Northeastern University
DAMG6210 - Data Management and Database Design

MEMBERS:

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PROJECT TOPIC:

Ecommerce Management System

PROBLEM STATEMENT:

With the ever-increasing eCommerce market space, the number of eCommerce platforms is proliferating. The competition between the Ecommerce service providers has gotten more tedious and tightened than ever before because of the increase in customer requirements. Henceforth, the system needs to track inventory (products, price, quantity, description, etc.) to increase delivery efficiency, and cut overstocking and understocking costs. This has led to an increase in the requirement to monitor sales and profits across various locations and product attributes and this monitoring requires the business to view specific niches that they can target for increasing sales significantly in these locations. This increases the emphasis on the importance of a powerful and comprehensible database system for business.

OBJECTIVES:

1. Avoid product duplication
2. Real time stock information (product quantities)
3. Build customer retention by providing discounts/coupons to loyal customers
4. To extract data and suggest similar, best, and cheaper alternative products
5. To find niches by tracking the products and locations available.
6. Track sales and profit Monitor on-time delivery performance.

PROPOSED SOLUTION:

1. User - The goal of e-commerce is to facilitate both users – customers and sellers. Our database collects and saves data for both users. Also, we maintain the product reviews and Wishlist from the customers and use that data to suggest products for their next purchase. Also, data from the seller will help in keeping track of their improvement in sales and profits and thus help to increase their reputation in the retail market.

2. Inventory (Products) - The table shall contain a name, ID, offers, quantity, price, product description, and product release date, making it accessible to track the sold-out and the remaining stock. The resultant gives better insights about the product on trend and ways to increase productivity and reputation in updating the stock depending on customer requirement. Also, we plan to implement suggestions based on purchase history and reviews from the customers using the product.

3. Order and order history – The OrderItems table will contain all the products and their quantity that was purchased for each order. We plan to track the order history and generate discounts or coupons for the customer.

4. Payment - Database will have payment information of users for present as well for past orders. It stores the payment method so it is easy for customers to understand how they have made payment for the relevant orders and depending upon the payment card information they can see which coupon they can apply to their purchase.

5. Delivery - Our system also makes sure that the placed order is delivered successfully by tracking the shipment status of the product purchased. This delivery data is accessible by both the users and the sellers – for the users this will be helpful to request for a replacement if not delivered and for the user to ensure that the products are reaching the customers safe and to maintain good customer loyalty.

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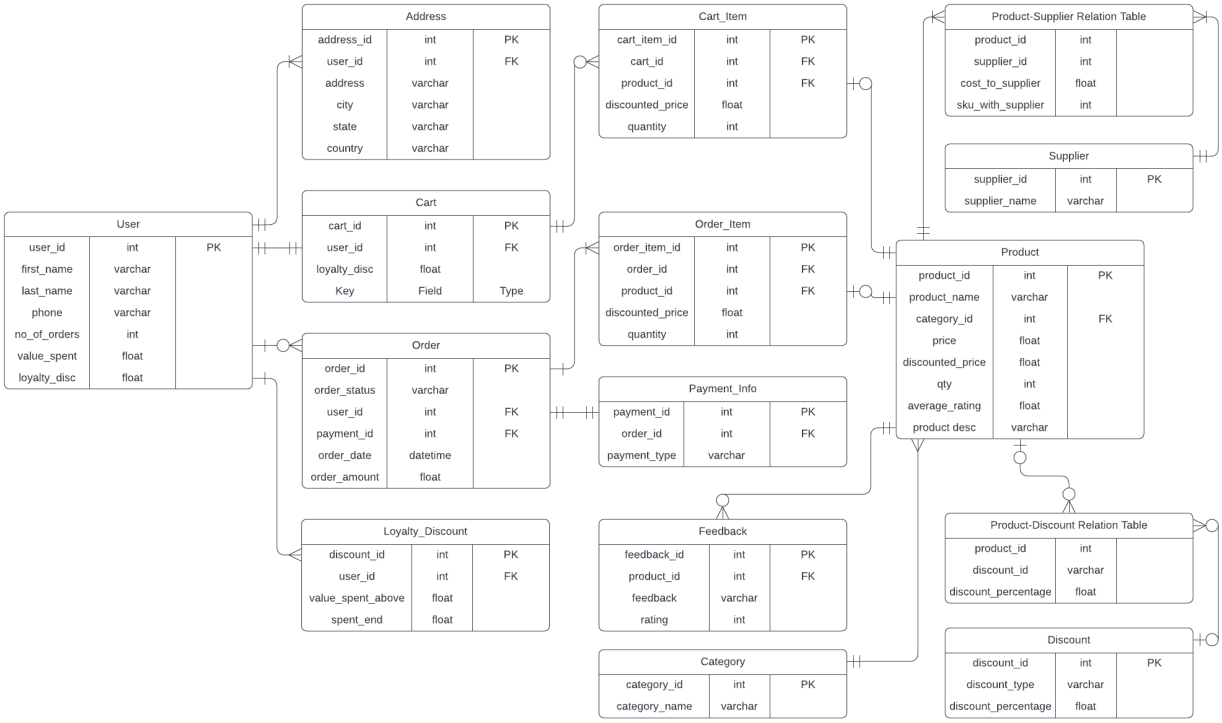
E - R DIAGRAM:



