Entity Relationship

For

AIRLINE MANAGEMENT SYSTEM

Version 1.0

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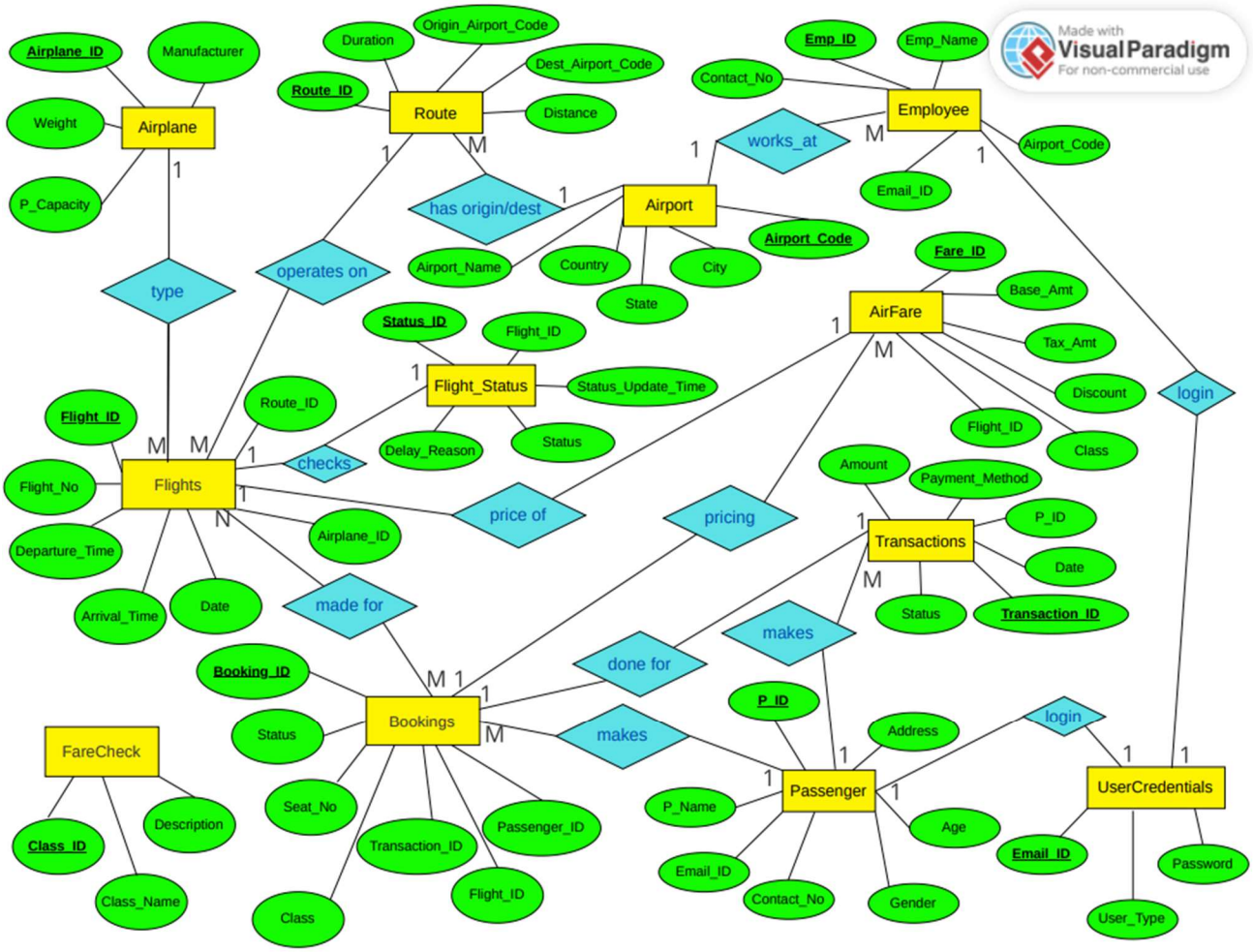
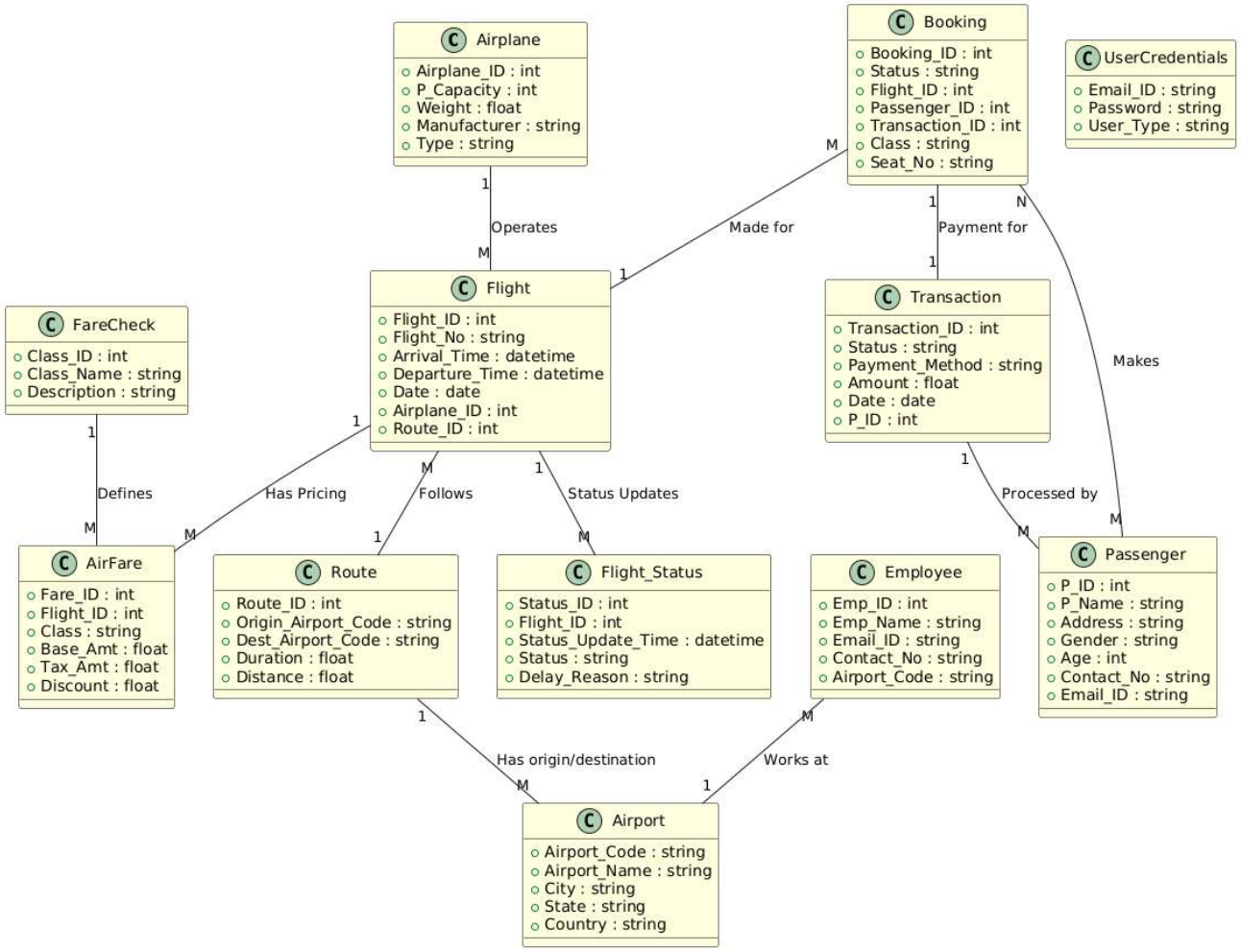
Analysis Models

