Database Design & Implementation

Analysis Report, Group F

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The database system is designed to manage the complex operations of a rapidly expanding Last Resort Hotel chain. The system is required to efficiently handle room reservations, guest management, facility usage, billing, and event planning while ensuring an intuitive and responsive interface for hotel staff. This document explains how our group designed and created the ERD based on the business description and project requirements. The ERD was developed to normalize hotel operations data, ensuring efficient management, accuracy, and ease of access to critical information.

The Last Resort Description document and Project Requirements outline a complex structure of rooms, facilities, guests, billing, and staff responsibilities. The system must accommodate various functionalities, including hotel chain management, room management, guest and reservation handling, event management, facility usage, billing and payments, employee tracking, and guest movement tracking. Each of these areas requires structured data relationships to facilitate smooth hotel operations. The ERD needed to reflect the relationships between different locations, buildings, floors, and wings to capture the hotel's multi-faceted operations. Each hotel contains multiple buildings, each with various wings and floors. Rooms within these floors serve different purposes, including sleeping accommodations, meeting spaces, and hybrid rooms. Furthermore, guests and events require structured tracking for reservations, check-ins, facility usage, and billing. The ERD ensures that these complex relationships are mapped out in a scalable manner.

Given the complexity of LRH’s operations, we structured the ERD by breaking down business operations into interconnected entities with well-defined relationships. The key entities in the ERD include hotels, buildings, wings, floors, rooms, room types, guests, reservations, events, facilities, billing, payments, employees, maintenance, room adjacency, reservation requirements, guest cards, transactions, check-in/check-out records, and split billing. Normalization was applied to ensure the database structure was efficient and avoided data redundancy. This approach allowed us to clearly define one-to-many and many-to-many relationships, ensuring that data is stored logically and consistently. Each entity was carefully

designed to reflect real-world business processes while maintaining the integrity of transactional records.

The ERD was developed with a focus on ensuring data integrity, scalability, and usability. Several important relationships were defined to reflect how different entities interact within the system. For example, a hotel contains multiple buildings, each containing multiple wings and floors. Each floor has rooms assigned to it, and each room is classified under a specific room type. Guests make reservations, which link them to specific rooms and generate billing records. Rooms are designed to have flexible uses, including standard sleeping rooms, suites, and meeting rooms. Some rooms have direct adjacencies, such as connecting suites or rooms with private access doors. Meeting rooms have additional configurations, such as movable walls that allow dynamic space allocation. Events taking place in the hotel require booking meeting rooms, and guest attendance is recorded to facilitate billing and logistics. Billing and payments are crucial components of the ERD. Each reservation generates a bill, which can be split among multiple parties if necessary. The system allows different types of payments, including those linked to reservations, event charges, and facility usage. Guest transactions, such as restaurant visits, spa usage, or additional room services, are recorded and linked to their billing accounts.vTo enhance security and tracking, the ERD includes a guest card system that tracks guest movements within the hotel. This system ensures that guests can access their rooms and designated facilities while maintaining an accurate log of activities. Additionally, employee records allow staff to manage reservations, process check-ins, and handle maintenance requests efficiently.

Several challenges were encountered during the ERD development, particularly in handling multi-function rooms, split billing scenarios, last-minute room changes, and tracking guest movement. Multi-function rooms, such as meeting rooms that convert into sleeping areas, required a flexible room type structure that accommodates different configurations. Split billing presented another challenge, as guests or organizations may need to divide costs among multiple responsible parties. A separate split billing table was introduced to address this issue.
Last-minute room changes were accounted for by implementing check-in and check-out tracking, along with assignment tables that allow real-time room reallocation. Guest movement tracking was enhanced using the guest card and card reader log system, ensuring that staff can monitor guest locations while maintaining privacy settings for those who opt out of tracking.

The work on this project was divided among the team members to ensure efficiency and accuracy. Chenhao, Jonathan, and Mingzhi designed the overall structure of the database, ensuring that it aligned with the requirements of Last Resort Hotels. Jonathan and Mingzhi focused on refining the details and creating the ERD, making sure that relationships between entities were accurately mapped. Chenhao and Mike were responsible for writing the analysis report, ensuring that the design decisions were well-documented and aligned with the business needs. For the first part of the project, the ERD for Last Resort Hotels created by our group successfully models the complex interactions between guests, reservations, billing, events, and facility usage. By implementing normalized data structures and well-defined relationships, this design ensures efficient database performance, accurate tracking, and scalability for the growing hotel chain. Future improvements could include dynamic room availability tracking, AI-based booking suggestions, and real-time revenue analytics to enhance the management experience.