Project

Airways Maganement

Team No. 15

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1 Introduction to the mini-world

Our mini world is based on the Airline system which is a critical component of any Airline's operations. It stores and manages all of the data that is essential to the Airline's day-to-day business, including information about flights, passengers, reservations, aircraft, and airports. The database has a variety of entities and attributes along with their relationships which can be used by a variety of users, including airline employees, passengers, travel agents, government agencies, and researchers.

2 Purpose of the database

- To store and manage all of the data that is essential to the operation of all the Airlines.
- To provide a central repository of information that can be accessed by a variety of users, including airline employees, passengers, travel agents, government agencies, and researchers.

3 Users of the database

The database would be used by the Airline employees, passenegres ,travel agents and anyone else who wants to know about the scheduled flights or any other similar information.

4 Applications of the database

- Airline employees use the database to manage flight schedules, book reservations, check in passengers, and track baggage.
- Passengers can use the database to book flights, check their flight status, and manage their reservations.
- Travel agents use the database to book flights for their clients and manage their clients' reservations.

5 Database Requirements

5.1 Assumptions

1. We are assuming only direct flights from one place to another.
2. We are assuming only one passenger is travelling per ticket and the ticket is being booked for one passenger at a time.
3. We are not storing real time data. That is, we are not maintaining if a flight is on time,delayed etc.
4. We are assuming that a particular city has only one airport in it.

5.2 Strong Entity types

1. ***AIRPORT***
   - City
     –> Varchar(25)
     –> Primary Key constraint
     –> NOT NULL constraint
   - Airport Type
     –> Boolean (Domestic or International)
     –> NOT NULL constraint
   - Number of Terminals
     –> int(1-50)

–> NOT NULL constraint

- Location in the City

  –> Varchar(100)

  –> NOT NULL constraint

- Number of Runways

  –> int(1-50)

  –> NOT NULL constraint

2. ***AEROPLANE***

   - Aeroplane_ID

     –> int(10 digits)

     –> Primary Key constraint

     –> NOT NULL constraint

   - Manufacturer Company

     –> Varchar(100)

     –> NOT NULL constraint

   - Airline Name

     –> Varchar(50)

     –> Foreign Key Constraint

     –> NOT NULL constraint

   - Fuel Capacity

     –> int(101-9999)

   - Seat Capacity

     –> int(10-1000)

     –> NOT NULL constraint

3. ***EMPLOYEE***

   - Employee_ID

     –> int(5 digits)

     –> Primary Key constraint

     –> NOT NULL constraint

   - Name

     –> Varchar(50)

     –> Composite (First Name, Last Name)

     –> NOT NULL constraint

   - Salary

     –> int(10000-1000000)

     –> NOT NULL constraint

   - Working Role

     –> Varchar(100)

     –> Multi-valued Attribute

     –> NOT NULL constraint

   - Working Hours

     –> int(5-15)

     –> NOT NULL constraint

   - Working Place

     –> Boolean (Airport / Aeroplane)

     –> NOT NULL constraint

- Airport City
  –> Varchar(100)
  –> Foreign Key Constraint
- Flight_ID
  –> int(10 digits)
  –> Foreign Key Constraint

4. ***PASSENGER***

   - Passenger_ID
     –> int(5 digits)
     –> Primary Key constraint
     –> NOT NULL constraint
   - Name
     –> Varchar(50)
     –> Composite(First Name, Last Name)
     –> NOT NULL constraint
   - Date Of Birth
     –> DD/MM/YYYY
     –> Check constraint $(1 <= DD <= 31; 1 <= MM <= 12)$
     –> NOT NULL constraint
   - Nationality
     –> Varchar(100)
     –> NOT NULL constraint
   - Age
     –> int(0-150)
     –> Derived (from - Date Of Birth)
     –> NOT NULL constraint

5. ***FLIGHT***

   - Flight_ID
     –> int(10 digit)
     –> Primary Key constraint
     –> NOT NULL constraint
   - Arrival City
     –> Varchar(100)
     –> Foreign Key Constraint
     –> NOT NULL Constraint
   - Departure City
     –> Varchar(100)
     –> Foreign Key Constraint
     –> NOT NULL Constraint
   - Total Number of Passengers
     –> int(10-500)
     –> Derived (from - Ticket)
     –> NOT NULL constraint
   - Aeroplane_ID
     –> int(10 digits)
     –> Foreign Key Constraint

