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

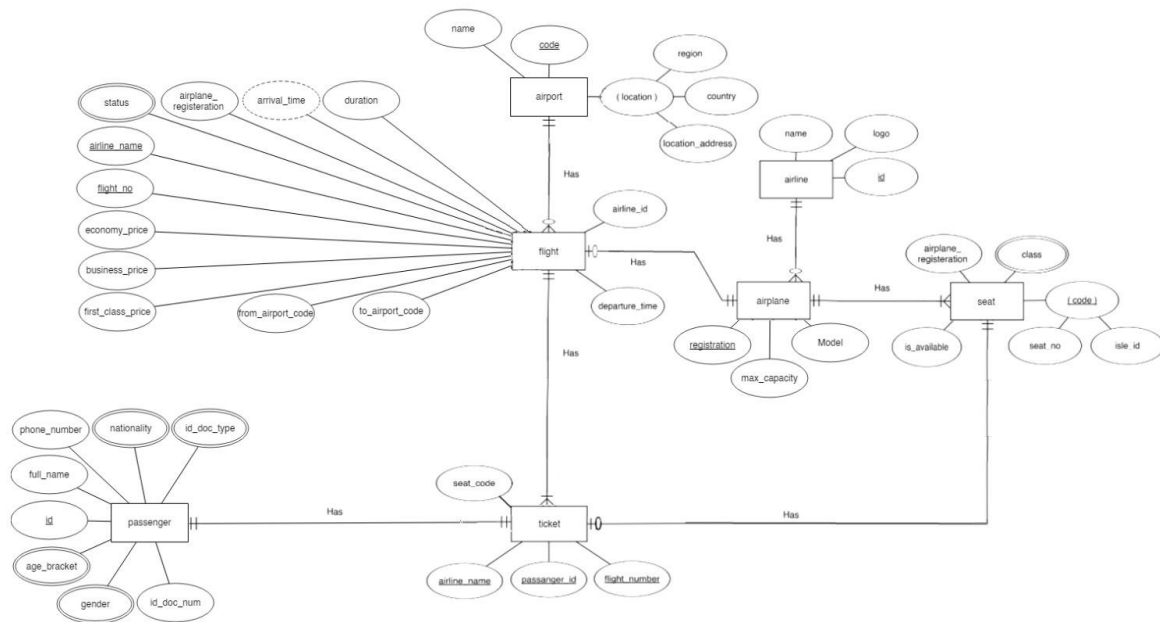| Student Name	ID
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