel :

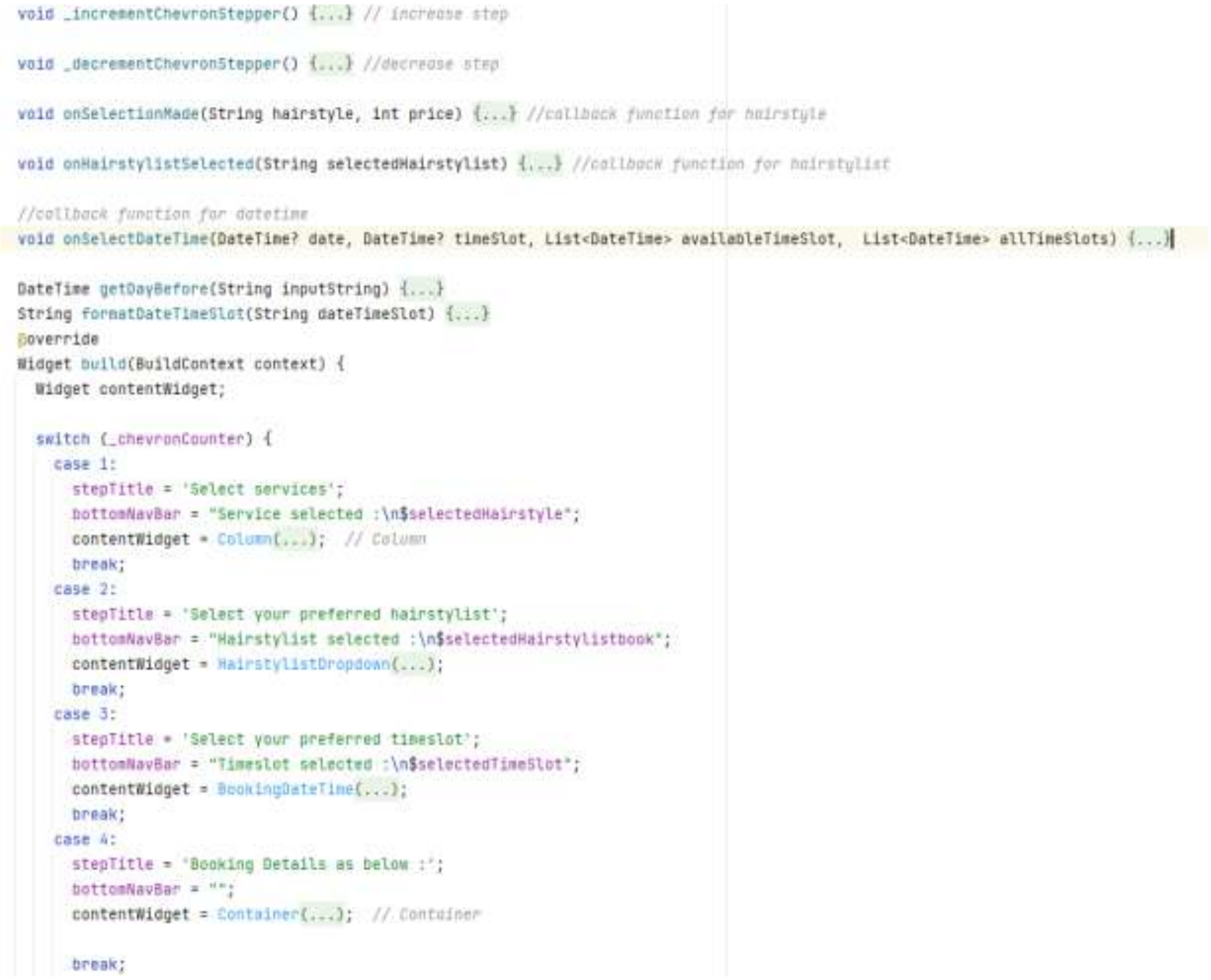


```
int getHashCode(DateTime key) {
  return key.day * 1000000 + key.month * 10000 + key.year;
}

@override
void initState() {...}

_loadFirestoreEvents() async {...}

List<Event> _getEventsForTheDay(DateTime day) {...}

List<EventGroup> groupEventsByTitle(DateTime day) {
  List<Event> events = _getEventsForTheDay(day);
  events.sort((a, b) => a.title!.compareTo(b.title!));

  List<EventGroup> eventGroups = [];
  String currentTitle = '';

  for (var event in events) {
    if (event.title != currentTitle) {
      eventGroups.add(EventGroup(title: event.title!, events: [event]));
      currentTitle = event.title!;
    } else {
      eventGroups.last.events.add(event);
    }
  }

  return eventGroups;
}
Widget _buildEventsList() {
  List<EventGroup> eventGroups = groupEventsByTitle(_selectedDay);

  for (var group in eventGroups) {
    group.events.sort((a, b) => a.date!.compareTo(b.date!));
  }

  return Column(...);  // Column
}
```

Figure 3.4.4.3 Web admin panel Calendar Module

3.4.5 Customers' Booking Process

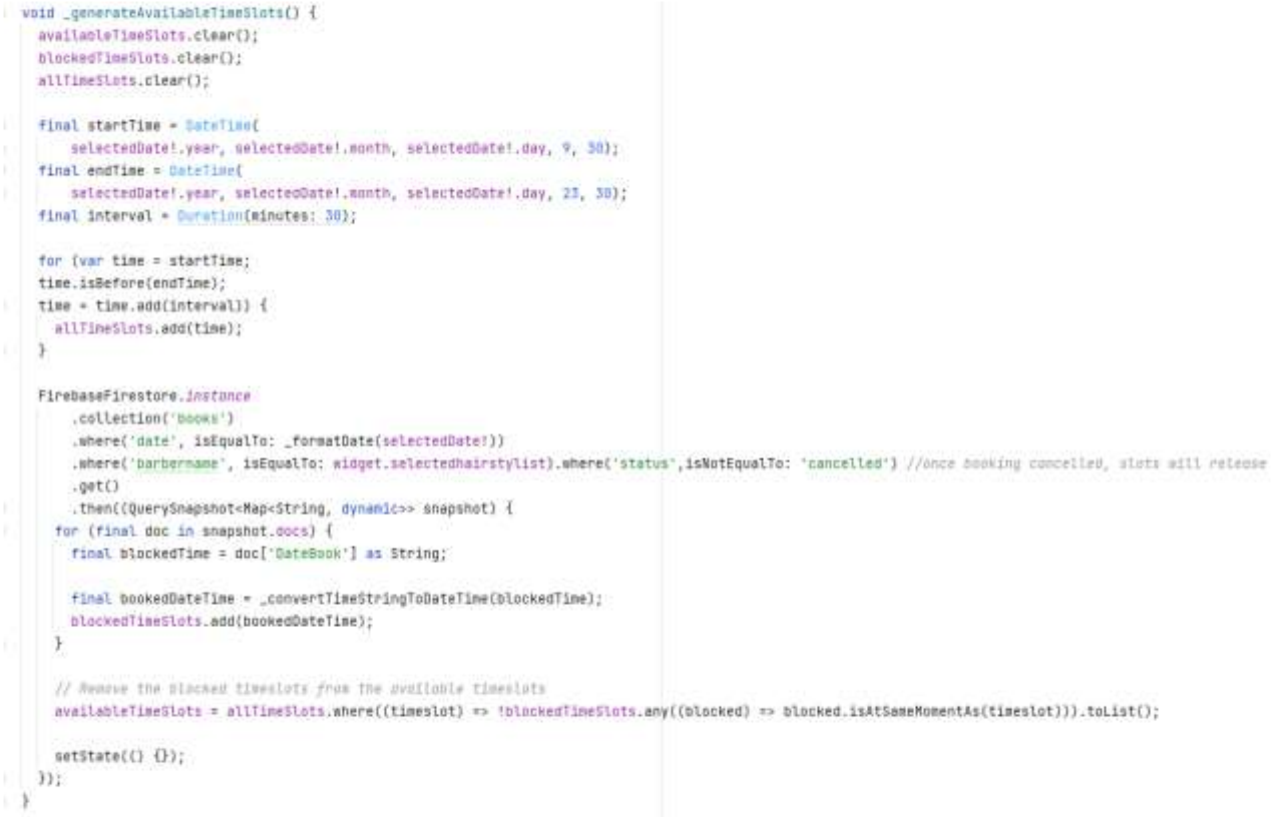
To navigate to booking screens, customers may press the floating action button. A total of four steps will be required for whole booking process which includes select preferred hairstyle, preferred hairstylist , choose available timeslot based on availability of hairstylist and booking confirmation. Stepper package has been applied so that customers are able to track current step.



```
void _incrementChevronStepper() {...} // increase step

void _decrementChevronStepper() {...} //decrease step

void onSelectionMade(String hairstyle, int price) {...} //callback function for hairstyle

void onHairstylistSelected(String selectedHairstylist) {...} //callback function for hairstylist

//callback function for datetime
void onSelectDateTime(DateTime? date, DateTime? timeSlot, List<DateTime> availableTimeSlot,  List<DateTime> allTimeSlots) {...}

DateTime getDayBefore(String inputString) {...}
String formatDateTimeSlot(String dateTimeSlot) {...}
@override
Widget build(BuildContext context) {
  Widget contentWidget;

  switch (_chevronCounter) {
    case 1:
      stepTitle = 'Select services';
      bottomNavBar = "Service selected :\n$selectedHairstyle";
      contentWidget = Column(...);  // Column
      break;
    case 2:
      stepTitle = 'Select your preferred hairstylist';
      bottomNavBar = "Hairstylist selected :\n$selectedHairstylistbook";
      contentWidget = HairstylistDropdown(...);
      break;
    case 3:
      stepTitle = 'Select your preferred timeslot';
      bottomNavBar = "Timeslot selected :\n$selectedTimeSlot";
      contentWidget = BookingDateTime(...);
      break;
    case 4:
      stepTitle = 'Booking Details as below :';
      bottomNavBar = "";
      contentWidget = Container(...);  // Container

      break;
```

Figure 3.4.5.1 Booking Process

To check availability of each hairstylists, the booked timeslots are fetched from Firebase and are sorted based on selection of data from customers. Once the slots are booked by others, it becomes unavailable for subsequent customers to choose.

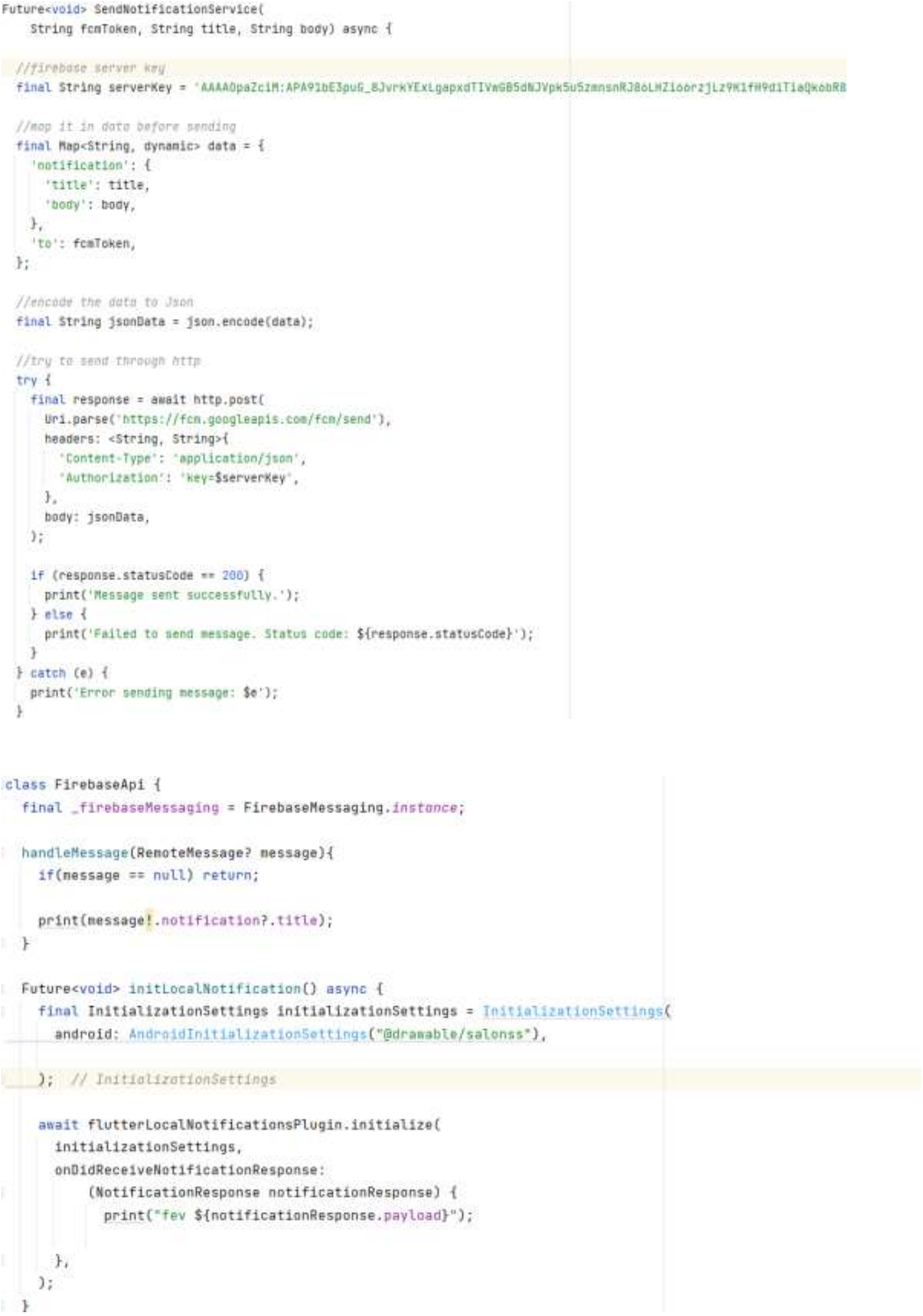


```
void _generateAvailableTimeSlots() {
  availableTimeSlots.clear();
  blockedTimeSlots.clear();
  allTimeSlots.clear();

  final startTime = DateTime(
      selectedDate!.year, selectedDate!.month, selectedDate!.day, 9, 30);
  final endTime = DateTime(
      selectedDate!.year, selectedDate!.month, selectedDate!.day, 23, 30);
  final interval = Duration(minutes: 30);

  for (var time = startTime;
  time.isBefore(endTime);
  time = time.add(interval)) {
    allTimeSlots.add(time);
  }

  FirebaseFirestore.instance
      .collection('books')
      .where('date', isEqualTo: _formatDate(selectedDate!))
      .where('barbername', isEqualTo: widget.selectedhairstylist).where('status',isNotEqualTo: 'cancelled') //once booking cancelled, slots will release
      .get()
      .then((QuerySnapshot<Map<String, dynamic>> snapshot) {
    for (final doc in snapshot.docs) {
      final blockedTime = doc['DateBook'] as String;

      final bookedDateTime = _convertTimeStringToDateTime(blockedTime);
      blockedTimeSlots.add(bookedDateTime);
    }

    // Remove the blocked timeslots from the available timeslots
    availableTimeSlots = allTimeSlots.where((timeslot) => !blockedTimeSlots.any((blocked) => blocked.isAtSameMomentAs(timeslot))).toList();

    setState(() {});
  });
}
```

Figure 3.4.5.2 Generate Available Slots for Booking

3.4.6 Notification Feature

Powered by Firebase push notification technology, notification module operates efficiently through HTTP, ensuring real-time updates and smooth coordination between customers and hairstylists throughout the booking process. Upon a customer's booking, an automatic trigger initiates a notification, informing the selected hairstylist. Subsequently, whether accepting or updating its status, notification will be triggered to the involved users. Additionally, customers or hairstylists are able to view all the history of notification from notification page. Once they have any unread notification, a red indicator will appear stacking on the notification icon from the home page.



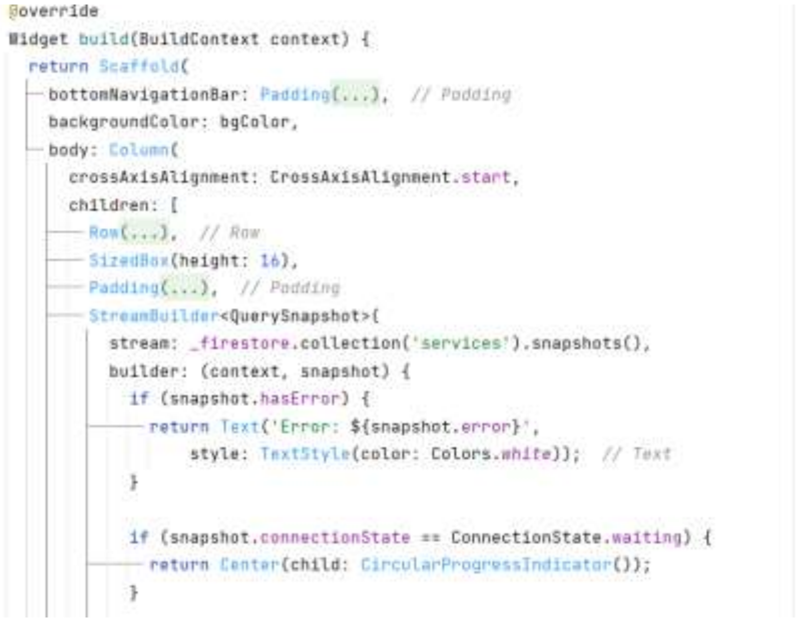
```
Future<void> SendNotificationService(
    String fcmToken, String title, String body) async {

  //firebase server key
  final String serverKey = 'AAAAOpaZciM:APA91bE3puG_8JvrkYExLgapxdTIVwGB5dNJVpk5u5zmnsnRJ8oLMZioorzjLz9K1fH9d1TiaQkobR8

  //map it in data before sending
  final Map<String, dynamic> data = {
    'notification': {
      'title': title,
      'body': body,
    },
    'to': fcmToken,
  };

  //encode the data to Json
  final String jsonData = json.encode(data);

  //try to send through http
  try {
    final response = await http.post(
      Uri.parse('https://fcm.googleapis.com/fcm/send'),
      headers: <String, String>{
        'Content-Type': 'application/json',
        'Authorization': 'key=$serverKey',
      },
      body: jsonData,
    );

    if (response.statusCode == 200) {
      print('Message sent successfully.');
    } else {
      print('Failed to send message. Status code: ${response.statusCode}');
    }
  } catch (e) {
    print('Error sending message: $e');
  }
```

```
class FirebaseApi {
  final _firebaseMessaging = FirebaseMessaging.instance;

  handleMessage(RemoteMessage? message){
    if(message == null) return;

    print(message!.notification?.title);
  }

  Future<void> initLocalNotification() async {
    final InitializationSettings initializationSettings = InitializationSettings(
      android: AndroidInitializationSettings("@drawable/salonss"),

    ); // InitializationSettings

    await flutterLocalNotificationsPlugin.initialize(
      initializationSettings,
      onDidReceiveNotificationResponse:
          (NotificationResponse notificationResponse) {
            print("fev ${notificationResponse.payload}");

      },
    );
  }
```

Figure 3.4.6.1 Notification Feature

3.4.7 Managing Banner, Hairstylist and Services

Managing on Banner, Hairstylist and Services are implemented throughout the process of CRUD (Create, Retrieve , Update, Delete) from the firebase. Through Firebase services such as Firestore and Storage, data persistence and retrieval are facilitated. During the CRUD processes, data are fetched and sent and since it involves network requests, there might be latency or delays. Therefore, loading indicators are implemented to help maintain a smooth user experience for the users.

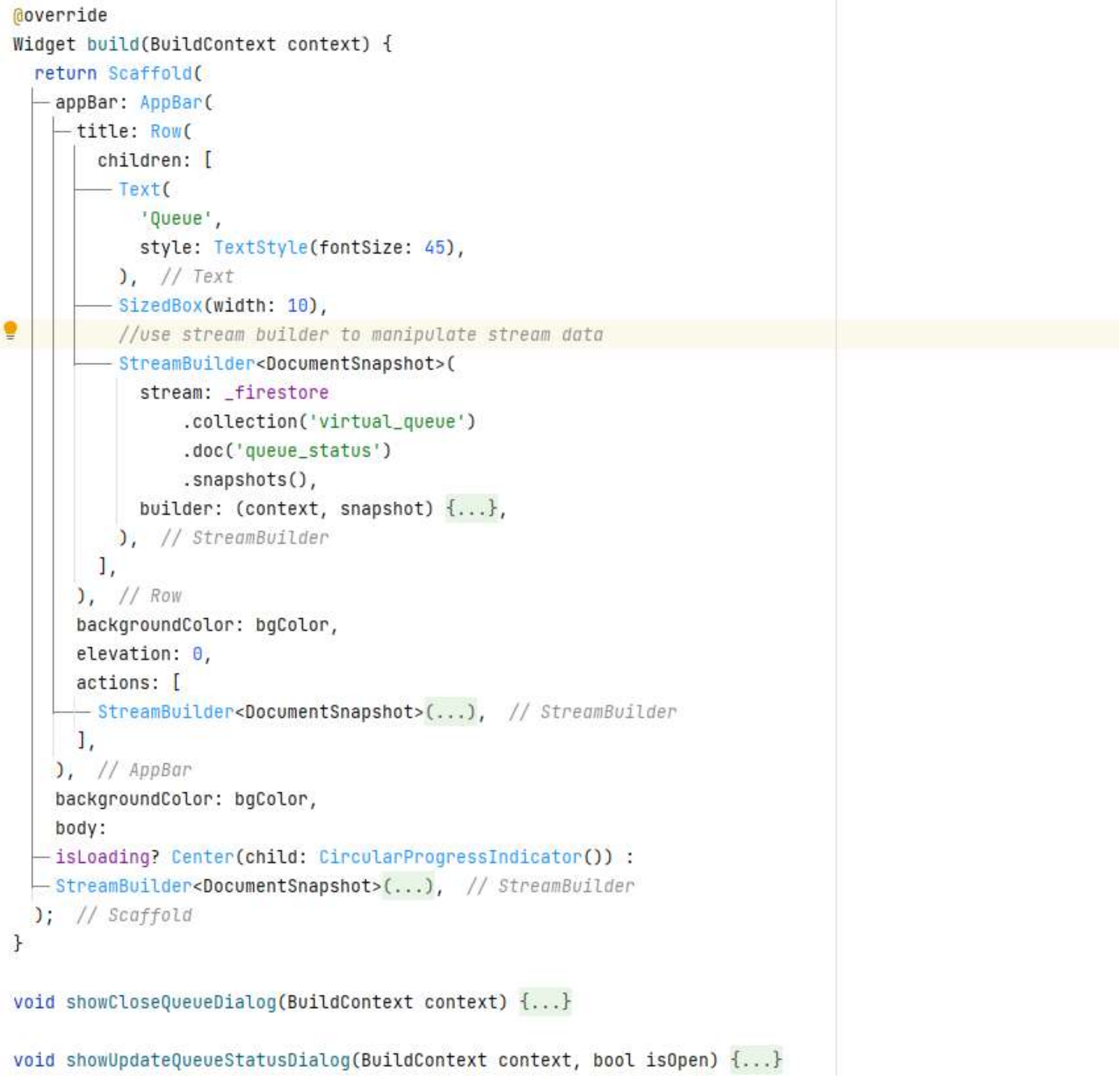


```
@override
Widget build(BuildContext context) {
  return Scaffold(
    bottomNavigationBar: Padding(...),  // Padding
    backgroundColor: bgColor,
    body: Column(
      crossAxisAlignment: CrossAxisAlignment.start,
      children: [
        Row(...),  // Row
        SizedBox(height: 16),
        Padding(...),  // Padding
        StreamBuilder<QuerySnapshot>(
          stream: _firestore.collection('services').snapshots(),
          builder: (context, snapshot) {
            if (snapshot.hasError) {
              return Text('Error: ${snapshot.error}',
                  style: TextStyle(color: Colors.white));  // Text
            }

            if (snapshot.connectionState == ConnectionState.waiting) {
              return Center(child: CircularProgressIndicator());
            }
```

Figure 3.4.7.1 Managing Banner, Hairstylist and Services

3.4.8 Queue Management System

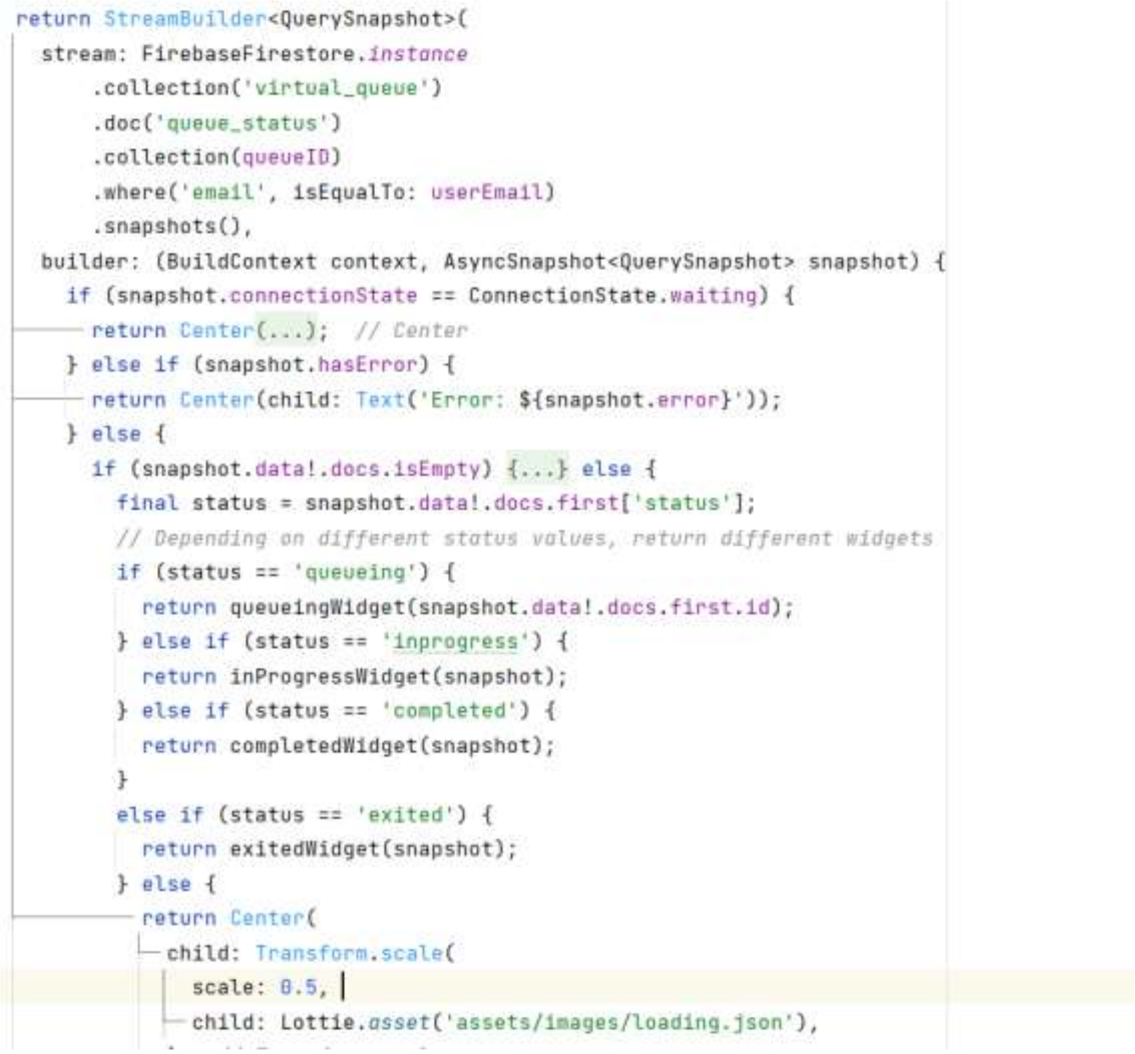
In queue management systems which involves all the user at the same time, efficient data transfer is crucial to ensure smooth real-time updates and interactions. Firebase’s real-time database features such as Firestore has been implemented to ensure the seamless communication between the project and the cloud backend. Stream Builder has been implemented into the project to facilitate continues data synchronization and dynamic UI updates which do not require user to reload the page for any updates. This real-time synchronization ensures that the queue management systems are fairly use among customers with accuracy and responsiveness.



```
@override
Widget build(BuildContext context) {
  return Scaffold(
    appBar: AppBar(
      title: Row(
        children: [
          Text(
            'Queue',
            style: TextStyle(fontSize: 45),
          ),  // Text
          SizedBox(width: 10),
          //use stream builder to manipulate stream data
          StreamBuilder<DocumentSnapshot>(
            stream: _firestore
                .collection('virtual_queue')
                .doc('queue_status')
                .snapshots(),
            builder: (context, snapshot) {...},
          ),  // StreamBuilder
        ],
      ),  // Row
      backgroundColor: bgColor,
      elevation: 0,
      actions: [
        StreamBuilder<DocumentSnapshot>(...),  // StreamBuilder
      ],
    ),  // AppBar
    backgroundColor: bgColor,
    body:
    isLoading? Center(child: CircularProgressIndicator()) :
    StreamBuilder<DocumentSnapshot>(...),  // StreamBuilder
  );  // Scaffold
}

void showCloseQueueDialog(BuildContext context) {...}

void showUpdateQueueStatusDialog(BuildContext context, bool isOpen) {...}
```

Figure 3.4.8.1 Queue Management System (Admin Panel)

For customers, interfaces will be updates on each stages as Stream Builder have been implemented. Furthermore, calculation of estimated wait time for each customer will be done in backend where the system will check for the availability of hairstylists and calculate based on current queue situation to display to customers.

