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Software Engineering Principles and Practice
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1 Project background

The Hotel Booking System's objective is to make online reservations more efficient by connecting clients with hotels across the globe through an intuitive interface. This program was developed to make it simple for users to look up, evaluate, and reserve hotels in various areas. A number of criteria, including price range, location, guest reviews, and particular features like free Wi-Fi, breakfast, pool access, parking, and pet-friendly choices, can be used by users to narrow down their search results. Users may quickly and easily find hotels that suit their tastes thanks to this. Through the app's simple design, users can quickly search, choose, and safely reserve rooms.

Users can also see ratings and reviews left by prior visitors, which helps them gauge the caliber of each hotel's offerings. Transactions are easy to execute because of the straightforward and safe payment choices. If a user's plans change, the app also allows them to easily modify or cancel their reservations.

For hotel management, the app provides a platform to showcase their hotel's facilities, update details, and adjust prices as needed to stay competitive. Hotels can also promote special offers or packages to attract more guests. This way, the app serves as a valuable tool for both travelers and hotel owners, offering a flexible, reliable booking experience for all parties involved [1].

2. PROBLEM AND MOTIVATION

Problem

This project addresses the need for a secure, efficient, and easy-to-use online hotel reservation platform. Many booking systems are not user-friendly; they often lack timely updates on details, prices, and availability. Additionally, limited cancellation options and outdated information leave customers frustrated and disappointed. This app aims to solve these issues [1] [2].

Customers

When using the current hotel booking systems, customers frequently run into a number of issues. It might be challenging for customers to locate hotels that meet their needs because many systems are challenging to use. Additionally, tourists can discover that hotel information, rates, or availability are not updated in real-time, which could leave them disappointed if the facts don't correspond with what is actually available.

Another frequent problem is the lack of booking flexibility; some systems make it difficult to make modifications or cancel reservations once they are made, which can be annoying if plans change. Customers may also find it difficult to make well-informed decisions if they have little

information about hotels and services. These problems may cause stress throughout the reservation process and result in an unsatisfactory user experience in general.

Hotel managers

The existing booking systems provide a number of difficulties for hotel employees. First of all, staff find it challenging to maintain correct and current information on room availability, rates, and amenities because many systems do not provide simple updates. Both employees and visitors may become irate as a result of duplicate reservations, inaccurate pricing, or out-of-date information.

Furthermore, many systems are devoid of functionality necessary for efficient reservation management. Employees may find it difficult to handle visitor inquiries, update special offers, or notify guests of changes to reservations. Hotels may find it challenging to showcase special features or advertise seasonal packages if they have few possibilities for customization.

Motivation

The objective of this project is to create a user-friendly hotel booking platform that makes it easier for guests to make reservations and gives hotel employees better tools to run their businesses. The software guarantees that users can trust the accuracy of hotel facts, pricing, and availability by providing a safe, transparent, and dependable method of making hotel reservations. This builds customer loyalty and satisfaction. For hotel management, the platform streamlines tasks like updating room availability, adjusting prices, and managing bookings efficiently. By addressing these challenges, the project aims to improve both the guest experience and hotel operations, benefiting all parties involved and enhancing overall efficiency.

For Customers:

Customers may search and book hotels easily and securely with the help of the hotel booking app. It offers real-time pricing and availability information, as well as simple search and price, location, and amenity criteria. Clients receive email reminders for confirmations and modifications, and they can simply adjust or cancel their reservations. The app offers a smooth and practical booking experience by including user ratings, tailored suggestions, and an intuitive, mobile-friendly layout.

For Hotel Managers:

The hotel booking app also provides hotel management with an efficient platform to manage their operations. It allows them to update room availability, adjust pricing, and showcase hotel amenities in real time. Hotel staff can easily manage reservations, offer special promotions, and track bookings. The app also provides tools for monitoring customer reviews and feedback, helping hotels improve services.

