

# Paradian Hotel Booking Mobile Application with QR Code for Check-In

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## Abstract

This project focuses on developing a mobile application to streamline hotel reservations and check-ins for Paradian Hotel in Seremban. The current manual booking system leads to inefficiencies such as overbooking, long waiting times. By using Agile methodology, the application is designed with modules for registration, booking, payments, room management, and promotions. It incorporates Quick Response (QR) code technology for faster check-ins to optimize operations and marketing. The system enhances guest satisfaction, reduces errors, and improves efficiency, offering a modernized solution for hotel management.

## 1. Introduction

In today's digital era, mobile applications have become a popular and convenient tool for hotel reservations, improving guest experiences and operational efficiency [1]. Paradian Hotel, located in Paroi, Seremban, Negeri Sembilan, offers affordable accommodation and receives high ratings from guests. However, the hotel currently relies on manual booking methods leading to delays, overbooking, and inefficiencies. To address these challenges, this project proposes a mobile booking application that allows guests to select rooms, make payments, and check in using Quick Response (QR) codes. This application aims to modernize the booking process, minimize errors, and enhance guest satisfaction.

Currently, Paradian Hotel relies on manual booking methods like walk-ins and phone calls, which are prone to errors, delays, and overbooking. Guests face long waiting times during check-in, especially at peak hours, causing frustration and a poor experience. Additionally, the lack of a digital platform limits the hotel's ability to analyze customer preferences, optimize operations, and implement target marketing.

The main objectives of this project are to design the Paradian Hotel Booking Mobile Application with QR Code for Check-In using an object-oriented approach, to develop the application using Android technology, and to test its functionalities to ensure optimal performance and user experience.

The users involved in this proposed mobile application are guests and staff. The proposed mobile application consists of seven modules which are Register, Login, Room booking, Payment, Room manages, Manage booking and lastly Promotion. Table 1 lists the modules that are proposed for this mobile application.

**Table 1** *The modules involved in the proposed mobile application*

Modules	Description
Register	New staff and guest need to register by inserting their personal details.
Login	Staff and guest can log in by entering their email and password.

**Table 1** (Continued)

Modules	Description
Room booking	Guest can see available rooms and make booking.
Payment	Guest make payment and view payment receipt contains QR code for check-in.
Room manages	Staff can view, add, update or delete the room based on housekeeping status.
Manage booking	Staff can view, add, update or delete booking information. Staff scan QR code for check-in.
Promotion	Staff can view, add, update or delete hotel promotion.

The expected outcome of this project is a fully functional and user-friendly mobile application for Paradian Hotel that streamlines the booking and check-in processes. Guests will be able to view room availability, make reservations, complete payments, and check in using QR code. Staff will benefit from easier booking management and improved operational efficiency. Overall, the system is expected to enhance guest satisfaction and support the hotel’s digital transformation efforts.

## 2. Related Work

This section discusses technology used, existing related systems and comparison with the proposed system.

### 2.1 Technology use

This section outlines the various technologies implemented in the Paradian Hotel Application which is Flutter and covers the mobile application frameworks to the database, that is Firebase. Flutter is a free and open-source framework developed by Google that enables developers to build mobile, web, and desktop applications using a unified codebase [2]. Firebase Realtime Database is a NoSQL cloud database from Google that supports real-time data updates and is designed to scale efficiently for dynamic applications [3]. Each component is selected to provide seamless functionality, reliability, and scalability.

### 2.2 Existing Related Systems

The comparison of Smile Hotel [4], Suasana All Suites Hotel [5], and Amari Hotel & Resorts [6] with the Paradian Hotel app highlights improvements in check-in processes. Paradian Hotel app uses QR codes for seamless check-ins, reducing waiting times and enhancing efficiency for a more user-friendly experience.

### 2.3 Comparisons Existing Systems

The Paradian Hotel app enhances guest experience by offering a QR code-based check-in system, allowing guests to bypass the front desk entirely for key collection, making the process faster and more efficient. In contrast, the Smile Hotel [4], Suasana All Suites Hotel [5], and Amari Hotel & Resorts [6] still require guests to check in online but necessitate a visit to the front desk for room keys, which can create delays. This system makes the Paradian Hotel app more user-friendly and responsive to customer needs compared to traditional hotel check-in processes. Table 2 shows the comparison between the existing system and the proposed system.

**Table 2** Comparison between the existing system and the proposed system

Features	Paradian Hotel	Smile Hotel [4]	Suasana All Suites Hotel [5]	Amari Hotel & Resorts [6]
Login Process	Yes	No	No	No
Homepage	Yes	Yes	Yes	Yes
Room booking	Yes	Yes	Yes	Yes
Promotions	Yes	Yes	Yes	Yes
Payment Methods	Yes	Yes	Yes	Yes
QR Code for Check-In	Yes	No	No	No
Applications	Yes	No	No	No

### 3. Methodology

Agile model development is a streamlined approach designed to address the shortcomings of traditional development methods, minimizing overhead and costs, while providing flexibility to accommodate changes in requirements at any stage of the process [7]. This project adopts an Agile approach inspired by Scrum, where development is carried out in Sprints. Table 3 shows software development activities and their task. For the task labeled with (Iteration), it indicates tasks are repeated after first iteration.

**Table 3** Software development activities and their task

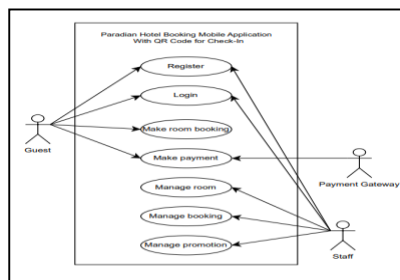
Sprint Activity	Task	Output
Requirements	Define project objectives and scope.	Project proposal.
	Conduct interviews with stakeholders.	User stories and requirements.
	Analyze requirements through data Collection.	Gantt chart.
	Develop project plan and schedule.	
Design	Design use case diagrams and specifications.	Use case diagram and specification
	Design sequence diagrams.	Sequence diagrams.
	Design activity diagrams.	Activity diagrams.
	Design class diagrams.	Class diagrams.
	Update use case diagram and class diagram (Iteration)	New use case diagram and class diagram.
	Design user interface.	User interface.
	Update user interface (Iteration)	New user interface.
	Design database.	Schema table for database.
Development	Update database (Iteration)	New database.
	Develop the application modules.	Fully working application modules.
Testing	Integrate the application.	Integrated application.
	Conduct full testing.	Test cases report
Deployment	Test functionalities.	Bug reports and fixes.
	Deploy the application.	Deployed system.
Review	Monitor deployment.	Monitoring reports.
	Gather user feedback.	Received user feedback.
	Plan for future improvement.	List for future improvement

### 3.1 System Analysis

This section describes the analytical and design of the application. A Unified Modeling Language (UML) diagram is a visual presentation used to model the structure of a system [8]. It consists of use case diagram, activity diagram in Appendix A, sequence diagram in Appendix B and lastly class diagram.

#### 3.1.1 Use Case Diagram

Figure 1 shows, use case diagram for Paradian Hotel booking application using QR Code for Check-In.



