Minimal FD Set and BCNF Proof

Accommodation

Accommodation_ID -> Accommodation_Name

Accommodation_ID -> Accommodation_Type

Accommodation_ID -> Street

Accommodation_ID -> Landmark

Accommodation_ID -> City

Accommodation_ID -> State

Accommodation_ID -> Pincode

Accommodation_ID -> Check_In_Time

Accommodation_ID -> Check_Out_Time

Accommodation_ID -> User_Rating

Accommodation_ID -> Star_Category

Accommodation_ID -> Starting_Price

Here we can infer from the given FDs that Accommodation_ID is the key. It matches the key from the relation. Hence' Accommodation' is in BCNF.

Room_Type

{Accommodation_ID,Room_Type_ID} -> Room_Type_Name

{Accommodation_ID,Room_Type_ID} -> Capacity

{Accommodation_ID,Room_Type_ID} -> Bed_Type

{Accommodation_ID,Room_Type_ID} -> Area

{Accommodation_ID,Room_Type_ID} -> Extra_Capacity

{Accommodation_ID,Room_Type_ID} -> Total_Rooms

Here we can infer from the given FDs that {Accommodation_ID, Room_Type_ID} is the key. It matches the key from the relation. Hence 'Room_Type' is in BCNF.

Available_Rooms

{Accommodation_ID,Room_Type_ID,Check_In_Date,Check_Out_Date} -> Available_Rooms

Here we can infer from the given FDs that {Accommodation_ID,Room_Type_ID,Check_In_Date,Check_Out_Date} is the key. It matches the key from the relation. Hence 'Available_Rooms' is in BCNF.

Accommodation_Fares

{Accomodation_ID,Room_Type_ID} -> Base_Price

{Accommodation_ID,Room_Type_ID} -> Mattresses

{Accommodation_ID,Room_Type_ID} -> Breakfast

{Accommodation_ID,Room_Type_ID} -> Lunch_Or_Dinner

{Accommodation_ID,Room_Type_ID} -> Lunch_And_Dinner

{Accommodation_ID,Room_Type_ID} -> Zero_Cancellation

{Accommodation_ID,Room_Type_ID} -> Taxes

Here we can infer from the given FDs that {Accommodation_ID, Room_Type_ID} is the key. It matches the key from the relation. Hence 'Accommodation_Fares' is in BCNF.

Accommodation_Refund_Rules
{Accommodation_ID,Room_Type_ID,Grace_Period} -> Cancellation_Penalty

Here we can infer from the given FDs that {Accommodation_ID,Room_Type_ID,Grace_Period} is the key. It matches the key from the relation. Hence 'Accommodation_Refund_Rules' is in BCNF.

Transportation_Owner
{Transportation_Owner_ID, Transportation_Type} -> Transportation_Owner_Name

Here we can infer from the given FDs that{Transportation_Owner_ID, Transportation_Type} is the key. It matches the key from the relation. Hence 'Transportation_Facilities_Owner' is in BCNF.

Station
Station_Code -> Station_Name
Station_Code -> City
Station_Code -> Transportation_Type

Here we can infer from the given FDs that Station_Code is the key. It matches the key from the relation. Hence 'Station' is in BCNF.

Classes
Class_ID -> Class_Name
Class_ID -> Transportation_Type

Here we can infer from the given FDs that Class_ID is the key. It matches the key from the relation. Hence 'Classes' is in BCNF.

Transportation
Transportation_ID -> Source_Code
Transportation_ID -> Destination_Code
Transportation_ID -> Departure
Transportation_ID -> Arrival
Transportation_ID -> Transportation_Name
Transportation_ID -> Transportation_Type
Transportation_ID -> Transportation_Owner_ID
Transportation_ID -> User_Rating
Transportation_ID -> No_Of_Days

Here we can infer from the given FDs that Transportation_ID is the key. It matches the key from the relation. Hence 'Transportation' is in BCNF.

Transportation_Class
{Transportation_ID ,Class_ID } -> Total_Seats
{Transportation_ID ,Class_ID } -> Hand_Luggage
{Transportation_ID ,Class_ID } -> Check-In_Luggage

Here we can infer from the given FDs that {Transportation_ID ,Class_ID} is the key. It matches the key from the relation. Hence 'Transportation_Class' is in BCNF

Routes

{Transportation_ID,Station_Code } -> Stop_Number
{Transportation_ID,Station_Code } -> Arrival_Time
{Transportation_ID,Station_Code } -> Departure_Time
{Transportation_ID,Station_Code } -> Day_No
{Transportation_ID,Station_Code } -> Halt
{Transportation_ID,Station_Code } -> Km_From_Origin

Here we can infer from the given FDs that {Transportation_ID,Station_Code } is the key. It matches the key from the relation. Hence 'Routes' is in BCNF.