–> NOT NULL constraint

- Date

  –> DD/MM/YYYY

  –> Check constraint ($1 <= DD <= 31; 1 <= MM <= 12$)

  –> NOT NULL constraint

- Timings

  –> Composite Attribute

  –> First Value : Start Time of the flight == HH:MM where HH is the hour (24-hour format) and MM is the minute, NOT NULL constraint, Check constraint ($00 <= HH <= 23, 00 <= MM <= 59$)

  –> Second Value : Finish Time of the flight == HH:MM where HH is the hour (24-hour format) and MM is the minute, NOT NULL constraint, Check constraint ($00 <= HH <= 23, 00 <= MM <= 59$)

- Duration

  –> Derived Attribute (from - Timings)

  –> HH:MM where HH is the number of hours and MM is the number of minutes

  –> NOT NULL constraint

6. ***TICKET***

- PNR

  –> int(10 digits)

  –> Primary Key constraint

  –> NOT NULL constraint

- Passenger_ID

  –> int(5 digits)

  –> Foreign Key Constraint

  –> NOT NULL constraint

- Flight_ID

  –> int(10 digits)

  –> Foreign Key Constraint

  –> NOT NULL constraint

- Seat Number

  –> int(1-500)

  –> NOT NULL constraint

- Ticket Type

  –> Varchar(50)

  –> NOT NULL constraint

- Booking Agent

  –> Varchar(50)

- Ticket Prize

  –> int(0-10000000)

  –> NOT NULL constraint

- Booking Date and Time

  –> Composite Attribute

  –> First Value : DD/MM/YYYY, Check constraint ($1 <= DD <= 31; 1 <= MM <= 12$), NOT NULL constraint

  –> Second Value : Booking Time == HH:MM where HH is the hour (24-hour format) and MM is the minute, NOT NULL constraint, Check constraint ($00 <= HH <= 23, 00 <= MM <= 59$)

7. ***AIRLINE***

   - Airline Name

     –> Varchar(50)
     –> Primary Key constraint
     –> NOT NULL constraint
   - Owner Name

     –> Varchar(50)
     –> Composite(First Name, Last Name)
     –> NOT NULL constraint
   - Net Worth

     –> int(0-100000000000)
     –> NOT NULL constraint

5.3 Weak entity types

1. ***BAGGAGE***

   - Baggage_ID

     –> int(10-500)
     –> Partial Key constraint
     –> NOT NULL constraint
   - Weight

     –> int(1-200)
     –> NOT NULL constraint
   - Ticket_ID

     –> int(10 digits)
     –> Foreign Key constraint
     –> NOT NULL constraint

2. ***SHOPS***

   - Shop_ID

     –> int(101-999)
     –> Partial Key Constraint
     –> NOT NULL constraint
   - Shop_Name

     –> Varchar(100)
     –> Partial Key Constraint
     –> NOT NULL constraint
   - Shop_Type

     –> Varchar(50)
     –> NOT NULL constraint
   - License Expiry

     –> DD/MM/YYYY
     –> Check constraint ($1 <= DD <= 31; 1 <= MM <= 12$)
     –> NOT NULL constraint
   - Timings

     –> Composite Attribute
     –> First Value : Opening Time == HH:MM where HH is the hour (24-hour format) and MM is the minute, NOT NULL constraint, Check constraint ($00 <= HH <= 23, 00 <= MM <= 59$)
     –> Second Value : Closing Time == HH:MM where HH is the hour (24-hour format) and MM is the minute, NOT NULL constraint, Check constraint ($00 <= HH <= 23, 00 <= MM <= 59$)