**Fig. 1** Use case diagram for the Paradian Hotel booking application using QR Code for Check-In

### 3.1.2 Class Diagram

Class diagram represents the system's classes, their attributes, methods, and the relationships among the classes [9]. Figure 2, shows class diagram of Paradian Hotel booking application using QR Code for Check-In.

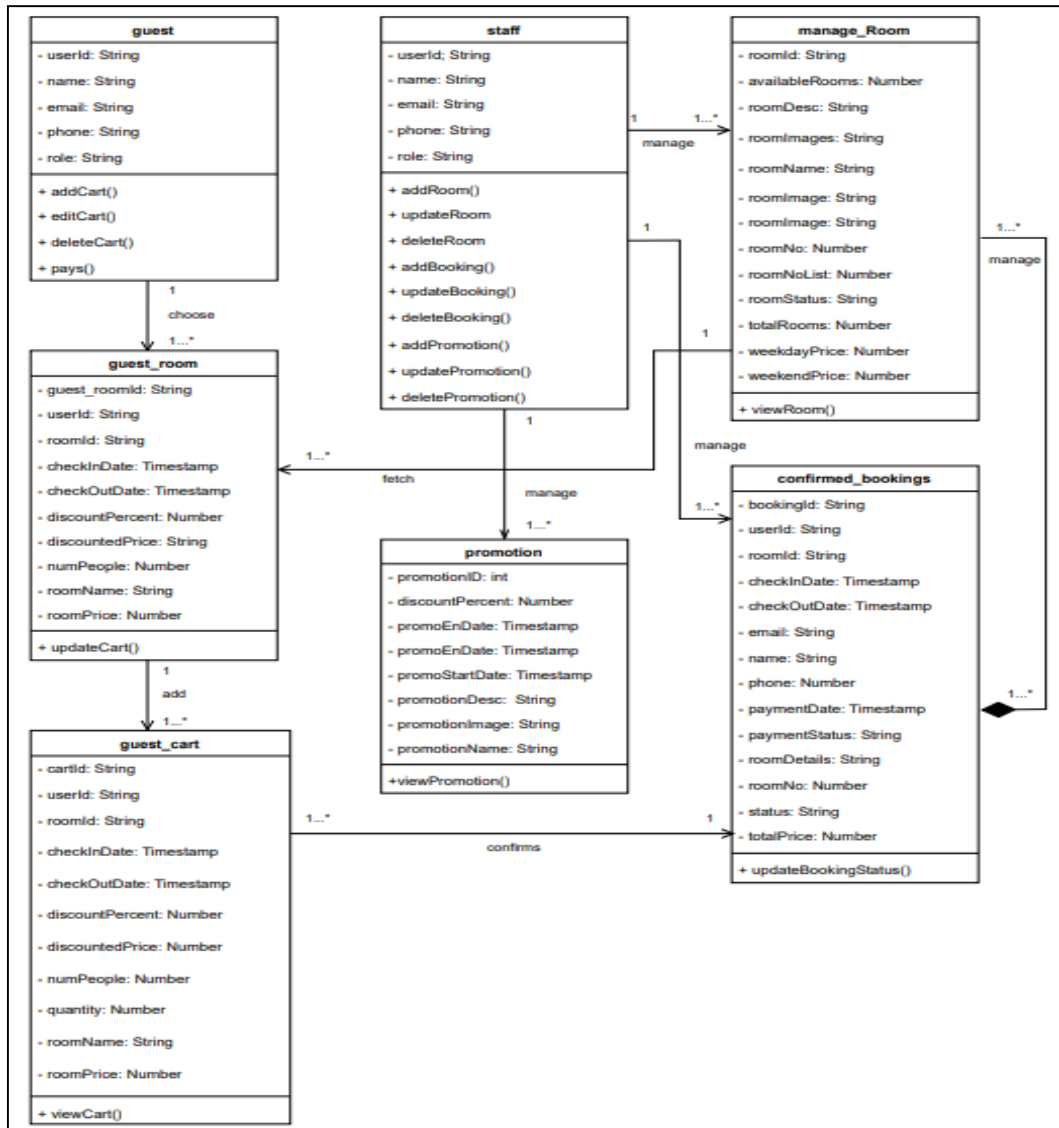


Fig. 2 Class diagram for the Paradian Hotel booking application using QR Code for Check-In.

### 3.2 Requirement Traceability

Table 4 shows the requirement traceability matrix for the proposed application.

Table 4 Requirement Traceability Matrix for the proposed application

Phase	Descriptions
<b>REQ_100</b>	<b>Register</b>
REQ_101	The user must be able to enter their name, email, phone number, password and confirm password.
REQ_102	The system shall validate the name, email, phone number, password and confirm password.
REQ_103	The system shall allow new users to register.
REQ_104	The system shall redirect the user to the Login page upon successful register.
REQ_105	The system shall display an error message when email already exist.

**Table 4 (Continued)**

Phase	Descriptions
<b>REQ_200</b>	<b>Login</b>
REQ_201	The system shall allow users to enter their username and password.
REQ_202	The system shall validate the username and password.
REQ_203	The system shall log in the user upon successful validation.
REQ_204	The system shall redirect the user to the homepage upon successful login.
REQ_205	The system shall display an error message for wrong password.
<b>REQ_300</b>	<b>Make room booking</b>
REQ_301	The system shall display available rooms based on the selected date and guest count.
REQ_302	The system shall allow the guest to select a room for booking.
REQ_303	The system shall allow guest to add room to the cart.
REQ_304	The system shall allow guest to update room at the cart.
REQ_305	The system shall allow guest to remove the room from the cart.
<b>REQ_400</b>	<b>Make payment</b>
REQ_401	The system shall display total price.
REQ_402	The system shall display a transaction result.
REQ_403	The system must be able to store information and generate booking ID.
REQ_404	The system shall generate booking receipt containing a QR code after successful payment.
REQ_405	The system shall display error message if the payment is unsuccessful.
<b>REQ_500</b>	<b>Manage room</b>
REQ_501	The system shall display Room manages.
REQ_502	The system shall allow user to add room type.
REQ_503	The system shall allow user to update available room.
REQ_504	The system shall allow user to delete room.
REQ_505	The system shall display error if user enter invalid information.
<b>REQ_600</b>	<b>Manage booking</b>
REQ_601	The system shall display Manage booking.
REQ_602	The system shall allow user to add new room booking details.
REQ_603	The system shall allow user to update room booking details.
REQ_604	The system shall allow user to delete room booking details.
REQ_605	The system shall allow update room status whether check-in or check-out.
REQ_606	The system shall display receipt after scanning the QR Code.
REQ_607	The system shall display error if user enter invalid information.
<b>REQ_700</b>	<b>Manage promotion</b>
REQ_701	The system shall display promotion.
REQ_702	The system shall allow user to add new promotion.
REQ_703	The system shall allow user to update promotion.
REQ_704	The system shall allow user to delete promotion.
REQ_705	The system shall display error if user enter invalid information.

### 3.3 Interface Design

Interface design focuses on creating user-friendly and visually appealing interactions between users and a system. By prioritizing consistency, accessibility, and aesthetics, interface design enhances the overall user experience and serves as a blueprint for developers to implement a cohesive and functional system. Appendix C is the user interface for Paradian Hotel booking application using QR Code for Check-In.