ENTITIES AND ATTRIBUTES:

1. User

ATTRIBUTES	DATATYPE	COMMENTS
user_id	int	PRIMARY KEY, AUTO GENERATED
first_name	varchar	NOT NULL
last_name	varchar	NOT NULL
phone	varchar	NOT NULL
no_of_orders	int	NOT NULL
value_spent	float	NOT NULL
loyalty_disc	float	NOT NULL

2. Address

ATTRIBUTES	DATATYPE	COMMENTS
address_id	int	PRIMARY KEY, AUTO GENERATED
user_id	int	FOREIGN KEY, NOT NULL
address	varchar	NOT NULL
city	varchar	NOT NULL
state	varchar	NOT NULL
country	varchar	NOT NULL

3. Cart

ATTRIBUTES	DATATYPE	COMMENTS
cart_id	int	PRIMARY KEY, AUTO GENERATED
user_id	int	FOREIGN KEY, NOT NULL
loyalty_disc	float	NOT NULL

4. Order

ATTRIBUTES	DATATYPE	COMMENTS
order_id	int	PRIMARY KEY, AUTO GENERATED
order_status	varchar	NOT NULL
user_id	int	FOREIGN KEY, NOT NULL
payment_id	int	FOREIGN KEY, NOT NULL
order_date	datetime	NOT NULL
order_amount	float	NOT NULL

5. Loyalty_Discount

ATTRIBUTES	DATATYPE	COMMENTS
discount_id	int	PRIMARY KEY, AUTO GENERATED
user_id	int	FOREIGN KEY, NOT NULL
value_spent_above	varchar	NOT NULL
discount	float	NOT NULL

6. Cart_Item

ATTRIBUTES	DATATYPE	COMMENTS
cart_item_id	int	PRIMARY KEY, AUTO GENERATED
cart_id	int	FOREIGN KEY, NOT NULL
product_id	int	FOREIGN KEY, NOT NULL
phone	varchar	NOT NULL
discounted_price	float	NOT NULL
quantity	int	NOT NULL

7. Order_Item

ATTRIBUTES	DATATYPE	COMMENTS
order_item_id	int	PRIMARY KEY, AUTO GENERATED
order_id	int	FOREIGN KEY, NOT NULL
product_id	int	FOREIGN KEY, NOT NULL
discounted_price	float	NOT NULL
quantity	int	NOT NULL

8. Payment_Info

ATTRIBUTES	DATATYPE	COMMENTS
payment_id	int	PRIMARY KEY, AUTO GENERATED
order_id	int	FOREIGN KEY, NOT NULL
payment_type	varchar	NOT NULL