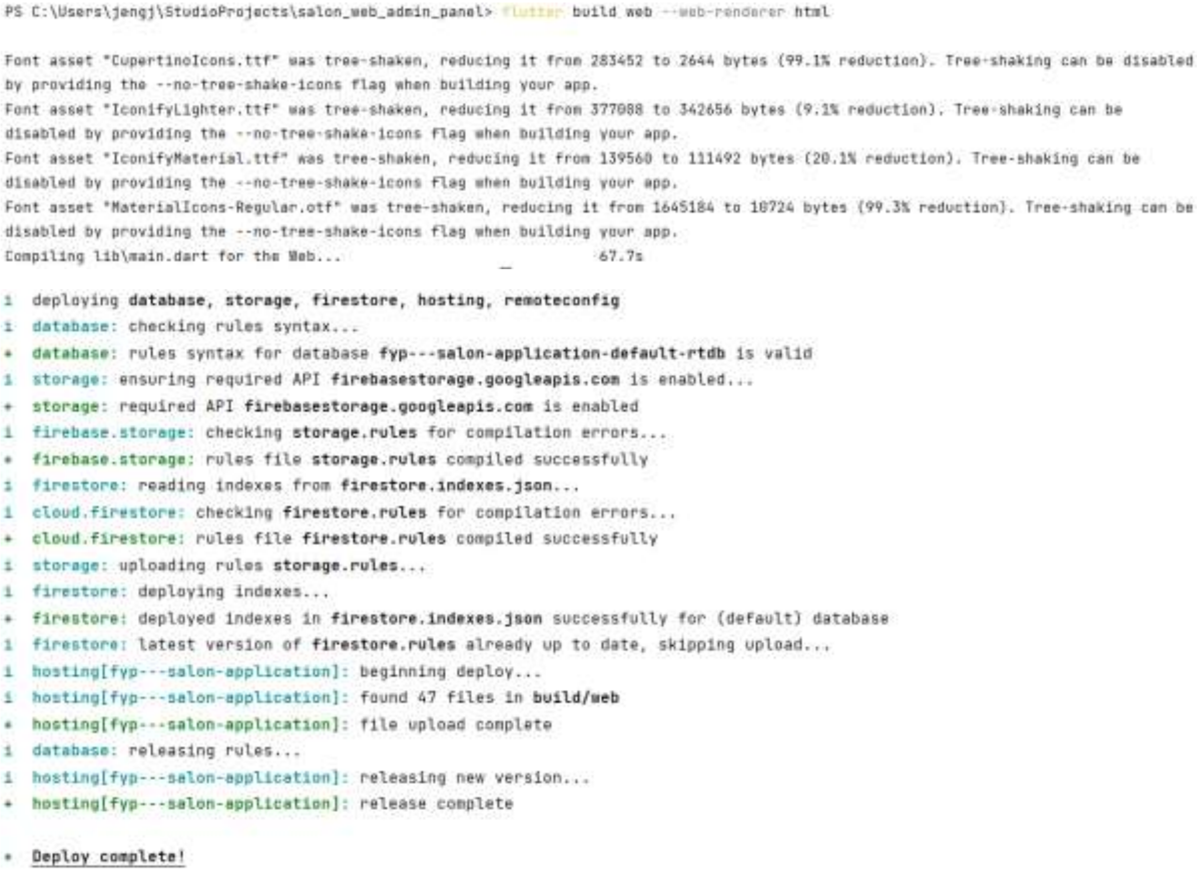


```
return StreamBuilder<QuerySnapshot>(
  stream: FirebaseFirestore.instance
      .collection('virtual_queue')
      .doc('queue_status')
      .collection(queueID)
      .where('email', isEqualTo: userEmail)
      .snapshots(),
  builder: (BuildContext context, AsyncSnapshot<QuerySnapshot> snapshot) {
    if (snapshot.connectionState == ConnectionState.waiting) {
      return Center(...);  // Center
    } else if (snapshot.hasError) {
      return Center(child: Text('Error: ${snapshot.error}'));
    } else {
      if (snapshot.data!.docs.isEmpty) {...} else {
        final status = snapshot.data!.docs.first['status'];
        // Depending on different status values, return different widgets
        if (status == 'queueing') {
          return queueingWidget(snapshot.data!.docs.first.id);
        } else if (status == 'inprogress') {
          return inProgressWidget(snapshot);
        } else if (status == 'completed') {
          return completedWidget(snapshot);
        }
        else if (status == 'exited') {
          return exitedWidget(snapshot);
        } else {
          return Center(
            child: Transform.scale(
              scale: 0.5,
              child: Lottie.asset('assets/images/loading.json'),
```

Figure 3.4.8.2 Queue Management System (Customers)

3.4.9 Hosting on Firebase (Web Admin Panel)

Flutter web applications, built using the Flutter framework, can be easily hosted on Firebase by following a few simple steps. Firstly, will be build web renderer for html in flutter project as the websites or webapp recognizes on html only. Then, implement firebase.json file into project and integrate the project with Firebase account. Lastly, deploy the project to websites or webapp by specifying firebase deploy on terminal. Once the project has been deployed to web, it can be downloaded into a web app.



```
PS C:\Users\jengj\StudioProjects\salon_web_admin_panel> flutter build web --web-renderer html

Font asset "CupertinoIcons.ttf" was tree-shaken, reducing it from 283452 to 2644 bytes (99.1% reduction). Tree-shaking can be disabled
by providing the --no-tree-shake-icons flag when building your app.
Font asset "IconifyLighter.ttf" was tree-shaken, reducing it from 377088 to 342656 bytes (9.1% reduction). Tree-shaking can be
disabled by providing the --no-tree-shake-icons flag when building your app.
Font asset "IconifyMaterial.ttf" was tree-shaken, reducing it from 139560 to 111492 bytes (20.1% reduction). Tree-shaking can be
disabled by providing the --no-tree-shake-icons flag when building your app.
Font asset "MaterialIcons-Regular.otf" was tree-shaken, reducing it from 1645184 to 10724 bytes (99.3% reduction). Tree-shaking can be
disabled by providing the --no-tree-shake-icons flag when building your app.
Compiling lib\main.dart for the Web...                              67.7s

i  deploying database, storage, firestore, hosting, remoteconfig
i  database: checking rules syntax...
+  database: rules syntax for database fyp---salon-application-default-rtdb is valid
i  storage: ensuring required API firebasestorage.googleapis.com is enabled...
+  storage: required API firebasestorage.googleapis.com is enabled
i  firebase.storage: checking storage.rules for compilation errors...
+  firebase.storage: rules file storage.rules compiled successfully
i  firestore: reading indexes from firestore.indexes.json...
i  cloud.firestore: checking firestore.rules for compilation errors...
+  cloud.firestore: rules file firestore.rules compiled successfully
i  storage: uploading rules storage.rules...
i  firestore: deploying indexes...
+  firestore: deployed indexes in firestore.indexes.json successfully for (default) database
i  firestore: latest version of firestore.rules already up to date, skipping upload...
i  hosting[fyp---salon-application]: beginning deploy...
i  hosting[fyp---salon-application]: found 47 files in build/web
+  hosting[fyp---salon-application]: file upload complete
i  database: releasing rules...
i  hosting[fyp---salon-application]: releasing new version...
+  hosting[fyp---salon-application]: release complete

+  Deploy complete!
```

Figure 3.4.9.1 Web Hosting Deployment

3.4.10 Virtual Hairstyle Try on

3.4.10.1 Overview

The Hairstyle Filter module seamlessly integrates 3D modeling with Blender, augmented reality (AR) technology via DeepAR Studio, and Flutter mobile application development to offer customers an immersive experience in trying on various hairstyles virtually. Through real-time visualization on their device's camera feed, customers can explore different haircuts and styles, empowering them to discover hairstyles they like and potentially consult hairstylists for further guidance or execution. Additionally, users have the option to experiment with different hair colors, allowing them to preview potential coloring options and further customize their desired look. This module not only engages users but also shows how AR can innovate personal grooming and self-expression.

3.4.10.2 Creating 3D objects

Blender is a widely used open-source software for 3D modeling, animation and rendering. It offers a comprehensive set of tools and features for creating detailed and realistic 3D objects. To create 3D objects for different type of hairstyle, Blender provides the necessary tools for designing various hairstyle in digital form. This process involves shaping and styling virtual hair strands to resemble real-world hairstyles, considering factors such as length, volume, and texture. Additionally, Blender supports the creation of complex hair physics and dynamics, facilitating the generation of realistic movements. Once hairstyles are created in Blender, they are exported in compatible format such as .obj or .fbx to be integrated in next step.

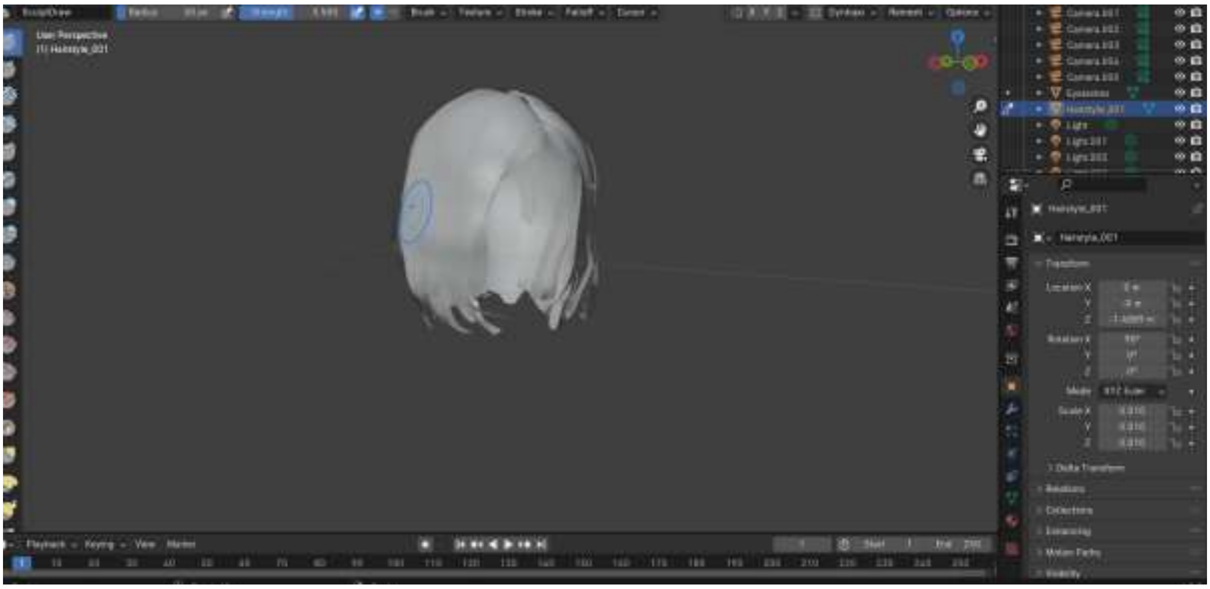


Figure 3.4.10.1 Blender Object

3.4.10.3 Implementation of DeepAR Studio Software

DeepAR Studio, an AR development platform for AR filters which can empowers developers with intuitive tools for seamlessly integrating 3D models, animations and visual effects for real-world environments. Within DeepAR Studio, the 3D models created in Blender are integrated, allowing for the positioning and scaling of hairstyles onto visual guides such as a fake human skull or face mesh. This guarantees accurate alignment and realism within the augmented reality encounter. Additionally, DeepAR Studio provides tools for applying hair colors, shading, and other visual effects, enhancing the appearance of the virtual hairstyles and enabling users to explore various hair color options realistically. Lastly, the filter can be exported into .deepar format files to be integrated into the project.

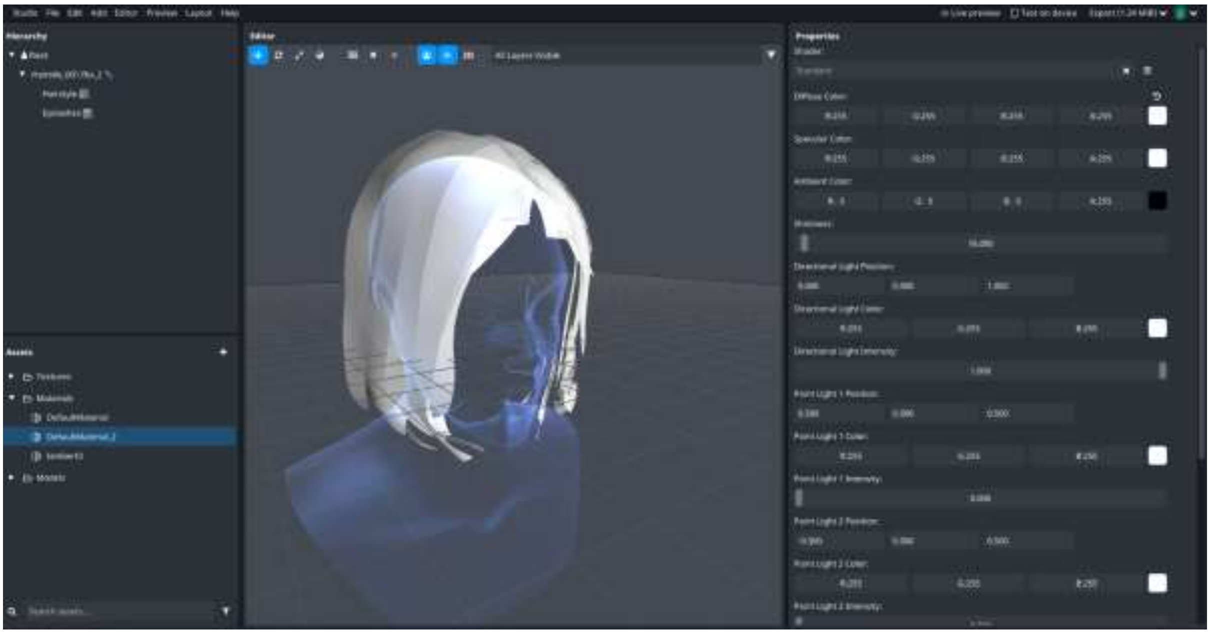


Figure 3.4.10.2 DeepAR Studio

3.4.10.4 Development and Integration of Flutter and DeepAR Studio

To integrate between Flutter projects with DeepAR Studio, API key is required to be generated from DeepAR Studio to establish communication between each other. Furthermore, on the Flutter side, it is required to implement “deepar_flutter” packages into the project with provide functionality such as taking images, live AR preview, flip camera and so on with DeepAR Studio backend. On the backend side, additional logic to handle data exchange and processing are required such as handling authentication and optimizing data flow for performance.

Once integration has been done, development of code continues with a focus on enhancing the functionalities with the front-end for better interaction with the users. This involves color selection of virtual hairstyle , changing to other virtual hairstyle and capture images. Throughout this phase, continuous testing is needed to identify and address any issues or improvements needed.

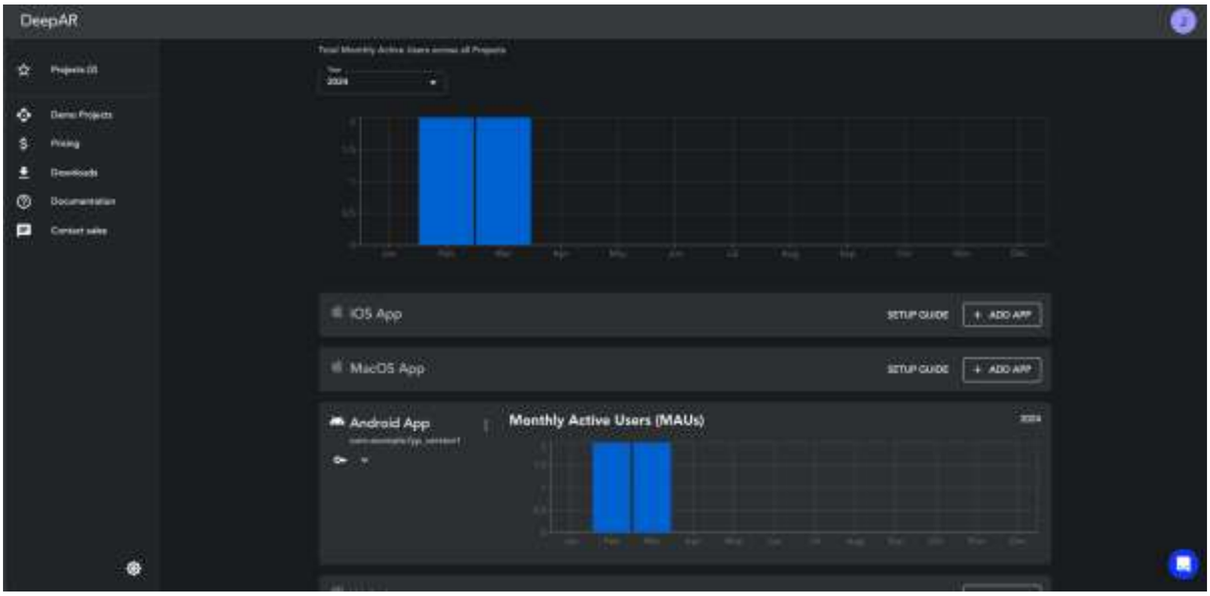
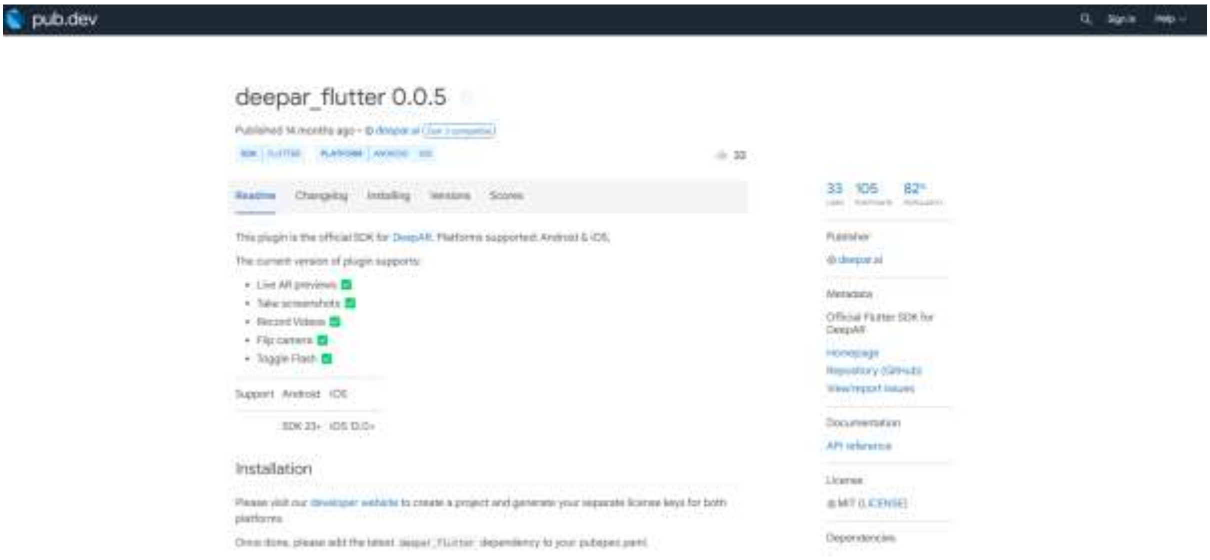


Figure 3.4.10.3 DeepAR Studio Developer



deepar_flutter 0.0.5

Published 14 months ago • deepar.ai (Dart 3 compatible)

SDK | FLUTTER PLATFORM | ANDROID IOS 33

Readme Changelog Installing Versions Scores

33 LIKES 105 PUB POINTS 82% POPULARITY

This plugin is the official SDK for DeepAR. Platforms supported: Android & iOS.

The current version of plugin supports:

- Live AR previews ✅
- Take screenshots ✅
- Record Videos ✅
- Flip camera ✅
- Toggle Flash ✅

Support	Android	iOS
	SDK 21+	iOS 13.0+

Installation

Please visit our developer website to create a project and generate your separate license keys for both platforms.

Once done, please add the latest deepar_flutter dependency to your pubspec.yaml.

Publisher

deepar.ai

Metadata

Official Flutter SDK for DeepAR

Homepage
Repository (GitHub)
View/report issues

Documentation

API reference

License

MIT (LICENSE)

Dependencies

Figure 3.4.10.4 DeepAR Flutter Dependencies

3.5 Summary

This chapter delves into the meticulous design and development process of the proposed system, offering a comprehensive overview of its functionalities and the technologies employed. It begins by detailing use-case descriptions, covering various aspects such as user registration, login, booking, profile viewing, and notification management. The development process unfolds with the utilization of the Flutter framework, Dart programming language, and Firebase backend solution, facilitating real-time database capabilities and user authentication. Specific modules like the calendar view, booking process, notification feature, and management of banners, hairstylists, and services are thoroughly explained alongside their implementation methods. Furthermore, the chapter introduces a Virtual Hairstyle Try-on module, showcasing the integration of 3D modeling from Blender with augmented reality technology through DeepAR Studio and Flutter.

CHAPTER 4 METHODOLOGY AND TOOLS

4.1 Overview

In Methodology and Tools chapter, the methodology along with tools including both hardware and software are discussed. Moreover, timeline of the whole project is detailed in this chapter by visualizing in Gantt Chart format.

4.2 Methodology

SDLC methodology is often used for development of smaller and non-critical projects. The most suitable methodology for the proposed system is Rapid Application Development (RAD). RAD is an agile project management strategy and is suitable for fast, small project development. Moreover, it provides business value sooner compared to other methodologies which suits this proposed project well. In RAD, there are four phases which are requirements planning, prototyping, rapid construction and implementation [13].