### 3.4 Database

The table scheme for Paradian Hotel booking application using QR Code for Check-In are listed as follows:

- i. `guest` (userId, name, email, phone, role)
- ii. `staff` (userId, name, email, phone, role)
- iii. `guest_homepage` (guest\_homepageId, userId, checkInDate, checkOutDate, numPeople)
- iv. `guest_room` (guest\_roomId, userId, roomId, checkInDate, checkOutDate, discountPercent, discountedPrice, numPeople, roomName, roomPrice)
- v. `guest_cart` (cartId, userId, roomId, checkInDate, checkOutDate, discountPercent, discountedPrice, numPeople, quantity, roomName, roomPrice)
- vi. `guest_details` (detailsId, userId, roomId, bookingDate, checkIn, checkOut, email, name, phone, rooms, totalPrice)
- vii. `confirmed_bookings` (bookingId, userId, roomId, checkInDate, checkOutDate, email, name, phone, paymentDate, paymentStatus, roomDetails, roomNo, status, totalPrice)
- viii. `manage_Room` (roomId, availableRooms, roomDesc, roomImages, roomName, roomNo, roomNoList, roomStatus, totalRooms, weekdayPrice, weekendPrice)
- ix. `promotion` (promotionId, discountPercent, promoEndDate, promoStartDate, promotionDesc, promotionImage, promotionName)

## 4. Results and Discussion

The proposed system is designed with eight functional modules, each tailored to deliver specific features and capabilities. Extensive implementation and thorough testing have been carried out to ensure optimal functionality, reliability, and seamless user experience.

### 4.1 Register Module

The guest and staff must create their own account first by entering their name, email address, phone number and password. Figure 3(a) and (b) below shows the guest and staff register interface.

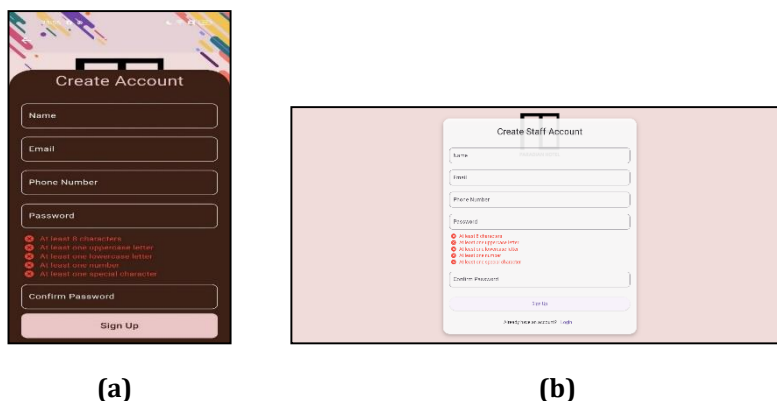


Fig. 3 Figure (a) Guest Register Interface; (b) Staff Register Interface

### 4.2 Login Module

After successfully registered, it will redirect to Login interface, where guest and staff has to enter the registered email and password. Figure 4(a) and (b) below shows the guest and staff login interface.



(a) (b)

Fig. 4 Figure (a) Guest Login interface; (b) Staff Login Interface

### 4.3 Room Booking Module

The Room Booking Module allows users to search for available rooms based on selected dates and view detailed pricing and availability. Selected rooms are added to a cart for easy review and management before payment. Figure 5(a) shows the room booking interface, while Figure 6(b) shows the cart interface.

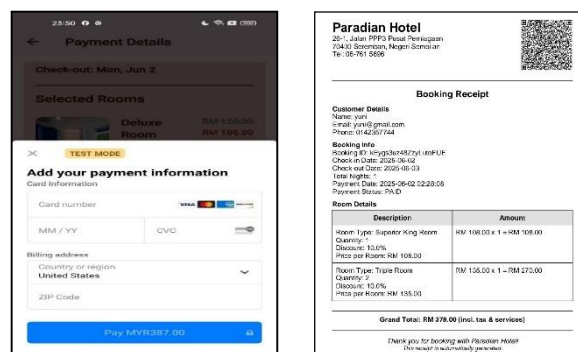


(a) (b)

Fig. 5 Figure (a) Room booking interface; (b) Cart interface

### 4.4 Payment Module

The Payment Module allows users to complete their booking by making a secure card payment. The total price, including any discounts or promotions, is clearly displayed before proceeding with the payment. Figure 6(a) below shows the payment interface, while Figure 6(b) shows the receipt interface.



(a) (b)

Fig. 6 Figure (a) Payment interface; (b) Receipt interface

### 4.5 Room Manage Module

The Room Manages Module is designed for staff to add, update, and delete room records in the system. Figure 7 below shows the room manages interface.



Fig. 7 Room manages interface

### 4.6 Manage Booking Module

The Manage Booking Module is designed for admin to view and manage all guest bookings. It retrieves booking data from the database collection and displays it in a structured format. Staff can manually add new bookings. They can also update existing bookings, including modifying guest information or room assignments, and delete bookings when necessary. Figure 8 below shows a manage booking interface.



Fig. 8 Manage booking interface

### 4.7 Promotion

The Promotion Module allows staff to add, update and delete promotional offers in the system. Figure 9 below shows the promotion interface.



Fig. 9 Promotion interface

### 4.9 Test Cases

The test cases are created based on the functional requirements of the system. Table 5 shows the test cases for all modules.

