# 📊 Sales Data Analysis Using SQL

## Project Overview

This project involved building and analyzing a structured sales transaction database using SQL. The goal was to extract meaningful business insights from retail sales data through SQL queries and database transformations.

## Tech Stack

- Database: MySQL / PostgreSQL (standard SQL)  
- Tools Used: SQL Editor (e.g., MySQL Workbench, pgAdmin)

## Database Design

- Created a `sales` table with comprehensive attributes including:  
 - Sales Details: Invoice ID, Branch, City, Customer Type, Gender, Product Line  
 - Financial Metrics: Unit Price, Quantity, Tax, Total, COGS, Gross Margin %, Gross Income  
 - Transaction Time: Date, Time  
 - Customer Feedback: Rating  
- Enriched the dataset by adding month and day\_name columns derived from the transaction date.

## Key Analytical Tasks

- Customer Insights:  
 - Counted the number of unique cities and customer types.  
 - Analyzed the distribution of branches across different cities.  
- Product & Sales Analysis:  
 - Identified the most popular product lines based on quantity sold.  
 - Determined the best-selling months and days of the week.  
 - Found the most used payment methods.  
- Revenue Analysis:  
 - Calculated monthly revenues.  
 - Tracked gross income per product line and customer type.

## Sample SQL Operations

- Table Creation:  
```sql  
CREATE TABLE sales (...)  
```  
- Data Transformation:  
```sql  
ALTER TABLE sales ADD COLUMN month VARCHAR(20);  
UPDATE sales SET month = MONTHNAME(dateT);  
```  
- Insight Queries:  
```sql  
SELECT city, COUNT(\*) FROM sales GROUP BY city;  
SELECT product\_line, SUM(quantity) AS total\_sold FROM sales GROUP BY product\_line ORDER BY total\_sold DESC;  
```

## Challenges Faced

- Data Normalization: Ensured all fields (especially monetary values) used correct data types for accurate calculations.  
- Date-Time Management: Extracted meaningful time-based features (month, day name) for seasonal analysis.

## Excel Visualizations

To complement the SQL-based analysis, an Excel file was created to visualize key sales insights. This file, named 'Sales\_Analysis\_Charts.xlsx', contains PivotTables and PivotCharts based on the processed sales data. These visualizations help to communicate trends and summaries in a more accessible, graphical format.

Included charts:

- Total Sales by Month: A line chart tracking monthly revenue trends.

- Sales by Product Line: A bar chart showing the performance of different product categories.

- Payment Method Distribution: A pie chart illustrating how customers prefer to pay.

- Sales by City: A bar chart comparing sales across different locations.

These charts offer a visual perspective on the data, which can be especially helpful for stakeholders in understanding key business patterns quickly.

## Outcome

The project successfully demonstrated the ability to build a sales database from scratch, enhance it with additional features, and extract critical business intelligence using SQL querying techniques.