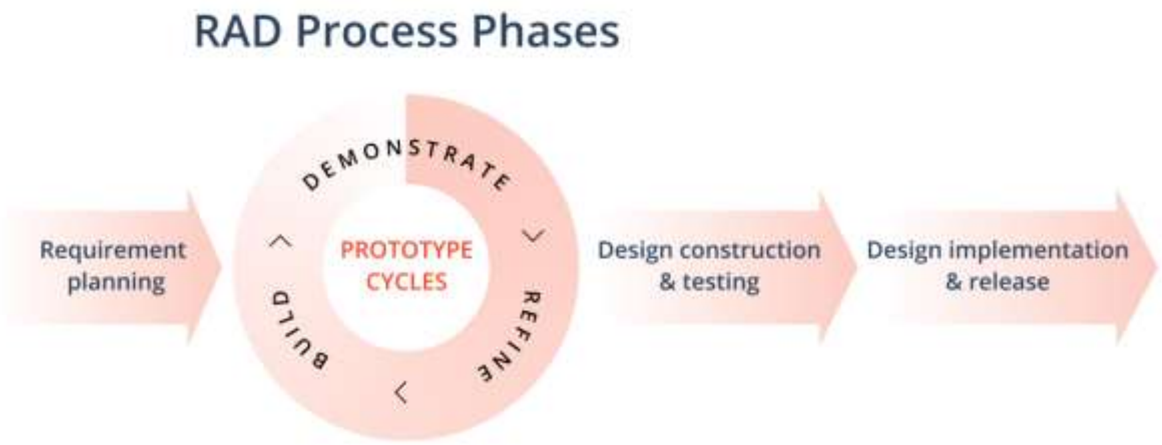


Figure 4.2.1 RAD Methodology [14]

4.2.1 Phase 1 – Requirement Planning

Requirement planning phase is the first phase where the developer collects all the requirements for the system. Besides requirements, project developer should conduct feasibility analysis such as technical feasibility. Technical Feasibility is defined as the challenges of the system during development. The background of the proposed system will be studied to briefly explained the whole project. For the salon management system, four similar existing systems have been reviewed in terms of functionalities, strengths and weaknesses. In the proposed system, problem statement which includes hairstylist reviewing system, physical queue management and traditional appointment booking system will be resolved with the proposed objectives. Furthermore, different existing systems has been reviewed in the literature review chapter to study their strengths and weaknesses of them. In Chapter 2, SalonAppy, MyCuts, DaySmart Salon and Book & S system have been reviewed and compared with each other including the proposed system. Once all requirements have been gathered, the project progress is able to move to the second phase.

4.2.2 Phase 2 – Prototyping

Prototyping is a phase where the development process is a cycle to keep redemonstrating redefining and rebuilding the system. The main focus during this phase will be the prototyping and it might be a working or not working prototype. Prototype of all modules such as login and logout module, profile module, schedule module, queue module and review module will be done during second phase of the project. In proposed system, interface or front-end of the system will be designed and evaluated. In the proposed system, UI design will be done in Flutter to check on all the outputs of the system before and after integration with backend and other modules.

4.2.3 Phase 3 – Rapid Construction

During third phase of methodology, the main focus will be on changing prototyping into a working model and perform testing on each module. Programming languages will be important during this phase to ensure that there is no delay towards the project. Hence, this phase might take longer time compared to other phases. For the proposed system, the main programming language will be using Dart and Firebase for front-end and back-end development. Lastly, unit and integration testing will be done to ensure that the results meet the requirements and objectives of the project. The objectives of the projects are to develop a better salon management system compared to the existing system and the outcome of the system will be evaluated to check on the deliverables of the whole project.

4.2.4 Phase 4 – Product finalization and release

In the final phase of RAD, whole system will be checked for finalization and testing will be done before release. Different testing plans such as black box testing and white box testing to test on the interface, feature, functionality, and database will be carried out to ensure that the whole system is completely working fine for the user. For black box testing in the proposed system, a lot of dummy data for customers and employees will be used after integrating all the modules into one system. Each module such as appointment module, and report module will also be tested with dummy data. For the proposed system, it is important to do testing as there are three types of users in the system which is admin, hairstylists and customers. Once the system is completed, it is ready to be released and commercialized.

4.3 Development tools

4.3.1 Hardware

Hardware development tools involve both laptop and mobile devices. Laptop is used to code the system while final testing will be run in emulator (mobile device) & physical phone for mobile application and Microsoft Edge/Google Chrome will be used for web admin panel.

Laptop :

Table 4.3.1.1 Laptop Specifications

Component	**Specifications**
Operating System	Windows 11 Home
Processor	Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz 2.11 GHz
Storage	512 GB SSD
Memory	12.0 GB (11.8GB useable)
Graphic Card	NVIDIA GeForce MX330
Input	Keyboard and mouse
System Type	64-bit operating system, x64-based processor

Mobile Device:

Table 4.3.1.2 Mobile Device Specifications

Component	Specifications
Model	Google Pixel 6 (Emulator) & Samsung Galaxy S22 (Physical Phone)
Processor	Qualcomm SDM730 Snapdragon 730 (8 nm) & Snapdragon 8 Gen 1
Operating System	Android 12
UI version	One UI 6.1

Memory	8GB RAM
Storage	128GB ROM

4.3.2 Software Requirements

Table 4.3.2.1 Software Requirements

Component	**Requirements**
Tools	**Android Studio** Android Studio is a free IDE for developers to build, test and debug for mobile application development. It provides a lot of analysis frameworks and faster coding with quick iteration as it is powered by the IntelliJ IDEA. Additionally, Android Studio allows connection with Firebase and Integrated cloud support for backend development. In this proposed system, Android Studio is used as there are many frameworks to be included in the development system.
	Firebase Firebase is a cloud-hosted NoSQL database, unlike traditional database which uses relational database schema. It can be used for cloud-based appointments as well as queue management systems as they need online databases. However, there are cons using Firebase such as the configuration might be harder than a relational database and NoSQL do not support ACID (atomicity, consistency, isolation and durability) characteristic. [13] In this proposed system, firebase is used as there will be a virtual queueing system and cloud-based appointment scheduling in terms of meeting the objectives of the proposed system. Firebase provides real-time database which is more suitable compared to other databases in this proposed system.
	Blender 4.0 Blender 4.0 is the latest iteration of the renowned open-source 3D modeling, animation, and rendering software. Users can expect a more intuitive interface with updated tools and features to empower creativity and efficiency. Additionally, Blender 4.0 continues to support a vibrant

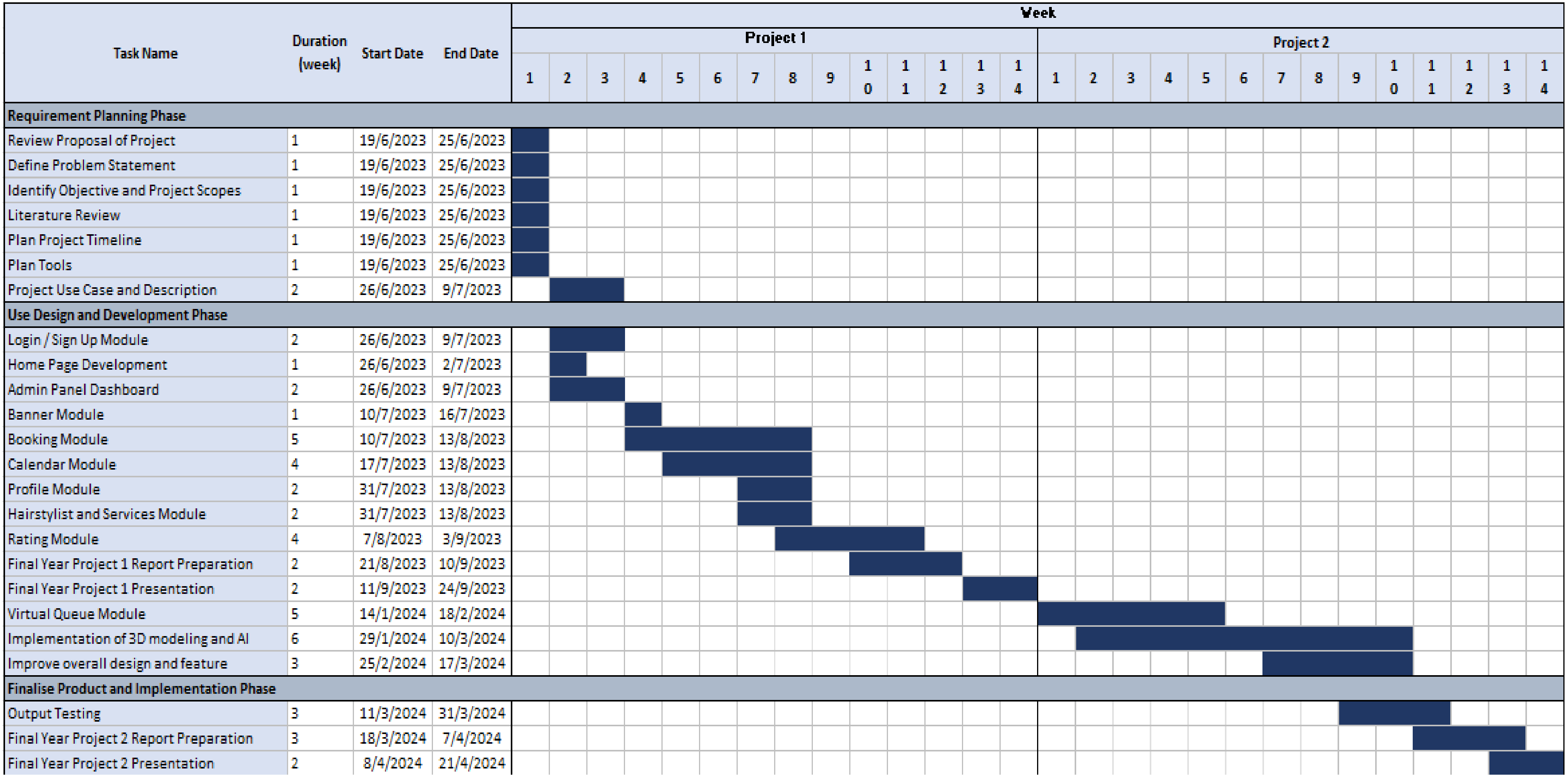
	community of artists, developers, and enthusiasts, fostering collaboration and innovation in the world of 3D content creation.
Languages, Libraries and Frameworks	**Flutter** Flutter is an open-source UI software development kit created by Google, designed to build natively compiled applications for mobile, web, and desktop from a single codebase. It uses Dart programming language and offers a rich set of pre-built widgets for crafting sleek and responsive user interfaces. Flutter's hot reload feature enables developers to quickly iterate and see changes in real-time, fostering rapid development.
	Augmented Reality Augmented Reality (AR) is a technology that overlays digital information, such as images, videos, or 3D models, onto the real world through devices like smartphones, tablets, or specialized AR glasses. By combining computer-generated elements with the user's environment in real-time, AR enhances perception and interaction with the physical world.

4.4 Timeline

4.4.1 Overview

The whole proposed system timeline is based on the methodology chosen while is rapid application development. During the first phrase which is on requirement gathering phase, proposal is reviewed to define problem statement, objectives as well as project scope. Additionally, literature review on existing system is conducted to gain insights into existing systems and best practices. Following the requirement planning phase, design and development phase begins. During this stage, creation of use case and its descriptions are created. Subsequently, modules such as login/sign up , home page, admin panel , booking module, calendar module, profile module, hairstylists and services module as well as rating module have been implemented during final year project 1. All of the modules have been implemented within the timeline outline in the project plan, ensuring timely progress. Moving forward, remaining modules have been developed in final year project 2 which are still under design and development phase. Once all of the modules have been developed, integration has been done as well under rapid construction phase. Then on the final stage, testing which involves output testing has conducted to ensure the robustness and reliability of the system.

4.4.2 Gantt Chart



Task Name	Duration (week)	Start Date	End Date	Week																											
				Project 1														Project 2													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Requirement Planning Phase																															
Review Proposal of Project	1	19/6/2023	25/6/2023	■																											
Define Problem Statement	1	19/6/2023	25/6/2023	■																											
Identify Objective and Project Scopes	1	19/6/2023	25/6/2023	■																											
Literature Review	1	19/6/2023	25/6/2023	■																											
Plan Project Timeline	1	19/6/2023	25/6/2023	■																											
Plan Tools	1	19/6/2023	25/6/2023	■																											
Project Use Case and Description	2	26/6/2023	9/7/2023		■	■																									
Use Design and Development Phase																															
Login / Sign Up Module	2	26/6/2023	9/7/2023		■	■																									
Home Page Development	1	26/6/2023	2/7/2023		■																										
Admin Panel Dashboard	2	26/6/2023	9/7/2023		■	■																									
Banner Module	1	10/7/2023	16/7/2023				■																								
Booking Module	5	10/7/2023	13/8/2023				■	■	■	■	■																				
Calendar Module	4	17/7/2023	13/8/2023					■	■	■	■																				
Profile Module	2	31/7/2023	13/8/2023							■	■																				
Hairstylist and Services Module	2	31/7/2023	13/8/2023							■	■																				
Rating Module	4	7/8/2023	3/9/2023								■	■	■	■																	
Final Year Project 1 Report Preparation	2	21/8/2023	10/9/2023										■	■	■																
Final Year Project 1 Presentation	2	11/9/2023	24/9/2023													■	■														
Virtual Queue Module	5	14/1/2024	18/2/2024															■	■	■	■	■									
Implementation of 3D modeling and AI	6	29/1/2024	10/3/2024																■	■	■	■	■	■	■	■	■				
Improve overall design and feature	3	25/2/2024	17/3/2024																					■	■	■	■				
Finalise Product and Implementation Phase																															
Output Testing	3	11/3/2024	31/3/2024																							■	■	■			
Final Year Project 2 Report Preparation	3	18/3/2024	7/4/2024																									■	■	■	
Final Year Project 2 Presentation	2	8/4/2024	21/4/2024																											■	■

Figure 4.4.2.1 Gantt chart

4.5 Summary

Chapter 4 outlines the methodology employed in developing the salon management system, along with the hardware and software tools utilized. The chosen methodology is Rapid Application Development (RAD), known for its agility and fast project development. It consists of four phases: Requirement Planning, Prototyping, Rapid Construction, and Product Finalization and Release. Each phase is detailed, explaining its objectives and activities. Additionally, the chapter provides an overview of the hardware specifications, including laptops and mobile devices, along with the software requirements such as Android Studio, Firebase, Blender 4.0, Flutter, and Augmented Reality. The timeline of the project is presented in a Gantt chart format, depicting the various phases of development and their corresponding activities. Overall, this chapter offers a comprehensive understanding of the development process and the tools utilized in creating the salon management system.

CHAPTER 5 IMPLEMENTATION AND TESTING

5.1 Overview

A total of 8 modules are developed including Login/ Sign Up module, Appointment and Scheduling module, Review module, Calendar module, Notification module, Managing Banner, Hairstylist and Services module, Virtual Queue Management module as well as Virtual Hairstyle Try-on module. These modules involve three different users. For hairstylists and customers, flutter mobile is developed while flutter web is implemented for admin.

5.2 Mobile Application

5.2.1 Login/Sign Up Module (Customers and Hairstylists)

Customers and Hairstylists shares the same login pages, but they will be directed to different page after authentication. Splash screen will be showing for newly download users. Customers may create a new account before using the application. Email, username gender and password are mandatory to be filled during registration process. If customers or hairstylists have forgot their password, they can reset it. An email will send to their email account and link will be given for changing his or her password.

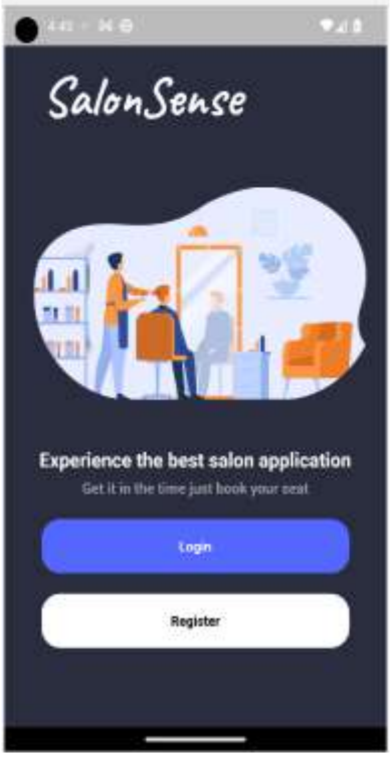

SalonSense
Experience the best salon application
Get it in the time just book your seat
Login
Register

Figure 5.2.1.1 Splash Screen

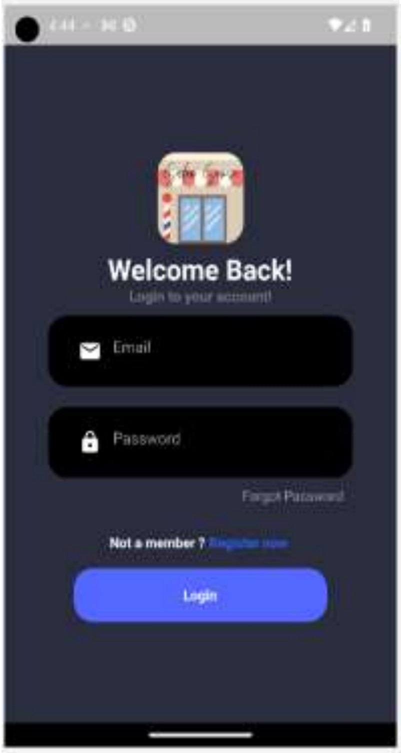


Figure 5.2.1.2 Login Screen

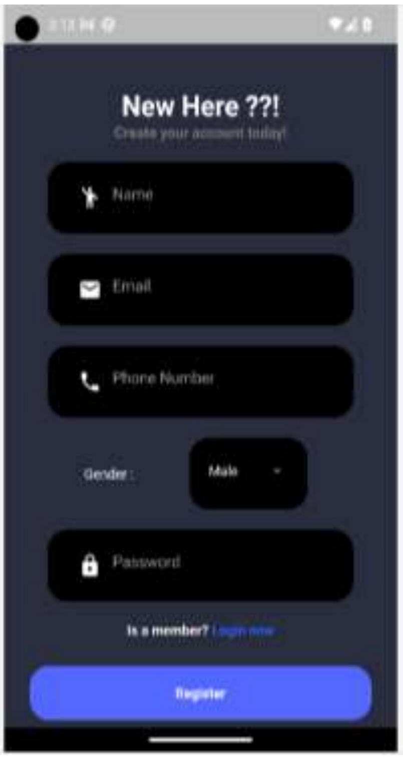


Figure 5.2.1.3 Register Screen

5.2.2 Homepage and Profile Page (Customers)

Once customers have successfully logged in or created a new account, they will be redirected to the homepage. Homepage will be default first page under bottom navigation bar. Homepage will show banner which controlled by admin, customers upcoming booking and also all the hairstylist profile where customers may check on their details and ratings. Customers can also navigate to profile page by clicking on the image icon on the top right. Floating action button with plus icon will always be displayed which can redirect users to booking page. Profile page will be showing necessary details and functions for customers to logout or edit profile picture or username.

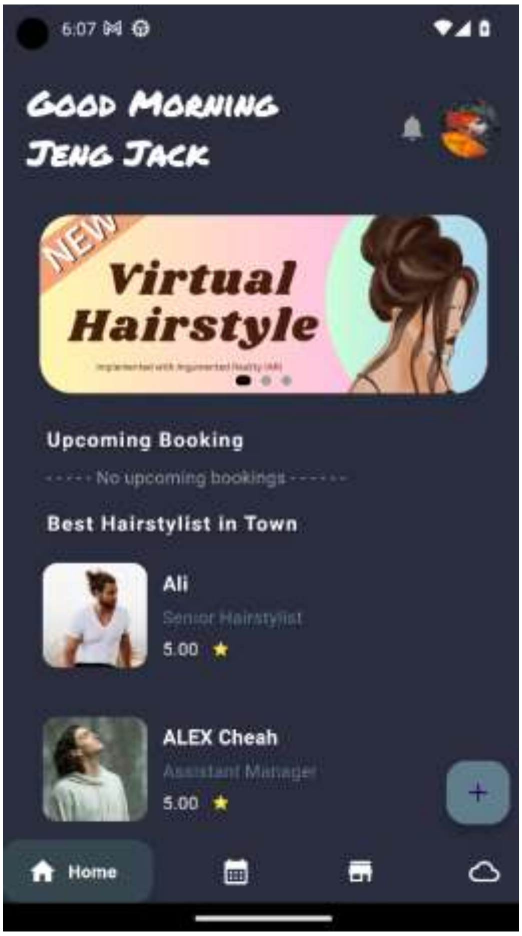


Figure 5.2.2.1 Customer Homepage

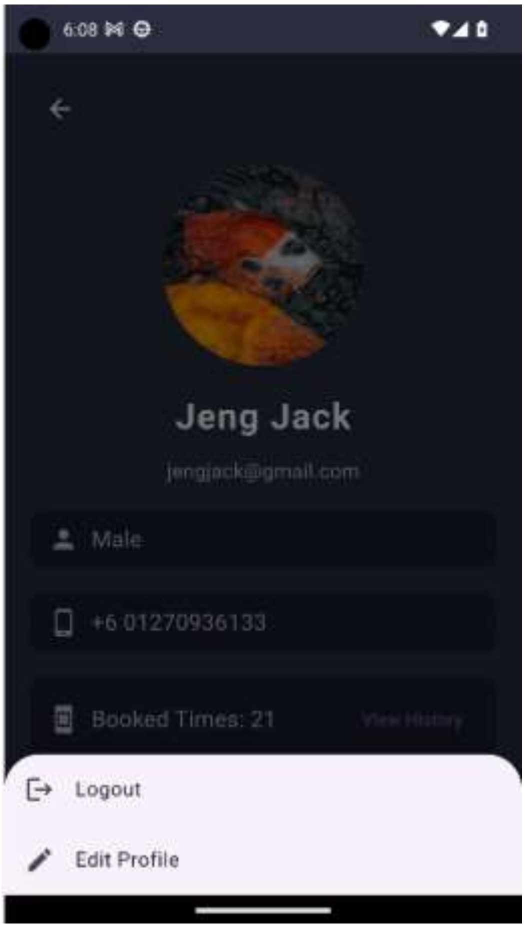
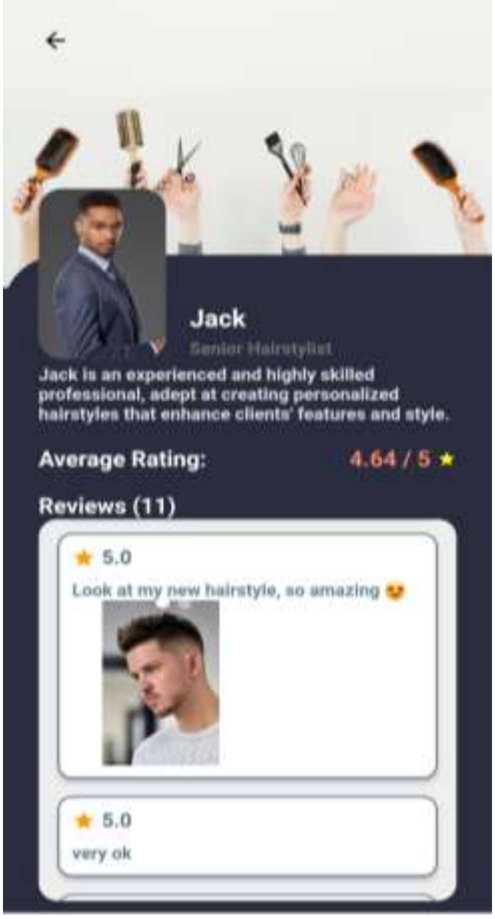


Figure 5.2.2.2 Profile Page

5.2.3 Hairstylist profile page (Customers)

On the homepage, all the hairstylists will be displayed, and customers may click on them to view hairstylist profile page. Hairstylist profile page will be showing hairstylist details, average rating as well as the ratings given by customers. This ensures transparency as hairstylist have no rights to change the ratings as well.



Jack

Senior Hairstylist

Jack is an experienced and highly skilled professional, adept at creating personalized hairstyles that enhance clients' features and style.

Average Rating: 4.64 / 5 ★

Reviews (11)

★ 5.0

Look at my new hairstyle, so amazing 😍

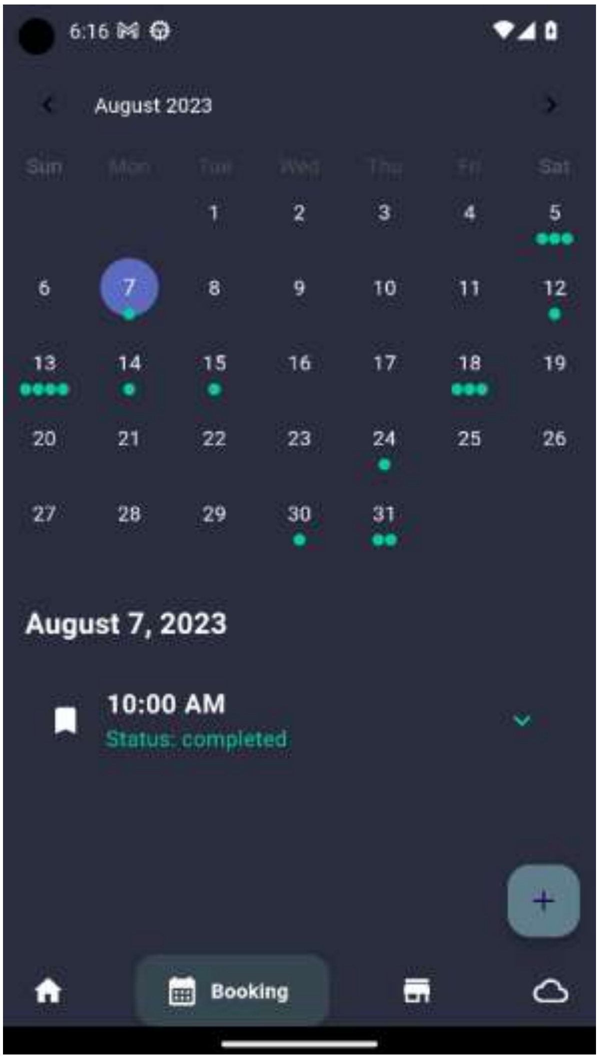
★ 5.0

very ok

Figure 5.2.3 Hairstylist profile page (Customer)

5.2.4 Calendar Module (Customers)

Second navigation button under navigation bar will redirect user to calendar page. Customer's booking will be mapped into calendar and days with booking will have indicator on it. It is scrollable to left and right for next or previous month. Customers may press on any day and if there is booking on that day, booking list will be showing below the calendar. Else, it will be showing "No booking on this day". Cancellation of booking is available for users if they have changed their mind. Also, reviews will be displayed under the list tile if they have submitted the ratings, and they can view back the images that are provided by them in case of any.

