AttribTable(CustID,CustName,LocID,Phone.no,Cart,ItemID,DAgent,ItemPrice,TotalPrice,ItemQty,OrderID,EmpID,Phone.no,EmpName,Gender,JoinDate,Password,Desk.no,EmpID,DAgentID,DAgentName,Phone.no,Password,CurrentStatus,DeliveryID,Address,Landmark,VehicleID,Currentstatus,PaymentID,PaymentMethod,PaymentAmt,ItemName,ItemStatus)

Fucntional Dependencies:

CustID -> CustName,LocID,Phone.no,Cart

CustID,OrderID -> ItemID,DAgentID,ItemPrice,TotalPrice,ItemQty

EmpID -> EmpName,Phone,Gender,JoinDate, Password,Deskno,CurrentStatus,DAgentID,DAgentName

LocID -> Landmark,Address

CustID,OrderID -> PaymentID

DAgentID -> DAgentName,Password,EmpID,Phone,CurrentStatus

PaymentID -> PaymentMethod, PaymentAmt

ItemID -> ItemName,ItemPrice,ItemStatus

EmpName -> DAgentName

Phone -> Phone

Password -> Password

OrderID -> DeliveryID

DeliveryID -> DAgentID

VehicleID -> LocID

DAgentID -> LocID

Removing Multivalued attributes:

\*The cart attribute in the Customer entity is multivalued as it contains the contents of the customer's cart

\*We add Cart as a separate entity with CartID and CustID as Primary key

Specialisation:

\*The Employee entity can be specialised by splitting it into two types of employees and having unique attributes to each

\*Here we split the Entities into DeskEmployee and DeliveryAgent

1NF :

Customer(CustID,LocID,Phone,CustName,CartNo)

Cart(CartID, CustID, ItemID, ItemQty)

Order(OrderID, DAgentID, ItemPrice, TotalPrice, ItemQty, ItemID, CustID)

Employee(Phone,EmpName,Gender,JoinDate,Password,EmpID)

DeskEmployee(Deskno,EmpID)

DeliveryAgent(EmpID,DAgentID,DAgentName,Phone,Password,CurrentStatus)

Location(LocID, Landmark, Address)

Delivery(DeliveryID,DAgentID,OrderID,LocID)

Payment(PaymentID, PaymentAmt,PaymentID, PaymentMethod,OrderID,CustID)

Menu(ItemID,ItemName,ItemPrice,ItemStatus)

Vehicle(VehicleID,LocID,CurrentStatus, DAgentID)

Partial Dependencies:

EmpID -> DAgentName,Phone,Password

CustID -> ItemID, ItemQty

Removing Extraneous Attributes:

\*The attributes DAgentId, DAgentName, Password, Phone are just copies of the EmpID, EmpName, Phone,Password in the Employee table

\*The Primary key DAgentID is dependent on EmpID

\*So we remove all these attributes out of the table and just have EmpID and CurrentStatus in the table

Replacing DAgentID with EmpID:

\*As the attribute DAgentID is removed from the schema we have to replace it's occurrences with EmpID

2NF:

Customer(CustID,LocID,Phone,CustName,CartNo)

Cart(CustID, ItemID, ItemQty)

Order(OrderID, ItemPrice, TotalPrice, ItemQty, ItemID, CustID)

Employee(Phone,EmpName,Gender,JoinDate,Password,EmpID)

DeskEmployee(Deskno,EmpID)

DeliveryAgent(EmpID,Phone,Password,CurrentStatus)

Location(LocID, Landmark, Address)

Delivery(DeliveryID,EmpID,OrderID,LocID)

Payment(PaymentID, PaymentAmt,PaymentID, PaymentMethod,OrderID,CustID)

Menu(ItemID,ItemName,ItemPrice,ItemStatus)

Vehicle(VehicleID,LocID,CurrentStatus, EmpID)

Transitive Dependencies:

ItemID -> ItemQty => This applies in two Entities -> Order and Cart

EmpID -> CurrentStatus => We removed the attributes and added them to new entity

OrderID -> LocID,EmpID => DeliveryID Becomes an Extraneous attribute here (Transitivity Rule)

Changes:

\*The Primary key of Cart is now both CustID and ItemID

\*New Entity named Status is added to satisfy the EmpID -> CurrentStatus dependency

\*OrderID is made the Primary Key of the Delivery entity

\*To satisfy the ItemID -> ItemQty in the Order entity we add a new entity named OrderItems and Add ItemID,OrderID,ItemQty,ItemPrice to the entity and make ItemID and OrderID the primary key

\* Since TotalPrice can be derived from ItemQty and ItemPrice It is also removed

3NF:

Customer(CustID,LocID,Phone,CustName,CartNo)

Cart(CustID, ItemID, ItemQty)

Order(OrderID, CustID)

OrderItems(OrderID, ItemPrice, ItemQty, ItemID)

Employee(Phone,EmpName,Gender,JoinDate,Password,EmpID)

DeskEmployee(Deskno,EmpID)

DeliveryAgent(EmpID,Phone,Password,CurrentStatus)

Location(LocID, Landmark, Address)

Delivery(EmpID,OrderID,LocID)

Payment(PaymentID, PaymentAmt,PaymentID, PaymentMethod,OrderID,CustID)

Menu(ItemID,ItemName,ItemPrice,ItemStatus)

Vehicle(VehicleID,LocID)

Status(CurrentStatus, EmpID)

Dependencies not satisfying BCNF:

OrderID -> PaymentID => in Payment entity

Changes:

\*We added PaymentID as an attribute to the Order entity and removed OrderID and CustID from Payment entity

\*Since the Dependencies satisfied by the status table is already satisfied by the DeliveryAgent entity, we remove the Status entity

Dependency Closure:

CustID -> CustName,LocID,Phone.no,Cart

CustID,OrderID -> ItemID,ItemPrice,ItemQty

EmpID -> EmpName,Phone,Gender,JoinDate, Password,Deskno,CurrentStatus

LocID -> Landmark,Address

CustID,OrderID -> PaymentID

PaymentID -> PaymentMethod, PaymentAmt

ItemID -> ItemName,ItemPrice,ItemStatus

DeliveryID -> EmpID

VehicleID -> LocID

EmpID -> LocID

OrderID -> PaymentID

ItemID -> ItemQty

EmpID -> CurrentStatus

OrderID -> LocID,EmpID

CustID -> ItemID, ItemQty

\*All the Dependencies are preserved and even after removing the Extraneous attributes the schema and dependencies are intact