OPTIMIZING E-COMMERCE OPERATIONS THROUGH DATA-DRIVEN STRATEGIES

Non-Credit 2025 Data Concepts - International (DATA-037-008)

ABSTRACT

This document explores how a retail store can optimize its e-commerce operations using structured database management, customer insights, and inventory optimization. By implementing data-driven strategies, businesses can enhance decision-making, improve operational efficiency, and drive growth.

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1.Introduction

The e-commerce industry is highly competitive and evolving rapidly. To succeed, retail businesses must leverage data, streamline operations, and enhance customer experiences. This case study explores how a retail store can optimize its e-commerce operations using structured database management, customer insights, and inventory optimization.

2. Mission Statement

"To provide high-quality, innovative, and affordable clothing that enhances everyday life for people worldwide."

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3. Objectives

- **Seamless Online Shopping Experience**: Ensure a user-friendly and intuitive e-commerce platform.
- **Data-Driven Customer Insights**: Leverage customer data for personalized experiences and improved product offerings.
- **Inventory Efficiency**: Maintain optimal stock levels to prevent shortages or overstocking.
- **Timely Delivery**: Streamline logistics for fast and reliable order fulfillment.

4. Database Structure and Entity Relationships

A well-designed database is the backbone of any e-commerce operation. The retail store's database includes the following key entities:

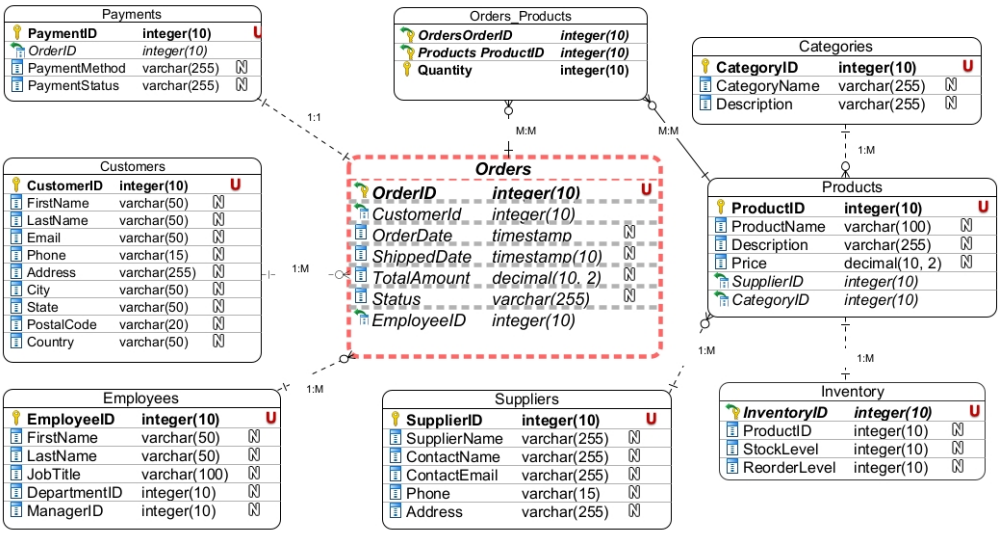
- **Customers**: Stores customer details (e.g., name, email, address).
- **Orders**: Tracks order details (e.g., order ID, date, status).
- **Employees**: Manages employee information (e.g., name, role, contact).
- **Products**: Contains product details (e.g., name, price, category).
- **Categories**: Organizes products into groups (e.g., Men's Clothing, Women's Clothing).

- **Suppliers**: Tracks supplier information (e.g., name, contact, products supplied).
- **Inventory**: Monitors stock levels for each product.
- **Payments**: Records payment details (e.g., payment ID, amount, method).