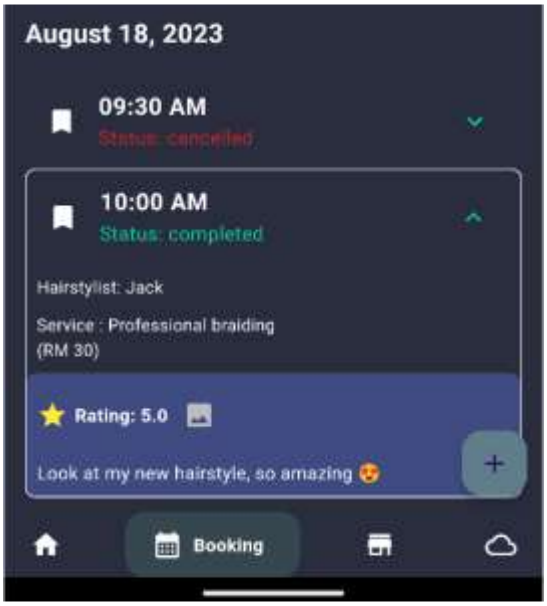


Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

August 7, 2023

10:00 AM
Status: completed

Figure 5.2.4.1 Calendar Module (Customer)



August 18, 2023

09:30 AM
Status: cancelled

10:00 AM
Status: completed

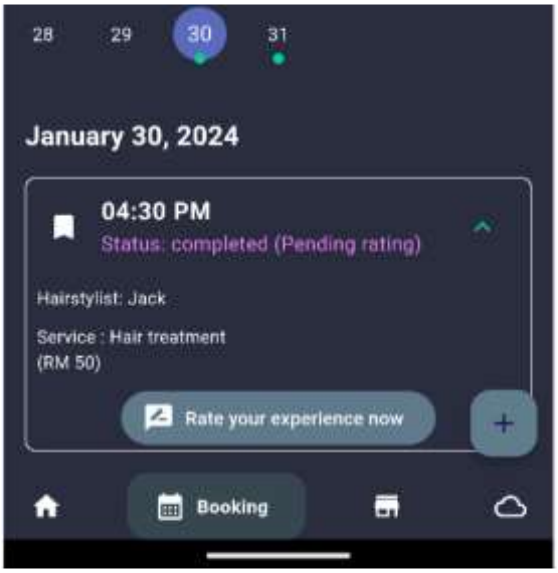
Hairstylist: Jack

Service : Professional braiding (RM 30)

Rating: 5.0

Look at my new hairstyle, so amazing 😍

Figure 5.2.4.2 Calendar Module – Completed State



January 30, 2024

04:30 PM

Status: completed (Pending rating)

Hairstylist: Jack

Service : Hair treatment
(RM 50)

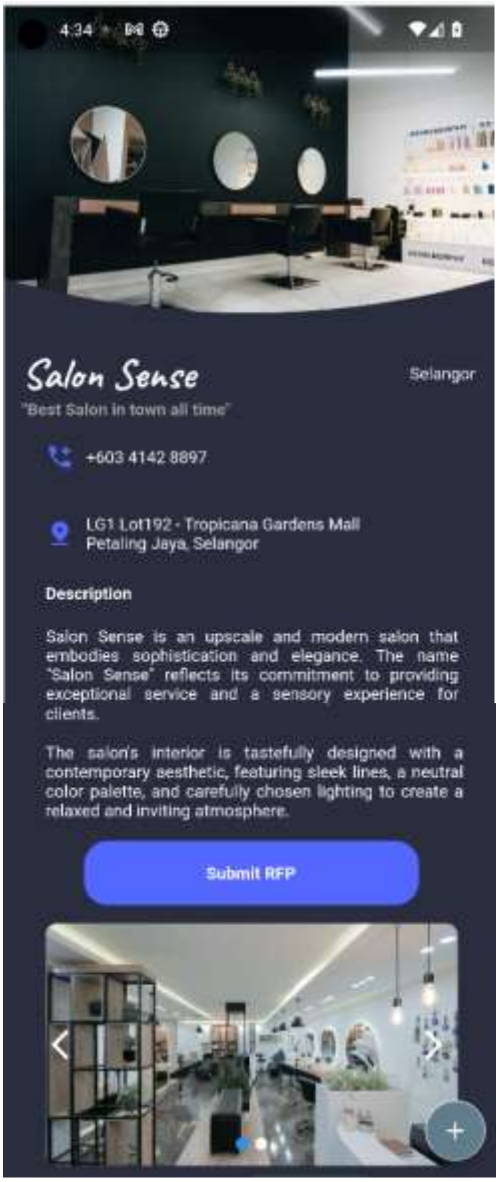
Figure 5.2.4.2 Calendar Module – Pending Rating State

Table 5.2.4.1 Differences of Status

Status	**Explanation**
Waiting	The booking is currently pending approval by hairstylist.
Approved	The booking is approved by hairstylist.
Rejected	The booking is rejected by hairstylist.
Cancelled	The booking is cancelled by either customer or hairstylist after booked / approval.
Completed (Pending rating)	The booking has done but is yet to be rated by customer.
Completed	The booking is completed with ratings.

5.2.5 Salon Details Page (Customers and Hairstylists)

Thrid icon under bottom navigation bar will lead customers to salon details page while hairstylists can enter this page through side navigation panel. This page will be showing all the information regarding salon such as contact information, location, description as well as images of the salon. Users will be redirected to phone application with salon numbers on the keypad once they press on the phone number row. Moreover, they will be redirected to google map when they have pressed on the location. Additionally, customers can also submit RFP (Request for Proposal) which will lead to email applications by clicking on the button.



Salon Sense

Selangor

"Best Salon in town all time"

+603 4142 8897

LG1 Lot192 - Tropicana Gardens Mall
Petaling Jaya, Selangor

Description

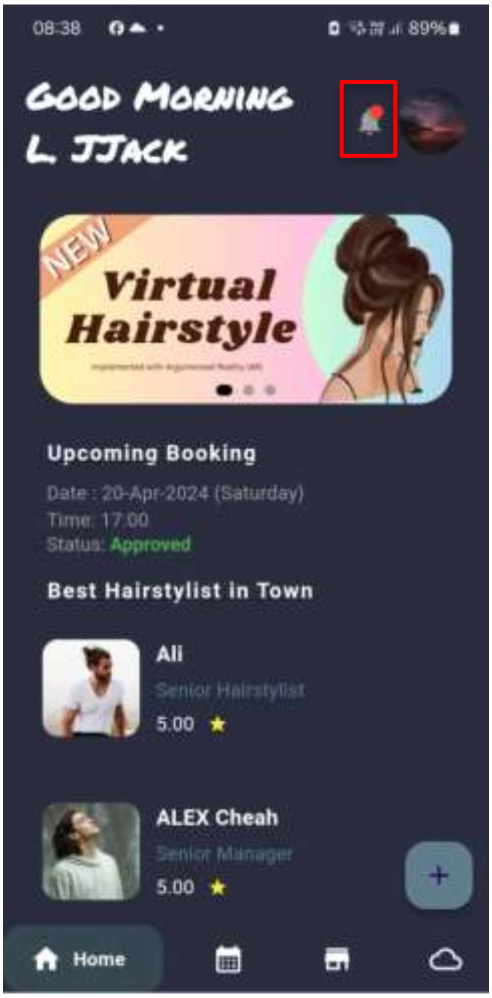
Salon Sense is an upscale and modern salon that embodies sophistication and elegance. The name "Salon Sense" reflects its commitment to providing exceptional service and a sensory experience for clients.

The salon's interior is tastefully designed with a contemporary aesthetic, featuring sleek lines, a neutral color palette, and carefully chosen lighting to create a relaxed and inviting atmosphere.

Figure 5.2.5.1 Salon Details Page (Customers and Hairstylists)

5.2.6 Notification Module (Customers and Hairstylists)

Customers and hairstylists share a unified notification module, allowing them to conveniently review all past notifications. Upon accessing the homepage, they can easily spot any unread notifications by observing a red dot indicator overlaid on the notification icon located at the top right corner of the screen to enhance user experience.



GOOD MORNING
L. JJACK

NEW
Virtual
Hairstyle

Upcoming Booking

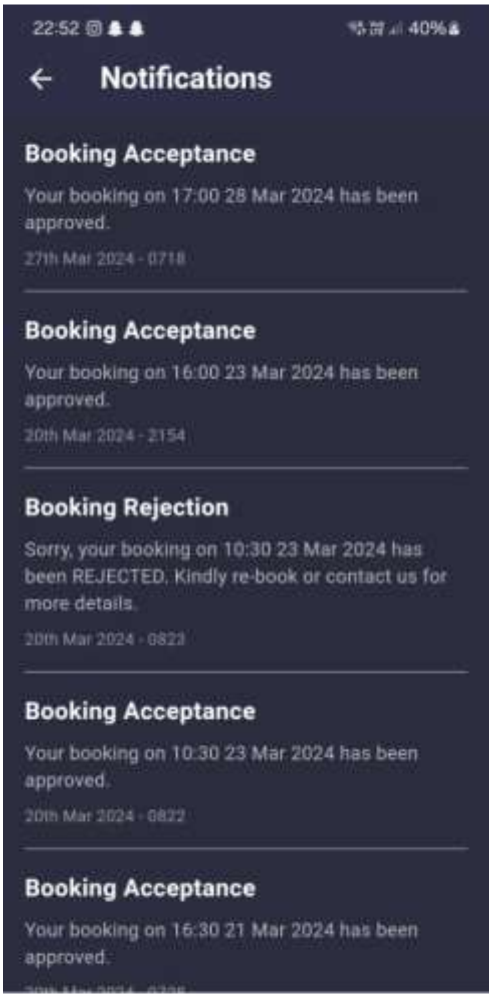
Date : 20-Apr-2024 (Saturday)
Time: 17:00
Status: Approved

Best Hairstylist in Town

Ali
Senior Hairstylist
5.00 ★

ALEX Cheah
Senior Manager
5.00 ★

Figure 5.2.6.1 Unread Notification



← Notifications

Booking Acceptance

Your booking on 17:00 28 Mar 2024 has been approved.

27th Mar 2024 - 0718

Booking Acceptance

Your booking on 16:00 23 Mar 2024 has been approved.

20th Mar 2024 - 2154

Booking Rejection

Sorry, your booking on 10:30 23 Mar 2024 has been REJECTED. Kindly re-book or contact us for more details.

20th Mar 2024 - 0823

Booking Acceptance

Your booking on 10:30 23 Mar 2024 has been approved.

20th Mar 2024 - 0822

Booking Acceptance

Your booking on 16:30 21 Mar 2024 has been approved.

Figure 5.2.6.2 Notification Page (Customers and Hairstylists)

5.2.7 Homepage (Hairstylist)

Once hairstylists have logged in with their credentials, they will be redirected to hairstylists homepage. The design is simple with side navigation where hairstylists can be directed to their profile page, salon details screen or log out from their account. From the homepage, hairstylists can navigate to various module screen such as appointment scheduling calendar, pending booking screen, ratings module notification module and queue management system module.

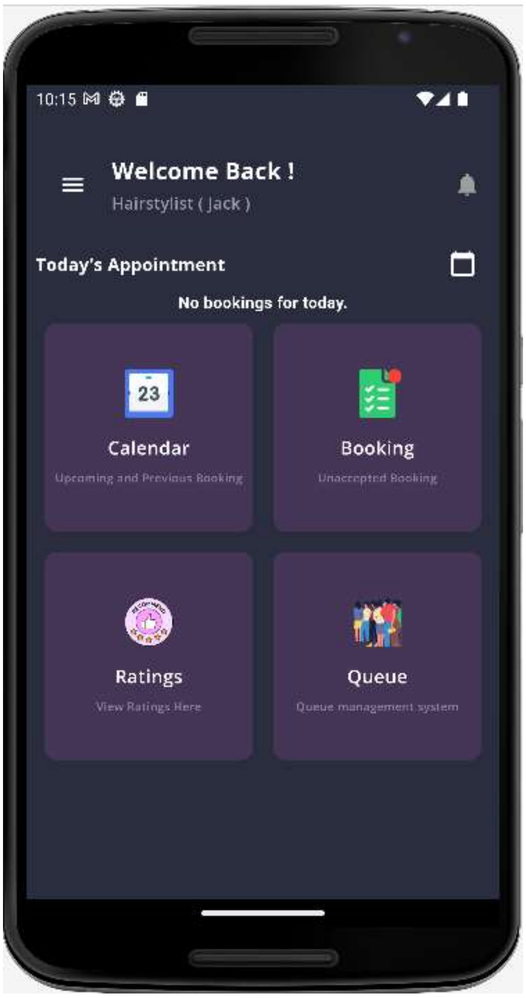


Figure 5.2.7.1 Homepage (Hairstylists)

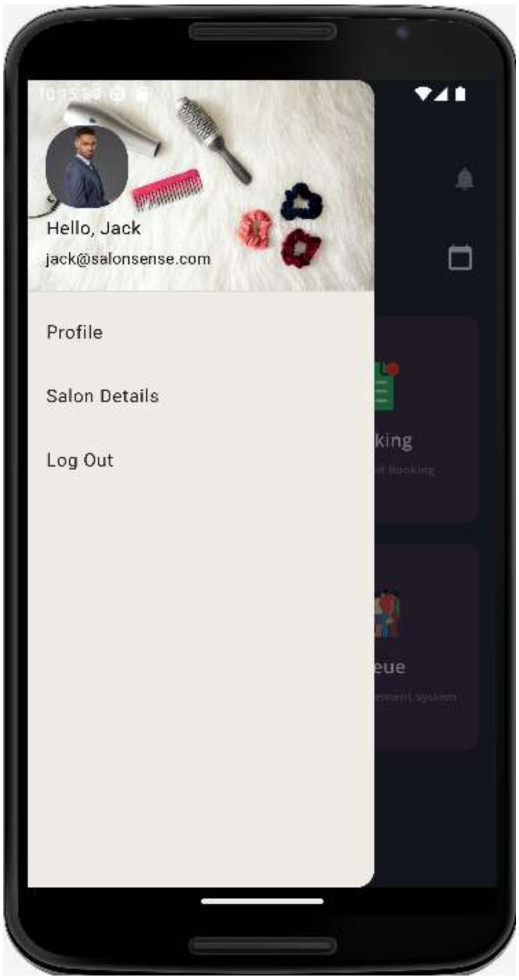
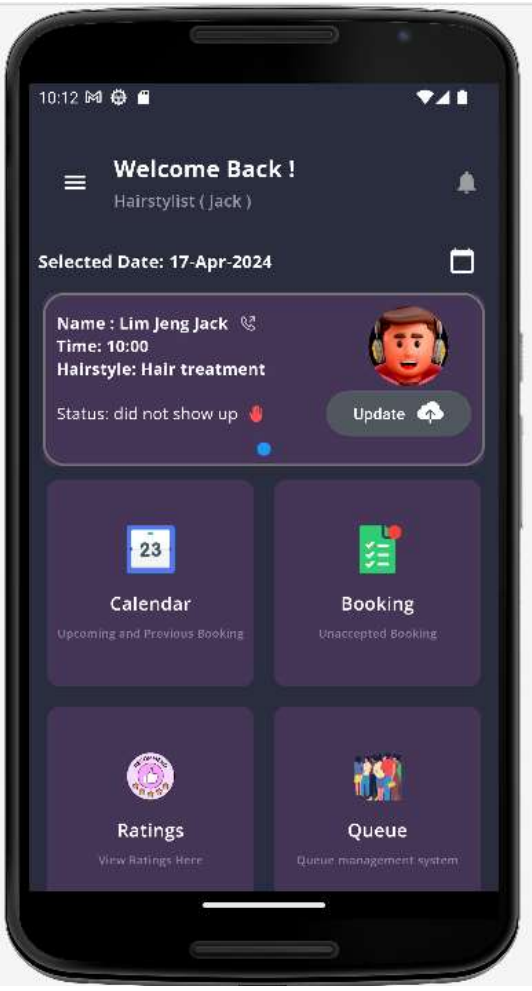


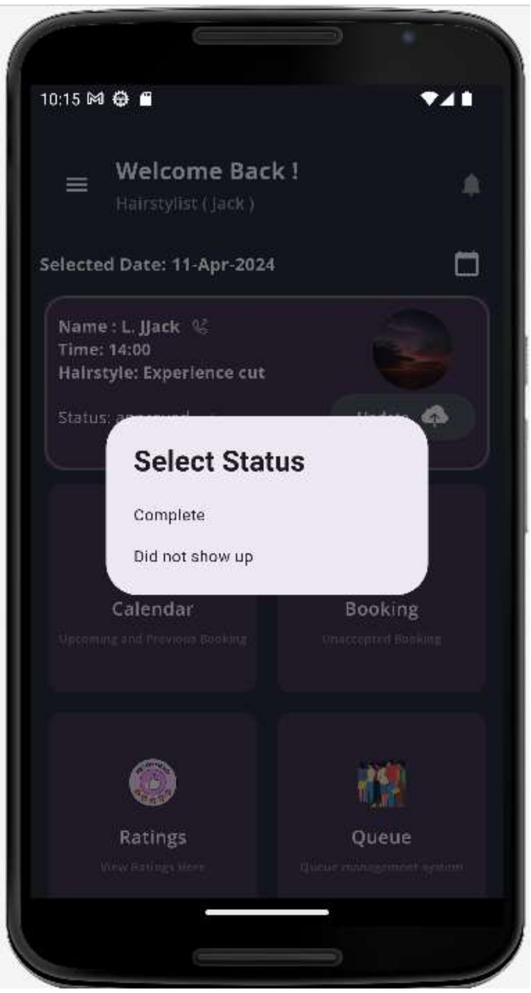
Figure 5.2.7.2 Side Navigation

From the homepage, hairstylists can also access a convenient card feature where they can swipe to view today's bookings. Within this feature, they can easily update the status of appointments, mark them as completed, or mark as absence as needed, ensuring smooth and efficient management of their daily schedule. Additionally, they are able to view appointments on selected day by clicking on the calendar icon.



Welcome Back !
Hairstylist (Jack)
Selected Date: 17-Apr-2024
Name : Lim Jeng Jack
Time: 10:00
Hairstyle: Hair treatment
Status: did not show up

Figure 5.2.7.3 Homepage with Today’s Booking



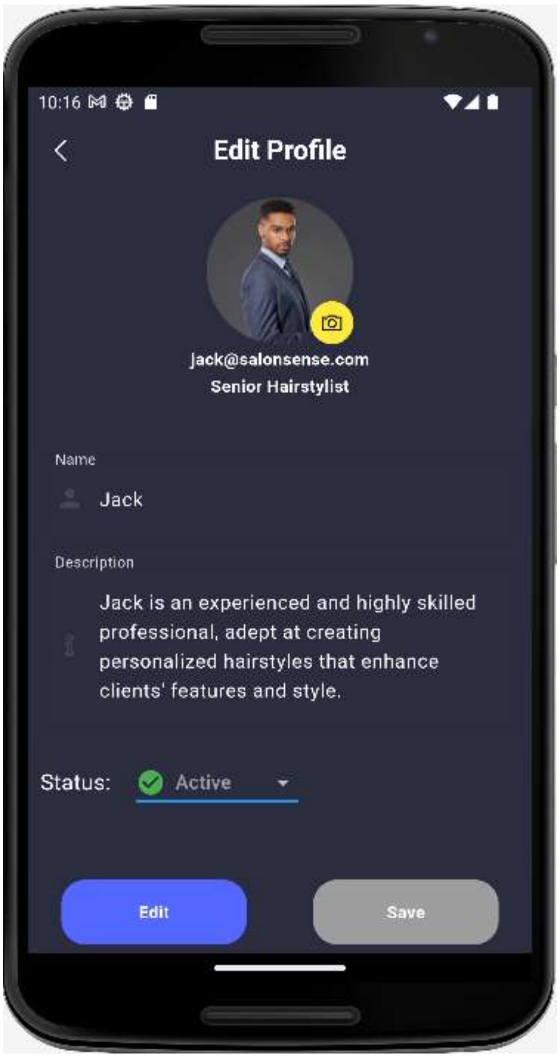
Welcome Back !
Hairstylist (Jack)
Selected Date: 11-Apr-2024
Name : L. JJack
Time: 14:00
Hairstyle: Experience cut

Select Status
Complete
Did not show up

Figure 5.2.7.4 Update Status

5.2.8 Profile Page (Hairstylists)

Hairstylists are able to update their basic information such as name and description in profile page. Furthermore, they can deactivate current status so that customers are not able to book his or her slot at the moment.



10:16

Edit Profile

jack@salonsense.com
Senior Hairstylist

Name
Jack

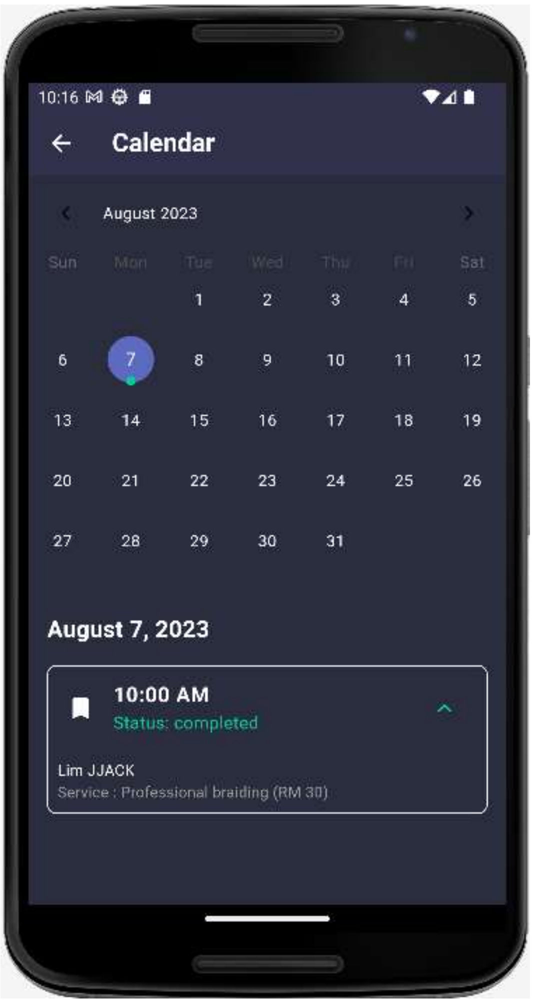
Description
Jack is an experienced and highly skilled professional, adept at creating personalized hairstyles that enhance clients' features and style.

Status: Active

Figure 5.2.8.1 Profile Page (Hairstylists)

5.2.9 Calendar Module (Hairstylists)

Similarly with customers, hairstylists have the calendar module that shows all the bookings in the same calendar. Updates can be done on bookings such as cancelling a booking or update the booking to new status.



August 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

August 7, 2023

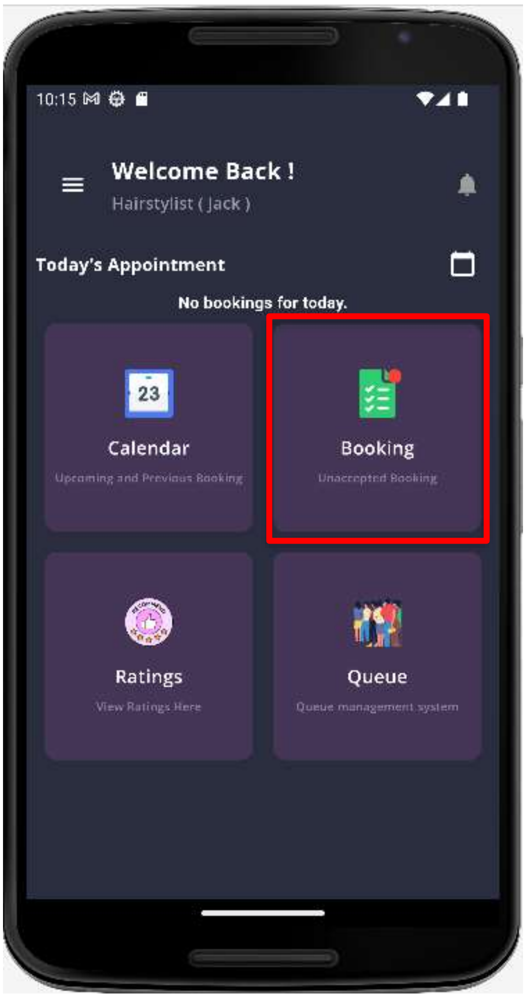
10:00 AM
Status: completed

Lim JJACK
Service : Professional braiding (RM 30)

Figure 5.2.9.1 Calendar Module (Hairstylists)

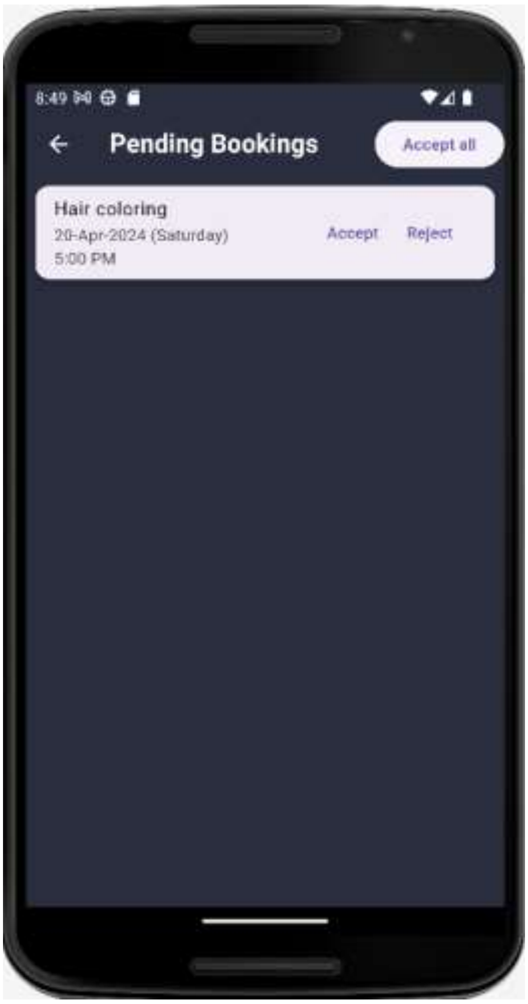
5.2.10 Booking Module (Hairstylists)

When customers make bookings, hairstylists need to either accept or reject them. On the homepage, a red dot will indicate the presence of pending acceptance or rejection requests in this module. Additionally, a feature within this module allows hairstylists to accept all bookings simultaneously, streamlining the process for efficient management.



