## **Overview about the Project**

The project focuses on building and analyzing a **Healthcare Database** using **SQL Server** as the backend and **Power BI** for visualization.  
The main goal was to design a structured database, clean and prepare the data, handle relationship issues with SQL joins, and finally extract valuable insights to support decision-making in the healthcare sector.

**2. Data Cleaning and Problems**

During the cleaning stage, several data quality issues were identified:

* **Gender column inconsistency** → data had invalid or missing gender values.
* **Duplicates** → multiple duplicate rows for the same patients.

## **3. Problems of Joins and Solutions**

One of the key challenges was joining the **Expenses table** with other healthcare-related tables (Patients, Appointments, Revenue).

* **Problem**: Mismatched keys and missing foreign keys led to incorrect aggregations and inflated results.
* **Solution**: Standardized keys (Date) and applied the right type of joins (INNER JOIN) based on the business logic, ensuring accurate expense-appointment matching.

## **4. Insights**

**Part 1 – SQL Queries:**

* Revenue
* [Total Revenue]
* [Net Profit]
* [Max and Min Specialty revenue]
* [Revenue by appointment status]
* [Revenue\_by\_specialty]
* [Revenue by Gender]
* Expenses
* [Total expenses]
* [Max and Min expenses type]
* [Expenses of each specialty]
* Appointments
* [Total Appointments]
* [Appointments by Gender]
* [Highest Doctor # of appointments]
* [Highest patient of appointments #]
* [ # of appointments by city]
* [status appointments]

**Part 2 – Power BI Dashboard:**

* Built an interactive dashboard summarizing revenue, expenses, and patient distribution.
* Visualized KPIs for performance monitoring.
* Enabled filtering by specialty, city, and demographics for deeper analysis.

## **5. Recommendations**

Based on the SQL and Power BI insights:

1. Optimize High-Cost Specialties

* Problem:

Certain specialties surgeries show expenses rising faster than revenues.

* Business Solution:
* Negotiate better deals with suppliers & medical equipment vendors.
* Outsource some services or adopt cost-sharing models with partner clinics.
* Launch package-based services to increase revenue predictability.

1. Improve Patient Segmentation & Services

* Problem:

Demographic insights (gender/age distribution) show gaps in targeted services.

* Business Solution:
  + Use discounts for underrepresented groups to increase retention**.**
  + Implement preventive care services to reduce high-cost treatments in the long run.

1. Revenue Growth in Low-Performing Cities

* Problem:

Some cities have a good patient base but generate low revenue.

* Business Solution:
* Open specialized units in those cities based on unmet demand (e.g., pediatrics, diagnostics).