

DBMS Project Deliverable 2

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March 31, 2017

1 Initial Relational Schema

- Suppliers(SupplierID, SupplierName, Address, Country)
- Products(ProductID, CategoryID, SupplierID, ProductName, Price, Size, Color, GarmentType, Rating)
- Category(CategoryID, CategoryName, Description)
- Customer(CustomerID, CustomerName, Address, City, Country, Phone, Email, Password, ShipAddress, PendingShipments)
- Orders(OrderID, CustomerID, SupplierID, PaymentID, DeliveryCharges, Amount, TransactionStatus, ShipDate, OrderDate)
- OrderDetails(OrderID, ProductID, CustomerID, Quantity, Status)
- Admin(AdminID, AdminName, AdminPassword)

2 Normal Forms

Definitions:

1. 2NF: All non-prime attributes are fully functionally dependent on any primary key on R.
2. 3NF: There should not be the case that a non-prime attribute is determined by another non-prime attribute.
3. BCNF: $X \rightarrow Y$ implies X is a superkey.

3 Functional Dependencies

1. Suppliers(SupplierID, SupplierName, Address, Country)

- $\text{SupplierID} \rightarrow \text{SupplierName}$
- $\text{SupplierID} \rightarrow \text{Address}$
- $\text{SupplierID} \rightarrow \text{Country}$
- $\text{Address} \rightarrow \text{Country}$

This is in 3NF. This is in BCNF.

2. Products(ProductID, CategoryID, SupplierID, ProductName, Price, Size, Color, GarmentType, Rating)

- $\text{SupplierID} \rightarrow \text{SupplierName}$
- $\text{SupplierID} \rightarrow \text{Address}$
- $\text{SupplierID} \rightarrow \text{Country}$
- $\text{Address} \rightarrow \text{Country}$

This table is not in 2NF since attributes can be determined using a subset of the primary key (ProductID, CategoryID, SupplierID).

We can modify the primary key such that all attributes can be fully functionally dependent on the modified primary key.

So, the modified primary key is ProductID.

Modified Table: Products(ProductID, CategoryID, SupplierID, ProductName, Price, Size, Color, GarmentType, Rating)

3. Category(CategoryID, CategoryName, Description)

- $\text{CategoryID} \rightarrow \text{CategoryName, Description}$

This is in 3NF as well as BCNF.

4. Customer(CustomerID, CustomerName, Address, City, Country, Phone, Email, Password, ShipAddress, PendingShipments)

- $\text{CustomerID} \rightarrow \text{CustomerName, Address, City, Country, Phone, Email, Password, ShipAddress, PendingShipments}$

This is in 3NF as well as BCNF.

5. Orders(OrderID, CustomerID, SupplierID, PaymentID, DeliveryCharges, Amount, TransactionStatus, ShipDate, OrderDate)

- $\text{OrderID} \rightarrow \text{OrderDate, PaymentID, TransactionStatus, ShipDate}$
- $\text{PaymentID} \rightarrow \text{DeliveryCharges, Amount}$

This is in 2NF, but not in 3NF or BCNF. This is because PaymentID is not a superkey. So, we break the relation into two:

a. Orders(OrderID, CustomerID, SupplierID, PaymentID, DeliveryCharges, Amount, TransactionStatus, ShipDate, OrderDate)

This table has the following functional dependency:

OrderID \rightarrow OrderDate, PaymentID, TransactionStatus, ShipDate

b. Payment (PaymentID, OrderID, DeliveryCharges, Amount)

This table has the following functional dependency:

PaymentID \rightarrow DeliveryCharges, Amount

6. OrderDetails(OrderID, ProductID, CustomerID, Quantity, Status)

- OrderID, CustomerID \rightarrow Quantity, ProductID, Status

- ProductID \rightarrow Quantity, Status

This is in 2NF, but not in 3NF or BCNF. This is because ProductID is not a superkey. So, we break the relation into two:

OrderDetails(OrderID, ProductID, CustomerID)

This table has the following functional dependency:

OrderID, CustomerID \rightarrow ProductID

ProductOrder(ProductID, Quantity, Status)

This table has the following functional dependency:

ProductID \rightarrow Quantity, Status

7. Admin(AdminID, AdminName, AdminPassword)

- AdminID \rightarrow AdminName, AdminPassword

This is in 3NF as well as BCNF.

4 Normal Form of Relational Schema

- Suppliers(SupplierID, SupplierName, Address, Country)

- Products(ProductID, CategoryID, SupplierID, ProductName, Price, Size, Color, GarmentType, Rating)

- Category(CategoryID, CategoryName, Description)

- Customer(CustomerID, CustomerName, Address, City, Country, Phone, Email, Password, ShipAddress, PendingShipments)

- Orders(OrderID, CustomerID, SupplierID, PaymentID, DeliveryCharges, Amount, TransactionStatus, ShipDate, OrderDate)

- Payment (PaymentID, OrderID, DeliveryCharges, Amount)

- OrderDetails(OrderID,ProductID,CustomerID)
- ProductOrder(ProductID,Quantity,Status)
- Admin(AdminID, AdminName, AdminPassword)