3 Project Aim and Objectives

Our hotel booking app's goal is to provide a smooth, dependable, and intuitive platform that improves hotel management operations as well as the booking experience for customers. Customers can easily search for hotels using the app, filter alternatives based on price, location, and amenities, and check current, accurate availability and pricing information. This guarantees that consumers can make safe reservations with confidence, change or cancel them as necessary, and get real-time notifications to keep themselves updated at every stage.

The software provides hotel management with an effective tool for managing day-to-day operations, enabling employees to exhibit facilities and services in real time, change pricing, and update room availability. In order to improve visitor happiness and foster customer loyalty, it also helps hotels to react to input from patrons, start promotions, and make sure that all information is up to date and accurate. The app's overall objective is to link travelers and lodging establishments in a way that enhances efficiency, convenience, and trust—making the reservation process more seamless for all parties.

Objectives

- **Provide a User-Friendly Interface:** Make sure the layout is clear and easy to use so that clients can browse, filter, and reserve hotels with ease.
- **Enable Secure and Reliable Booking:** Provide safe payment methods and a dependable platform for handling reservations, changes, and cancellations to enable safe and dependable booking.
- **Real-Time Updates:** To prevent client dissatisfaction, keep accurate and current information about room availability, rates, and amenities.
- **Enhance Customer Experience: Improve the Client Experience:** Give guests access to hotel ratings and reviews as well as email alerts for confirmations and modifications to their reservations.
- **Support Hotel Management: Assist Hotel Management:** Give hotels the resources they need to maintain information, control pricing and availability, and advertise exclusive deals.
- **Build Trust and Loyalty: Develop Loyalty and Trust:** Boost client happiness by guaranteeing openness, dependable service, and prompt assistance for both guests and hotel employees.
- **Optimize Revenue for Hotels:** By providing effective booking management and promotional resources, hotels may increase occupancy and revenue.

