**HOSPITAL MANAGEMENT SYSTEM\_DATA BASE:**

PROBLEM STATEMENT:

To create a comprehensive **Hospital Management System (HMS)** database, we need to design tables that cover a wide range of real-world scenarios. The schema will also ensure relationships between tables using **foreign keys**, helping you understand **Relational Database Management System (RDBMS)** concepts like **primary keys, foreign keys, joins**, and **normalization**.

**Comprehensive List of Tables**

Here’s the list of tables with their purposes:

**1. patients**

Stores details about patients.

* **Columns:**
  + id (Primary Key)
  + first\_name
  + last\_name
  + dob (Date of Birth)
  + gender
  + address
  + phone\_number
  + email (Unique)
  + emergency\_contact
  + created\_at
  + updated\_at

**2. doctors**

Stores information about doctors.

* **Columns:**
  + id (Primary Key)
  + first\_name
  + last\_name
  + specialization
  + department\_id (Foreign Key to departments.id)
  + phone\_number
  + email
  + availability (e.g., "9 AM - 5 PM")
  + created\_at
  + updated\_at

**3. departments**

Stores details about hospital departments.

* **Columns:**
  + id (Primary Key)
  + name (e.g., "Cardiology", "Neurology")
  + floor
  + created\_at
  + updated\_at

**4. appointments**

Stores appointment data linking patients to doctors.

* **Columns:**
  + id (Primary Key)
  + patient\_id (Foreign Key to patients.id)
  + doctor\_id (Foreign Key to doctors.id)
  + appointment\_date
  + status (e.g., "Scheduled", "Completed", "Cancelled")
  + created\_at
  + updated\_at

**5. bills**

Stores billing information.

* **Columns:**
  + id (Primary Key)
  + patient\_id (Foreign Key to patients.id)
  + amount
  + payment\_status (e.g., "Pending", "Paid")
  + bill\_date
  + created\_at
  + updated\_at

**6. medical\_records**

Stores medical history and treatments for patients.

* **Columns:**
  + id (Primary Key)
  + patient\_id (Foreign Key to patients.id)
  + doctor\_id (Foreign Key to doctors.id)
  + diagnosis
  + treatment
  + prescription
  + record\_date
  + created\_at
  + updated\_at

**7. prescriptions**

Stores detailed prescription data.

* **Columns:**
  + id (Primary Key)
  + medical\_record\_id (Foreign Key to medical\_records.id)
  + medicine\_name
  + dosage
  + frequency (e.g., "2 times a day")
  + duration (e.g., "7 days")
  + created\_at
  + updated\_at

**8. pharmacy**

Stores pharmacy inventory.

* **Columns:**
  + id (Primary Key)
  + medicine\_name
  + quantity
  + price\_per\_unit
  + supplier\_name
  + expiry\_date
  + created\_at
  + updated\_at

**9. staff**

Stores information about hospital staff (nurses, receptionists, etc.).

* **Columns:**
  + id (Primary Key)
  + first\_name
  + last\_name
  + role (e.g., "Nurse", "Receptionist", etc.)
  + department\_id (Foreign Key to departments.id)
  + phone\_number
  + email
  + created\_at
  + updated\_at

**10. rooms**

Stores details about hospital rooms.

* **Columns:**
  + id (Primary Key)
  + room\_number
  + room\_type (e.g., "General", "ICU", "Private")
  + floor
  + status (e.g., "Available", "Occupied")
  + created\_at
  + updated\_at

**11. admissions**

Tracks patient admissions to hospital rooms.

* **Columns:**
  + id (Primary Key)
  + patient\_id (Foreign Key to patients.id)
  + room\_id (Foreign Key to rooms.id)
  + admission\_date
  + discharge\_date
  + created\_at
  + updated\_at

**12. lab\_tests**

Stores lab tests offered by the hospital.

* **Columns:**
  + id (Primary Key)
  + test\_name
  + description
  + cost
  + created\_at
  + updated\_at

**13. lab\_results**

Stores patient lab test results.

* **Columns:**
  + id (Primary Key)
  + patient\_id (Foreign Key to patients.id)
  + test\_id (Foreign Key to lab\_tests.id)
  + doctor\_id (Foreign Key to doctors.id)
  + result\_details
  + test\_date
  + created\_at
  + updated\_at

**14. users**

Stores login credentials for all users in the system.

