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Hotel System

Analysis

Project documentation for the purpose of BIE-SWI course.

Authors:

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Table of Contents

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1. Project Specification

The project specification should provide a basic description of the project, the idea of its functions, and basic constraints for its realization. Anything written in italics is meant as explanation of the structure and is not relevant to the actual project of the Hotel Management System.}

The goal of this project is to develop a system for managing room availability, customer reservations, stays, and billing in a hotel. The system aims to facilitate real-time room availability checks, streamline the reservation process, track guest stays, and handle billing efficiently. It will support hotel staff in managing rooms, their equipment, customer reservations, guest accommodations, and additional services, while providing customers with a seamless experience for booking and utilizing hotel offerings.

The system will maintain a record of all rooms, including their equipment (e.g., number and types of beds) and availability based on physical status and reservations. Pricing for each room will be defined, with the ability to adjust prices for different periods and retain price history. Customers can reserve rooms for specific dates and guest counts, with staff confirmation required. Guests can stay with or without prior reservations, and the system will manage billing, including costs for rooms and additional services (e.g., food, fitness center, wellness, room service), payable upon checkout.

The system will operate as a web application hosted on a hotel server, accessible to staff for management tasks after authentication, and to customers for browsing availability and managing reservations. Data will be backed up to ensure reliability.

2. Business Process Model

In the hotel domain, key business processes include managing room availability, handling customer reservations including payment, and managing billing. These are detailed below.

2.1 Payment - AS IS

This section describes the current process of paying for a reservation.

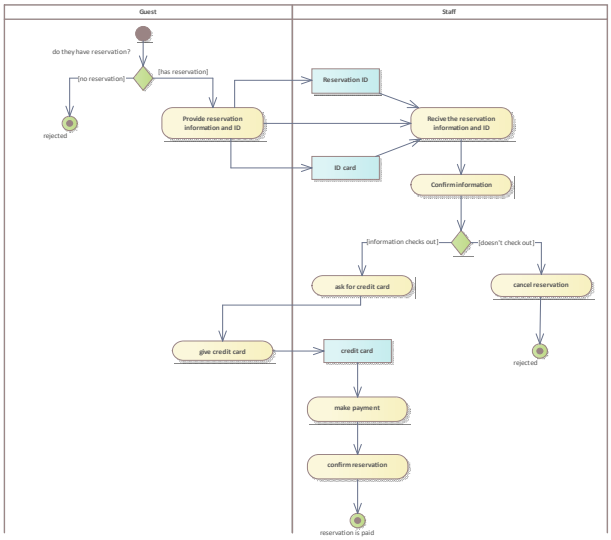

Figure 1 - Payment - AS IS

2.2 Payment - TO BE

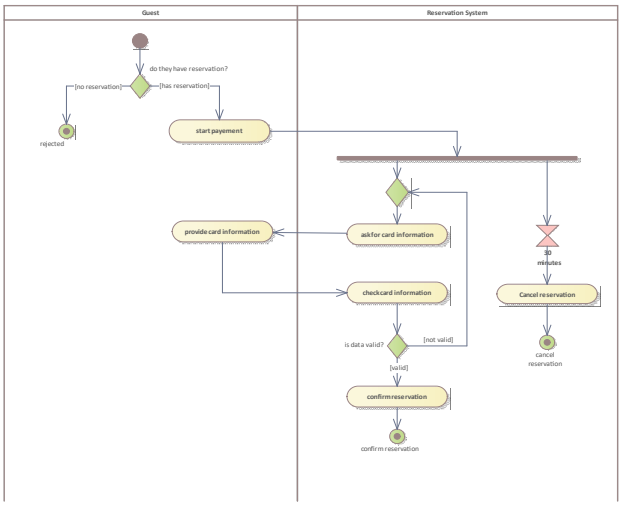

Figure 2 - Payment - TO BE

2.3 Reservation - AS IS

This activity describes the current process of handling customer reservations.

Current state:

1. Customers call or visit the hotel to check availability and make reservations.
2. The staff manually verify availability, record details in a logbook, and confirm verbally.
3. Cancellations or expirations are updated manually.

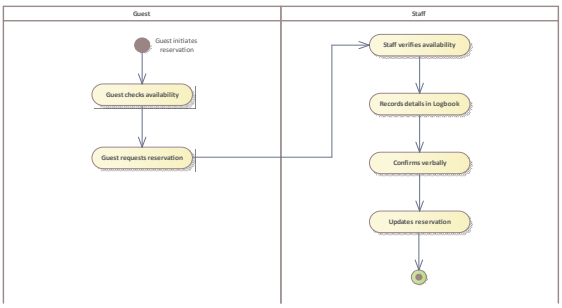

Figure 3 - Reservation - AS IS

2.4 Reservation - TO BE

This activity describes the proposed process of handling reservations.
Customers check availability and book rooms online or via staff. The system confirms reservations, tracks their status, and notifies staff/customers of cancellations or expirations.

