DBMS Project

On

Online Shopping Platform

by

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PROBLEM STATEMENT:

The problem statement for designing an online shopping platform's database involves creating a robust system to manage users, products, orders, payments, and carts. The goal is to build an efficient database schema that maintains data integrity, minimizes redundancy, and accommodates various relationships between entities. The system should allow users to Browse and purchase products,Maintain cart, Place orders, Make payments,View order history,Manage user accounts.

Key Features:

1.User Management: User profiles with personal details and addresses.

2.Product Catalog: Products with descriptions, prices, quantities, and categorization.

3.Order Processing: Ability for users to place orders with order details, linking products and users and also it allows users to check the status of orders (e.g., pending, shipped, delivered) that indicate their stage in the fulfillment process.

4.Payment Handling: Management of payment details

associated with orders.

5.Shopping Cart: Functionality for users to add/remove items from their carts.

6.Relationships: Implementing proper relationships between entities to accurately represent the interactions (like purchases,cart contents) between users and products.

ASSUMPTIONS:

1.Users are assumed to have unique usernames/emails and passwords for their accounts.

2.Products have distinct identifiers (like ProductID), and each product has a unique name and has count 1 in the website.

3. Users can place orders for only one cart at a time.

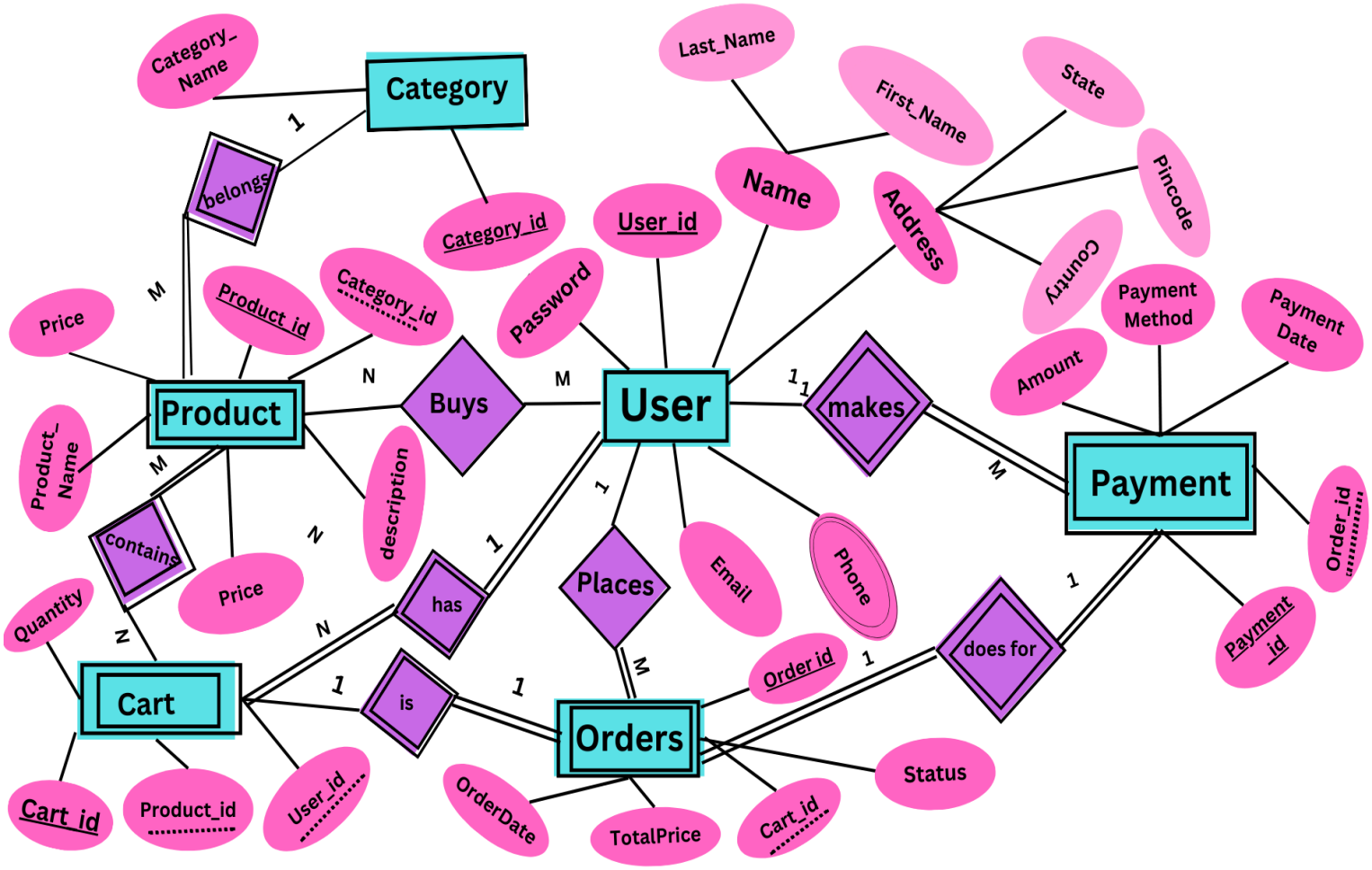
4.Different payment methods (credit/debit cards, online wallets, etc.) are accepted.

