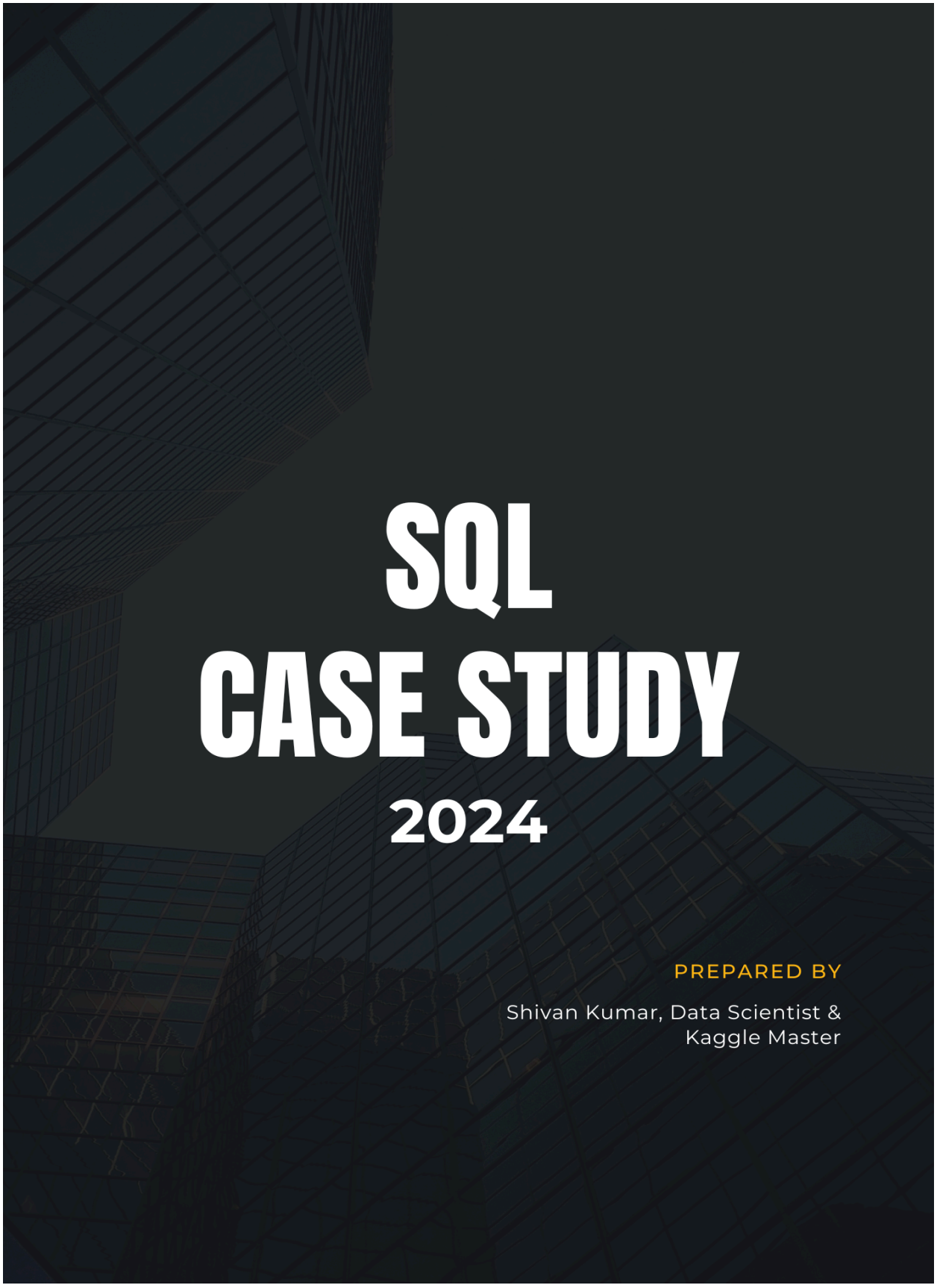

Hospital Patient Management System

Problem Statement:

A hospital wants to implement a Patient Management System to efficiently manage patient records, doctor appointments, treatment history, and hospital performance metrics. The system should allow for the storage of electronic health records (EHR), patient demographics, medical diagnoses, treatment history, and doctor information. Additionally, it should support analysis of patient demographics, disease prevalence, treatment outcomes, and hospital performance metrics.