9. Product

ATTRIBUTES	DATATYPE	COMMENTS
product_id	int	PRIMARY KEY, AUTO GENERATED
product_name	varchar	NOT NULL
category_id	int	FOREIGN KEY, NOT NULL
price	float	NOT NULL
discounted_price	float	NOT NULL
quantity	int	NOT NULL
average_rating	float	NOT NULL
product_desc	text	NOT NULL

10. Supplier

ATTRIBUTES	DATATYPE	COMMENTS
supplier_id	int	PRIMARY KEY, AUTO GENERATED
supplier_name	varchar	NOT NULL

11. Discount

ATTRIBUTES	DATATYPE	COMMENTS
discount_id	int	PRIMARY KEY, AUTO GENERATED
discount_type	varchar	NOT NULL
discount_percentage	float	NOT NULL

12. Category

ATTRIBUTES	DATATYPE	COMMENTS
category_id	int	PRIMARY KEY, AUTO GENERATED
category_name	varchar	NOT NULL

13. Feedback

ATTRIBUTES	DATATYPE	COMMENTS
feedback_id	int	PRIMARY KEY, AUTO GENERATED
product_id	int	FOREIGN KEY, NOT NULL
feedback	text	NOT NULL
rating	float	NOT NULL

BUSINESS RULES:

1. At one time, products can only be added to a single cart by the customer.
2. A customer can create more than one order, but not at once.
3. A customer may have more than one delivery address.
4. A customer has to make a single selection among the available loyalty discounts.
5. Products may have zero or multiple ratings and discounts.
6. A Product must have at least one supplier.
7. At any point, the total number of stock units present with the suppliers for a particular product must always be greater than the estimated demand.
8. The supplier must update every order item that is ordered by the customer.

VIEWS:

1. Overall Sales and Profits (Day, Week, Month, Year): This view will show the overall sales and profit till date by day, week, month and year.

2. Overall Sales and Profits (City, State, Country): This view will show the overall sales and profit till date by city, state and country.

3. Product Sales and Profits (Day, Week, Month, Year): This view will show the product sales and profit till date by day, week, month and year.

4. Product Sales and Profits (City, State, Country): This view will show the product sales and profit till date by city, state and country.

5. Inventory_status: This view aims to show all the products that are unavailable in the inventory and the products with quantity less than the weekly average sale quantity.

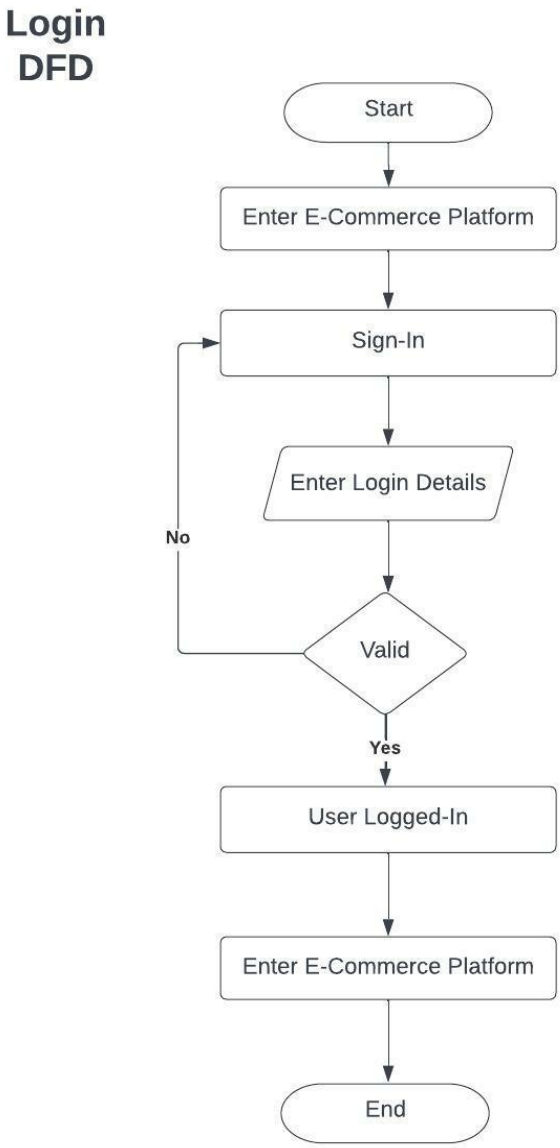
6. Top Products (Day, Week, Month, Year): This view will show the top products sold in a particular day, week, month and year.

