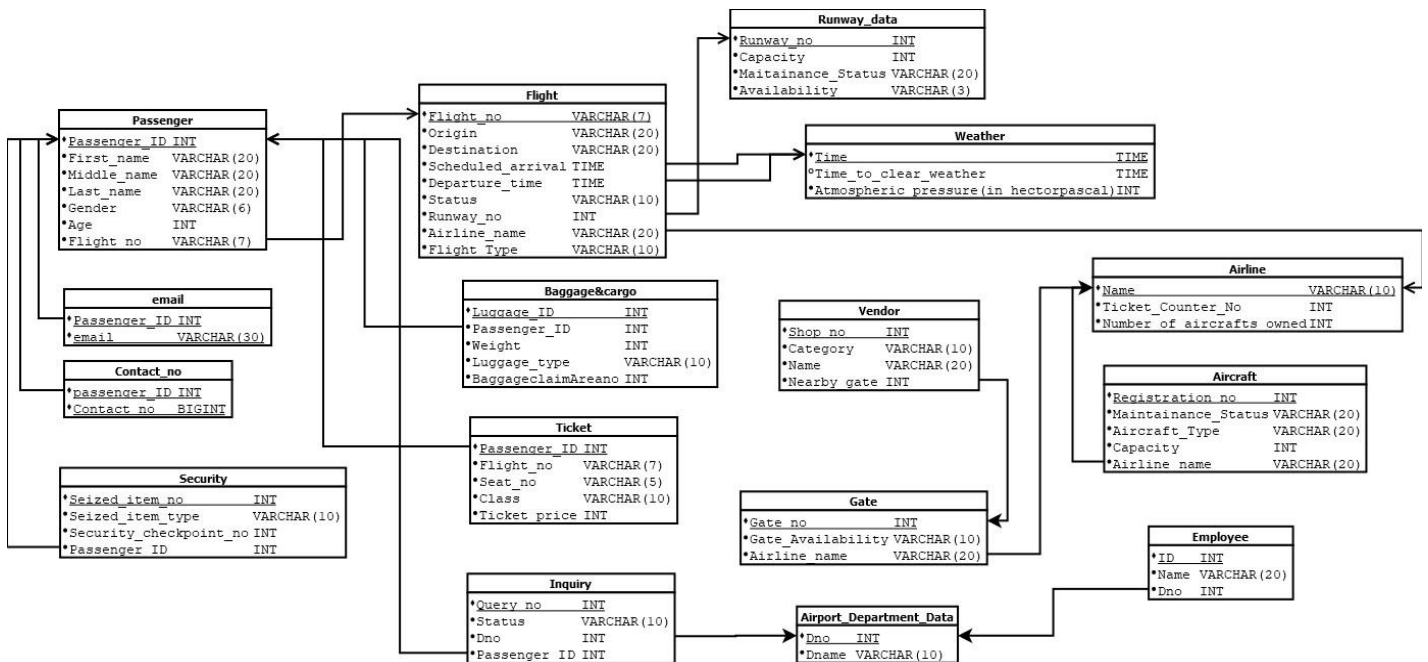


The diagram is an Entity-Relationship (ER) model for an airport system. It consists of the following entities, attributes, and relationships:

- Entities and Attributes:**
 - Ticket:** Ticket_Price, Class, Flight_No, Seat_No.
 - Passenger:** Name (First_Name, Middle_Name, Last_Name), Gender, Passenger_ID, Age, Contact_Details (Contact_No, Email).
 - Flight:** Scheduled_Arrival, Destination, Origin, Flight_Type, Departure_Time, Flight_No, Status.
 - Security:** Seized_Item_Type, Seized_Item_No.
 - Aircraft:** Registration_No, Aircraft_Type, Capacity.
 - Airline:** Name, Tickets_Counters_No, Number_of_Aircraft_Owned.
 - Inquiry:** Query_No, Status.
 - Airport_Department_Data:** Name, ID, Dno.
 - Employee:** Name, ID.
 - Gate:** Gate_Availability, Gate_No.
 - Vendor:** Category, Shop_No, Name.
- Relationships and Cardinalities:**
 - Bought:** Between Ticket (1) and Passenger (N).
 - Got_seized:** Between Passenger (1) and Security (N).
 - Travels_in:** Between Passenger (N) and Flight (1).
 - Owns:** Between Passenger (1) and Aircraft (N).
 - Takes_off/lands:** Between Flight (N) and Aircraft (1).
 - Observes_while_arriving:** Between Flight (N) and Passenger (1).
 - Observes_while_departing:** Between Flight (N) and Passenger (1).
 - Solved_by:** Between Inquiry (N) and Airport_Department_Data (1).
 - Operates:** Between Airport_Department_Data (N) and Employee (1).
 - Gate_Availability:** Between Gate (1) and Vendor (N).

