

HOTEL MANAGEMENT SYSTEM

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Github link: <https://github.com/dondeash2025/DMDD-Project-Group-4>

Mission:

Hotel Management System is to design and implement a centralized, consistent and scalable solution that helps day – to – day operations of a hotel. The system will support the efficient management of reservations, staff duties, payments and bills, hotel availability, guest bookings, check-in and check-out procedures. It reduces manual labor, minimize errors, provides real – time information access, enhance customer satisfaction, provides prompt and precise service.

Objectives:

1. Booking Management
 - Make new bookings and cancellations in real time.
 - Keep track of room availability.
 - Prevents double bookings by updating room availability.
2. Guest information management
 - Maintain guest profiles like first name, last name, age, address, nationality etc.
 - Ensure secure storage of personal data.
3. Room and facilities management
 - Manage room assignments and status of the room (booked, available, under maintenance).
 - Issue alerts for out – of – service rooms.
4. Check – in and Check – out process
 - Log guest arrivals and departures efficiently.
 - Create invoices at checkout that include information about room fees and services.
5. Billing and payment management
 - Manage several payments options (online, card and cash)
 - Maintain detailed billing history.

6. Analytics and reporting

- Generate reports

7. Staff scheduling and allocation

- Assign housekeeping tasks based on guest check-ins and check-outs.
- Track employee shifts and availability.
- Ensure fair and efficient workload distribution.

8. Data security and integrity

- Implement user authentication and role – based access control.
- Protect sensitive information from unauthorized access or manipulation.
- Maintain data accuracy and consistency.

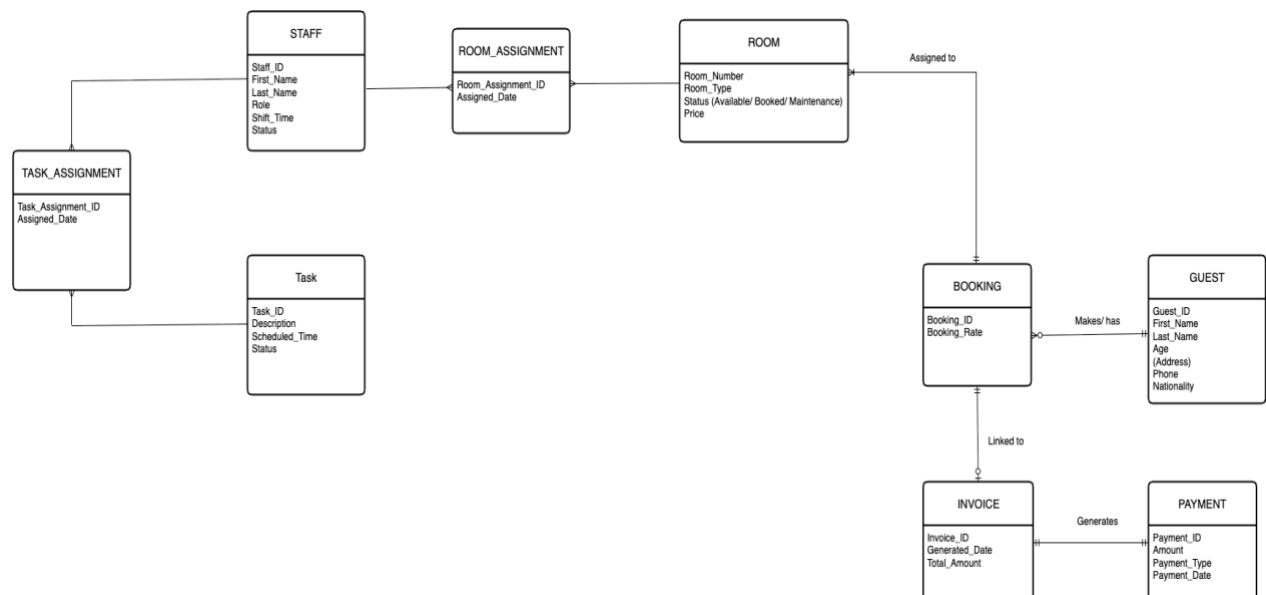
9. Data backup and recovery

- Automated backup schedules to ensure data safety.
- Recovery procedures for system failures.

