



COURSE: DATABASE AND INFORMATION SYSTEM

PROFESSOR NAME: MAURO IACONO

PROJECT BY: PRABHJOT PRABHJOT

SPECIFICATIONS

ShopMaster is a cutting-edge online retail management system meticulously designed to meet the complex needs of modern retail operations. At its core, ShopMaster handles a diverse range of products, including individual items, second-hand goods, and bundled offers, ensuring that every product is managed with precision and care. Each product is identified by a unique ProductID, and detailed information such as name, description, price, and stock quantity is stored to ensure that inventory is always up-to-date. Additionally, products are categorized effectively, allowing for easy navigation and retrieval, which is crucial in a fast-paced retail environment.

Customer management is a key focus of ShopMaster, ensuring that each customer's experience is personalized and seamless. The system stores comprehensive records of each customer, including their name, contact information, and address, under a unique CustomerID. This enables retailers to provide personalized service and maintain effective communication, whether it's for marketing purposes or for resolving any issues that may arise. By keeping meticulous records, ShopMaster ensures that retailers can build strong, lasting relationships with their customers, fostering loyalty and repeat business.

Order processing within ShopMaster is designed to be efficient and error-free, tracking every detail from the moment an order is placed until it is fulfilled. The system records essential order information, such as the OrderID, customer details, order date, and total amount, ensuring that the entire process is transparent and manageable. For each order, individual items are tracked through an OrderItem table, which includes information on the specific products, quantities, and prices. This level of detail ensures that inventory levels are accurately managed, and customers receive their orders promptly and correctly.

One of the standout features of ShopMaster is its ability to handle complex sales scenarios, such as bundles and promotional offers. Bundles, which may include both products and services, are available for limited periods and can be priced attractively, either by discounting the total cost or applying a percentage reduction. This flexibility allows retailers to create compelling offers that drive sales. Additionally, ShopMaster supports the issuance of coupons with purchases, which can be used for discounts on future transactions. These coupons are highly flexible, applying to selected products or bundles and being valid for a defined period, adding another layer of promotional strategy for retailers.

Finally, ShopMaster acknowledges the importance of handling second-hand items and services within the retail environment. For second-hand products, detailed histories, including information about previous owners and unique warranty terms, are stored, ensuring transparency and trust with customers. Services, such as maintenance packages or subscriptions, are also managed within ShopMaster, and these can be sold either individually or as part of a bundle. The system even accommodates variable pricing for services based on duration, giving customers the flexibility to choose the service that best meets their needs. By integrating these advanced

features, ShopMaster stands as a comprehensive solution for retailers, offering a seamless and efficient way to manage their operations and enhance the customer experience.

Requirements:

- a. Listing all the products within a specific category.
- b. Finding all orders placed by a specific customer.
- c. Counting the number of orders that include a specific product.
- d. Listing all the bundles and services purchased by a specific customer.

