



**Misr University for Science & Technology
College of Information Technology
Information Systems Department**

IS312 (Intro. to Database)
Project Title: Airline Booking System(P.No.#8)

Team Members

Student Name	ID
Mohamed Ayman	200026500
Rabab Mohsen	200019725
Belal Ahmed Saqer	200023029
Omar Ahmed Asaad	200027710
Assem Mohamed	200030013
Rawan Mohamed Mahmoud	200031284
Ahmed Gwayed	200027755

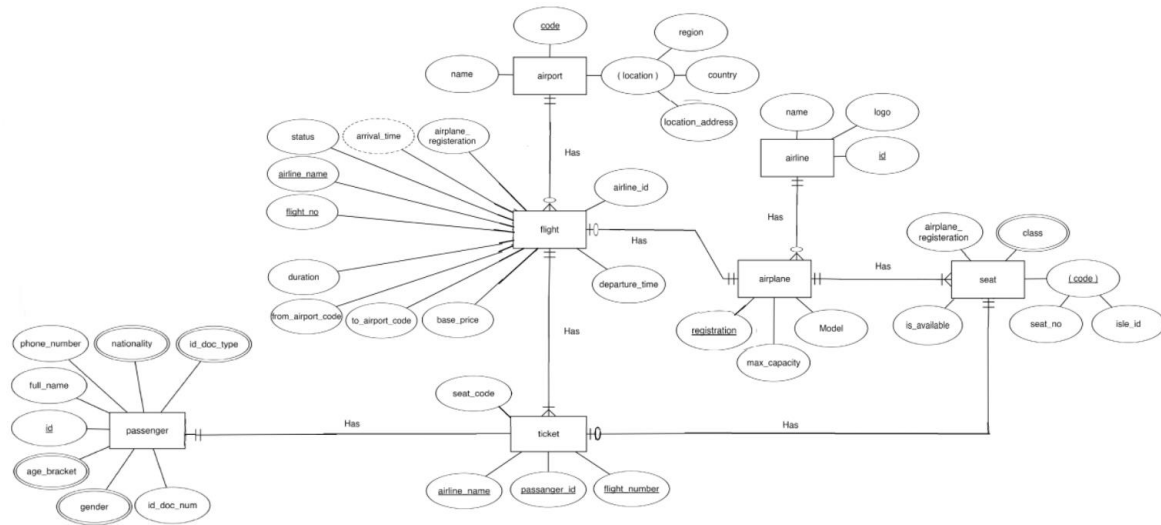
Supervised by:

Dr/ Alaa Eldein Yassin
Assistant Lecturer/ Ayman S. Abdelaziz
T.A/ Amany Mohamed

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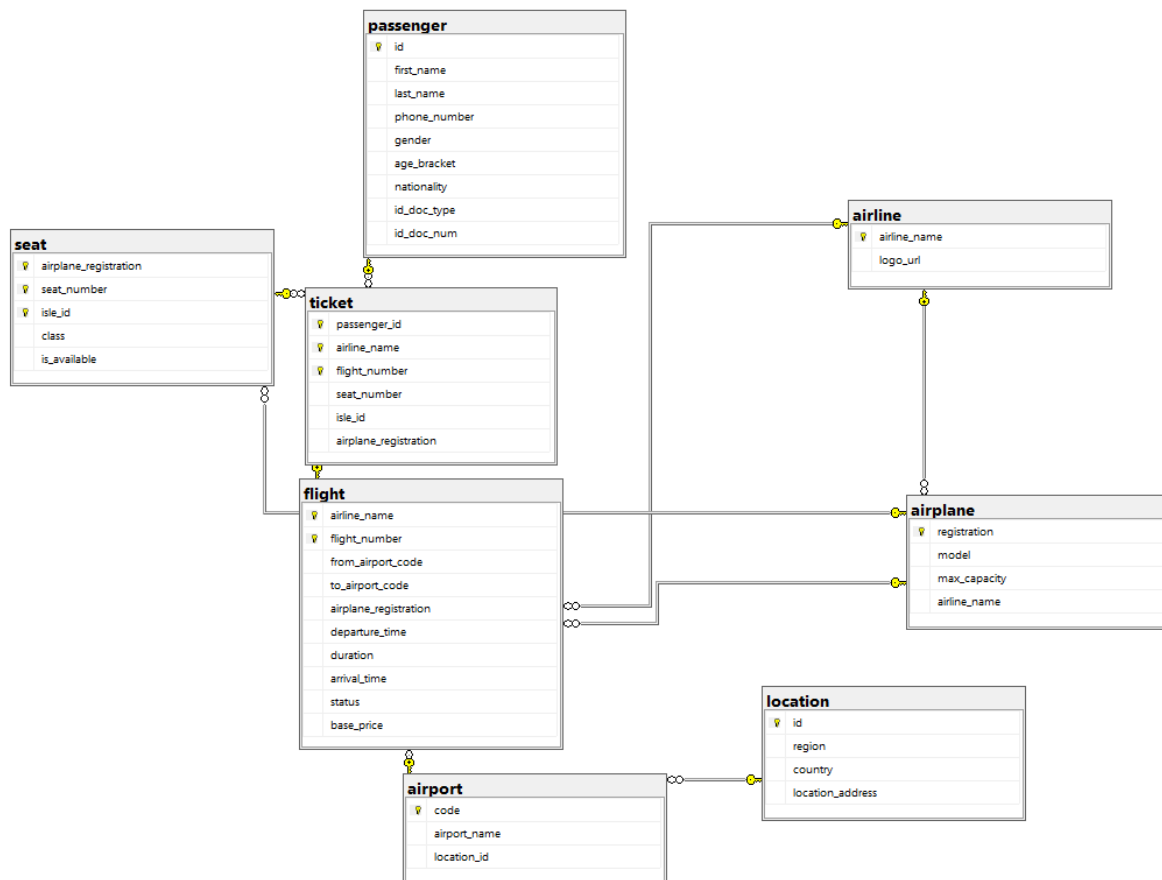
Phase (I): Database Design

a) ER Diagram



Phase (I): Database Design

b) Schema



Phase (II): Database Implementation

1- Create Database

SQL Statement

```
CREATE DATABASE airline_reservation_system;
```

2- USE Database

SQL Statement

```
USE airline_reservation_system;
```

3- Create tables: (For Each Entity)

