# CENTRAL AIRPORT DATABASE MANAGEMENT SYSTEM

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## Overview :

The mini world chosen for this project is **Airports in India.**

The database aims to fulfil the needs of airport staff, passengers and their relatives, companies (like Indigo, Air India etc.), travel agencies, live tracking applications, tracking shipments, business partners etc.

Passengers can check the availability of flights and book their tickets. Employees can check the status of their company flights. A particular company can maintain the records of their staff in the airport. Passenger's relatives can check the timings of flight (time of arrival) to receive the passenger at the airport. Travel agencies will work based on their requirements from the database. People can track their baggage shipments. Staff can update the status of the runways to the pilots. Maintains a record of passengers travelling from a particular city.

## Database Requirements :

## Strong Entity Types :

- **Airport :**

| IATA CODE | Name | City | Country | Coordinates | | Time Zone | Manager |
|---|---|---|---|---|---|---|---|
| | | | | Latitude | Longitude | | |

**Primary Key :** IATA CODE

**Composite Attribute :** Coordinates

- **Passenger :**

| Name (First,Minit, Last) | Ticket No. | Gender | DOB | Age | Senior Citizen (Yes/No) | Nationality | Email-ID | Current Address |
|---|---|---|---|---|---|---|---|---|

**Primary Key :** Ticket No.

**Composite Attribute :** Name, Current Address (House No., Street No., Area Name, City, Pincode, State, Nation)

**Derived Attribute :** Age (Derived from DOB)

- **Aircraft :**

| Reg. No. | Airline Company | Capacity | Manufacturer | Plane Model | Distance Travelled | Last Maintenance Check Date | Flight ID |
|---|---|---|---|---|---|---|---|

**Primary Key :** Reg. No.

**Candidate Key :** Flight ID

- **Airline :**

| IATA Airline Code | Company Name | No. of aircrafts owned | Active (Yes/No) | Country of Ownership | Managing Director |
|---|---|---|---|---|---|

**Primary Key :** IATA Airline Code

**Candidate Key :** Company Name

- **Luggage :**

| Baggage ID | Owner | Destination Airport's IATA CODE | Flight ID | PNR No. |
|---|---|---|---|---|

**Primary Key :** Baggage ID

**Foreign Key :** Destination Airport's IATA CODE, Flight ID

- **Airport Employees :**

The Airport Employees entity type comprises all Employees working at Airport.

| Name | Aadhaar No. | Working Airport's IATA CODE | Gender | Nationality | DOB | Age | Salary | Joining Date |
|---|---|---|---|---|---|---|---|---|

**Primary Key :** Aadhaar No.

**Foreign Key :** Working Airport's IATA CODE

**Composite Attribute :** Name (Fname, Minit, Lname)

**<u>The Staff can be of three main subclasses</u> :**

1. **Air Traffic Controller :**

| Education | Current Communication Frequency |
|---|---|

**Multi Valued Attribute :** Education

2. **Security :**

| Designation | Security ID |
|---|---|

3. **Management and Operations Executives :**

The only Attribute is : Job Title (Eg : Airport Manager)

- **Airline Employees :**

The Airline Employees entity types comprises all Employees employed by Airlines.

| Name | <u>Aadhaar No.</u> | Working Airline's IATA Airline Code | Gender | Nationality | DOB | Salary | Joining Date | Languages Spoken |
|---|---|---|---|---|---|---|---|---|

**Primary Key :** <u>Aadhaar No.</u>

**Foreign Key :** Working Airline's IATA Airline Code

**Composite Attribute :** Name (Fname, Minit, Lname)

**Multi Valued Attribute :** Languages Spoken

**<u>The Staff can be of two main subclasses</u> :**

A. **FLIGHT CREW :**

1. **Pilot :**

| Licence No. | No. of flying hours achieved |
|---|---|

2. **Flight Attendants :**

| Education | Past Experiences |
|---|---|

Both the Attributes are Multivalued.

3. **Flight Engineers :**

| Education | Aircrafts specialised in |
|---|---|

Both the Attributes are Multivalued, Aircrafts specialised in is a Composite Attribute also (Manufacturer + Flight ID)

**B. ON-GROUND EMPLOYEES:**

The only Attribute is : Job Title.