5.Users can add/remove multiple products from their carts before placing an order.

6.Products belong to specific categories or departments.

7.Orders can be placed only after adding the products to the cart.

ER Diagram:


Category_ Name
Category
belongs
1
M
Category_id
Price
Product_id
Category_id
Password
User_id
Name
Last_Name
First_Name
State
Pincode
Address
Country
Payment Method
Payment Date
Amount
Product
N
Buys
M
User
1
1
makes
M
Payment
Product_ Name
M
contains
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description
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Order_id
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N
has
1
1
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1
1
does for
Payment _id
Cart
1
is
1
Orders
Order id
Cart_id
Product_id
User_id
OrderDate
TotalPrice
Cart_id
Status

Relational Schema:

Entity: User
Attributes:
User_Id(PK)
Name(Composite Attribute)
Phone
Email
Password
Address(Composite Attribute)

1NF:- This relation doesn't satisfy the 1NF condition because of the presence of composite attributes.So,to bring this relation into 1NF we have to insert sub attributes instead of main attributes.

Attributes:
User_id(PK)
First_Name
Last_Name
Phone
Email
Password
Pincode
State
Country

Functional Dependencies:

- User_id → First_Name
- User_id → Last_Name
- User_id → Password
- User_id → Phone
- User_id → Email
- User_id → Pincode
- User_id → State
- User_id → Country
- Pincode → State
- State → Country

2NF: As the determinant of the above functional dependencies is single valued attribute.As no proper subset of candidate key exists and no chance of existence of partial dependency,the above relation is in 2NF.

3NF: In the above Functional dependencies, Pincode and state are nonprime attributes and they are determining another non-prime attribute country.So, transitive dependency exist .Therefore this table is not in 3NF.
To bring this table into 3NF we should do lossless decomposition.

Decomposition into tables:
1) USER - user_id, First_Name, Last_Name, email, Password, Pincode
2) PIN - Pincode, State

3) STATE - State, Country

BCNF :- In all the above modified tables , only the superkeys are determining all other attributes.
Hence, we can say that the table is in BCNF.

Entity: Category
Attributes:
Category_Name
Category_id(PK)

Functional Dependencies:

- Category_id→Category_Name

This relation satisfies the 1NF condition as it ensures that each column contains atomic values with no repeating groups. Furthermore, it has no partial dependencies because all columns are functionally dependent on the primary key. Therefore, the relation satisfies the 2NF condition.
All functional dependencies are from the candidate key (prime attribute) to non-prime attributes, eliminating partial dependencies. Consequently, the table is also in 3NF since there are no transitive dependencies between non-prime attributes.Finally, all functional dependencies are from the superkey, Payment_id, to all other attributes, confirming that this table is in BCNF.

Entity: Product
Attributes:
Product_id(PK)
Category_id(FK)
Product_Name
Description
Price

Functional Dependencies:

- Product_id →Category_id
- Product_id→Product_Name
- Product_id→Description
- Product_id→ Price
- Product_Name→Price
- Product_Name→Description

This relation satisfies the 1NF condition as it ensures that each column contains atomic values with no repeating groups. Furthermore, it has no partial dependencies because all columns are functionally dependent on the primary key. Therefore, the relation satisfies the 2NF condition.

