📄 Healthcare Financial & Operational Analytics Dashboard

Case Study Document

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1️⃣ Executive Summary

This project presents an end-to-end Healthcare Analytics solution built using SQL Server and Power BI.

The objective was to design a scalable data model and interactive dashboard to help hospital management monitor:

- Revenue performance
- Admission trends
- Doctor efficiency
- Insurance contribution
- Growth simulation scenarios

The solution integrates a SQL-based star schema with optimized DAX measures to deliver executive-level insights.

2️⃣ Business Problem

Hospital management lacked centralized reporting and visibility into key performance indicators such as:

- Total billing revenue
- Admission growth
- Revenue by city and doctor
- Insurance provider performance
- Length of stay impact

Manual reports were slow and decision-making lacked data clarity.

3️⃣ Data Architecture & Modeling

🔹 Data Source

- Cleaned structured dataset
- Migrated into SQL Server database

🔹 Database Design

- Implemented a Star Schema:

Fact Table:

Fact_Admission

Dimension Tables:

- Dim_Date
- Dim_Doctor
- Dim_City
- Dim_Insurance
- Dim_Medical_Condition
- Dim_Age_Group
- Dim_Stay_Category

🔹 Relationships

- One-to-Many relationships
- Enforced foreign keys at SQL level
- Referential integrity maintained

Architecture Flow:

SQL Server → Power BI Model → Interactive Dashboard

4️⃣ KPI Definitions

🔹 Total Revenue

Sum of Billing Amount across all admissions.

🔹 Total Admissions

Count of unique Admission_ID.

🔹 Revenue Growth %

Year-over-Year percentage change in revenue.

🔹 Admission Growth %

Year-over-Year admission growth rate.

🔹 Revenue Per Day

Average billing per day of hospital stay.

🔹 What-If Scenario

Simulated revenue impact based on projected admission growth percentage.

5️⃣ Dashboard Features

📊 Executive Overview

- KPI summary cards
- Monthly revenue trend
- Admission trend analysis

👨‍⚕️ Operational Analysis

- Top 5 performing doctors
- Revenue by city
- Insurance provider distribution

📈 What-If Simulation

- Admission growth parameter slider
- Projected revenue calculation
- Sensitivity analysis chart

📱 Mobile Optimized Layout

- Custom mobile view designed in Power BI

6 Technical Stack

- Excel
- SQL Server Express
- SQL Server Management Studio
- Power BI Desktop
- DAX
- Data Modeling (Star Schema)
- Tailwind CSS (Portfolio Integration)

7 Key Insights Generated

- Identified top revenue-generating cities
- Measured doctor performance contribution
- Analyzed insurance provider revenue share
- Quantified revenue impact of admission growth scenarios
- Improved clarity in hospital performance tracking

8 Performance & Optimization

- Optimized DAX calculations
- Used single-direction relationships
- Structured model using best practices
- Implemented clean fact-dimension separation

9 Future Improvements

- Add Profit & Cost analysis
- Integrate real-time database updates
- Add forecasting using time-series models
- Deploy using Power BI Service workspace sharing

🔟 Conclusion

This project demonstrates:

- Strong understanding of SQL database design
- Practical experience with star schema modeling
- Advanced DAX measure development
- Executive-level dashboard storytelling
- End-to-end BI solution implementation

The solution reflects industry-ready Business Intelligence capabilities.

🔗 GitHub Repository : https://github.com/kirubanandham18

🔗 Live Dashboard : https://app.powerbi.com/reportEmbed?reportId=44eb5add-fbd8-4c65-ad78-67549d732b77&autoAuth=true&ctid=d4963ce2-af94-4122-95a9-644e8b01624d

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