HOSPITAL MANAGEMENT

Final project for SQL module

By Gaurang Sanyasi

1. Description:

The following database schema is designed to function as a comprehensive hospital management system, allowing efficient management of patients, doctors, appointments, admissions, rooms, staff, and billing.

This system aims to streamline the hospital's administrative tasks and provide a smooth experience for both healthcare professionals and patients.

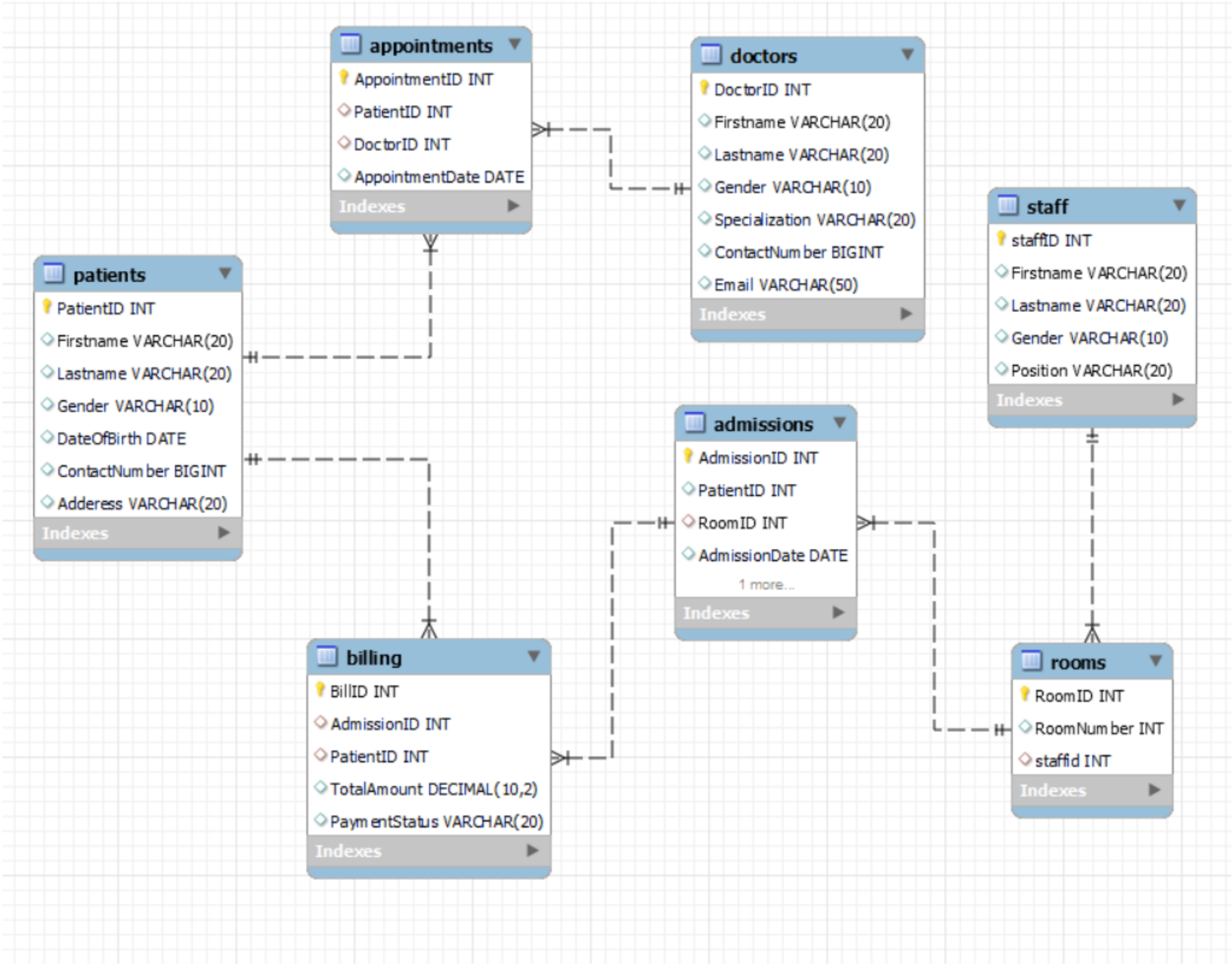
- Enable easy appointment scheduling and personalized patient care.
- Provide a structured appointment booking process for patients and doctors.
- Allocate and track room assignments for patient admissions.
- Enable quick access to patient history, diagnoses, and treatments.