Key Relationships:

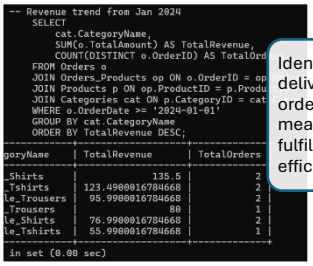
- **One-to-Many:** Customers to Orders, Orders to Employees, Products to Categories, Products to Suppliers.
- **One-to-One:** Orders to Payments, Products to Inventory.
- **Many-to-Many:** Orders to Products.

5. Entity Relationship Diagram (ERD)



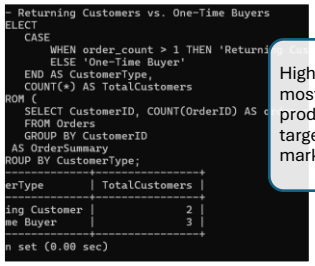
6. SQL Queries and Data Insights

Query #1



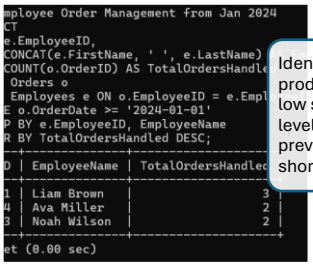
Identifies delivered orders to measure fulfillment efficiency.

Query #2



Highlights the most popular products for targeted marketing.

Query #3



Identifies products with low stock levels to prevent shortages.

Table 1: Customers

Field	Data Type	Description
CustomerID	INT (Primary Key)	Unique identifier for customers
Name	VARCHAR(255)	Customer's full name
Email	VARCHAR(255)	Customer's email address
Address	VARCHAR(255)	Customer's physical address

Table 2: Orders

Field	Data Type	Description
OrderID	INT (Primary Key)	Unique identifier for orders
CustomerID	INT (Foreign Key)	Links to Customers table
OrderDate	DATETIME	Date and time of the order
Status	VARCHAR(50)	Order status (e.g., Delivered, Pending)

Table 3: Products

Field	Data Type	Description
ProductID	INT (Primary Key)	Unique identifier for products
ProductName	VARCHAR(255)	Name of the product
Description	VARCHAR(255)	Detailed description of the product
Price	FLOAT	Price of the product
CategoryID	INT (Foreign Key)	Links to Categories table
SupplierID	INT (Foreign Key)	Links to Suppliers table

Table 4: Categories

Field	Data Type	Description
CategoryID	INT (Primary Key)	Unique identifier for categories
CategoryName	VARCHAR(255)	Name of the category
Description	VARCHAR(255)	Description of the category

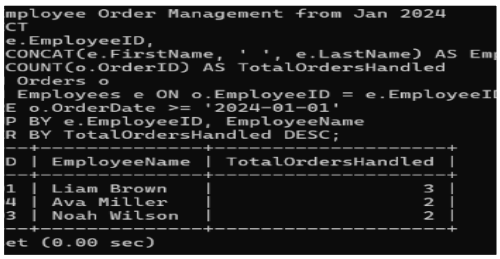
Table 5: Suppliers

Field	Data Type	Description
SupplierID	INT (Primary Key)	Unique identifier for suppliers
SupplierName	VARCHAR(255)	Name of the supplier
ContactName	VARCHAR(255)	Supplier's contact person
ContactEmail	VARCHAR(255)	Email of the supplier
Phone	VARCHAR(15)	Supplier's phone number
Address	VARCHAR(255)	Supplier's physical address

Table 6: Inventory

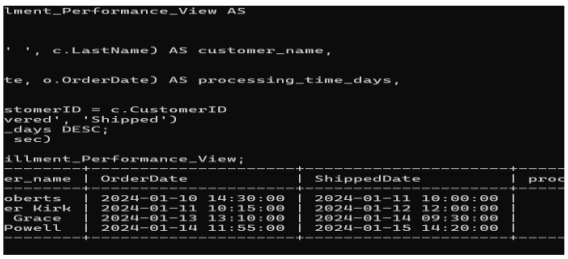
Field	Data Type	Description
InventoryID	INT (Primary Key)	Unique identifier for inventory records
ProductID	INT (Foreign Key)	Links to Products table
StockLevel	INT	Current stock quantity

