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Airlines Database Design Report

Introduction

SKY-HIGH Airlines, in celebration of its merger with ALWAYS-ON-TIME Airlines, requires the design of a new database system to streamline its flight reservation and information processes. The newly formed CLOUD-9 Airlines needs a comprehensive ER schema and table structure to manage passenger travel effectively. This report details the design, assumptions, and constraints for the new database system.

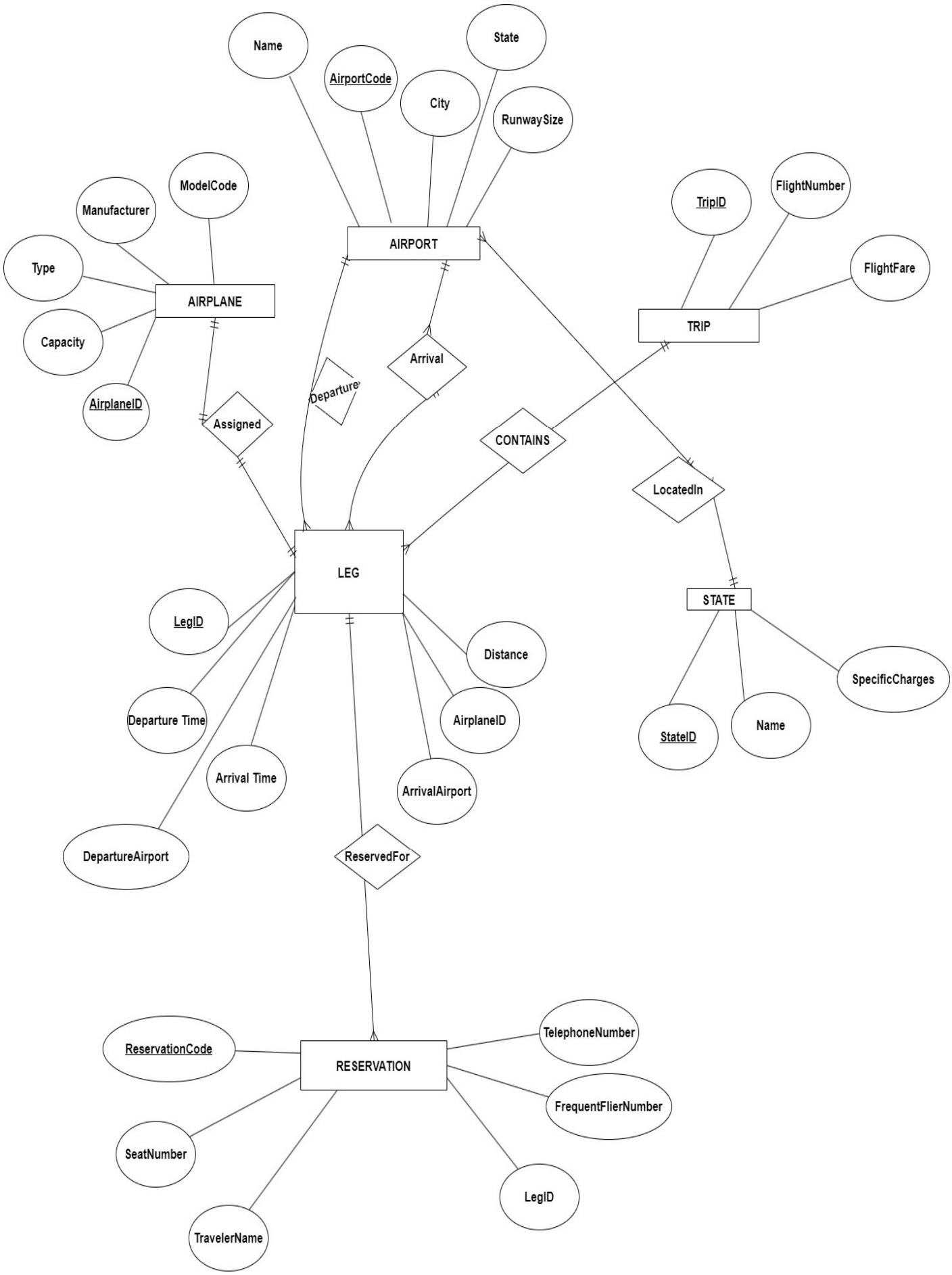
ER Schema Diagram

The ER schema diagram models the various entities and relationships involved in the flight reservation and information system.