SQL Statements

```
CREATE TABLE passenger (  
    id INT IDENTITY(1,1) PRIMARY KEY,  
    first_name VARCHAR(30) NOT NULL,  
    last_name VARCHAR(30) NOT NULL,  
    title VARCHAR(30) NOT NULL,  
    phone_number VARCHAR(15) NOT NULL  
    CHECK (  
        phone_number NOT LIKE '%[^0-9]%'  
        AND LEN(phone_number) BETWEEN 7 AND 15  
    ),  
    gender VARCHAR(9) CHECK (gender IN ('Male', 'Female')) NOT NULL, -- enum  
(multivalued)  
    age_bracket VARCHAR(6) CHECK (age_bracket IN ('Infant', 'Child', 'Adult')) NOT  
NULL,  
    nationality VARCHAR(30) NOT NULL,  
    id_doc_type VARCHAR(20) CHECK (id_doc_type IN ('Driver License', 'Passport',  
'National ID')) NOT NULL,  
    id_doc_num SMALLINT NOT NULL,);
```

```
CREATE TABLE location( --composite attr8 in erd  
    id INT IDENTITY(1,1) PRIMARY KEY,  
    region VARCHAR(30) NOT NULL,  
    country VARCHAR(30) NOT NULL,  
    location_address VARCHAR(255)  
);
```

```
CREATE TABLE airport (  
    code CHAR(3) PRIMARY KEY,  
    airport_name VARCHAR(60) NOT NULL,
```

```

        location_id INT NOT NULL,
        FOREIGN KEY (location_id) REFERENCES location(id)
    );

CREATE TABLE airline (
    id INT IDENTITY(1,1) PRIMARY KEY,
    airline_name VARCHAR(40) NOT NULL,
    logo_url VARCHAR(512)
);

CREATE TABLE airplane (
    id INT IDENTITY(1,1) PRIMARY KEY,
    model VARCHAR(40),
    max_capacity INT NOT NULL,
    airline_id INT NOT NULL,
    FOREIGN KEY (airline_id) REFERENCES airline(id)
);

CREATE TABLE seat (
    airplane_id INT NOT NULL,
    seat_number INT NOT NULL,
    isle_id CHAR(1) NOT NULL,
    class VARCHAR(10) CHECK (class IN ('Economy', 'Business')),
    is_available BIT NOT NULL DEFAULT 1, -- 1 = available, 0 = not available
    PRIMARY KEY (seat_number, isle_id),
    FOREIGN KEY (airplane_id) REFERENCES airplane(id)
);

CREATE TABLE flight (
    id INT IDENTITY(1,1) PRIMARY KEY,
    from_airport_code CHAR(3) NOT NULL,
    to_airport_code CHAR(3) NOT NULL,
    airline_id INT NOT NULL,
    airplane_id INT NOT NULL,
    departure_time DATETIME NOT NULL,
    duration INT NOT NULL, -- in minutes
    arrival_time AS DATEADD(MINUTE, duration, departure_time) PERSISTED,
    status VARCHAR(10) CHECK (status IN ('On Time', 'Delayed', 'Cancelled')),
    FOREIGN KEY (from_airport_code) REFERENCES airport(code),
    FOREIGN KEY (to_airport_code) REFERENCES airport(code),
    FOREIGN KEY (airline_id) REFERENCES airline(id),
    FOREIGN KEY (airplane_id) REFERENCES airplane(id)
);

CREATE TABLE ticket (
    price SMALLINT NOT NULL,
    passenger_id INT NOT NULL,
    flight_id INT NOT NULL,

```

```

seat_number INT NOT NULL,
isle_id CHAR(1) NOT NULL,
FOREIGN KEY (seat_number, isle_id) REFERENCES seat(seat_number, isle_id),
FOREIGN KEY (passenger_id) REFERENCES passenger(id),
FOREIGN KEY (flight_id) REFERENCES flight(id),
PRIMARY KEY (seat_number, isle_id, passenger_id, flight_id)
);

```

4- Data Insertion:- (at least 3 records for each table)

SQL Statements

```

INSERT INTO location (region, country, location_address) VALUES
('Cairo', 'Egypt', 'Oruba Road, Heliopolis'),
('New York', 'USA', 'Jamaica, NY 11430'),
('New York', 'USA', '9400 Ditmars Blvd, East Elmhurst, NY 11369'),
('Los Angeles', 'USA', '1 World Way, Los Angeles, CA 90045'),
('Chicago', 'USA', '10000 W O"Hare Ave, Chicago, IL 60666'),
('San Francisco', 'USA', 'San Francisco, CA 94128'),
('Miami', 'USA', '2100 NW 42nd Ave, Miami, FL 33142'),
('London', 'UK', 'Longford TW6'),
('Paris', 'France', '95700 Roissy-en-France'),
('Tokyo', 'Japan', 'Narita, Chiba 282-0004'),
('Dubai', 'UAE', 'Dubai, UAE'),
('Sydney', 'Australia', 'Mascot NSW 2020, Australia'),
('Singapore', 'Singapore', 'Airport Boulevard, Singapore 819643'),
('Toronto', 'Canada', '6301 Silver Dart Drive, Mississauga');

```

```

INSERT INTO airport (code, airport_name, location_id) VALUES
('CAI', 'Cairo International Airport', (SELECT id FROM location WHERE location_address = 'Oruba Road, Heliopolis')),

('JFK', 'John F. Kennedy International Airport', (SELECT id FROM location WHERE location_address = 'Jamaica, NY 11430')),

('LGA', 'LaGuardia Airport', (SELECT id FROM location WHERE location_address = '9400 Ditmars Blvd, East Elmhurst, NY 11369')),

('LAX', 'Los Angeles International Airport', (SELECT id FROM location WHERE location_address = '1 World Way, Los Angeles, CA 90045')),

('ORD', 'O"Hare International Airport', (SELECT id FROM location WHERE location_address = '10000 W O"Hare Ave, Chicago, IL 60666')),

