

## **E-Commerce Logistics and Statement Management System**

### **Database Specification**

Purpose, Business Problems Addressed, and Business Rules

#### **Database Purpose**

The purpose of this database is to support the core operations of an e-commerce business by maintaining accurate, real-time data across inventory management, order processing, logistics tracking, customer billing, and financial reporting. The system is designed to ensure timely order fulfillment, transparent payment reconciliation, and comprehensive insight into business performance. It enables coordination across departments—operations, accounting, and customer service—by providing a centralized and normalized data structure.

#### **Business Problems Addressed**

- Centralize and normalize customer and address data to prevent duplication and inconsistency across sales and shipping systems.
- Maintain a clear mapping between products to support cost control, sourcing decisions.
- Prevent stockouts and overstocking by monitoring inventory levels across multiple warehouse locations in real time.
- Provide complete visibility of the customer order lifecycle, from product purchase to final delivery.
- Separate invoice creation from payment collection to track outstanding balances and customer credit.
- Generate consolidated financial statements that capture total revenues, costs, and profit margins for a given period.

#### **Business Rules**

- Each product may be stocked in multiple warehouses.
- Each warehouse can hold multiple products.
- Each shipment has multiple orders. Each order has multiple shipments.
- Each order is made by multiple customers and contains multiple products.
- Each order has multiple payment. Each payment has multiple orders.
- Each payment is associated with multiple invoices.
- Each customer can have multiple addresses.
- Each address may be reused by multiple customers (e.g., family accounts or shared work addresses).
- Financial reports are generated based on payment data.

#### **Design Requirements**

- Use Crow's Foot Notation.
- Primary Keys (PK) must be explicitly labeled in each entity.
- Draw relationship lines to show how entities connect.
- Support referential integrity using InnoDB engine and foreign key constraints.

## Design Decisions

Entity Name	Why Entity Included	How Entity Is Related to Other Entities
<b>Product</b>	Enables categorization and future analytics.	Linked to Inventory (one-to-many), and Orders (many-to-many).
<b>OrderProduct</b>	Stores information on all items sold in the store. Associates a Order to one or more products.	Many-to-many link between Product and Order.
<b>Inventory</b>	Tracks stock quantity of each product in each warehouse location.	Linked to both Product and Warehouse through many-to-one relationships.
<b>Warehouse</b>	Tracks where inventory is stored.	Related to Inventory (many-to-one)
<b>Customer</b>	Centralizes customer profile data including name and contact info.	Linked to CustomerOrders, CustomerAddress, and indirectly to Shipment.
<b>Order</b>	Captures customer purchases, including what was bought, by whom, and when.	Linked to CustomerOrder, OrderProduct, OrderShipment, OrderPayment.
<b>OrderShipment</b>	Associates a order to one or more shipments.	Many-to-many link between Shipment and Order.
<b>OrderPayment</b>	Associates a order to one or more payments.	Many-to-many link between Payment and Order.
<b>CustomerOrder</b>	Associates a order to one or more customers.	Many-to-many link between Customer and Order.
<b>Shipment</b>	Tracks delivery status, carrier, and key dates.	Linked many-to-many with Orders to represent fulfillment.
<b>Address</b>	Stores city, state and supports reuse.	Linked to Customer via CustomerAddress junction table.
<b>CustomerAddress</b>	Associates a customer to one or more addresses.	many-to-many relationship with Customer and Address.
<b>Payment</b>	Captures received payments (amount, method, date).	Linked to OrderPayment, Invoice and FinancialReport.
<b>Invoice</b>	Documents amounts billed, dates.	Linked to Payment (one-to-many, but tracks separately).
<b>FinancialReport</b>	Aggregates performance data (revenue, cost, profit) over monthly/quarterly periods.	Aggregated from Payment, used for executive reporting.