**Database Systems**

**Project**

**Hospital Management System**

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**Project**

Design the database for Hospital Management System.

Note: It should store patient records, including demographics, medical history, diagnoses, medications, and test results. It should also manage appointments, scheduling, and billing information.

1. Design the Data model by applying all three normal forms.

**Tables**

1. Patient
2. Appointment
3. Doctor
4. Diagnosis
5. Medication
6. TestResult
7. Billing

**Relationships**

1. **Patient-Appointment Relationship**:

* One patient can have multiple appointments.
* One appointment is associated with one patient.
* Foreign Key: PatientID in Appointment table

1. **Appointment-Doctor Relationship:**

* One appointment is associated with one doctor.
* One doctor can have multiple appointments.
* Foreign Key: DoctorID in Appointment table.

1. **Diagnosis-Doctor-Patient Relationship:**

* One diagnosis is associated with one patient and one doctor.
* One patient can have multiple diagnoses.
* One doctor can provide multiple diagnoses.
* Foreign Keys: PatientID and DoctorID in Diagnosis table.

1. **Medication-Doctor-Patient Relationship:**

* One medication record is associated with one patient and one doctor.
* One patient can have multiple medications.
* One doctor can prescribe multiple medications.
* Foreign Keys: PatientID and DoctorID in Medication table.

1. **TestResult-Patient Relationship:**

* One test result is associated with one patient.
* One patient can have multiple test results.
* Foreign Key: PatientID in TestResult table.

1. **Billing-Doctor-Patient-Appointment Relationship:**

* One billing record is associated with one patient, one doctor, and one appointment.
* One patient can have multiple billing records.
* One doctor can generate multiple billing records.
* One appointment can have one billing record.
* Foreign Keys: PatientID, DoctorID, and AppointmentID in Billing table.

**QUERIES**

1. Count the number of completed appointments.
2. Show doctors and their respective specializations.
3. Retrieve patient details for a specific appointment.
4. List all appointments along with corresponding doctor details.
5. Find patients with their diagnosis details.
6. Retrieve medication details for a specific patient.
7. List test results along with patient names.
8. Show billing details for a specific patient.
9. Show billing details for appointments that are unpaid.
10. Find patients with a specific diagnosis.
11. Show billing details for appointments that are unpaid
12. List all medications prescribed by a specific doctor.
13. Find patients with a specific diagnosis.

**IMPLEMENTATION**

-- Create Patient table

DROPTABLE Patient;

CREATETABLE Patient(

PatientIDINTPRIMARYKEY,

FirstName VARCHAR(50),

LastName VARCHAR(50),

DateOfBirthDATE,

Gender VARCHAR(10),

ContactNumberVARCHAR(15),

AddressVARCHAR(100)

);

-- Insert data into Patient table

INSERTINTO Patient(PatientID,FirstName,LastName,DateOfBirth, Gender,ContactNumber,Address)

VALUES

(1,'Muaaz','Hussan','1990-05-15','Male','123-456-7890','123 Main St'),

(2,'Mehwish','Nasir','1985-08-20','Female','987-654-3210','456 Mr St'),

(3,'Aatiqa','Sadiq','1992-02-10','Female','555-123-4567','789 Jr St');

-- Create Doctor table

DROPTABLE Doctor;

CREATETABLE Doctor(

DoctorIDINTPRIMARYKEY,

FirstName VARCHAR(50),

LastName VARCHAR(50),

Specialization VARCHAR(50),

ContactNumberVARCHAR(15),

Email VARCHAR(50)

);

INSERTINTO Doctor(DoctorID,FirstName,LastName, Specialization,ContactNumber, Email)

VALUES

(1,'Dr. Ali','Hussan','Cardiologist','555-888-7777','ali@example.com'),

(2,'Dr. Abdul','Ahad','Orthopedic Surgeon','555-999-6666','ahad@example.com'),

(3,'Dr. Dua','Nasir','Pediatrician','555-777-8888','dua@example.com');

