E-Commerce Overview

The topic in focus for this assignment is the e-commerce database management system. E-commerce has revolutionized how customers shop for products from the comfort of their own homes. Since the pandemic, e-commerce has skyrocketed as customers and businesses adapted to a new way of life with social distancing and quarantine in effect. It has created a global marketplace that anyone from anywhere in the world can access. There have been many businesses that solely focus on connecting brands and companies with customers through online shopping. This complex ecosystem which provides an exceptional online shopping experience depends on a variety of functions and technology to ensure the efficiency as well as security of online transactions.

Key Functions

Many functions go on in the backend to ensure a customer's experience with e-commerce goes as efficiently as possible. One key function of online shopping is the catalog itself, this is where the business can display its products and where the customer can view the product and its details such as the description of the product, price and if it is available. This particular function allows for a smooth and efficient browsing experience for the customer. The next key function for e-commerce is managing the orders placed, which would track the order placed by the customer from when the order is placed to when it reaches the customer. This function is responsible for payment confirmation, shipping details, billing information etc. Having efficient order management lets the business ensure customer satisfaction. The most important key function would be the payment gateways for online businesses where transactions are made. The gateways ensure that the transactions are safe and accurate to the price. It would also be optimal for the gateways to have multiple secure payment methods such as credit cards, digital wallets and services like PayPal. These gateways are important in ensuring the transactions are safe and reducing the risk of fraud.

Information Flow

With many key functions that are crucial for online shopping to be conducted smoothly and safely, these systems must work together to give the customer a positive experience shopping online. The DBMS helps create, manage and control databases which ensure the smooth operation of online shopping. They are expected to synchronize the various types of data effectively for different key functions from the moment the customer visits the website to the customer receiving the product. The process starts with product catalogue management which allows the customer to view descriptions of a product and if interested, buy the product, this is then the responsibility of the order management system as it collects customer data such as their shipping address, payment method and the status of their order until it is delivered to the customer. The most sensitive and vital DBMS is the payment gateway. After the customer data is collected, the customer has to use the payment gateway to pay for the product. This is where the financial aspect of the process is stored, the customer is asked to choose their method of payment and enter the required credentials to ensure the method of payment is valid and the transaction is completely secure.

Entities and Attributes

1. **Admin**
   - **Admin_ID** (Primary Key)
   - **Admin_name**
   - **Admin_role**
2. **E-commerce Website**
   - **Website_name** (Primary Key)
   - **Website_URL**
3. **Category**
   - **Category_ID** (Primary Key)
   - **Category_name**
4. **Product**
   - **Product_ID** (Primary Key)
   - **Product_name**
   - **Quantity**
   - **Price**
5. **Cart**
   - **Cart_ID** (Primary Key)
   - **Product_ID** (Foreign Key: Related to Product entity)
   - **Quantity**
6. **Supplier**
   - **Supplier_ID** (Primary Key)
   - **Supplier_name**
   - **Supplier_address**
     - **Country**
     - **State**
     - **City**
     - **Street**
     - **Unit**
     - **Postal Code**

7. **Inventory**
   - **Batch_ID** (Primary Key)
   - **Product_ID** (Foreign Key: Related to Product entity)
   - **Price**
   - **Quantity**
8. **Customer**
   - **Customer_ID** (Primary Key)
   - **Email**
   - **Password**
   - **Contact_number**
   - **F_name** (First Name)
   - **L_name** (Last Name)
   - **Address**
     - **Country**
     - **State**
     - **City**
     - **Street**
     - **Unit**
     - **Postal Code**
9. **Order**
   - **Order_ID** (Primary Key)
   - **Cart_ID** (Foreign Key: Related to Cart entity)
   - **Customer_ID** (Foreign Key: Related to Customer entity)
   - **Status**
   - **Total Amount**
10. **Tracking Details**
    - **Tracking_ID** (Primary Key)
    - **Order_ID** (Foreign Key: Related to Order entity)
    - **Shipping_Method**
    - **Delivery_date**

11. **Payment**

- **Payment_ID** (Primary Key)
- **Order_ID** (Foreign Key: Related to Order entity)
- **Payment_Method**
- **Payment_date**
- **Amount**