4 Stakeholder Identification and analysis

4.1 Onion diagram

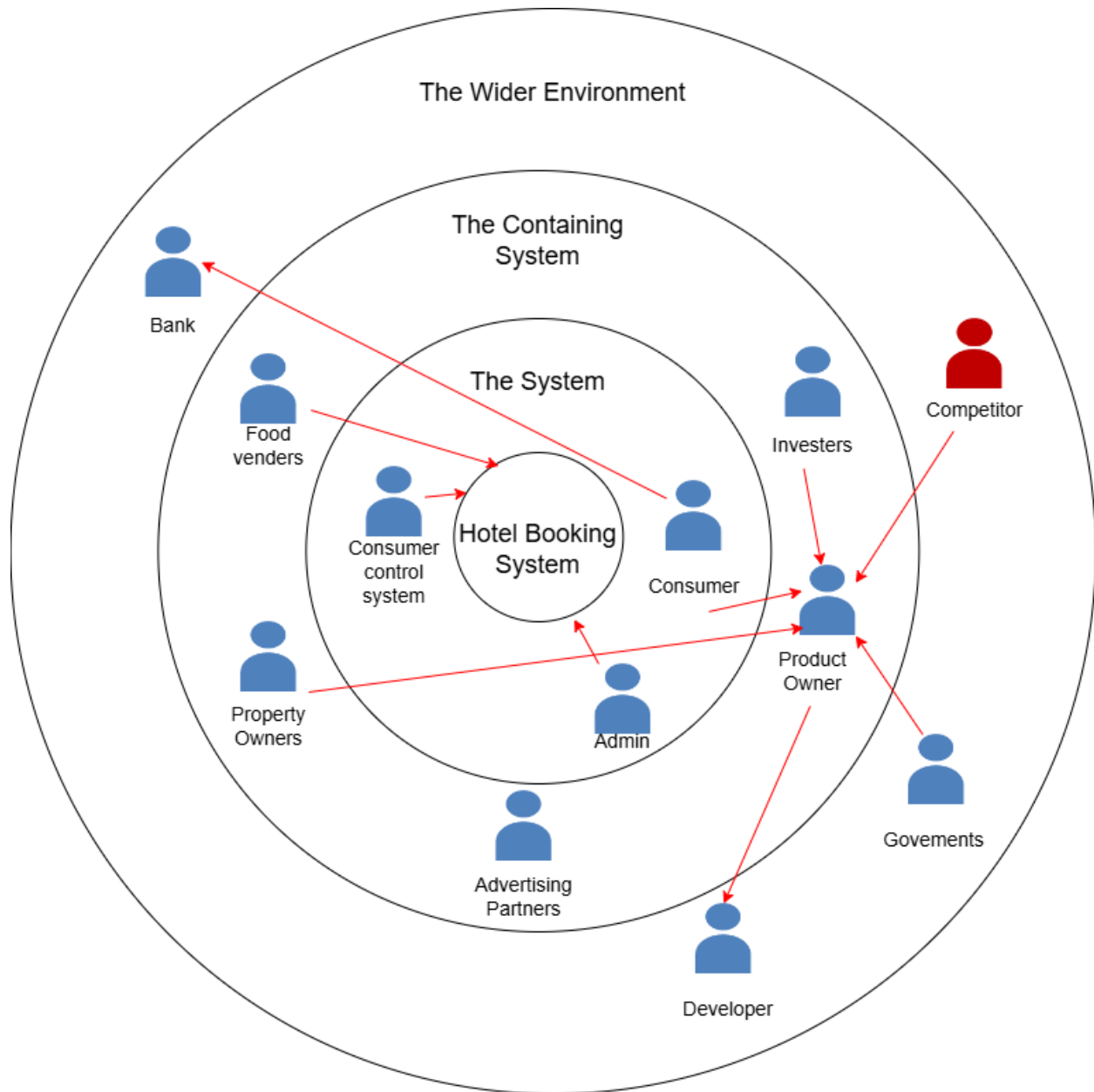


Figure 1 Onion diagram

4.2 Role of each Stakeholder

Consumer (Customer)

- **Role:** Uses the app to search for hotels, view prices and availability, read reviews, and make secure reservations.
- **Layer:** Positioned in the core layer as a primary user who directly interacts with the booking platform for their needs [2].

Admin

- **Role:** Monitors and manages the platform's operations, resolving issues, maintaining data integrity, and supporting both users and hotel partners.
- **Layer:** Placed in the core layer, as they are crucial for system management and work closely with both user and system functionalities [2].

Consumer Control System

- **Role:** Manages and oversees user accounts, access permissions, and data privacy, ensuring that user information is secure and accessible.
- **Layer:** Positioned in the core layer, as it directly interacts with user data to ensure secure access and functionality [2].

Investors

- **Role:** Provide financial resources and funding for the development and scaling of the app in exchange for equity or returns.
- **Layer:** Positioned in the external layer, as they indirectly influence the project's growth and strategy but don't interact with the platform directly [2].

Product Owner

- **Role:** Oversees the development process, prioritizing features, and setting goals to ensure the app aligns with customer needs and business objectives.
- **Layer:** Positioned in the application layer, acting as a bridge between developers and business stakeholders, guiding the app's evolution [2].

Advertising Partners

- **Role:** Promotes the app and its features through various marketing channels to attract new users and increase bookings.
- **Layer:** Positioned in the support layer as they provide external marketing services, helping to grow the user base without interacting with the app directly [2].

Property Owners

- **Role:** Supplies hotel property listings, sets prices, and manages room availability and details that appear on the platform.
- **Layer:** Positioned in the core layer, as they regularly interact with the app to update availability and pricing, ensuring accurate information for customers [2].

Food Vendors

- **Role:** Provides additional services for guests, such as room service or nearby dining options that can be promoted within the app.
- **Layer:** Placed in the support layer as a third-party partner that adds value to the user experience but doesn't directly interact with the core system [2].

Developer

- **Role:** Responsible for designing, coding, testing, and maintaining the app's functionality to ensure reliability and user satisfaction.
- **Layer:** Positioned in the application layer as a core contributor to the app's functionality, directly shaping the user experience [2].

Government

- **Role:** Sets regulatory standards, privacy policies, and security requirements that the app must comply with for legal operation.
- **Layer:** Positioned in the external layer as a regulatory authority that enforces compliance but doesn't interact with the app directly [2].

