# **Problem Statement: Advanced Query Generation for E-commerce Insights**

### **Abstract**

Structured Query Language (SQL) is essential for managing and analyzing vast amounts of e-commerce data, enabling businesses to make data-driven decisions that enhance customer satisfaction, optimize inventory, and improve overall performance. Modern e-commerce platforms generate extensive data related to customers, products, orders, reviews, and shipments, requiring advanced SQL techniques to extract meaningful insights. By leveraging SQL’s powerful querying capabilities—such as joins, aggregate functions, subqueries, and window functions—businesses can analyze key trends, monitor product performance, and improve operational efficiency. This project focuses on crafting advanced SQL queries to uncover valuable insights into sales patterns, customer behavior, and inventory management, ultimately aiding strategic decision-making.

### **Objective**

The goal is to design and implement a well-structured relational database for an e-commerce platform using MySQL and to develop a set of advanced SQL queries that:  
✅ Identify popular products, top customers, and revenue trends.  
✅ Analyze customer spending habits and purchase frequency.  
✅ Evaluate product performance based on sales, reviews, and stock levels.  
✅ Generate operational insights such as shipment timelines, discount usage, and order statuses.  
✅ Provide actionable insights for inventory management, including low-stock alerts and unsold inventory.

### **Project Scope**

#### **Database Creation:**

* Design and create a relational database schema for an e-commerce platform using MySQL.
* Define appropriate tables, relationships, primary keys, and foreign keys to ensure data integrity.

#### **Data Ingestion:**

* Load structured data into the database using SQL INSERT queries or bulk import techniques.

#### **Query Writing & Report Generation:**

* Develop advanced SQL queries to address critical business questions related to sales, customer engagement, product performance, and operations.
* Utilize SQL concepts such as GROUP BY, HAVING, CASE, JOIN, DISTINCT, and subqueries to generate insightful reports.

### **Dataset & Tables (Sample Structure)**

The database will consist of multiple interconnected tables, including:  
✅ **Customers** – Stores customer details and purchase history.  
✅ **Orders** – Contains order information, including date, amount, and status.  
✅ **Products** – Maintains product details, pricing, stock levels, and reviews.  
✅ **Shipments** – Tracks order deliveries and estimated timelines.  
✅ **Discounts** – Records promotional offers and usage statistics.

### **Expected Outcome**

By the end of this project, learners will:  
✅ Gain hands-on experience in designing relational databases and defining schemas.  
✅ Master writing advanced SQL queries using DDL (Data Definition Language) and DML (Data Manipulation Language).  
✅ Be able to generate insightful reports that drive business decisions in e-commerce.