

## Hair Technique Salon Management System Using Mobile Application

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**Abstract:** Hair Technique Salon Management System is a mobile application that provides a mobile platform that enables customers to make an appointment for hair services and employer and employees to manage the salon's information and customer's information. The Hair Technique Salon is currently managing the salon and customer information manually by using paper-based and electronic document management. In addition, it has poor appointment management which only allows customers to make an appointment via phone call. Thus, a mobile-based Hair Technique Salon Management System is developed to solve these inconveniences. In terms of methodology, simple Software Development Life Cycle (SDLC) methodology is used in this project. In this project, the Dart programming language will be used as a mobile-based scripting language, and this application is developed using Flutter, Android Studio and Firebase database. Through this Hair Technique Salon Management System, customer can view salon information, make an appointment, and receive a notification. At the same time, the employer and employees can manage the appointment, manage the salon information, and manage notification easily. The developed system will help improve the hair salon's systematic work management efficiency and expand the customer's segments and increase the hair salon's competitiveness among its peers.

**Keywords:** Salon, Salon Management System, Software Development Life Cycle, Flutter, Android Studio, Dart Programming Language

### 1. Introduction

Hair Technique Salon is a hairstyling premise that prefers Kérastase Salon products for a unique experience. Its services include a complimentary hair and scalp diagnosis, a customized hair ritual and a tailored hair and scalp at-home routine using high-performance Kérastase hair and scalp care products. Established by Mr. Andy Yeap, Hair Technique Salon is located at Tesco Tanjung Pinang lot, 1-F-F12, Penang, Malaysia. The Hair Technique Salon's operation and customer information are currently managing manually, which are paper-based and electronic document management. Hair Technique Salon only allows customers to make an appointment via a phone call. Besides, Hair Technique Salon update the information manually when there are any changes, such as the appointment schedule. Thus, this current management practice of Hair Technique Salon is disorganized and time-consuming.

Therefore, this project aims to analyze and design the hair salon management system using the object-oriented approach, develop the hair salon management system based on mobile platform application, and perform functional testing and user acceptance testing for the developed hair salon management system. This system is going to design a mobile-based salon management system for Hair Technique Salon. This system is designed to provide a computerized management system for Hair Technique Salon. The target users of this system are the administrator, employees, and customers. There are 6 modules: registration module, login module, hair salon information management module, user profile management module, appointment management module, and notification management module. Based on three target users, they may use the same module, but with distinct functions depending on their authorization level.

## 2. Related Work

This section describes the related work of the system, which are collected information and documents that are important for analysis purposes. Thus, this section presents the technology, background of the case study which is the manual management system for Hair Technique Salon, and a comparison between the existing system and the developed system.

### 2.1 Technology

In this technology era, mobile applications are emerging rapidly around the world. Almost every smartphone including an entry-level phone and regardless of the price can run and download a mobile application [1]. Thus, the system will be developed as a native mobile application. The system development only targets a specific platform which is Android. Android is an operating system (OS) based on the Linux kernel, which is initially developed for mobile devices. The development tool kit, which is an Android Software Development Kit (SDK), is required to build an Android application. Android has a diverse variety of SDKs and a well-formed library that is ready for developers to build applications. This has become a good feature as Android developers can access anything that can be accessed by the operating system.

The system will be developed in Android Studio using the Flutter framework. Android Studio is an official integrated development environment (IDE) specifically for Android application development. Flutter is a lightweight user interface (UI) framework developed by Google with the purpose of developing contemporary, native, and reactive apps for iPhone OS (iOS) and Android [2]. Besides, Firebase is a back-as-a-service (BaaS) software development platform that provides various useful and functional hosted back-end services [3]. Thus, Firebase is chosen to manage the database the system. Moreover, Management Information System (MIS) is one of the main computer-based information systems in an organization that offers business information to help an organization operate. MIS provide comprehensive and integrated coverage of new technologies, information systems applications, and their impact on business models and management decisions engagingly and interactively [4].

### 2.2 Manual Management System for Hair Technique Salon

The current management system of Hair Technique Salon is performed manually to achieve their business processes by using Microsoft Excel to key-in the data of the customers and their business such as employee's data, and incoming or outgoing expenses. The Microsoft Excel document which contains the recorded data is saved in a folder in the Personal Computer (PC), which is placed at the cashier's counter. The employer can view and manage the detail of the recorded data whenever he wants. However, the manual management system is insecure because there is no database that automatically creates a backup for this data, and this may cause the loss of customers records and retrieving files.

Besides, the current management system allows customers to walk-in or make an appointment via a phone call for a hair service. For customers who walk into the hair salon, customer may waste a lot of time while waiting for the receptionist to arrange an available hairstylist during peak time. For customers who make an appointment, the appointment details are initially written on a piece of paper. Then appointment details are gathered, analyzed, and scheduled by using Microsoft Excel to generate a schedule. Next, the schedule is printed out for employees as a reference. If there is a mistake in the schedule, the process of scheduling must be repeated until a precise schedule is generated. Furthermore,

customers who are interested in purchasing any hair product from Hair Technique Salon must walk-in to the hair salon to make purchases.

Moreover, the admin in the hair salon does not have an appropriate notification method to notify all the customers about the emergency update of the hair salon. The entire management system, which is conducted manually, is time-consuming and contain uncertainty such as miscalculation or miscommunication. Therefore, the process needs to be supported by a computerized system that can perform efficient record keeping, data storing and retrieval, analysis, notifications, and others that improve the efficiency of the management process.

### 2.3 Comparison with the Existing Systems

The three existing systems are studied and compared to the important features of the system. Table 1 shows a precise summary of the comparison between the three existing systems namely SuperSalon [5], MySalon Hair Studio [6], JeffLee The Hair Company [7] and the system which is Hair Technique Salon Management System.