Avialable_Seats

{Transportation_ID ,Class_ID,Departure_Timestamp,Arrival_Timestamp} -> To_Station
{Transportation_ID ,Class_ID,Departure_Timestamp,Arrival_Timestamp} -> From_Station
{Transportation_ID ,Class_ID,Departure_Timestamp,Arrival_Timestamp} -> Available_Seats

Here we can infer from the given FDs that {Transportation_ID ,Class_ID} is the key. It matches the key from the relation. Hence 'Available_Seats' is in BCNF.

Transportation_Fares

{Transportation_ID ,Class_ID } -> Base_Price
{Transportation_ID ,Class_ID } -> Breakfast
{Transportation_ID ,Class_ID } -> Lunch
{Transportation_ID ,Class_ID } -> Dinner
{Transportation_ID ,Class_ID } -> Zero_Cancellation
{Transportation_ID ,Class_ID } -> Taxes

Here we can infer from the given FDs that {Transportation_ID ,Class_ID } is the key. It matches the key from the relation. Hence 'Transportation_Fares' is in BCNF.

Transportation_Refund_Rules

{Transportation_ID ,Class_ID ,Grace_Period} -> Cancellation_Penalty

Here we can infer from the given FDs that {Transportation_ID ,Class_ID, Grace_Period } is the key. It matches the key from the relation. Hence 'Transportation_Refund_Rules' is in BCNF.

Package

Package_ID -> Package_Name
Package_ID -> Starting_Price

Here we can infer from the given FDs that Package_ID is the key. It matches the key from the relation. Hence 'Package' is in BCNF.

Offers

{Offer_ID, Package_ID} -> Offer_Name
{Offer_ID, Package_ID} -> No_Of_Days
{Offer_ID, Package_ID} -> No_Of_Nights
{Offer_ID, Package_ID} -> No_Of_Accommodations
{Offer_ID, Package_ID} -> No_Of_Transportations
{Offer_ID, Package_ID} -> Price

Here we can infer from the given FDs that {Offer_ID, Package_ID} is the key. It matches the key from the relation. Hence 'Offers' is in BCNF.

Offer_Dates
Here we have no FDs, meaning all the attributes are keys. It matches the key from the relation. Hence 'Offer_Dates' is in BCNF.

Offer_Accommodation
{Offer_ID, Check-In_Date, Check-Out_Date, Accommodation_ID} -> Room_Type_ID
{Offer_ID, Check-In_Date, Check-Out_Date, Accommodation_ID} -> Day_No

Here we can infer from the given FDs that {Offer_ID, Check-In_Date, Check-Out_Date, Accommodation_ID} is the key. It matches the key from the relation. Hence 'Offer_Accommodation' is in BCNF.

Offer_Transportation
{Offer_ID, Departure_Timestamp, Arrival_Timestamp , Transportation_ID} -> Class_ID

Here we can infer from the given FDs that {Offer_ID, Journey_Start_Date, Journey_End_Date, Transportation_ID} is the key. It matches the key from the relation. Hence 'Offer_Transportation' is in BCNF.

Offer_fares
{Offer_ID, Package_ID} -> Total_Accm_amt
{Offer_ID, Package_ID} -> Total_Trans_Amt
{Offer_ID, Package_ID} -> Total_Taxes

Here we can infer from the given FDs that {Offer_ID, Package_ID} is the key. It matches the key from the relation. Hence 'Offer_fares' is in BCNF.

Consumer
Consumer_ID -> UserName
Consumer_ID -> Password
Consumer_ID -> Prev_Password

Here we can infer from the given FDs that Consumer_ID is the key. It matches the key from the relation. Hence 'Consumer' is in BCNF.

Consumer_Profile
Consumer_ID -> First_Name
Consumer_ID -> Last_Name
Consumer_ID -> Email_ID
Consumer_ID -> Mobile_No
Consumer_ID -> DoB
Consumer_ID -> Age
Consumer_ID -> Gender
Consumer_ID -> City
Consumer_ID -> Rating

Here we can infer from the given FDs that Consumer_ID is the key. It matches the key from the relation. Hence 'Consumer_Profile' is in BCNF.

