



## Hospital Management System – SQL Database Project

Total points: 100 + 20 bonus

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### Project Objective

This project simulates a **Hospital Management System** using a relational SQL database. In the first part of this project, you will **set up the hospital management database** by defining the structure of each table and the data relationships between tables. In the second part, you will **write queries on this database** to answer questions and gain insights. The data for each table is provided to you in your **project\_data.sql** file.

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### Tables in the Dataset

#### 1. hospitals

- Contains general information about hospitals in the system.
  - **Key Fields:** `hospital_id`, `name`, `address`, `phone`
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#### 2. doctors

- Stores details about doctors and their hospital affiliations.
  - **Key Fields:** `doctor_id`, `name`, `specialty`, `hospital_id`, `email`
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#### 3. patients

- Holds patient demographics and contact information.
  - **Key Fields:** `patient_id`, `name`, `dob`, `address`, `phone`
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#### 4. appointments

- Tracks appointments between patients and doctors.
  - **Key Fields:** `appointment_id`, `patient_id`, `doctor_id`, `appointment_date`, `reason`
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## 5. departments

- Represents medical departments within hospitals.
  - **Key Fields:** `department_id`, `hospital_id`, `name`
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## 6. medications

- Contains the list of available or prescribed medications.
  - **Key Fields:** `medication_id`, `name`, `description`
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## 7. prescriptions

- Links doctors, patients, and medications together.
  - **Key Fields:** `prescription_id`, `patient_id`, `doctor_id`, `medication_id`, `prescribed_date`
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## 8. rooms

- Stores information about rooms assigned to departments.
  - **Key Fields:** `room_id`, `room_no`, `department_id`, `capacity`
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## Part 1: Database Setup and Data Insertion (20 points)

Set up the hospital management database by defining the structure of each table and inserting data into it from your **project\_data** file. A critical part of this phase is **establishing data relationships** through primary keys (PK) and foreign keys (FK), ensuring referential integrity between tables for e.g. linking doctors to hospitals, appointments to patients and doctors, and prescriptions to medications. This prepares the database for advanced querying and data analysis.

### Key tasks:

- Create a new schema for your project and create all tables inside it.
- Write **CREATE TABLE** statements for all the tables keeping the following in mind:
  - Define appropriate data types for each column (e.g. int, text, date).
  - Specify primary keys to uniquely identify records.
  - Add foreign keys to represent relationships between tables.

- Insert data into each table using **INSERT** statements from the **project\_data** file.
  - Validate referential integrity by ensuring foreign keys correctly reference primary keys.
  - Write simple **SELECT** queries to confirm data insertion and relationships.
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## Part 2: SQL Queries to Analyze Hospital Data (80 points)

Write SQL queries to answer the following questions based on the database. These queries will include the use of all covered concepts like filtering, sorting, aggregations, joins, subqueries, Common Table Expressions (CTEs), window functions, and conditional logic using CASE statements.

### Basic (4 points each)

- Show the number of appointments in each month.
- Show room numbers and their capacities in the Neurology department.
- Find the names, phones and appointment\_dates of all patients with appointments in August.
- List all medications that include the keywords pain or infection in the description.
- Find doctors who have not prescribed any medication yet.
- Find the names of patients who have been prescribed more than one medication.

### Advanced (7 points each)

- Rank doctors by number of appointments (within their hospitals).
- List the last 2 appointments for every patient.
- For all the **emergency** appointments, show patient name, date of birth as well as age-group according to the following:
  - 18 or below - Pediatric
  - 19 to 64 - Adult
  - 65 or above - Geriatric
- Out of all the **consultation** appointments with **cardiologists**, break down how many are by pediatric, adult and geriatric patients each (age criteria is the same as above).

- Every medication has a prescription frequency, i.e. the number of times it has been prescribed. Find all medications with the top three prescription frequencies (for example if the top 3 frequencies are 8,7 and 6, then list all medications prescribed these number of times).
  - Show all hospitals with the lowest doctor count.
  - Out of the **cardiology** departments in each hospital, find out which hospital(s)'s cardiology department has the most number of rooms.
  - Find out the difference in days between the appointment dates of returning patients
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## Project Deliverables

- A report containing:
    - SQL scripts for each task. **(100 marks)**
    - Any further insights derived from the data for example: **(Up to 20 bonus marks)**
      - Top hospitals with the most specialists in a particular field (e.g., cardiology)
      - Average room capacity per department or per hospital.
      - The trend of appointments over time (daily/weekly/monthly).
      - Most frequent appointment reasons.
      - Data visualizations using tools like Tableau or Power BI
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