Group 4: Hospibrosis

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Hospital Database

Our Database System

Our Hospital Database Management System is intended to store, track, and manage:

- Patient Information
- Physicians and Nurses
- Departments and Rooms
- Appointments and Medical Procedures
- Prescriptions and Medications
- In-patient stays and Billing

Main Goal: Ensure accurate medical records, efficient hospital operations, and data consistency.

Possible Usages for our Database

Organizations that can use our database

- Hospitals
- Clinics
- Urgent Care Centers
- Private Medical Practices
- Rehab Centers

Possible Use Cases:

- Patient receptionists can schedule appointments for patients
- Managers can assign nurses to appointments for each of their shifts
- Administrators can manage patient stays and room assignments
- Tracking procedures performed
- Authorized staff can track and see each patient’s medication prescriptions
- Patient receptionists can create accurate bills for patients

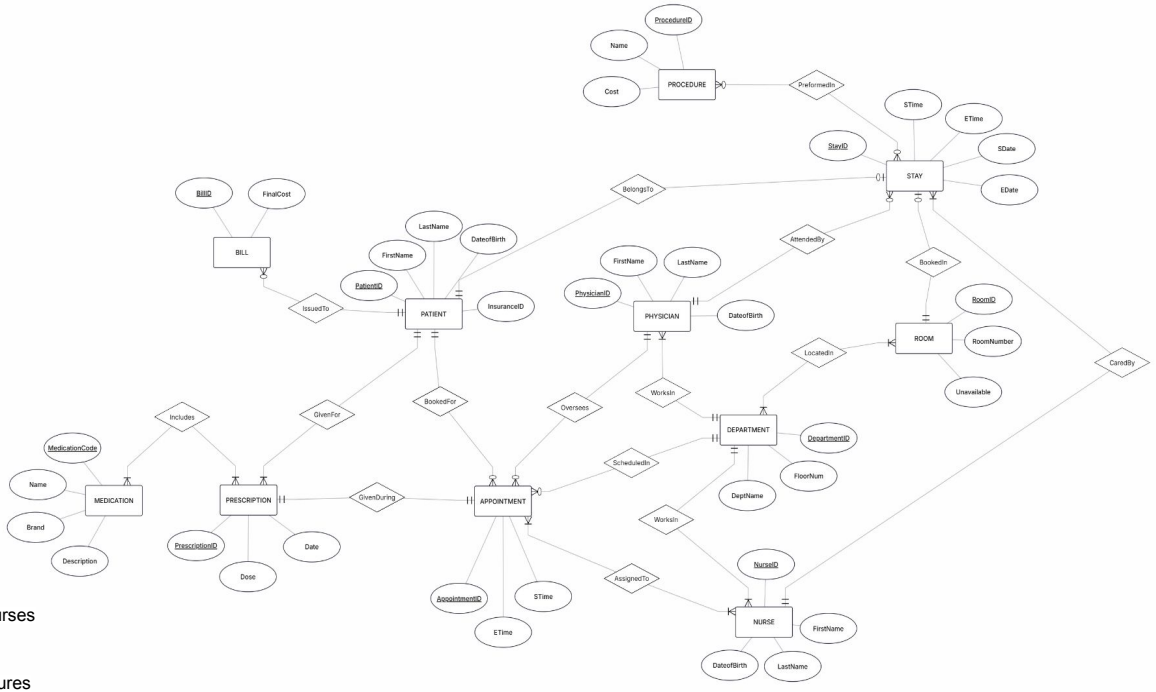
Entity Relationship Diagram

Core Entities in the ERD

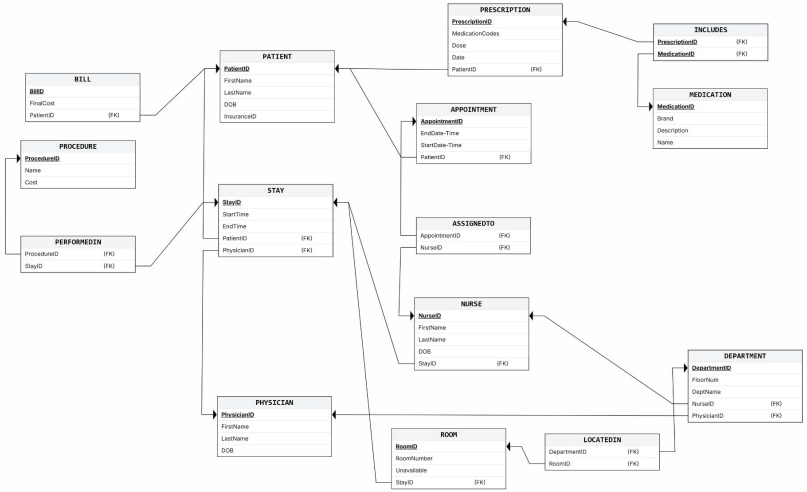
- Patient – ID, name, DOB, insurance
- Department – ID, name, floor
- Physician – ID, name, DOB
- Nurse – ID, name, DOB
- Room – ID, room number, availability
- Appointment – ID, start & end time
- Medication – code, name, brand, description
- Prescription – ID, date, dose
- Procedure – ID, name, cost
- Stay – ID, start & end time
- Bill – ID, final cost

