University of Ottawa

Faculty of Engineering School of Electrical Engineering and Computer Science Course Project

Course CSI2132 Databases I
Academic year 2022-23
Semester Winter
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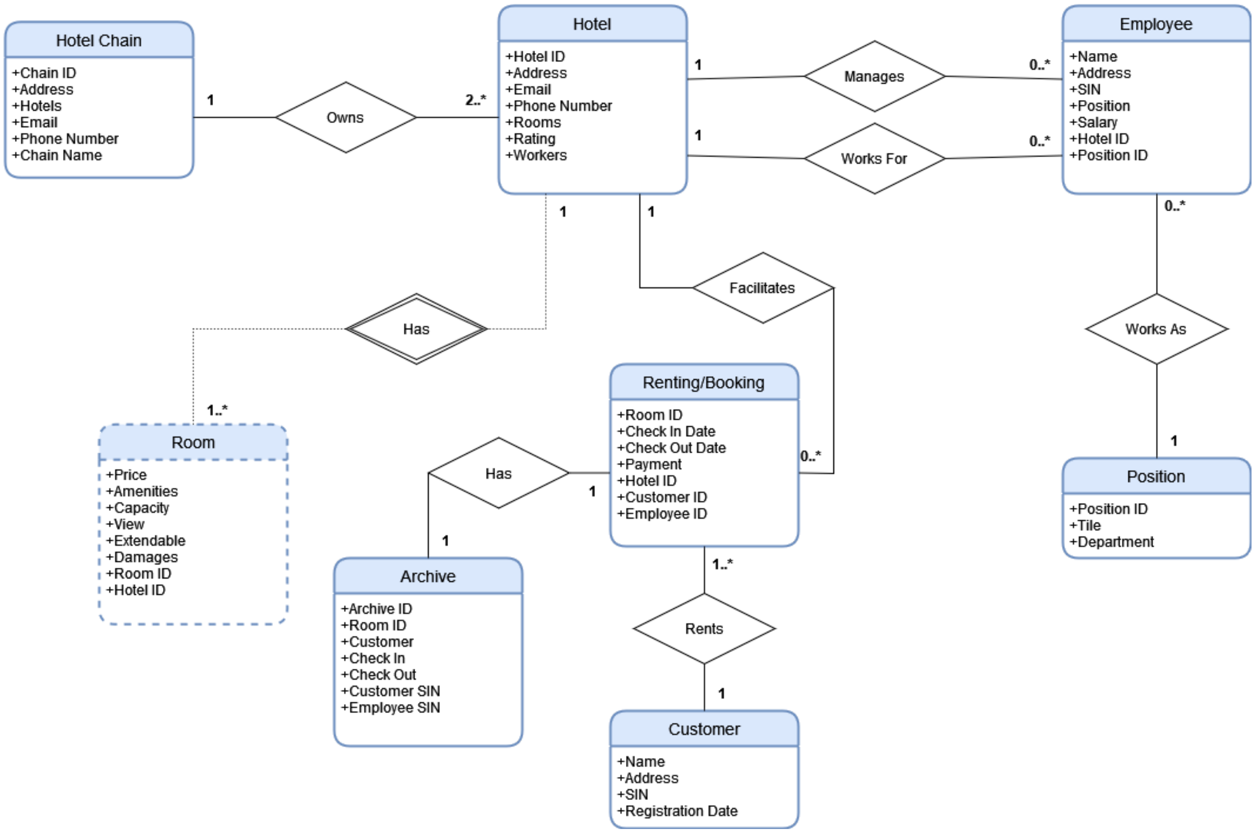
Introduction

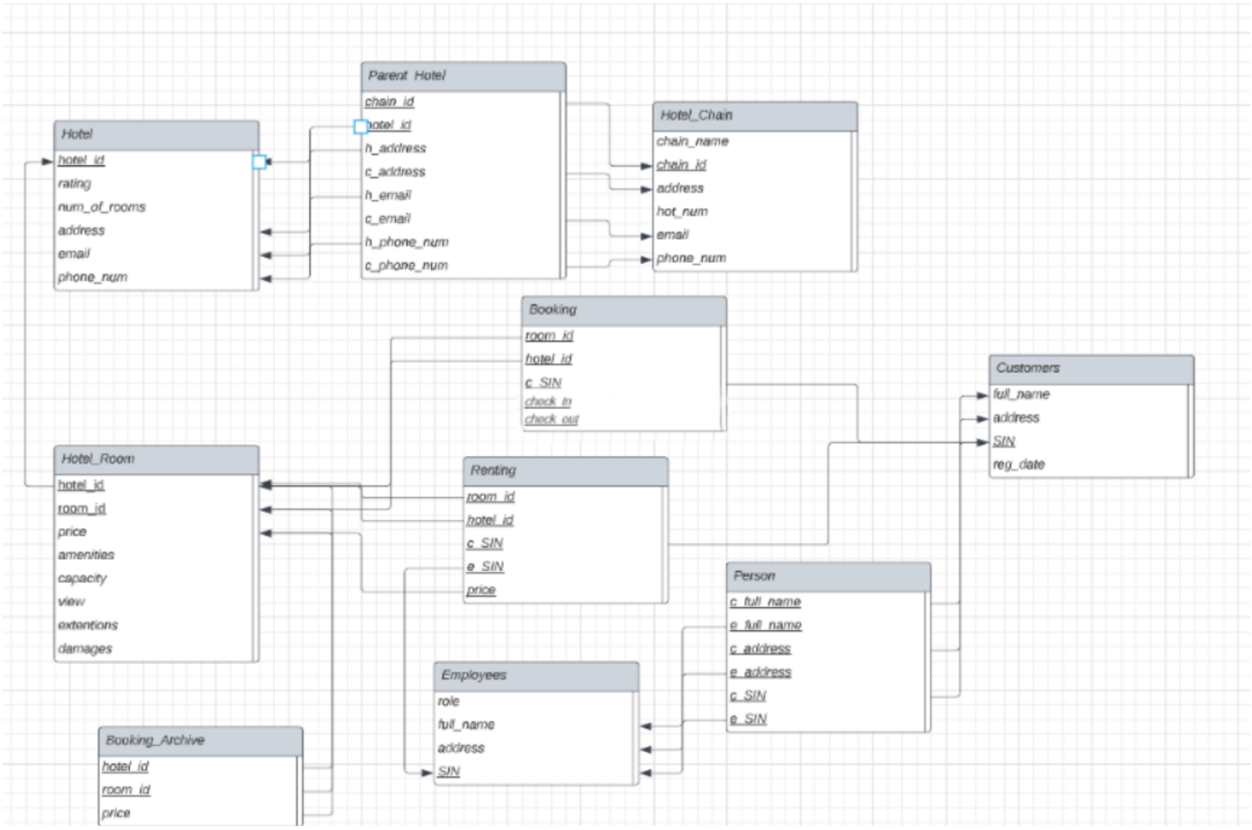
This report covers the design of a database system to be used by multiple hotel-chains to facilitate booking and renting within their respective hotels. The first deliverable in this project covers the entity-relationship diagram, schema diagram, and constraints of this database management system.