This Database contains 7 tables:

1. Patients
2. Doctors
3. Appointments
4. Staff
5. Rooms
6. Admissions
7. Billing

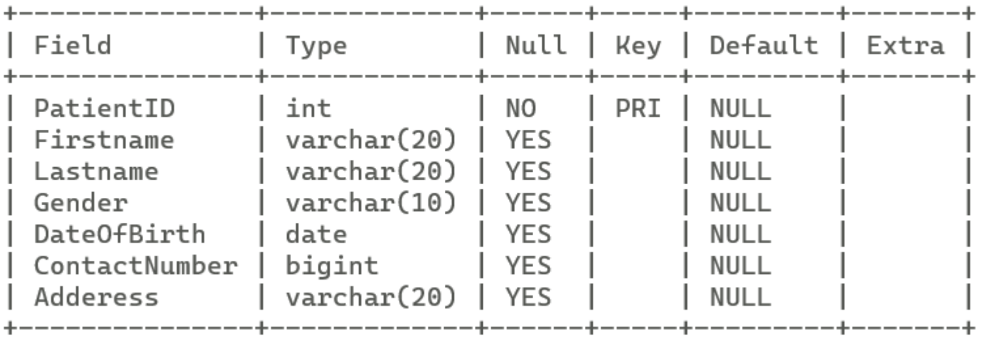
How these Tables/Entities are related to each other is shown pictorially on the next page through ER Diagram, i.e., Entity Relation Diagram.

2. ER-Diagram for Hospital Management:



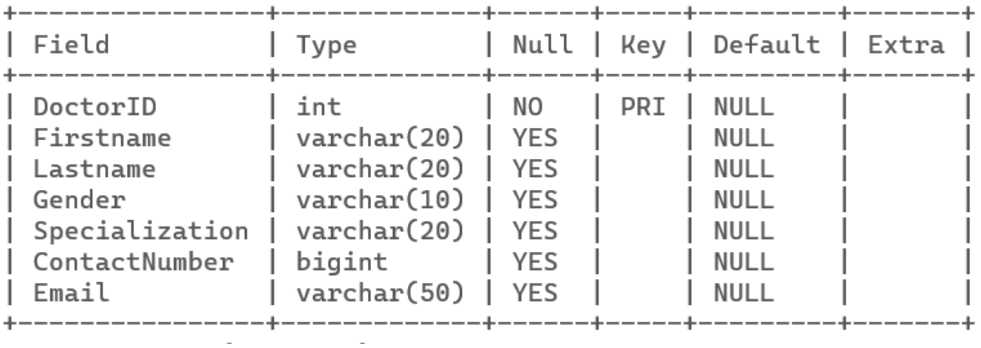
3. Table Description:

1. **Patients:**



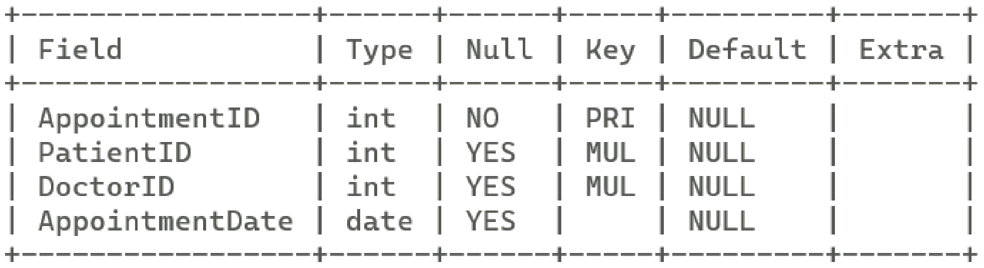
```
+---------------+-------------+------+-----+---------+-------+
| Field         | Type        | Null | Key | Default | Extra |
+---------------+-------------+------+-----+---------+-------+
| PatientID     | int         | NO   | PRI | NULL    |       |
| Firstname     | varchar(20) | YES  |     | NULL    |       |
| Lastname      | varchar(20) | YES  |     | NULL    |       |
| Gender        | varchar(10) | YES  |     | NULL    |       |
| DateOfBirth   | date        | YES  |     | NULL    |       |
| ContactNumber | bigint      | YES  |     | NULL    |       |
| Adderess      | varchar(20) | YES  |     | NULL    |       |
+---------------+-------------+------+-----+---------+-------+
```