Development Stages

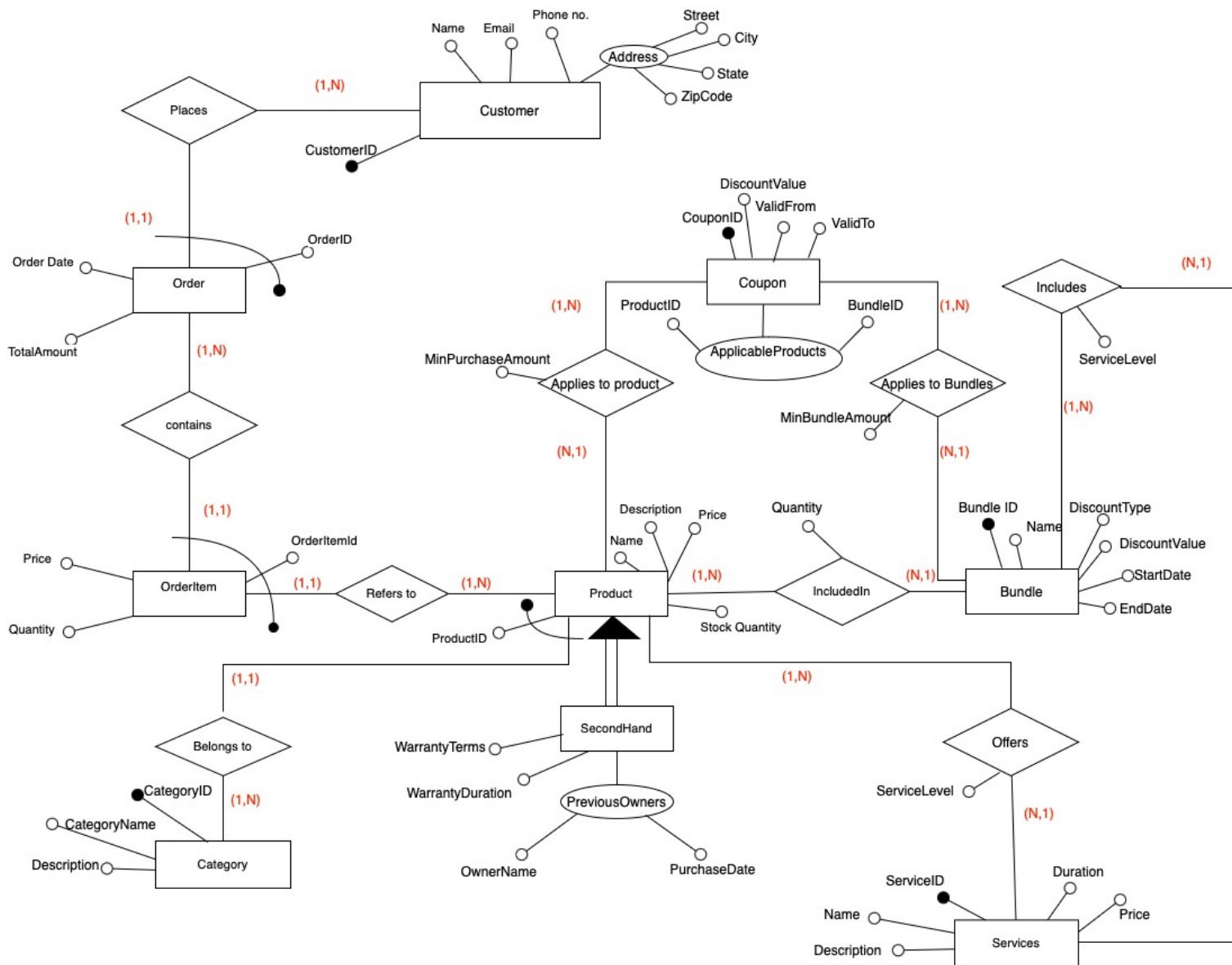
- **ER Diagram:** Design an ER diagram to visually represent entities like Product, Customer, Order, OrderItem, and Category, along with their attributes and relationships.
- **Relational Model:** Develop a relational model from the ER diagram, defining tables, columns, primary keys, and foreign keys to establish entity relationships.
- **SQL Queries:** Implement the relational model using SQL, including table creation, data insertion, and writing queries for database management and data retrieval.

Some Important Terms

Term	Description	Synonyms	Links
Product	An item available for sale in the store, including details like name, description, price, and stock.	Item	Category,OrderItem, Bundle, Customer
Customer	An individual who purchases products or services from the store.	Buyer	Order
Order	A record of a transaction made by a customer, including order date and total amount.	Purchase	Customer, OrderItem,
OrderItem	Specific details of the products or services included in an order.	Order Line	Order, Product

Category	A classification that organizes products into groups based on type or function.	Group	Product
Bundle	A special offer combining multiple products and/or services, often at a discounted price.	Package Deal	Product, Coupon, Services
Services	Non-physical offerings such as maintenance packages or subscriptions, sometimes included in bundles.	Offering	Product,Bundle
Coupon	A promotional discount provided with a purchase, applicable to future purchases.	Voucher	Bundle, Product
SecondHand	Represents used products with additional attributes like previous owners and warranty details.	Pre-owner, Used Products	Product