No bookings for today.

Figure 5.2.10.1 Booking Module (Hairstylists)

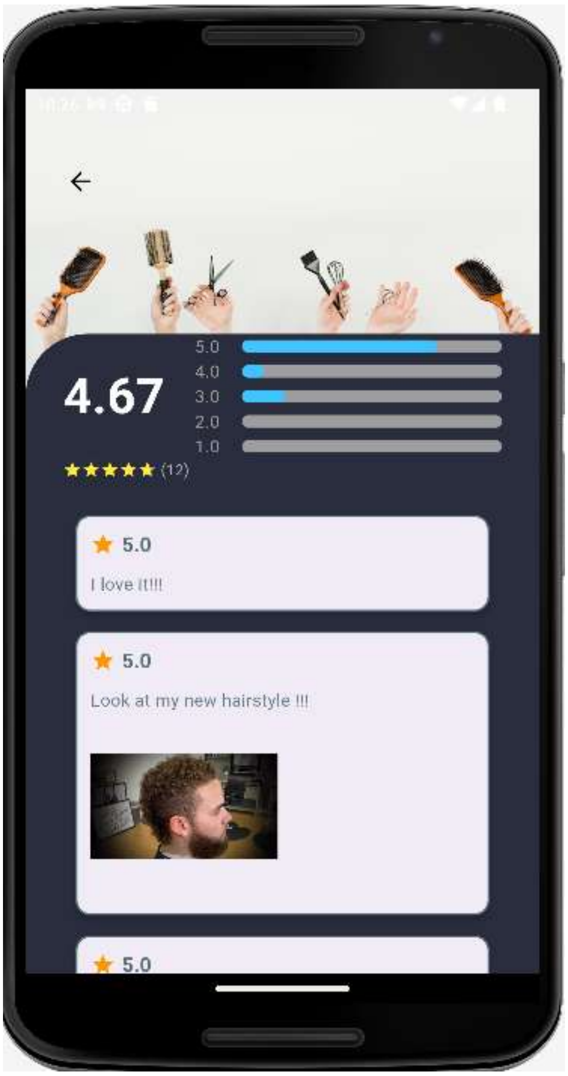


Hair coloring
20-Apr-2024 (Saturday)
5:00 PM

Figure 5.2.10.2 Pending bookings Page (Hairstylists)

5.2.11 Rating Page (Hairstylists)

Every hairstylists are able to view the average ratings and feedback given by customers that have completed the booking.



4.67

★★★★★ (12)

5.0
4.0
3.0
2.0
1.0

★ 5.0

I love it!!!

★ 5.0

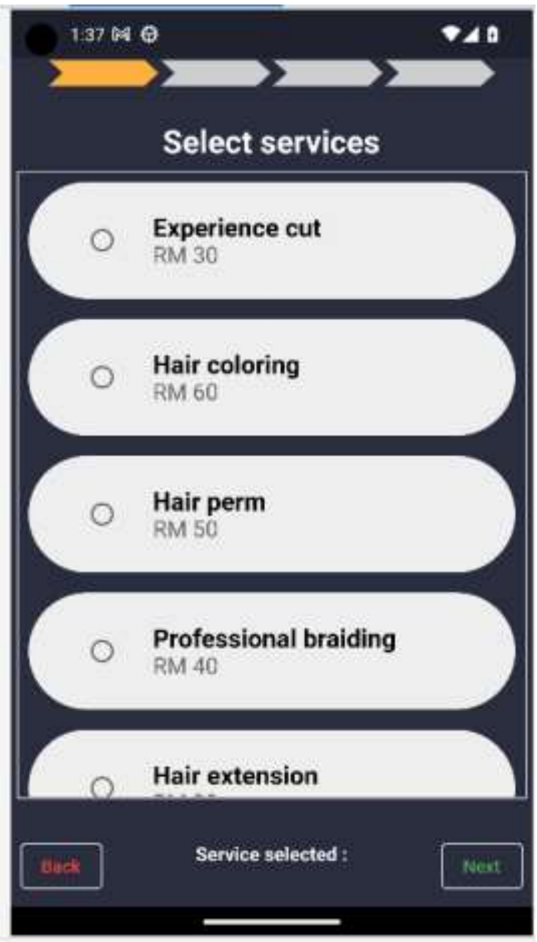
Look at my new hairstyle !!!

★ 5.0

Figure 5.2.11.1 Rating Page (Hairstylists)

5.2.12 Book an Appointment (Customers)

To book an appointment through the application, there are a total of four processes. Firstly, customers have to choose desired hairstyle and also hairstylist. Next customers have to choose preferred timeslot based on availability of hairstylist. After selected desired date, a list of available slot will be displayed. If the slot is booked by others, it will be in grey color and cannot be chosen again. Lastly, before confirming the booking, it will be showing all the details of booking.



Select services

○ Experience cut RM 30

○ Hair coloring RM 60

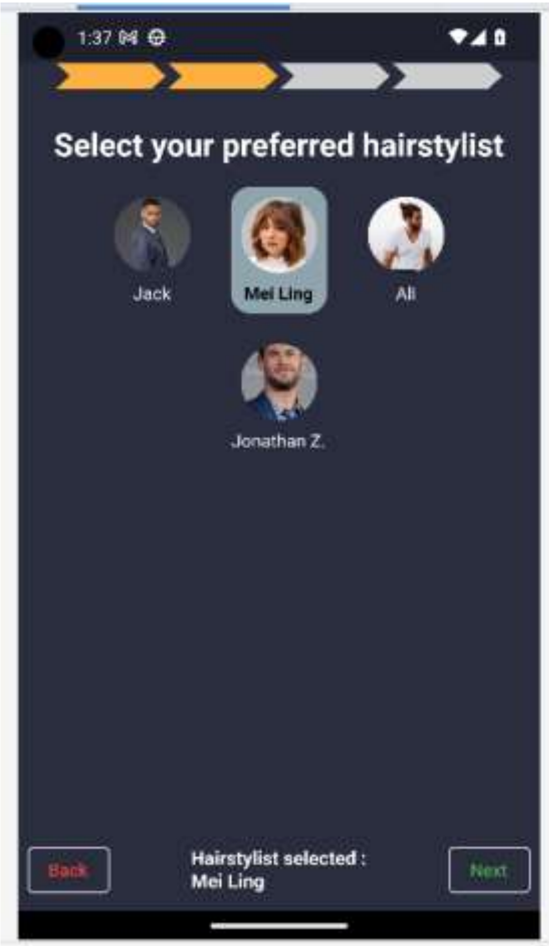
○ Hair perm RM 50

○ Professional braiding RM 40

○ Hair extension

Service selected :

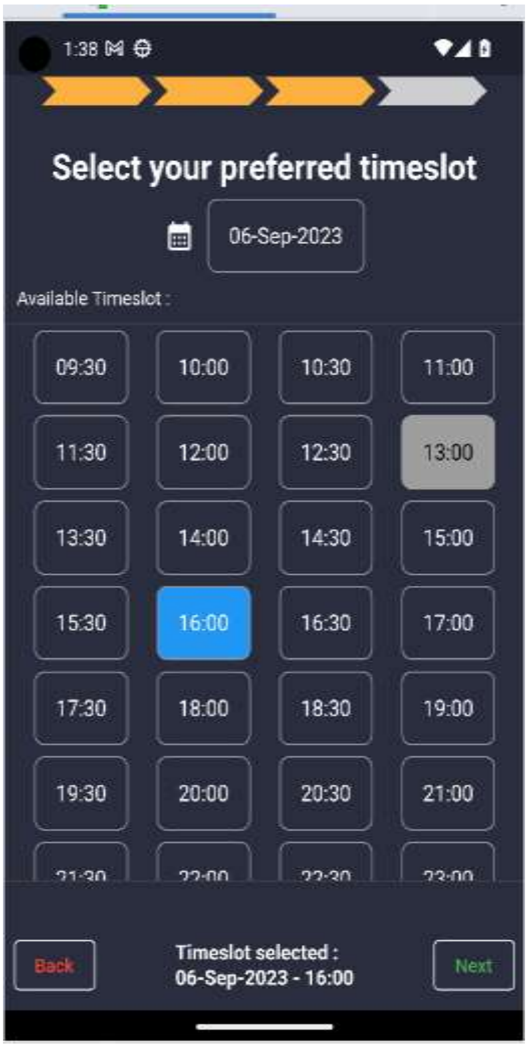
Figure 5.2.12.1 Select Service



Select your preferred hairstylist

Hairstylist selected : Mei Ling

Figure 5.2.12.2 Select Hairstylist



Select your preferred timeslot

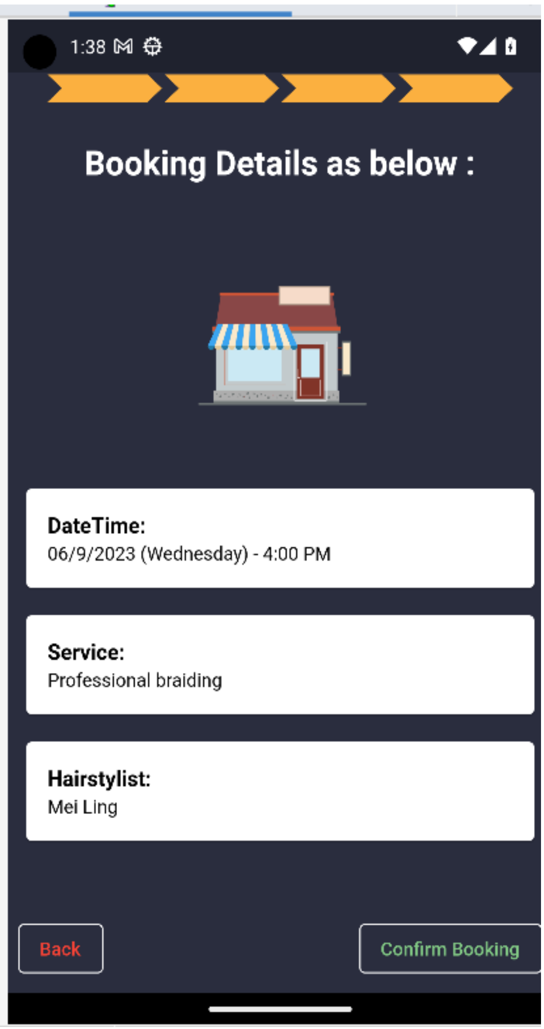
06-Sep-2023

Available Timeslot :

09:30	10:00	10:30	11:00
11:30	12:00	12:30	13:00
13:30	14:00	14:30	15:00
15:30	16:00	16:30	17:00
17:30	18:00	18:30	19:00
19:30	20:00	20:30	21:00
21:30	22:00	22:30	23:00

Timeslot selected :
06-Sep-2023 - 16:00

Figure 5.2.12.3 Select Timeslot



Booking Details as below :

DateTime:
06/9/2023 (Wednesday) - 4:00 PM

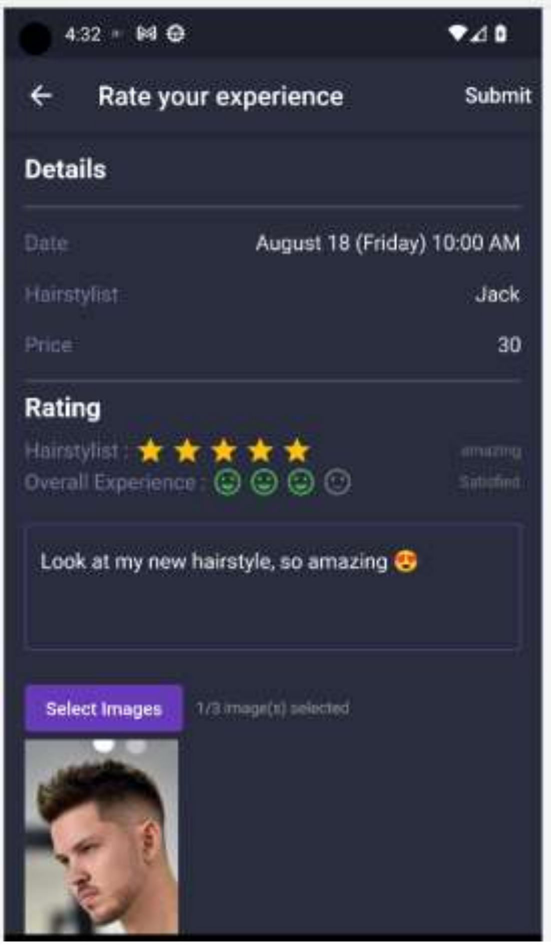
Service:
Professional braiding

Hairstylist:
Mei Ling

Figure 5.2.12.4 Confirmation page

5.2.13 Rating page (Customers)

Once customers have completed booking, hairstylist will update the status to completed, a button will be showing for customers to rate the whole experience and provide rating towards the hairstylist. On the rating page, details of booking will be showing, and customers are able to rate the hairstylist out of 5 star and provide review towards the hairstylist. Additionally, customers can choose to upload image or not and maximum can choose to upload 3 images.



Details

Date August 18 (Friday) 10:00 AM

Hairstylist Jack

Price 30

Rating

Hairstylist : ★★★★★ amazing

Overall Experience : ☺☺☺☺ Satisfied

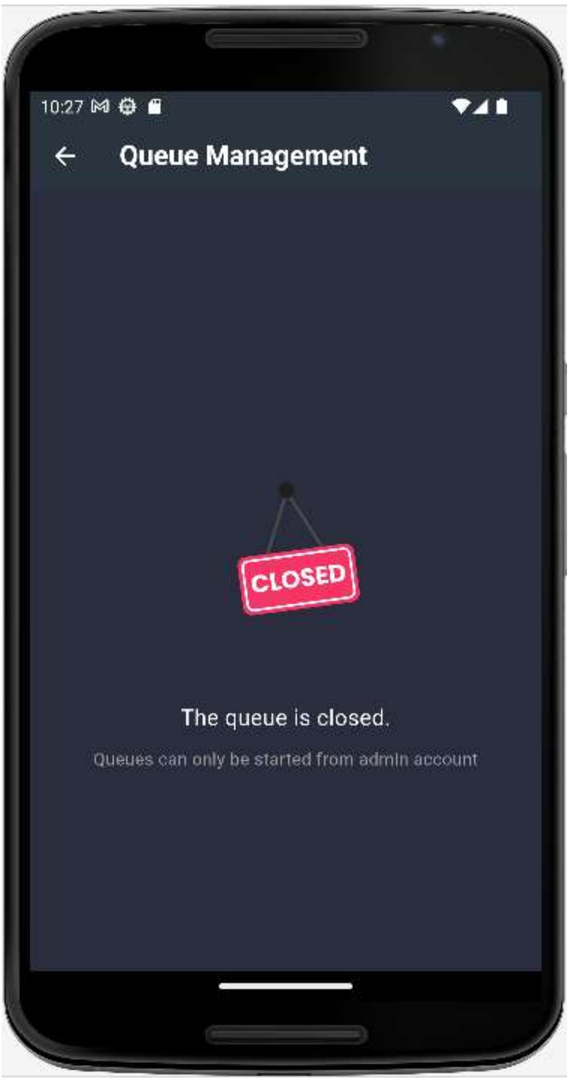
Look at my new hairstyle, so amazing 😍

1/3 image(s) selected

Figure 5.2.13.1 Rating page

5.2.14 Queue Management System (Hairstylists)

In the Queue Management System for hairstylists, when the queue is closed, the page will display a "Closed" status.

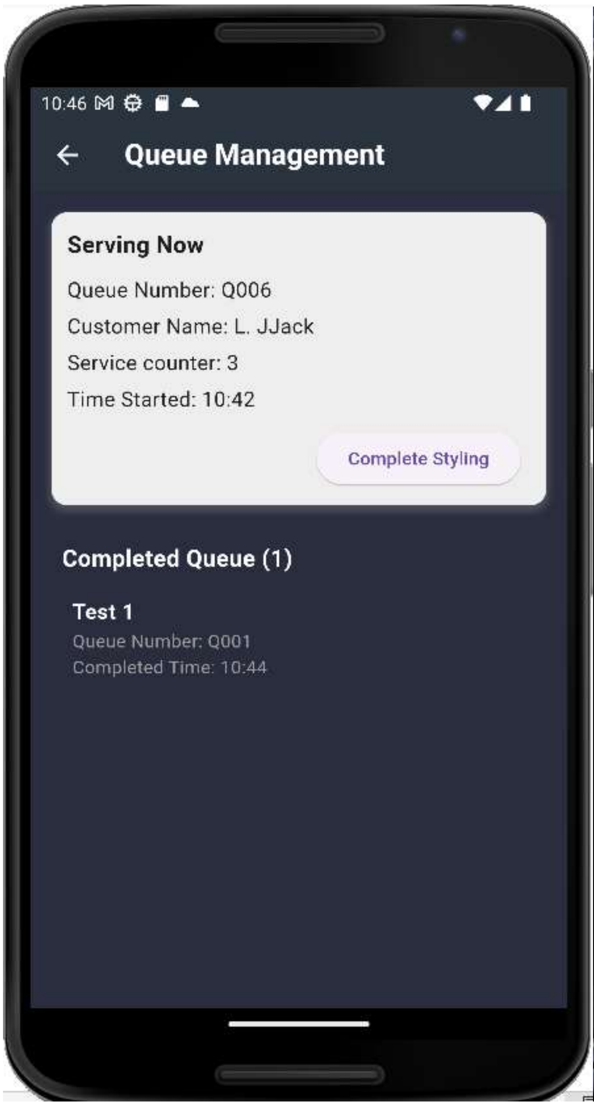


The queue is closed.

Queues can only be started from admin account

Figure 5.2.14.1 Queue Closed Page (Hairstylists)

However, when the queue is open, the page will show the currently assigned customer along with a list of completed customers, providing real-time visibility into the queue status and enabling efficient management of customer flow. Hairstylists may update the status of currently serving customers to "completed," and these updates will be promptly reflected not only in the admin interface but also in the customer interface. This ensures that both administrators and customers have real-time visibility on current status.



10:46

Queue Management

Serving Now

Queue Number: Q006

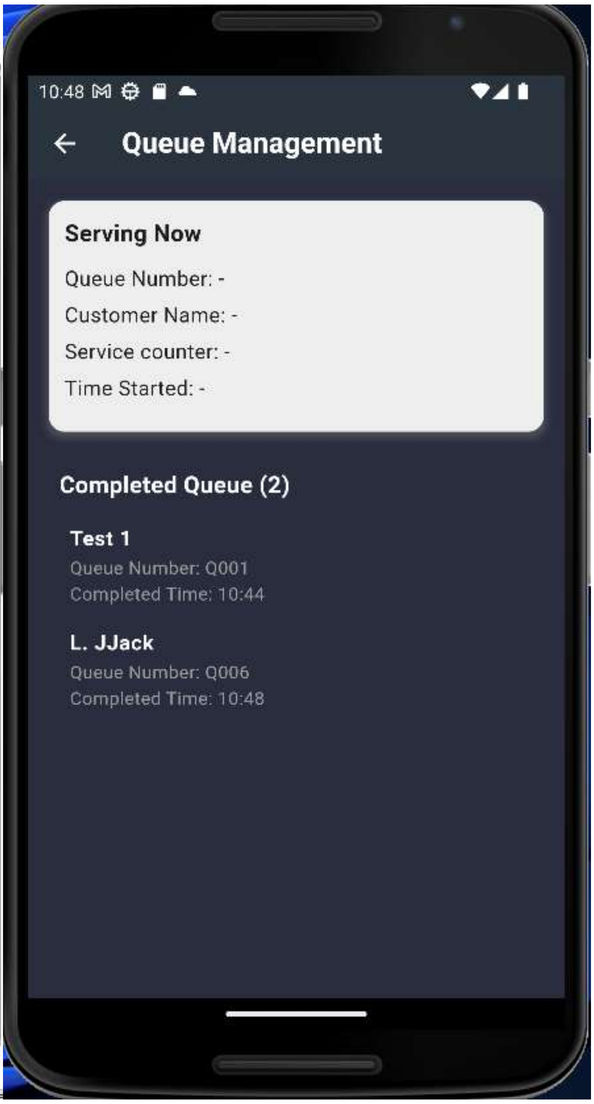
Customer Name: L. JJack

Service counter: 3

Time Started: 10:42

Completed Queue (1)

Test 1
Queue Number: Q001
Completed Time: 10:44



10:48

Queue Management

Serving Now

Queue Number: -

Customer Name: -

Service counter: -

Time Started: -

Completed Queue (2)

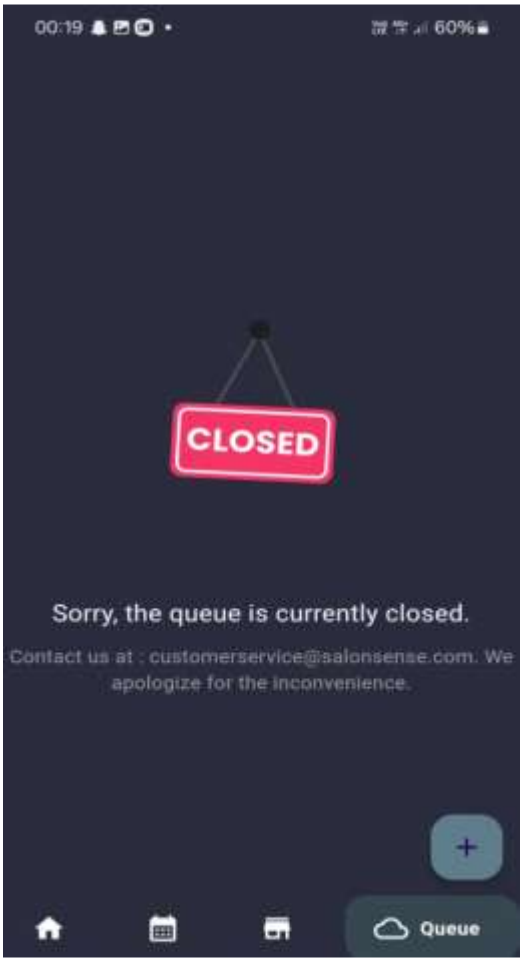
Test 1
Queue Number: Q001
Completed Time: 10:44

L. JJack
Queue Number: Q006
Completed Time: 10:48

Figure 5.2.14.2 & Figure 5.2.14.3 Queue Management Page (Hairstylists)

5.2.15 Queue Management System (Customers)

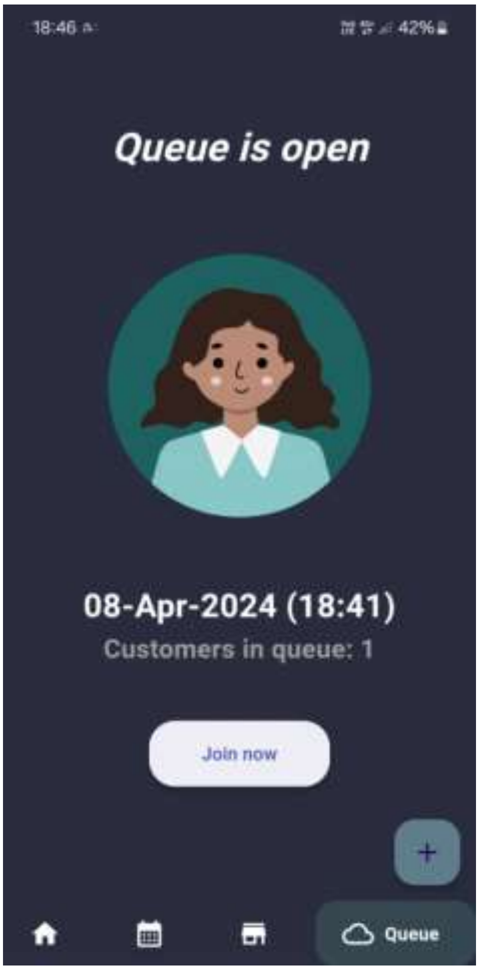
For the Queue Management System on the customer side, when the queue is closed, a closed page is displayed. However, when its open, customers see an open page indicating the date it was opened by the admin and the number of current customers in the queue. They are presented with a "Join" button. Upon joining, a virtual queue number is assigned, and details such as estimated waiting time are provided. Customers have the option to exit the queue and rejoin if needed. When it's their turn, they receive a notification and the interface changes to an "In Progress" state, displaying the assigned hairstylist and counter information. Finally, once the service is completed, the completed page is shown, including the time of completion.



Sorry, the queue is currently closed.

Contact us at : customerservice@salonsense.com. We apologize for the inconvenience.