Competitor

- **Role:** Competes with the app by offering similar hotel booking services; they influence the app's features, pricing, and marketing strategies.
- **Layer:** Positioned in the external layer as an indirect stakeholder that impacts the app's development and market strategy [2].

Bank

- **Role:** Provides secure payment processing and manages financial transactions for the app, ensuring smooth and secure payments from customers to hotels.
- **Layer:** Placed in the support layer as a third-party service that facilitates transactions but doesn't interact directly with end users [2].

5 Requirements elicitation and analysis

5.1. User Requirements Analysis

1. User Registration and Account Management

- Users should be able to register by providing basic information, creating an account, and verifying their identity.
- Users should be able to edit and update their profile information after registration [3].

2. Hotel Search and Information

- Users should be able to filter and search for hotels based on specific criteria (e.g., location, price, amenities).
- The system should provide detailed hotel information, including room types, amenities, and user reviews [3].

3. Reservation Management

- Users should be able to make reservations for selected hotels and rooms, with booking confirmation provided.
- Users should have options to modify their reservation details if needed.
- Users should be able to cancel reservations and receive confirmation of the cancellation [3].

4. Reservation Viewing

- Users should be able to view the details of their current and past reservations.
- The system should display all active and previous bookings, including reservation details like hotel name, check-in and check-out dates, and room type [3].

5. User Interaction with Reviews

- Users should have access to previous guest reviews for each hotel to help with decision-making
- After completing a stay, users should be able to provide feedback by submitting their own review [3].

6. Customer Support

- Users should have access to customer support for help with any issues or questions about their bookings.
- Customer support should be accessible through the platform for quick assistance [3].

7. Email Notifications

- The system should send email notifications to keep users updated.

- Users should receive email notifications for account verification, booking confirmations, reservation modifications, and cancellations [3].
- 8. Security and Privacy
 - The system should ensure secure handling of user data and payment information.
 - User data, payment information, and reservation details should be securely stored and transmitted to prevent unauthorized access [3].
- 9. Payment Processing with Bank Integration
 - Users should have the option to complete payments using bank accounts or other secure payment methods
 - The platform should ensure secure transmission of payment data and facilitate the transfer of funds to the hotels upon booking confirmation.
 - Any transaction failures should trigger alerts or notifications for the user to retry or choose another method [3].

5.2 System Requirements

5.2.1 Functional Requirement

- **Security:** Encryption, safe payment processing, and compliance with data privacy laws can lead to data protection.
- **Performance:** The system must handle heavy traffic and accommodate multiple users simultaneously during peak hours.
- **Expandability:** As the platform grows, the system should be capable of accommodating more hotels, rooms, and users.
- **Providing Service:** Users should be able to reserve their accommodations in a matter of seconds without having to complete a lengthy process to fill
- **Overlap:** overbooking can be made, due to any system error. Solving the issue has to be a big task, so the support system needs to be focused on that more [3].

5.2.3 Importance of Non-Functional Requirements

- **Security**
 - is crucial since the network's sensitive financial and personal data could be compromised, resulting in scam or financial loss for the user. A secure system is necessary for the online hotel booking industry to retain growth and win over customers.
- **Performance**
 - OL When several users sign in at once, the system won't crash because of its excellent performance. Real-time booking capabilities and fast loading times lower user annoyance and the likelihood of reservation cancellations.
- **Expandability**
 - It is feasible to launch new properties and draw in additional viewers thanks to the platform's competitiveness. Market share and revenue growth are directly impacted by the system's ability to reach a larger audience and provide customers with more options.
- **Overlap**
 - Avoiding overbooking is crucial to avoiding unhappy customers. In order to preserve the platform's reputation and ensure dependability, conflicts can be promptly resolved by a support system built to address overbooking issues [3].