**Table 5** Test cases for all modules

Test Cases ID	Requirement ID	Descriptions	Status
<b>TC_100</b>	<b>REQ_100</b>	<b>Register</b>	
TC_100_01	REQ_101	The user must be able to enter their name, email, phone number, password and confirm password.	PASS
TC_100_02	REQ_102	The system shall validate the name, email, phone number, password and confirm password.	PASS
TC_100_03	REQ_103	The system shall allow new users to register.	PASS
TC_100_04	REQ_104	The system shall redirect the user to the Login page upon successful register.	PASS
TC_100_05	REQ_105	The system shall display an error message when email already exists.	PASS
<b>TC_200</b>	<b>REQ_200</b>	<b>Login</b>	
TC_200_01	REQ_201	The system shall allow users to enter their username and password.	PASS
TC_200_02	REQ_202	The system shall validate the username and password.	PASS
TC_200_03	REQ_203	The system shall log in the user upon successful validation.	PASS
TC_200_04	REQ_204	The system shall redirect the user to the homepage upon successful login.	PASS
TC_200_05	REQ_205	The system shall display an error message for wrong password.	PASS
<b>TC_300</b>	<b>REQ_300</b>	<b>Make room booking</b>	
TC_300_01	REQ_301	The system shall display available rooms based on the selected date and guest count.	PASS
TC_300_02	REQ_302	The system shall allow the guest to select a room for booking.	PASS
TC_300_03	REQ_303	The system shall allow guest to add room to the cart.	PASS
TC_300_04	REQ_304	The system shall allow guest to update room at the cart.	PASS
TC_300_05	REQ_305	The system shall allow guest to remove the room from the cart.	PASS
<b>TC_400</b>	<b>REQ_400</b>	<b>Make payment</b>	
TC_400_01	REQ_401	The system shall display total price.	PASS
TC_400_02	REQ_402	The system shall display a transaction result.	PASS
TC_400_03	REQ_403	The system must be able to store information and generate booking ID.	PASS
TC_400_04	REQ_404	The system shall generate booking receipt containing a QR code after successful payment.	PASS
TC_400_05	REQ_405	The system shall display error message if the payment is unsuccessful.	PASS
<b>TC_500</b>	<b>REQ_500</b>	<b>Manage room</b>	
TC_500_01	REQ_501	The system shall display Room manages.	PASS
TC_500_02	REQ_502	The system shall allow user to add room type.	PASS
TC_500_03	REQ_503	The system shall allow user to update available room.	PASS
TC_500_04	REQ_504	The system shall allow user to delete room.	PASS
TC_500_05	REQ_505	The system shall display error if user enter invalid information.	PASS
<b>TC_600</b>	<b>REQ_600</b>	<b>Manage booking</b>	
TC_600_01	REQ_601	The system shall display Manage booking.	PASS
TC_600_02	REQ_602	The system shall allow user to add new room booking details.	PASS
TC_600_03	REQ_603	The system shall allow user to update room booking details.	PASS
TC_600_04	REQ_604	The system shall allow user to delete room booking details.	PASS
TC_600_05	REQ_605	The system shall allow update room status whether check-in or check-out.	PASS
TC_600_06	REQ_606	The system shall display receipt after scanning the QR Code.	PASS
TC_600_07	REQ_607	The system shall display error if user enter invalid information.	PASS
<b>TC_700</b>	<b>REQ_700</b>	<b>Manage promotion</b>	
TC_700_01	REQ_701	The system shall display promotion.	PASS
TC_700_02	REQ_702	The system shall allow user to add new promotion.	PASS
TC_700_03	REQ_703	The system shall allow user to update promotion.	PASS
TC_700_04	REQ_704	The system shall allow user to delete promotion.	PASS
TC_700_05	REQ_705	The system shall display error if user enter invalid information.	PASS

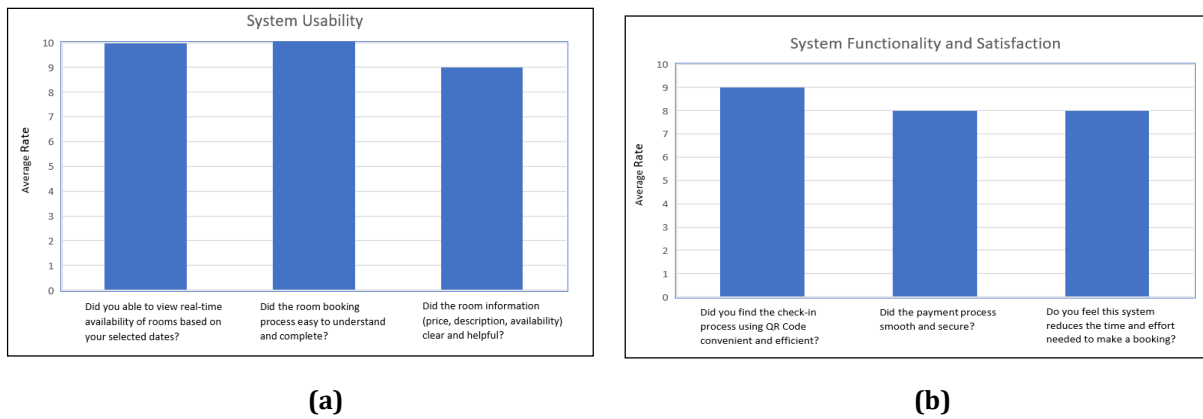
Based on Table 6 below, the results shown in the test case summary, all 37 test cases were executed successfully with no failures recorded. This indicates that each module in the Paradian Hotel mobile application, including the QR Code check-in functionality, performed as expected under the given test conditions. The system is functioning reliably and meets the functional requirements outlined for this project.

**Table 6 Overall test result**

Test Cases	Total Test Cases	Total Success	Total Failed
TC_100	5	5	0
TC_200	5	5	0
TC_300	5	5	0
TC_400	5	5	0
TC_500	5	5	0
TC_600	7	7	0
TC_700	5	5	0
Total	37	37	0

### 4.10 User Acceptance Testing (UAT)

Figure 10(a) and (b) shows the User Acceptance Test (UAT) was conducted with 10 randomly selected users through a Google Form, using a 5-star scale to evaluate perceived usefulness and ease of use. The questions used in the UAT were designed by the author to ensure relevance to the system’s functionalities and objectives. The majority agreed that the system improves task efficiency, enhances effectiveness, and is easy to understand and operate. Additionally, in Appendix D, the staff confirmed that all modules met the requirements, indicating the system’s readiness for deployment.



**Fig. 10** Figure (a) and (b) Summary User Acceptance for Guest

### 5. Conclusion

The Paradian Hotel Booking Application with QR Code for Check-In has successfully achieved its objectives through structured planning, efficient time management, and thorough testing. The application offers features such as room booking, real-time availability, QR code check-in, and secure payment integration. While the system performs effectively, further enhancements are recommended to improve its functionality and user experience. Future improvements could include adding a report generation feature for staff to support operational monitoring and analysis. Additionally, integrating online banking as a payment option would provide guests with a more secure and convenient transaction method. These enhancements would not only improve staff efficiency but also contribute to a more seamless and modern booking experience, enabling Paradian Hotel to remain competitive and meet the evolving expectations of its guests.

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### Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

*The authors confirm contribution to the paper as follows: **study conception and design:** Nor Liyana Binti Nor Zamrai, Suhaila Binti Mohd. Yasin; **data collection:** Nor Liyana Binti Nor Zamrai; **analysis and interpretation of results:** Nor Liyana Binti Nor Zamrai, Suhaila Binti Mohd. Yasin; **draft manuscript preparation:** Nor Liyana Binti Nor Zamrai. All authors reviewed the results and approved the final version of the manuscript.*