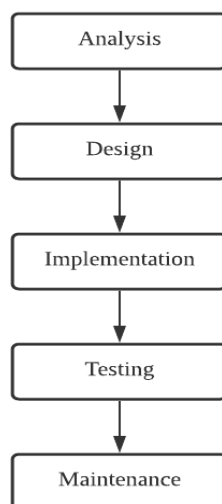
**Table 1: Comparison between existing system and Hair Technique Salon Management System**

Features/System	SuperSalon	MySalon Hair Studio	JeffLee The Hair Company	Hair Technique Salon Management System
Type of User	Employer of the Salon	Customer	Customer	Admin, Employee, and Customer
System Type	Web-Based, Android and iOS application	Web-Based, Android and iOS application	Web-Based	Android application
User Registration	Yes	Yes	No registration needed	Yes
Login	Username and password needed	Username and password needed	No username and password needed	Phone number and One-time password (OTP)
Online Appointment	Yes, provide online appointment	Yes, provide online appointment	Yes, Provide online appointment	Yes, provide online appointment
Manage Salon Information	Yes, it provides salon information management function	No, it does not provide	No, it does not provide	Yes, it provides salon information management function
Manage Appointment	Yes, it provides appointment management function.	No, it does not provide	No, it does not provide	Yes, it provides appointment management function.
Notification	Yes, it provides notification function.	Yes, it provides notification function.	No, it does not provide	Yes, it provides notification function.

Based on the Table 1, it can be summarized that the system enables the Hair Technique Salon to manage the hair salon information, appointment, notification, which help the salon owner can manage the salon more efficient. Moreover, the system centralized all function in one system platform which will help to reduce the operating cost and improve convenience to both the salon owners and customers. Based on the comparative system review, the system fulfills the uniqueness of the system evaluated. Therefore, the system has more strength and features compared to the other existing system.

### 3. Methodology

The methodology is important to complete every activity in the system development life cycle, including models, tools, and techniques [8]. The methodology chosen to develop the system is the simple Software Development Life Cycle (SDLC) model. In its most basic form, the simple Software Development Life Cycle (SDLC) is a methodology for structuring a software project management [9]. This methodology is appropriate for a small project with no ambiguous criteria and a tight timeframe. Therefore, a basic simple Software Development Life Cycle (SDLC) model used to develop the Hair Technique Salon Management System to ensure the system is fulfilling requirement in a more stable way. The SDLC model is usually divided into five phases that must be completed to finish the system's development: planning or requirements analysis, design, implementation, testing, and maintenance. Figure 1 depicts the whole graphical depiction of phases in a simple SDLC model.



**Figure 1: Simple Software Development Life Cycle [9]**

#### 3.1 System Development Workflow

System development workflow consists of a description of all phases, including analysis, design, implementation, and testing. Each phase has its own activities that produce different deliverables. Table 2 shows the workflow for the development of the Hair Technique Salon Management System.

**Table 2: System Development Workflow of the Hair Technique Salon Management System**

No	Phase	Activities	Deliverables
1.	Analysis Phase	<ul style="list-style-type: none"> <li>• Proposed the project</li> <li>• Define the target user</li> <li>• Identify problem statements, objectives, scope of project</li> <li>• Set work plan</li> <li>• Conduct interview with owner of the hair salon</li> <li>• Analyse the system requirement specification.</li> <li>• Analyse the current manual system</li> <li>• Analyse the similar existing system.</li> <li>• Analyse the hardware and software requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Project Proposal</li> <li>• Gantt chart</li> <li>• User requirements</li> <li>• Literature review</li> <li>• Hardware and software requirements</li> <li>• Functional and non-functional requirements.</li> <li>• UML Diagram: Use case diagram, class diagram, sequence diagram and activity diagram</li> </ul>
2.	Design Phase	<ul style="list-style-type: none"> <li>• Design database</li> <li>• Design system interface according to the modules</li> </ul>	<ul style="list-style-type: none"> <li>• Data schema and Data dictionary table</li> <li>• System interface according to modules</li> </ul>

**Table 2: (cont.)**

3.	Implementation Phase	<ul style="list-style-type: none"> <li>• Implement all the function and features designed by developing the system</li> </ul>	<ul style="list-style-type: none"> <li>• Complete system</li> </ul>	workable
4.	Testing Phase	<ul style="list-style-type: none"> <li>• Conduct functional testing</li> <li>• Conduct user acceptance testing</li> </ul>	<ul style="list-style-type: none"> <li>• Test report</li> </ul>	

#### 4. Analysis and Design

This section describes the approach to analysis and design involved in the process of developing the system. Thus, this section includes the system requirements analysis, Use Case Diagram, and Class Diagram.

##### 4.1 System Requirements Analysis

System requirements analysis is a process to determine user expectations outcome from the system. System requirements are clarified regarding the specifics of the system services along with the functional and non-functional requirements [10]. Functional requirements define what the system can do or how the system should behave [10]. Table 3 shows the functional requirements of the system.

**Table 3: Functional requirements of the Hair Technique Salon Management System**

No.	Modules	Functionalities
1	Login Module	<ul style="list-style-type: none"> <li>• The system should allow the users to login into the system using user phone number.</li> <li>• The system should allow the users to input the valid phone number and One-time password code to logged in as user.</li> <li>• The system should alert the user for invalid input.</li> <li>• The system should redirect the user to respective homepage once successful login.</li> </ul>
2	Registration Module	<ul style="list-style-type: none"> <li>• The system should allow the registration of new customer.</li> <li>• The system should show error when empty field is found.</li> </ul>
3	Users Profile Management Module	<ul style="list-style-type: none"> <li>• The system should allow the users to edit the personal information.</li> </ul>
4	Hair Salon Information Management Module	<ul style="list-style-type: none"> <li>• The system should allow the administrator to insert new hair salon information.</li> <li>• The system should allow the administrator to edit the hair salon information.</li> <li>• The system should allow the administrator to delete the hair salon information.</li> <li>• The system should allow the users to view the hair salon information.</li> </ul>
5	Appointment Management Module	<ul style="list-style-type: none"> <li>• The system should allow the customer to insert new appointment.</li> <li>• The system should allow the customer to view the appointment details.</li> <li>• The system should allow the administrator to view the appointment schedule.</li> <li>• The system should allow the employee to view the appointment schedule.</li> </ul>