5.4 Relationship types

1. ***IS_OF***
    - Baggage IS_OF a ticket.
    - Degree = 2
    - Cardinality Ratio = N:1
    - Participating entities : Baggage and Ticket
    - Participation constraint : Baggage (1,1) has total participation and Ticket (0,N) has partial participation.
2. ***IS_OWNER_OF***
    - Passenger IS_OWNER_OF Ticket
    - Degree = 2
    - Cardinality Ratio = 1:N
    - Participating entities : Ticket and Passenger
    - Participation constraint : Ticket (0,1) have partial participation and Passenger (1,N) also has total participation.
3. ***HAS***
    - Airport HAS Shops
    - Degree = 2
    - Cardinality Ratio = 1:N
    - Participating entities : Shop and Airport
    - Participation constraint : Shop (1,1), has total participation and Airport (0,N) has partial participation.
4. ***OWNS***
    - Airline OWNS Aeroplane
    - Degree = 2
    - Cardinality Ratio = 1:N
    - Participating entities : Aeroplane and Airline
    - Participation constraint : Aeroplane (1,1) has total participation and Airline (1,N) has total participation.
5. ***ARE_OF***
    - Tickets ARE_OF a Flight
    - Degree = 2
    - Cardinality Ratio = N:1
    - Participating entities : Ticket and Flight
    - Participation constraint : Ticket (1,1) has total participation and Flight (1,N) has total participation
6. ***DONE_BY***
    - Flight is DONE_BY an Aeroplane
    - Degree = 2
    - Cardinality Ratio = N:1
    - Participating entities : Flight and Aeroplane
    - Participation constraint : Flight (1,1) has total participation and Aeroplane (0:N) has partial participation.

7. ***SERVES ON***
   - Employee SERVES ON a Flight
   - Degree = 2
   - Cardinality Ratio = N:1
   - Participating entities : Employee and Flight
   - Participation constraint : Employee (0,N) has partial participation and Flight (1:N) has total participation.

8. ***WORKS_IN***
   - Employee WORKS_IN an Airport
   - Degree = 2
   - Cardinality Ratio = N:1
   - Participating entities : Employee and Airport
   - Participation constraint : Employee (0,1) has partial participation and Airport (1:N) has total participation.

9. ***TAKES OFF***
   - Flight TAKES OFF from an airport
   - Degree = 2
   - Cardinality Ratio = N:1
   - Participating entities : Flight and Airport
   - Participation constraint : Flight (1,1) has total participation and Airport (1:N) has total participation.

10. ***LANDS ON***
    - Flight LANDS ON an airport
    - Degree = 2
    - Cardinality Ratio = N:1
    - Participating entities : Flight and Airport
    - Participation constraint : Flight (1,1) has total participation and Airport (1:N) has total participation.

5.5 Degree > 2 relationship types

1. ***TRAVEL***
   - Passenger TRAVELS on an Flight with a Baggage OF_A ticket
   - Degree = 4 , Quatenary relationship.
   - Cardinality Ratio = N:1:M:N
   - Participating entities : Passenger,Flight,Ticket,Baggage.

5.6 Recursive Relationship

1. ***SUPERVISION***
   - Employee SUPERVISES Employee
   - Degree = 1
   - Cardinality Ratio = 1:N
   - Participation constraint : Employee when as supervisor has partial participation (0,N) and when supervisee then also partial participation- (0,1)

6 Functional Requirements

6.1 Modifications

1. INSERT

   - Add a new Passenger.ticket,flight,aeroplane to the system, ensuring that the Passenger ID is unique

2. DELETE

   - Remove an Aeroplane as it is on no more use
   - Remove a shop from an Airport

3. UPDATE

   - Change the Seat Capacity of a specific aeroplane
   - Update the number of runways in a particular airport

6.2 Retrievals

1. SELECTION

   - Query to fetch all flights departing from a specific airport on a particular date.
   - List of all shops in an Airport
   - List of All Aeroplane that belong to an airline

2. PROJECTION

   - List of all domestic Airports
   - List of All ticket that are booked by Paytm

3. AGGREGATE

   - SUM: Calculate the total revenue collected from a specific flight.
   - MAX: Find the flight with the maximum number of passengers on a given day.
   - MIN: On a flight Baggage with min weight.
   - AVG: Determine the average fare for flights between two specific airports in 10 days.

4. SEARCH

   - Search for all passengers with names containing the substring "Elvish".

6.3 Analysis

1. On a particular day, list all flights from one city to another. Show flight in sorted order of time and if time is same then sort according to fare

2. Most Used Airline