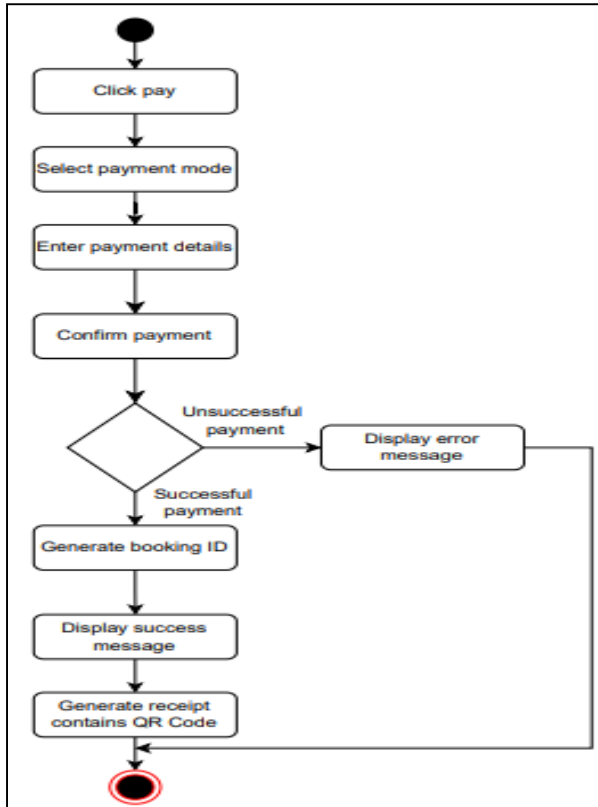
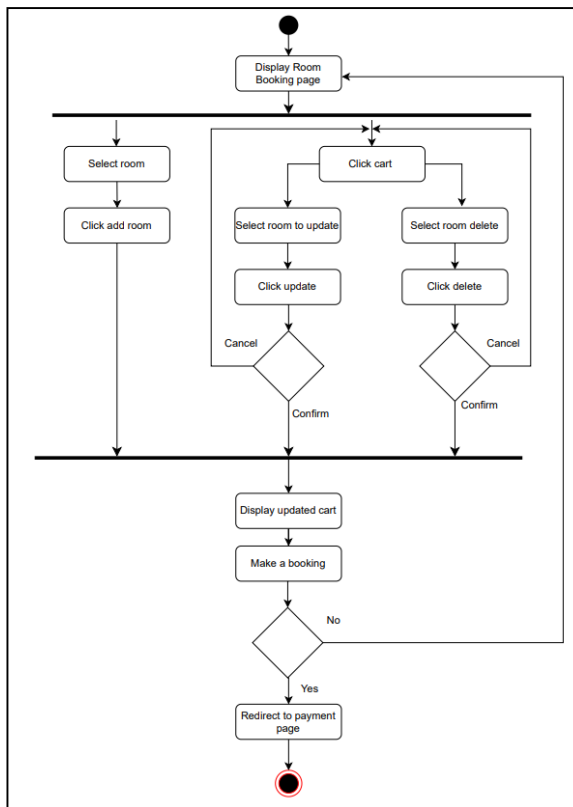
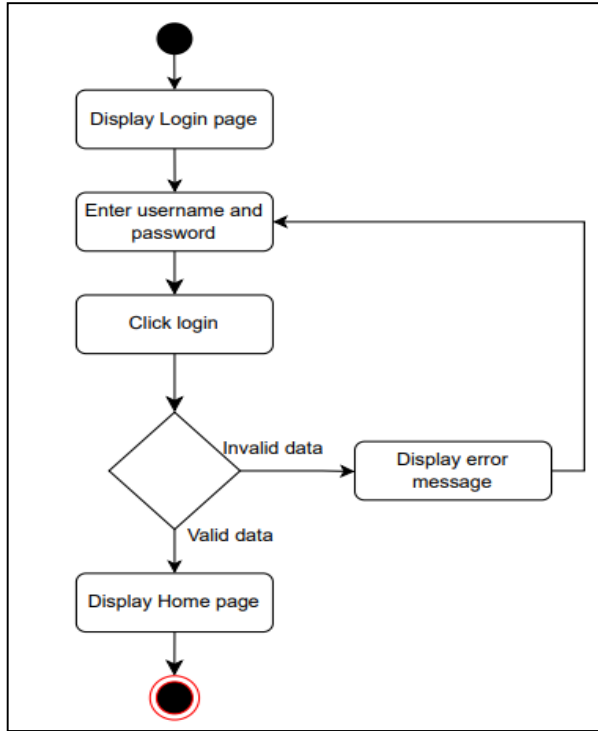
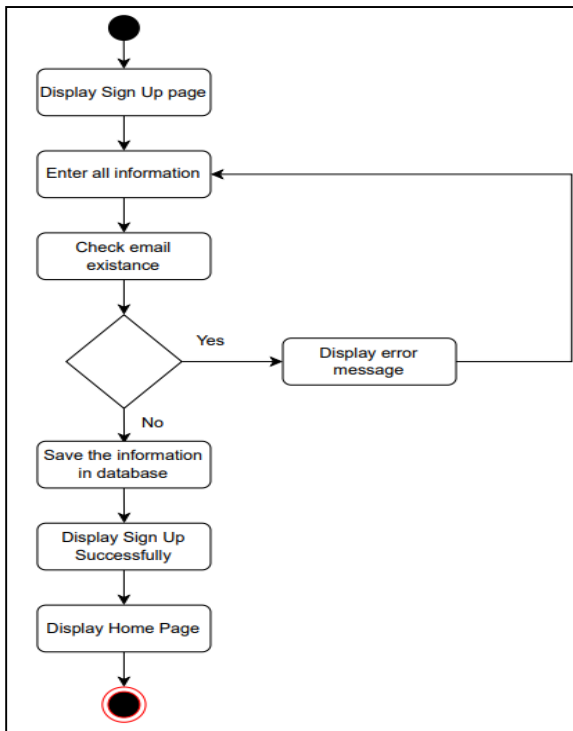
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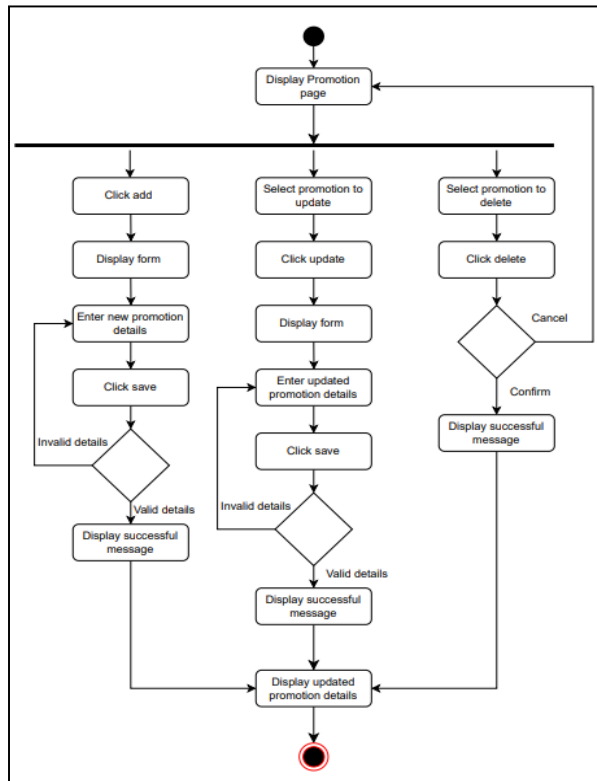
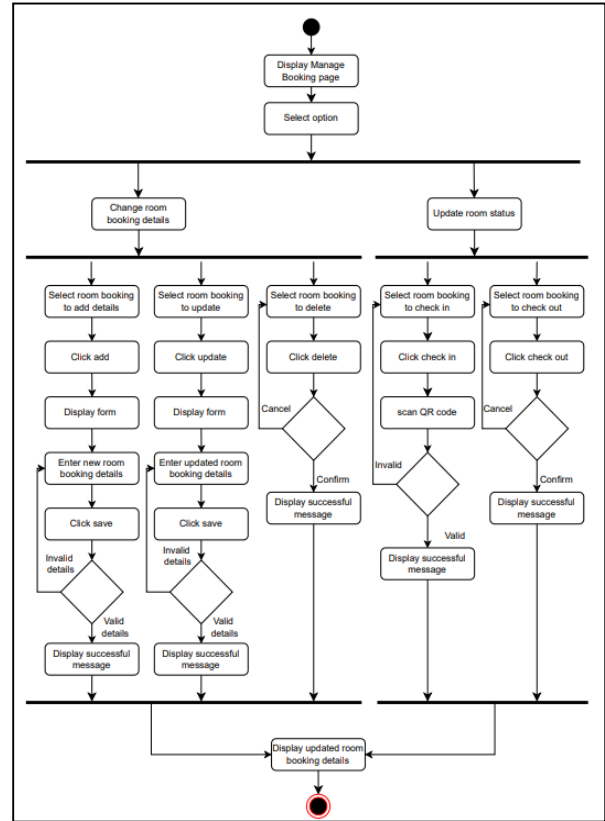
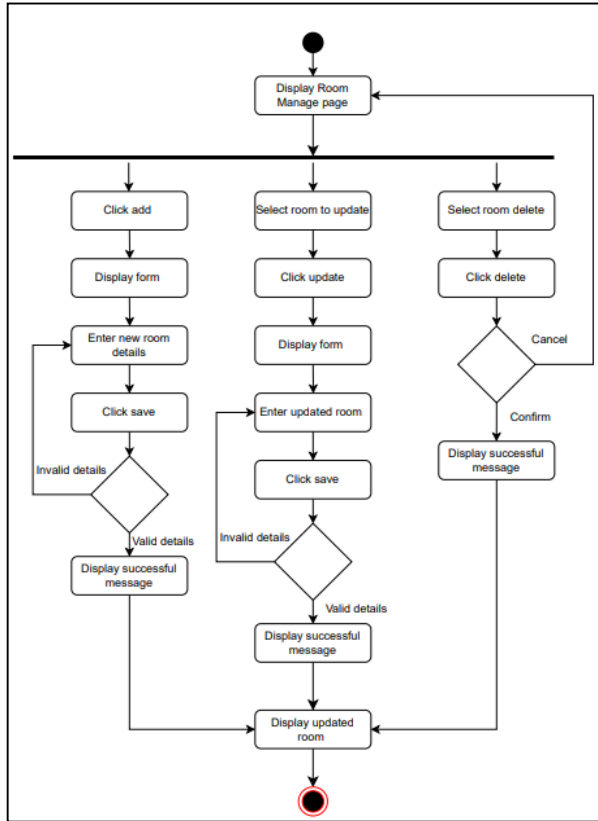
*The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.*

