Airplane Database Management System
CS306- Project Phase 1

Yunus Emre Gök
Ufuk Çimen
Ahmet Çavuşoğlu

Airplane Database Management System

We are designing a flight tracking database for a government organization that needs to gather, monitor, and analyze comprehensive information from multiple airlines and airports. The system is intended for security, investigative, and strategic purposes, ensuring that officials have real-time oversight of flights, passengers, crew assignments, and baggage.

Passengers in the database are uniquely identified by a Passenger_ID. Each passenger record holds details such as first name, last name, sex, passport number, and phone number. Because travelers may book multiple flights, the system links passengers to their Tickets, which are uniquely identified by a Ticket_ID and specify the seat number, travel class (economy, business, or first), and price.

Every Flight—identified by a Flight_ID—includes the flight number, references the airline operating it, specifies the departure and arrival airports, and indicates scheduled times along with the flight status (e.g., on-time, delayed, canceled). Each flight is assigned to an Aircraft, which has its own Aircraft_ID, model, manufacturer, capacity, and a reference to the airline that owns or operates it. Multiple airlines can be tracked, each described by an Airline_ID, name, country, IATA code, and contact information.

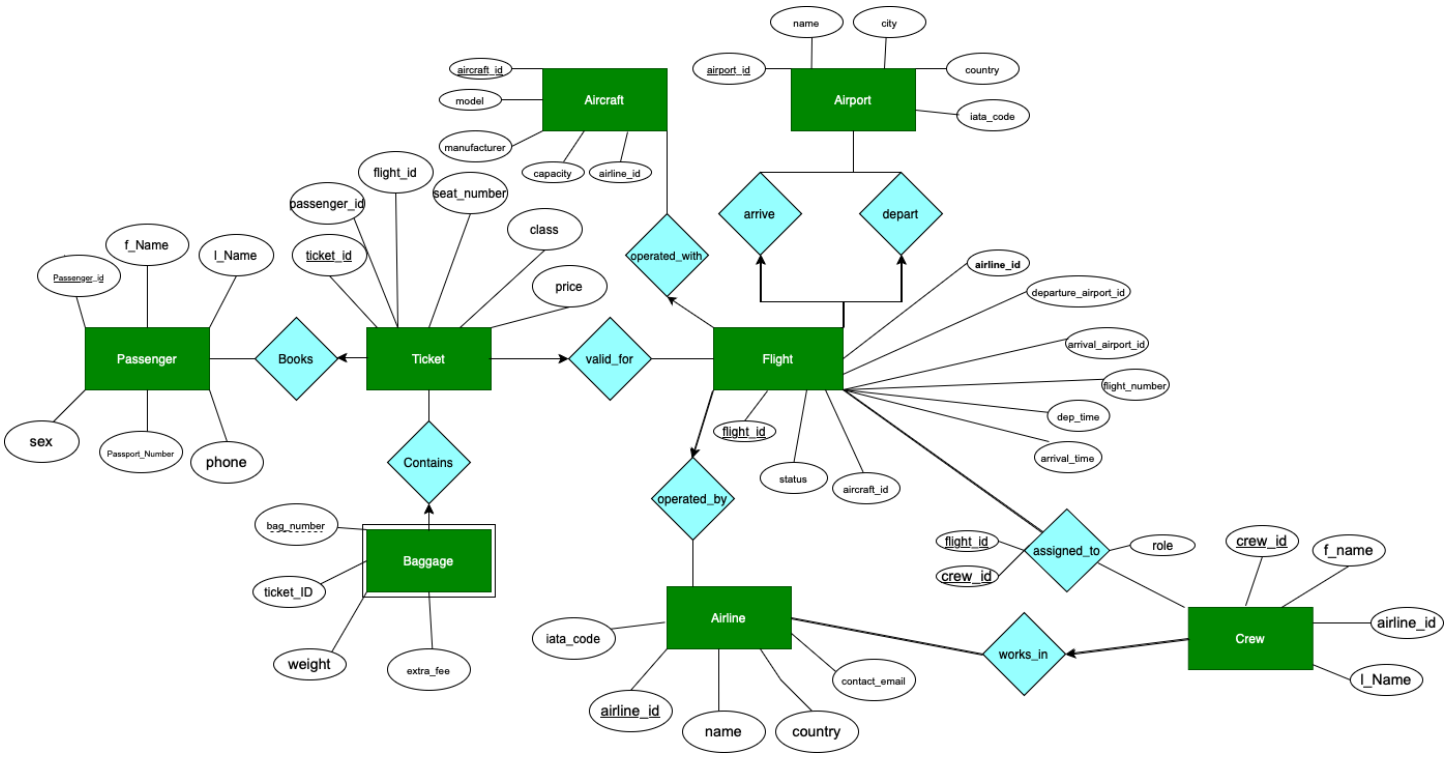
Airports are core to flight tracking, with each Airport given an Airport_ID and attributes like name, city, country, and IATA code. Since flights depart from one airport and land at another, airport data helps the government organization to monitor routes and identify trends or suspicious travel patterns.