ER for E-Commerce Website

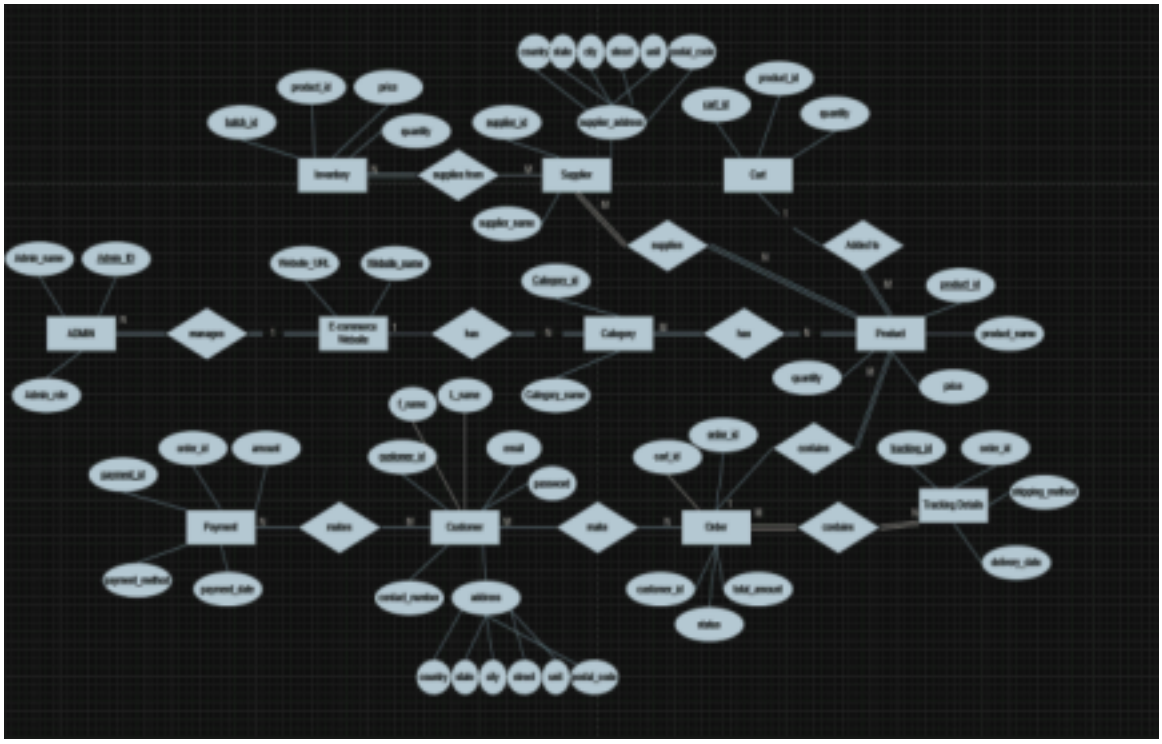

Table Decomposition

Example: Non-normalized table of Order records

Initial Table (Non-Normalized)

OrderID	CustomerName	CustomerAddress	Product	ProductCategory	Price
1	Alice Smith	123 Elm St.	Laptop	Electronics	1200
2	Bob Jones	456 Oak St.	T-shirt	Clothing	25
3	Alice Smith	123 Elm St.	Novel	Books	15
4	Alice Smith	123 Elm St.	T-shirt	Clothing	25

First Normal Form (1NF)

In 1NF, each column must contain atomic values with no repeating groups.

First Normal Form (1NF)

OrderID	CustomerName	CustomerAddress	Product	ProductCategory	Price
1	Alice Smith	123 Elm St.	Laptop	Electronics	1200
2	Bob Jones	456 Oak St.	T-shirt	Clothing	25
3	Alice Smith	123 Elm St.	Novel	Books	15
4	Alice Smith	123 Elm St.	T-shirt	Clothing	25

Second Normal Form (2NF)

Order Table

Order Table

OrderID	Product	ProductCategory	Price	Quantity	TotalAmount
1	Laptop	Electronics	1200	1	1200
2	T-shirt	Clothing	25	2	50
3	Novel	Books	15	3	45
4	T-shirt	Clothing	25	1	25

Customer Table

CustomerID	CustomerName	CustomerAddress
1	Alice Smith	123 Elm St.
2	Bob Jones	456 Oak St.

Order-Customer Table

OrderID	CustomerID
1	1
2	2
3	1
4	1

Product Table

ProductID	ProductName	ProductCategory	Price
1	Laptop	Electronics	1200
2	T-shirt	Clothing	25
3	Novel	Books	15

Revised Order Table

OrderID	ProductID	Quantity	TotalAmount
1	1	1	1200
2	2	2	50
3	3	3	45
4	2	1	25

Customer Table

CustomerID	CustomerName	CustomerAddress
1	Alice Smith	123 Elm St.
2	Bob Jones	456 Oak St.

Order-Customer Table

OrderID	CustomerID
1	1
2	2
3	1
4	1

Menu with UI

```
Menu:
1. Create Tables
2. Drop Tables
3. Populate Tables
4. Query Data
5. Exit
Choose an option: 1
All tables created successfully!
```

```
Menu:
1. Create Tables
2. Drop Tables
3. Populate Tables
4. Query Data
5. Exit
Choose an option: 2
Table dropped: TrackingDetails
Table dropped: Payment
Table dropped: Inventory
Table dropped: Supplier
Table dropped: Cart
Table dropped: "Order"
Table dropped: Customer
Table dropped: Product
Table dropped: Category
Table dropped: Admin
```

```
Menu:
1. Create Tables
2. Drop Tables
3. Populate Tables
4. Query Data
5. Exit
Choose an option: 4
Admin_ID: 1, Name: John Doe, Role: Manager
Admin_ID: 2, Name: Jane Smith, Role: Assistant
```