2. **Doctors:**



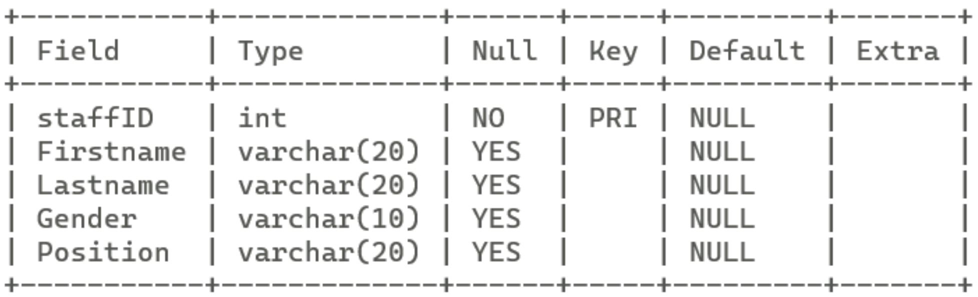
```
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| DoctorID       | int         | NO   | PRI | NULL    |       |
| Firstname      | varchar(20) | YES  |     | NULL    |       |
| Lastname       | varchar(20) | YES  |     | NULL    |       |
| Gender         | varchar(10) | YES  |     | NULL    |       |
| Specialization | varchar(20) | YES  |     | NULL    |       |
| ContactNumber  | bigint      | YES  |     | NULL    |       |
| Email          | varchar(50) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
```

3. **Appointments:**



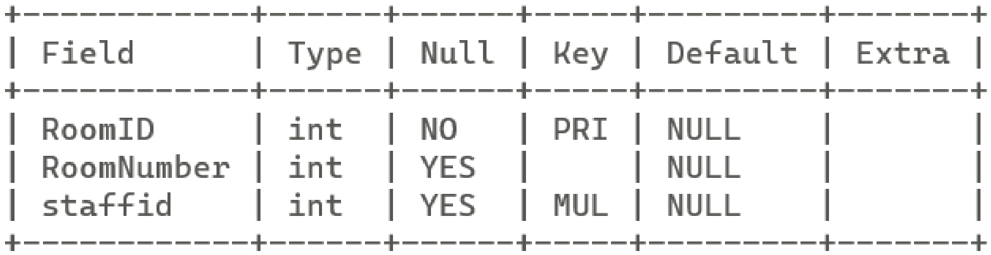
```
+-----------------+------+------+-----+---------+-------+
| Field           | Type | Null | Key | Default | Extra |
+-----------------+------+------+-----+---------+-------+
| AppointmentID   | int  | NO   | PRI | NULL    |       |
| PatientID       | int  | YES  | MUL | NULL    |       |
| DoctorID        | int  | YES  | MUL | NULL    |       |
| AppointmentDate | date | YES  |     | NULL    |       |
+-----------------+------+------+-----+---------+-------+
```