Additionally, the database monitors Crew members, identified by a Crew_ID. This includes personal details such as first name, last name, role (pilot, flight attendant, engineer, etc.), and a reference to their associated airline. Because one flight can have multiple crew members, and each crew member can serve on many flights, the system logs these assignments for effective oversight and scheduling.

Baggage tracking is also crucial, particularly for security. Each baggage record has a Baggage_ID linked to the appropriate ticket. It stores information about the weight, number of bags, and any extra fees for exceeding baggage limits. By tying baggage data to specific passengers and flights, the government organization can more easily detect anomalies or risk factors.

By integrating the Passenger, Flight, Airline, Aircraft, Airport, Ticket, Crew, and Baggage entities, this flight tracking database provides a centralized, robust platform. It supports the government's mission by consolidating vital travel data in one system—empowering real-time monitoring, enhancing investigative capabilities, and improving overall security and regulatory compliance.

- **ER Diagram**



- **ER Diagram to Relational Model**

CREATE TABLE Passenger (
passenger_id INT,
f_name CHAR(50),
l_name CHAR(50),
sex CHAR(10),
passport_number INT,

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    phone INT,
    PRIMARY KEY (passenger_id)
);

CREATE TABLE Airline (
    airline_id INT,
    name CHAR(50),
    country CHAR(50),
    iata_code CHAR(10),
    contact_email CHAR(100),
    PRIMARY KEY (airline_id)
);

CREATE TABLE Airport (
    airport_id INT,
    name CHAR(50),
    city CHAR(50),
    country CHAR(50),
    iata_code CHAR(10),
    PRIMARY KEY (airport_id)
);

CREATE TABLE Aircraft (
    aircraft_id INT,
    model CHAR(50),
    manufacturer CHAR(50),
    capacity INT,
    airline_id INT,
    PRIMARY KEY (aircraft_id),
    FOREIGN KEY (airline_id)
        REFERENCES Airline(airline_id)
        ON DELETE CASCADE
);
```

```
CREATE TABLE Flight (
    flight_id INT,
    flight_number INT,
    airline_id INT,
    departure_airport_id INT,
    arrival_airport_id INT,
    departure_time DATETIME,
    arrival_time  DATETIME,
    aircraft_id INT,
    status CHAR(15),
    PRIMARY KEY (flight_id),
    FOREIGN KEY (airline_id)
        REFERENCES Airline(airline_id)
        ON DELETE CASCADE,
    FOREIGN KEY (departure_airport_id)
        REFERENCES Airport(airport_id)
        ON DELETE CASCADE,
    FOREIGN KEY (arrival_airport_id)
        REFERENCES Airport(airport_id)
        ON DELETE CASCADE,
    FOREIGN KEY (aircraft_id)
        REFERENCES Aircraft(aircraft_id)
        ON DELETE CASCADE
);

