

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