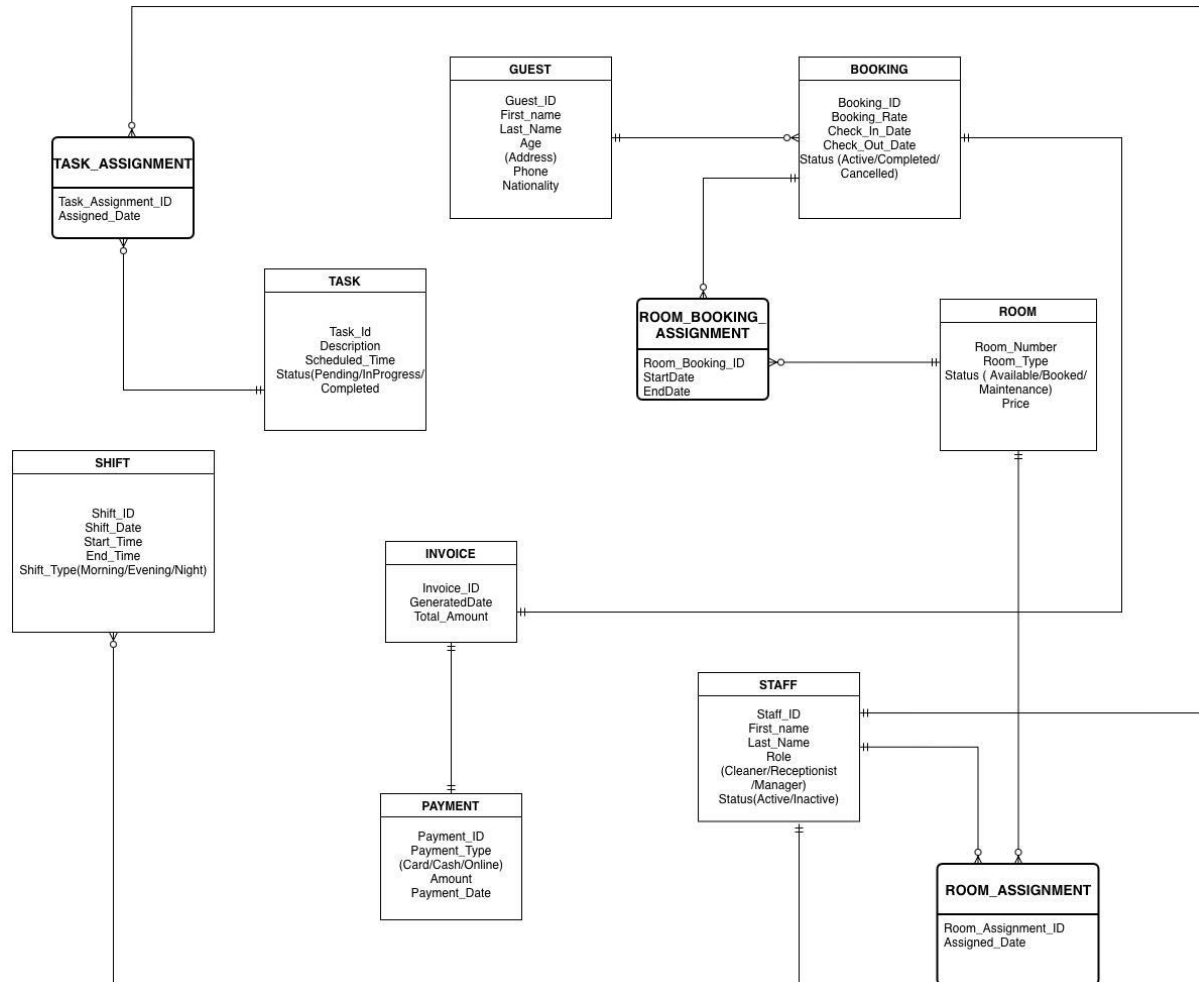
10. Scalability and maintainability

- Support future enhancements such as mobile integration, loyalty programs and third-party APIs.

ERD:



Updated ERD:



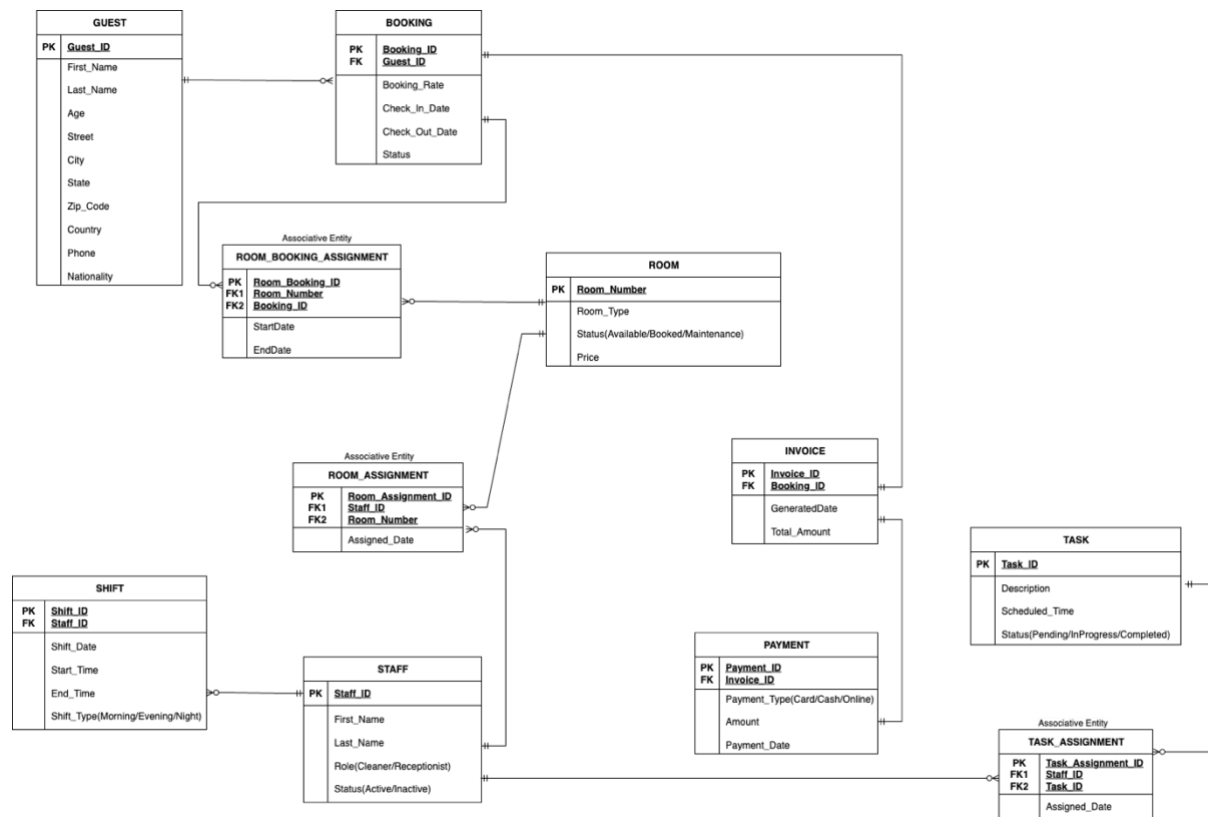
Key Changes in ERD:

- Introduced associative entity **ROOM_BOOKING_ASSIGNMENT** for **ROOM** – **BOOKING** relationship.
- Introduced associative entity **TASK_ASSIGNMENT** for **STAFF** – **TASK** relationship.
- Expanded **ROOM_ASSIGNMENT** as associative entity for **STAFF** – **ROOM** relationship.
- Added **SHIFT** entity linked to **TASK**.

List of entities and their relationships:

- Guest represents hotel customers. A guest can make multiple bookings but each booking is associated with only one guest.
- Booking represents a guest commitment to stay. A booking can include multiple rooms, and a room can appear in multiple bookings over time. This many-to-many relationship is implemented using the Room_Booking_Assignment entity.
- Rooms are physical units in the hotel. Rooms can be assigned to multiple staff for cleaning or maintenance.
- Room_Booking_Assignment links rooms and bookings. It captures the specific period Start_Date and End_Date for which each room is reserved under a booking.
- Invoice is generated once a booking is completed. Each booking generates one invoice that records the total amount due.
- Payment represents financial transactions associated with invoices. Each invoice has exactly one payment, and each payment is linked to a single invoice.
- Staff includes hotel employees such as housekeepers, maintenance workers, receptionists, and managers. Each staff member can have multiple shifts, handle multiple rooms, and be assigned multiple tasks.
- Shift records the working schedule for each staff member, including shift date, start and end times, and shift type (Morning, Evening, Night).
- Task includes operational activities like cleaning or repairs. Each task is scheduled for a specific time and has a status (Pending, In Progress, Completed).
- Task_Assignment links staff and tasks, allowing multiple staff to perform multiple tasks. It records the date when each task is assigned.
- Room_Assignment links staff and rooms, tracking which staff are responsible for which rooms and the date of assignment. It supports daily cleaning and maintenance scheduling.

Logical ERD:



Key database design decisions:

- Booking is flexible in tracking guest's intent versus actual room allocation through Room_Booking_Assignment associative entity.
- Payment and Invoice are distinct to ensure financial integrity and traceability of transactions.
- Room_Assignment and Task_Assignment are associative entities designed to handle many-to-many relationships between rooms–staff and tasks–staff respectively.
- The Shift entity enables efficient scheduling of staff, tracking daily shift dates, start and end times, and shift types.
- Composite attributes like Address for Guest is decomposed into atomic attributes such as Street, City, State, Zip_Code, and Country in the logical model to satisfy normalization.
- The model ensures full normalization up to Third Normal Form - no repeating groups, no partial dependencies, and no transitive dependencies.
- Data integrity is maintained using primary and foreign key relationships. All many-to-many relationships are resolved using associative entities.
- The database design is scalable for future extensions such as service-based billing, customer feedback, and staff performance tracking.