Figure 5.2.15.1 Queue Inactive (Customers)



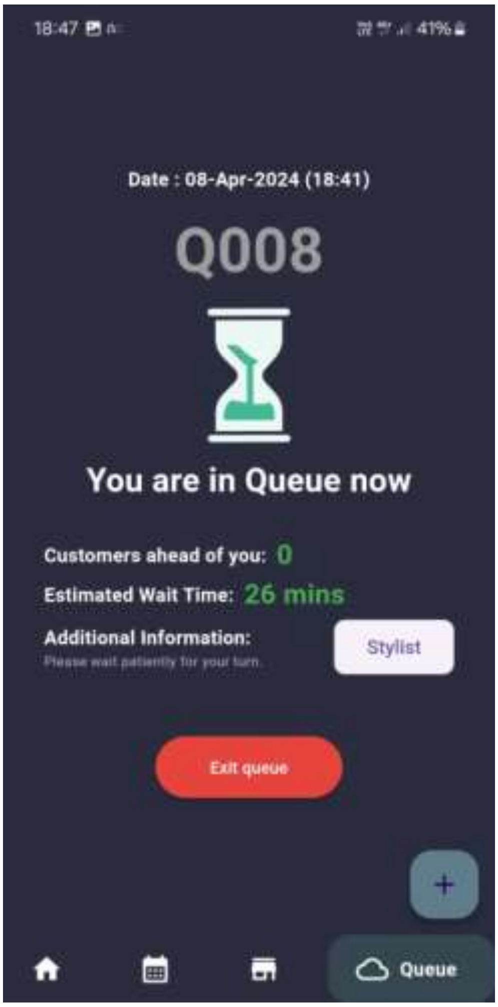
Queue is open

08-Apr-2024 (18:41)

Customers in queue: 1

Figure 5.2.15.2 Queue Active (Customers)

The estimated wait time for customers in the queue is calculated based on the current availability of hairstylists and the number of customers currently being served. If there are more available hairstylists than customers in the queue, the estimated wait time will be less than 1 minute. However, if there are not enough hairstylists available, the calculation considers the current hairstylists who are already engaged with customers. The system then calculates the estimated wait time based on the time required for these in-progress hairstylists to complete their current tasks before attending to the next customer in the queue.



Date : 08-Apr-2024 (18:41)

Q008

You are in Queue now

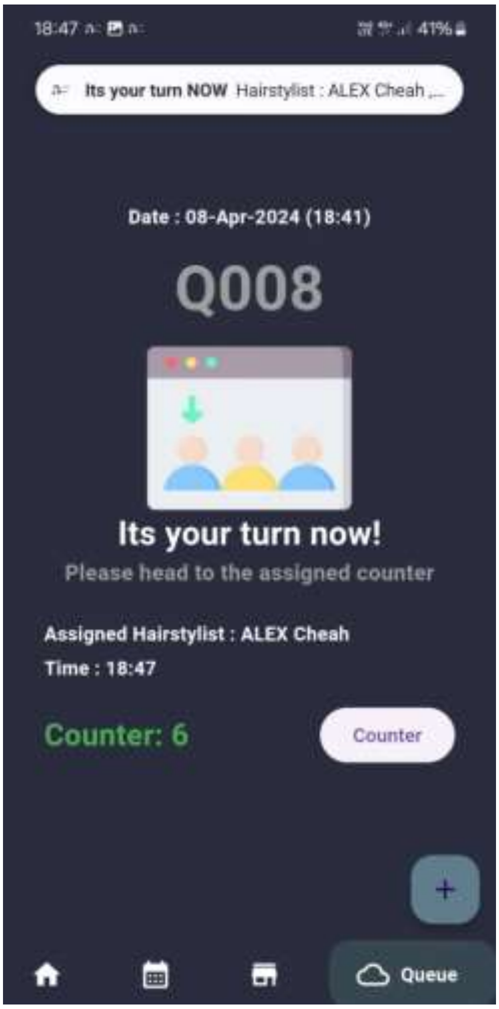
Customers ahead of you: 0

Estimated Wait Time: 26 mins

Additional Information:

Please wait patiently for your turn.

Figure 5.2.15.3 Queueing State



Its your turn NOW Hairstylist : ALEX Cheah ,...

Date : 08-Apr-2024 (18:41)

Q008

Its your turn now!

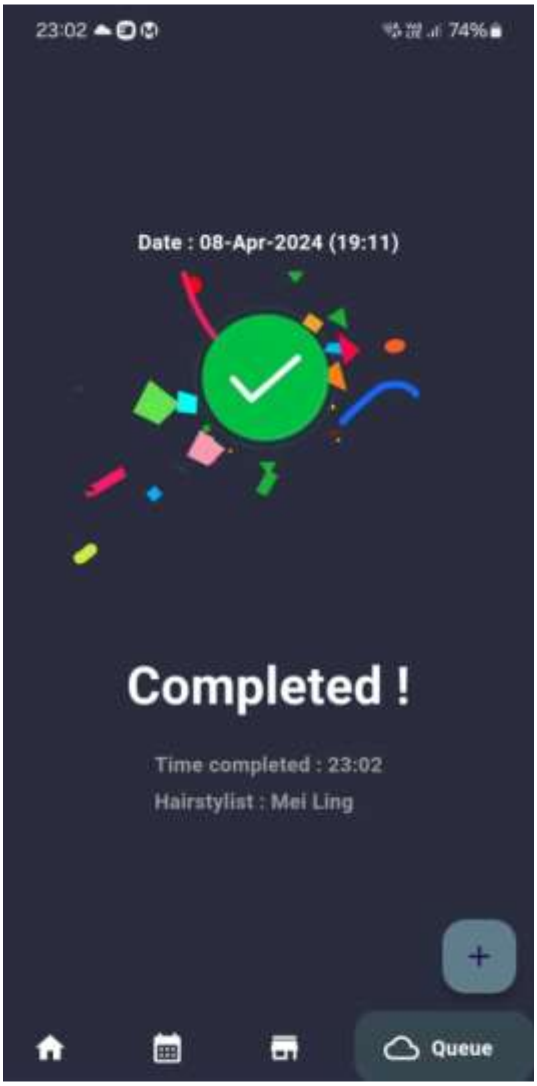
Please head to the assigned counter

Assigned Hairstylist : ALEX Cheah

Time : 18:47

Counter: 6

Figure 5.2.15.4 In Progress State



23:02

74%

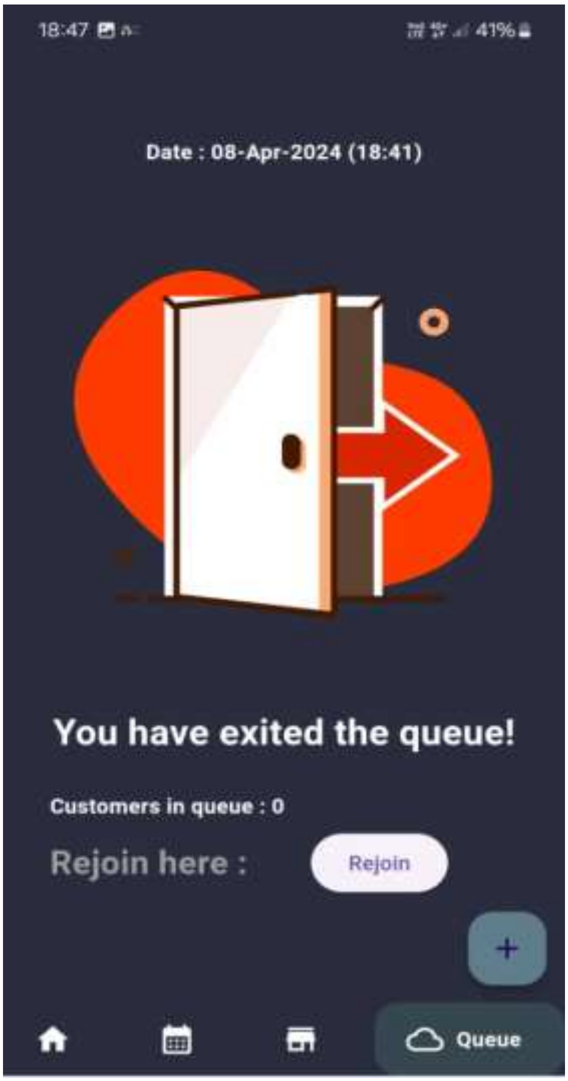
Date : 08-Apr-2024 (19:11)

Completed !

Time completed : 23:02

Hairstylist : Mei Ling

Figure 5.2.15.5 Completed State



18:47

41%

Date : 08-Apr-2024 (18:41)

You have exited the queue!

Customers in queue : 0

Rejoin here :

Figure 5.2.15.6 Exited State

5.2.16 Virtual Hairstyle Try-on module (Customers)

Customers can access the Virtual Hairstyle Try-on feature by clicking on the promotional banners section on their homepage. Upon redirection to the module page, they'll be able to utilize the real-time virtual hairstyle application, which detects and applies hairstyles to the detected face. This feature is capable of processing one face at a time. Alongside trying out different hairstyles, customers also have the option to take pictures with the applied virtual hairstyle and save them directly to their gallery for future reference or sharing.

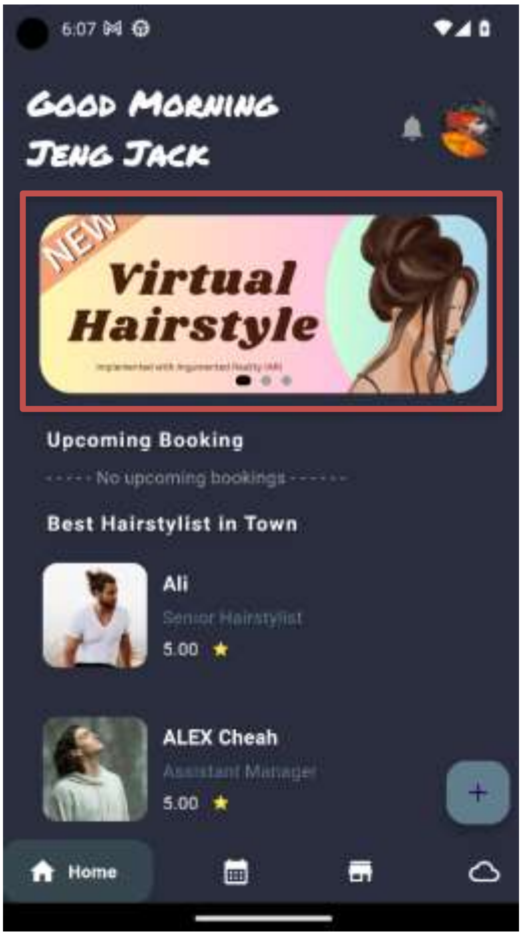


Figure 5.2.16.1 Promotional Banner

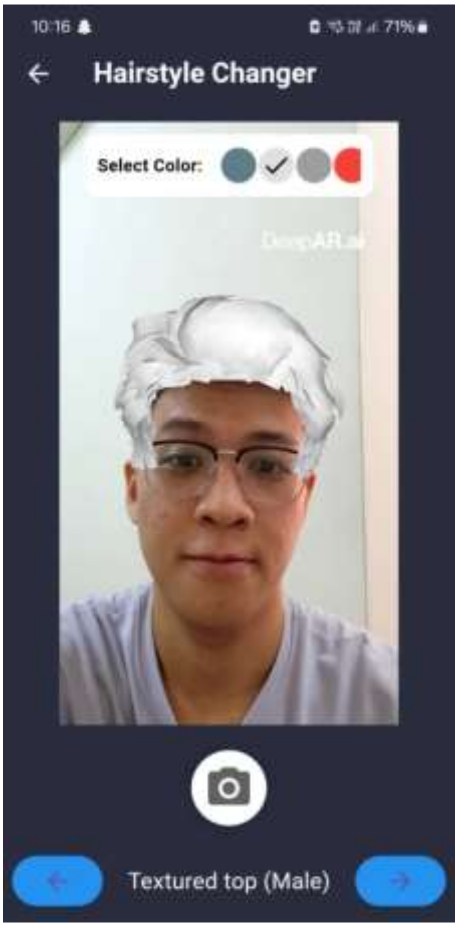


Figure 5.2.16.2 Real Time Virtual Hairstyle try-on

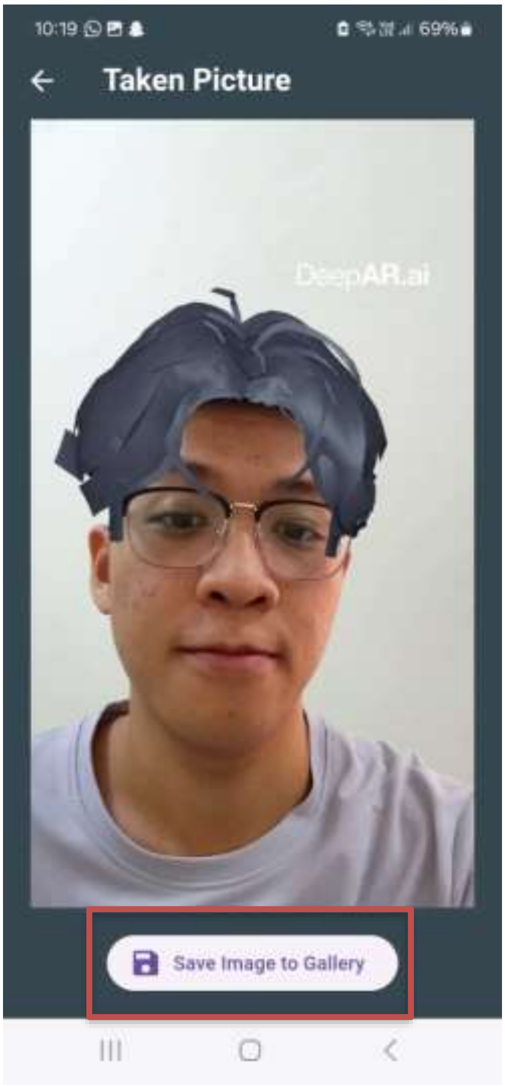


Figure 5.2.16.3 Save Image to Gallery

5.3 Web Admin Panel (Admin)

5.3.1 Dashboard

When the web admin panel is loaded , the default page will be dashboard screen. It shows the analysis of current month such as booking revenue, number of bookings , number of customers and queue status. Two analysis graphs are provided on the number of booking for past 5 months and the number of users and hairstylist. Side navigation bar is provided to navigate through screens.

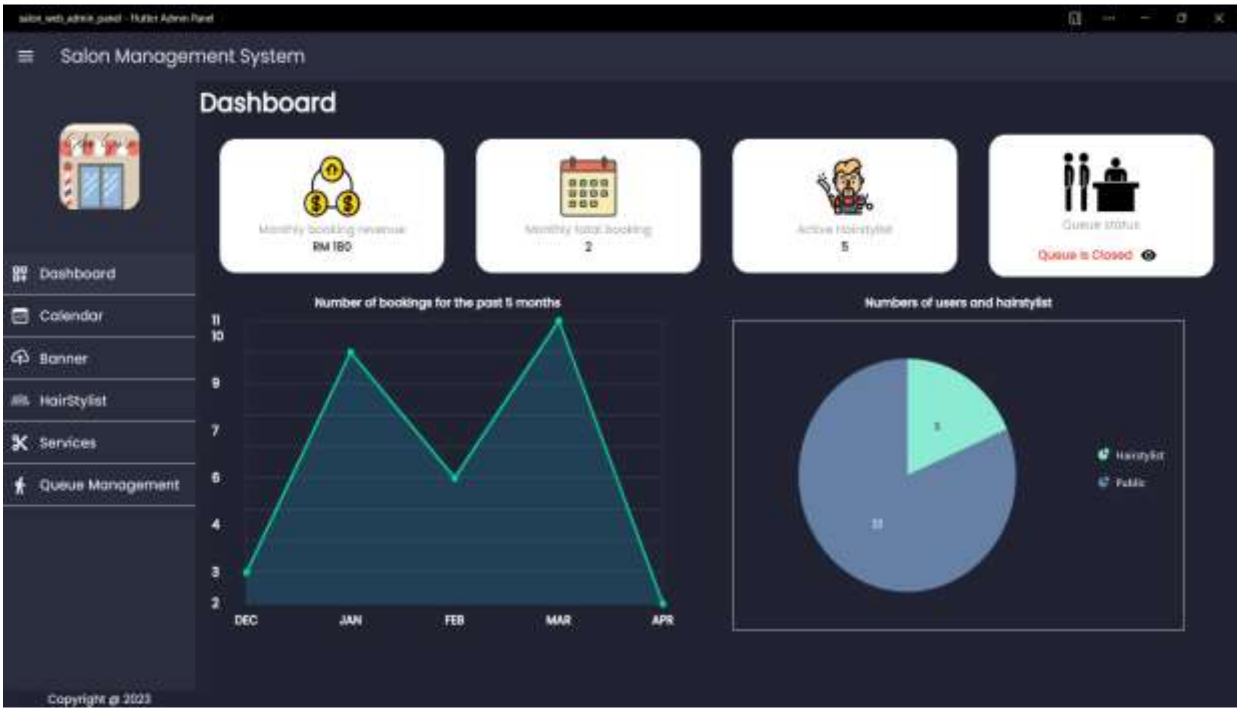


Figure 5.3.1.1 Dashboard Screen

5.3.2 Calendar Screen

In calendar screen, days with booking will have light green indicator and details will be displayed below. All the bookings will be grouped by the selected hairstylist. Information icon is provided for hairstylist to view the information of customers. Additionally, hairstylist can also change the status of booking such as completed, did not show up and cancelled.

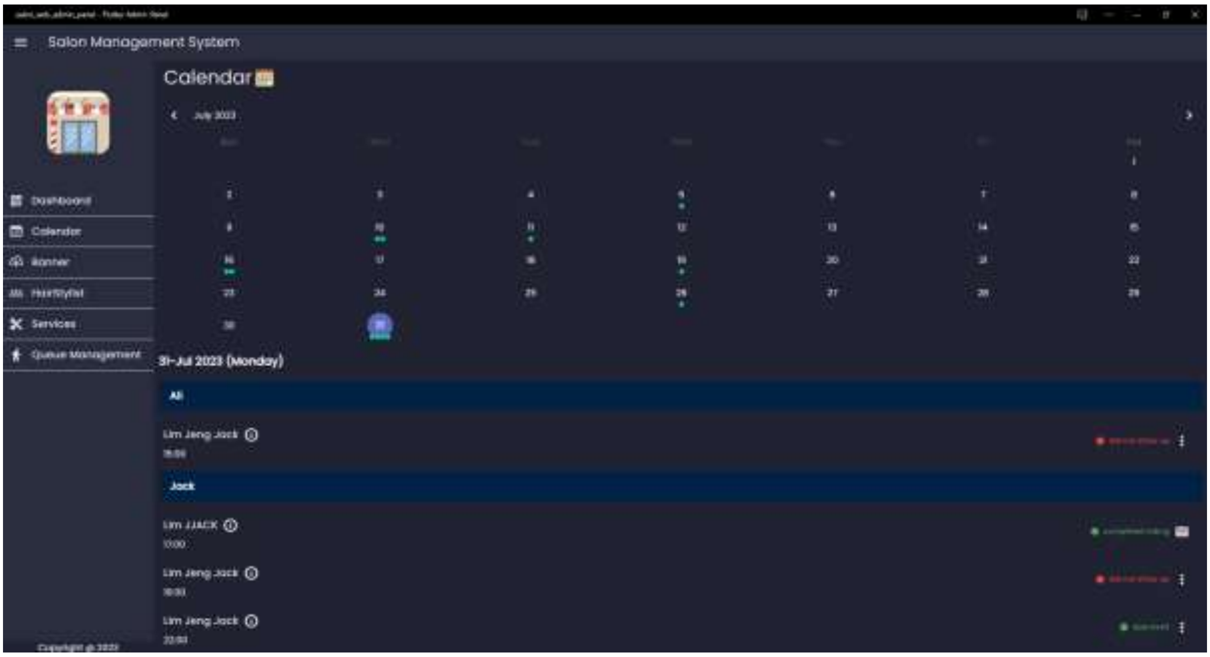


Figure 5.3.2.1 Calendar Screen

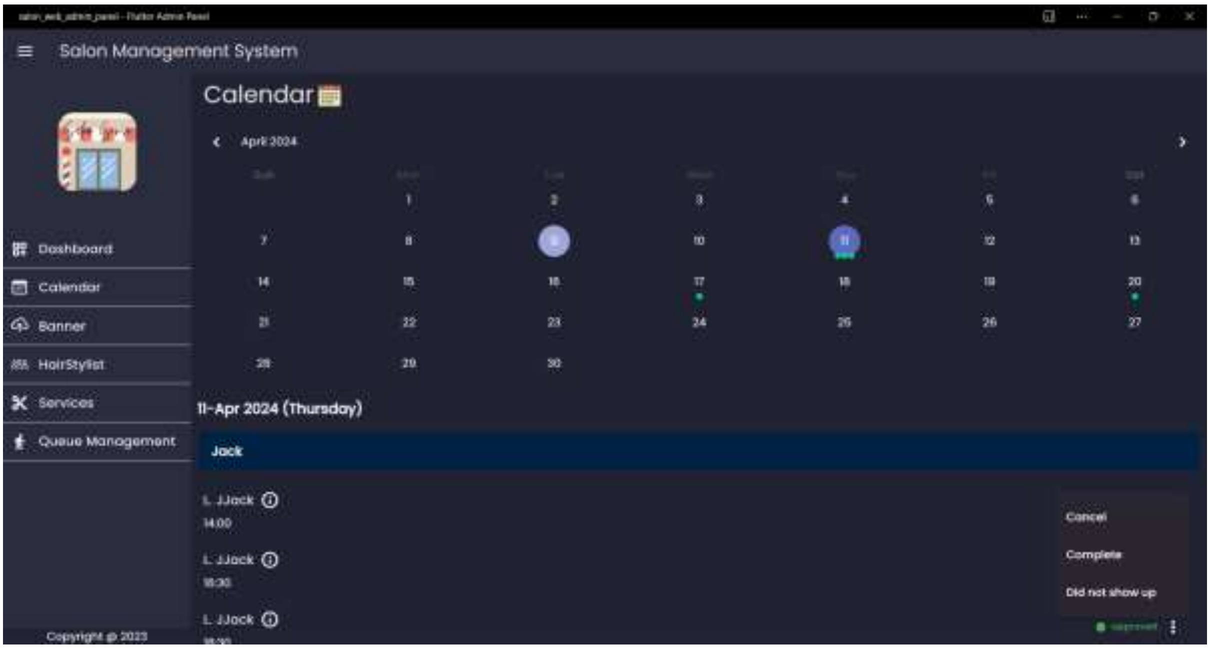


Figure 5.3.2.2 Calendar Screen with Action

5.3.3 Managing Banner Screen

Banner is displayed on the main page of customers' mobile application. Hence, hairstylist can manage the banners for promotion purpose. In managing banner screen, hairstylists are able to select image from local storage to be uploaded to and they can hide or unhide the current banner to be view by public. Additionally, they can view the banner by pressing the list tile and also delete them once they don't need the banner. During uploading of banner event, loading widget will be shown and it will indicate the process either successfully updated or not.