Entity-Relationship Schema



Data Dictionary

Entities

Entity	Description	Attributes	Identifier
Product	Represents items available for sale	ProductID, Name, Description, Price, StockQuantity, CategoryID	ProductID, CategoryID
Customer	Represents an individual who purchases products or services.	CustomerID, Name, Email, Phone no., Street, City, State, ZipCode	CustomerID
Order	Tracks transactions made by customers, detailing the purchase of products and bundles.	OrderID, CustomerID, OrderDate, TotalAmount	OrderID, CustomerID
OrderItem	Details the specific products or bundles included in an order.	OrderItemID, OrderID, ProductID, Quantity, Price	OrderItemID, OrderID, ProductID
Category	Organizes products into groups for easier management and navigation.	CategoryID, CategoryName, Description	CategoryID

Bundle	Represents a collection of products and/or services sold together at a discounted price.	BundleID, Name, DiscountType, DiscountValue, StartDate, EndDate	BundleID
Services	Represents non-physical offerings, such as maintenance packages or subscriptions.	ServiceID, Name, Description, Duration, Price	ServiceID
Coupon	Provides discounts on future purchases, applicable to specific products or bundles.	CouponID, DiscountValue, ValidFrom, ValidTo, ApplicableProducts (ProductID), ApplicableBundles (BundleID)	CouponID
SecondHand	Represents used products with additional attributes like previous owners and warranty details.	ProductID, OwnerName, PurchaseDate, WarrantyDuration, WarrantyTerms	ProductID

Relationships

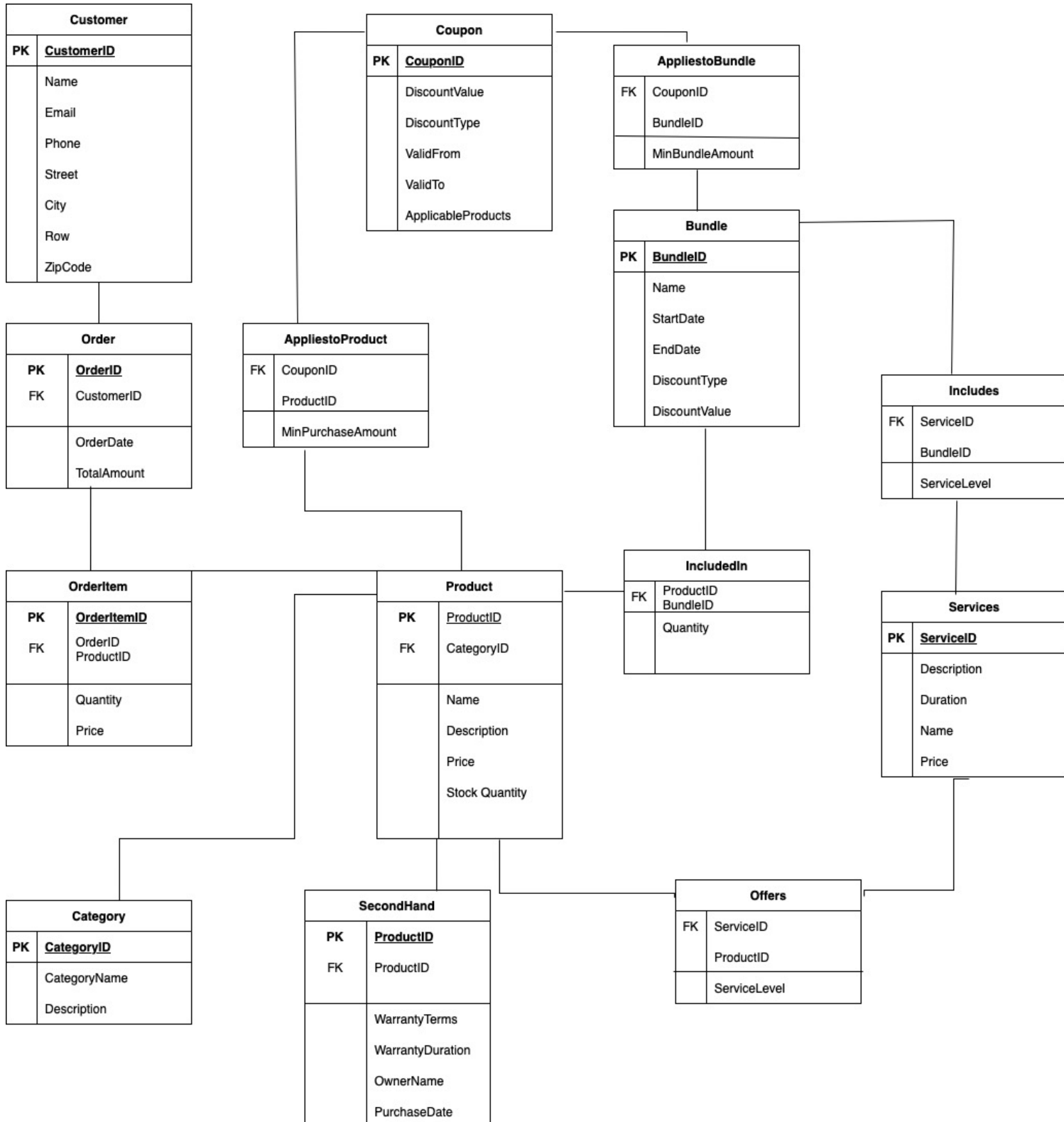
Relation	Description	Entities Involved	Attributes
Contains	Associates an Order with the orderitem	Order (1,N), OrderItem (1,1)	
Places	Links a Customer to their Order(s).	Customer (1,N), Order (1,1)	
Belongs to	Associates a Product with its Category.	Product (N,1), Category (1,N)	