7. Top Products (City, State, Country): This view will show the top products sold in a particular city, state and country.

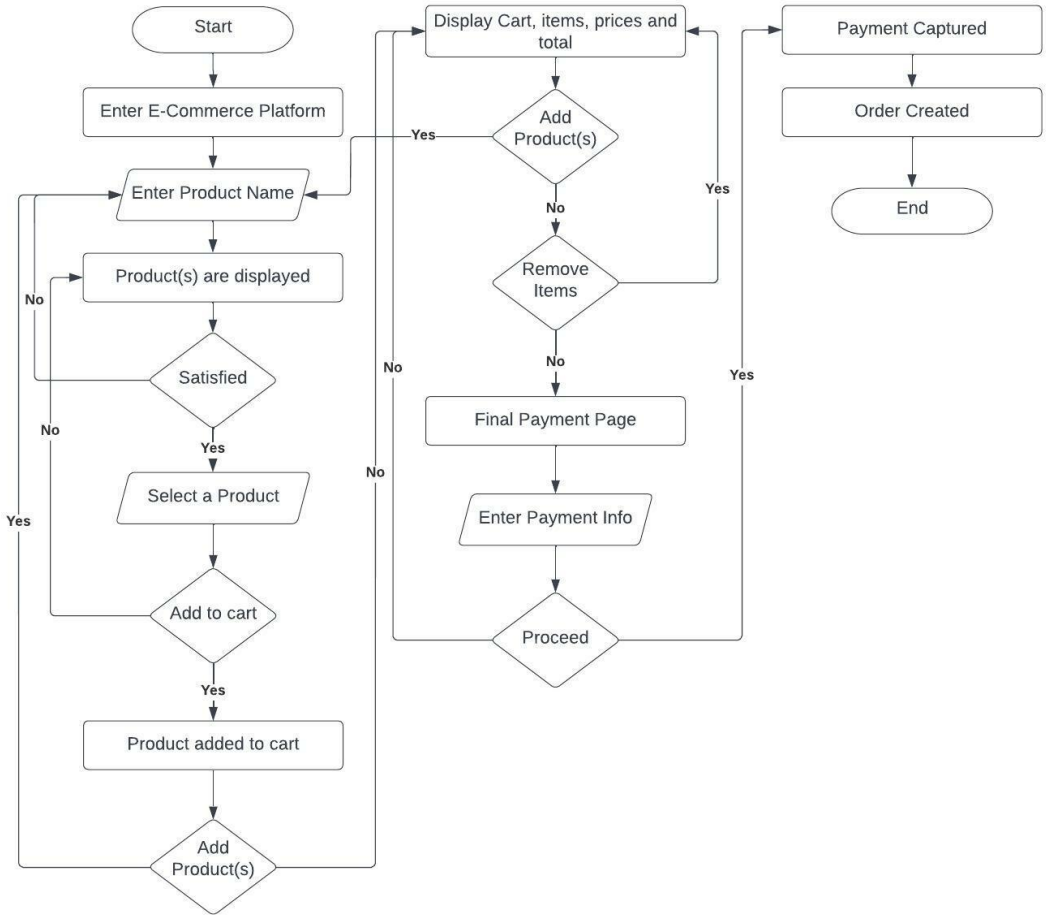
8. Products by Category: This view will show the products and their category or vice-versa.