4. **Staff:**



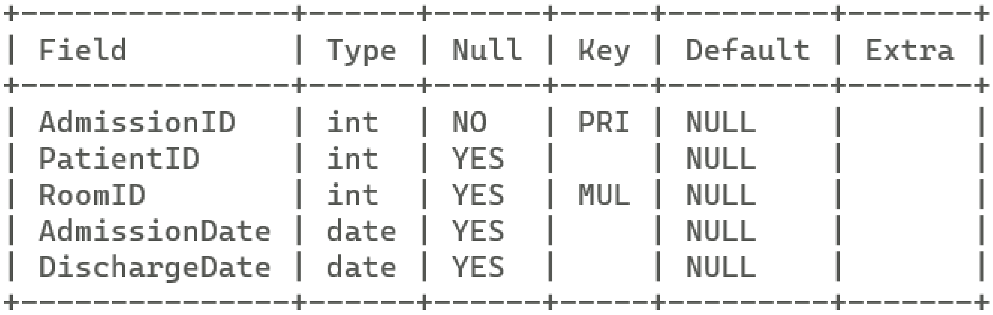
```
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| staffID   | int         | NO   | PRI | NULL    |       |
| Firstname | varchar(20) | YES  |     | NULL    |       |
| Lastname  | varchar(20) | YES  |     | NULL    |       |
| Gender    | varchar(10) | YES  |     | NULL    |       |
| Position  | varchar(20) | YES  |     | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
```

5. **Rooms:**



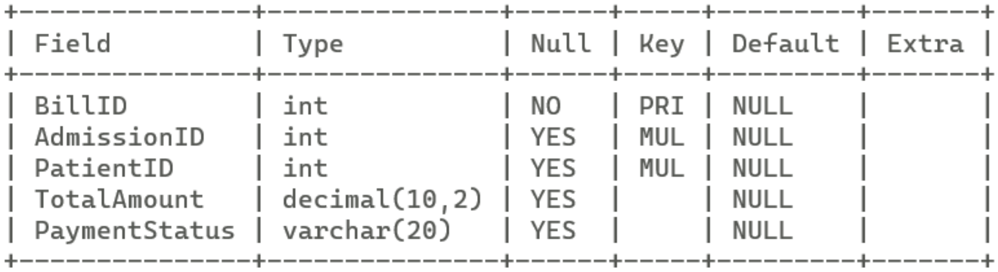
```
+------------+------+------+-----+---------+-------+
| Field      | Type | Null | Key | Default | Extra |
+------------+------+------+-----+---------+-------+
| RoomID     | int  | NO   | PRI | NULL    |       |
| RoomNumber | int  | YES  |     | NULL    |       |
| staffid    | int  | YES  | MUL | NULL    |       |
+------------+------+------+-----+---------+-------+
```

6. **Admissions:**



```
+---------------+------+------+-----+---------+-------+
| Field         | Type | Null | Key | Default | Extra |
+---------------+------+------+-----+---------+-------+
| AdmissionID   | int  | NO   | PRI | NULL    |       |
| PatientID     | int  | YES  |     | NULL    |       |
| RoomID        | int  | YES  | MUL | NULL    |       |
| AdmissionDate | date | YES  |     | NULL    |       |
| DischargeDate | date | YES  |     | NULL    |       |
+---------------+------+------+-----+---------+-------+
```

7. **Billing:**



```
+---------------+---------------+------+-----+---------+-------+
| Field         | Type          | Null | Key | Default | Extra |
+---------------+---------------+------+-----+---------+-------+
| BillID        | int           | NO   | PRI | NULL    |       |
| AdmissionID   | int           | YES  | MUL | NULL    |       |
| PatientID     | int           | YES  | MUL | NULL    |       |
| TotalAmount   | decimal(10,2) | YES  |     | NULL    |       |
| PaymentStatus | varchar(20)   | YES  |     | NULL    |       |
+---------------+---------------+------+-----+---------+-------+
```

4. Commands:

- **Create Database:**

```
CREATE DATABASE My_Project;
```

- **Select Database:**

```
USE My_Project;
```

- **Create Table named Patients:**

```
CREATE TABLE Patients (
   PatientID INT PRIMARY KEY,
   FirstName VARCHAR(50),
   LastName VARCHAR(50),
   Gender VARCHAR(10),
   DateOfBirth DATE,
   ContactNumber VARCHAR(15),
   Address VARCHAR(100)
);
```

- **Create Table named Doctors:**

```
CREATE TABLE Doctors (
   DoctorID INT PRIMARY KEY,
   FirstName VARCHAR(50),
   LastName VARCHAR(50),
   Gender VARCHAR(10),
   Specialization VARCHAR(50),
   ContactNumber VARCHAR(15),
   Email VARCHAR(100)
);
```

