**PROBLEM STATEMENT:**

Construct an ER Diagram for RAILWAY TICKET BOOKING SYSTEM

In this system, every passenger has a unique AADHAR ID and other attributes such as Name, Age, Sex, Phone Number and email id. Here, name is composite attribute and phone number is multi-valued.

He/She can make a booking depending on no. of seats available and a booking ID is generated.

Each train has a unique Train Number, available seats and route it passes through.

There is a schedule for each train which consists of the route and timing of the train.

The passenger provides a feedback as well and a unique feedback ID is generated.

One person can make many bookings, be it same or different trains.

There should be a unique feedback for every booking made by the passenger.

Every train can have one or multiple bookings made for it.

Logically, every train has a unique schedule as the timing and duration are unique for each train.

The passengers are issued tickets which have unique ticket IDs.

**SCHEMA:**

1. Train (**Train\_No**, Available, Route)
2. Train\_has\_booking (**Train\_No, Booking\_ID**, Date)
3. Booking (**Booking\_ID**, No\_of\_seats, Cost)
4. Feedback\_for\_booking (**Feedback\_ID**, Booking\_ID)
5. Feedback (**Feedback\_ID**, QoS)
6. Schedule (**Arrival\_Time, Day, Train\_No**)
7. Passenger\_makes\_booking (**Aadhar\_ID**, Booking\_ID, Catering, Date)
8. Passenger (**Aadhar\_ID**, First Name, Last Name, Middle Name, Age, Email, Sex)
9. Passenger\_phone (Phone, **Aadhar\_ID**)
10. Ticket\_given\_to\_passenger (**Ticket\_ID, Aadhar\_ID**, Seat\_No)
11. Booking\_prints\_ticket (**Ticket\_ID, Aadhar\_ID**, Booking\_ID)

**FUNCTIONAL DEPENDENCIES :**

1. TRAIN\_NO **->** ROUTE
2. TRAIN\_NO, BOOKING\_ID **->** DATE
3. BOOKING\_ID **->** NO\_OF\_SEATS, COST
4. FEEDBACK\_ID **->** BOOKING\_ID
5. FEEDBACK\_ID **->** QoS
6. TRAIN\_NO, ARRIVAL\_TIME, DAY **->** DAY, ARRIVAL\_TIME
7. AADHAR\_ID **->** DATE, CATERING, BOOKING\_ID
8. AADHAR\_ID **->** FIRST\_NAME, MIDDLE\_NAME, LAST\_NAME, AGE, SEX, EMAIL\_ID, PHONE
9. AADHAR\_ID **->** PHONE
10. TICKET\_ID, AADHAR\_ID **->** SEAT\_NO
11. TICKET\_ID, AADHAR\_ID **->** BOOKING\_ID

Here, the serial numbers 1, 2, 3, …, 11 represent the functional dependency of the respective schema.

Now let us consider tables one by one:

**Table 1:**

Its functional dependency is:

TRAIN\_NO **->** ROUTE

From this we can say that TRAIN\_NO plays the role of a super key.

If X🡪A, and X is a super key, then we say that the table is in BCNF form.

Since TRAIN\_NO is a super key, we can say table 1 is in BCNF Form.

**Table 2:**

Its functional dependency is:

TRAIN\_NO, BOOKING\_ID **->** DATE

From this we can say that (TRAIN\_NO, BOOKING\_ID) plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since (TRAIN\_NO, BOOKING\_ID) is a super key, we can say table 2 is in BCNF Form.

**Table 3:**

Its functional dependency is:

BOOKING\_ID **->** NO\_OF\_SEATS, COST

From this we can say that BOOKING\_ID plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since BOOKING\_ID is a super key , we can say table 3 is in BCNF Form.

**Table 4:**

Its functional dependency is:

FEEDBACK\_ID **->** BOOKING\_ID

From this we can say that FEEDBACK\_ID plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since FEEDBACK\_ID is a super key, we can say table 4 is in BCNF Form.

**Table 5:**

Its functional dependency is:

FEEDBACK\_ID **->** QoS

From this we can say that FEEDBACK\_ID plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since FEEDBACK\_ID is a super key, we can say table 5 is in BCNF Form.

**Table 6:**

Its functional dependency is:

TRAIN\_NO, ARRIVAL\_TIME, DAY **->** DAY, ARRIVAL\_TIME

From this we can say that (TRAIN\_NO, ARRIVAL\_TIME, DAY) plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since (TRAIN\_NO, ARRIVAL\_TIME, DAY) is a super key, we can say table 6 is in BCNF Form.

**Table 7:**

Its functional dependency is:

AADHAR\_ID **->** DATE, CATERING, BOOKING\_ID

From this we can say that AADHAR\_ID plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since AADHAR\_ID is a super key, we can say table 7 is in BCNF Form.

**Table 8:**

Its functional dependency is:

AADHAR\_ID **->** FIRST\_NAME, MIDDLE\_NAME, LAST\_NAME, AGE, SEX, EMAIL\_ID, PHONE

From this we can say that AADHAR\_ID plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since AADHAR\_ID is a super key, we can say table 8 is in BCNF Form.

**Table 9:**

Its functional dependency is:

AADHAR\_ID **->** PHONE

From this we can say that AADHAR\_ID plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since AADHAR\_ID is a super key, we can say table 9 is in BCNF Form.

**Table 10:**

Its functional dependency is:

TICKET\_ID, AADHAR\_ID **->** SEAT\_NO

From this we can say that (TICKET\_ID, AADHAR\_ID) plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since (TICKET\_ID, AADHAR\_ID) is a super key, we can say table 10 is in BCNF Form.

**Table 11:**

Its functional dependency is:

TICKET\_ID, AADHAR\_ID **->** BOOKING\_ID

From this we can say that (TICKET\_ID, AADHAR\_ID) plays the role of a super key.

If X🡪A, and X is a super key we say that the table is in BCNF Form.

Since (TICKET\_ID, AADHAR\_ID) is a super key, we can say table 11 is in BCNF Form.

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