6 Requirement modeling: use case diagram

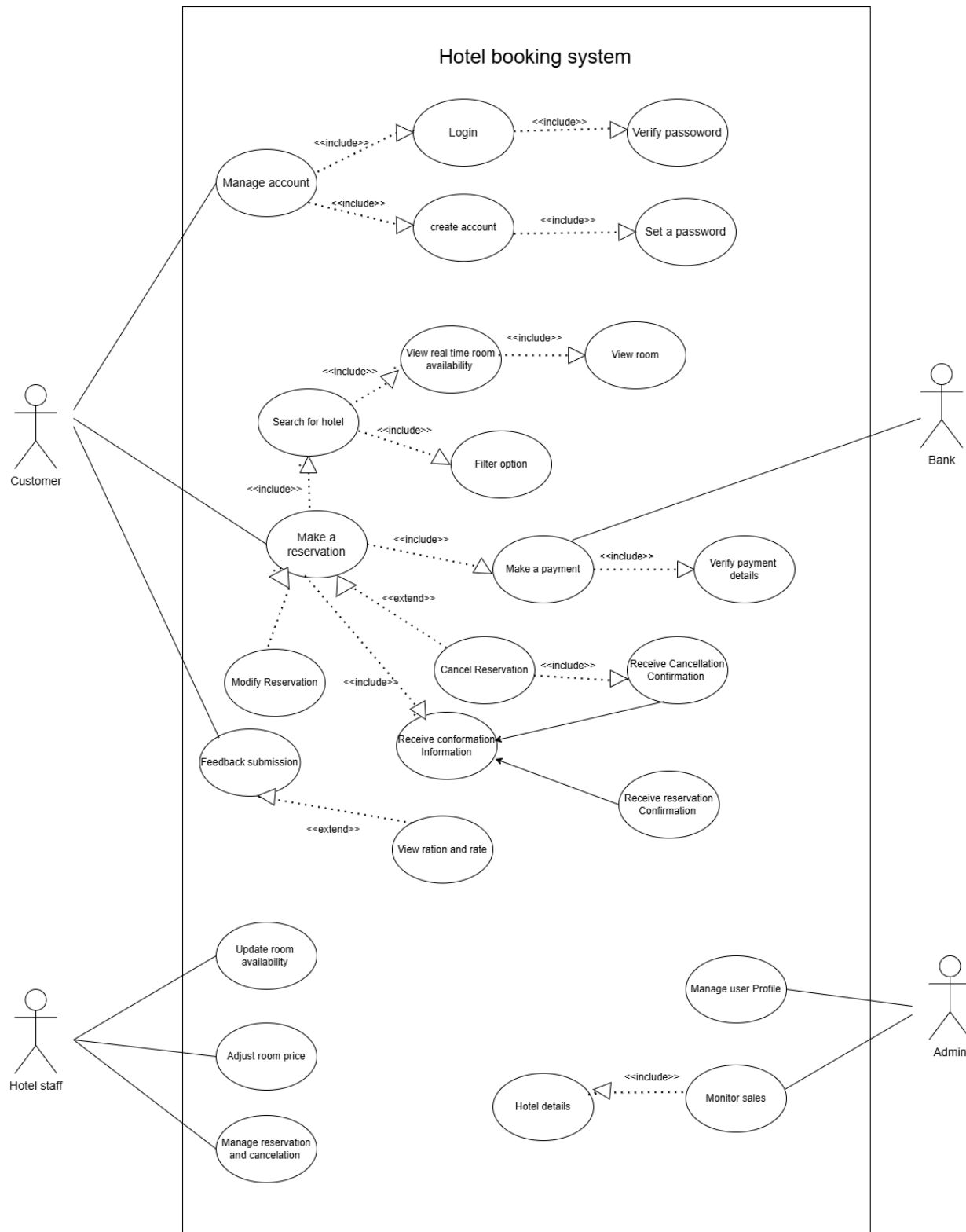


Figure 2 Use case diagram

7 A use case description

7.1 formal use case diagram

Make Reservation	
Actors:	Customer , Bank
Preconditions:	<ul style="list-style-type: none">• The user must have an active account on the platform and be logged in.• Real-time availability of hotels and rooms must be displayed accurately.• The user has selected a hotel and room and is ready to proceed with the reservation.• Payment gateway integration must be operational.
Postconditions:	<ul style="list-style-type: none">• The reservation is successfully created, and a booking confirmation is sent to the user via email.• Room availability is updated to reflect the reservation• Payment details are securely processed, and a payment confirmation is received• The reservation details are stored in the system and accessible to the user and hotel staff.
Flow:	<ul style="list-style-type: none">• The user logs into the system and searches for available hotels using filters like location, dates, and price range.• The system displays a list of hotels that match the search criteria in real time• The user selects a specific hotel and room type from the results.• The system displays the selected room details, including pricing, policies, and availability.• The user clicks on the "Make a Reservation" option.• The system prompts the user to enter their booking details, such as check-in and check-out dates and guest information.• The system calculates the total reservation cost and presents it to the user.• The user reviews the booking information and clicks "Proceed to Payment."• The system redirects the user to the secure payment gateway.• The user enters payment details, and the payment is processed.• Upon successful payment, the system generates a reservation confirmation.• The user receives a confirmation email with booking details.

	<ul style="list-style-type: none"> • The reservation details are saved in the user's profile and accessible for future reference.
Alternative Flows:	<ul style="list-style-type: none"> • Payment Failure <ul style="list-style-type: none"> ○ If the payment fails, the system displays an error message to the user. ○ The user is given the option to retry the payment or choose an alternative payment method • Insufficient Room Availability <ul style="list-style-type: none"> ○ If the selected room is unavailable the system notifies the user. ○ The user is prompted to choose another room or date.
Exceptions:	<ul style="list-style-type: none"> • Network Issues During Payment Processing <ul style="list-style-type: none"> ○ The system displays an error message and prompts the user to retry once the issue is resolved. • Session Timeout <ul style="list-style-type: none"> ○ If the session times out due to inactivity, the user is redirected to the login page, and any unsaved reservation information is discarded. • Incorrect Payment Information <ul style="list-style-type: none"> ○ If the payment gateway detects incorrect payment information, the user is notified to correct and re-enter their details.