- **Create Table named Appointments:**

```
CREATE TABLE Appointments (
   AppointmentID INT PRIMARY KEY,
   PatientID INT,
   DoctorID INT,
   AppointmentDate DATE,
   FOREIGN KEY (PatientID) REFERENCES Patients(PatientID),
   FOREIGN KEY (DoctorID) REFERENCES Doctors(DoctorID)
);
```

- **Create Table named Staff:**

```
CREATE TABLE Staff (
   StaffID INT PRIMARY KEY,
   FirstName VARCHAR(50),
   LastName VARCHAR(50),
   Gender VARCHAR(10),
   Position VARCHAR(50)
);
```

- **Create Table named Rooms:**

```
CREATE TABLE Rooms (
   RoomID INT PRIMARY KEY,
   RoomNumber VARCHAR(10),
   StaffID INT,
   FOREIGN KEY (StaffID) REFERENCES Staff(StaffID)
);
```

- **Create Table named Admissions:**

```
CREATE TABLE Admissions (
   AdmissionID INT PRIMARY KEY,
   PatientID INT,
   RoomID INT,
   AdmissionDate DATE,
   DischargeDate DATE,
   FOREIGN KEY (PatientID) REFERENCES Patients(PatientID),
   FOREIGN KEY (RoomID) REFERENCES Rooms(RoomID)
);
```

- **Create Table named Billing**

```
CREATE TABLE Billing (
   BillID INT PRIMARY KEY,
   AdmissionID INT,
   TotalAmount DECIMAL(10, 2),
   PaymentStatus VARCHAR(20),
   FOREIGN KEY (AdmissionID) REFERENCES Admissions(AdmissionID)
);
```

- **Populate “Patients” Table**

```
-> insert into patients
   -> values
   -> (101, 'John', 'Smith', 'Male', '1990-05-15', 1234567890, '123 Main St,Cityyville'),
   -> (102, 'Jane', 'Doe', 'Female', '1985-09-20', 9876543210, '456 Elm St, Townsville'),
   -> (103, 'Alex', 'Johnson', 'Male', '1988-03-10', 5551112222, '789 Oak Ave, Villagetown'),
   -> (104, 'Emily', 'Williams', 'Female', '1995-12-03', 5555555555, '567 Maple Rd, Countryside'),
   -> (105, 'Ryan', 'Turner', 'Male', '1982-11-08', 7778889999, '234 Pine Ln, Meadowville'),
   -> (106, 'Olivia', 'White', 'Female', '1998-07-25', 8887776666, '678 Cedar Rd, Hillside'),
   -> (107, 'Ethan', 'Harris', 'Male', '2000-02-12', 6665554444, '345 Birch St, Riverside'),
   -> (108, 'Ava', 'Martin', 'Female', '1976-09-02', 4443332222, '456 Willow Ave, Lakeside'),
   -> (109, 'Liam', 'Lewis', 'Male', '1994-04-18', 2221110000, '567 Oak St, Seaside'),
   -> (110, 'Mia', 'Turner', 'Female', '2005-12-30', 1110009999, '679 Elm Ln, Brookside');
```

- **Populate “Doctors” Table**

```
-> insert into Doctors
   -> values
   -> (201, 'Michael', 'Johnson', 'Male', 'Cardiology', 5551234567, 'Michael@Gmail.com'),
   -> (202, 'Sarah', 'Williams', 'Female', 'Pediatrics', 5559876543, 'sarah@Gmail.com'),
   -> (203, 'David', 'Lee', 'Male', 'Orthopedics', 555-444-3333,'david@Gmail.com'),
   -> (204, 'Jessica', 'Miller', 'Female', 'Gynecology', 5557778888, 'jessica@gmail.com'),
   -> (205, 'Kevin', 'Brown', 'Male', 'Internal Medicine', 5552229999, 'kevon@gmail.com'),
   -> (206, 'Emily', 'Davis', 'Female', 'Dermatology', 5556665555, 'emily@gmail.com'),
   -> (207, 'Andrew', 'Wilson', 'Male', 'Neurology', 5555558888, 'Andrew@gmail.com');
```