```

```

('SFO', 'San Francisco International Airport', (SELECT id FROM location WHERE location_address = 'San Francisco, CA 94128')),

('MIA', 'Miami International Airport', (SELECT id FROM location WHERE location_address = '2100 NW 42nd Ave, Miami, FL 33142')),

('LHR', 'Heathrow Airport', (SELECT id FROM location WHERE location_address = 'Longford TW6')),
('CDG', 'Charles de Gaulle Airport', (SELECT id FROM location WHERE location_address = '95700 Roissy-en-France')),

('NRT', 'Narita International Airport', (SELECT id FROM location WHERE location_address = 'Narita, Chiba 282-0004')),

('DXB', 'Dubai International Airport', (SELECT id FROM location WHERE location_address = 'Dubai, UAE')),

('SYD', 'Sydney Kingsford Smith Airport', (SELECT id FROM location WHERE location_address = 'Mascot NSW 2020, Australia')),

('SIN', 'Singapore Changi Airport', (SELECT id FROM location WHERE location_address = 'Airport Boulevard, Singapore 819643')),

('YYZ', 'Toronto Pearson International Airport', (SELECT id FROM location WHERE location_address = '6301 Silver Dart Drive, Mississauga'));

INSERT INTO airline (airline_name, logo_url) VALUES
('SkyJet', 'https://example.com/logo/skyjet.png'),
('CloudAir', 'https://example.com/logo/cloudair.png'),
('GlobalFly', 'https://example.com/logo/globalfly.png');

INSERT INTO airplane (model, max_capacity, airline_id) VALUES
('Boeing 737', 180, 1),
('Airbus A380', 500, 2),
('Boeing 777', 300, 3);

INSERT INTO seat (airplane_id, seat_number, isle_id, class, is_available) VALUES
(1, 1, 'A', 'Economy', 1),
(1, 2, 'B', 'Economy', 1),
(1, 3, 'C', 'Business', 1),
(1, 4, 'D', 'Economy', 1);

INSERT INTO passenger (first_name, last_name, phone_number, gender, age_bracket, nationality) VALUES
('Alice', 'Johnson', '1234567890', 'Female', 'Adult', NULL),
('Bob', 'Smith', '2345678901', 'Male', 'Adult', NULL),

```

```
(('Cecilia', 'Tanaka', '3456789012', 'Female', 'Adult', 'Japan'),
('David', 'Nguyen', '4567890123', 'Male', 'Child', 'Vietnam'),
('Elena', 'Garcia', '5678901234', 'Female', 'Adult', 'Brazil'),
('Farouk', 'Hassan', '6789012345', 'Male', 'Adult', NULL),
('Grace', 'Lee', '7890123456', 'Female', 'Infant', 'South Korea'),
('James', 'Brown', '8901234567', 'Male', 'Adult', 'UK'),
('jane', 'austin', '19071734214', 'Female', 'Adult', 'USA'),
('jacob', 'smith', '8201564667', 'Male', 'Adult', 'South Africa'));
```

```
INSERT INTO flight (from_airport_code, to_airport_code, airline_id, airplane_id, departure_time, duration, status)
VALUES
('JFK', 'LHR', 1, 1, '2025-04-15 08:00:00', 420, 'On Time'),
('LHR', 'CAI', 2, 2, '2025-04-16 09:30:00', 720, 'Delayed'),
('DXB', 'YYZ', 3, 3, '2025-04-17 23:00:00', 960, 'Cancelled'),
('SFO', 'JFK', 1, 1, '2025-04-18 06:00:00', 840, 'On Time'),
('NRT', 'DXB', 2, 2, '2025-04-19 21:00:00', 540, 'On Time');
```

```
INSERT INTO ticket (passenger_id, flight_id, seat_number, isle_id) VALUES
(1, 1, 1, 'A'),
(2, 1, 2, 'B'),
(3, 2, 3, 'C'),
(4, 2, 4, 'D');
```