In the above Functional dependencies Product_Name is nonprime attributes and it is determining another non-prime attribute country. So,transitive dependency exist .Therefore this table is not in 3NF.
To bring this table into 3NF we should do lossless decomposition.

Decomposition into tables:

1)**Product**:Product_id,Category_id,Product_Name
2)**Price:**Product_Name,Description,Price

In the above tables, as all functional dependencies are from the superkeys to all other attributes, confirming that this tables are in BCNF.

Entity: Cart
Attributes:
Cart_id(PK)
User_id(FK)
Product_id(PK)
Quantity

Functional dependencies:

- Cart_id→User_id
- Product_id,Cart_id→Quantity

1NF: This relation satisfies the 1NF condition as it ensures that each column contains atomic values with no repeating groups.

2NF: In this table (Cart_id,Product_id) becomes the primary key. User_id attribute partially depends on the primary key i.e., on the Cart_id prime attribute.So there is Partially Dependencies.To bring this table into 2NF we should do lossless decomposition.

Decomposition into tables:

Cart: Cart_id,User_id
Product_Cart: Cart_id, Product_id,Quantity

3NF: The table is in 3NF since there are no transitive dependencies between non-prime attributes.

BCNF: In the above tables, as all functional dependencies are from the superkeys to all other attributes, confirming that this tables are in BCNF.

Entity: Orders

Attributes:

Order_id(PK)
Cart_id(FK)
Status
TotalPrice
OrderDate

Functional dependencies:

- Order_id→Cart_id
- Order_id→Status
- Order_id→TotalPrice
- Order_id→OrderDate

This relation satisfies the 1NF condition as it ensures that each column contains atomic values with no repeating groups. Furthermore, it has no partial dependencies because all columns are functionally dependent on the primary key. Therefore, the relation satisfies the 2NF condition.
All functional dependencies are from the candidate key (prime attribute) to non-prime attributes, eliminating partial dependencies. Consequently, the table is also in 3NF since there are no transitive dependencies between non-prime attributes.Finally, all functional dependencies are from the superkey, Payment_id, to all other attributes, confirming that this table is in BCNF.

Entity: Payment
Attributes:
Payment_id(PK)
Order_id(FK)
Amount
PaymentDate
PaymentMethod

Note:Here amount includes TotalPrice from orders plus other charges including like delivery charges.
Functional Dependencies:

- Payment_id→Amount
- Payment_id→Order_id
- Payment_id→PaymentDate

- Payment_id→PaymentMethod

Similar to the Order entity this also satisfies the 1NF,2NF,3NF,BCNF conditions.

--CREATING TABLES :-

--1)User

```
CREATE TABLE User (
   User_id varchar(10) NOT NULL PRIMARY KEY,
   First_Name VARCHAR(20),
   Last_Name VARCHAR(20),
   Phone Varchar(20),
   Email VARCHAR(50),
   Password VARCHAR(20),
   Pincode VARCHAR(10)
);
```

--2)PIN

```
Create table PIN (
  Pincode  VARCHAR(10) PRIMARY KEY,
  State VARCHAR(20)
  );
```

--3)State

```
Create Table State (
  State varchar(20) PRIMARY KEY,
  Country varchar(20)
  );
```

--4)Category

```
Create Table Category (
  Category_id INT PRIMARY KEY,
  Category_Name VARCHAR(20)
  );
```

--5) Product

```
CREATE TABLE Product (
    Product_id INT PRIMARY KEY,
    Category_id INT,
    Product_Name VARCHAR(20),
        FOREIGN KEY (Category_id) REFERENCES
        Category(Category_id)
);
```

--6)Price

```
CREATE TABLE Price (
    Product_Name VARCHAR(20) PRIMARY KEY,
    Price INT,
    Description VARCHAR(255)
);
```

--7)Cart

```
CREATE TABLE Cart (
    Cart_id INT,
    User_id varchar(10),
Primary key (Cart_id),
    FOREIGN KEY (user_id) REFERENCES User(User_id)
);
```