CREATE TABLE Ticket (
    ticket_id INT,
    passenger_id INT,
    flight_id INT,
    seat_number CHAR(10),
    class CHAR(15),
    price DECIMAL(10,2),
    PRIMARY KEY (ticket_id),
    FOREIGN KEY (passenger_id)
```

```
        REFERENCES Passenger(passenger_id)
        ON DELETE CASCADE,
    FOREIGN KEY (flight_id)
        REFERENCES Flight(flight_id)
        ON DELETE CASCADE,
);

CREATE TABLE Crew (
    crew_id INT,
    first_name CHAR(50),
    last_name CHAR(50),
    airline_id INT,
    PRIMARY KEY (crew_id),
    FOREIGN KEY (airline_id)
        REFERENCES Airline(airline_id)
        ON DELETE CASCADE
);

CREATE TABLE Baggage (

    ticket_id INT,
    weight DECIMAL(5,2),
    bag_number INT,
    extra_fee DECIMAL(10,2),
    PRIMARY KEY (ticket_id, baggage_number),
    FOREIGN KEY (ticket_id)
        REFERENCES Ticket(ticket_id)
        ON DELETE CASCADE
);

CREATE TABLE assigned_to(
        flight_id INT,
        crew_id INT,
        role Char(20),
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```
    PRIMARY KEY (flight_id, crew_id),

    FOREIGN KEY(flight_id)
        REFERENCES Flight(flight_id)
        ON DELETE CASCADE,