**Table 3: (cont.)**

6	Notification Management Module	<ul style="list-style-type: none"> <li>• The system should allow the administrator to insert new notification.</li> <li>• The system should allow the administrator to delete notification.</li> <li>• The system should allow the users to view the notification.</li> </ul>
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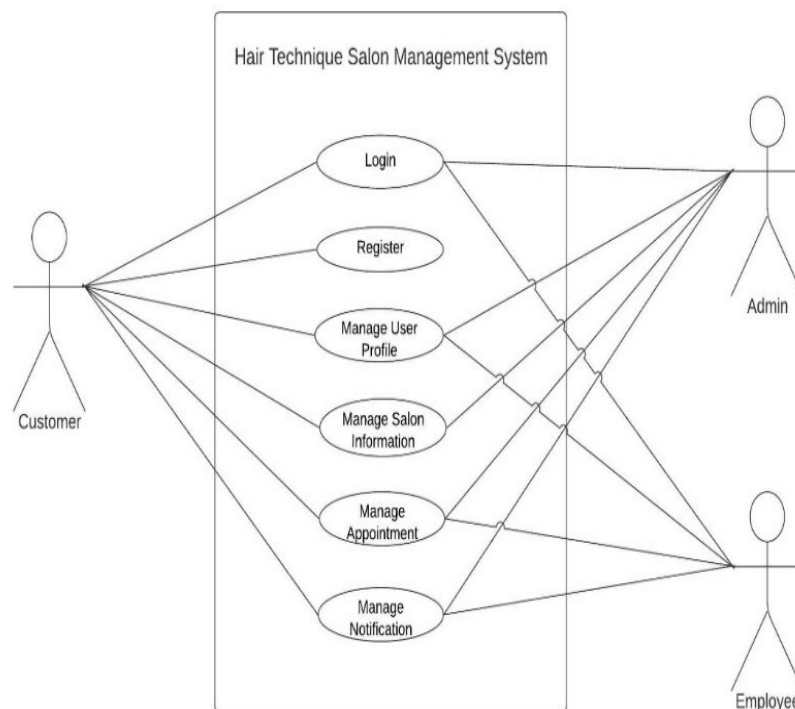
Non-functional requirements specify the criteria used to judge a system's operation, rather than specific behaviors [10]. It depicts variety of system characteristics such as performance, operational, security, and usability. Table 4 shows the non-functional requirements of the system.

**Table 4: Non-Functional requirements of the Hair Technique Salon Management System**

No.	Requirements	Descriptions
1.	Performance	<ul style="list-style-type: none"> <li>• The system should be able for use anytime with an Internet connection.</li> <li>• The execution of the process should not exceed 5 seconds.</li> </ul>
2.	Operational	<ul style="list-style-type: none"> <li>• The system only available when there is an Internet connection.</li> </ul>
3.	Security	<ul style="list-style-type: none"> <li>• The users may access the system with correct username and password</li> </ul>
4.	Usability	<ul style="list-style-type: none"> <li>• The system interfaces are user-friendly and easy to navigate.</li> </ul>

#### 4.2 Use Case Diagram

Hair Technique Salon Management System contain six main use cases as shown in Figure 2. They are login, register, manage user profile, manage hair salon information, manage appointment, and manage notification. The system users include administrator, customer, and employee. Each of the users is interacting with the use case to show the connection and limitation towards the system features.

**Figure 2: Use case diagram of Hair Technique Salon Management System**

### 4.3 Class Diagram

In the class diagram, there are nine classes: Login, Administrator, Employee, Customer, Appointment, Appointment Schedule, Hairstyles, HairServices, and Notification. Each class holds its attributes value and can be linked to another class. There are 3 users involved in the class diagram which are administrator, employee, and customer. When the users proceed to login the system, there will be a “isStaff” and “isAdmin” Boolean method which is used to check the level of authorization. Based on their level of authorization, the system will redirect them to their specific homepage. After that, the users may start to access the function provided in the system. Figure 3 shows the class diagram of Hair Technique Salon Management System.

