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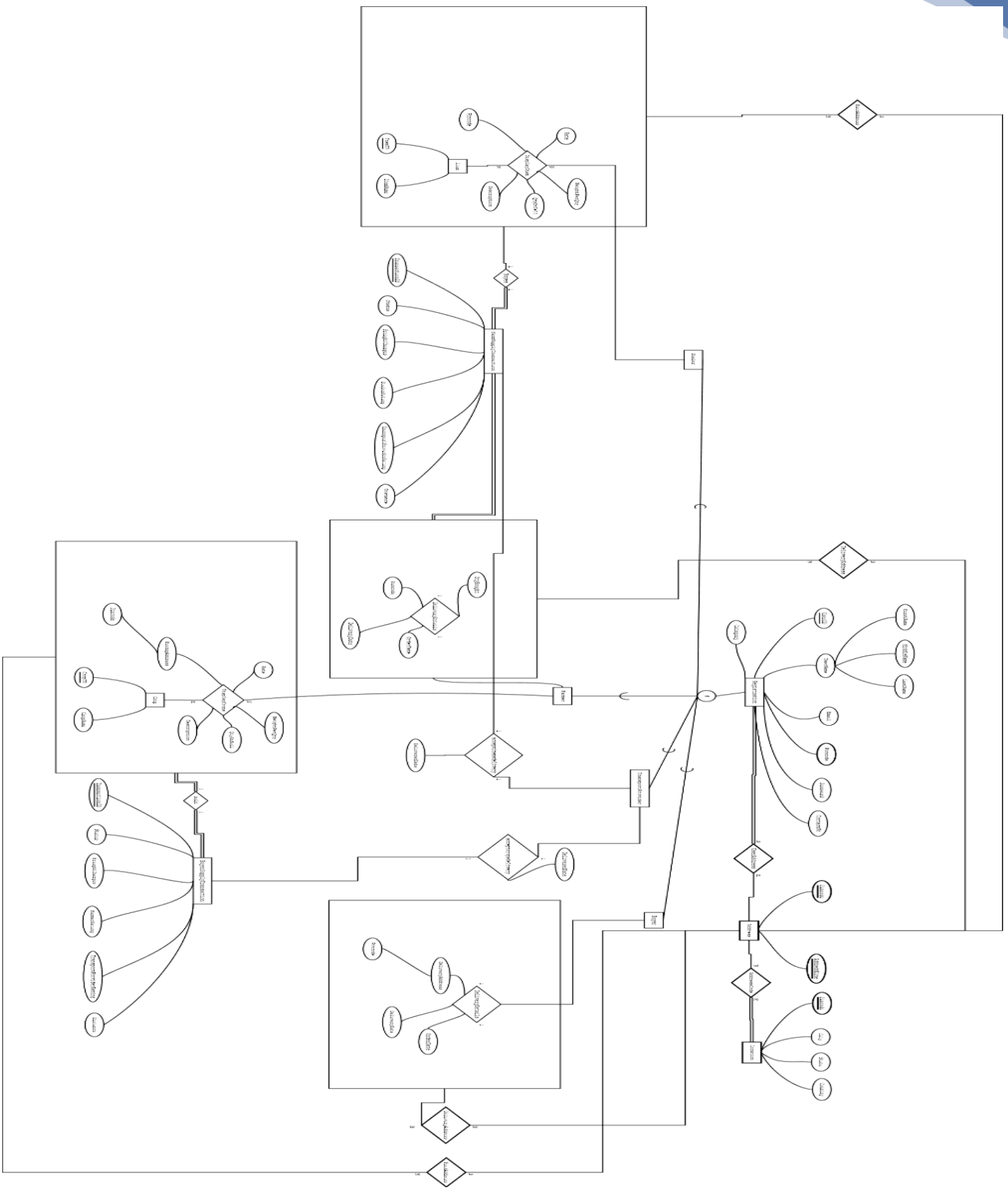