- **Populate “Appointments” Table:**

```
-> insert into Appointments
   -> values
   -> (301, 101, 201, '2023-08-30'),
   -> (302, 102, 202, '2023-09-05'),
   -> (303, 103, 203, '2023-09-12'),
   -> (304, 104, 204, '2023-08-18'),
   -> (305, 101, 205, '2023-09-25'),
   -> (306, 105, 206, '2023-10-03'),
   -> (307, 106, 207, '2023-10-10'),
   -> (308, 107, 201, '2023-10-18');
```

- **Populate “staff” Table:**

```
-> insert into staff
   -> values
   -> (401, 'Emily', 'Davis', 'Female', 'Nurse'),
   -> (402, 'Robert', 'Brown', 'Male', 'Receptionist'),
   -> (403, 'Maria', 'Martinez', 'Female', 'Nurse'),
   -> (404, 'Daniel', 'Clark', 'Male', 'Janitor'),
   -> (405, 'Jennifer', 'Adams', 'Female', 'Nurse'),
   -> (406, 'William', 'Turner', 'Male', 'Security Guard'),
   -> (407, 'Sophia', 'Moore', 'Female', 'Administrator');
```

- **Populate “Rooms” Table:**

```
-> insert into rooms
   -> values
   -> (501, 101, 401),
   -> (502, 102, 402),
   -> (503, 103, 403),
   -> (504, 104, 404),
   -> (505, 105, 405),
   -> (506, 106, 406),
   -> (507, 107, 407),
   -> (508, 108, 401),
   -> (509, 109, 402),
   -> (510, 110, 403);
```

- **Populate “Admissions” Table:**

```
-> insert into admissions
   -> values
   -> (601, 101, 501, '2023-08-28', '2023-09-02'),
   -> (602, 102, 502, '2023-09-01', '2023-09-07'),
   -> (603, 103, 503, '2023-09-08', '2023-09-15'),
   -> (604, 104, 504, '2023-09-14', '2023-09-20'),
   -> (605, 105, 505, '2023-09-28', '2023-10-05'),
   -> (606, 106, 506, '2023-10-01', '2023-10-08'),
   -> (607, 107, 507, '2023-10-09', '2023-10-16'),
   -> (608, 108, 508, '2023-10-15', '2023-10-22'),
   -> (609, null, 509, null, null),
   -> (610, null, 510, null, null);
```

- **Populate “Billing” Table:**

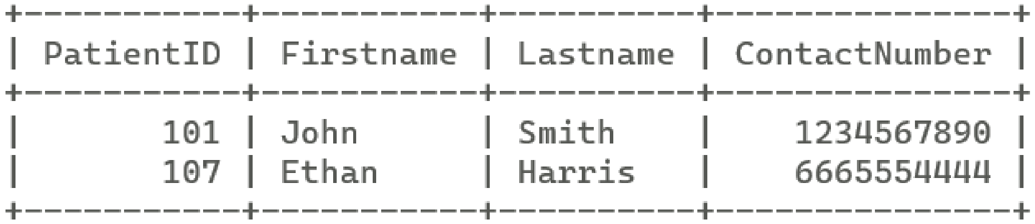
```
-> insert into billing
   -> values
   -> (701, 601, 101, 1500, 'Paid'),
   -> (702, 602, 102, 2000, 'Pending'),
   -> (703, 603, 103, 1800, 'Paid'),
   -> (704, 604, 104, 1600, 'Paid'),
   -> (705, 605, 105, 2200, 'Pending'),
   -> (706, 606, 106, 2100, 'Paid'),
   -> (707, 607, 107, 1900, 'Pending'),
   -> (708, 608, 108, 1800, 'Paid');
```

5. Sub-Queries:

1. **List the Names of patients who have appointments scheduled with Dr. Michael Johnson.**

```
-> SELECT PatientID, Firstname, Lastname, ContactNumber FROM Patients
-> WHERE PatientID IN (SELECT PatientID FROM Appointments
-> WHERE DoctorID = (SELECT DoctorID FROM Doctors
-> WHERE Firstname = 'Michael' AND Lastname = 'Johnson')
-> );
```

