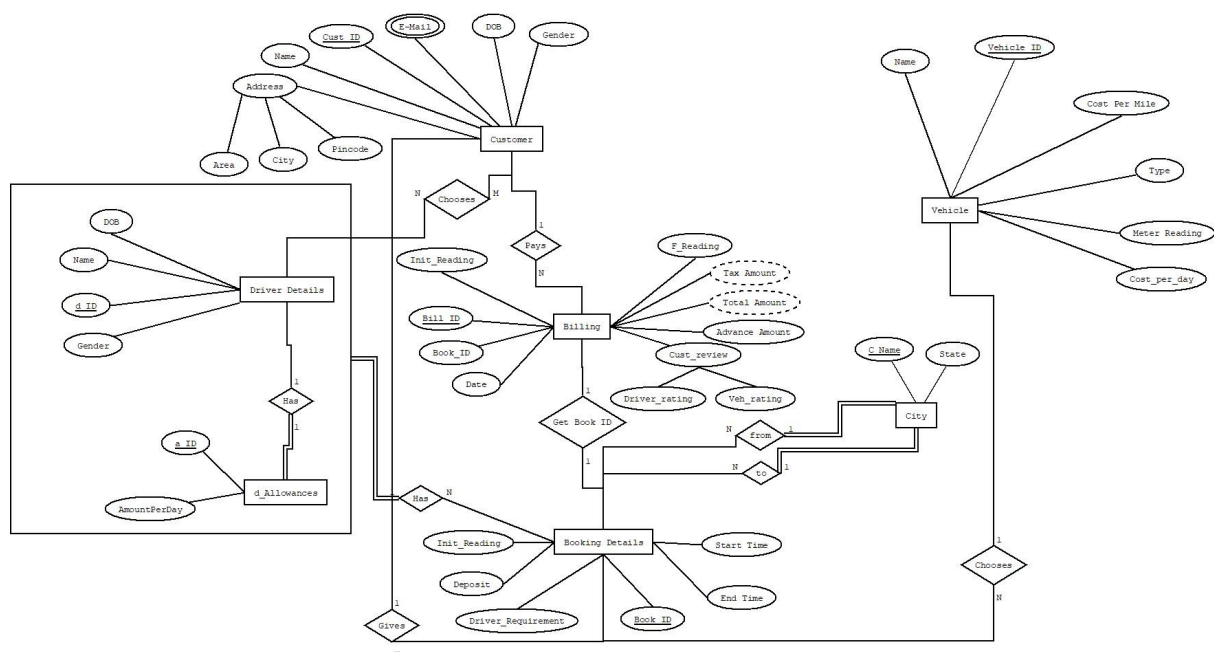# TOPIC: CAR RENTAL SERVICE
GROUP NO: 2.09

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ER-Diagram:-

FD'S :-

FD's for the given relations are as follows:-

1.) R (CUST_ID, Name, DOB, Gender, Area, City, Pincode , Email)
  - CUST_ID → Name
  - CUST_ID → DOB
  - CUST_ID → Gender
  - CUST_ID → Area
  - CUST_ID → City
- CUST_ID →Pincode

The above relation has MVD.

R(CUST_ID,Email).

- CUST_ID-->> Email

Now $\{CUST\_ID\}^+$ is { Name, DOB,Gender, Area, City, Pincode}
Thus the key for the relation is CUST_ID as its closure has all the elements of the relation and also all the above FD's are in canonical form thus the above relation is in BCNF form.

2.) R(VEHICLE_ID, Name, Cost_per_mile, Cost_per_day, Meter Reading, Type)

- VEHICLE_ID → Name
- VEHICLE_ID → Cost_per_mile
- VEHICLE_ID → Cost_per_day
- VEHICLE_ID → Meter Reading
- VEHICLE_ID → Type

Now $\{VEHICLE\_ID\}^+$ is {Name, Cost_per_mile, Cost_per_day, Meter Reading,Type}
Thus the key for the relation is VEHICLE_ID as its closure has all the elements of the relation and also all the above FD's are in canonical form thus the above relation is in BCNF form.

3.)R(C_NAME,State)

- C_NAME → State

Here, $\{C\_NAME\}^+$ is State.

- Key is C_NAME and its closure has all the attributes in the relation so it is in BCNF form.