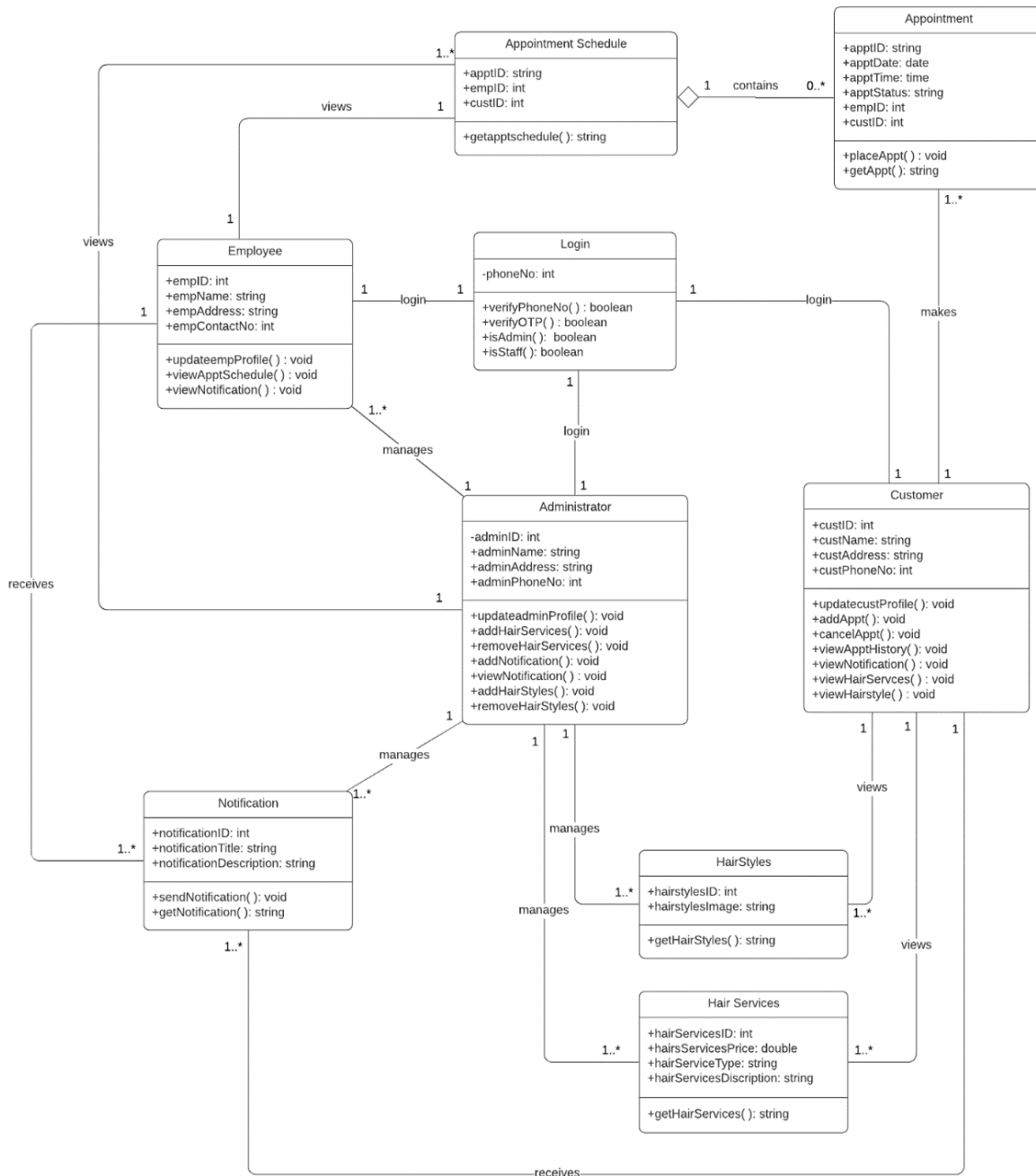


Figure 3: Class Diagram of Hair Technique Salon Management System.

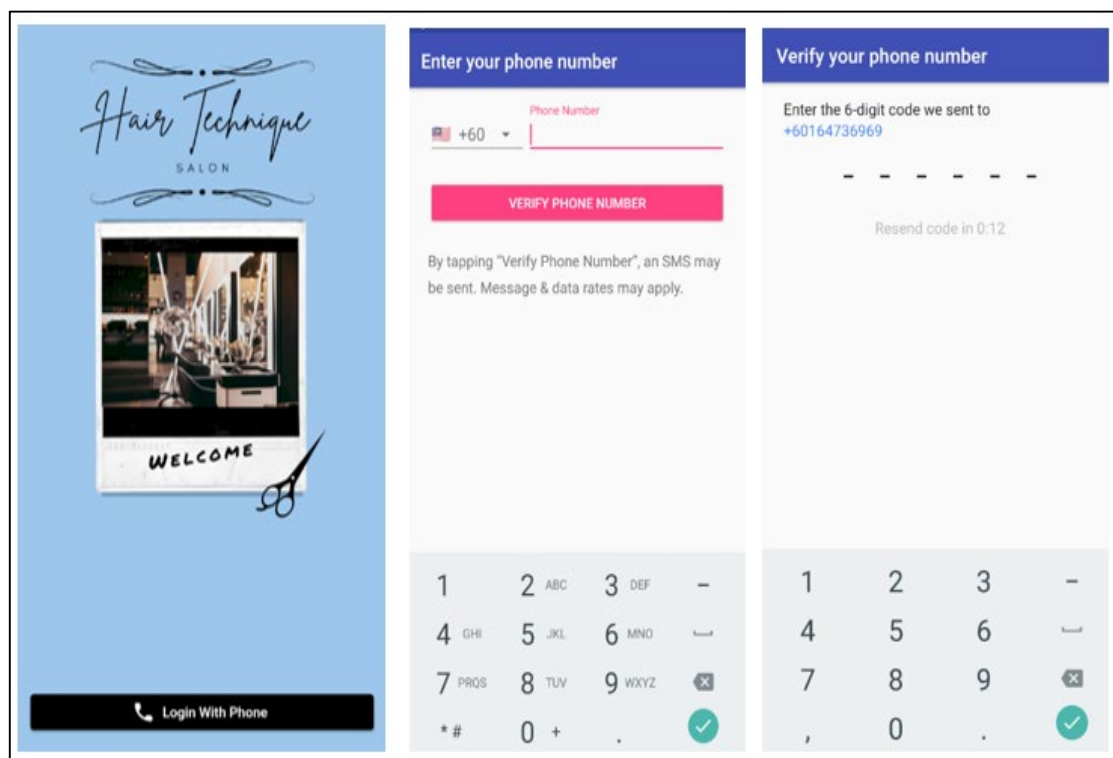
## 5. Implementation and Testing

This section focuses on the description of the implementation and testing of the system. The implementation and testing phase were important to ensure the system is well functioned without errors. The testing is conducted to ensure the system free from bugs before delivering it to system user.

### 5.1 Implementation

The Hair Technique Salon Management System implementation is implemented in Android Studio IDE using the Flutter framework. The Dart programming language is used to provide the logic part and design interface of the system development. Firebase database and Firebase authentication are used as the storage platform for the system. The modules in Hair Technique Salon Management System are login module, register module, manage user profile module, manage hair salon information module, manage appointment module, and manage notification module. In this section, a few selected main modules will be described in terms of its interface and the functions it performs.

The Hair Technique Salon Management System requires its users to login with phone number to access into the system. A one-time password (OTP) code is sent to the user via SMS after inserting valid phone number. OTP code will verify user's phone number, by redirecting the user to the home page if the code is valid. Figure 4 shows the Login Module Interface.



**Figure 4: Login Module Interface**

The Manage Hair Salon Information Module allow administrator to add and delete hair services and hairstyles of the salon. Then, customer can view the hair services and hairstyles available in the hair salon. Figure 5 and Figure 6 shows the Manage Hair Salon Information Module Interface.