--8)Product_Cart

```
CREATE TABLE Product_Cart (
 Cart_id INT,
    Product_id INT,
   Quantity INT,
Primary key (Cart_id,Product_id)
);
```

--9)Orders

```
Create Table Orders(
  Order_id int PRIMARY KEY,
  Cart_id INT,
 OrderDate date,
TotalPrice int,
  Status varchar(50),
        FOREIGN KEY (Cart_id) REFERENCES Cart(Cart_id)
  );
```

--10)Payment

```
CREATE TABLE Payment (
    Payment_id INT PRIMARY KEY,
 Order_id INT,
   Amount INT,
    PaymentDate DATE,
  PaymentMethod Varchar(30),
    FOREIGN KEY (Order_id) REFERENCES Orders(Order_id)
);
```

--Inserting data into tables :-

--1)User

```
insert into User values
('happy_1','lalith','takare','9673682921','lalith_123@
gmail.com','takare*2','29384');

insert into User values
('m3g4n','meghana','pasikanti','6322232541','megh
anapasikanti@gmail.com','m_pasi*2','10283');

insert into User values
('asam_123','asam','samba','3256974105','asamsa
mba@gmail.com','test1', '93749');
insert into User values
('suji_rider','sujit','das','3689741025','sujitdas@gmai
l.com','passw_ord','92748');
insert into User values
('hema_123','hema','landa','6598126523','hemaland
a@gmail.com','hema*123','92472');

insert into User values
('sruth_56','sruthi','pulusu','6548236545','sruthipulu
su@gmail.com','zinch','65463');
```

--2)PIN

```
Insert into PIN
Values (29384, 'Telangana');
Insert into PIN
Values (10283, 'Tokyo');
Insert into PIN
Values (93749, 'Beijing');
Insert into PIN
Values (92748, 'Tripura');
Insert into PIN
Values (92472, 'Hassen');
Insert into PIN
Values (65463, 'Washington');
```

--3)State

```
Insert into STATE
Values ('Telangana', 'India');
Insert into STATE
Values ('Tokyo', 'Japan');
Insert into STATE
```

```
Values ('Beijing', 'China');
Insert into STATE
Values ('Tripura', 'India');
Insert into STATE
Values ('Hassen', 'Germany');
Insert into STATE
Values ('Washington', 'America');
```

--4)Category

```
INSERT INTO Category (Category_id, Category_Name) VALUES
(1, 'Electronics'),
(2, 'Clothing'),
(3, 'Books'),
(4, 'Home and Kitchen'),
(5, 'Sports and Outdoors'),
(6, 'Beauty and Personal Care');
```

--5) Product

```
insert into Product (Product_id, Category_id,Product_Name) values
(1,1,'Laptop'),
(2,3,'Hydraulic Structures'),
```

(3,6,'Sunscreen'),

(4,5,'Shuttlecock'),

(5,4,'Cookware Set'),

(6,5,'Running Shoes'),

(7, 1, 'Smartphone'),

(8, 2, 'T-shirt'),

(9, 3, 'Novel'),

(10, 4, 'Coffee Maker'),

(11, 5, 'Yoga Mat'),

(12, 6, 'Perfume');

--6)Price

INSERT INTO Price (Product_Name, Price, Description) VALUES

('laptop', 57000, 'Dell 15 Laptop, 13th Gen Intel Core i5-1335U Processor/ 8GB/ 512GB SSD/15.6" (39.62cm) FHD AG 120Hz 250 nits Narrow Border/ Win11 + MSO21/15 Month McAfee/Carbon Black/Thin & Light- 1.66kg'),

('hydraulic structures', 3000, 'This book discusses in detail the planning, design, construction and management of hydraulic structures, covering dams, spillways, tunnels'),

('sunscreen', 600, 'Sunscreen SPF 50 PA+++ | UVA/B & Blue Light Protection for Men & Women | Oily, Dry, Sensitive & Combination Skin | Fragrance-Free | 50g'),

('shuttle', 100, 'Badminton Nylon Shuttlecock with Heavy Cork with Excellent Flite, Kids Beginner Practice Shuttlecocks'),