    FOREIGN KEY(crew_id)
        REFERENCES Crew(crew_id)
        ON DELETE CASCADE

)
```

- **INSERTING DATA TO EACH TABLE IN DATABASE**

INSERT INTO Passenger (passenger_id, f_name, l_name, sex, passport_number, phone)
VALUES
(1, 'Ahmet', ‘Binbaşı’, 'M', 123431789, 5321269567),
(2, 'Ayşe', 'Kaya', 'F', 987654321, 5429876543),

(3, 'Mehmet', 'Demir', 'M', 456789123, 5554567891),
(4, 'Zeynep', 'Çelik', 'F', 789456123, 5307894561),
(5, “Emre”, ‘Kaymak’, 'M', 321654987, 5453216549),
(6, 'Fatma', 'Koç', 'F', 654321789, 5326543217),
(7,’2, 'Aydın', 'M', 147258369, 5501472583),
(8, ‘Horison’, ‘Grass’, 'F', 963852741, 5319638527),
(9, 'Burak', 'Arslan', 'M', 258963147, 5342589631),
(10, 'Ceylin', 'Erdoğan', 'F', 852741963, 5388527419);

INSERT INTO Airline (airline_id, name, country, iata_code, contact_email)
VALUES
(1, 'Türk Hava Yolları', 'Türkiye', 'THY', 'info@thy.com'),
(2, 'Pegasus', 'Türkiye', 'PGS', 'info@flypgs.com'),
(3, 'AnadoluJet', 'Türkiye', 'AJT', 'info@anadolujet.com')
(4, 'SunExpress', 'Türkiye', 'SXS', 'info@sunexpress.com'),
(5, 'Lufthansa', Germany, 'LH', 'info@lufthansa.com'),
(6, 'Emirates', 'UAE', 'EK','info@emirates.com'),
(7, 'Qatar Airways', 'Qatar', 'QR', 'info@qatarairways.com'),
(8, 'British Airways', 'UK', 'BA', 'info@britishairways.com'),
(9, 'Air France', France, 'AF', 'info@airfrance.com'),
(10, 'Delta Airlines', USA, 'DL', 'info@delta.com');

INSERT INTO Aircraft (aircraft_id, model, manufacturer, capacity, airline_id)
VALUES
(1, 'Boeing 737', 'Boeing', 180, 1),

(2, 'Airbus A320', 'Airbus', 160, 2),
(3, 'Boeing 777', 'Boeing', 350, 1),
(4, 'Embraer E190', 'Embraer', 114, 3),
(5, 'Airbus A321', 'Airbus', 190, 2),
(6, 'Boeing 787', 'Boeing', 296, 4),
(7, 'Airbus A350', 'Airbus', 314, 5),
(8, 'Bombardier CRJ900', 'Bombardier', 90, 6),
(9, 'Boeing 747', 'Boeing', 410, 7),
(10, 'ATR 72', 'ATR', 78, 8);

INSERT INTO Airport (airport_id, name, city, country, iata_code)
VALUES
(1, 'İstanbul Airport’, 'İstanbul', 'Türkiye', 'IST'),
(2, 'Sabiha Gökçen Airport’, 'İstanbul', 'Türkiye', 'SAW'),
(3, 'Esenboğa Airport’, 'Ankara', 'Türkiye', 'ESB'),
(4, 'Adnan Menderes Airport’, 'İzmir', 'Türkiye', 'ADB'),
(5, 'Antalya Airport’, 'Antalya', 'Türkiye', 'AYT'),
(6, 'Trabzon Airport’, 'Trabzon', 'Türkiye', 'TZX'),
(7, 'Dalaman Airport’, 'Muğla', 'Türkiye', 'DLM'),
(8, 'Milas-Bodrum Airport’, 'Muğla', 'Türkiye', 'BJV'),
(9, 'Gaziantep Airport’, 'Gaziantep', 'Türkiye', 'GZT'),
(10, 'Erzurum Airport’, 'Erzurum', 'Türkiye', 'ERZ');

INSERT INTO Flight (flight_id, flight_number, airline_id,
departure_airport_id, arrival_airport_id, departure_time,

arrival_time, aircraft_id, status)
VALUES
(1, 1001, 1, 1, 3, '08:00', '09:30', 1, 'Scheduled'),
(2, 1002, 2, 2, 4, '10:00', '11:45', 2, 'Scheduled'),
(3, 1003, 3, 3, 5, '13:30', '15:00', 4, 'Delayed'),
(4, 1004, 1, 4, 1, '16:00', '18:10', 3, 'Scheduled'),
(5, 1005, 2, 5, 2, '19:00', '20:40', 5, 'Cancelled'),
(6, 1006, 3, 6, 2, '06:45', '08:15', 1, 'Scheduled'),
(7, 1007, 1, 7, 3, '09:20', '11:00', 2, 'Scheduled'),
(8, 1008, 2, 8, 4, '12:10', '14:05', 3, 'Delayed'),
(9, 1009, 3, 9, 5, '15:30', '17:00', 4, 'Scheduled'),
(10, 1010, 1, 10, 1, '21:15', '23:00', 5, 'Cancelled');

INSERT INTO Ticket (ticket_id, passenger_id, flight_id,
seat_number, class, price)
VALUES
(1, 1, 1, '12A', 'Economy', 1200.50),
(2, 2, 2, '5B', 'Business', 3200.75),
(3, 3, 3, '7C', 'Economy', 900.00),
(4, 4, 4, '10D', 'First', 4500.00),
(5, 5, 5, '15E', 'Economy', 1400.30),
