AIRPORT MANAGEMENT SYSTEM

Lab Group 1

Team ID – 110

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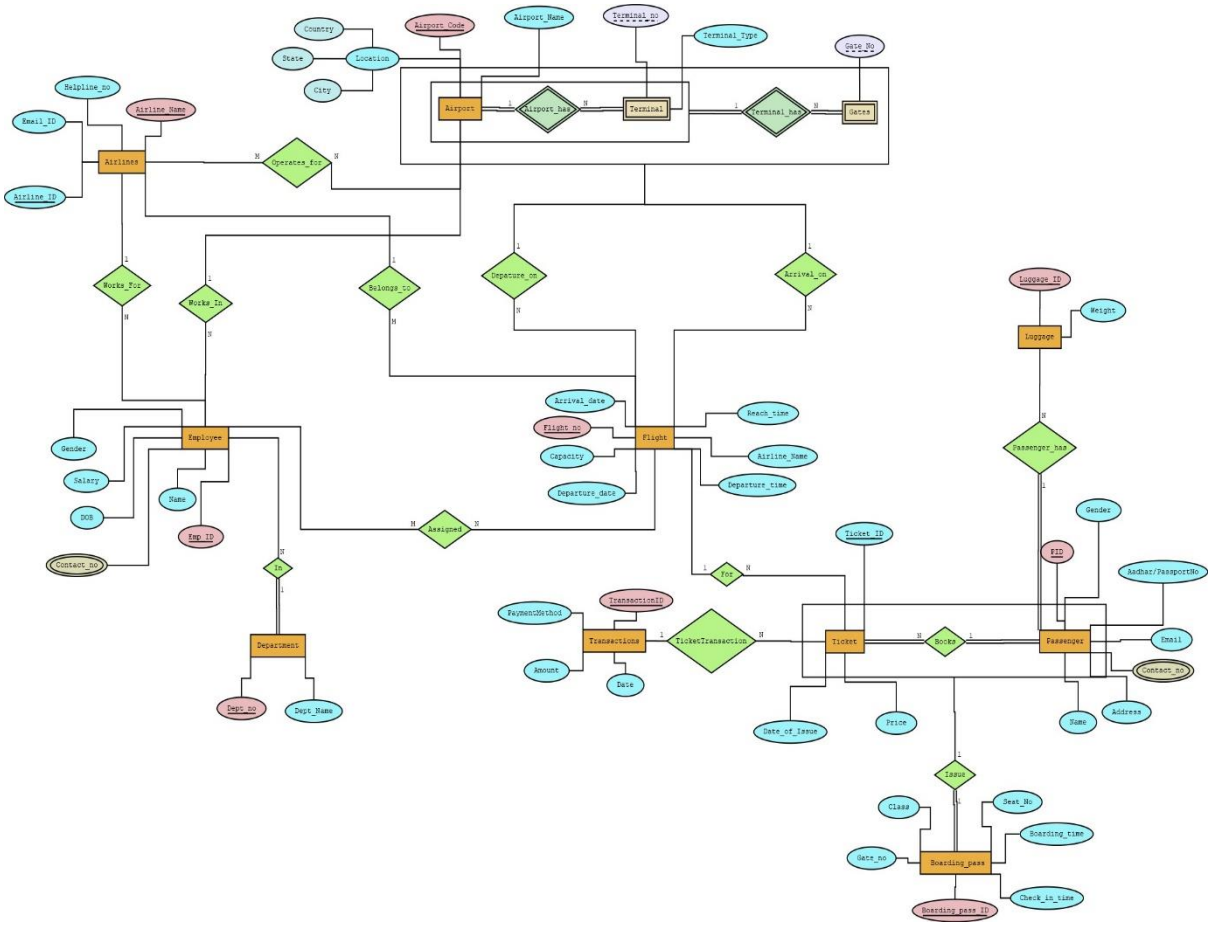
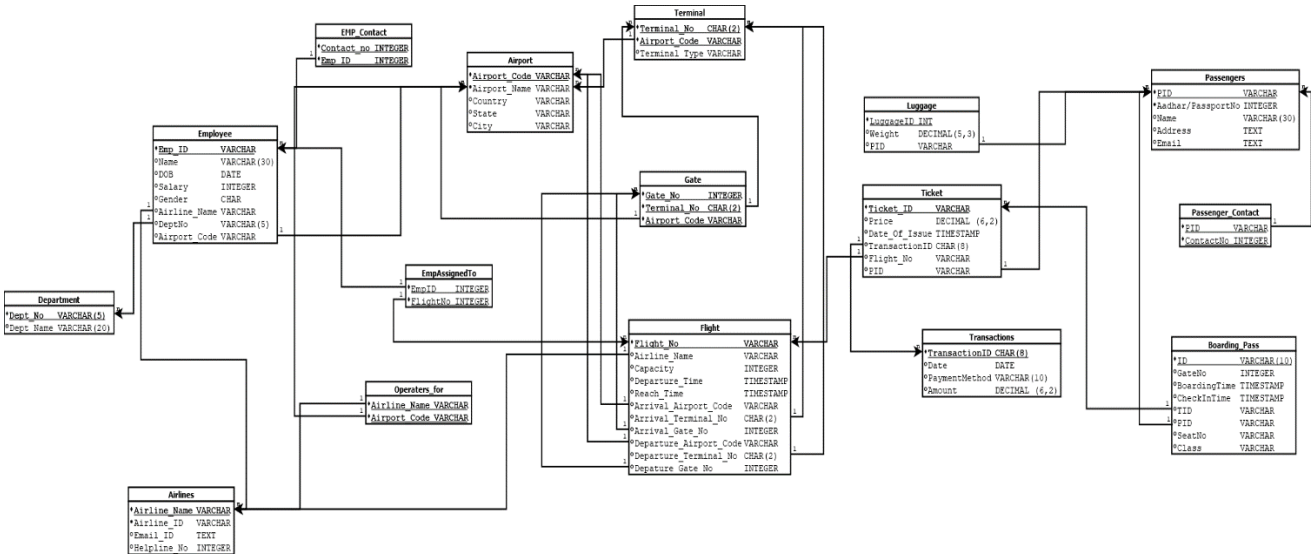
ER DIAGRAM



