Normalization

1NF :

As all of the tables have one value in each column so they are all in 1NF.

2NF :

- **Customer-Gives-Order**(CartID , CustomerID , OrderID , Date) :

  OrderID → CustomerID

  OrderID → CartID

  New tables :

  Customer-Gives-Order(OrderID , CustomerID , Date)

  Order-Cart(OrderID , CustomerID)

- **ShippedBy**(OrderID , ShipperID , Date) :

  OrderID → ShipperID

  New tables :

  ShippedBy(OrderID , Date)

  Order-Shipper(OrderID , ShipperID)

- **OrderRateProduct**(ProductID , CustomerID , OrderID , Rate) :

  OrderID → CustomerID

  New tables :

  OrderRateProduct(ProductID , OrderID , Rate)

  Order-Customer(OrderID , CustomerID)

- **Adds**(AdminID , ProductID) :

  ProductID → AdminID

  New tables :

  Adds(ProductID , AdminID)

3NF :

- **PersonalInfo-Customer**(CustomerID , PersonalID , city , Email , Phone , Address , Country , PostalCode) :

  PersonalID → CustomerID → Email

  PersonalID → Email

  New tables :

  PersonalInfo-Customer(PersonalID , city , Email , Phone , Address , Country , PostalCode)

  Personal-Customer(PersonalID , CustomerID)

- **PersonalInfo-Supplier**(SupplierID , PersonalID , city , Email , Phone , Address , Country , PostalCode) :

  PersonalID → SupplierID → Email

  PersonalID → Email

  New tables :

  PersonalInfo-Customer(PersonalID , city , Email , Phone , Address , Country , PostalCode)

  Personal-Supplier(PersonalID , SupplierID)

- **PersonalInfo-Supplier**(EmployeeID , PersonalID , city , Email , Phone , Address , Country , PostalCode) :

  PersonalID → EmployeeID → Email

  PersonalID → Email

  New tables :

  PersonalInfo-Customer(PersonalID , city , Email , Phone , Address , Country , PostalCode)

  Personal-Employee(PersonalID , EmployeeID)

- **Category**(CategoryID , Name , Description , picture) :

  CategoryID → Name → Description → Picture

  CategoryID → Description

  CategoryID → Picture

New tables :

Category(CategoryID , Name)

Category-Description(CategoryID , Description)

Category-Picture(CategoryID , Picture)

- **Payment**(PaymentID , Address , Date , OrderID , CustomerID) :

PaymentID → OrderID → CustomerID

PaymentID → CustomerID

New tables :

Payment(PaymentID , Address , Date , CustomerID)

Payment-Order(PaymentID , OrderID)

- **DueToReceive**(PaymentID , TransactionID , Signature , SSN) :

PaymentID → TransactionID → Signature(SSN)

PaymentID → Signature(SSN)

New tables :

DueToReceive(PaymentID , Signature , SSN)

Payment-Transaction(PaymentID , TransactionID)

- **Online**(PaymentID , CreditID , CreditExpireDate , Email) :

PaymentID → CreditID → CreditExpireDate(Email)

PaymentID → CreditExpireDate(Email)

New tables :

Online(CreditID , CreditExpireDate , Email)

Payment-Credit(CreditID , PaymentID)

BCNF :

All the tables are in BCNF.

NEW TABlES (after normalization) :

User(UserID)

Supplier(SupplierID , Rate)   *-foreign key from UserID*

Person(PersonID , FirstName , LastName , SupplierID)

Business(BusinessID , CompanyName , SupplierID)

Customer(CustomerID , FirstName , LastName)   *-foreign key from UserID*

PersonalInfo-Customer(PersonalID , city , Email , Phone , Address , Country , PostalCode)

Personal-Supplier(PersonalID , SupplierID)

PersonalInfo-Customer(PersonalID , city , Email , Phone , Address , Country , PostalCode)

Personal-Supplier(PersonalID , SupplierID)

Product(ProductID , ProductName , Price , Dimensions , Color , Weight , Description , Discount , CategoryID)

Category(CategoryID , Name)

Category-Description(CategoryID , Description)

Category-Picture(CategoryID , Picture)

Supplies(SupplierID , ProductID , Quantity)

Cart(CartID , TotalCost)

ProductInCart(ProductID , CustomerID , CartID , NumberOfProduct)

Order(OrderID , Cost)

OrderDetails(OrderID , ProductID , UnitPrice , Quantity , Discount)

OrderRateProduct(ProductID , OrderID , Rate)

Order-Customer(OrderID , CustomerID)

Customer-Gives-Order(OrderID , CustomerID , Date)

Order-Cart(OrderID , CustomerID)

Shipper(ShipperID , Phone , Company)

ShippedBy(OrderID , Date)

Order-Shipper(OrderID , ShipperID)

Payment(<u>PaymentID</u> , Address , Date , <mark>CustomerID</mark>)

Payment-Order(<mark><u>PaymentID</u></mark> , <mark>OrderID</mark>)

DueToReceive(<mark><u>PaymentID</u></mark> , Signature , SSN)

Payment-Transaction(<mark><u>PaymentID</u></mark> , TransactionID)

Online(<u>CreditID</u> , CreditExpireDate , Email)

Payment-Credit(<mark><u>CreditID</u></mark> , <mark>PaymentID</mark>)

Employee(<u>EmployeeID</u> , Degree , CV , FirstName , LastName)

FullTime(<mark><u>EmployeeID</u></mark> , Salary-Scale , Holiday-Allowance)

PartTime(<mark><u>EmployeeID</u></mark> , Hourly-Rate)

Admin(<mark><u>EmployeeID</u></mark> , Admin-Password)

Security(<mark><u>EmployeeID</u></mark> , height)

Accountant(<mark><u>EmployeeID</u></mark> , Exprience)

Developer(<mark><u>EmployeeID</u></mark> , FE or BE)

Secretary(<mark><u>EmployeeID</u></mark> , Office-certificate)

Adds(<mark><u>ProductID</u></mark> , <mark>AdminID</mark>)

PersonalInfo-Customer(<u>PersonalID</u> , city , Email , Phone , Address , Country , PostalCode)

Personal-Employee(<mark><u>PersonalID</u></mark> , <mark>EmployeeID</mark>)

Next-Of-Kin(<mark><u>EmployeeID</u></mark> , Relation , Phone , Address , FirstName , LastName)