5- UPDATE

SQL Statement

```
UPDATE flight
SET status = 'Cancelled'
WHERE id = 2;
```

6- DELETE

SQL Statement


```
DELETE FROM passanger
WHERE name = 'Alice' AND last_name = 'Johnson';
```

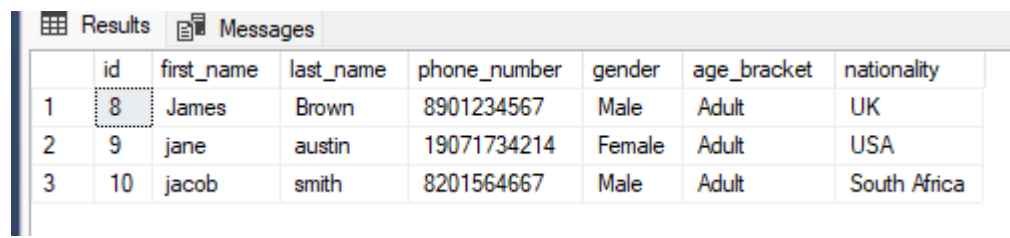
7- Select statements (Only 7 Statements and their output)

7.1) Using LIKE Operator

SQL Statement

```
SELEECT * from passenger
WHERE first_name LIKE 'J_%';
```

Output (Screen Shot)



	id	first_name	last_name	phone_number	gender	age_bracket	nationality
1	8	James	Brown	8901234567	Male	Adult	UK
2	9	jane	austin	19071734214	Female	Adult	USA
3	10	jacob	smith	8201564667	Male	Adult	South Africa

7.2) Using IN Operator

SQL Statement

```
SELECT * from passenger
WHERE id IN (1, 5);
```

Output (Screen Shot)

Results		Messages					
	id	first_name	last_name	phone_number	gender	age_bracket	nationality
1	1	Alice	Johnson	1234567890	Female	Adult	NULL
2	5	Elena	Garcia	5678901234	Female	Adult	Brazil

7.3) Using Between Operator

SQL Statement									
SELECT * FROM flight WHERE departure_time BETWEEN '2025-04-17 23:00:00' AND '2025-04-19 21:00:00';									
Output (Screen Shot)									
Results		Messages							
	id	from_airport_code	to_airport_code	airline_id	airplane_id	departure_time	duration	arrival_time	status
1	3	DXB	YYZ	3	3	2025-04-17 23:00:00.000	960	2025-04-18 15:00:00.000	Cancelled
2	4	SFO	JFK	1	1	2025-04-18 06:00:00.000	840	2025-04-18 20:00:00.000	On Time
3	5	NRT	DXB	2	2	2025-04-19 21:00:00.000	540	2025-04-20 06:00:00.000	On Time

7.4) Using IS NULL Operator

SQL Statement									
SELECT * FROM passenger WHERE nationality IS NULL;									
Output (Screen Shot)									

		Results Messages					
	id	first_name	last_name	phone_number	gender	age_bracket	nationality
1	1	Alice	Johnson	1234567890	Female	Adult	NULL
2	2	Bob	Smith	2345678901	Male	Adult	NULL
3	6	Farouk	Hassan	6789012345	Male	Adult	NULL

7.5) Using IS NOT NULL Operator

SQL Statement

```
SELECT * FROM passenger
WHERE nationality IS NOT NULL;
```

Output (Screen Shot)

		Results Messages					
	id	first_name	last_name	phone_number	gender	age_bracket	nationality
1	3	Cecilia	Tanaka	3456789012	Female	Adult	Japan
2	4	David	Nguyen	4567890123	Male	Child	Vietnam
3	5	Elena	Garcia	5678901234	Female	Adult	Brazil
4	7	Grace	Lee	7890123456	Female	Infant	South Korea
5	8	James	Brown	8901234567	Male	Adult	UK
6	9	jane	austin	19071734214	Female	Adult	USA
7	10	jacob	smith	8201564667	Male	Adult	South Africa

7.6) Using Distinct Keyword

SQL Statement

```
SELECT DISTINCT class from seat;
```

Output (Screen Shot)