RELATIONAL SCHEMA



MINIMAL FDS AND NORMALIZATION PROOFS

1. Flight

Minimal FD Set :

Flight_No → Airline_Name
Flight_No → Capacity
Flight_No → Departure_Time
Flight_No → Reach_Time
Flight_No → Arrival_Airport_Code
Flight_No → Arrival_Terminal_No
Flight_No → Arrival_Gate_No
Flight_No → Departure_Airport_Code
Flight_No → Departure_Terminal_No
Flight_No → Departure_Gate_No

$\{Flight\_No\}^{+}$ = Flight(Flight_No, Airline_Name, Capacity, Departure_Time, Reach_Time, Arrival_Airport_Code, Arrival_Terminal_No, Arrival_Gate_No, Departure_Airport_Code, Departure_Terminal_No, Departure_Gate_No)
Therefore, Flight_No is the key.

For every FD A→B that holds on “Flight”, A is the key(Flight_No).
Relation Flight is in BCNF.

2. Airport

Minimal FD Set :

Airport_Code → Airport_Name
Airport_Code → City
City → {State, Country}

{Airport_Code}$^+$ = Airport(Airport_Code, Airport_Name, Country, State, City)
{City}$^+$ = Airport(City, State, Country)
Therefore, Airport_Code is the key.

For every FD A→B that holds on “Airport”, A is not always the key(Airport_Code).
Relation Airport is not in BCNF.
So we need to decompose, as a result we will make another table which contains city, state and country with city as key, which will be foreign key airport table.

3. Airlines

Minimal FD Set :

Airline_Name → Airline_ID
Airline_Name → Email_ID
Airline_Name → Helpline_No

{Airline_Name}$^+$ = Airlines(Airline_Name, Airline_ID, Email_ID, Helpline_No)
Therefore, Airport_Name is the key.

For every FD A→B that holds on “Airlines”, A is always the key(Airline_Name).
Relation Airlines is in BCNF.