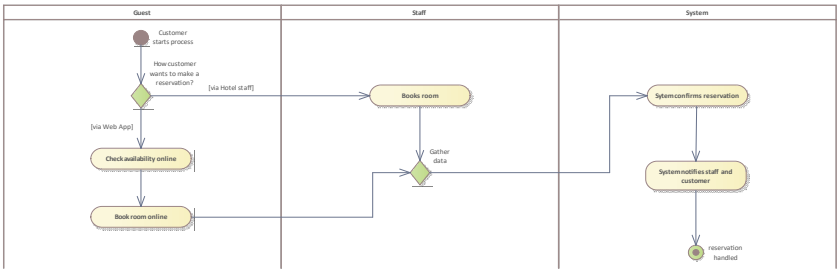

Figure 4 - Reservation - TO BE

2.5 Room Service - AS IS

This diagram represents the process of a guest ordering a room service

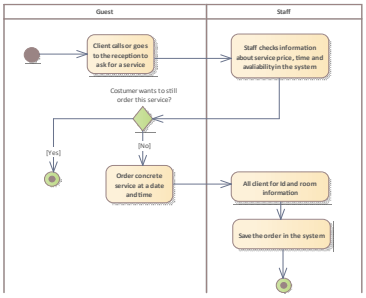

Figure 5 - Room Service - AS IS

2.6 Room Service - TO BE

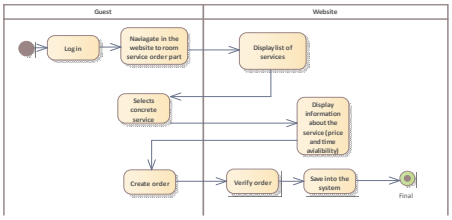

Figure 6 - Room Service - TO BE

3. Requirements

This chapter defines the requirements for the Hotel Management System. The requirements are divided into functional and non-functional categories.

Figure 7 - Requirements

3.1 Actors

This package describes the actors of the system.

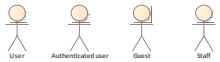

Figure 8 - Actors

3.1.1 Authenticated user

A user logged into the system, assigned a role (e.g., guest or staff) based on their profile.

3.1.2 Guest

A registered user who can browse availability, make reservations, and view stays/bills

3.1.3 Staff

Hotel employees with access to manage rooms, reservations, stays, and billing

3.1.4 User

Any user using the web application. Besides logging, any user can always browse to see the Hotel availability

3.2 Functional requirements

In this section, the functional requirements of the Hotel System are defined in the form of use cases.

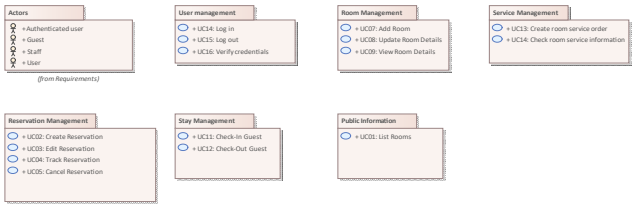

Figure 9 - Functional Requirements

3.2.1 Public Information

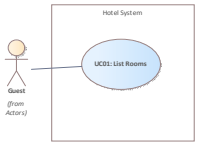

Figure 10 - Public Information

3.2.1.1 UC01: List Rooms

Description:
Allows a user (customer or staff) to view available rooms in the hotel, filter by different criteria (e.g., price, room type), and see detailed information about each room.

Actors:
1. Guest: Views the list of available rooms and applies filters.
2. Hotel Staff: Views and manages room availability and details.

Preconditions:
1. The user must be logged in.
2. There must be available rooms in the system.

Main Scenario:
1. The user logs into the system.
2. The user selects the option to list available rooms.
3. The system retrieves the list of available rooms from the database.
4. The user can apply filters (e.g., price, room type, availability).
5. The user can search for specific rooms using keywords or criteria.
6. The system updates the list based on the applied filters and search terms.
7. The user selects a room to view details.
8. The system displays detailed room information (e.g., price, type, availability).

Alternate Scenario:
1. No rooms available: If no rooms match the search criteria, the system displays a message saying ”No rooms available.”
2. Invalid search: If the search criteria are invalid, the system prompts the user to modify the search.