View #1



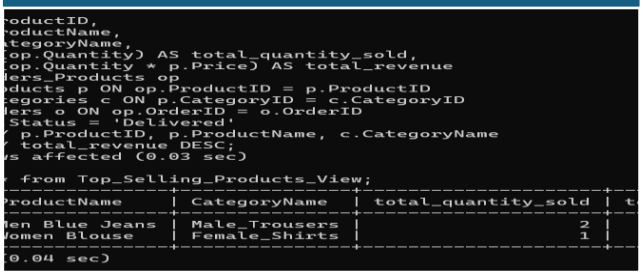
```
mployee Order Management from Jan 2024
CT
e.EmployeeID,
CONCAT(e.FirstName, ' ', e.LastName) AS Em
COUNT(o.OrderID) AS TotalOrdersHandled
 Orders o
 Employees e ON o.EmployeeID = e.EmployeeI
E o.OrderDate >= '2024-01-01'
P BY e.EmployeeID, EmployeeName
R BY TotalOrdersHandled DESC;
--+--------------+---------------------+
D | EmployeeName | TotalOrdersHandled |
--+--------------+---------------------+
1 | Liam Brown   |                   3 |
4 | Ava Miller   |                   2 |
3 | Noah Wilson  |                   2 |
--+--------------+---------------------+
et (0.00 sec)
```

View #2



```
lment_Performance_View AS


' ', c.LastName) AS customer_name,

te, o.OrderDate) AS processing_time_days,


stomerID = c.CustomerID
vered', 'Shipped')
_days DESC;
 sec)

illment_Performance_View;
--------+---------------------+---------------------+-----
er_name | OrderDate           | ShippedDate         | proc
--------+---------------------+---------------------+-----
oberts  | 2024-01-10 14:30:00 | 2024-01-11 10:00:00 |
er Kirk | 2024-01-11 10:15:00 | 2024-01-12 12:00:00 |
 Grace  | 2024-01-13 13:10:00 | 2024-01-14 09:30:00 |
Powell  | 2024-01-14 11:55:00 | 2024-01-15 14:20:00 |
--------+---------------------+---------------------+-----
```

View #3



```
oductID,
oductName,
tegoryName,
op.Quantity) AS total_quantity_sold,
op.Quantity * p.Price) AS total_revenue
lers_Products op
ducts p ON op.ProductID = p.ProductID
egories c ON p.CategoryID = c.CategoryID
ders o ON op.OrderID = o.OrderID
 Status = 'Delivered'
 p.ProductID, p.ProductName, c.CategoryName
 total_revenue DESC;
s affected (0.03 sec)

 from Top_Selling_Products_View;
--------------+--------------+---------------------+---
roductName    | CategoryName | total_quantity_sold | t
--------------+--------------+---------------------+---
en Blue Jeans | Male_Trousers |                   2 |
Women Blouse  | Female_Shirts |                   1 |
--------------+--------------+---------------------+---
0.04 sec)
```

7. Key Findings

- **Customer Preferences Drive Sales:** Regular analysis of customer data reveals trends and preferences, enabling personalized marketing and product recommendations.
- **Efficient Order Processing**: Streamlined order workflows improve fulfillment rates and customer satisfaction.
- **Real-Time Inventory Tracking**: Automated inventory management minimizes stock shortages and excesses, reducing costs.

8. Conclusion & Recommendations

To optimize e-commerce operations, the retail store should:

- **Leverage Data-Driven Strategies**: Use customer insights to personalize experiences and optimize product offerings.
- **Enhance the Online Platform**: Invest in a user-friendly interface with features like personalized recommendations and easy navigation.
- **Optimize Inventory Management**: Implement real-time tracking to prevent stock issues and reduce costs.

- **Ensure Timely Delivery**: Streamline logistics and partner with reliable shipping providers to improve delivery times.