-- Create Appointment table

DROPTABLE Appointment

CREATETABLE Appointment(

AppointmentIDINTPRIMARYKEY,

PatientIDINT,

DoctorIDINT,

AppointmentDateDATETIME,

Reason VARCHAR(255),

StatusVARCHAR(20),

FOREIGNKEY (PatientID)REFERENCESPatient(PatientID),

FOREIGNKEY (DoctorID)REFERENCESDoctor(DoctorID)

);

-- Insert data into Appointment table

INSERTINTO Appointment(AppointmentID,PatientID,DoctorID,AppointmentDate, Reason,Status)

VALUES

(101, 1, 1,'2023-01-15 10:00:00','Regular Checkup','Scheduled'),

(102, 2, 2,'2023-02-20 14:30:00','Knee Pain','Completed'),

(103, 3, 3,'2023-03-05 09:45:00','Child Vaccination','Scheduled');

-- Create Diagnosis table

DROPTABLE Diagnosis;

CREATETABLE Diagnosis(

DiagnosisIDINTPRIMARYKEY,

PatientIDINT,

DoctorIDINT,

DiagnosisDateDATETIME,

DescriptionVARCHAR(255),

FOREIGNKEY (PatientID)REFERENCESPatient(PatientID),

FOREIGNKEY (DoctorID)REFERENCESDoctor(DoctorID)

);

INSERTINTO Diagnosis(DiagnosisID,PatientID,DoctorID,DiagnosisDate,Description)

VALUES

(201, 1, 1,'2023-01-20','Healthy'),

(202, 2, 2,'2023-02-25','Strained Ligament'),

(203, 3, 3,'2023-03-10','Normal');

-- Create Medication table

DROPTABLE Medication;

CREATETABLE Medication(

MedicationIDINTPRIMARYKEY,

PatientIDINT,

DoctorIDINT,

MedicationNameVARCHAR(50),

Dosage VARCHAR(50),

Frequency VARCHAR(50),

StartDate DATE,

EndDateDATE,

FOREIGNKEY (PatientID)REFERENCESPatient(PatientID),

FOREIGNKEY (DoctorID)REFERENCESDoctor(DoctorID)

);

INSERTINTO Medication(MedicationID,PatientID,DoctorID,MedicationName, Dosage, Frequency,StartDate,EndDate)

VALUES

(301, 1, 1,'Aspirin','1 tablet','Once a day','2023-01-20','2023-01-27'),

(302, 2, 2,'Ibuprofen','1 tablet','Twice a day','2023-02-25','2023-03-10'),

(303, 3, 3,'Multivitamin','1 tablet','Once a day','2023-03-10','2023-03-17');

-- Create TestResult table

DROPTABLETestResult;

CREATETABLETestResult(

TestResultIDINTPRIMARYKEY,

PatientIDINT,

TestDateDATETIME,

TestNameVARCHAR(50),

Result VARCHAR(255),

FOREIGNKEY (PatientID)REFERENCESPatient(PatientID)

);

INSERTINTOTestResult(TestResultID,PatientID,TestDate,TestName, Result)

VALUES

(401, 1,'2023-01-25','Blood Pressure','120/80'),

(402, 2,'2023-03-01','X-Ray','Normal'),

(403, 3,'2023-03-15','Blood Test','Healthy');

-- Create Billing table

DROPTABLE Billing;

CREATETABLE Billing(

BillingIDINTPRIMARYKEY,

PatientIDINT,

DoctorIDINT,

AppointmentIDINT,

BillingDateDATETIME,

TotalAmountDECIMAL(10, 2),

PaymentStatusVARCHAR(20),

FOREIGNKEY (PatientID)REFERENCESPatient(PatientID),

FOREIGNKEY (DoctorID)REFERENCESDoctor(DoctorID),

FOREIGNKEY (AppointmentID)REFERENCESAppointment(AppointmentID)

);

-- Insert data into Billing table

INSERTINTO Billing(BillingID,PatientID,DoctorID,AppointmentID,BillingDate,TotalAmount,PaymentStatus)

VALUES

(501, 1, 1, 101,'2023-01-15', 150.00,'Paid'),

(502, 2, 2, 102,'2023-02-20', 200.00,'Paid'),

(503, 3, 3, 103,'2023-03-05', 100.00,'Unpaid');