Data:
Room ID, room type, availability status, price, amenities, capacity, search filters.

3.2.2 Reservation Management

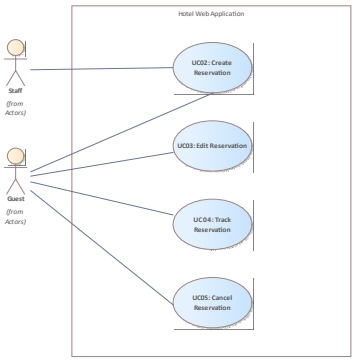

Figure 11 - ReservationManagement

3.2.2.1 UC02: Create Reservation

Description:
Allows a customer or staff member to create a reservation for a hotel room by selecting dates, guest count, and a room, with staff confirmation required for finalization.

Actors:
1. Customer: Books online via the web application.
2. Hotel Staff : Books on behalf of a customer or overrides availability if needed.

Preconditions:
1. The user (customer) must be logged in to book online.
2. Staff must be authenticated.
3. Rooms must be defined in the system with availability data.

Main Scenario:
1. The user selects desired check-in and check-out dates and the number of guests.
2. The system displays a list of available rooms matching the criteria (bed types, capacity, etc.).
3. The user selects a room from the list.
4. The user enters guest details (e.g., name, contact info; for customers, this may auto-fill from their profile).

5. The system calculates the total price based on room rates and dates.
6. The user confirms the reservation.
7. For customers: The system marks the reservation as ”pending” and notifies staff for approval. For staff: The reservation is confirmed immediately.
8. The system assigns a unique reservation ID and updates room availability.
9. The user receives confirmation (email or on-screen).

Alternate Scenario:
1. No Rooms Available: If no rooms match the criteria, the system suggests alternative dates or room types.
2. Invalid Input: If dates or guest details are incorrect, the system prompts the user to correct them.
3. Staff Override: Staff can book a room even if it’s marked unavailable (for overbooking), with a note added to the reservation.

Data:
Reservation ID, check-in/check-out dates, guest count, room ID, status (pending/confirmed), total price

3.2.2.2 UC03: Edit Reservation

Description:
Allows a customer or staff member to modify a reservation for a hotel room by changing dates, guest count, and a room, with re-checking of availability and pricing and staff confirmation required.

Actors:
1. Customer: Modifies their own reservation online.
2. Hotel Staff : Modifies any reservation, with possible approval override.

Preconditions:
1. The user must be logged in.
2. An existing reservation must be present (identified by reservation ID or customer details).

Main Scenario:
1. The user enters the reservation ID or finds the reservation in the cabinet.
2. The system displays the current reservation details (dates, room, price, etc.).
3. The user modifies desired fields (new dates, room type, guest count, etc.).
4. The system checks availability for the new room/dates.
5. The system recalculates the price based on changes.
6. The user confirms the modifications.
7. For customers: The system marks the change as ”pending” and notifies staff. For staff: Changes are applied immediately.
8. The system updates the reservation and notifies the customer (via email).

Alternate Scenario:
1. Reservation not found: If the ID don’t match, the system prompts the user to verify them.
2. Changes Unavailable: If the new room/dates aren’t available, the system suggests alternatives.

Data:
Reservation ID, updated dates, room ID, guest count, new price, status

3.2.2.3 UC04: Track Reservation

Description:
Allows a customer or hotel staff to track the status of a reservation,
including confirmation, modification history, and payment details.

Actors:
1. Customer: Tracks their own reservation online.
2. Hotel Staff : Tracks any reservation for assistance or verification.

Preconditions:
1. The user must be logged in.
2. A valid reservation must exist in the system.

Main Scenario:
1. The user enters the reservation ID or finds the reservation in their account.
2. The system displays the current reservation details
3. The user can view the reservation history (modifications, cancellations, approvals).

Alternate Scenario:
1. Reservation not found: If the reservation ID is incorrect, the system prompts the user to verify it.

Data:
Reservation ID, check-in/check-out dates, guest count, room ID, reservation history, status, payment details.

3.2.2.4 UC05: Cancel Reservation

Description:
Allows a customer or hotel staff to cancel a reservation. Customers can cancel online before the check-in date, while staff can cancel any reservation if necessary (updates room availability).

Actors:
1. Customer: Cancels their own reservation through the web application.
2. Hotel Staff : Cancels any reservation on behalf of a customer, possibly overriding restrictions.

Preconditions:
1. The user must be logged in.
2. Staff must be authenticated to cancel a reservation.
3. A valid reservation must exist in the system.

