

Hospital Patient Management – SQL Case Study

Background

A multi-specialty hospital collects data on patients, appointments, doctors, billing, and departments.

However, the data is spread across separate tables, and the management team struggles to get a complete picture of daily operations and revenue.

The objective of this project is to use **SQL JOINs** to integrate data and generate useful healthcare analytics.

Business Problem

The hospital wants answers to questions like:

Business Question	Challenge
Which department earns more?	Revenue is spread across multiple tables
Which doctor is most in demand?	Appointment records are separate
How many payments are pending?	Billing is not directly linked
Which patients visit frequently?	Data not aggregated
What is the appointment status trend?	Manual tracking
Management needs a consolidated analytics system.	

Project Objective

Objective Description

- 1 Understand hospital entity relationships
- 2 Connect tables using JOINs
- 3 Perform business analysis using SQL
- 4 Create KPIs

Objective Description

- 5 Present insights
 - 6 Build a real-time SQL project
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Dataset Overview

Table	Description
Patients	Patient demographic details
Doctors	Doctors working in departments
Departments	Medical specialization
Appointments	Patients visit records
Bills	Payment details

ER Diagram (conceptual)

patients (1) ---- (M) appointments (M) ---- doctors (1) ---- departments (1)
appointments (1) ---- (1) bills

SQL Techniques Used

- INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- FULL JOIN
- GROUP BY
- HAVING
- ORDER BY

KPIs Calculated

KPI	Meaning
Total Appointments	Count of visits
Completed Appointments	Success rate
Pending Payments	Bills not cleared
Cancelled Appointments	Wasted slots
Total Revenue	Financial performance
Most Visited Department	Patient traffic
Frequent Patients	Repeat visits

Key Insights

Insight	Business Value
Cardiology has the highest revenue	Allocate more resources
Neurology has the most pending bills	Improve payment follow-ups
Orthopedics completed most appointments	High doctor efficiency
Amit Sharma is a repeat visitor	Improve patient experience

Business Impact

The hospital can now:

- Track revenue per department
- Monitor unpaid invoices
- Evaluate doctor productivity
- Understand patient behaviour

- Improve appointment planning

This leads to improved hospital management and better patient care.

Final Outcome

This SQL project demonstrates:

- Multi-table JOIN queries
 - Healthcare data relationships
 - Business case analysis
 - Domain understanding
 - Real-time analytics using SQL
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Tools Used

- MySQL (primary)
 - Workbench
 - Excel (optional)
 - GitHub
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Built a real-time healthcare analytics SQL system using JOINs across 5 relational tables to analyze revenue, appointments, department performance, and billing insights.

Final Deliverables

- ✓ CSV Dataset
- ✓ SQL Create Tables
- ✓ SQL Insert Data
- ✓ JOIN queries
- ✓ Business queries
- ✓ Insights

- ✓ KPIs
- ✓ README.md