* **Columns:**
  + id (Primary Key)
  + username (Unique)
  + password\_hash
  + role (e.g., "Admin", "Doctor", "Patient", "Staff")
  + created\_at
  + updated\_at

**15.Diseases**

**Columns:**

* **id (Primary Key)**
* **patient\_id (Foreign Key to patients.id)**
* **doctor\_id (Foreign Key to doctors.id)**
* **disease\_name (e.g., "Diabetes", "Hypertension")**
* **diagnosis\_date (Date of diagnosis)**
* **status (e.g., "Active", "Recovered")**
* **created\_at**
* **updated\_at**

**Relationships Between Tables (Foreign Keys)**

* **patients ↔ appointments ↔ doctors**: Patients book appointments with doctors.
* **patients ↔ medical\_records ↔ doctors**: Doctors create medical records for patients.
* **medical\_records ↔ prescriptions**: Medical records reference prescriptions.
* **patients ↔ bills**: Patients have associated bills.
* **patients ↔ admissions ↔ rooms**: Patients are admitted to rooms.
* **lab\_tests ↔ lab\_results ↔ patients ↔ doctors**: Lab results reference tests, patients, and doctors.
* **departments ↔ doctors, staff**: Departments group doctors and staff.
* **users**: Tracks all user credentials for the system.

LIST OF THINGS TO DO ON THE DATA BASE:

* **Insert Sample Data**
* **Validate Relationships**
* **Perform Queries**
* **Build Stored Procedures and Triggers (Optional)**
* **Develop Application Logic**
* **Testing**

Order of filling the tables

**1. Departments**

No dependencies. Fill this table first.

**2. Rooms**

Depends only on Departments (if floor assignment is based on departments).

**3. Patients**

No dependencies. Can be filled independently.

**4. Doctors**

Depends on Departments (via department\_id).

**5. Staff**

Depends on Departments (via department\_id).

**6. Lab Tests**

No dependencies. Can be filled anytime.

**7. Pharmacy**

No dependencies. Can be filled anytime.

**8. Users**

No dependencies. Can be filled anytime.

**9. Medical Records**

Depends on Patients and Doctors.

**10. Prescriptions**

Depends on Medical Records.

**11. Appointments**

Depends on Patients and Doctors.

**12. Bills**

Depends on Patients.

**13. Lab Results**

Depends on Lab Tests, Patients, and Doctors.

**14. Admissions**

Depends on Patients and Rooms.

**15.Disease**

Depends on patients and doctor

DATA USED TO POPULATE THE DATABASE:

DEPARTMENTS:

| **id** | **name** | **floor** | **created\_at** | **updated\_at** |
| --- | --- | --- | --- | --- |
| 1 | Cardiology | 2 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 2 | Neurology | 3 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 3 | Orthopedics | 4 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 4 | Pediatrics | 1 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 5 | General Surgery | 5 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 6 | Emergency Medicine | 0 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 7 | Oncology | 6 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 8 | Radiology | -1 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 9 | Obstetrics and Gynecology | 2 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 10 | Dermatology | 3 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 11 | ENT (Ear, Nose, Throat) | 4 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 12 | Urology | 5 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 13 | Psychiatry | 7 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 14 | Gastroenterology | 6 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 15 | Ophthalmology | 1 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 16 | Nephrology | 5 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 17 | Pathology | -1 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 18 | Anesthesiology | 0 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 19 | Physiotherapy | 2 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |
| 20 | Dentistry | 1 | CURRENT\_TIMESTAMP | CURRENT\_TIMESTAMP |

**ROOMS:**

INSERT INTO rooms (id, room\_number, room\_type, floor, status, created\_at, updated\_at)

VALUES

(1, 101, 'General', 1, 'Available', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(2, 102, 'General', 1, 'Occupied', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(3, 201, 'Private', 2, 'Available', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(4, 202, 'ICU', 2, 'Occupied', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(5, 301, 'Private', 3, 'Available', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(6, 302, 'ICU', 3, 'Occupied', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(7, 401, 'General', 4, 'Available', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(8, 402, 'Private', 4, 'Occupied', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(9, 501, 'ICU', 5, 'Available', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(10, 502, 'General', 5, 'Occupied', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP);

**PATIENTS AND DOCTORS FROM EXCEL FILE:**

**Sql query for lab test:**

INSERT INTO lab\_tests (id, test\_name, description, cost, created\_at, updated\_at)

VALUES

(1, 'Blood Test', 'Basic blood panel', 500, '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 'X-Ray', 'Chest X-Ray', 1500, '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 'MRI', 'Full body MRI scan', 7000, '2024-12-28 10:00:00', '2024-12-28 10:00:00'),

(4, 'ECG', 'Electrocardiogram Test', 1200, '2024-12-28 07:30:00', '2024-12-28 07:30:00'),

(5, 'Covid Test', 'RT-PCR test for Covid-19', 800, '2024-12-28 08:30:00', '2024-12-28 08:30:00');

**Pharmacy:**

INSERT INTO pharmacy (id, medicine\_name, quantity, price\_per\_unit, supplier\_name, expiry\_date, created\_at, updated\_at)

VALUES

(1, 'Paracetamol', 200, 2, 'HealthCare Pharma', '2025-06-30', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 'Amoxicillin', 150, 5, 'MediSupply Ltd.', '2025-03-31', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 'Ibuprofen', 300, 3, 'GoodHealth Inc.', '2025-09-30', '2024-12-28 10:00:00', '2024-12-28 10:00:00'),