(6, 6, 6, '3F', 'Economy', 1100.20),
(7, 7, 7, '8A', 'Business', 3500.50),
(8, 8, 8, '14C', 'Economy', 950.75),
(9, 9, 9, '2B', 'First', 4800.00),
(10, 10, 10, '19D', 'Economy', 1300.90);

INSERT INTO Crew (crew_id, first_name, last_name, role, airline_id)
VALUES
(1, 'Ali', 'Özkan', 'Pilot', 1),
(2, 'Mehmet', 'Yıldırım', 'Flight Attendant', 2),
(3, 'Zeynep', 'Kara', 'Engineer', 3),
(4, 'Fatih', 'Demir', 'Pilot', 1),
(5, 'Elif', 'Şahin', 'Flight Attendant', 2),
(6, 'Ahmet', 'Çelik', 'Pilot', 3),
(7, 'Burcu', 'Aydın', 'Flight Attendant', 1),
(8, 'Cem', 'Güneş', 'Engineer', 2),
(9, 'Derya', 'Taş', 'Flight Attendant', 3),
(10, 'Emre', 'Kurt', 'Pilot', 2);

INSERT INTO Baggage (ticket_id, weight, bag_number, extra_fee)
VALUES
(1, 23.5, 1, 0.00),
(1, 18.0, 2, 0.00),
(3, 27.2, 1, 50.00),

(4, 30.0, 2, 75.00),

(5, 20.5, 1, 0.00),
(6, 6, 25.0, 1, 0.00),
(7, 7, 29.8, 2, 60.00),
(8, 8, 15.3, 1, 0.00),
(9, 9, 33.5, 3, 90.00),
(10, 10, 22.0, 1, 0.00);

INSERT INTO Works_in (flight_id, crew_id)
VALUES
(1, 1),
(2, 2),
(3, 3),
(4, 4),
(5, 5),
(6, 6),
(7, 7),
(8, 8),
(9, 9),
(10, 10);

1. Passenger

Attributes: Passenger_ID (Primary Key), F_Name, L_Name,Sex, Passport_Number, Phone

Description: Stores personal details of passengers who book flights.

2. Flight

Attributes: Flight_ID (Primary Key), Flight_Number, Airline_ID (Foreign Key), Departure_Airport_ID (Foreign Key), Arrival_Airport_ID (Foreign Key), Departure_Time, Arrival_Time, Aircraft_ID (Foreign Key), Status

Description: Contains details about flights operated by the airline.

3. Airline

Attributes: Airline_ID (Primary Key), Name, Country, IATA_Code, Contact_Email

Description: Stores information about the airline operating the

flights.

4. Aircraft

Attributes: Aircraft_ID (Primary Key), Model, Manufacturer, Capacity, Airline_ID (Foreign Key)

Description: Maintains records of aircraft used by the airline.

5. Airport

Attributes: Airport_ID (Primary Key), Name, City, Country,

IATA_Code(saw,ist) **Description:** Stores information about airports where

flights take off and land.

6. Ticket

Attributes: Ticket_ID (Primary Key), Passenger_ID (Foreign Key), Flight_ID (Foreign Key), Seat_Number, Class (Economy, Business, First), Price

Description: Represents booked flight tickets for passengers.

7. Crew

Attributes: Crew_ID (Primary Key), First_Name, Last_Name, Role (Pilot, Flight Attendant, Engineer, etc.), Airline_ID (Foreign Key)
Description: Stores details of airline crew members assigned to flights.

8. Baggage

Attributes: Baggage_ID (Primary Key), Ticket_ID (Foreign Key), Weight (kg), Number_of_Bags, Extra_Fee

Description: Tracks checked baggage details for passengers, including the total weight, number of bags, and any extra fees for exceeding the allowed limit.

Relationships Between Entities:

Passenger ←Ticket (One-to-Many) → A passenger can book multiple tickets.(bold, total part) - books

Flight <- Ticket (One-to-Many) → A flight can have multiple tickets booked.(sağ taraf bold)- has

Airline <- Flight (One-to-Many) → An airline operates multiple flights. (sağ taraf bold)- departs-from arrive_from

Flight ↔ Aircraft (One-to-One) → A flight is assigned to a specific aircraft.(2 taraf hem bold hem ok)- assigned_to

Flight – Crew (Many-to-Many) → Multiple crew members are assigned to multiple flights. (sol taraf bold)- includes

Ticket ↔ Baggage (One-to-Many) → A ticket can have multiple baggage entries. -has

Airport - departure

Airport- arrival