IncludedIn	Links a Bundle to the products	Bundle (N,1), Product (1,N)	ProductID, BundleID, Quantity
Applies to product	Associates a Coupon with the products it can be applied to.	Coupon (1,N), Product (N,1)	CouponID, ProductID, MinPurchaseAmount
Applies to Bundle	Associates a Coupon with the Bundle it can be applied to.	Coupon (1,N), Bundle (N,1)	CouponID, BundleID, MinBundleAmount
Includes	Links a Service to the Bundle that includes it.	Service (1,N), Bundle (1,N)	ServiceID, BundleID,ServiceLevel
Offers	Links a Service to the product that offers it.	Service (1,N), Bundle (1,N)	ServiceID, ProductID,ServiceLevel

Business Rules

1. **Product Assignment:** Every product must be assigned to a category before it can be added to the inventory and made available for sale.
2. **Bundle Discounts:** Bundles must be offered at a price lower than the sum of the individual products or services included in them.
3. **Second-Hand Product Details:** A secondHand product must reference an existing product.
4. **Coupon Usage:** Coupons can only be applied to selected products or bundles and must have a clear expiration date.
5. **Service :** Services included in a bundle must have a specified duration and cannot be second-hand.
6. No two products can have the same name under same category.

Relational Model



SQL Queries

Listing all the products within a specific category

```
SELECT p.ProductID, p.Name AS ProductName, p.Description, p.Price
FROM Product p
INNER JOIN Category c ON p.CategoryID = c.CategoryID
WHERE c.CategoryName = 'Electronics';
```

Finding all orders placed by a specific customer

```
SELECT o.OrderID, o.OrderDate, o.TotalAmount
FROM `Order` o
INNER JOIN Customer c ON o.CustomerID = c.CustomerID
WHERE c.Name = 'John Doe';
```

Counting the number of orders that include a specific product

```
SELECT p.ProductID, p.Name AS ProductName, COUNT(o.OrderID) AS OrderCount
FROM OrderItem oi
INNER JOIN Product p ON oi.ProductID = p.ProductID
INNER JOIN `Order` o ON oi.OrderID = o.OrderID
WHERE p.Name = 'Laptop A'
GROUP BY p.ProductID, p.Name;
```

Listing all the bundles and services purchased by a specific customer

```
SELECT b.BundleID, b.Name AS BundleName, s.ServiceID, s.Name AS  
ServiceName  
  
FROM `Order` o  
  
INNER JOIN Customer c ON o.CustomerID = c.CustomerID  
  
INNER JOIN OrderItem oi ON o.OrderID = oi.OrderID  
  
LEFT JOIN Bundle b ON oi.ProductID = b.BundleID  
  
LEFT JOIN ProductService ps ON oi.ProductID = ps.ProductID  
  
LEFT JOIN Service s ON ps.ServiceID = s.ServiceID  
  
WHERE c.Name = 'John Doe';
```