# Retail Sales Analysis SQL Project

## 📌 Project Summary

This project demonstrates end-to-end SQL-based retail data analysis using SQL Server Management Studio (SSMS). The project includes data loading, cleaning, transformation, and business-level insights derived through SQL queries.

## 🧰 Tools & Technologies

- Database: SQL Server (sql\_pro)  
- Tool: SQL Server Management Studio (SSMS)  
- Language: T-SQL (Transact-SQL)

## 📁 Project Workflow

### 1. Database Setup

CREATE DATABASE sql\_pro;  
USE sql\_pro;

### 2. Data Loading & Preview

SELECT \* FROM [dbo].[retail\_sales];

### 3. Column Renaming

EXEC sp\_rename 'retail\_sales.quantiy','quantity','COLUMN';

### 4. Null Value Detection

SELECT \* FROM retail\_sales  
WHERE sale\_date IS NULL OR sale\_time IS NULL OR customer\_id IS NULL   
OR gender IS NULL OR age IS NULL OR category IS NULL   
OR quantity IS NULL OR price\_per\_unit IS NULL   
OR cogs IS NULL OR total\_sale IS NULL;

### 5. Null Value Removal

DELETE FROM retail\_sales  
WHERE sale\_date IS NULL OR sale\_time IS NULL OR customer\_id IS NULL   
OR gender IS NULL OR age IS NULL OR category IS NULL   
OR quantity IS NULL OR price\_per\_unit IS NULL   
OR cogs IS NULL OR total\_sale IS NULL;

## 🔍 Business Questions & SQL Solutions

### 1. Sales on 2022-11-05

SELECT \* FROM retail\_sales  
WHERE sale\_date = '2022-11-05';

### 2. Clothing Transactions (Quantity > 4) in Nov 2022

SELECT \* FROM retail\_sales  
WHERE category = 'Clothing' AND quantity > 4  
AND sale\_date BETWEEN '2022-11-01' AND '2022-11-30';

### 3. Total Sales per Category

SELECT category, SUM(total\_sale) AS totalsale  
FROM retail\_sales  
GROUP BY category;

### 4. Average Age of Beauty Category Customers

SELECT customer\_id, AVG(age) AS avgage  
FROM retail\_sales  
WHERE category = 'Beauty'  
GROUP BY customer\_id;

### 5. Transactions with Sales > ₹1000

SELECT customer\_id, transactions\_id, total\_sale  
FROM retail\_sales  
WHERE total\_sale > 1000  
ORDER BY customer\_id ASC;

### 6. Transactions by Gender & Category

SELECT gender, category, COUNT(transactions\_id) AS transaction\_count  
FROM retail\_sales  
GROUP BY gender, category  
ORDER BY transaction\_count ASC;

### 7. Average Monthly Sale + Best Month Per Year

SELECT YEAR(sale\_date) AS sale\_year, MONTH(sale\_date) AS sale\_month,  
 AVG(total\_sale) AS avg\_monthly\_sale  
FROM retail\_sales  
GROUP BY YEAR(sale\_date), MONTH(sale\_date)  
ORDER BY sale\_year, avg\_monthly\_sale DESC;

### 8. Top 5 Customers by Total Sale

SELECT TOP 5 \* FROM retail\_sales  
ORDER BY total\_sale DESC;

### 9. Unique Customers by Category

SELECT category, COUNT(DISTINCT customer\_id) AS numbers\_of\_customers  
FROM retail\_sales  
GROUP BY category;

### 10. Shifts & Order Counts

SELECT   
 CASE  
 WHEN DATEPART(HOUR, sale\_time) < 12 THEN 'Morning'  
 WHEN DATEPART(HOUR, sale\_time) BETWEEN 12 AND 17 THEN 'Afternoon'  
 ELSE 'Evening'  
 END AS shift,  
 COUNT(\*) AS order\_count  
FROM retail\_sales  
GROUP BY   
 CASE  
 WHEN DATEPART(HOUR, sale\_time) < 12 THEN 'Morning'  
 WHEN DATEPART(HOUR, sale\_time) BETWEEN 12 AND 17 THEN 'Afternoon'  
 ELSE 'Evening'  
 END;

### 11. Total Orders per Month-Year

SELECT YEAR(sale\_date) AS sale\_year, MONTH(sale\_date) AS sale\_month,  
 COUNT(\*) AS total\_orders  
FROM retail\_sales  
GROUP BY YEAR(sale\_date), MONTH(sale\_date)  
ORDER BY sale\_year, sale\_month;

### 12. Category-wise Top Sales by Year

SELECT category, YEAR(sale\_date) AS sale\_year,  
 SUM(total\_sale) AS total\_sales  
FROM retail\_sales  
GROUP BY category, YEAR(sale\_date)  
ORDER BY total\_sales DESC;

## 📊 Insights & Findings

- Best-selling categories: Clothing, Beauty, and Electronics had the highest sales.  
- High-value transactions: Multiple sales exceeded ₹1000, indicating premium products.  
- Customer behavior: Afternoon had the highest number of sales.  
- Time trend: November 2022 was a strong sales month.  
- Top customers: Identified top 5 customers based on overall spending.

## ✅ Next Steps & Improvements

- Add visualizations via Power BI or Tableau  
- Automate reports with stored procedures or views  
- Integrate Python or Excel for additional EDA

## 🎓 Author: Zero Analyst

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