Requirements:	<ul style="list-style-type: none"> • Searching Options: Users can search for hotels using filters like location, dates, and price range to find suitable options. • Real-Time Information: The system provides users with accurate, up-to-date room availability and pricing information. • Booking System: Users can make, modify, and cancel reservations with booking confirmations provided in real time. • Notifications: The system sends users booking confirmations and reminders through email notifications. • Payment Process: A secure payment gateway allows users to complete transactions safely and without interruptions. • Providing Service: The booking process is quick and easy, allowing users to reserve accommodations without lengthy steps.

	<ul style="list-style-type: none"> • • Secure Payment Processing: Payment information is handled securely, ensuring safe and reliable transactions • Data Security: The system complies with data privacy regulations to protect user data and maintain confidentiality.
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Figure 3 Use case description

7.2 Informal Description

Requirement 01: User-friendly interface for hotel search and booking:

that makes it easy for clients to look for hotels, filter them according to features, and book them. Customers can easily peruse hotel listings and choose the options that best suit their needs thanks to this, which meets the criterion for an easy user experience.

Requirement 02: Real-time updates on room availability and pricing:

The "Make a Reservation" use case satisfies this need by displaying correct and current room availability and pricing data from the system. This function guarantees that clients receive the most recent information while making a reservation and avoids overbooking.

Requirement 3: Secure payment process:

To manage transactions for every reservation, the system offers a secure payment gateway. This feature is crucial for gaining the trust of customers, making sure that payments are handled securely, and protecting against unauthorized access.

Requirement 04: Booking confirmation and notifications:

The system automatically provides the consumer with a confirmation email with booking details after a booking is made. In addition to offering a handy reference for their booking details, this feature guarantees that consumers are updated on the status of their reservations.

Requirement 5: Flexibility and booking management:

Clients be able to change or cancel their reservations and obtain cancellation confirmations. Users have control over their reservations thanks to this feature, which also enables modifications in response to shifting plans.ds

The system ensures that all user data, including reservation details, is securely stored, complying with data privacy laws. This feature protects sensitive information and builds trust among users by safeguarding their personal information.

