

# Detailed SQL Data Analysis Report

This report provides a comprehensive data analysis using SQL on an eCommerce database. It includes schema overview, ER diagram explanation, detailed queries, business insights, performance tuning notes, and recommendations.

## 1. Database Schema Overview

The dataset includes the following tables: 1. Customers (customer\_id, name, email, location) 2. Orders (order\_id, customer\_id, order\_date, status) 3. Order\_Items (item\_id, order\_id, product\_id, quantity, price) 4. Products (product\_id, product\_name, category, price) 5. Payments (payment\_id, order\_id, amount, method, status)

## 2. ER Diagram Summary

The ER diagram shows 1-to-many relationships between Customers → Orders and Orders → Order Items.

## 3. Key SQL Queries & Insights

### *Top Customers by Spending*

```
SELECT c.name, SUM(oi.price * oi.quantity) AS total_spent
FROM customers c
JOIN orders o ON c.customer_id = o.customer_id
JOIN order_items oi ON o.order_id = oi.order_id
GROUP BY c.customer_id
ORDER BY total_spent DESC
LIMIT 10;
```

### *Monthly Revenue Trend*

```
SELECT DATE_FORMAT(order_date, '%Y-%m') AS month, SUM(oi.price *
oi.quantity) AS revenue
FROM orders o
JOIN order_items oi ON o.order_id = oi.order_id
GROUP BY month
ORDER BY month;
```

### *Best-Selling Products*

```
SELECT p.product_name, SUM(oi.quantity) AS units_sold
FROM products p
JOIN order_items oi ON p.product_id = oi.product_id
GROUP BY p.product_id
ORDER BY units_sold DESC
```

```
LIMIT 10;
```

### ***Customer Retention (Repeat Orders)***

```
SELECT c.name, COUNT(o.order_id) AS total_orders  
FROM customers c  
JOIN orders o ON c.customer_id = o.customer_id  
GROUP BY c.customer_id  
HAVING total_orders > 1;
```

## **4. Performance Optimization**

Indexes added: - Index on orders(customer\_id) - Index on order\_items(order\_id) - Index on products(category) These reduce query execution time significantly for joins and filtering operations.

## **5. Business Recommendations**

- ✓ Focus marketing on top-spending customers
- ✓ Improve inventory of high-selling products
- ✓ Target repeat customers with loyalty programs
- ✓ Monitor monthly revenue dips for seasonal insights