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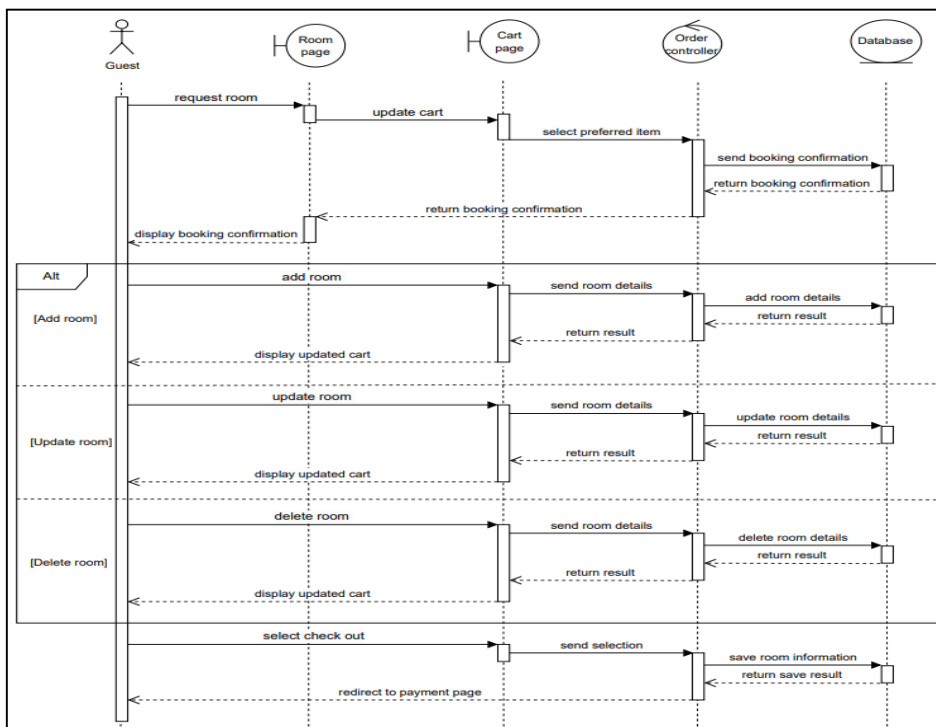
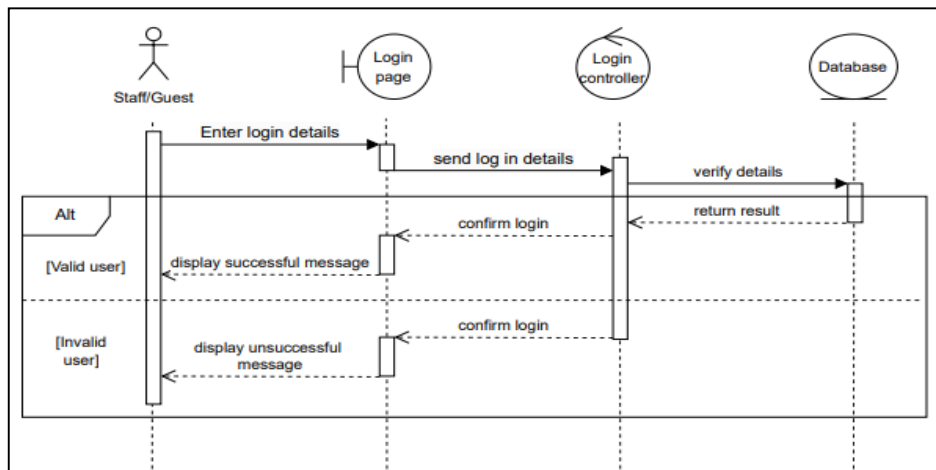
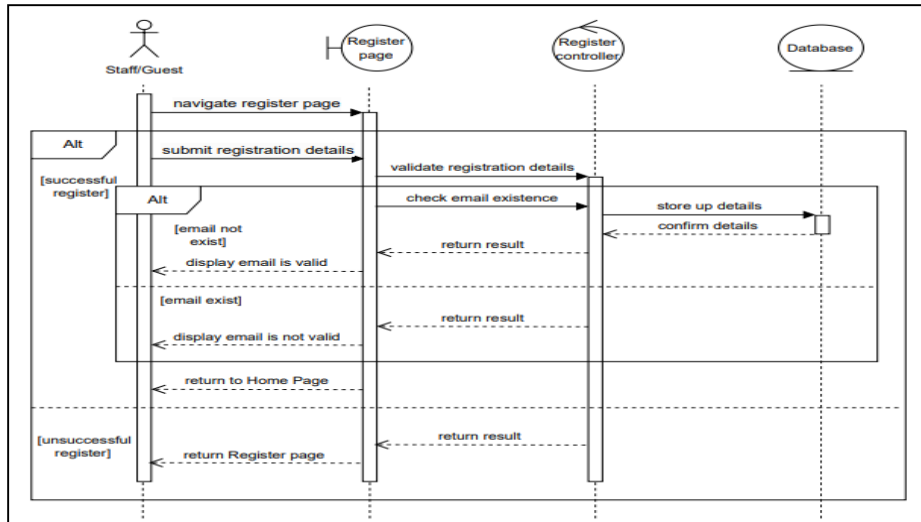
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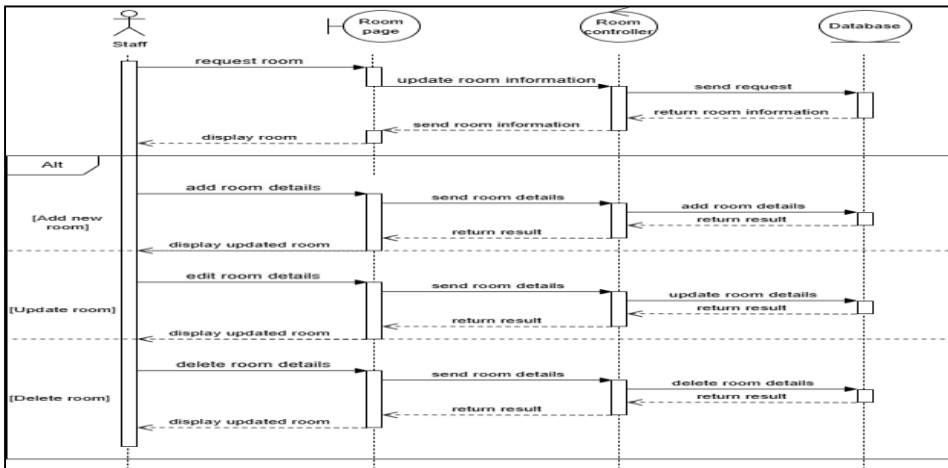
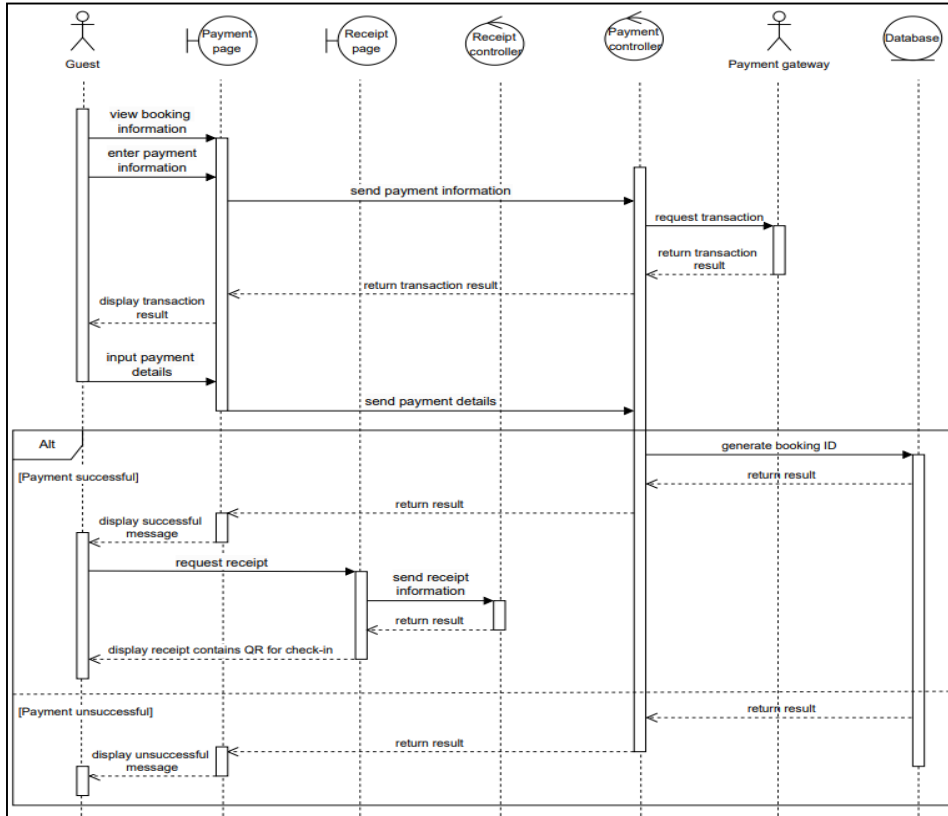
### Appendix A: Activity Diagram