Results		Message
	class	
1	Business	
2	Economy	

7.7) Using TOP Clause

SQL Statement									
SELECT TOP 2 * FROM flight;									
Output (Screen Shot)									
	id	from_airport_code	to_airport_code	airline_id	airplane_id	departure_time	duration	arrival_time	status
1	1	JFK	LHR	1	1	2025-04-15 08:00:00.000	420	2025-04-15 15:00:00.000	On Time
2	2	LHR	CAI	2	2	2025-04-16 09:30:00.000	720	2025-04-16 21:30:00.000	Delayed

8- Data Sorting

<u>SQL Statement</u>
SELECT * FROM passenger ORDER BY first_name DESC, last_name;
Output (Screen Shot)

	id	first_name	last_name	phone_number	gender	age_bracket	nationality
1	9	jane	austin	19071734214	Female	Adult	USA
2	8	James	Brown	8901234567	Male	Adult	UK
3	10	jacob	smith	8201564667	Male	Adult	South Africa
4	7	Grace	Lee	7890123456	Female	Infant	South Korea
5	6	Farouk	Hassan	6789012345	Male	Adult	NULL
6	5	Elena	Garcia	5678901234	Female	Adult	Brazil
7	4	David	Nguyen	4567890123	Male	Child	Vietnam
8	3	Cecilia	Tanaka	3456789012	Female	Adult	Japan
9	2	Bob	Smith	2345678901	Male	Adult	NULL
10	1	Alice	Johnson	1234567890	Female	Adult	NULL

9- Data Grouping

SQL Statement

```
SELECT age_bracket, COUNT(*) AS number_of_passengers
FROM passenger
GROUP BY age_bracket;
```

Output (Screen Shot)

	age_bracket	number_of_passengers
1	Adult	8
2	Child	1
3	Infant	1

10- Creating Index

SQL Statement

```
CREATE INDEX idx_ airport
ON airport (code, airport_name);
```

11- Creating View

SQL Statement

```
CREATE VIEW Traveller AS  
SELECT id, first_name, last_name , title  
FROM passenger  
WHERE first_name IS NOT NULL;
```

