**Question 1:**

**Design a database schema that can handle the operations of a room reservation system for a global hotel chain. Ensure the schema is scalable, maintainable, and supports necessary business operations.**

Considering all the requirements, I have finalized the approach with the following solution, which should appropriately meet the necessary needs.

I will include the following tables: Countries, Cities, Hotels, Staff, Rooms, Customers, Reservations, Payments, and RoomTypes.

**Countries Table –** Stores information about countries where the hotels are located.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| country\_id | INT | PRIMARY KEY |
| country\_name | VARCHAR(100) | NOT NULL, UNIQUE |
| country\_code | VARCHAR(10) | NOT NULL, UNIQUE |

**Cities Table –** Stores information about cities where the hotels are located.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| city\_id | INT | PRIMARY KEY |
| city\_name | VARCHAR(100) | NOT NULL |
| state | VARCHAR(100) | NOT NULL |
| country\_id | INT | FOREIGN KEY (country\_id) REFERS Countries (country\_id) |

**Hotels Table –** Contains information about the hotels in the chain.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| hotel\_id | INT | PRIMARY KEY |
| name | VARCHAR(100) | NOT NULL |
| address | VARCHAR(255) | NOT NULL |
| city\_id | INT | FOREIGN KEY (city\_id) REFERS Cities (city\_id) |
| postal\_code | VARCHAR(20) | NOT NULL |
| phone\_number | VARCHAR(20) | NOT NULL |
| email | VARCHAR(20) |  |
| starrating | INT |  |

**Staffs Table**

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| employee\_id | INT | PRIMARY KEY |
| hotel\_id | INT | FOREIGN KEY (hotel\_id) REFERS Hotels (hotel\_id) |
| first\_name | VARCHAR(50) | NOT NULL |
| last\_name | VARCHAR(50) | NOT NULL |
| position | VARCHAR(50) | NOT NULL |
| email | VARCHAR(100) | NOT NULL, UNIQUE |
| phone\_number | VARCHAR (20) | NOT NULL |
| date\_of\_birth | DATE | NOT NULL |
| salary | DECIMAL(10, 2) | NOT NULL |

**Rooms Table –** Contains information about the rooms in each hotel.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| room\_number | INT | PRIMARY KEY |
| hotel\_id | INT | FOREIGN KEY (hotel\_id) REFERS Hotels (hotel\_id) |
| room\_number | VARCHAR(10) | NOT NULL |
| room\_type | VARCHAR(50) | FOREIGN KEY (room\_type) REFERS Room Types (room\_type) |
| capacity | INT | NOT NULL |
| price\_per\_night | DECIMAL(10, 2) | NOT NULL |
| is\_available | BOOLEAN | DEFAULT TRUE |

**RoomTypes Table -** Store types of rooms available.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| room\_type | INT | PRIMARY KEY |
| type\_name | VARCHAR(50) | NOT NULL, UNIQUE |
| description | TEXT |  |

**Customers Table -** Stores information about the customers.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| customer\_id | INT | PRIMARY KEY |
| first\_name | VARCHAR(50) | NOT NULL |
| last\_name | VARCHAR(50) | NOT NULL |
| email | VARCHAR(100) | NOT NULL, UNIQUE |
| phone\_number | VARCHAR (20) | NOT NULL |
| date\_of\_birth | DATE | NOT NULL |
| address | VARCHAR(255) | NOT NULL |

**Reservations Table -** Stores information about room reservations.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| reservation\_id | INT | PRIMARY KEY |
| customer\_id | INT | FOREIGN KEY (customer\_id) REFERS Customers (customer\_id) |
| hotel\_id | INT | FOREIGN KEY (hotel\_id) REFERS Hotels (hotel\_id) |
| room\_number | INT | FOREIGN KEY (room\_id) REFERS Rooms(room\_id) |
| check\_in\_date | DATE | NOT NULL |
| check\_out\_date | DATE | NOT NULL |
| total\_amount | DECIMAL(10, 2) | NOT NULL |
| reservation\_status | VARCHAR(50) | NOT NULL |

**Payments Table -** Stores payment information for reservations.

|  |  |  |
| --- | --- | --- |
| Column Name | Data Type | Constraints |
| payment\_id | INT | PRIMARY KEY |
| reservation\_id | INT | FOREIGN KEY (reservation\_id) REFERS Reservations (reservation\_id) |
| payment\_date | TIMESTAMP | DEFAULT CURRENT\_TIMESTAMP |
| amount | DECIMAL(10, 2) | NOT NULL |
| payment\_method | VARCHAR(50) | NOT NULL |
| payment\_status | VARCHAR(50) | NOT NULL |
| amount | DECIMAL(10, 2) | NOT NULL |
| update\_at | TIMESTAMP | DEFAULT CURRENT\_TIMESTAMP ON UPDATE CURRENT\_TIMESTAMP |

**Relationships:**

1. **Countries to Cities:** One-to-Many (A country has many cities)
2. **Cities to Hotels:** One-to-Many (A city has many hotels)
3. **Hotels to Rooms:** One-to-Many (A hotel has many rooms)
4. **Hotels to Staff:** One-to-Many (A hotel employs multiple staff)
5. **Rooms to Reservations:** One-to-Many (A room can have many reservations)
6. **Customers to Reservations:** One-to-Many (A customer can make many reservations)
7. **Reservations to Payments:** One-to-Many (Each reservation might have multiple payments)
8. **RoomTypes to Rooms:** One-to-Many (A room type can be assigned to many rooms)

**For a better understanding the below is the ER diagram.**

**A diagram of a company

Description automatically generated**