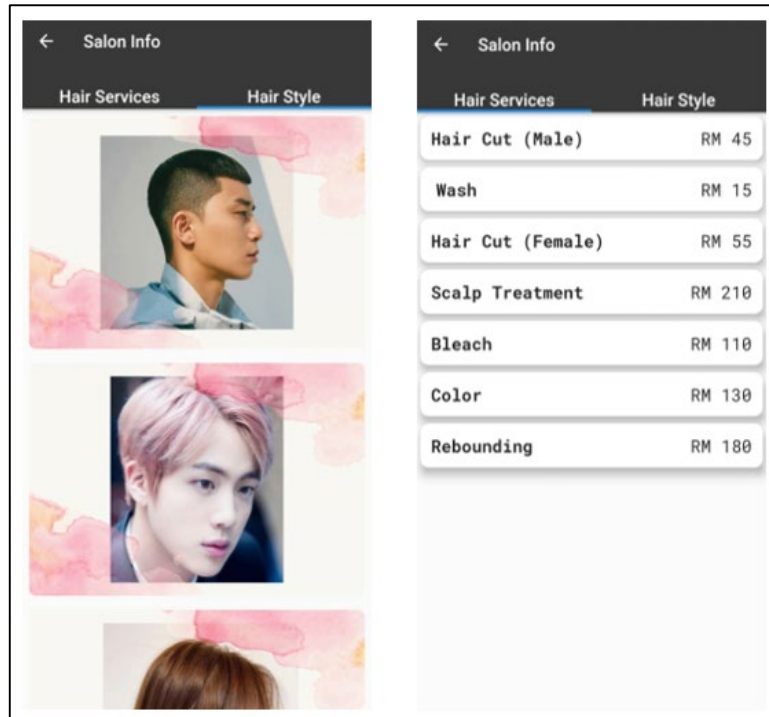


Figure 5: Manage Hair Salon Information Module Interface

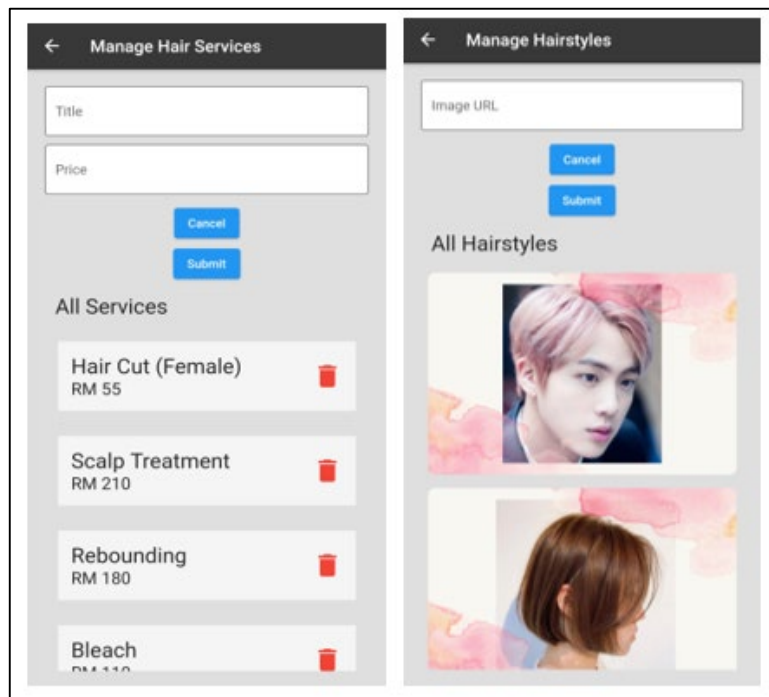


Figure 6: Manage Hair Salon Information Module Interface (cont.)

The Manage Appointment Module allows the customer to make an appointment by selecting the state, salon, stylist, date, and time slot. Then, the customer can view the appointment information on the history page after confirming the appointment. On the history page, the user can also cancel an upcoming appointment. For administrator and employees, they can view the appointment schedule after the customer made the appointment. It is synchronized in the Firebase database when customers

make an appointment or cancel an appointment. Figure 7, Figure 8, and Figure 9 shows the Manage Appointment Module Interface.