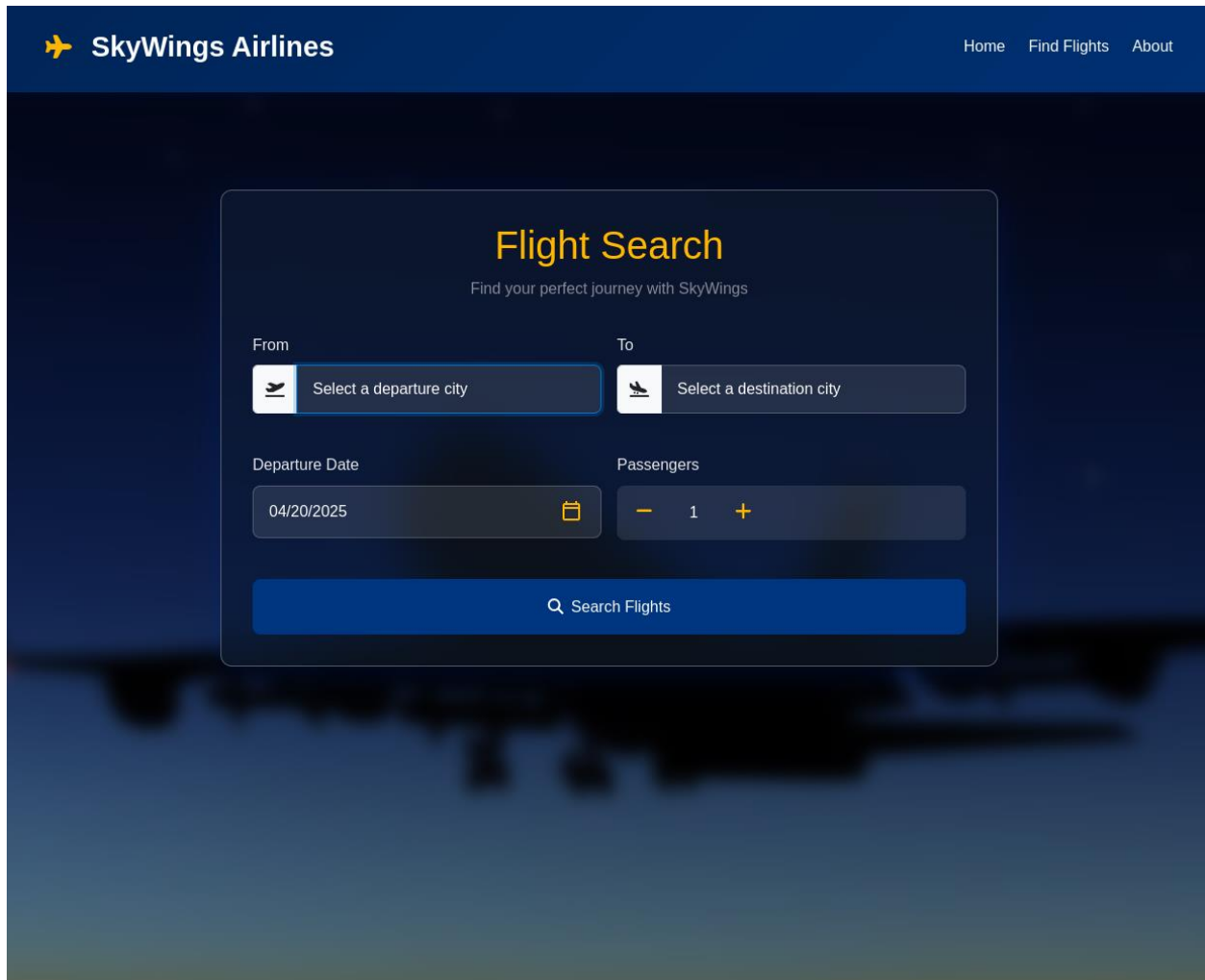
12- Creating Sub-Query

SQL Statement

```
SELECT first_name, last_name, phone_number  
FROM passenger  
WHERE id IN (  
    SELECT passenger_id  
    FROM ticket  
    WHERE flight_id IN (  
        SELECT id  
        FROM flight  
        WHERE from_airport_code = 'JFK' AND to_airport_code = 'LHR'  
    )  
);
```

Phase (III): GUI

Form (I) Screen Shot



The screenshot displays the SkyWings Airlines website's flight search interface. The header features the SkyWings Airlines logo on the left and navigation links for Home, Find Flights, and About on the right. The main content area is a dark blue rectangle with rounded corners, containing the title "Flight Search" in yellow, followed by the subtitle "Find your perfect journey with SkyWings". Below this, there are four input fields arranged in a 2x2 grid: "From" (with a dropdown menu showing "Select a departure city"), "To" (with a dropdown menu showing "Select a destination city"), "Departure Date" (with a date input field showing "04/20/2025" and a calendar icon), and "Passengers" (with a numeric input field showing "1" and minus/plus icons). A large blue button with a magnifying glass icon and the text "Search Flights" is positioned at the bottom of the form.

SkyWings Airlines

Home Find Flights About

Flight Search

Find your perfect journey with SkyWings

From To

Select a departure city Select a destination city

Departure Date Passengers

04/20/2025 1

Search Flights

Form (II) Screen Shot

★ Available Flights

Best options matching your preferences

John F. Kennedy International Airport → Los Angeles International Airport

Departure:	2025-06-15 08:00:00
Arrival:	2025-06-15 13:00:00
Duration:	5h 0m
Airline:	 Delta Air Lines
Flight #:	DL123

299\$

 Book Now

Form (III) Screen Shot

Select a Seat

Find your perfect journey with SkyWings

Passenger Name	Flight Number	Departure	Date
John Doe	SW 2024	JFK → LHR	15 DEC 2024

Business Class

1A	1B	1C	1D	1E	1F
2A	2B	2C	2D	2E	2F

Selected Seats

No seats selected

Base Fare: \$499

Seat Selection: \$0

Total: \$499

Confirm Selection