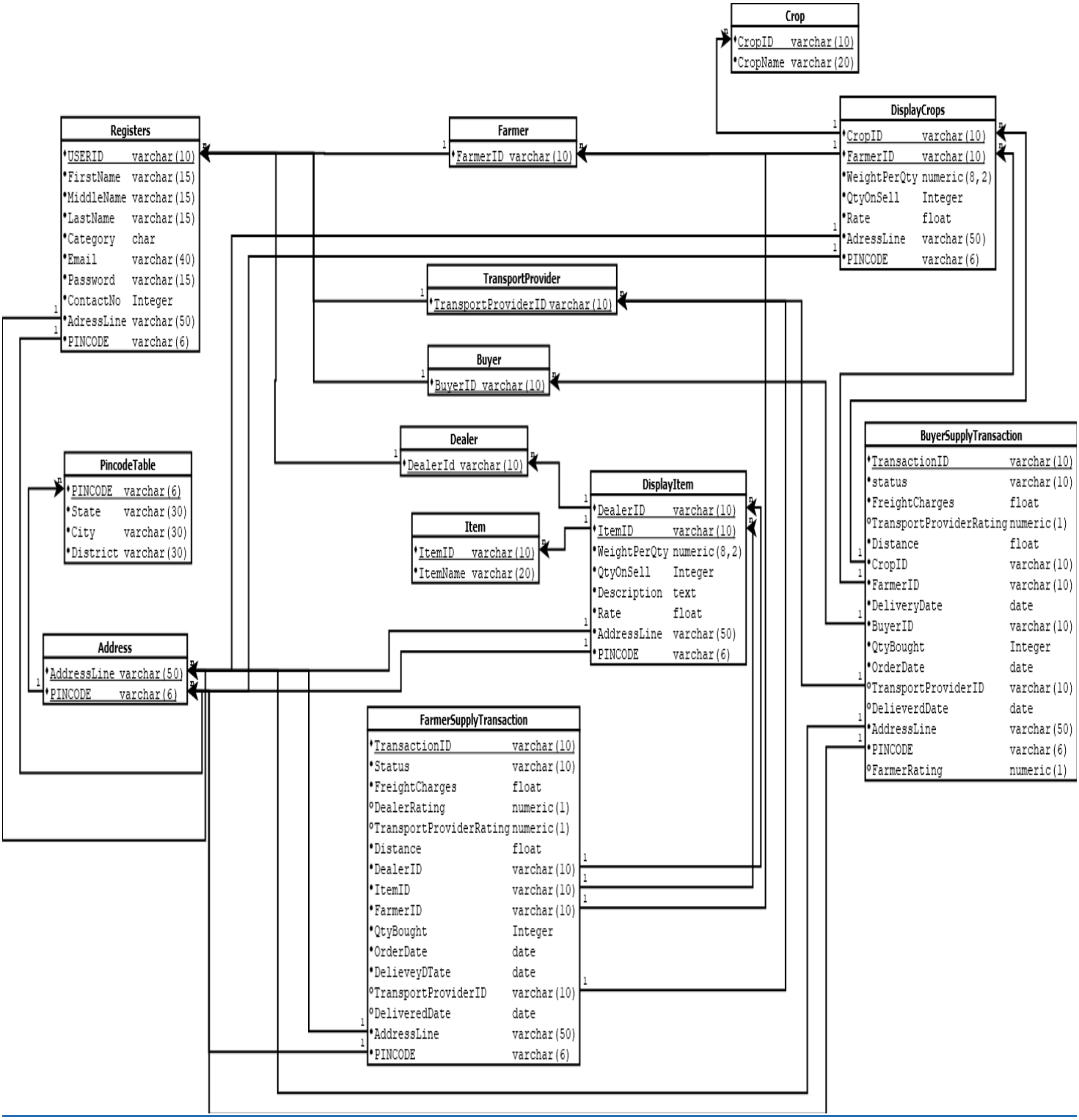
- ER Diagram:



- Relational Shema:



- Minimal FD set for all relation and Proof that Relations are in BCNF:

1) Registers (UserID, FirstName, MiddleName, LastName, Category, EmailID, Addressline, Pincode, Password, ContactNo.)

UserID → {FirstName, MiddleName, LastName, Category, EmailID, Addressline, Pincode, Password, ContactNo}

{Category, ContactNo.} → {UserID, FirstName, MiddleName, LastName, EmailID, addressline, Pincode, Password}

This is the Minimal FD set for the Relation Registers.

Key: UserID or {Category, ContactNo.}

In first FD in minimal FD set there is UserID on left side and it is one of key and in second FD there is {Category, ContactNo.} which is also a possible key for this relation so both FDs in minimal FD set satisfies BCNF requirement so this relation is in BCNF.

2) Item (ItemID, Item Name)

ItemID → {ItemName}

This is the Minimal FD set for the Relation Items

Key: ItemID

As, ItemID, being the key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set. Thus, it in the BCNF Form.

3) FarmSupplyTransaction (TransactionID, Status, FreightCharges, DealerRating, TransportProviderRating, Distance, DealerID, ItemID, FarmerID, QtyBought, OrderDate, DeliveryDate, Pincode, Addressline, TransportProviderID, DeliveredDate)

TransactionID → {Status, FreightCharges, DealerRating, TransportProviderRating, Distance, DealerID, ItemID, FarmerID, QtyBought, OrderDate, DeliveryDate, Pincode, Addressline, TransportProviderID, DeliveredDate}

This is the Minimal FD set for the Relation FarmSupplyTransaction

Key: TransactionID

As, TransactionID, being the key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set.

Thus, it in the BCNF Form.

4) DisplayItem (DealerID, ItemID, WeightperQty, QtyOnSell, Description, Pincode, Addressline)

{Dealer ID, ItemID} → {WeightperQty, QtyOnSell, Description, Rate, Pincode, Addressline}

This is the Minimal FD set for the Relation FarmSupplyTransaction

Key: {Dealer ID, Item ID}

As, {Dealer ID, Item ID}, being the composite key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set. Thus, it in the BCNF Form.

5) DisplayCrops (CropID, FarmerID, WeightperQty, QtyOnSell, Description, Rate, Pincode, Addressline)

{CropID, FarmerID}→{WeightperQty, QtyOnSell, Description, Rate, Addressline, Pincode}

This is the Minimal FD set for the Relation DisplayCrops

Key: {CropID, FarmerID}

As {CropID, FarmerID}, being the composite key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set. Thus, it in the BCNF Form.

6) BuyerSupplyTransaction (TransactionID, Status, FreightCharges, FarmerRating, TransportProviderRating, Distance, CropID, FarmerID, OrderDate, DeliveryDate, BuyerID, QtyBought, Pincode, Addressline, TransportProviderID, DeliveredDate)

TransactionID → {Status, FreightCharges, FarmerRating, TransportProviderRating, Distance, CropID, FarmerID, OrderDate, DeliveryDate, BuyerID, QtyBought, Addressline, PinCode, TransportProviderID, DeliveredDate}

This is the Minimal FD set for the Relation BuyerSupplyTransaction

Key: {TransactionID}

As {TransactionID}, being the primary key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set. Thus, it in the BCNF Form.

7) Crop (CropID, CropName)

Crop ID → {Crop Name}

This is the Minimal FD set for the Relation Crop

Key: {CropID}

As {CropID}, being the primary key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set. So, it is in BCNF.

8) Address (Addressline,Pincode)

For this relation there is no FD in Minimal FD. Minimal FD set is null.

Key: {Addressline, Pincode}

This relation has no FD in its FD set. So, there is no FD in minimal FD set that violates BCNF requirements. So, it is in BCNF.

9) Pincodetable (Pincode, City, State, District)

Pincode → {City, State, District}

Key: {Pincode}

As {Pincode}, being the primary key determines every attribute in the relation, it is on the left side of all FDs in Minimal FD set. So, it is in BCNF.

10) Farmer (FarmerID)

Key: {FramerID}

This relation has only one attribute and hence its FD set has no functional dependencies. It has only one atomic attribute: Farmer ID. So, it is in BCNF.

11) Buyer (BuyerID)

Key: {BuyerID}

This relation has only one attribute and hence its FD set has no functional dependencies. It has only one atomic attribute: BuyerID. So, it is in BCNF.

12) Dealer (DealerID)

Key: {DealerID}

This relation has only one attribute and hence its FD set has no functional dependencies. It has only one atomic attribute: DealerID. So, it is in BCNF.

13) TransportProvider (TransportProviderID)

Key: {TransportProviderID}

This relation has only one attribute and hence its FD set has no functional dependencies. It has only one atomic attribute: TransportProviderID. So, it is in BCNF.