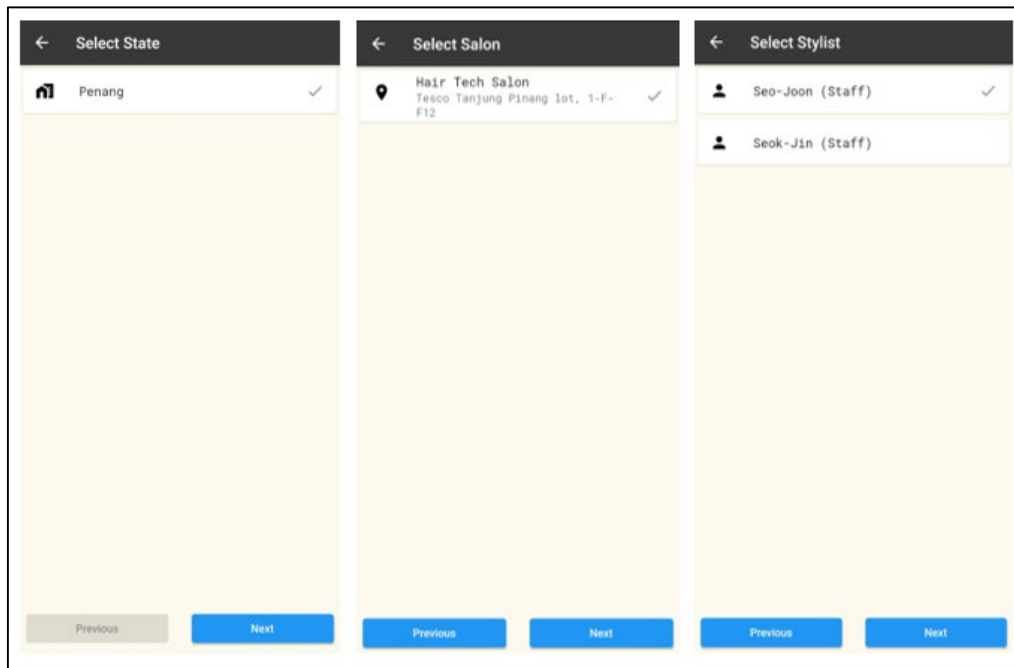


Figure 7: Manage Appointment Module Interface

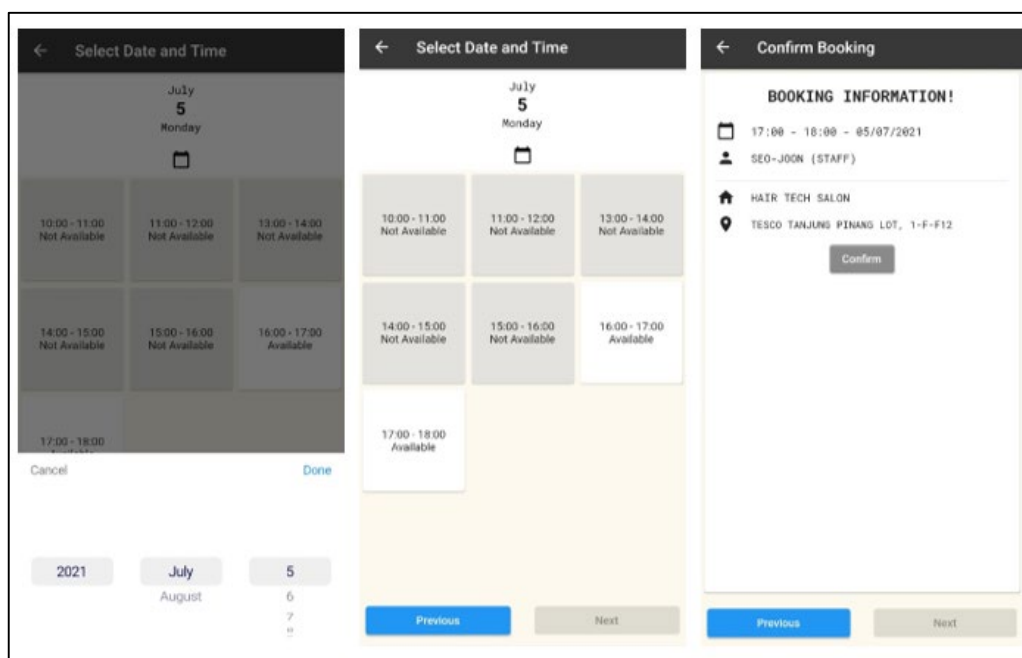
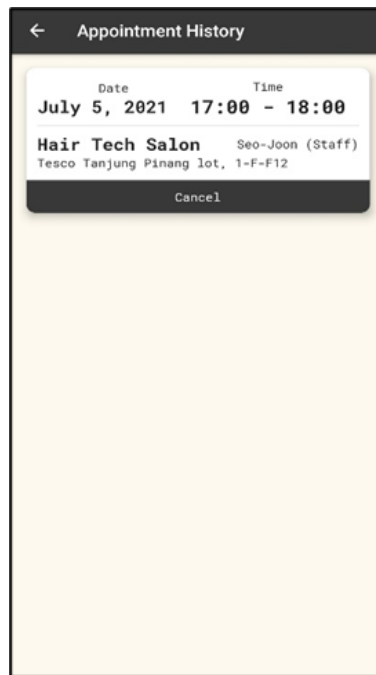
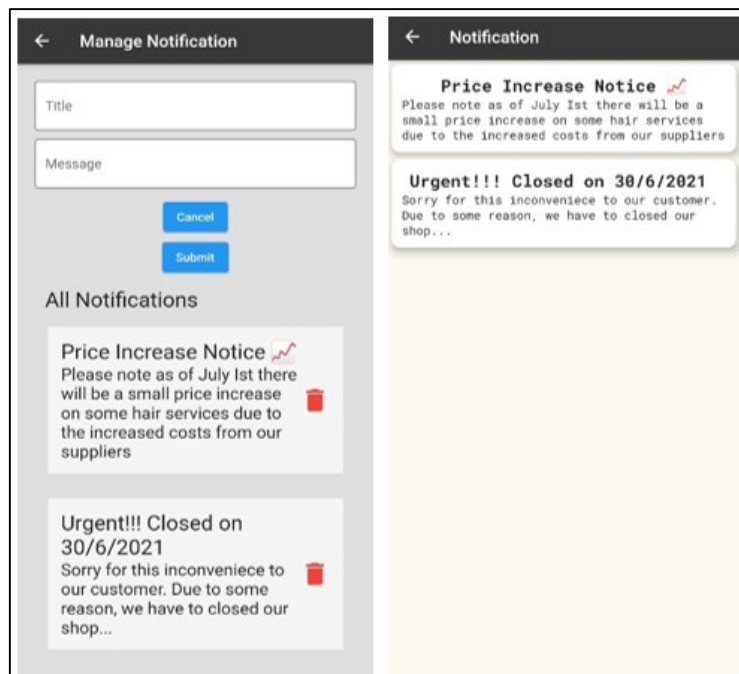


Figure 8: Manage Appointment Module Interface (cont.)



**Figure 9: Manage Appointment Module Interface (cont.)**

The Manage Notification Module allow the administrator to create a notification and delete the notification. If there are any emergency updates, the administrator can inform the customers by using the manage notification module in the system. This improves the convenience of the management of the hair salon. Figure 10 shows the Manage Notification Module Interface.



**Figure 10: Manage Notification Module Interface**

## 5.2 Testing

Testing is a significant process performing in the development of the system because it verifies the completed system's function whether it meets expectations. For Hair Technique Salon Management System, functional testing and user acceptance testing is conducted to ensure the system works according to the defined requirements.

### 5.2.1 Functional Testing

Functional testing is performed to test and determine Hair Technique Salon Management System whether it meets the functional requirements. Therefore, a test plan is created as one of the functional testing for Hair Technique Salon Management System. Table 5 shows the test plan of Hair Technique Salon Management System.