('cookware set', 1599, 'Pro Cook Kitchen Jewel Set of 5 (Fry pan 24 cm/1.6 Litres; Kadhai 24 cm/2.5 Litres with glass lid; Tawa 25 cm; Nylon Laddle and Spatula), Peach | Induction | Dishwasher | Hot Plate | Flame Safe'),

('running shoes', 1300, 'Chrome-02 Sports Running, Walking & Gym Shoes with Max Cushion Technology with Memory Form Casual Sneaker Shoes'),

('Smartphone',10000,'13C 5G (Starlight Black, 4GB RAM, 128GB Storage) | MediaTek Dimensity 6100+ 5G | 90Hz Display'),

('T-shirt',500,'Pure Cotton Oversized Fit Multicolor Official Marvel & Disney Merchandise'),

('Novel','1000','Immerse yourself in the captivating world of this gripping novel. Explore the depths of human emotions and follow the thrilling narrative that will keep you on the edge of your seat. With well-developed characters and an engaging plot, this novel promises an unforgettable reading experience'),

('Coffee Maker',1000,'urban platter French Press Coffee Maker Pot, 850ml [Toughened Boron Glass, Stainless Steel Plunger]'),

('Yoga Mat',900,'Basics 13mm Extra Thick NBR Yoga and Exercise Mat with Carrying Strap, Black'),

('Perfume',565,'Luxury Unisex Eau De Parfum Gift Set 4 x 20ml for Men & Women with SKAI, FRESH, WHITEOUD, HONEY OUD Perfume|Long Lasting EDP Fragrance Scent');

--7)Cart

```
insert into Cart (Cart_id,User_id) values
(122,'happy_1'),
(123,'m3g4n'),
(132,'asam_123'),
(212,'suji_rider'),
(224,'hema_123'),
(256,'sruth_56'),
(258,'suji_rider');
```

--8)Product_Cart

```
insert into Product_Cart (Cart_id,Product_id,Quantity)
values
(122,5,2),
(122,10,1),
(122,1,1),
(123,4,6),
```

(132,8,2),
(132,12,3),
(132,2,1),
(212,2,1),
(224,10,1),
(224,7,1),
(256,6,1),
(256,3,4),
(258,2,1);

--9)Orders

```
INSERT INTO Orders(Order_id,Cart_id,OrderDate,
    TotalPrice,Status) VALUES
(101, 122, '10-01-2024', 58599, 'Processing'),
(102, 132, '4-12-2023',5695, 'Shipped'),
(103, 256, '26-11-2023', 2500, 'Delivered'),
(104, 123, '8-01-2024', 600, 'Processing'),
(105, 258, '28-12-2023', 3000, 'Shipped'),
(106, 224, '23-12-2023', 11000, 'Delivered');
```

--10)Payment

```
INSERT INTO Payment (Payment_id,Order_id,Amount,
    PaymentDate, PaymentMethod) VALUES
(2670, 101,5899, '15-01-2024', 'Credit Card'),
(9860,102,5695, '4-12-2023', 'PayPal'),
(5670, 103,2500, '30-11-2023', 'Debit Card'),
(4560, 104,600, '10-01-2024', 'Credit Card'),
```

(3450, 105, 3000, '28-12-2023', 'PayPal'),
(980, 106,11000, '25-12-2023', 'Debit Card');

Table Outputs:

1)User

User_id	First_Name	Last_Name	Phone	Email	Password	Pincode
happy_1	lalith	takare	9673682921	lalith_123@gmail.com	takare*2	29384
m3g4n	meghana	pasikanti	6322232541	meghanapasikanti@gmail.com	m_pasi*2	10283
asam_123	asam	samba	3256974105	asamsamba@gmail.com	test1	93749
suji_rider	sujit	das	3689741025	sujitdas@gmail.com	passw_ord	92748
hema_123	hema	landa	6598126523	hemalanda@gmail.com	hema*123	92472
sruth_56	sruthi	pulusu	6548236545	sruthipulusu@gmail.com	zinch	65463

2)PIN

Pincode	State
29384	Telangana
10283	Tokyo
93749	Beijing
92748	Tripura
92472	Hassen
65463	Washington

