Assignment 8

**User Table:**

FDs = {

user\_id → user\_name, user\_username, user\_password

}

*Analysis:* No transitive or partial dependencies. This table is already in 3NF and BCNF.

**Admins Table:**

FDs = {

admin\_id → admin\_username, admin\_password

}

*Analysis:* No transitive or partial dependencies. This table is in 3NF and BCNF.

**Items Table:**

FDs = {

item\_id → item\_name, item\_description, item\_minBid, item\_buyPrice, item\_startDate, item\_endDate

item\_minBid → item\_buyPrice

item\_startDate → item\_endDate

}

*Analysis:* Contains transitive dependencies (item\_minBid → item\_buyPrice and item\_startDate → item\_endDate).

*Normalization:*

3NF Decomposition:

Create a new table ItemPricing(item\_minBid, item\_buyPrice) to remove the transitive dependency.

Create a new table ItemDates(item\_startDate, item\_endDate) to remove the other transitive dependency.

The remaining Items table has item\_id as the primary key.

*Resulting Tables:*

Items(item\_id, item\_name, item\_description, item\_minBid, item\_startDate)

ItemPricing(item\_id, item\_minBid, item\_buyPrice)

ItemDates(item\_id, item\_startDate, item\_endDate)

*BCNF Analysis:* Each table has all its non-key attributes fully functionally dependent on the primary key.

**Auctions Table:**

FDs = {

user\_id, item\_id → auction\_id

auction\_id → auction\_latest

}

*Analysis:* Contains a compound FD and a transitive dependency.

*Normalization:*

3NF Decomposition:

Create a new table AuctionStatus(auction\_id, auction\_latest) to remove the transitive dependency.

The remaining Auctions table has user\_id and item\_id as the compound primary key.

*Resulting Tables:*

Auctions(user\_id, item\_id, auction\_id)

AuctionStatus(auction\_id, auction\_latest)

*BCNF Analysis:* Each table has all its non-key attributes fully functionally dependent on the primary key.

**Finance Table:**

FDs = {

user\_id → finance\_number

finance\_number → finance\_expiry, finance\_address, finance\_cvv

}

*Analysis:* Transitive dependency present (finance\_number → finance\_expiry, finance\_address, finance\_cvv).

*Normalization:*

3NF Decomposition:

Create a new table FinanceDetails(finance\_number, finance\_expiry, finance\_address, finance\_cvv) to remove the transitive dependency.

The remaining Finance table has user\_id as the primary key.

*Resulting Tables:*

FinanceUser(user\_id, finance\_number)

FinanceDetails(finance\_number, finance\_expiry, finance\_address, finance\_cvv)

*BCNF Analysis:* Each table has all its non-key attributes fully functionally dependent on the primary key.

**Shipping Table:**

FDs = {

user\_id → shipping\_tracking

shipping\_tracking → shipping\_receiver

Analysis: Transitive dependency present.

}

*Normalization:*

3NF Decomposition:

Create a new table ShippingDetails(shipping\_tracking, shipping\_receiver) to remove the transitive dependency.

The remaining Shipping table has user\_id as the primary key.

*Resulting Tables:*

ShippingUser(user\_id, shipping\_tracking)

ShippingDetails(shipping\_tracking, shipping\_receiver)

*BCNF Analysis:* Each table has all its non-key attributes fully functionally dependent on the primary key.

**Bids Table:**

FDs = {

user\_id, item\_id → bids\_id

bids\_id → bids\_top

}

*Analysis:* Contains a compound FD and a transitive dependency.

*Normalization:*

3NF Decomposition:

Create a new table BidStatus(bids\_id, bids\_top) to remove the transitive dependency.

The remaining Bids table has user\_id and item\_id as the compound primary key.

*Resulting Tables:*

BidDetails(user\_id, item\_id, bids\_id)

BidStatus(bids\_id, bids\_top)

*BCNF Analysis:* Each table has all its non-key attributes fully functionally dependent on the primary key.

**Past Bids Table:**

FDs = {

user\_id, item\_id → pastbids\_id

pastbids\_id → pastbids\_bidDate, pastbids\_bid

}

*Analysis:* Contains a compound FD and a transitive dependency.

*Normalization:*

3NF Decomposition:

Create a new table PastBidStatus(pastbids\_id, pastbids\_bidDate, pastbids\_bid) to remove the transitive dependency.

The remaining Past Bids table has user\_id and item\_id as the compound primary key.

*Resulting Tables:*

PastBidDetails(user\_id, item\_id, pastbids\_id)

PastBidStatus(pastbids\_id, pastbids\_bidDate, pastbids\_bid)

*BCNF Analysis:* Each table has all its non-key attributes fully functionally dependent on the primary key.

**Summary:**

In summary, each table has been normalized to 3NF by removing transitive dependencies through decomposition. The resulting tables are also in BCNF, as every determinant is a candidate key, and there are no non-key attributes determining other non-key attributes.