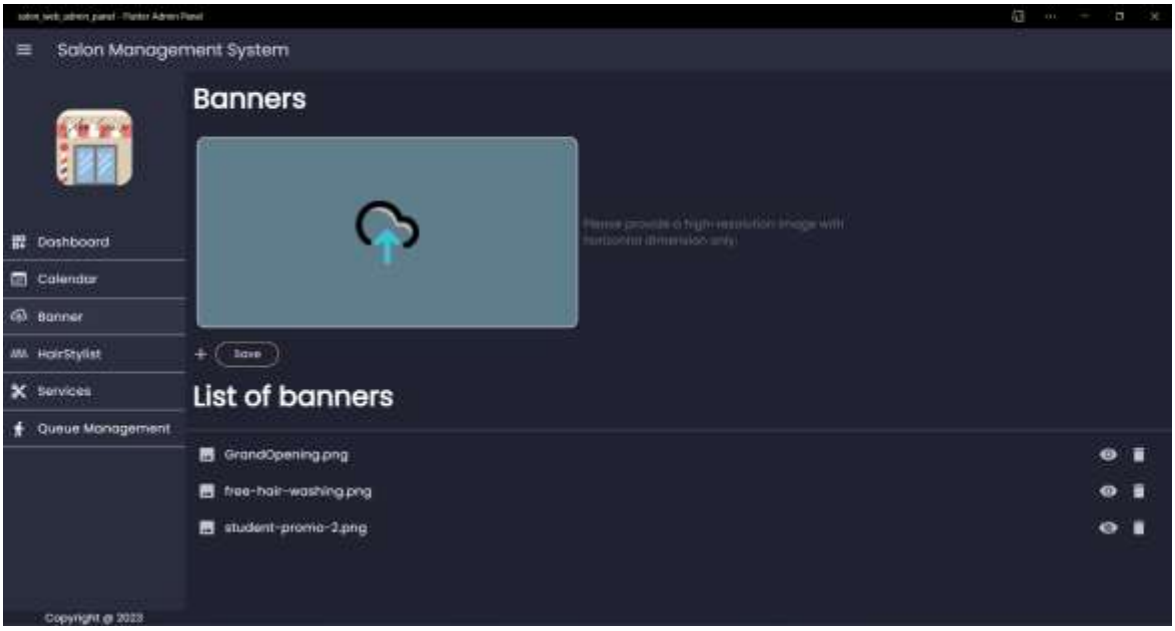


Figure 5.3.2.1 Banner Screen

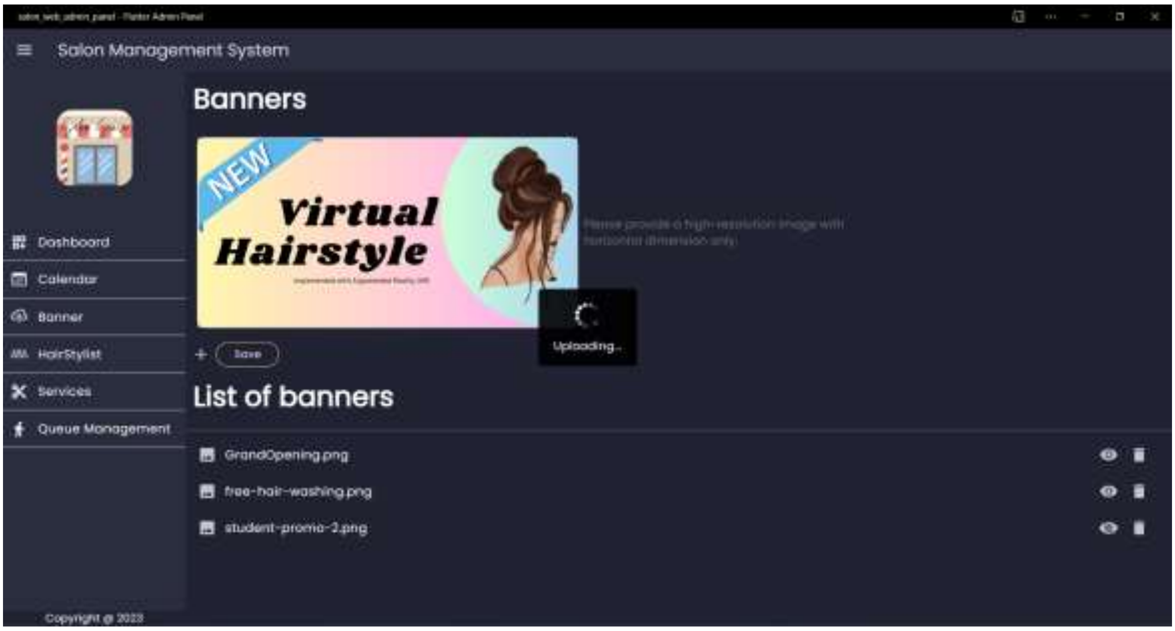
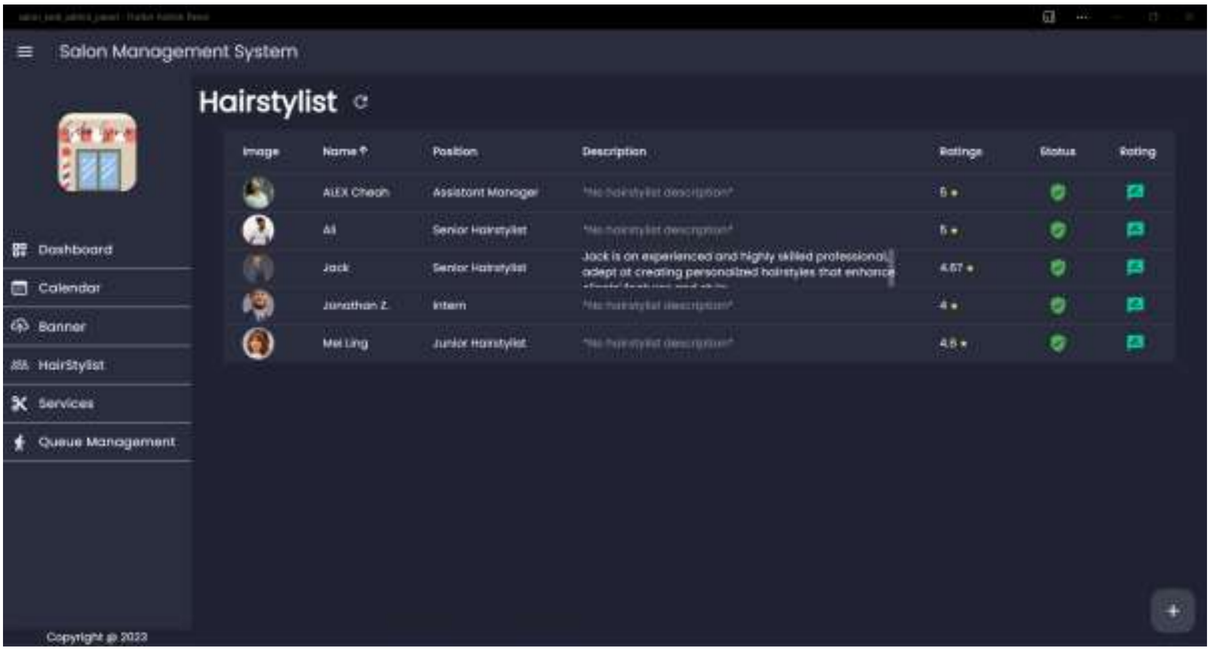


Figure 5.3.2.2 Uploading Banner in Banner Screen

5.3.4 Managing Hairstylist Screen

Hairstylist page mainly is used to manage all the hairstylist such as updating on their information , view all the ratings as well as add new hairstylist. When adding a new hairstylist, an account will be created for them, and they can use the credentials to login to their own account by using email and password.



Hairstylist

Image	Name	Position	Description	Ratings	Status	Rating
	ALEX Cheah	Assistant Manager	*No hairstylist description*	5 ★	✓	
	Ali	Senior Hairstylist	*No hairstylist description*	5 ★	✓	
	Jack	Senior Hairstylist	Jack is an experienced and highly skilled professional, adept at creating personalized hairstyles that enhance	4.67 ★	✓	
	Jonathan Z.	Intern	*No hairstylist description*	4 ★	✓	
	Mei Ling	Junior Hairstylist	*No hairstylist description*	4.5 ★	✓	

Figure 5.3.4.1 Manage Hairstylist Screen

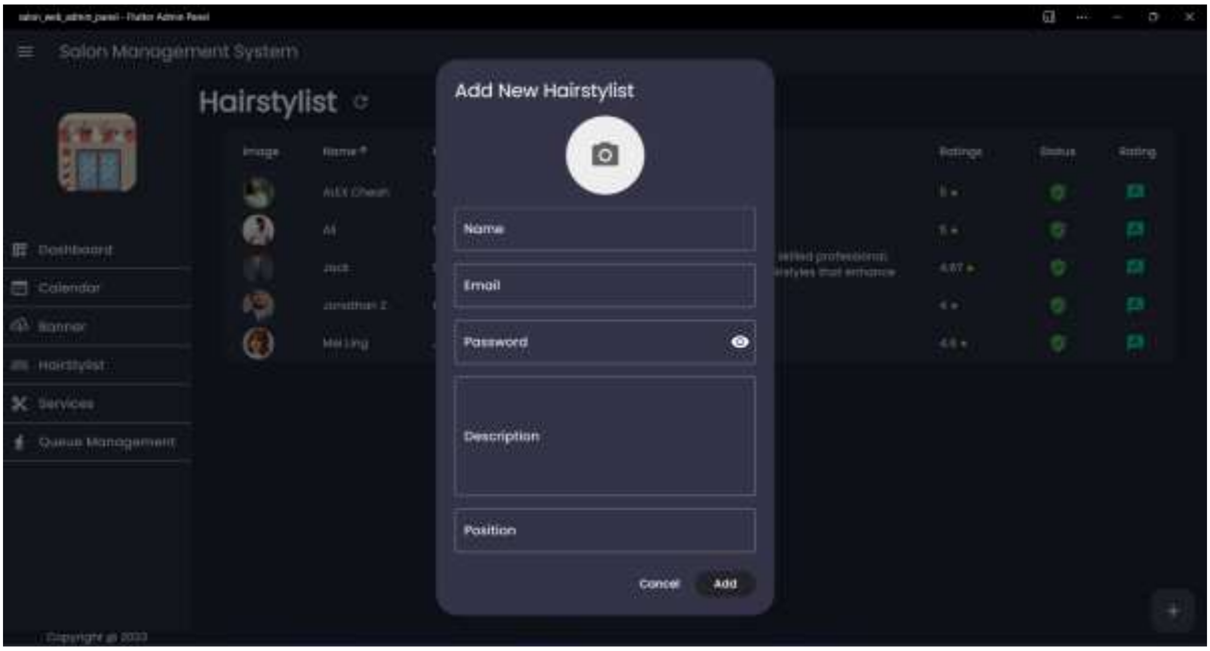
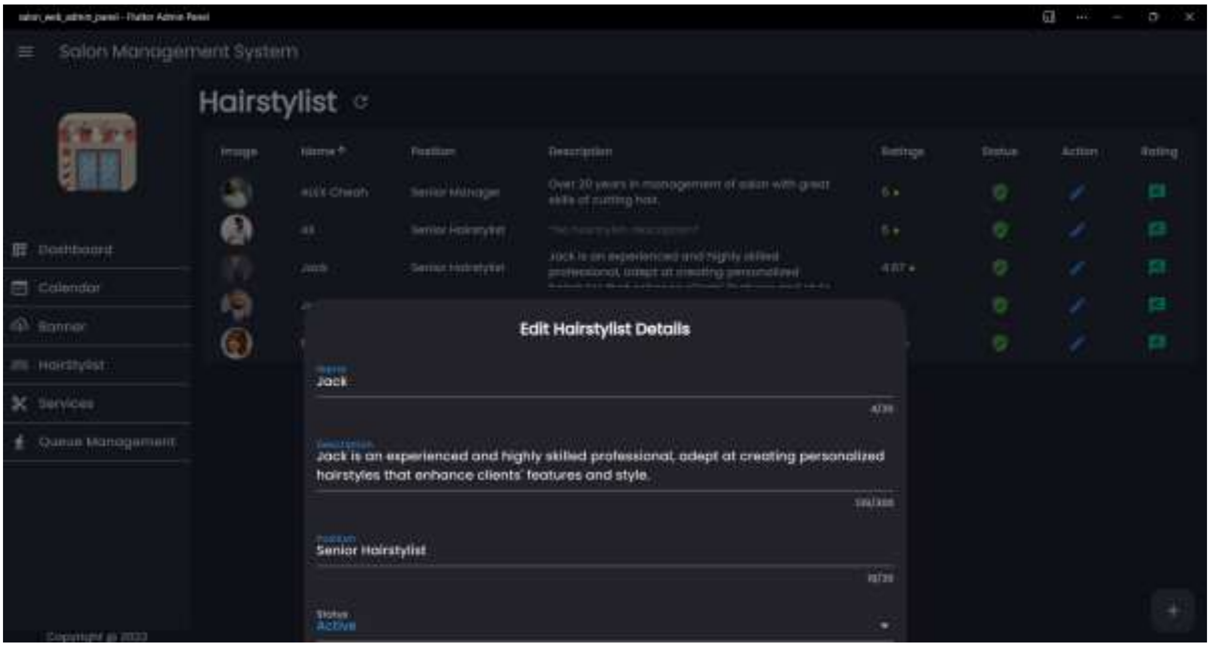


Figure 5.3.4.2 Add new Hairstylist



Edit Hairstylist Details

Name
Jack

Description
Jack is an experienced and highly skilled professional, adept at creating personalized hairstyles that enhance clients' features and style.

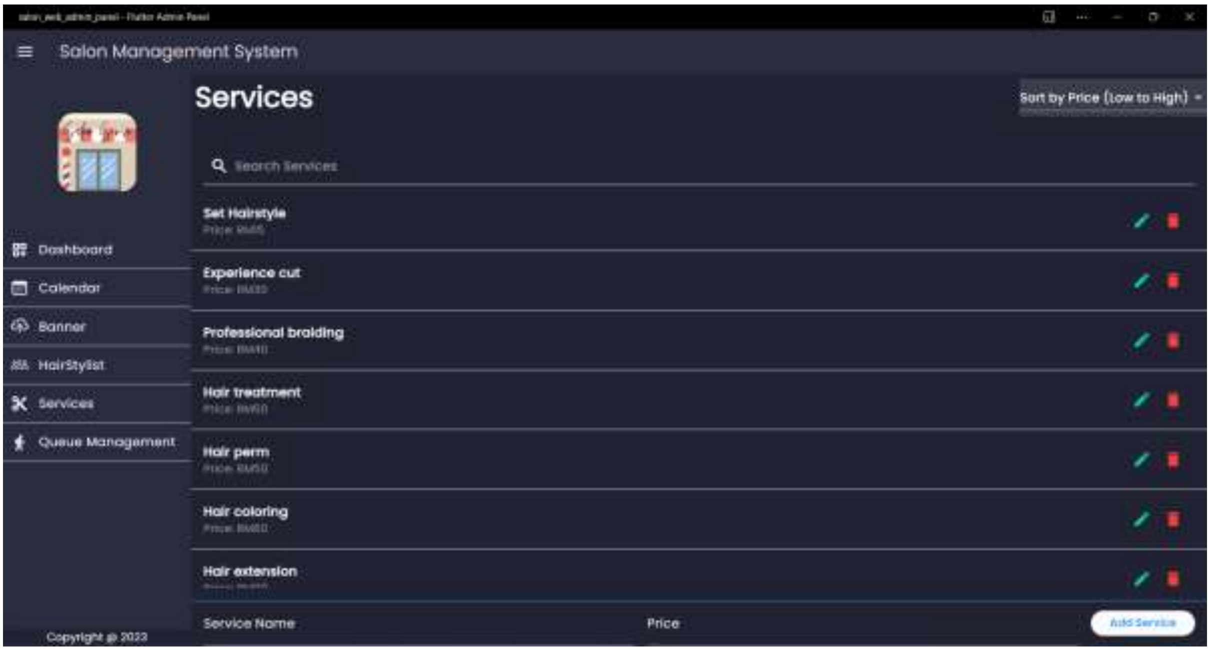
Position
Senior Hairstylist

Status
Active

Figure 5.3.4.3 Edit Hairstylist Screen

5.3.5 Managing Service Screen

In services page, hairstylists are able to update existing services name and prices as well as delete them. Moreover, they can add new services by keying in the name and the price. Furthermore, sorting and searching features are provided to sort and search by prices or service name.



Set Hairstyle

Experience cut

Professional braiding

Hair treatment

Hair perm

Hair coloring

Hair extension

Service Name

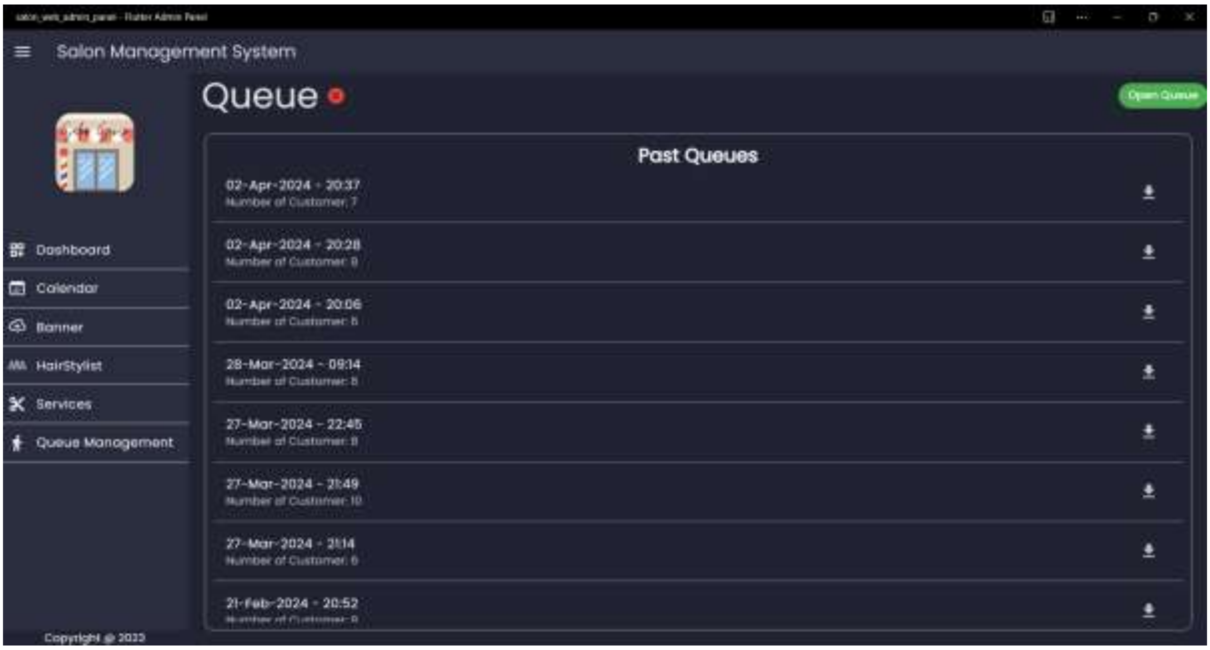
Price

Figure 5.3.5.1 Manage Services Screen

5.3.6 Queue Management System

The Queue Management system facilitates virtual queuing for customers during high-demand periods, ensuring transparency and reliability, with the ability for the administrator to open and close the system as needed. Different states of queue management system will be showing different content.

When the queue is inactive, it will be showing a list of past queues and reports of each queue can be downloaded by admin. Report will be generated in a pdf format consisting of information of customers and the queue.



Past Queues

02-Apr-2024 - 20:37
Number of Customer: 7

02-Apr-2024 - 20:28
Number of Customer: 9

02-Apr-2024 - 20:06
Number of Customer: 6

28-Mar-2024 - 09:14
Number of Customer: 6

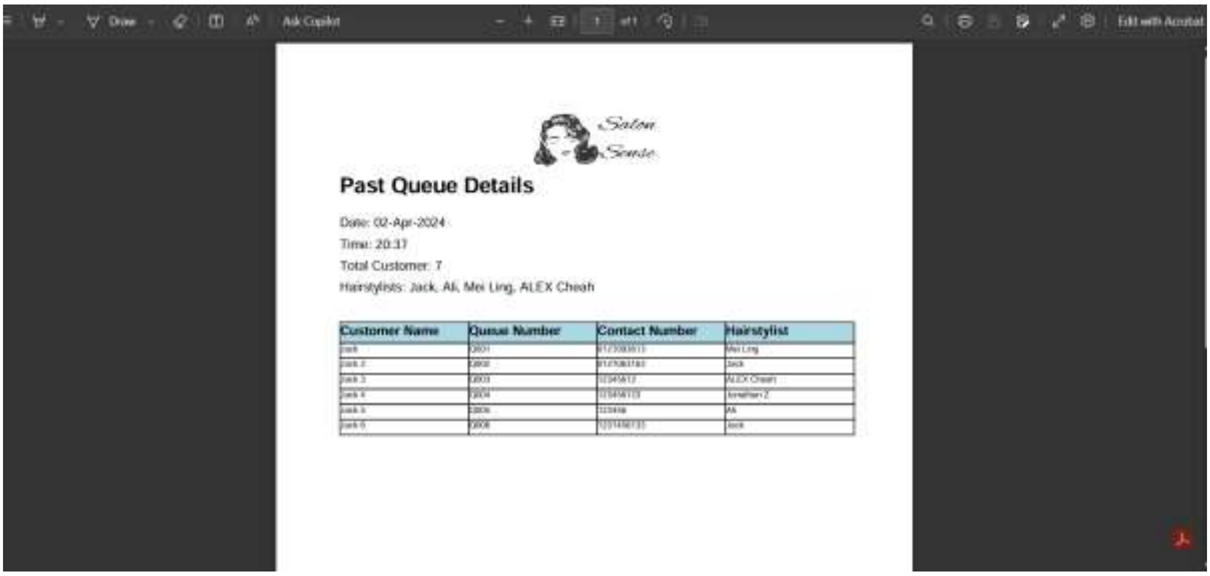
27-Mar-2024 - 22:45
Number of Customer: 8

27-Mar-2024 - 21:49
Number of Customer: 10

27-Mar-2024 - 21:14
Number of Customer: 6

21-Feb-2024 - 20:52
Number of Customer: 9

Figure 5.3.6.1 Queue Management Screen (Virtual Queue is not on)



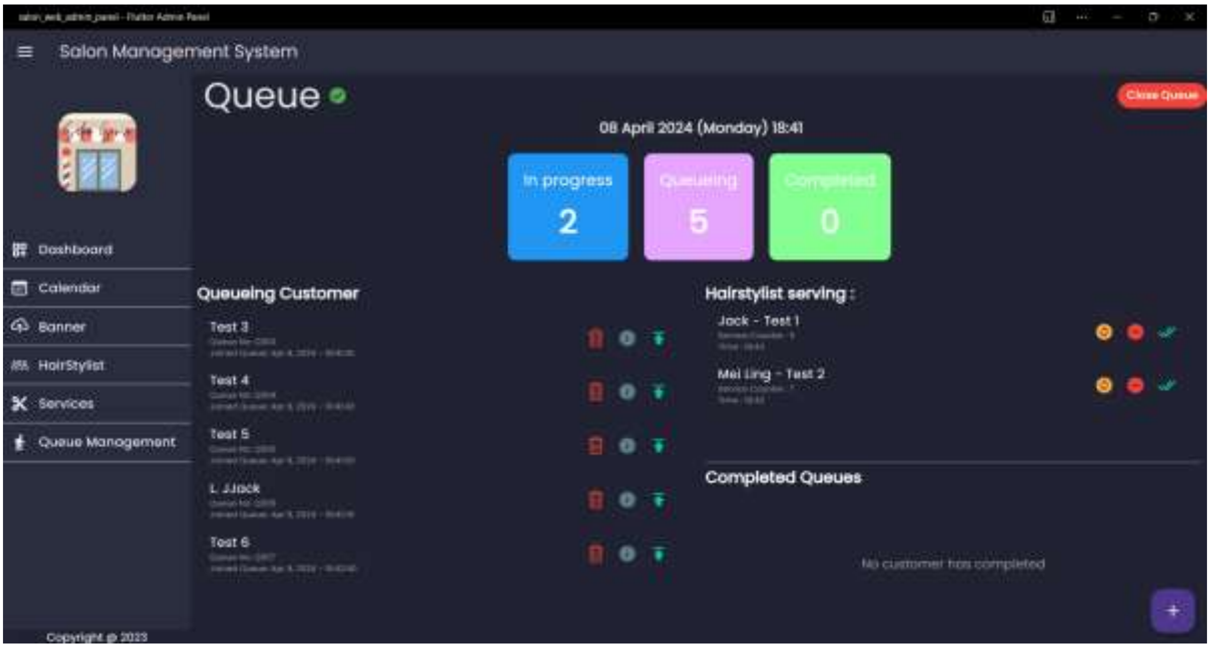
Past Queue Details

Date: 02-Apr-2024
Time: 20:37
Total Customer: 7
Hairstylists: Jack, Ali, Mei Ling, ALEX Cheah

Customer Name	Queue Number	Contact Number	Hairstylist
Jack	Q001	[illegible]	Mei Ling
Jack 2	Q002	[illegible]	Jack
Jack 3	Q003	12345612	ALEX Cheah
Jack 4	Q004	123456123	Jonathan Z
Jack 5	Q006	123456	Ali
Jack 6	Q008	[illegible]	Jack

Figure 5.3.6.2 Report from Previous Queue

For efficient queue management, the admin can open the queue, enabling customers to join virtually. Customers can be added to the queue by providing their name and contact number to admin or via mobile application. Within the queue management interface, the admin can monitor the number of customers queuing, those in progress, and those who have completed their service. The queueing customers list displays details in ascending order, including queue numbers. The admin can assign a hairstylist to a specific customer, select the service counter, and transition the customer to the "In Progress" status. During this phase, the admin has the flexibility to assign a different available hairstylist, update the customer's status to "Did Not Show Up," or mark the service as completed. Finally, the completed queue showcases customers who have finished their service.