Key entities include:

- **Passenger**: Represents customers booking flights.
- **Reservation**: Tracks flight bookings made by passengers.
- **Flight**: Represents the scheduled flights.
- **Flight Leg**: Details specific segments of a flight.
- **Aircraft**: Represents the airplanes used for flights.
- **Airport**: Represents the airports involved in flights.
- **Seat**: Represents individual seats on an aircraft.

ER SCHEMA DIAGRAM: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City
State
RunwaySize
AIRPORT
ModelCode
Manufacturer
Type
AIRPLANE
Capacity
AirplaneID
Assigned
Departure
Arrival
TripID
FlightNumber
FlightFare
TRIP
CONTAINS
LocatedIn
LEG
LegID
Departure Time
Arrival Time
DepartureAirport
Distance
AirplaneID
ArrivalAirport
ReservedFor
STATE
StateID
Name
SpecificCharges
ReservationCode
SeatNumber
TravelerName
RESERVATION
TelephoneNumber
FrequentFlierNumber
LegID

Table Implementation

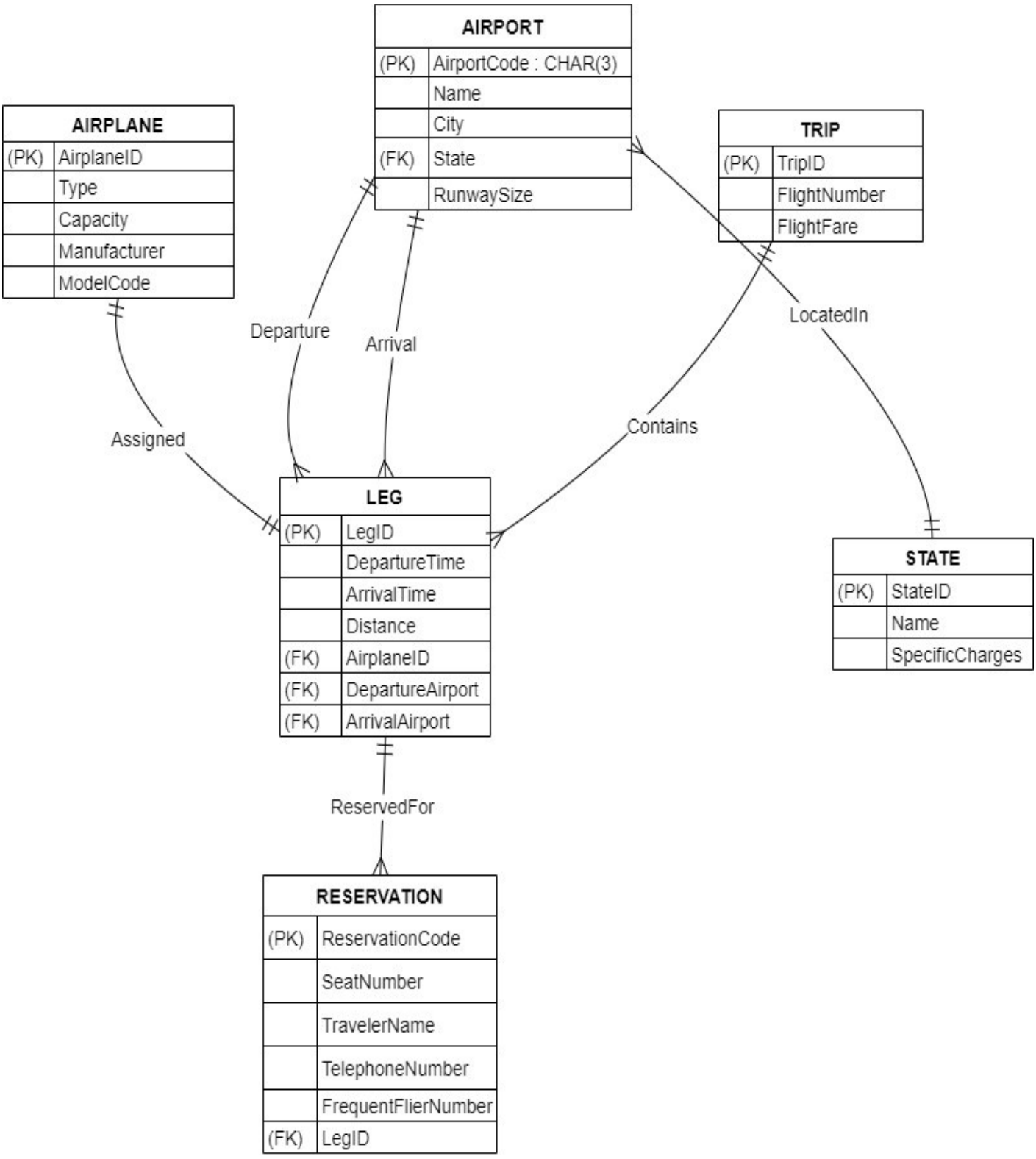

Table Implementation

The ER diagram was converted into a set of relational tables, with primary and foreign keys defined to maintain data integrity and relationships. The tables are as follows:

1. Passenger Table

- **Primary Key:** PassengerID
- **Attributes:** Name, Address, Phone Number, Email

2. Reservation Table

- **Primary Key:** ReservationID
- **Foreign Keys:** PassengerID, FlightLegID, SeatID
- **Attributes:** ReservationDate, Status

3. Flight Table

- **Primary Key:** FlightID
- **Attributes:** FlightNumber, DepartureAirport, ArrivalAirport

4. Flight Leg Table

- **Primary Key:** FlightLegID
- **Foreign Key:** FlightID
- **Attributes:** LegNumber, DepartureTime, ArrivalTime, AircraftID

5. Aircraft Table

- **Primary Key:** AircraftID
- **Attributes:** ModelCode, Capacity, Airline