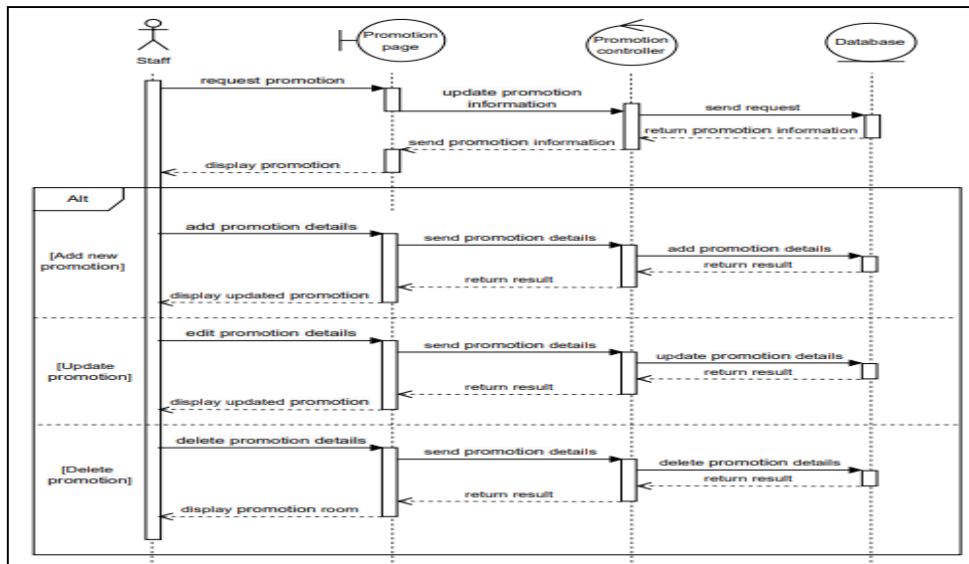
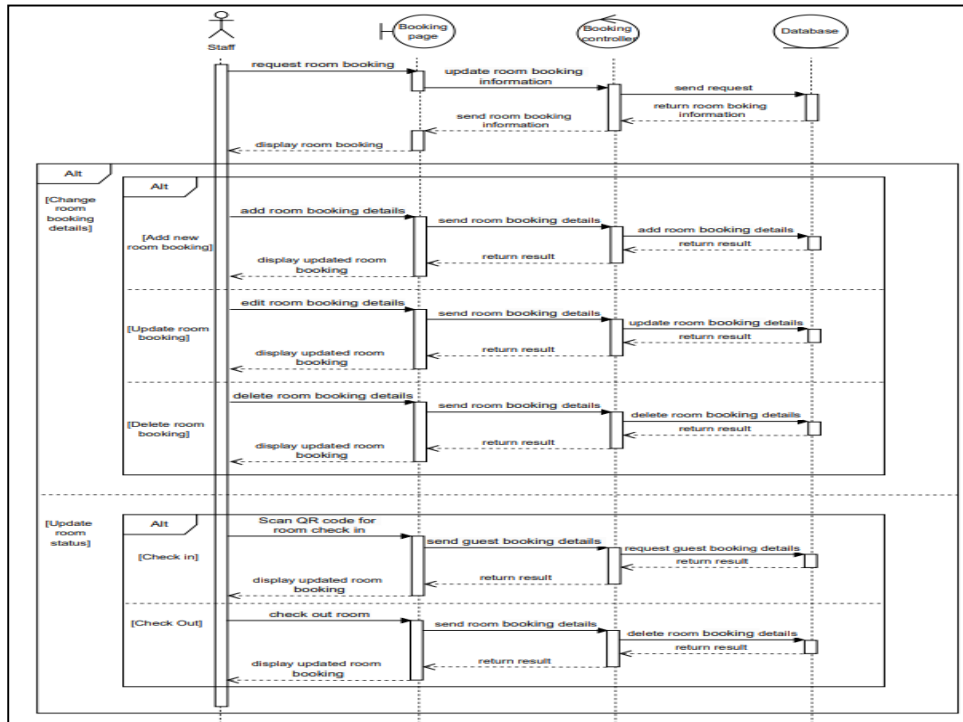