**Table 5: Test plan of Hair Technique Salon Management System**

Test Case ID	Description	Expected Result	Actual Result	Status
<b>Login Module (TC_100)</b>				
TC_100_01	Users enter valid phone number to login the system.	System will send One-time password (OTP) code to user.	System will send One-time password (OTP) code to user.	PASS
TC_100_02	Users enter invalid phone number to login the system.	System will display error message "Enter a valid phone number".	System will display error message "Enter a valid phone number".	PASS
TC_100_03	Users enter One-time password code to verify user phone number.	System will redirect user to user home page based on their level of authorization.	System will redirect user to user home page based on their level of authorization.	PASS
TC_100_04	Users enter invalid One-time password code to verify user phone number.	System will display error message "Wrong code, please enter again".	System will display error message "Wrong code, please enter again".	PASS
<b>Register Module (TC_200)</b>				
TC_200_01	Customer login the system by using an un-register valid phone number.	System will display pop-up register form to request customer to enter name and address for.	System will display pop-up register form to let customer to enter name and address for.	PASS
TC_200_02	Customer presses cancel button in the register form without insert name and address.	System redirects back to the login page.	System redirects back to the login page.	PASS
TC_200_03	Customer presses login button again.	System will display pop up register form to request customer to enter name and address.	System will display pop up register form to request customer to enter name and address.	PASS
TC_200_04	Customer presses register button in the register form without input name and address.	System will display error message. Failed to login.	System will display error message. Failed to login.	PASS

**Table 5: (cont.)**

Manage User Profile Module (TC_300)				
TC_300_01	Users click update icon to update profile.	System will display pop-up updates profile form.	System will display pop-up updates profile form.	PASS
TC_300_02	Users update profile by insert new name and new address then click "Update" button.	System will display pop-up message "Updates Profile Successfully".	System will display pop-up message "Updates Profile Successfully".	PASS
Manage Hair Salon Information Module (TC_400)				
TC_400_01	Admin insert new hair services and click "submit" button.	System will display pop-up message "Hair services Submit Successfully". New hair services will display in the hair services list.	System will display pop-up message "Hair services Submit Successfully". New hair services will display in the hair services list.	PASS
TC_400_02	Admin clicks "delete" icon.	The hair services will be deleted from the hair services list and database.	The hair services will be deleted from the hair services list and database.	PASS
TC_400_03	Admin insert new hairstyles and click "submit" button.	System will display pop-up message "Hairstyles Submit Successfully". New hairstyles will display in the hair services list.	System will display pop-up message "Hairstyles Submit Successfully". New hairstyles will display in the hair services list.	PASS
TC_400_04	Admin long press hairstyles image.	System will display pop up confirmation message "Delete Booking" and "Are you sure you want to delete this hairstyle?"	System will display pop up confirmation message "Delete Booking" and "Are you sure you want to delete this hairstyle?"	PASS
TC_400_05	Admin clicks "delete" in the pop-up confirmation message.	System will display pop-up message "Successfully removed the hairstyle". The hair services will be deleted from the hair services list and database.	System will display pop-up message "Successfully removed the hairstyle". The hair services will be deleted from the hair services list and database.	PASS
TC_400_06	Users click "Salon Info" button.	System will display hair services list and hairstyles list.	System will display hair services list and hairstyles list.	PASS