SELECT\*FROM Patient;

SELECT\*FROM Doctor;

SELECT\*FROM Appointment;

SELECT\*FROM Diagnosis;

SELECT\*FROM Medication;

SELECT\*FROMTestResult;

SELECT\*FROM Billing;

-- Count the number of completed appointments

SELECTCOUNT(\*)ASNumberOfReturns

FROM Appointment

WHEREStatus='Completed';

--Show doctors and their respective specializations:

SELECTDoctor.FirstName,Doctor.LastName,Doctor.Specialization

FROM Doctor;

--Retrieve patient details for a specific appointment:

SELECT patient.\*,a.AppointmentDate,a.Reason,a.Status

FROM Patient

JOIN Appointment a ONpatient.PatientID=a.PatientID

WHEREa.AppointmentID= 101;

--List all appointments along with corresponding doctor details:

SELECT Appointment.\*,Doctor.FirstNameASDoctorFirstName,Doctor.LastNameASDoctorLastName,Doctor.Specialization

FROM Appointment

JOINDoctor ONAppointment.DoctorID=Doctor.DoctorID;

--Find patients with their diagnosis details:

SELECT Patient.\*,Diagnosis.DiagnosisDate,Diagnosis.Description

FROM Patient

LEFTJOIN Diagnosis ONPatient.PatientID=Diagnosis.PatientID;

--Retrieve medication details for a specific patient:

SELECT Medication.\*,Doctor.FirstNameASDoctorFirstName,Doctor.LastNameASDoctorLastName

FROM Medication

JOIN Doctor ONMedication.DoctorID=Doctor.DoctorID

WHEREMedication.PatientID= 1;

--List test results along with patient names:

SELECTTestResult.\*,Patient.FirstNameASPatientFirstName,Patient.LastNameASPatientLastName

FROMTestResult

JOIN Patient ONTestResult.PatientID=Patient.PatientID;

--Show billing details for a specific patient:

SELECT Billing.\*,Patient.FirstNameASPatientFirstName,Patient.LastNameASPatientLastName

FROM Billing

JOIN Patient ONBilling.PatientID=Patient.PatientID

WHEREBilling.PatientID= 1;

--Show billing details for appointments that are unpaid:

SELECT Billing.\*,Patient.FirstNameASPatientFirstName,Patient.LastNameASPatientLastName

FROM Billing

JOIN Patient ONBilling.PatientID=Patient.PatientID

WHEREBilling.PaymentStatus='Unpaid';

--Find patients with a specific diagnosis:

SELECT Patient.\*,Diagnosis.DiagnosisDate,Diagnosis.Description

FROM Patient

JOIN Diagnosis ONPatient.PatientID=Diagnosis.PatientID

WHEREDiagnosis.Description='Strained Ligament';

--Show billing details for appointments that are unpaid:

SELECT Billing.\*,Patient.FirstNameASPatientFirstName,Patient.LastNameASPatientLastName

FROM Billing

JOIN Patient ONBilling.PatientID=Patient.PatientID

WHEREBilling.PaymentStatus='Unpaid';

--List all medications prescribed by a specific doctor:

SELECT Medication.\*,Patient.FirstNameASPatientFirstName,Patient.LastNameASPatientLastName

FROM Medication

JOIN Patient ONMedication.PatientID=Patient.PatientID

WHEREMedication.DoctorID= 1;

--Find patients with a specific diagnosis:

SELECT Patient.\*,Diagnosis.DiagnosisDate,Diagnosis.Description

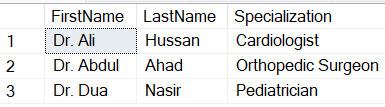
FROM Patient

JOIN Diagnosis ONPatient.PatientID=Diagnosis.PatientID

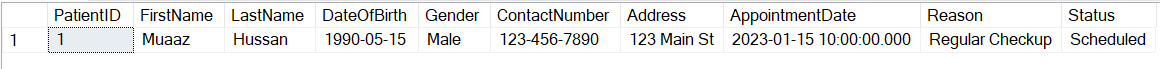
WHEREDiagnosis.Description='Strained Ligament';