Main Scenario:
1. The user enters the reservation ID or finds the reservation in their account.
2. The system displays the current reservation details
3. The user selects the cancellation option.
4. The system checks if the cancellation is within the allowed period (e.g., before check-in date).
5. The system updates the reservation status to ”canceled” and releases the room availability.
6. If applicable, the system processes any refund based on cancellation policies.
7. The system sends a confirmation notification For staff: Changes are applied immediately.

Alternate Scenario:
1. Late cancellation: If the cancellation is past the allowed period, the system notifies the user about possible penalties
2. Reservation not found: If the reservation ID is incorrect, the system prompts the user to verify it.
3. Staff Override: Staff can cancel reservations after the deadline with an override reason logged

Data:
Reservation ID, cancellation timestamp, cancellation policy applied, refund amount (if applicable), status (canceled).

3.2.3 Room Management

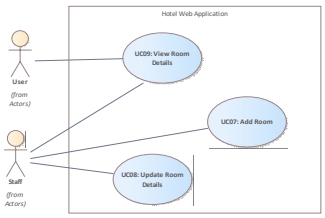

Figure 12 - Room Management

3.2.4 Stay Management

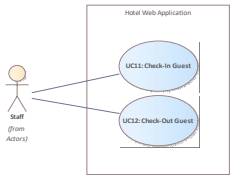

Figure 13 - Stay Management

3.2.4.1 UC11: Check-In Guest

- **Description:** Activate reservation or create ad-hoc booking.
- **Main Scenario:** Staff input guest details, confirm price, system updates stay.
- **Data:** Guest ID, room ID, stay dates.

3.2.4.2 UC12: Check-Out Guest

- **Description:** Calculate final bill, process payment.
- **Main Scenario:** Staff review services, guest pays, system closes stay.

3.2.5 Service Management

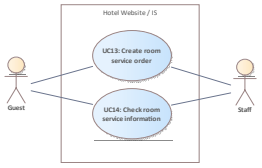

Figure 14 - Service Management

3.2.5.1 UC13: Create room service order

Description:
Creates a room service order in the web system

Actors: Guest and Hotel Staff

Main Scenario: The guest is using the website system to order a room service.
1. Authenticate the user
2. The guest navigates to the section and sees the services and some basic information
3. The guest selects a concrete service and the system shows them the price and time availability information
4. Then the guest can create and order for a service which will verified by the system

Alternative scenario: The guest makes the order by going to the reception and having the staff make the order for them
1. The staff checks information about the services in the system and tells it to the guest
2. If the guest still wants to make the order then it gives his id to the staff else the process ends
3. Then the order is verified and save in the system

3.2.5.2 UC14: Check room service information

Description:
Checks the information of the room service: services, prices and time availability

3.2.6 User management

This package defines the use cases related to basic user management.

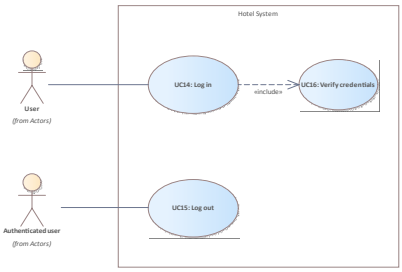

Figure 15 - User management

3.2.6.1 UC14: Log in

Description:
Allows a user to log in to access their privileges, which vary depending on whether they are a hotel staff member or a guest.

Actors:
1. User : a non-authenticated user

Preconditions:
1. The user must not be authenticated

Main Scenario:
1. The user gets on the login page
2. The user fills the needed credentials (email and password)
3. If the credentials are correct, access is granted based on their role.

Alternate Scenario:
1. Invalid credentials: if the credentials given do not match an account, an error message informs them that either the email or password is incorrect.

Data:
User email and password

3.2.6.2 UC15: Log out

Description:
Once authenticated, the user can log out, losing access to all account privileges. To regain access, they must log in again.

Actors:
1. Authenticated user

Preconditions:
1. The user must be authenticated

Main Scenario:
1. The user gets on the logout page
2. The user is disconnected and loses all access to his account

3.2.6.3 UC16: Verify credentials

Description:
The system verifies whether the provided password matches the one associated with the account.

Actors:
1. User : a non-authenticated user

Preconditions:
1. The user must not be authenticated

Main Scenario:
1. The credentials are correct and the authentication is validated

Alternate Scenario:
1. The credentials do not match any account and an error message is returned.

Data:
User email and password

3.3 Non-functional requirements

In this section, the non-functional requirements for the Hotel System are specified.

Figure 16 - Non-functional requirements

3.3.1 NF01: Web Application

The system will be a web application hosted on a hotel server, accessible via modern browsers (e.g., Chrome 110+, Firefox 109+).