9. Customer Acquisition: This view will display customer acquisition with time in regions.

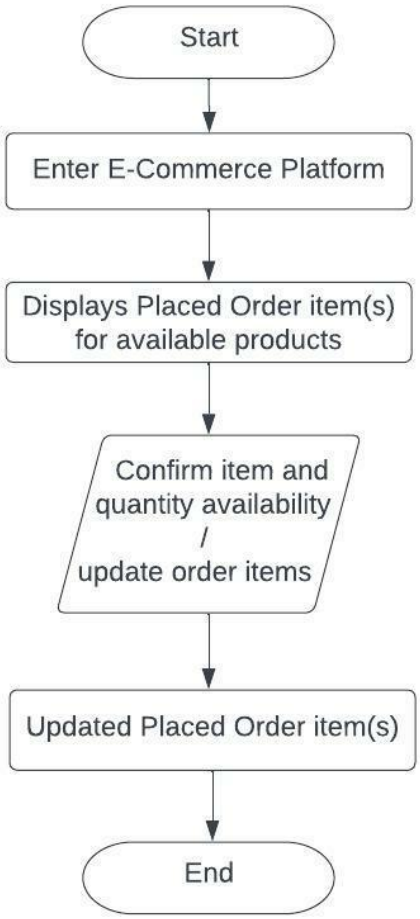
DATA FLOW DIAGRAMS:



Customer DFD



Supplier DFD



SECURITY CONSTRAINTS:

In total, a user with the database access can play one of the below three roles, i.e:

1. **Customer** - A customer logs in to purchase products, view previous orders, etc.
2. **Supplier** - A supplier checks and processes any order that they receive.
3. **Admin** - Has access to all functions and tables.

Tables involved in the system are:

1. User
2. Address
3. Cart
4. Loyalty_Discount
5. Order
6. Order_Item
7. Payment_Info
8. Product
9. Product-Supplier Relation Table
10. Product-Discount Relation Table
11. Category
12. Feedback
13. Discount
14. Supplier

A. USER ACCESSIBILITY

The following attributes in the below mentioned table (according to Entity model) are accessible by the user:

1. Table Name – User:

user_id, first_name, last_name, phone, loyalty_disc

2. Table Name – Address:

address_id, Address, User_id, City, State, Country

3. Table Name – Cart:

Cart_id, User_id, loyalty_disc

4. Table Name - Loyalty_Discount:
discount_id, user_id, discount_percentage

5. Table Name – Order:
Order_id, Order_status, User_id, Payment_id, Order_date, Order_amount

6. Table Name - Cart_Item:
Cart_item_id, Cart_id, Discounted_price, Quantity, product_id

7. Table Name - Order_Item:
Order_item_id, Order_id, Discounted_price, Quantity, product_id

8. Table Name - Payment_Info:
Order_id, Payment_type

9. Table Name – Product:
Product_name, product_id, Price, Discounted_price, Qty, Average_rating, Product_desc

10. Table Name – Feedback:
Feedback, rating, product_id

11. Table Name – Product-Discount Relation Table:
Product_id, Discount_id, Discount_percentage

12. Table Name – Discount:
Discount_id, Discount_type, Discount_percentage

B. SUPPLIER ACCESSIBILITY
The following attributes in the below mentioned table (according to Entity model) are accessible by the supplier:

1. Table Name: Product
Product_id, Product_name, Category_id, Price, Discounted_price, Qty, Average_rating, Product_disc

2. Table Name - Product-Supplier Relation Table:
Product_id, Supplier_id, Cost_to_supplier, Sku_with_supplier

3. Table Name – Product-Discount Relation Table:
Product_id, Discount_id, Discount_percentage

4. Table Name – Category:
Category_id, Category_name

5. Table Name – Feedback:
Feedback_id, Product_id, Feedback, Rating

5. Table Name – Discount:
Discount_id, Discount_type, Discount_percentage

C. ADMIN ACCESSIBILITY
Admin can access all the attributes of the above mentioned tables.