Bank_Details

{Consumer_ID,Account_No} -> Account_Holder_Name

{Consumer_ID,Account_No} -> IFSC_Code

{Consumer_ID,Account_No} -> UPI_ID

{Consumer_ID,Account_No} -> Credit_Card_No

{Consumer_ID,Account_No} -> Debit_Card_No

Here we can infer from the given FDs that {Consumer_ID,Account_No} is the key. It matches the key from the relation. Hence 'Bank_Details' is in BCNF.

Invoice_Details

Invoice_ID -> Total_Amount

Invoice_ID -> Taxes

Invoice_ID -> Grand_Total

Invoice_ID -> Total_Amount_Paid

Invoice_ID -> Amount_left

Invoice_ID -> Next_Installment

Here we can infer from the given FDs that Invoice_ID is the key. It matches the key from the relation. Hence 'Invoice_Details' is in BCNF.

Booking

Booking_ID -> Facility_Type

Booking_ID -> Consumer_ID

Booking_ID -> Invoice_ID

Booking_ID -> Booking_Date

Booking_ID -> No_Of_Travellers

Here we can infer from the given FDs that Booking_ID is the key. It matches the key from the relation. Hence 'Booking' is in BCNF.

Transactions

Transaction_ID -> Invoice_ID

Transaction_ID -> Transaction_Mode

Transaction_ID -> Amount

Transaction_ID -> Transaction_TimeStamp

Here we can infer from the given FDs that Transaction_ID is the key. It matches the key from the relation. Hence 'Transactions' is in BCNF.

Accommodation_Booking

Booking_ID -> Accomodation_ID

Booking_ID -> Room_Type_ID

Booking_ID -> Check_In_Date

Booking_ID -> Check_Out_Date

Booking_ID -> No_Of_Rooms

Booking_ID -> Booking_Status

Here we can infer from the given FDs that Booking_ID is the key. It matches the key from the relation. Hence 'Accommodation_Booking' is in BCNF.

Accommodation_Add_On

Booking_ID -> Breakfast
Booking_ID -> Lunch_Or_Dinner
Booking_ID -> Lunch_And_Dinner
Booking_ID -> No_Of_Mattresses
Booking_ID -> Zero_Cancellation

Here we can infer from the given FDs that Booking_ID is the key. It matches the key from the relation. Hence 'Accommodation_Add_On' is in BCNF.

Transportation_Booking

Booking_ID -> Transportation_ID
Booking_ID -> Class_ID
Booking_ID -> Departure_Timestamp
Booking_ID -> Arrival_Timestamp
Booking_ID -> PNR
Booking_ID -> To_Station
Booking_ID -> From_Station
Booking_ID -> Booking_Status

Here we can infer from the given FDs that Booking_ID is the key. It matches the key from the relation. Hence 'Transportation_Booking' is in BCNF.

Transportation_Add_On

Booking_ID -> Breakfast
Booking_ID -> Lunch
Booking_ID -> Dinner
Booking_ID -> Zero_Cancellation

Here we can infer from the given FDs that Booking_ID is the key. It matches the key from the relation. Hence 'Transportation_Add_On' is in BCNF.

Seats

Here we have no FDs, meaning all the attributes are keys. It matches the key from the relation. Hence 'Seats' is in BCNF.

Package_Booking

Booking_ID -> Package_ID
Booking_ID -> Offer_ID
Booking_ID -> Date_From
Booking_ID -> Date_To

Here we can infer from the given FDs that Booking_ID is the key. It matches the key from the relation. Hence 'Package_Booking' is in BCNF.

Package_Booking_Details

Here we have no FDs which means that all the attributes are keys. It matches the key from the relation. Hence 'Package_Booking_Details' is in BCNF.

Travellers

Traveller_ID -> First_Name

Traveller_ID -> Last_Name

Traveller_ID -> Age

Traveller_ID -> Gender

Traveller_ID -> Booking_ID

Here we can infer from the given FDs that Traveller_ID is the key. It matches the key from the relation. Hence 'Travellers' is in BCNF.

Cancellation

Cancellation_ID -> Booking_ID

Cancellation_ID -> Cancellation_Date

Cancellation_ID -> Cancellation_Penalty

Cancellation_ID -> Total_Refundable_Amount

Cancellation_ID -> Refund_Status

Here we can infer from the given FDs that Cancellation_ID is the key. It matches the key from the relation. Hence 'Cancellation' is in BCNF.