3)State

State	Country
Telangana	India
Tokyo	Japan
Beijing	China
Tripura	India
Hassen	Germany
Washington	America

4)Category

Category_id	Category_Name
1	Electronics
2	Clothing
3	Books
4	Home and Kitchen
5	Sports and Outdoors
6	Beauty and Personal Care

5) Product

Product_id	Category_id	Product_Name
1	1	Laptop
2	3	Hydraulic Structures
3	6	Sunscreen
4	5	Shuttlecock
5	4	Cookware Set
6	5	Running Shoes
7	1	Smartphone
8	2	T-shirt
9	3	Novel
10	4	Coffee Maker
11	5	Yoga Mat
12	6	Perfume

6)Price

Product_Name	Price	Description
laptop	57000	Dell 15 Laptop, 13th Gen Intel Core i5-1335U Processor/ 8GB/ 512GB SSD/15.6" (39.62cm) FHD AG 120Hz 250 nits Narrow Border/ Win11 + MSO21/15 Month McAfee/Carbon Black/Thin & Light- 1.66kg
hydraulic structures	3000	This book discusses in detail the planning, design, construction and management of hydraulic structures, covering dams, spillways, tunnels
sunscreen	600	Sunscreen SPF 50 PA+++ | UVA/B & Blue Light Protection for Men & Women | Oily, Dry, Sensitive & Combination Skin | Fragrance-Free | 50g
shuttle	100	Badminton Nylon Shuttlecock with Heavy Cork with Excellent Flite, Kids Beginner Practice Shuttlecocks
cookware set	1599	Pro Cook Kitchen Jewel Set of 5 (Fry pan 24 cm/1.6 Litres; Kadhai 24 cm/2.5 Litres with glass lid; Tawa 25 cm; Nylon Laddle and Spatula), Peach | Induction | Dishwasher | Hot Plate | Flame Safe
running shoes	1300	Chrome-02 Sports Running, Walking & Gym Shoes with Max Cushion Technology with Memory Form Casual

		Sneaker Shoes
Smartphone	10000	13C 5G (Starlight Black, 4GB RAM, 128GB Storage) | MediaTek Dimensity 6100+ 5G | 90Hz Display
T-shirt	500	Pure Cotton Oversized Fit Multicolor Official Marvel & Disney Merchandise
Novel	1000	Immerse yourself in the captivating world of this gripping novel. Explore the depths of human emotions and follow the thrilling narrative that will keep you on the edge of your seat. With well-developed characters and an engaging plot, this novel promises an unforgettable reading experience
Coffee Maker	1000	urban platter French Press Coffee Maker Pot, 850ml [Toughened Boron Glass, Stainless Steel Plunger]
Yoga Mat	900	Basics 13mm Extra Thick NBR Yoga and Exercise Mat with Carrying Strap, Black
Perfume	565	Luxury Unisex Eau De Parfum Gift Set 4 x 20ml for Men & Women with SKAI, FRESH, WHITEOUD, HONEY OUD Perfume|Long Lasting EDP Fragrance Scent

7)Cart

Cart_id	User_id
122	happy_1
123	m3g4n
132	asam_123
212	suji_rider
224	hema_123
256	sruth_56
258	suji_rider

8)Product_Cart

Cart_id	Product_id	Quantity
122	5	2
122	10	1
122	1	1
123	4	6
132	8	2
132	12	3
132	2	1
212	2	1
224	10	1
224	7	1
256	6	1
256	3	4
258	2	1

9)Orders

Order_id	Cart_id	OrderDate	TotalPrice	Status
101	122	10-01-2024	58599	Processing
102	132	4-12-2023	5695	Shipped
103	256	26-11-2023	2500	Delivered
104	123	8-01-2024	600	Processing
105	258	28-12-2023	3000	Shipped
106	224	23-12-2023	11000	Delivered

10)Payment

Payment_id	Order_id	Amount	PaymentDate	PaymentMethod
2670	101	5899	15-01-2024	Credit Card
9860	102	5695	4-12-2023	PayPal
5670	103	2500	30-11-2023	Debit Card
4560	104	600	10-01-2024	Credit Card
3450	105	3000	28-12-2023	PayPal
980	106	11000	25-12-2023	Debit Card