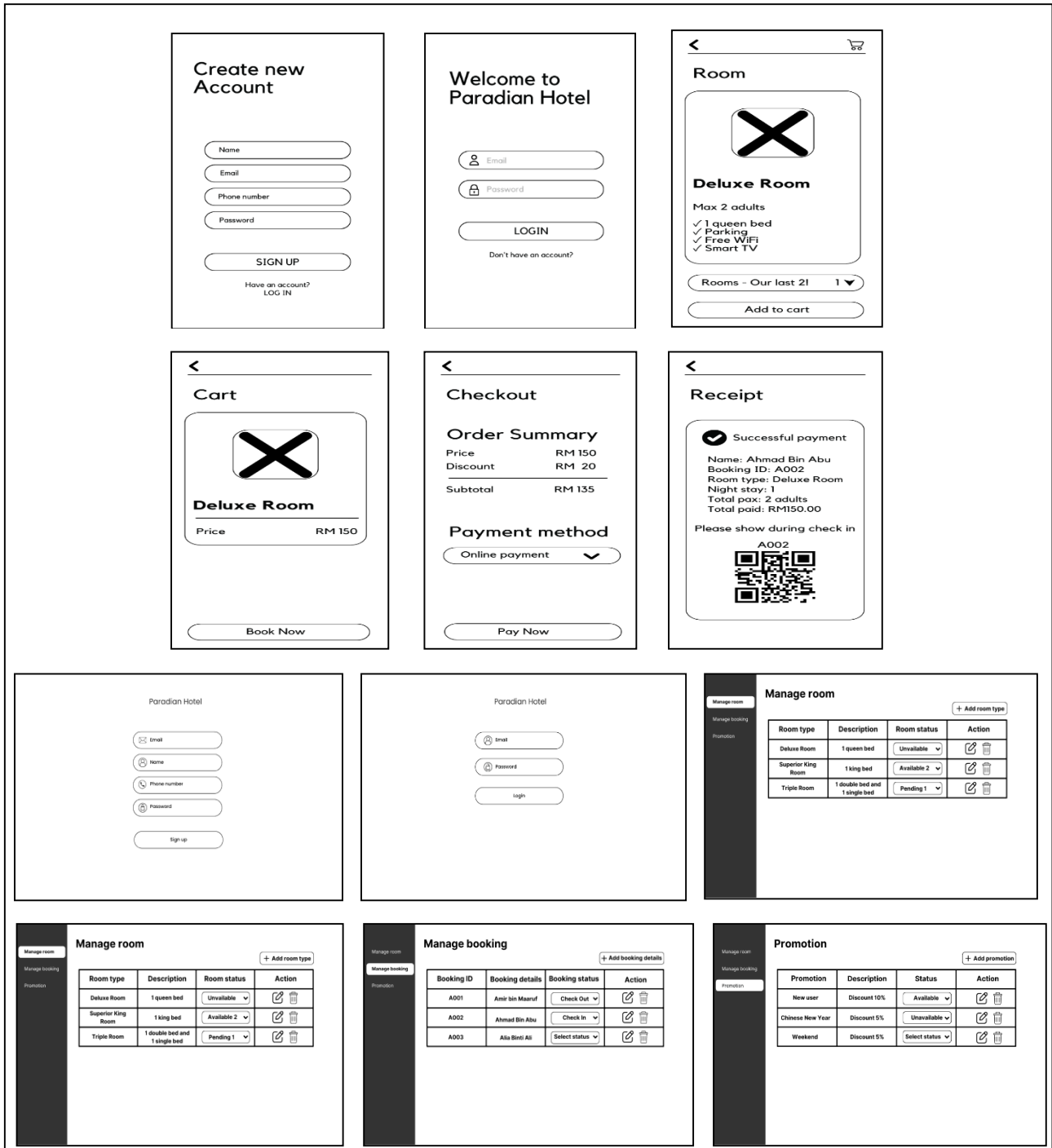
### Appendix B: Sequence Diagram







Appendix C: Interface



## Appendix D: User Acceptance Testing – Staff

### User Acceptance Testing (UAT) - Paradian Hotel Mobile Booking Application With QR Code For Check-In

This form is created to gain valuable feedback from your side regarding the system's core functionalities. Please rate each statement based on your experience using the system. Use the scale below to indicate your level of agreement:

1 = Strongly Disagree    2 = Disagree    3 = Neutral    4 = Agree    5 = Strongly Agree

No	Acceptance Criteria	Test Results (1-5)
1	Able to register and login into the system	5
2	Able to add, update and delete room.	5
3	Able to see the latest room available.	5
4	Able to make payment.	5
5	Able to receive receipt with QR code.	5
6	Able to scan guest QR code.	5
7	Able to view the guest's receipt details in PDF format after scanning the QR code	5
8	Able to add, update and delete booking details.	5
9	Able to add, update and delete promotion.	5
10	Able to see the latest promotion.	5
11	Able to scan guest QR code.	5
12	Able to see the PDF receipt.	5
13	The interface design of the system is user-friendly and intuitive.	4
14	The navigation of the systems efficient and straightforward.	4

**Comments/Suggestions:** The system is easy to use and performs all key functions smoothly. The QR code check-in and receipt features work well. However, there is no reporting feature available, which makes it a bit difficult to detect or analyse data trends.

**Tester Name:** Azam (Manager)

**Date:** 31<sup>st</sup> May 2025