- **Entity-Relationship Diagrams (ERD):** Diagrams depicting the relationships between all the key data entities.



- **Schema/Class Diagram:** A visual representation of a database structure. It shows the tables, columns, data types, primary keys, foreign keys, and relationships between tables in a database.



Schema Reduction Using Functional Dependency-Based Normalization

Step 1: Identify Relations and Functional Dependencies

From the ERD, we identify the following relations and their attributes:

- Has already been reduced and mentioned in the NORMALIZATION REPORT.

Step 2: Final Normalized Tables

After completing the normalization process, we obtain:

- **Airplane_type Table:**
    - Airplane_ID (PK)
    - Passenger_Capacity
    - Weight
    - Manufacturer
- **Airport Table:**
    - Airport_Code (PK)
    - Airport_Name
    - City
    - Country
    - State
- **Route Table:**
    - Route_ID (PK)
    - Origin_Airport_Code (FK)
    - Destination_Airport_Code (FK)
    - Distance

- Duration

- **Flight Table:**
  - Flight_ID (PK)
  - Flight_Number
  - Departure_Time
  - Arrival_Time
  - Flight_Date
  - Airplane_ID (FK)
  - Route_ID (FK)
- **Flight_Status Table:**
  - Status_ID (PK)
  - Flight_ID (FK)
  - Status
  - Status_Update_Time
  - Delay_Reason
- **Employee Table:**
  - Employee_ID (PK)
  - Employee_Name
  - Airline
  - Contact_Number
  - Email_Address
- **Passengers Table:**
  - Passenger_ID (PK)
  - Passenger_Name
  - Age
  - Gender

- Address
- Contact_Number
- Email

- **Fare_Class Table:**
  - Class_ID (PK)
  - Class_Name
  - Description
- **AirFare Table:**
  - Fare_ID (PK)
  - Base_Amount
  - Tax_Amount
  - Discount
  - Flight_ID (FK)
  - Class_ID (FK)
- **Transactions Table:**
  - Transaction_ID (PK)
  - Booking_Date
  - Payment_Method
  - Payment_Status
  - Amount
  - Passenger_ID (FK)
- **Booking Table:**
  - Booking_ID (PK)
  - Booking_Status
  - Seat_Number
  - Class_ID (FK)

    - Transaction_ID (FK)
    - Flight_ID (FK)
    - Passenger_ID (FK)

- **UserCredentials:**
    - Email (PK)
    - Password
    - User_Type

Step 3: Verify Lossless Join and Dependency Preservation

- **All relations still allow natural joins** to reconstruct the original data.
- **All functional dependencies are preserved**.

Conclusion

This reduction removes redundancy, prevents anomalies, and preserves dependencies while maintaining a lossless join.