

Minimal FD Set

1. City

Cname \rightarrow State , Country

2. Airport

AP_name \rightarrow State , Country , Cname

3. Airline

Airline_ID \rightarrow AL_name

4. Airport_Airline

(AP_name, Airline_ID) \rightarrow (no additional attributes, just linking)

5. Employee

SSN \rightarrow Fname, SSN \rightarrow Lname, Mname, Sex, Age, Phone, Address, Salary, Jobtype, AP_name

6. Administrative_Support

SSN \rightarrow AS_Type

7. Engineer

SSN \rightarrow Etype

8. Traffic_Monitor

SSN \rightarrow Shift

9. Airport_Authority

SSN \rightarrow Position

10. Employee_Flight

(SSN, Flight_Code) \rightarrow (no derived attributes)

11. Flight

Flight_Code \rightarrow Source, Destination, Arrival, Departure, Status, Duration, Flight_type, Airline_ID

12. Connecting

Flight_Code \rightarrow Layover_Time, No_of_stops

13. Nonstop

Flight_Code \rightarrow (no other attributes; just inclusion)

14. Passenger

PID \rightarrow Fname,Lname,Mname,Sex,Age, Phone,Address,PassportNo

15. Ticket

Ticket_Number \rightarrow Class,SeatNo,Source,Destination,Price,Date_of_travel,
Date_of_booking,Surcharge,PID

16. Flight_Passenger

(PID, Flight_Code) \rightarrow (no derived attributes)

17. Cancellation

Ticket_Number \rightarrow Date_of_cancellation

Proof For BCNF

1. CITY(Cname, State, Country)

FD:

Cname \rightarrow State

Cname \rightarrow Country

Candidate Key: Cname

All FDs have Cname (a key) on LHS \Rightarrow In BCNF

2. AIRPORT(AP_name, State, Country, Cname)

FD:AP_name \rightarrow State, Country, Cname

Candidate Key: AP_name

LHS is a key \Rightarrow In BCNF

3. AIRLINE(Airline_ID, AL_name)

FD:Airline_ID \rightarrow AL_name

Candidate Key: Airline_ID

LHS is a key \Rightarrow In BCNF

4. AIRPORT_AIRLINE(AP_name, Airline_ID)

FD: None (only a relationship table)
Composite Key: (AP_name, Airline_ID)
No FDs \Rightarrow Trivially in BCNF

5. EMPLOYEE(SSN, Fname, Lname, Mname, Sex, Age, Phone, Address, Salary, Jobtype, AP_name)

FD: SSN \rightarrow All other attributes
Candidate Key: **SSN**
LHS is a key \Rightarrow In BCNF

6. ADMINISTRATIVE_SUPPORT(SSN, AStype)

FD: SSN \rightarrow AStype
Candidate Key: **SSN**
LHS is a key \Rightarrow In BCNF

7. ENGINEER(SSN, Etype)

FD: SSN \rightarrow Etype
Candidate Key: **SSN**
In BCNF

8. TRAFFIC_MONITOR(SSN, Shift)

FD: SSN \rightarrow Shift
Candidate Key: **SSN**
In BCNF

9. AIRPORT_AUTHORITY(SSN, Position)

FD: SSN \rightarrow Position
Candidate Key: **SSN**
In BCNF

10. EMPLOYEE_FLIGHT(SSN, Flight_Code)

No FDs (pure relationship)
Candidate Key: (**SSN**, **Flight_Code**)
Trivially in BCNF

11. FLIGHT(Flight_Code, Source, Destination, Arrival, Departure, Status, Duration, Flighttype, Airline_ID)

FD: Flight_Code \rightarrow all other attributes

Candidate Key: Flight_Code

In BCNF

12. CONNECTING(Flight_Code, Layover_time, No_of_stops)

FD:

Flight_Code \rightarrow Layover_time

Flight_Code \rightarrow No_of_stops

Candidate Key: Flight_Code

In BCNF

13. NONSTOP(Flight_Code)

Only attribute is key \Rightarrow Trivially in BCNF

14. PASSENGER(PID, Fname, Lname, Mname, Sex, Age, Phone, Address, PassportNo)

FDs: PID \rightarrow all other attributes

Candidate Key: PID

In BCNF

15. FLIGHT_PASSENGER(PID, Flight_Code)

No FDs

Candidate Key: (PID, Flight_Code)

Trivially in BCNF

16. TICKET(Ticket_Number, Class, SeatNo, Source, Destination, Price, Date_of_travel, Date_of_booking, Surcharge, PID)

FD: Ticket_Number \rightarrow All other attributes

Candidate Key: Ticket_Number

In BCNF

17. CANCELLATION(Ticket_Number, Date_of_cancellation)

FD: Ticket_Number \rightarrow Date_of_cancellation

Candidate Key: Ticket_Number

In BCNF

Conclusion:

All the tables in your relational schema are already in BCNF as:

- Every non-trivial FD has a key on the LHS.
- Relationship tables have no non-trivial FDs \rightarrow Trivially BCNF.