(4, 'Insulin', 100, 20, 'DiabeticCare Co.', '2025-12-31', '2024-12-28 07:30:00', '2024-12-28 07:30:00'),

(5, 'Cough Syrup', 120, 7, 'PharmaMedics LLC', '2025-01-31', '2024-12-28 08:30:00', '2024-12-28 08:30:00');

**USERS:**

INSERT INTO users (id, username, password\_hash, role, created\_at, updated\_at)

VALUES

(1, 'admin', '5f4dcc3b5aa765d61d', 'Admin', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 'doctor.jones', 'a4b61598b03d1cd89e', 'Doctor', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 'patient01', '2bb80d537b1da3e38b', 'Patient', '2024-12-28 10:00:00', '2024-12-28 10:00:00'),

(4, 'staff.smith', '3a8f1a37f2c3bdf8c9', 'Staff', '2024-12-28 07:30:00', '2024-12-28 07:30:00'),

(5, 'patient02', '1d7355c5061b2f32d1', 'Patient', '2024-12-28 08:30:00', '2024-12-28 08:30:00');

**MEDICAL RECORDS:**

INSERT INTO medical\_records (id, patient\_id, doctor\_id, diagnosis, treatment, prescription, record\_date, created\_at, updated\_at)

VALUES

(1, 1, 2, 'Hypertension', 'Lifestyle Change', 'Amlodipine', '2024-12-25', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 3, 4, 'Diabetes Type 2', 'Insulin Therapy', 'Insulin', '2024-12-24', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 5, 2, 'Seasonal Allergies', 'Antihistamines', 'Loratadine', '2024-12-26', '2024-12-28 10:00:00', '2024-12-28 10:00:00');

**APPOINTMENTS:**

INSERT INTO appointments (id, patient\_id, doctor\_id, appointment\_date, status, created\_at, updated\_at)

VALUES

(1, 1, 2, '2024-12-30', 'Scheduled', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 3, 4, '2024-12-31', 'Completed', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 5, 2, '2025-01-02', 'Cancelled', '2024-12-28 10:00:00', '2024-12-28 10:00:00');

**PREDCRIPTIONS:**

INSERT INTO prescriptions (id, medical\_record\_id, medicine\_name, dosage, frequency, duration, created\_at, updated\_at)

VALUES

(1, 1, 'Amlodipine', '10mg', '1 time a day', '30 days', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 2, 'Insulin', '15IU', 'Before meals', '14 days', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 3, 'Loratadine', '5mg', '1 time a day', '10 days', '2024-12-28 10:00:00', '2024-12-28 10:00:00');

**BILLS:**

INSERT INTO bills (id, patient\_id, amount, payment\_status, bill\_date, created\_at, updated\_at)

VALUES

(1, 1, 500.00, 'Paid', '2024-12-20', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 2, 1200.00, 'Pending', '2024-12-21', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 3, 300.00, 'Paid', '2024-12-22', '2024-12-28 10:00:00', '2024-12-28 10:00:00');

**LAB\_RESULTS:**

INSERT INTO lab\_results (id, patient\_id, test\_id, doctor\_id, result\_details, test\_date, created\_at, updated\_at)

VALUES

(1, 1, 1, 2, 'Normal blood pressure', '2024-12-20', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 2, 2, 4, 'High glucose levels', '2024-12-21', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 3, 3, 2, 'No significant allergies', '2024-12-22', '2024-12-28 10:00:00', '2024-12-28 10:00:00');

**ADMISSIONS:**

INSERT INTO admissions (id, patient\_id, room\_id, admission\_date, discharge\_date, created\_at, updated\_at)

VALUES

(1, 1, 101, '2024-12-20', '2024-12-22', '2024-12-28 08:00:00', '2024-12-28 08:00:00'),

(2, 2, 102, '2024-12-23', '2024-12-26', '2024-12-28 09:00:00', '2024-12-28 09:00:00'),

(3, 3, 103, '2024-12-25', NULL, '2024-12-28 10:00:00', '2024-12-28 10:00:00');

**DISEASES:**

INSERT INTO disease (patient\_id, doctor\_id, disease\_name, diagnosis\_date, status, created\_at, updated\_at)

VALUES

(1001, 2, 'Diabetes', '2024-01-15', 'Active', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(1002, 3, 'Hypertension', '2024-02-10', 'Active', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(1003, 4, 'Asthma', '2024-03-01', 'Recovered', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(1004, 5, 'Pneumonia', '2024-05-20', 'Active', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(1005, 6, 'Cancer', '2024-06-15', 'Active', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP),

(1006, 7, 'Stroke', '2024-07-10', 'Recovered', CURRENT\_TIMESTAMP, CURRENT\_TIMESTAMP);