4.)R(BILL_ID, Initial_Reading, billingDate, Book_ID, F_Reading, Tax_Amount, Total_Amount, Advance_Amount, Driver_rating, Veh_rating)

- BILL_ID → Initial_Reading
- BILL_ID → billingDate
- BILL_ID → F_Reading
- BILL_ID → Tax_Amount
- BILL_ID → Total_Amount
- BILL_ID → Advance_Amount
- BILL_ID→ Driver_rating
- BILL_ID→ Veh_rating

- BILL_ID→BOOK_ID

Here $\{BILL\_ID\}^+$ is {Initial_Reading, billingDate, F_Reading, Tax Amount, Total Amount, Advance Amount, Driver_rating, Veh_rating,BOOK_ID }

Thus the key for the relation is BILL_ID as its closure has all the elements of the relation and also all the above FD's are in canonical form thus the above relation is in BCNF form.

5.)R(BOOK_ID, Start Time, End Time, Init_Reading, Deposit, From City, To_City, Cust_ID, d_ID,Driver_Requirement,Vehicle_ID)

- BOOK_ID → Start Time
- BOOK_ID → End Time
- BOOK_ID → Init_Reading
- BOOK_ID → Deposit
- BOOK_ID → From_City
- BOOK_ID → To_City
- BOOK_ID → Cust_ID
- BOOK_ID → d_ID
- BOOK_ID → Driver_requirement
- BOOK_ID → Vehicle_ID

Here $\{BOOK\_ID\}^+$ is {Start Time, End Time, Init_Reading, Deposit, From_City, To_City, Cust_ID, d_ID, Driver_Requirement, Vehicle_ID }

Thus the key for the relation is BOOK_ID as its closure has all the elements of the relation and also all the above FD's are in canonical form thus the above relation is in BCNF form.

6.)R(D_ID,Name, DOB, Gender,a_ID)

- D_ID → Name
- D_ID → DOB
- D_ID → Gender
- D_ID → a_ID

Here $\{D\_ID\}^+$ is {Name, DOB, Gender, a_ID}

Thus the key for the relation is D_ID as its closure has all the elements of the relation and also all the above FD's are in canonical form thus the above relation is in BCNF form.

7.)R(a_ID, AmountPerDay)

- a_ID → AmountPerDay

Here {a_ID}$^+$ is {AmoutPerDay}

Thus the key for the relation is a_ID as its closure has all the elements of the relation and also all the above FD's are in canonical form thus the above relation is in BCNF form.

The following relation has the key which comprises of all of its attributes as a result no FD's are possible but they are in BCNF form.

R(VEHICLE_ID,CUST_ID)
R(CUST_ID,a_ID,d_ID)

Below is the canonical cover representation of FD's for better readability of BCNF.

CANONICAL COVER FD'S:-

- CUST_ID → { Name, DOB,Gender, Area, City, Pincode, Email }
- VEHICLE_ID → {Name, Cost_per_mile, Cost_per_day, Meter Reading, Type }
- C_NAME→ { State }
- BILL_ID → {Initial_Reading, billingDate, F_Reading, Tax Amount, Total Amount, Advance Amount, Driver_rating, Veh_rating ,BOOK_ID}
- BOOK_ID → {Start Time, End Time, Init_Reading, Deposit, From City, To City, Cust_ID, d_ID,Driver_Requirement,Vehicle_ID}
- D_ID → {Name, DOB, Gender,a_ID}
- a_ID → {AmountPerDay}

Relational Schema Diagram:-

Customer_Email

- Cust_ID Integer
- Email   varchar(20)

Customer

- Cust_ID Integer
- Name   varchar(20)
- DOB   date
- Gender   char(1)
- Area   varchar(20)
- City   varchar(20)
- Pincode Integer

Choosen Driver

- Cust_ID Integer
- d_ID   Integer
- a_ID   Integer

Driver

- d_ID   Integer
- Name   varchar(20)
- DOB   date
- Gender   char(1)
- a_ID   Integer

d_Allowances

- a_ID   Integer
- AmountPerDay   Integer

Vehicle

- Vehicle_ID   Integer
- Name   varchar(20)
- Cost Per Mile Integer
- Type   varchar(5)
- Meter Reading Integer
- Cost Per Day   Integer

Billing

- Bill_ID   Integer
- Book_ID   Integer
- billingDate   date
- Advance Amount Integer
- F_Reading   Integer
- Init_Reading   Integer
- Driver_Rating   Integer
- Veh_Rating   Integer
- tax_amout   real
- total_amount   real

Booking

- Book_ID   Integer
- Cust_ID   Integer
- Init_Reading   Integer
- Deposit   Integer
- Start Time   date
- End Time   date
- From City   varchar(10)
- To City   varchar(10)
- d_ID   Integer
- Driver_Requirement bool
- Vehicle ID   Integer

City

- C_Name varchar(10)
- State   varchar(10)