Solution Overview:

We'll design and implement a relational database system to store patient and doctor information, medical records, and treatment details. We'll utilize SQL queries to perform various analyses such as patient demographics, disease prevalence, treatment outcomes, and hospital performance metrics.

Database Schema:

1. Patients: Stores patient demographics.
2. Doctors: Stores doctor information and specialization.
3. MedicalRecords: Stores medical records, including admission dates, discharge dates, diagnoses, treatments, and associated doctor IDs.

Detailed Data Schema:

Patients Table:

```
patient_id (Primary Key)
patient_name
date_of_birth
gender
address
phone_number
```

Doctors Table:

```
doctor_id (Primary Key)
doctor_name
specialization
department
```

Medical Records Table:

```
record_id (Primary Key)
patient_id (Foreign Key referencing Patients)
admission_date
discharge_date
diagnosis
treatment
doctor_id
```

Dataset Link to download. Click here.

Note: If data doesn't contain some features then try to add some sample data

SQL Analysis

Basic Level Questions:

- Retrieve the names and genders of all patients.
- List the unique diagnoses recorded in the medical records.
- Count the total number of patients in the database.
- Find the oldest patient in the database.
- Display the address and phone number of the patient with ID 7.
- Retrieve the names and specializations of all doctors.
- Calculate the average length of hospital stay for all patients.
- Count the number of male and female patients separately.
- Find the doctor who treated the most patients.
- List all patients whose names start with 'J'.

Medium Level Questions:

- Retrieve the names of patients along with their admission and discharge dates.
- Calculate the total number of medical records in the database.
- List the patients who were diagnosed with hypertension or diabetes.
- Find the average age of patients in the database.
- Display the doctors who treated patients admitted in January 2023.
- Calculate the total number of patients treated by each doctor.
- List the patients who were treated by doctors specializing in Cardiology.
- Find the patient with the longest hospital stay duration.
- Display the top 5 most common diagnoses recorded in the medical records.
- List the patients who were treated by doctors with names starting with 'Dr. S'.

Advanced Level Questions:

- Calculate the percentage of male and female patients in the database.
- Find the patient with the highest number of medical records.
- List the top 3 doctors who treated the most patients.
- Calculate the average length of hospital stay for each diagnosis.
- Rank patients based on the number of medical records they have, from highest to lowest.
- Display the patient who spent the most time in the hospital.
- Calculate the median length of hospital stay for all patients.
- List the patients who were treated by doctors specializing in Cardiology or Pulmonology.
- Find the doctor who treated the most patients diagnosed with Diabetes.
- Calculate the total number of patients treated by each doctor, including those with no patients.
- Identify patients who have been readmitted within 30 days of discharge.
- Calculate the average length of hospital stay by month for the past year.
- List patients who have been admitted to the hospital more than once in the past year.
- Find patients whose total hospital charges exceed a certain threshold.
- Calculate the percentage change in the number of patients admitted each month compared to the previous month.

Final Analysis Questions:

- Count of Male vs. Female Patients.
- Percentage of Male and Female Patients.
- Top 5 Most Common Diagnoses.
- Average Length of Hospital Stay.
- Top 3 Doctors Treating the Most Patients.
- Doctors Treating Patients with Diabetes.
- Readmission Rate within 30 Days

Supply Chain Optimization

Background:

A company operates in the retail industry and sources products from various suppliers to stock its inventory. The company aims to optimize its supply chain management process to ensure efficient order fulfillment, minimize stockouts, and reduce carrying costs. The database contains information about suppliers, products, orders, and shipments, which can be leveraged to improve supply chain operations.

Objectives:

- Analyze supplier performance and identify opportunities for collaboration.
- Optimize inventory levels to reduce stockouts and improve customer satisfaction.
- Streamline order fulfillment processes to enhance efficiency and reduce costs.
- Identify key trends and patterns in order and shipment data for strategic decision-making.