3.3.2 NF02: The web application availability

The system must be available 95% of the time.

3.3.3 NF03: Data capacity

The system should handle 500 rooms, 10,000 reservations, and 5,000 guests annually.

3.3.4 NF04: Current users

Support up to 50 concurrent users with a response time under 1 second.

3.3.5 NF05: Color Theme

Use a blue and white theme reflecting the hotel’s branding.

3.3.6 NF06: Localization

Support English and Czech languages.

3.3.7 NF07: Backup

Daily backups of reservations, stays, and billing data, completed within 10 minutes overnight.

4. Domain Model

This section describes the domain of the hotel management system, defining the properties and relations of the important objects in the domain.

The main entity is a Room, which defines a hotel accommodation unit. Each room has attributes such as room number, type, and a list of Equipments, such as beds, television, or minibar. A room must contain at least one Bed, and each bed has a defined type (e.g., single, double) and quantity. Rooms are assigned a Price, which can vary over time; the PriceHistory entity stores all past and current prices, including their validity period.

A Reservation represents a customer's intent to stay in one or more rooms for a specified number of nights and guests. Reservations are made by a Guest, who provides personal information and details of the intended stay. A reservation has a State (e.g., pending, confirmed, cancelled, expired). Once confirmed by the hotel staff, the reservation is valid until cancelled or expired.

A Stay represents the actual accommodation of guests. It may be based on an existing reservation or created ad-hoc for walk-in customers. In the case of a walk-in, a temporary reservation is created and immediately activated. Upon check-in, the customer must confirm the final Price of the stay, and upon check-out, the customer pays the total bill.

The hotel offers various Services, such as food, fitness center, wellness, or room service. Each service has a defined price and can be ordered by customers for a specific date and time. The ordered services are recorded as ServiceOrders, which are linked to a Stay and are added to the customer's Bill.

The Bill is associated with a stay and includes charges for the room and any ordered services. It is finalized and paid at the end of the stay.

The domain model focuses on the relationships and states of these key entities, without including implementation details. It serves as a conceptual foundation for the system’s design and functionality.

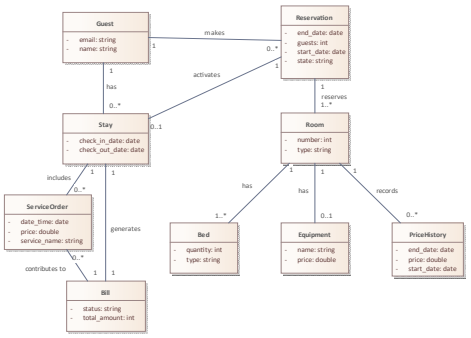

Figure 17 - Domain Model

4.1 Bed

Describes the bed(s) in a room.

Attribute name	Description
quantity	How many of that type are in the room.
type	Type of bed (e.g., single, queen, king).

4.2 Bill

Represents the invoice for a customer's stay, including room costs and all services used.

Attribute name	Description
status	Payment status (e.g., unpaid, paid, partially paid).
total_amount	Total price to be paid by the customer.

4.3 Equipment

Represents optional or built-in equipment available in a room.

Attribute name	Description
name	Name of the equipment (e.g., TV, minibar).
price	Cost (if any) associated with its use.

4.4 Guest

Represents a person who interacts with the hotel to make reservations and stays.

Attribute name	Description
email	Contact information for communication and confirmations.
name	The full name of the customer.

4.5 PriceHistory

Tracks the pricing history of a room over time.

Attribute name	Description
end_date	When a price period ends.
price	Room price during that time period.
start_date	When a price period begins.

4.6 Reservation

Represents a booking made by a customer in advance for one or more rooms.

Attribute name	Description
end_date	Date the stay is expected to end.
guests	Number of guests included in the reservation.
start_date	Date the stay is expected to begin.
state	Current status (e.g., pending, confirmed, cancelled, expired).

4.7 Room

Represents a hotel room that can be reserved or occupied.

Attribute name	Description
number	Unique identifier or room number.
type	The type of room (e.g., single, double, suite).

4.8 ServiceOrder

Represents an additional service (e.g., room service, spa, fitness) used by the guest.

Attribute name	Description
date_time	When the service was requested.
price	Cost of the individual service.
service_name	Name of the service (e.g., “Massage”, “Dinner”).

4.9 Stay

Represents the actual period the guest(s) stay in the hotel, it may be based on a reservation or created in the moment.

Attribute name	Description
check_in_date	The actual check-in date.
check_out_date	The actual check-out date


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