**Some Possible Values :** Passenger Service Agent, Management Director, Aviation Meteorologist etc.

- **Boarding Pass :**

| Barcode No. | Name | Source's IATA CODE | Destination's IATA CODE | Flight ID | PNR No. | Class of Travel |
|---|---|---|---|---|---|---|

| Date of Departure | Scheduled Departure Time | Scheduled Boarding Time | Terminal Number | Seats | Special Services |
|---|---|---|---|---|---|

**Primary Key :** Barcode No.
**Multi Valued Attribute :** Special Services
**Foreign Keys :** Source's IATA CODE, Destination's IATA CODE

## Weak Entity Types :

- **ROUTE :**

| Date | Time Duration | Source's IATA CODE | Destination's IATA CODE | Direct / Stop-over | Stop-over Airports IATA CODES | Status |
|---|---|---|---|---|---|---|

| Taking off Runway ID | Landing Runway ID | Pilot's Licence No.s | Distance Involved | Scheduled Departure | Scheduled Arrival |
|---|---|---|---|---|---|

**Foreign Keys :** Airports IATA CODES, Pilot's Licence No.s, Runway ID's.
**Multi Valued Attributes :** Stop-over Airports IATA CODES, Licence No.s.

- **Runways :**

| ID | Length (in ft) | Width (in ft) | Status |
|---|---|---|---|

**Partial Key :** ID (magnetic azimuth of the runway's heading in decadegrees)

- **Terminals :**

| Name | Flight Handling Capacity | Floor Area | ID |
|---|---|---|---|

- **Emergency Contacts :**

| Name | Phone No. |
|---|---|

## <u>Relationship Types</u> :

1. Passenger **USES** Boarding_Pass **(1:N)**
   (Total Participation from Boarding_Pass)
2. Boarding_Pass **IS USED TO TRAVEL ON THE** Route **(N:1)**
   (Total Participation from Boarding_Pass & Partial Participation from Route)
3. Baggage **IS LINKED TO** Boarding_Pass **(N:1)**
   (Total Participation from Baggage & Partial Participation from Boarding_Pass)
4. Airport **IS SOURCE AIRPORT FOR** Route **(1:N)**
   (Total Participation from Route & Partial Participation from Airport)
5. Airport **IS DESTINATION AIRPORT FOR** Route **(1:N)**
   (Total Participation from Route & Partial Participation from Airport)
6. Aircraft **IS USED FOR THE** Route **(1:N)**
   (Total Participation from Route & Partial Participation from Aircraft)
7. Flight_Crew **SERVES ON THE** Route **(M:N)**

(Total Participation from Flight_Crew & Total Participation from Route)

8. Airport **CONTAINS** Runways **(1:N)**
   (Total Participation from Airport & Total Participation from Runway)
9. Airport **CONTAINS** Terminals **(1:N)**
   (Total Participation from Airport & Total Participation from Terminal)
10. Airline **OWNS THE** Aircraft **(1:N)**
    (Total Participation from Airline & Total Participation from Aircraft)
11. Airline_Crew **WORKS IN THE** Airline **(N:1)**
    (Total Participation from Airline_Crew & Total Participation from Airline)
12. Airport_Crew **WORKS IN THE** Airport **(N:1)**
    (Total Participation from Airport_Crew & Partial Participation from Airport)
13. Passenger **HAS** Emergency_Contacts **(1:N)**
    (Total Participation from Emergency Contact & Partial Participation from Passenger)
14. Airport_Crew(Manager) **SUPERVISES** Airport_Crew(Subordinate)
    **This is a <u>Recursive Relationship</u>**
15. Pilot (First-officer), Flight_Engineer, Flight_Attendant **HAVE WORKED TOGETHER UNDER THE COMMAND OF** Pilot(Captain) **(n>3 degree Relationship)**

## <u>Functional Requirements</u> :

- **<u>Operations On Database</u> :**

## MODIFICATIONS :

- **INSERT :**
  - Addition of a new aircraft
  - Addition of a new employee
  - Addition of baggage to a particular boarding pass
- **DELETE :**
  - Deletion of a plane which is no longer active.
  - Deletion of fired employee
- **UPDATE :**
  - Update flight status information based on time delay
  - Update status of runway.
  - Update status of running flight.

## RETRIEVALS :

- **SELECTION :**
  - Retrieve complete data tuples of Pilots who work for a particular Airline.
  - Retrieve complete data tuples of passengers who were travelling in a particular crashed flight.
- **PROJECTION :**
  - Names of all passengers who have Wheelchair Assistance as a special service in their boarding pass.
  - Names of all Airlines whose flight crew is >= 100.
- **AGGREGATE :**
  - Find the pilot who has maximum no. of flying hours on record.
- **SEARCH :**
  - Search for all Airlines whose name starts with ‘A’.
- **ANALYSIS :**
  - Rank Busiest Airports in India by number of scheduled flight departures on a particular day.
  - Rank the flight based on the number of flying hours.

**Summary :**

The database can be used to extract information about Flights, their timings and about Airlines managing those flights. We have divided data into many tables with all its attributes, it makes easy accessing information regarding every aspect. Any error encountered can be rectified. This makes the database an important resource for efficient categorization of data.