Proof that relations are in Boyce-Codd Normal Form

1. 'Users' relation :

• Attributes :

Users {UserID, Name, Password, Email, Phone_no, IS_premium_user, City, Location}

• Functional dependencies :

UserID → Name
UserID → Password
UserID → Email
UserID → Phone_no
UserID → IS_premium_user
UserID → City
UserID → Location

Let X = UserID

X+ = {UserID, Name, Password, Email, Phone_no, IS_premium_user, City, Location}

Thus, **Primary key = UserID**

The left side of all the FDs in the minimal set of FDs for the relation 'Users' is UserID, which is the primary key of this relation, so **"Users" is in BCNF.**

2. 'Restaurant' relation :

• Attributes :

Restaurant {RestaurantID,Name,contact_no,City,Adress}

• Functional dependencies :

RestaurantID → Name
RestaurantID→ contact_no
RestaurantID→ City
RestaurantID→ Adress

Let X =RestaurantID

X+ = {RestaurantID,Name,contact_no,City,Adress}
Thus, **Primary key = RestaurantID**

The left side of all the FDs in a minimal set of FDs for the relation 'Restaurant' is RestaurantID, which is the primary key of this relation, so **"Restaurant" is in BCNF.**

3. 'Category' relation :

• Attributes :

Category {CategoryID, Name}

• Functional dependencies :

CategoryID → Name

Let X = CategoryID
X+ = {CategoryID, Name}
Thus, **Primary key = CategoryID**

The left side of all the FDs in minimal set of FDs for the relation 'Category' is CategoryID, which is the primary key of this relation, so
"Category" is in BCNF.

4. 'Items' relation :

• Attributes :

Items{ItemID, Name,Price, Preparation_time,CategoryID,RestaurantID }

• Functional dependencies :

ItemID→ Name
ItemID → Price

ItemID→ Preparation_time
ItemID→ CategoryID
ItemID→ RestaurantID

Let X =ItemID
X+ = {ItemID, Name,Price, Preparation_time,CategoryID,RestaurantID }
Thus, **Primary key = ItemID**

The left side of all the FDs in minimal set of FDs for the relation 'Items' is ItemID,

which is the primary key of this relation, so **"Items" is in BCNF.**

5. 'Delievery_Guy' relation :

• Attributes :
Delievery_Guy{Delievery_partner_ID, Name, Location,
PhoneNumber,VehicleNumber}

• Functional dependencies :
Delievery_partner_ID→ Name
Delievery_partner_ID→ Location
Delievery_partner_ID→ PhoneNumber
Delievery_partner_ID→ VehicleNumber

Let X = Delievery_partner_ID

X+ = {Delievery_partner_ID, Name, Location,
PhoneNumber, VehicleNumber}

Thus, **Primary key = Delievery_partner_ID**

The left side of all the FDs in minimal set of FDs for the relation 'Delievery_Guy' is Delievery_partner_ID, which is the primary key of this relation, so

"Delievery_Guy" is in BCNF.

6. 'Payment' relation :

• Attributes :
UmpiredBy {PaymentID, Payment_Method,Amount}
PaymentID→ Payment_Method
PaymentID→ Amount
Let X = PaymentID

X+ = {PaymentID, Payment_Method, Amount}

Here **Primary key = PaymentID**

According to theorem, all attribute primary key relation is always in BCNF.

Hence **“Payment” is in BCNF.**

7. ‘Orders’ relation :

• Attributes :

Orders {OrderID, Order_status,
DATE, UserID,PaymentID,Delievery_partner_ID
Delievery_Adress}

• Functional dependencies :

OrderID→ Order_status
OrderID→ DATE
OrderID→ UserID
OrderID→ PaymentID

OrderID→ Delievery_Adress

OrderID→ Delievery_partner_ID
Let X = OrderID

X+ ={OrderID, Order_status,

DATE, UserID,PaymentID,Delievery_partner_ID,Delievery_Adress}

Thus, **Primary key = OrderID**

The left side of all the FDs in minimal set of FDs for the relation ‘Orders ’ is OrderID, which is the primary key of this relation, so **“Orders ” is in BCNF.**

8. ‘Ordered_item’ relation :

• Attributes :

Ordered_item{OrderID, ItemID, Quantity}

• Functional dependencies :

{OrderID,ItemID}→ Quantity

Let X = {OrderID,ItemID}

X+ = {OrderID, ItemID, Quantity}

Thus, **Primary key = {OrderID,ItemID}**

The left side of all the FDs in minimal set of FDs for the relation ‘Ordered_item’ is {OrderID,ItemID}, which is the primary key of this relation, so **“Ordered_item” is in BCNF.**

9. ‘Item_Ratings’ relation :

• Attributes :

Item_Ratings{UserID,ItemID,Ratings}

• Functional dependencies :

{UserID, ItemID} → Ratings

Let X = {UserID, ItemID}

X+ = {UserID,ItemID,Ratings}

Thus, **Primary key = {UserID, ItemID}**

The left side of all the FDs in minimal set of FDs for the relation ‘Item_Ratings’ is {UserID, ItemID} , which is the primary key of this relation, so **“Item_Ratings” is in BCNF.**

10. ‘Restaurant_Ratings’ relation :

• Attributes :

Restaurant_Ratings{UserID,RestaurantID,Ratings}

• Functional dependencies :

{UserID, RestaurantID} → Ratings

Let X={UserID, RestaurantID}

X+ = {UserID, Restaurant ID,Ratings}

Thus, **Primary key = {UserID, RestaurantID}**

The left side of all the FDs in minimal set of FDs for the relation ‘Restaurant_ratings’ is {UserID, RestaurantID}, which is the primary key of this relation, so **“Restaurant_ratings” is in BCNF.**

11. ‘Offer’ relation :

• Attributes :

Offer{OfferID, Offername}

• Functional dependencies :

OfferID→ Offername

Let X = OfferID

X+ = {OfferID, Offername}

Thus, **Primary key = OfferID**

The left side of all the FDs in minimal set of FDs for the relation ‘Offer’ is

OfferID, which is the primary key of this relation, so **“Offer” is in BCNF.**

12. ‘Have_offer’ relation :

• Attributes :

Have_offer {RestaurantID, OfferID}

Thus, **Primary key = {RestaurantID, OfferID}**

The left side of all the FDs in minimal set of FDs for the relation ‘Have_offer’ is {RestaurantID, OfferID}which is the primary key of this relation, so **“Have_offer”**

is in BCNF.