Result:

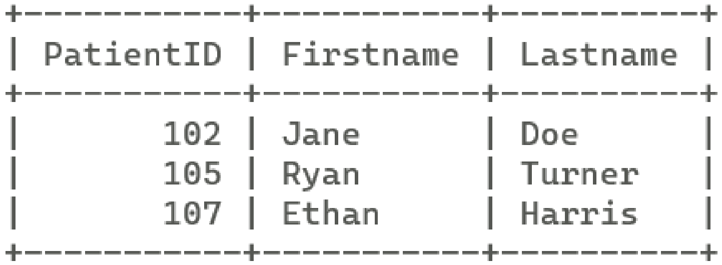


```
+-----------+-----------+----------+---------------+
| PatientID | Firstname | Lastname | ContactNumber |
+-----------+-----------+----------+---------------+
|       101 | John      | Smith    |    1234567890 |
|       107 | Ethan     | Harris   |    6665554444 |
+-----------+-----------+----------+---------------+
```

2. **List the patients who have an unpaid bill for their admission.**

```
-> SELECT P.PatientID, P.Firstname, P.Lastname
-> FROM Patients P
-> WHERE P.PatientID IN (SELECT A.PatientID FROM Admissions A
-> INNER JOIN Billing B ON A.AdmissionID = B.AdmissionID
-> WHERE B.PaymentStatus = 'Pending');
```

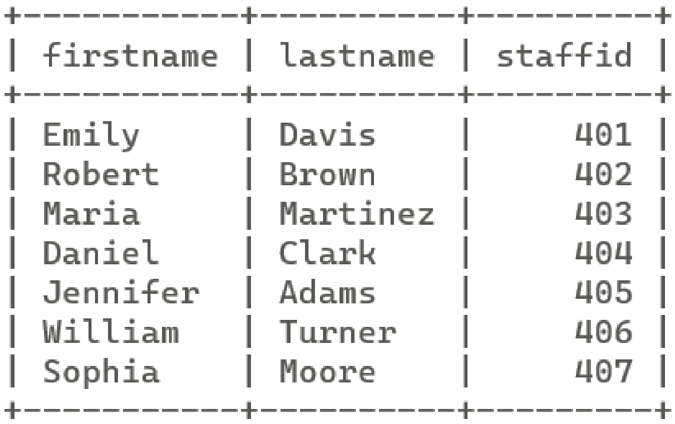
Result:



```
+-----------+-----------+----------+
| PatientID | Firstname | Lastname |
+-----------+-----------+----------+
|       102 | Jane      | Doe      |
|       105 | Ryan      | Turner   |
|       107 | Ethan     | Harris   |
+-----------+-----------+----------+
```

3. **List the names of staff members assigned to rooms.**

-> SELECT FirstName, LastName , StaffID FROM Staff
-> WHERE StaffID IN (SELECT DISTINCT StaffID FROM Rooms);

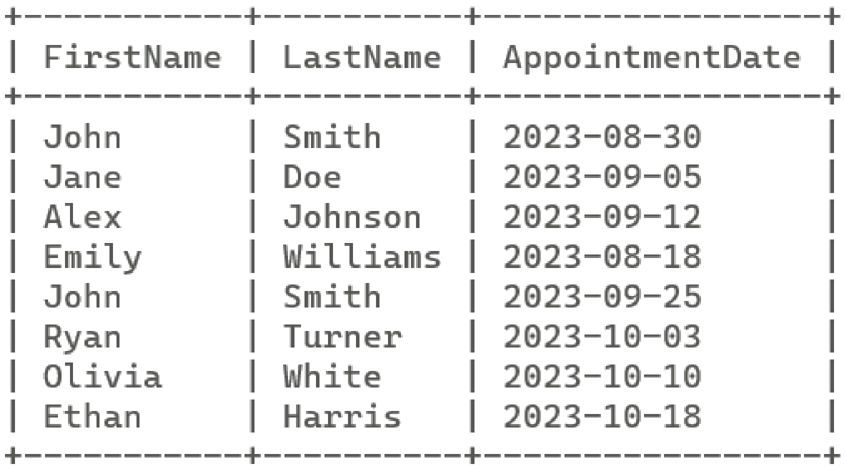


```
+-----------+----------+---------+
| firstname | lastname | staffid |
+-----------+----------+---------+
| Emily     | Davis    |     401 |
| Robert    | Brown    |     402 |
| Maria     | Martinez |     403 |
| Daniel    | Clark    |     404 |
| Jennifer  | Adams    |     405 |
| William   | Turner   |     406 |
| Sophia    | Moore    |     407 |
+-----------+----------+---------+
```