**OUTPUTS**

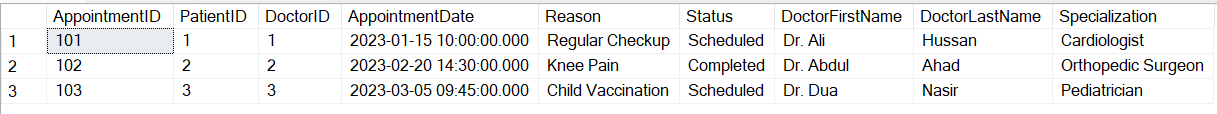
QUERY #1: QUERY #2:

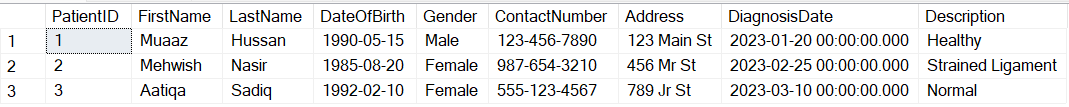
QUERY #3:



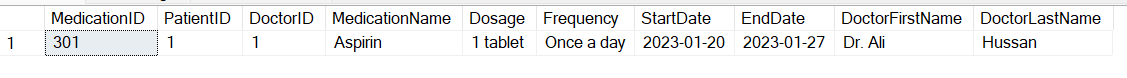
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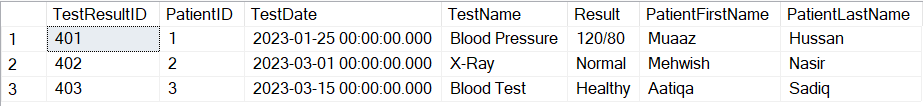


QUERY #5:



QUERY #6:

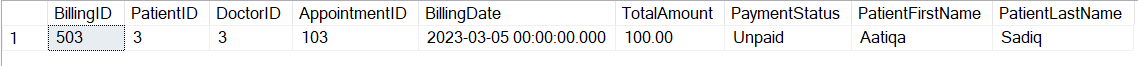
QUERY #7:



QUERY #8:



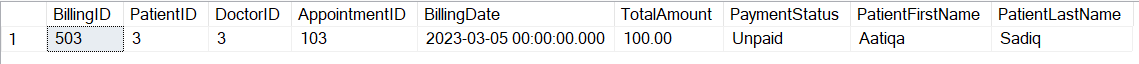
QUERY #9:



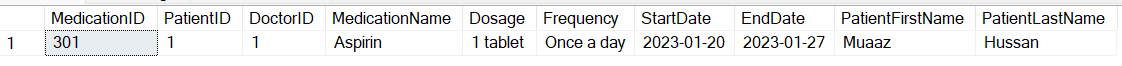
QUERY #10:



QUERY #11:



QUERY #12:



QUERY #13:



**SCHEMA MODEL**

|  |
| --- |
| **Patient** |
| PatientID (PK) |
| FirstName |
| LastName |
| DateOfBirth |
| Gender |
| ContactNumber |
| Address |

|  |
| --- |
| **Doctor** |
| DoctorID (PK) |
| FirstName |
| LastName |
| Specialization |
| ContactNumber |
| Email |

|  |
| --- |
| **Appointment** |
| AppointmentID (PK) |
| PatientID (FK) |
| DoctorID (FK) |
| AppointmentDate |
| Reason |
| Status |

|  |
| --- |
| **Billing** |
| BillingID (PK) |
| PatientID (FK) |
| DoctorID (FK) |
| AppointmentID (FK) |
| TotalAmount |
| PaymentStatus |

|  |
| --- |
| **Diagnosis** |
| DiagnosisID (PK) |
| PatientID (FK) |
| DoctorID (FK) |
| DiagnosisDate |
| Description |

|  |
| --- |
| **TestResult** |
| TestResultID (PK) |
| PatientID (FK) |
| TestDate |
| TestName |
| Result |

|  |
| --- |
| **Medication** |
| MedicationID (PK) |
| PatientID (FK) |
| DoctorID (FK) |
| MedicationName |
| Dosage |
| Frequency |
| StartDate |
| EndDate |