Relational Schema:



FDs and Normalization Proof:

- ➔ We know that the relation is in BCNF, if the determinant of every functional dependency which holds on a relation is a super key of that relation.
Here we can see that,

- **Passenger:**

Passenger_ID -> {First_name, Middle_name, Last_name, gender, age, flight_no}

In the Passenger relation, Passenger_ID is the key and it determines all the other attributes of the relation Passenger. So we can confirm that this relation is in BCNF.

- **Email:**

$\{\text{Passenger_ID}, \text{email}\} \rightarrow \{\text{Passenger_ID}, \text{email}\}$

In the Email relation, $\{\text{Passenger_ID}, \text{email}\}$ is the key and it determines all the other attributes of the relation Email. So we can confirm that this relation is in BCNF.

- **Contact_no:**

$\{\text{Passenger_ID}, \text{Contact_no}\} \rightarrow \{\text{Passenger_ID}, \text{Contact_no}\}$

In the Contact_no relation, $\{\text{Passenger_ID}, \text{Contact_no}\}$ is the key and it determines all the other attributes of the relation Contact_no. So we can confirm that this relation is in BCNF.

- **Flight:**

$\text{Flight_no} \rightarrow \{\text{Origin}, \text{Destination}, \text{Scheduled_arrival}, \text{Departure_time}, \text{Runway_no}, \text{Airline_name}, \text{Flight_type}, \text{status}\}$

In the flight relation, flight_no is the key and it determines all the other attributes of the relation flight. So we can confirm that this relation is in BCNF.

- **Ticket:**

$\text{Passenger_ID} \rightarrow \{\text{flight_no}, \text{seat_no}, \text{class}, \text{ticket_price}\}$

In the Ticket relation, passenger_ID is the key and it determines all the other attributes of the relation Ticket. So we can confirm that this relation is in BCNF.

- **Airline:**

Name -> {ticket_counter_no, number_of_aircrafts_owned}

In the Airline relation, name is the key and it determines all the other attributes of the relation Airline. So we can confirm that this relation is in BCNF.

- **Aircraft:**

Registration no -> {Maintenance_Status, Aircraft_Type, Capacity, Airline_name}

In the Aircraft relation, Registration_no is the key and it determines all the other attributes of the relation Aircraft. So we can confirm that this relation is in BCNF.

- **Security:**

Seized_item_no -> {Seized_item_type, Security_checkpoint_no, Passenger_ID}

In the Security relation, seized_item_no is the key and it determines all the other attributes of the relation security. So we can confirm that this relation is in BCNF.

- **Baggage_and_cargo:**

Luggage_ID -> {Passenger_ID, flight_no, Luggage_type, weight, baggageclaimarea}

In the Baggage_and_cargo relation, Luggage_ID is the key and it determines all the other attributes of the relation Baggage_and_cargo. So we can confirm that this relation is in BCNF.

- **Inquiry:**

Query_no -> {Passenger_Id, status, dno}

In the Inquiry relation, Query_no is the key and it determines all the other attributes of the relation Inquiry. So we can confirm that this relation is in BCNF.

- **Runway_Data:**

Runway_no -> {Capacity, Maintainance_status, Availability}

In the Runway_Data relation, runway_no is the key and it determines all the other attributes of the relation Runway_Data. So we can confirm that this relation is in BCNF.

- **Weather:**

Time -> {Time_to_clear_weather, Atmospheric_pressure}

In the Weather relation, Time is the key and it determines all the other attributes of the relation weather. So we can confirm that this relation is in BCNF.

- **Vendor:**

Shop_no -> {Category, name, nearyby_gate}

In the Vendor relation, shop_no is the key and it determines all the other attributes of the relation Vendor. So we can confirm that this relation is in BCNF.

- **Gate:**

Gate_no -> {Gate_availability, airline_name}

In the Gate relation, gate_no is the key and it determines all the other attributes of the relation Gate. So we can confirm that this relation is in BCNF.

- **Airport_department_data:**

Dno -> dname

In the Airport_department_data relation, Dno is the key and it determines all the other attributes of the relation Airport_department_data. So we can confirm that this relation is in BCNF.

- **Employee:**

Id -> {name, dno}

In the Employee relation, ID is the key and it determines all the other attributes of the relation Employee. So we can confirm that this relation is in BCNF.

➔ So, We can see that all the relations are in BCNF.