6. Joins:

1. **List the patients and their appointments. Include patient names and appointment dates.**

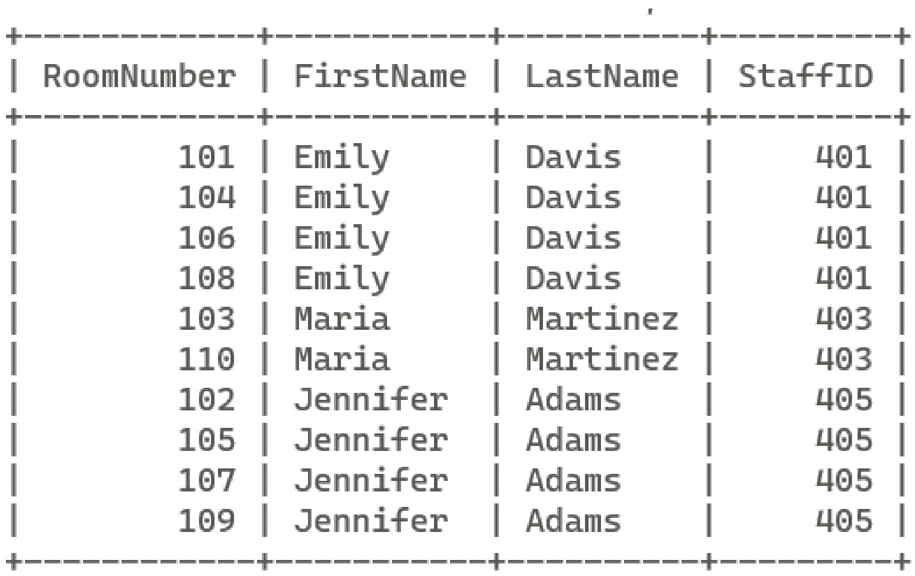
-> SELECT P.FirstName, P.LastName, A.AppointmentDate FROM Patients P
-> INNER JOIN Appointments A ON P.PatientID = A.PatientID;



```
+-----------+----------+-----------------+
| FirstName | LastName | AppointmentDate |
+-----------+----------+-----------------+
| John      | Smith    | 2023-08-30      |
| Jane      | Doe      | 2023-09-05      |
| Alex      | Johnson  | 2023-09-12      |
| Emily     | Williams | 2023-08-18      |
| John      | Smith    | 2023-09-25      |
| Ryan      | Turner   | 2023-10-03      |
| Olivia    | White    | 2023-10-10      |
| Ethan     | Harris   | 2023-10-18      |
+-----------+----------+-----------------+
```

2. **List the staff members and the rooms they are assigned to. Include staff names and room numbers.**

   -> SELECT R.RoomNumber, S.FirstName, S.LastName, S.StaffID FROM Rooms R
   -> INNER JOIN Staff S ON R.staffid = S.staffID
   -> WHERE S.Position = 'Nurse';



```
+------------+-----------+----------+---------+
| RoomNumber | FirstName | LastName | StaffID |
+------------+-----------+----------+---------+
|        101 | Emily     | Davis    |     401 |
|        104 | Emily     | Davis    |     401 |
|        106 | Emily     | Davis    |     401 |
|        108 | Emily     | Davis    |     401 |
|        103 | Maria     | Martinez |     403 |
|        110 | Maria     | Martinez |     403 |
|        102 | Jennifer  | Adams    |     405 |
|        105 | Jennifer  | Adams    |     405 |
|        107 | Jennifer  | Adams    |     405 |
|        109 | Jennifer  | Adams    |     405 |
+------------+-----------+----------+---------+
```