ER Diagram



So, the diagram depicts a hotel chain, which is an organization that owns multiple hotels. In fact, for an organization to be considered a hotel chain, it must own at least two hotels. Each individual hotel in the chain manages its own employees, who work in various positions within the hotel. For example, there might be front desk clerks, housekeeping staff, restaurant servers, and so on. The hotel also has rooms available for renting by customers. A room is a weak entity because its existence depends on the hotel. When a customer rents a room, the hotel keeps a record of this transaction in an archive. This archive will include information such as the dates of the rental, the employee, room, and the customer who rented it.

Database Schema Diagram



As one of many hotel chains, entity Hotel_Chain is identified by its primary key “chain_id”; likewise, each Hotel is identified by its primary key “hotel_id”, Hotel_Room by “room_id”, and Employees and Customers by their SIN. To be able to book a hotel room, Booking needs to have access to the “room_id”, “hotel_id”, and “c_SIN” as foreign keys so it has all the information it needs in order to book a room; Renting needs similar attributes with the addition of the employees’ SIN and the price of the room, and Booking_Archive needs all the information about the room and its price at the time.

Constraints

Defined below are the necessary constraints that will ensure the correctness of the database to be created according to the relational database schema. These are primary keys, referential integrity constraints, domain constraints and user-defined constraints.

1. Primary key constraints:

   Each table in the database has a primary key constraint to uniquely identify each row in the table.

   List of primary keys:

   i. chain_id in Hotel_Chain table
   ii. hotel_id in Hotel table
   iii. SIN in Employees table
   iv. SIN in Customers table
   v. room_id in Hotel_Room table
   vi. check_in in Booking table
   vii. check_out in Booking table

2. Referential integrity constraints:

   These constraints ensure that the relationships between tables are maintained properly.

   - Parent Hotel table has a chain_id and a hotel_id attribute that references the Hotel_chain table and Hotel table, ensuring that each hotel is associated with a hotel chain and vice versa.
   - Similarly, the Hotel_Room table has a hotel_id attribute that references the Hotel table, ensuring that each room is associated with a specific hotel.
   - The Booking Archive table has several foreign key constraints that reference the CUSTOMERS, Hotel_Room, and Hotel tables, ensuring that the archived data is linked to the correct customer, room, and hotel.

   List of foreign keys:

   i. chain_id in the references to the chain_id in the Hotel_Chain table.
   ii. hotel_id in the Hotel_Room table references the hotel_id in the hotel table.
   iii. e_SIN in theRenting table references the SIN in the employees table.
   iv. hotel_id in the works_at table references the hotel_id in the hotel table.
   v. c_SIN in the Booking table references the SIN in the customer table.
   vi. room_id in the booking table references the room_id in the Hotel_Room table.
   vii. c_SIN in the renting table references the SIN in the Customers table.
   viii. room_id in the renting table references the room_id in the Hotel_Room table.

3. Domain constraints:

   These constraints ensure that the values in each attribute are valid.

   - The CAPACITY attribute in the Hotel_Room table is restricted to 3 values: "single", "double", "triple".
   - The PRICE attribute in the Hotel_Room table is restricted to positive values only.
   - The amenities attribute in the Hotel_Room table is restricted to the following values: "Fridge", "TV", "Jacuzzi", “Wifi”,”Breakfast”, “Pet friendly”. A room could have any number of this amenities
   - The view attribute in Hotel_Room has three values: “mountain”, “ocean”, “city”.
   - The rating attribute in Hotel has five values: “one”, “two”, “three”, “four”, “five”
   - The role attribute in the employees table has three values: “manager”, “staff”, “cleaner”

4. User-defined constraints:

   These constraints are specific to the application and could be defined by each hotel or hotel chain as they see appropriate.

   - Example a hotel could have a rule that a room cannot be booked or rented for a date range that overlaps with an existing booking or renting.
   - Example a customer cannot have more than one active booking or renting at a time.