

Data Operations Description

1. Data Operations

These operations describe the actions that involve inserting, updating, or retrieving data within the online shopping system.

Operation Name	Description	Entities Involved	Expected Output
User Registration	Allows a new user to create an account by providing name, contact, and address information.	User(seller/ customer/ employee)	A new user record is created.
Add/Remove Product	Enables sellers or employees to add new products with descriptions, prices, and stock details.	Product, Category, Seller	A new product is added/Removed to the catalog.
Place Order	Customers can place an order that includes one or multiple products.	Order, Order_Item, Customer, Product	New order record created, product warehouse reduced.
Process Payment	Handles customer payments for completed orders.	Payment, Transaction, Order	Payment status updated to 'Paid'.
Manage Refund Request	Allows customers to request refunds for specific order items.	Refund, Order_Item, Return_Request	Refund record created and processed for the requested order item, linked to the corresponding return request.
Write Product Review	Customers can submit reviews and ratings for purchased products.	Review, Product, Customer	New review record linked to customer and product.

Manage Warehouse and Carrier	Company employees oversee warehouse operations and coordinate with carriers for deliveries.	Warehouse, Carrier, Employee, Company	Warehouse and delivery operations are tracked under employee supervision.
------------------------------	---	---------------------------------------	---

2. Reporting Analytical Operations

Report / Query Name	Purpose / Business Question	Data Sources / Entities	Expected Result / Output
Top Selling Products	Identify products with the highest sales within a selected period.	Order_Item, Product, Order	List of best-selling products with quantities sold.
Monthly Revenue Report	Calculate total revenue earned per month.	Payment, Order, Transaction	Summary of revenue by month.
Top Performing Sellers	Identify sellers with the highest total sales and commission rates.	Seller, Product, Order_Item	Ranked list of sellers based on sales performance.
Top Rating products	The products with the highest rating stars.	Product, review	Rank list of products that have high ratings.
Product Price fluctuation	Price differentiation during a period of time.	Product, User	The last three updated prices.
Customer Purchase Summary	Display the total number of orders, total spent, and reviews per product.	Customer, Order, Review	Achieve specific information about each customer.
Low Stock Products	Identify products that are running low on stock.	Product, Warehouse	List of products with stock below threshold.

Delivery Processes Report	Track delivery of product.	Carrier, Warehouse, Order	Average delivery date and process where our order is.
Refund Analysis Report	Analyze reasons and amounts of refunds issued.	Refund, Return_Request, Order_Item	Report summarizing total amount of refunded products.

3. Relationships justifications

Explanation of the relationships between entities that justify the inclusion of tables in each reporting query and clarification of indirect links observed in the ER diagram, especially for reports involving Warehouses, Products, and Orders.

Top Selling Products

The Order_Item entity connects each order with its Products. The relationships between order, order_Item and Product allow the system to count how many times a product was sold, and identify top-selling products.

Monthly Revenue Report

Each Payment is related to a Transaction, which in turn links to an order. The relationships between order_item, transaction and payment are used to calculate total revenue per month.

Top Performing Sellers

Sellers provide Products that appear in order_Items. The relationships user-Product with review make it possible to measure total sales per seller and rank them by performance.

Customer Purchase Summary

Customers place Orders and write Reviews. The relationships customer-order and Customer-Review allow generating summaries of total purchases and feedback activity per product/customer.

Low Stock Products

There is no direct link between Warehouse and Product. The connection is made through users who manage or own products. The relationship path is Warehouse - Company- employee(User) - Product, meaning stock status can be monitored based on the employee responsible for that warehouse.

Delivery Process Report

Orders are placed by customers (Users) and processed by employees associated with warehouses. Warehouses coordinate deliveries with carriers. The indirect relationship path is Order - Customer - employee - Company - Warehouse - Carrier, enabling analysis of delivery processes across carriers and warehouses.

Refund Analysis Report

Refunds are requested through Return_Requests related to specific order_Items. The path Order_Item processed_for Return_Request processed_for Refund allows analyzing refund patterns and totals.

Product Price Fluctuation / Top Rating products

have direct relationships with each other.