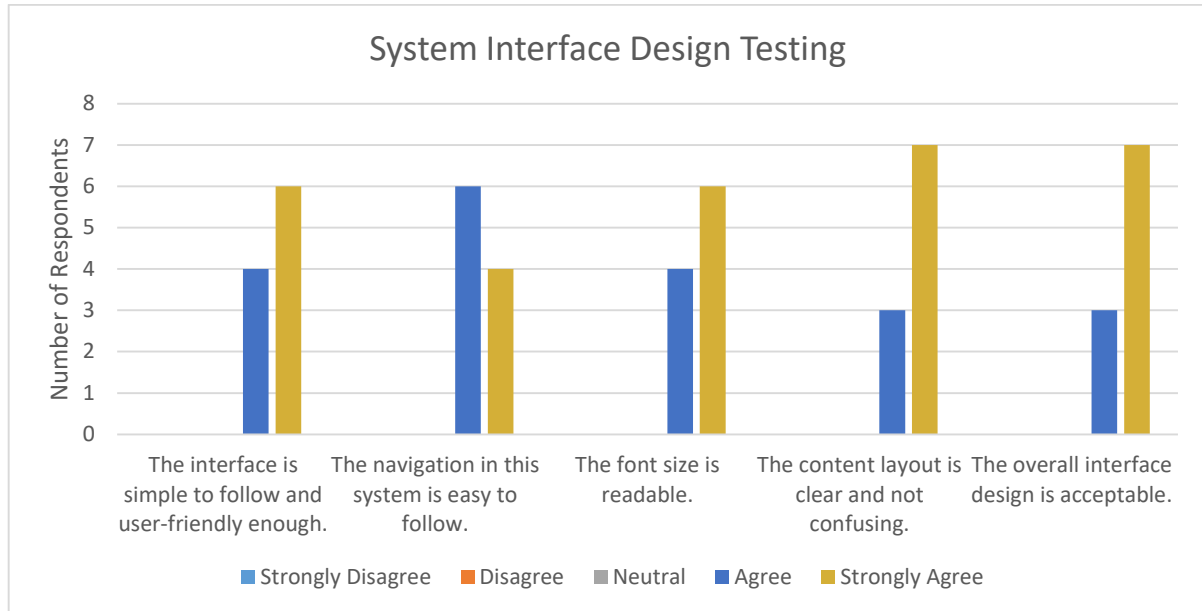
**Table 5: (cont.)**

Manage Appointment Module (TC_500)					
TC_500_01	Customer clicks “confirm” button in appointment last step.	System will display pop-up message “Booking Successfully”.	System will display pop-up message “Booking Successfully”.	PASS	
TC_500_02	Customer clicks “cancel” button to cancel appointment.	System will display pop-up confirmation message “Delete Booking” and “Are you sure you want to delete this booking?”	System will display pop-up confirmation message “Delete Booking” and “Are you sure you want to delete this booking?”	PASS	
TC_500_03	Customer clicks “delete” in the pop-up confirmation message.	System will redirect to home page.	System will redirect to home page.	PASS	
TC_500_04	Customers clicks “History” button.	System will display customer’s upcoming and completed appointment.	System will display customer’s upcoming and completed appointment.	PASS	
TC_500_05	Admin clicks “View All Appointments” button.	System will display all customer’s upcoming and completed appointment.	System will display all customer’s upcoming and completed appointment.	PASS	
TC_500_06	Employee clicks “View Appointment” button.	System will display customer’s upcoming appointment.	System will display customer’s upcoming appointment.	PASS	
Manage Notification Module (TC_600)					
TC_600_01	Admin insert new notification and click “submit” button.	System will display pop-up message “Notification Submit Successfully”. New notification will display in the notification list.	System will display pop-up message “Notification Submit Successfully”. New notification will display in the notification list.	PASS	
TC_600_02	Admin clicks “delete” icon.	The notification will be deleted from the notification list and database.	The notification will be deleted from the notification list and database.	PASS	
TC_600_03	Users click “Notification” button.	System will display notification list.	System will display notification list.	PASS	

According to table 5.1, the test plan for all the modules passed with no failure. The expected result is the same as the actual result. Therefore, the test plan has concluded that the Hair Technique Salon Management System faced no error during testing and the functional requirement for each of the modules are achieved.

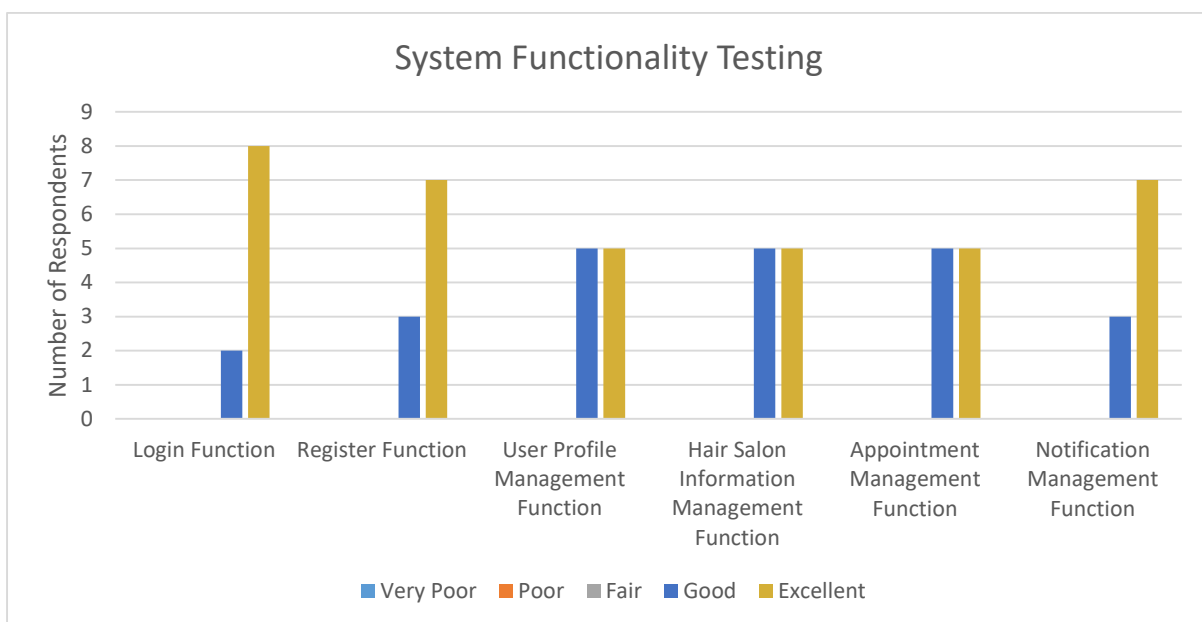
### 5.2.3 User Acceptance Testing

User acceptance testing is conducted by end-users to determine whether the system fulfils user requirements and obtain feedback regarding user satisfaction. There are ten respondents involved in this user acceptance testing process; one respondent is the hair salon owner of Hair Technique Salon, two respondents are employees of Hair Technique Salon, and seven respondents are customers. The user acceptance testing evaluation form is divided into two sections: system interface design testing and system functionality testing. Figure 11 shows the result of the system interface design testing. Figure 12 shows the result of the system functionality testing.



**Figure 11: Result of System Interface Design Testing**

By analysing the data collected from the user acceptance testing as shown in Figure 11, it shows most of the respondents considered satisfied with the interface design of the Hair Technique Salon Management System.



**Figure 12: Result of System Functionality Testing**

By analysing the data collected from the user acceptance testing as shown in Figure 12 shows that most respondents rated “Excellent” and “Good” to the Hair Technique Salon Management System functionality. With the high satisfaction response from the respondents, the Hair Technique Salon Management System function is believed to fulfil the requirements which had been defined.

## 5. Conclusion

In conclusion, the Hair Technique Salon Management System using Mobile Application is developed and tested successfully. The system is developed according to the objectives, scopes, and intended outcome described in the Introduction section. The system is successfully developed according to the phases in the simple Software Development Life Cycle (SDLC) model. The gathered requirements are analysed to construct Unified Modeling Language (UML) diagrams, use case specification, and interface design. The implementation and testing for this system are described and discussed.

Although the Hair Technique Salon Management System has been developed and achieved all the objectives, future efforts can make the system more reliable. There are a few recommendations proposed Hair Salon Management System in order to enhance the system. The system can provide a payment function to the customer to directly make payment after the appointment is completed. The system can provide customers to choose multiple hair services so that customers can select multiple hair services for one appointment that they make. The system can develop in iPhone OS (iOS) because there is a community where iOS users are the majority. As a result, it is an upgrade if there is exist an iOS platform for this system.

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