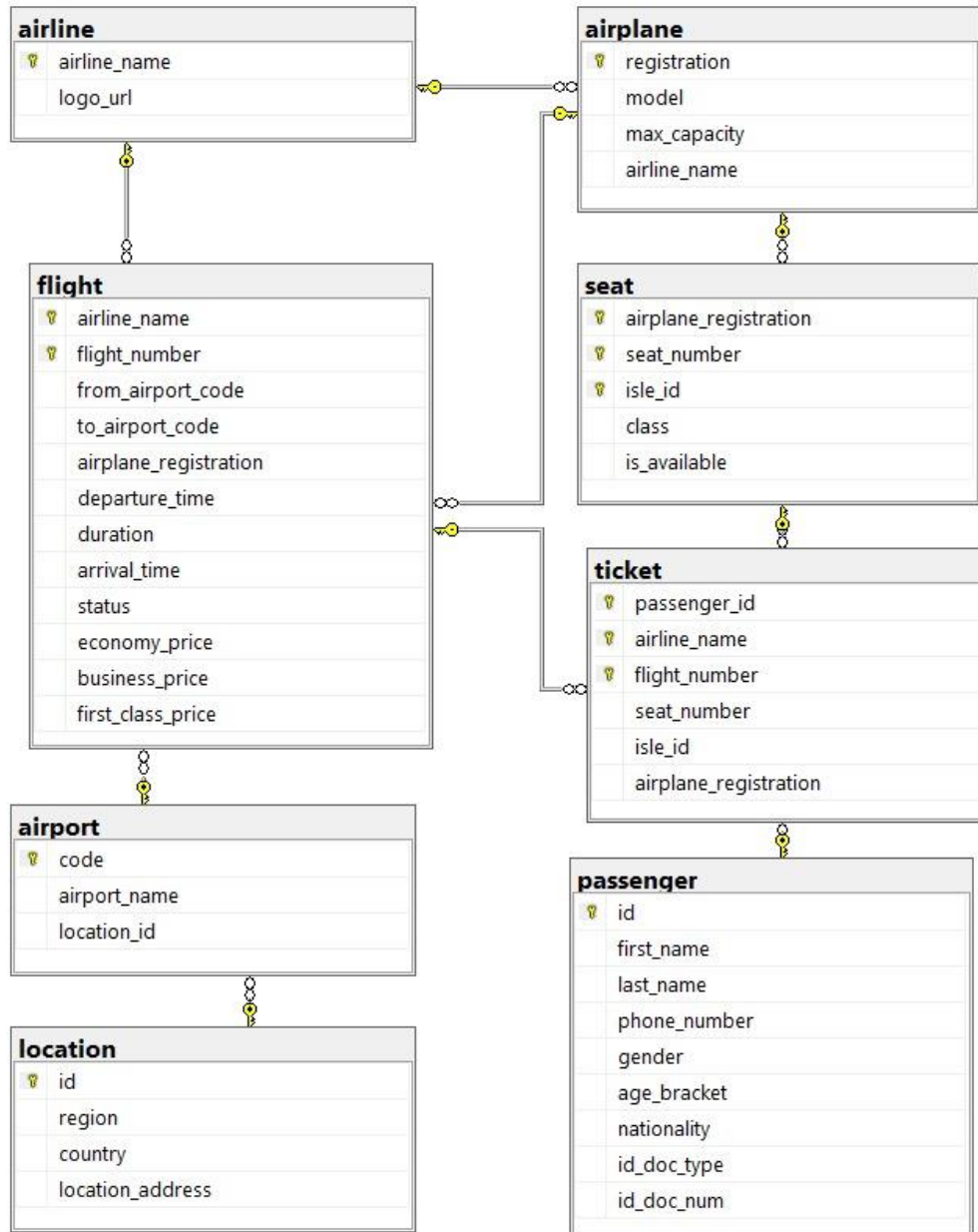**Assistant Lecturer/ Ayman S. Abdelaziz**
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Spring/2025