Key Relationships

- Departments → physicians, nurses, rooms
- Appointments → patient + physician + department + nurses
- Prescriptions → patient + appointment + medications
- Stays → patient + room + physician + nurses + procedures



Relational Database Schema Model



Main Entities:

Patient and Stay

Many to Many relationships (Bridge tables):

- Procedure performed in Stay (FK: ProcedureID and StayID)
- Prescription includes Medication (FK: PrescriptionID and MedicationID)
- Nurses assigned to Appointment (FK: AppointmentID and NurseID)
- Room located in Department (FK: RoomID and DepartmentID)

Index Strategy

```
CREATE INDEX idx_patient_lastname ON Patient(LastName);
CREATE INDEX idx_physician_lastname ON Physician(LastName);
CREATE INDEX idx_nurse_lastname ON Nurse(LastName);
```

Reasonings For these indexes

- Last-name searches are extremely common in a hospital environment when looking up a patient or staff
- Increases the speed of appointment lookups, patient check-ins, staff assignments, and prescription searches
- Reduces query execution time

Use Case 1 - Tracking Patient Appointments

The system can:

- Create and manage all patient appointments
- Assign appoints to a primary physician
- Assign nurses to an appointment
- Track start and end times for appointments

Use Case 2 - Tracking Procedures, Stays, and Billing

This system medication prescriptions:

- Patient checks in and gets assigned a physician
- Physician performs a procedure on patient
- Patient is assigned a room for a hospital stay
- Patient is prescribed a medicine
- Final bill is generated upon release from stay

Two summary queries with JOIN and their query results

```sql
/*Selecting Appointments for each patient*/
SELECT
    a.AppointmentID,
    p.FirstName || ' ' || p.LastName AS PatientName,
    phy.FirstName || ' ' || phy.LastName AS PhysicianName,
    n.FirstName || ' ' || n.LastName AS NurseName,
    a.StartTime,
    a.EndTime
FROM Appointment a
JOIN Patient p
    ON a.PatientID = p.PatientID
JOIN Physician phy
    ON a.PhysicianID = phy.PhysicianID
LEFT JOIN AssignedTo at
    ON a.AppointmentID = at.AppointmentID
LEFT JOIN Nurse n
    ON at.NurseID = n.NurseID
ORDER BY a.StartTime;
```

```sql
/*Selecting procedures and cost for each patient*/
SELECT
    p.PatientID,
    p.FirstName || ' ' || p.LastName AS PatientName,
    pr.ProcedureID,
    pr.Name AS ProcedureName,
    pr.Cost,
    s.StayID,
    s.StartTime AS StayStart,
    s.EndTime AS StayEnd
FROM Procedure_proj pr
JOIN PerformedIn pi
    ON pr.ProcedureID = pi.ProcedureID
JOIN Stay s
    ON pi.StayID = s.StayID
JOIN Patient p
    ON s.PatientID = p.PatientID
ORDER BY p.PatientID, s.StayID, pr.ProcedureID;
```

	PATIENTID	PATIENTNAME	PROCEDUREID	PROCEDURENAME	COST	STAYID	STAYSTART	STAYEND
1	1	Dom Monde	1	MRI Scan	3200	1	11-DEC-24 08.00.00.000000000 AM	12-DEC-24 08.00.00.000000000 AM
2	2	Linda Kerrigan	2	CMP Testing	200	2	10-JAN-25 09.00.00.000000000 AM	11-JAN-25 09.00.00.000000000 AM

	APPOINTMENTID	PATIENTNAME	PHYSICIANNAME	NURSENAME	STARTTIME	ENDTIME
1	2	Linda Kerrigan	Meredith Grey	Sam Harper	11-OCT-25 02.00.00.000000000 PM	11-JAN-24 02.45.00.000000000 PM
2	1	Dom Monde	Gregory House	Nina Keller	10-NOV-25 10.00.00.000000000 AM	10-JAN-24 10.30.00.000000000 AM

Thank you for listening

The End

Good Bye