Queue

08 April 2024 (Monday) 18:41

In progress 2

Queueing 5

Completed 0

Queueing Customer

Test 3

Test 4

Test 5

L JJack

Test 6

Hairstylist serving :

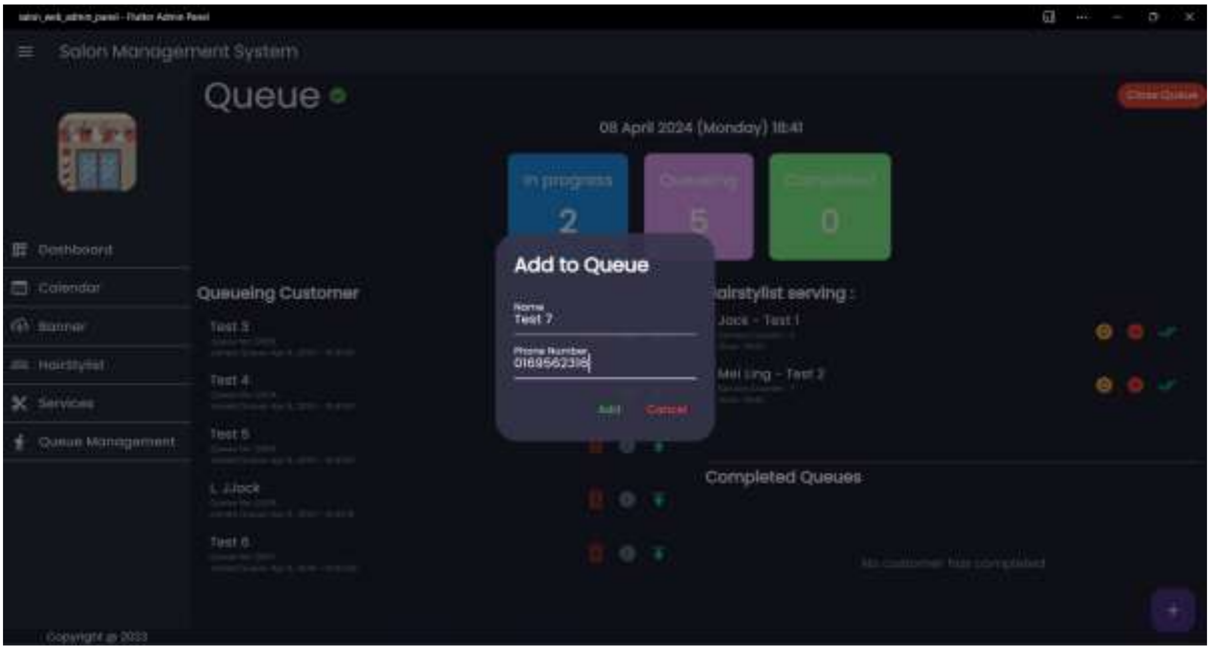
Jack - Test 1

Mei Ling - Test 2

Completed Queues

No customer has completed

Figure 5.3.6.3 Queue Management Page (Admin)

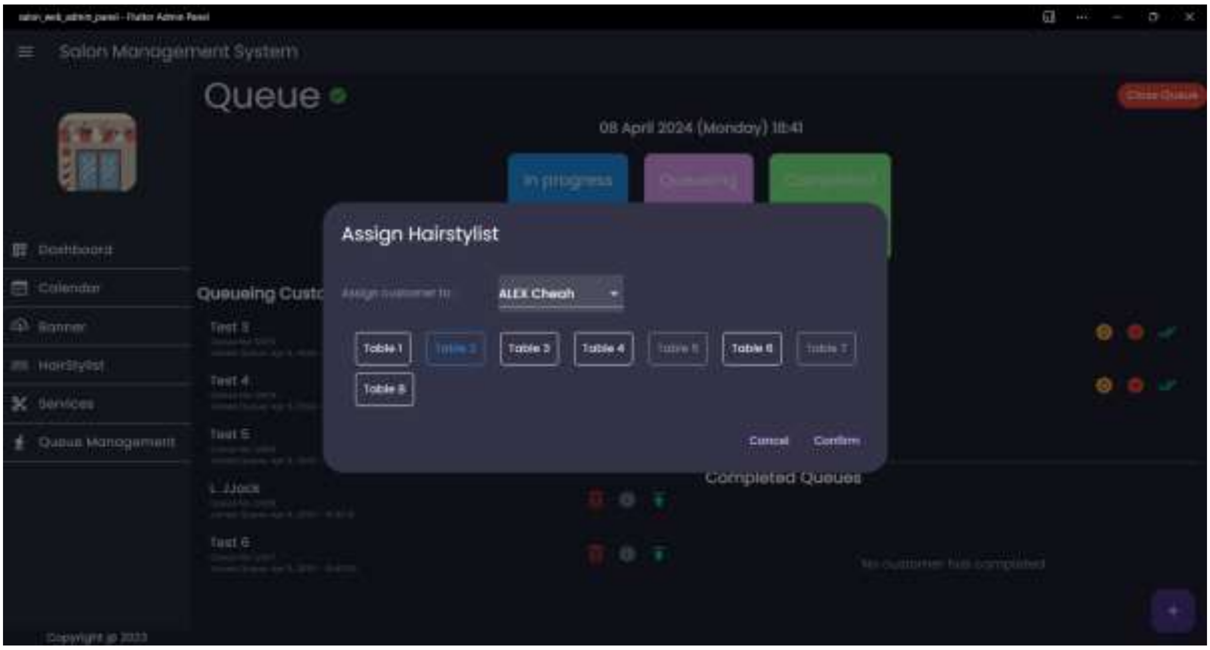


Add to Queue

Name
Test 7

Phone Number
0169562316

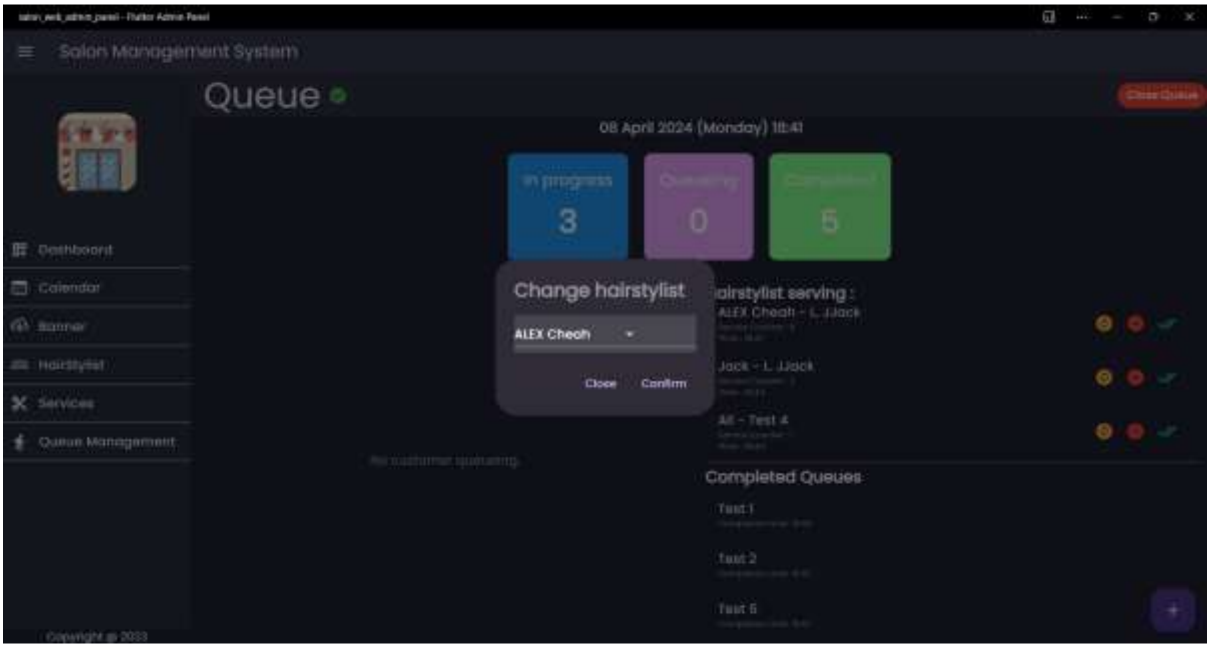
Figure 5.3.6.4 Add Customers to Queue



Assign Hairstylist

Assign customer to: ALEX Cheah

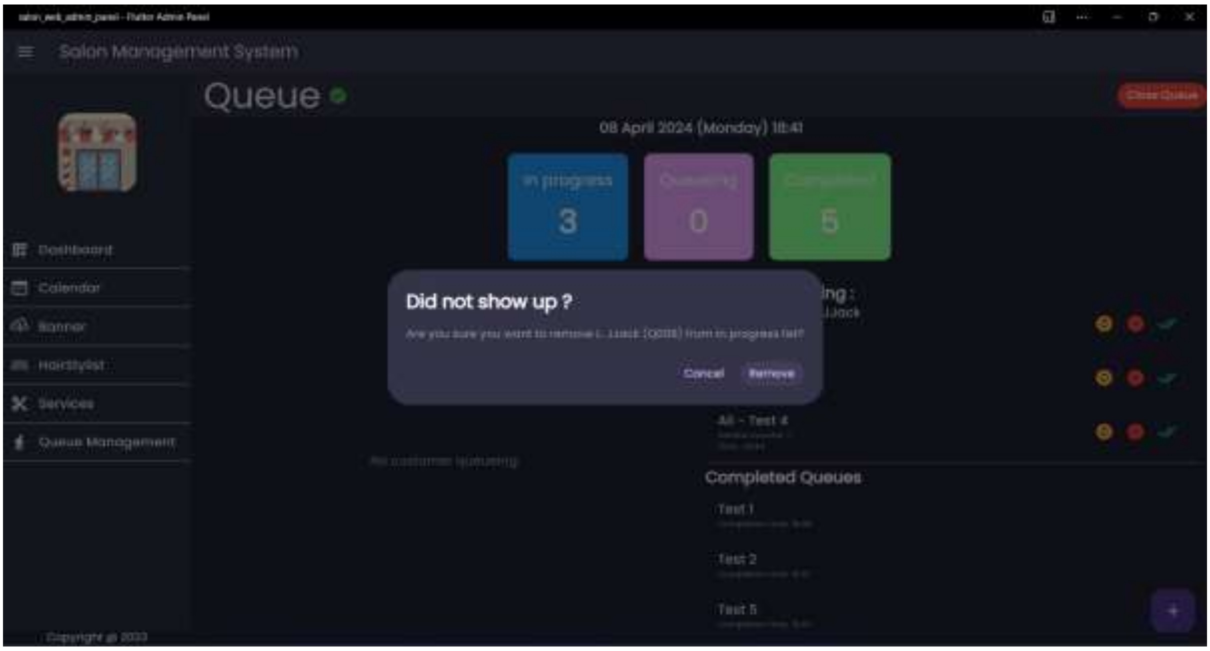
Figure 5.3.6.5 Assign Hairstylist to Queueing Customers



Change hairstylist

ALEX Cheah

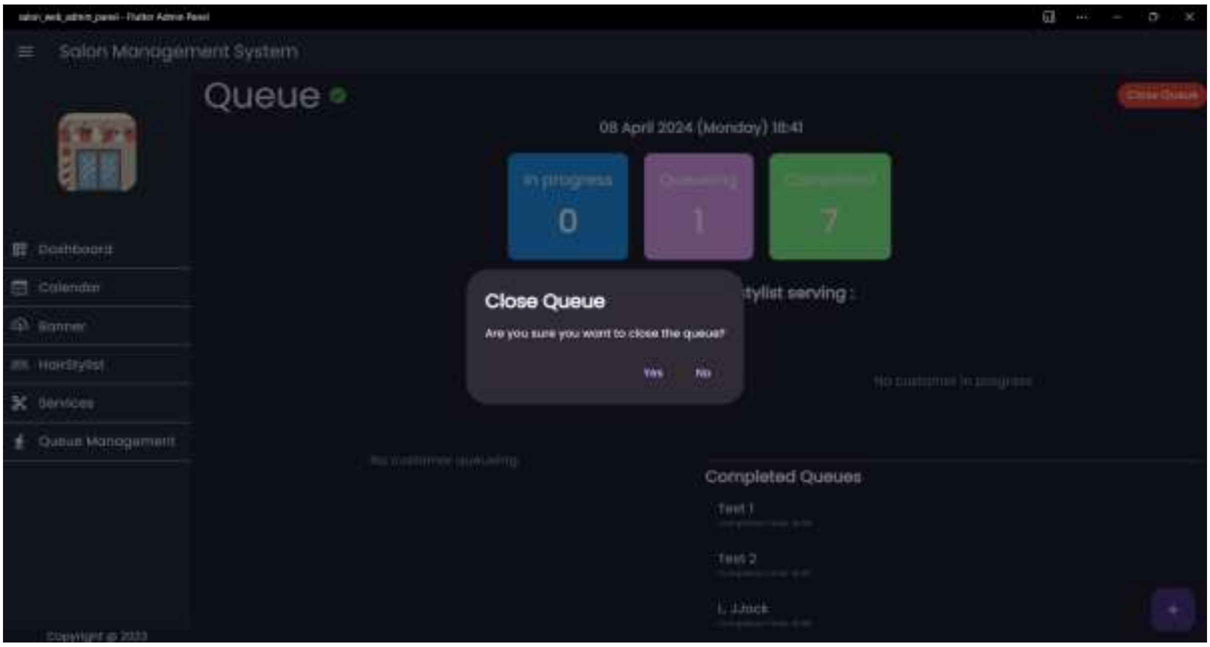
Figure 5.3.6.6 Change Hairstylist for In Progress Customers



Did not show up ?

Are you sure you want to remove L JJack (Q008) from in progress list?

Figure 5.3.6.7 Remove No Show Up Customers from In Progress State



Close Queue

Are you sure you want to close the queue?

Yes No

Figure 5.3.6.8 Close Queue

5.4 Summary

During the implementation and testing phase, a comprehensive system was developed with mobile applications tailored for both customers and hairstylists, while administrators accessed the platform through a web-based admin panel. The mobile applications featured modules such as Login/Sign Up, Profile Pages, Calendar Management, Appointment Booking, Virtual Queue Management, Notification Systems, and Virtual Hairstyle Try-on, providing convenient access and functionality for users on the go. Hairstylists and customers could seamlessly interact with the platform, managing appointments, profiles, and queues efficiently. Meanwhile, the web admin panel provided administrators with powerful tools for analytics, calendar management, banner and hairstylist management, service management, and comprehensive queue management capabilities, ensuring smooth operation and efficient oversight of salon operations.

CHAPTER 6 CONCLUSION

6.1 Project Review, Discussion and Conclusion

Proposed salon management system mainly focuses on solving the issues and challenges faced by traditional salons such as conventional booking function through phone call, non-existence of hairstylist rating system and physical queue management. By implementing technology into salon industry, this proposed system aims to enhance customer experience and improve overall communication between customers and hairstylist. Through advanced features such as cloud-based appointment system, hairstylist rating mechanism and virtual queue management system, it benefits all users, admin, hairstylist and customers.

By adopting the innovative system, salon hairstylist can better manage their appointments, reduce traditional scheduling errors due to communication issue. They have the flexibility to change the status of appointments which leads to more efficient workflow. While for customers, they have the flexibility to choose the preferred timeslot, hairstylist as well as the hairstyle that they want. Cancelling feature is provided as well if they have changed their mind. Notification has been implemented for more effective communication channel. Furthermore, the introduction of hairstylist rating mechanisms provides transparency for customers as the rating is open for public to view. Hairstylist may view all the ratings given by customers, but they are not able to change or hide any ratings. Once the appointment has completed, customers have right to upload images as well as provide ratings based on their satisfaction. Moreover, virtual queue system offers a modernized solution to manage customer queues effectively. The system is built based on First-In-First-Out data-structure method to ensure that fair and efficient queue as each customer’s queue starts time are recorded. Estimated time of each queueing customers will be calculated on the backend of the system and updates to the customers every few seconds to ensure that customers are notified. Hence, the queueing system ensures that customers are served based on arrival sequence similar to physical queueing system.

The proposed project is developed though one of the agile development approaches which is Rapid Application Development (RAD). As the whole project timeline is short, RAD enables to construct rapidly and refine the management key features and functions. This approach not only emphasize on immediate needs of the system but also allows the prompt adjustments in response to changing requirements. To further accelerate development, Flutter framework is utilized with Firebase as the backend. On the backend side, Firebase's non-SQL architecture introduce unnecessary complexity compared to traditional SQL approach which is better to be used in this proposed system. By integrating Firebase backend with Flutter frontend, the proposed system can achieve a balance between efficiency and functionality, solving the problem of old traditional salon management system.

In short, the proposed salon management system represents a significant step forward in revolutionizing traditional salon operation which doesn't really implement any technology. Through implementation of salon management system, where hairstylist will be using web admin panel and customers will be accessing to the system through mobile application, aims to achieve the three main objective and various modules in the system.

6.2 Future Work

While the proposed salon management system offers numerous benefits and improvements over traditional salon operations, there are still opportunities for further enhancement and refinement. Future work could focus on augmenting existing features and introduce new functionalities to provide an even more comprehensive solution for salon employees and customers.

One innovative feature that could be implemented in the salon management system is an employee leave management system. This functionality would allow hairstylists to request time off and once leave request is approved on admin side, the corresponding time slots would be automatically blocked off in appointment scheduling system. This streamlines the leave request process, enhances transparency for customers, and minimizes scheduling conflicts. Implementing such a feature would involve integrating leave request workflows and automated blocking mechanisms into the existing system, ultimately improving both employee satisfaction and customer experience.

Furthermore, incorporating emerging technologies like artificial intelligence (AI) and machine learning (ML) could greatly improve the salon management system's abilities. AI-powered recommendation engines could revolutionize the customer experience by offering personalized hairstyling options tailored to individual preferences and facial features. By analyzing past appointment data and customer feedback, these recommendation engines could suggest hairstyles, colors, and treatments that best suit each client's unique needs and preferences. Additionally, machine learning algorithms could be leveraged to predict demand for specific services based on factors such as seasonality, trends, and customer demographics. This predictive analytics capability would enable salon owners to optimize staffing levels and resource allocation, ensuring that they can efficiently meet customer demand while maximizing operational efficiency.

Besides, leveraging Flutter framework's support for web development presents an opportunity to extend the mobile based salon management system beyond just mobile application. By developing a responsive web application for customers and hairstylists, they can access to their account even without installing mobile application. This enhancement broadens the system's accessibilities and improve the usability for the users.

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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Year 3 Trimester 3	**Study week no.: 4**
Student Name & ID: Lim Jeng Jack , 20ACB02102	
Supervisor: Dr. Tan Joi San	
Project Title: Salon Management System	

1. WORK DONE

- Notification Feature, Queue Management Module

2. WORK TO BE DONE

- Implementation and Integration of Augmented Reality in the System

3. PROBLEMS ENCOUNTERED

- Building on 3D objects for virtual Hairstyle
- Integration of DeepAR Studio with flutter where the versions are incompatible

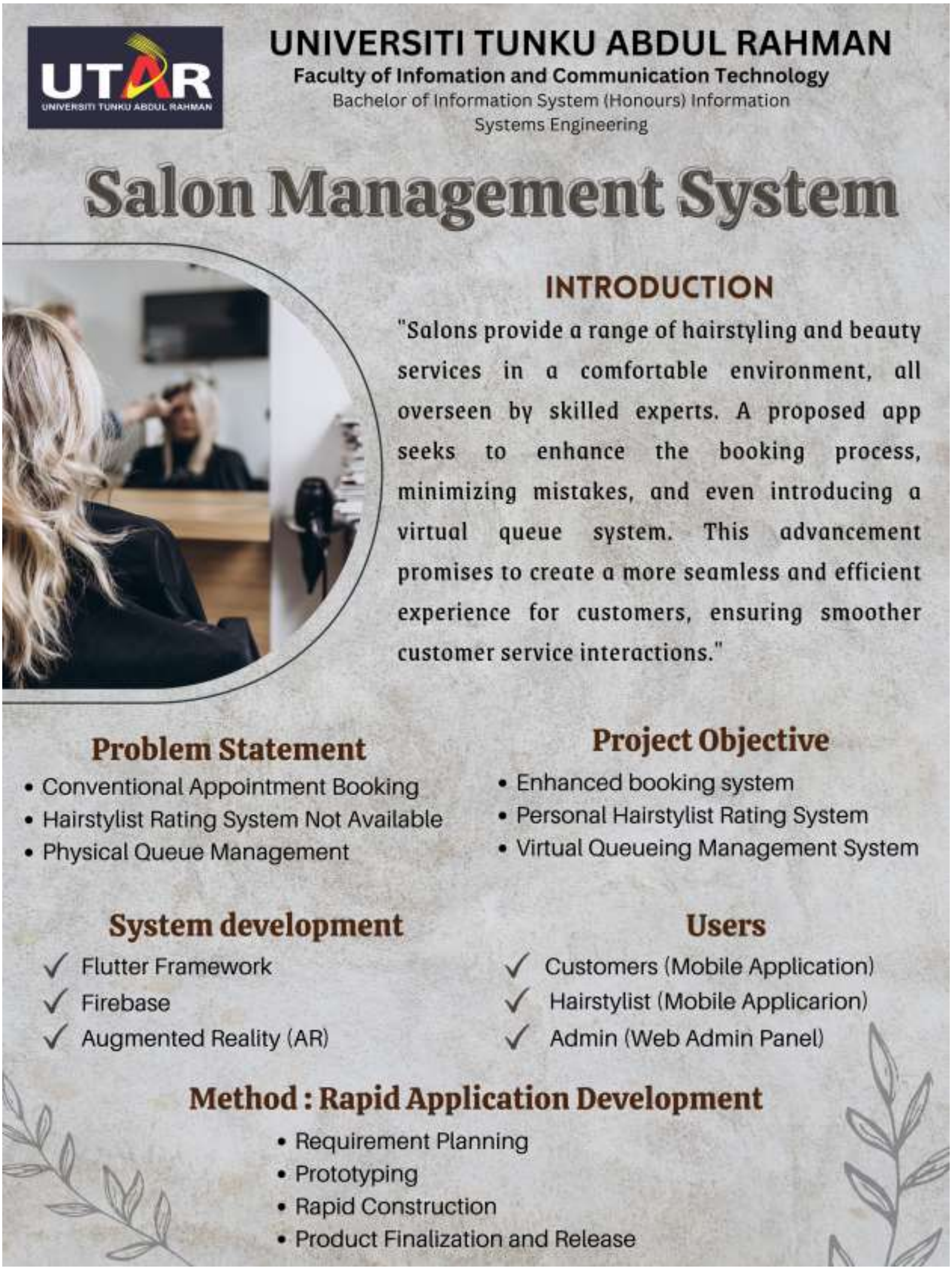
4. SELF EVALUATION OF THE PROGRESS

- More research on AR with flutter requires to be done. However, Blender provides easy solution to create on 3D objects and DeepAR studio allows integration of AR with Flutter.

_________________________ Supervisor's signature

_________________________ Student's signature

POSTER



UNIVERSITI TUNKU ABDUL RAHMAN

Faculty of Infomation and Communication Technology

Bachelor of Information System (Honours) Information Systems Engineering

Salon Management System

INTRODUCTION

"Salons provide a range of hairstyling and beauty services in a comfortable environment, all overseen by skilled experts. A proposed app seeks to enhance the booking process, minimizing mistakes, and even introducing a virtual queue system. This advancement promises to create a more seamless and efficient experience for customers, ensuring smoother customer service interactions."

Problem Statement

- Conventional Appointment Booking
- Hairstylist Rating System Not Available
- Physical Queue Management

Project Objective

- Enhanced booking system
- Personal Hairstylist Rating System
- Virtual Queueing Management System

System development

- ✓ Flutter Framework
- ✓ Firebase
- ✓ Augmented Reality (AR)

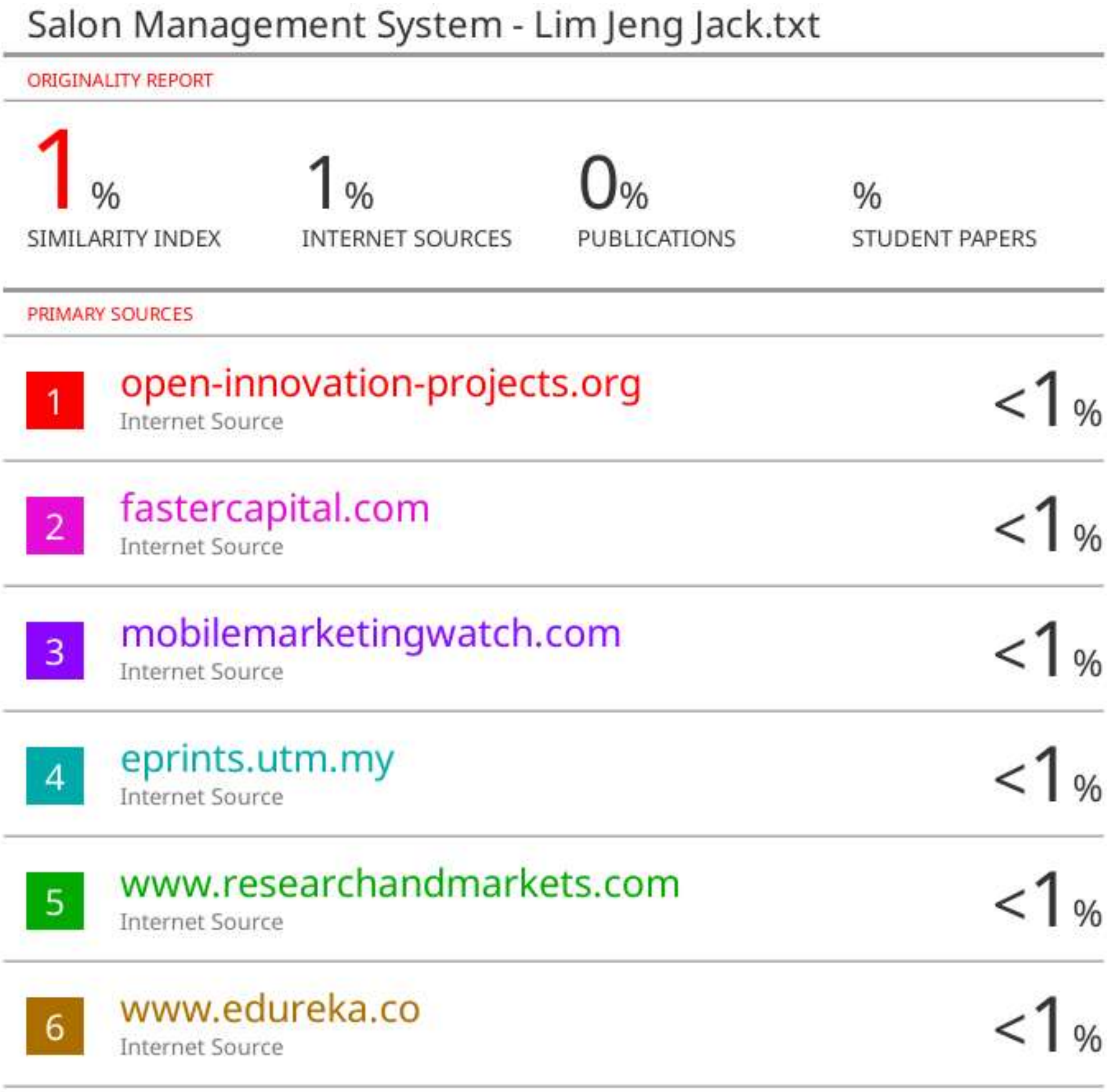
Users

- ✓ Customers (Mobile Application)
- ✓ Hairstylist (Mobile Applicarion)
- ✓ Admin (Web Admin Panel)

Method : Rapid Application Development

- Requirement Planning
- Prototyping
- Rapid Construction
- Product Finalization and Release

PLAGIARISM CHECK RESULT



Salon Management System - Lim Jeng Jack.txt

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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

Full Name(s) of Candidate(s)	Lim Jeng Jack
ID Number(s)	20ACB02102
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Title of Final Year Project	Salon Management System

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Signature of Supervisor

Name: Tan Joi San

Date: 22 April 2024

Signature of Co-Supervisor

Name: ______

Date: ______

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Student Name	Lim Jeng Jack
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