8 Activity diagram

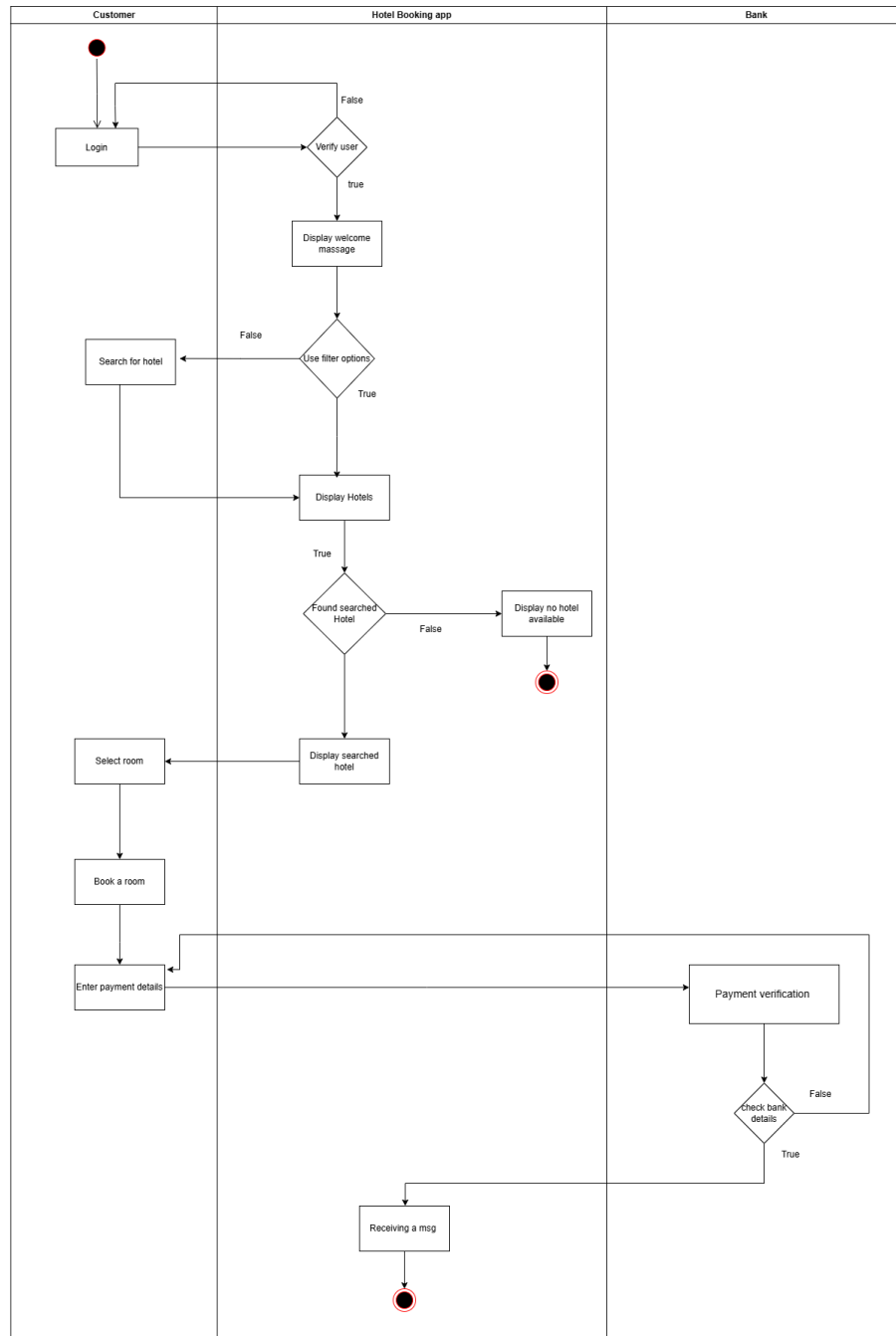


Figure 4 Activity diagram

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