6. Airport Table

- **Primary Key:** AirportID
- **Attributes:** AirportCode, Name, Location

7. Seat Table

- **Primary Key:** SeatID
- **Foreign Key:** AircraftID
- **Attributes:** SeatNumber, Class

Assumptions and Constraints

1. **No flight leg may have more reservations than the aircraft can accommodate.**
    - Ensures that the number of reservations does not exceed the seating capacity of the aircraft.
2. **Flight legs landing or taking off from an airport can only be assigned to aircraft with a model code appropriate for the runway size of that airport.**
    - Maintains compatibility between aircraft models and airport runways.
3. **During a specific flight leg, only one active reservation may be made for any given seat on an aircraft.**
    - Prevents double booking of seats.
4. **Airports are subject to the state-specific regulations and fees in which they are situated.**
    - Acknowledges that airports must comply with regional laws and fees.
5. **Every trip's leg must be taken in a specific order.**
    - Ensures that the sequence of flight legs is maintained.
6. **Weekend operations are limited to profitable routes.**
    - Operations during weekends are restricted to routes that generate profit.
7. **There are limitations on the airports that each type of aircraft can use.**
    - Restricts the usage of certain aircraft types to compatible airports.

Conclusion

This report presents a detailed design for the CLOUD-9 Airlines database, incorporating the key entities, relationships, assumptions, and constraints required for a robust and efficient flight reservation and information system. The ER schema and table implementations align with corporate guidelines and specifications, ensuring data integrity and operational efficiency.