Database Schema:
The database schema includes the following tables:

- **Suppliers Tables:** Stores information about suppliers, including supplier ID, name, contact person, phone number, and email.

```
supplier_id (Primary Key)
supplier_name
contact_person
phone_number
email
```

- Products: Contains details about products, such as product ID, name, description, unit price, and quantity in stock.

```
product_id (Primary Key)
product_name
description
unit_price
quantity_in_stock
```

- Orders: Captures data related to customer orders, including order ID, product ID, supplier ID, order date, quantity ordered, and order status.

```
order_id (Primary Key)
product_id (Foreign Key)
supplier_id (Foreign Key)
order_date
quantity_ordered
order_status
```

- Shipments: Stores information about shipments, including shipment ID, order ID, shipment date, delivery date, shipping company, and tracking number.

```
shipment_id (Primary Key)
order_id (Foreign Key)
shipment_date
delivery_date
shipping_company
tracking_number
```

Dataset Link to download. Click here.

Note: If data doesn't contain some features then try to add some sample data.

Analysis and Recommendations:

1. **Supplier Performance Analysis:**

- Analyze the total revenue generated by each supplier to identify top-performing suppliers.
- Evaluate the average delivery time for shipments from different suppliers to assess logistics efficiency.
- Identify suppliers with declining order trends or inconsistent performance over time for further investigation and potential collaboration opportunities.

2. **Inventory Optimization:**

- Review inventory levels for each product and identify items with low stock levels (e.g., less than 50 units).
- Implement inventory forecasting models to predict demand and ensure optimal stock levels to meet customer demand without excessive inventory holding costs.
- Establish reordering thresholds and automate replenishment processes to maintain adequate inventory levels while minimizing stockouts.

3. **Order Fulfillment Process Improvement:**

- Analyze order status data to identify bottlenecks in the order fulfillment process.
- Evaluate the average shipment duration for each supplier and shipping company to identify opportunities for streamlining logistics operations.
- Implement performance metrics to track order processing times and enhance operational efficiency.

4. **Trend Analysis and Strategic Insights:**

- Conduct trend analysis to identify seasonal demand patterns and product popularity trends.
- Identify correlations between order frequency, product categories, and customer demographics to tailor inventory management strategies.
- Leverage historical order and shipment data to forecast future demand and optimize procurement and logistics strategies accordingly.

SQL Analysis

1. Select all records from the Suppliers table.
2. Select product name and unit price from the Products table
3. Select order IDs and order dates from the Orders table
4. Select shipment IDs and shipment dates from the Shipments table
5. Count the total number of products in stock
6. Calculate the average unit price of products
7. Find the maximum quantity ordered
8. List suppliers along with their contact persons
9. List products with their descriptions
10. Display shipment details including the tracking number
11. List orders along with the associated supplier information
12. Display products that have a unit price greater than $15
13. Count the number of orders per supplier
14. Calculate the total quantity ordered for each product
15. List shipments along with the associated order information
16. Find suppliers with more than 2 contacts
17. Calculate the average quantity ordered per order
18. List products along with the total number of orders they are associated with.
19. Display orders that are in progress (order_status = 'In Progress')

20. Find the earliest and latest order dates
21. Calculate the total revenue generated from orders
22. List suppliers along with the total quantity ordered from them
23. Find products with the highest unit price
24. List orders along with the associated supplier and product information
25. Display the top 3 products with the highest quantity ordered
26. Find the percentage of completed orders out of total orders
27. Calculate the total number of shipments per shipping company
28. List suppliers who have not yet made any orders
29. Display orders along with the corresponding shipment details, if available.
30. Find the top 5 suppliers with the highest total quantity ordered.
31. Find the total revenue generated by each supplier
32. Calculate the average delivery time for each shipping company.
33. Identify products that have never been ordered
34. Find the top 3 shipping companies with the most shipments
35. Calculate the percentage of orders that were completed for each supplier.
36. Identify products with low inventory levels (less than 50 in stock) that need restocking.
37. Find the top 5 suppliers with the highest total revenue.
38. Calculate the total number of orders made each month.
39. Identify suppliers with declining order trends over the past three months.
40. Calculate the average shipment duration for each supplier.
41. Identify Seasonal Demand Patterns.
42. Product Popularity Trends.
43. Correlation between Order Frequency, Product Categories, and Customer Demographics.
44. Forecast Future Demand.