4. Terminal

Minimal FD Set :

{Terminal_No,Airport_Code} → Terminal_Type

{Terminal_No, Airport_Code}$^+$ = Terminal(Terminal_No, Airport_Code, Terminal_Type)
Therefore, {Terminal_No, Airport_Code} is the key.

For every FD A→B that holds on “Terminal”, A is always the key({Terminal_No, Airport_Code}).
Relation Terminal is in BCNF.

5. Gate

Since all attributes in relation Gate are key, **Relation Gate is in BCNF.**

6. Employee

Minimal FD Set :

Emp_ID → Name
Emp_ID → DOB
Emp_ID → Salary
Emp_ID → Gender
Emp_ID → Airline_Name
Emp_ID → DeptNo
Emp_ID → Airport_Code

$\{Emp\_ID\}^+$ = Employee(Emp_ID, Name, DOB, Salary, Gender, Airline_Name, DeptNo, Airport_Code)
Therefore, {Emp_ID} is the key.

For every FD A→B that holds on “Employee”, A is always the key(Emp_ID).
Relation Employee is in BCNF.

7. Department

Minimal FD Set :

Dept_No → Dept_Name

$\{Dept\_No\}^+$ = Department(Dept_No, Dept_Name)
Therefore, {Dept_No} is the key.

For every FD A→B that holds on “Department”, A is always the key(Dept_No).
Relation Department is in BCNF.

8. Ticket

Minimal FD Set :

Ticket_ID → Price
Ticket_ID → TransactionID
Ticket_ID → Flight_No
Ticket_ID → PID
TransactionID → Date_Of_Issue

$\{Ticket\_ID\}^+$ = Ticket(Ticket_ID, Price, Date_Of_Issue, TransactionID, Flight_No, PID)
$\{TransactionID\}^+$ = Ticket(TransactionID, Date_Of_Issue)
Therefore, {Ticket_ID} is the key.

For every FD A→B that holds on “Ticket”, A is not always the key(Ticket_ID).
Relation Ticket is not in BCNF.

9. Transaction

Minimal FD Set :

TransactionID → Date
TransactionID → PaymentMethod
TransactionID → Amount

$\{TransactionID\}^+$ = Transaction(TransactionID, Date, PaymentMethod, Amount)
Therefore, {TransactionID} is the key.

For every FD A→B that holds on “Transaction”, A is always the key(TransactionID).
Relation Transaction is in BCNF.

10. Luggage

Minimal FD Set :

LuggageID → Weight
LuggageID → PID

{LuggageID}$^+$ = Luggage(LuggageID, Weight, PID)
Therefore, {LuggageID} is the key.

For every FD A→B that holds on “Luggage”, A is always the key(LuggageID).
Relation Luggage is in BCNF.

11. Passenger

Minimal FD Set :

PID → Aadhar/PassportNo
PID → Name
PID → Address
PID → Email

{PID}$^+$ = Passenger(PID, Aadhar/PassportNo, Name, Address, Email)
Therefore, {PID} is the key.

For every FD A→B that holds on “Passenger”, A is always the key(PID).
Relation Passenger is in BCNF.

12. Passenger_Contact

Since all attributes in relation Passenger_Contact are key, **Relation Passenger_Contact is in BCNF.**

13. Boarding_Pass

Minimal FD Set :

ID → GateNo
ID → BoardingTime
ID → CheckInTime
ID → SeatNo
ID → Class
ID → TID

ID → PID

{ID}⁺ = Boarding_Pass(ID, GateNo, BoardingTime, CheckInTime, SeatNo, Class, TID, PID)
Therefore, {ID} is the key.

For every FD A→B that holds on “Boarding_Pass”, A is always the key(ID).
Relation Boarding_Pass is in BCNF.

14. Operates_for

Since all attributes in relation Operates_for are key, **Relation Operates_for is in BCNF.**

15. EmpAssignedTo

Since all attributes in relation EmpAssignedTo are key, **Relation EmpAssignedTo is in BCNF.**

16. Emp_Contact

Since all attributes in relation EMP_Contact are key, **Relation Emp_Contact is in BCNF.**