Phase (I): Database Design

a) ER Diagram

Phase (I): Database Design

b) Schema

airline
- airline_name
- logo_url

airplane
- registration
- model
- max_capacity
- airline_name

flight
- airline_name
- flight_number
- from_airport_code
- to_airport_code
- airplane_registration
- departure_time
- duration
- arrival_time
- status
- economy_price
- business_price
- first_class_price

seat
- airplane_registration
- seat_number
- isle_id
- class
- is_available

ticket
- passenger_id
- airline_name
- flight_number
- seat_number
- isle_id
- airplane_registration

airport
- code
- airport_name
- location_id

location
- id
- region
- country
- location_address

passenger
- id
- first_name
- last_name
- phone_number
- gender
- age_bracket
- nationality
- id_doc_type
- id_doc_num

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,

```sql
      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')),
```

```sql
('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);
```

```sql
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

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

6- DELETE

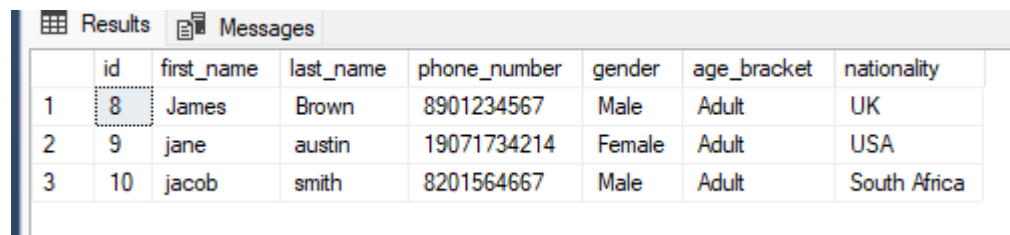| SQL Statement |
| --- |
| DELETE FROM passanger
WHERE name = 'Alice' AND last_name = 'Johnson'; |

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)

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)

7.4) Using IS NULL Operator

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

7.5) Using IS NOT NULL Operator

SQL Statement
SELECT * FROM passenger WHERE nationality IS NOT NULL;
Output (Screen Shot)

7.6) Using Distinct Keyword

SQL Statement
SELECT DISTINCT class from seat;
Output (Screen Shot)

	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

SQL Statement

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

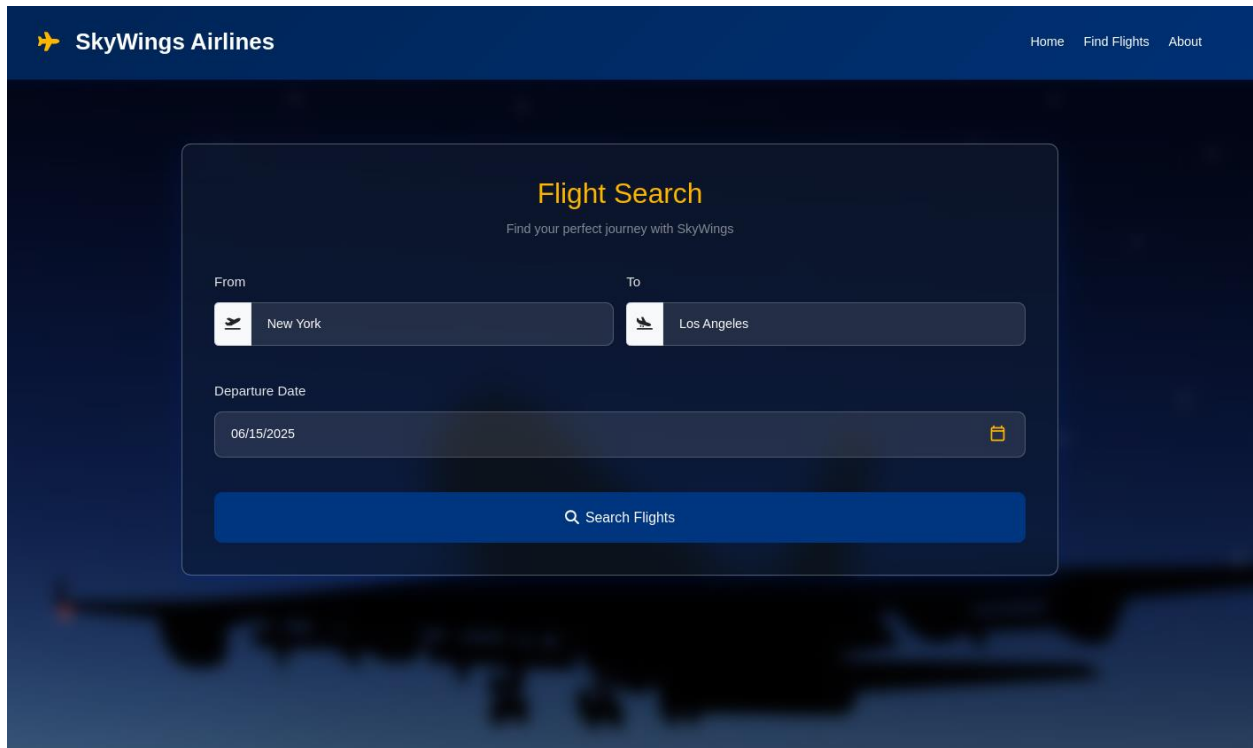| **SQL Statement** |
| --- |
| CREATE VIEW Traveller AS
SELECT id, first_name, last_name , title
FROM passenger
WHERE first_name IS NOT NULL; |

12- Creating Sub-Query

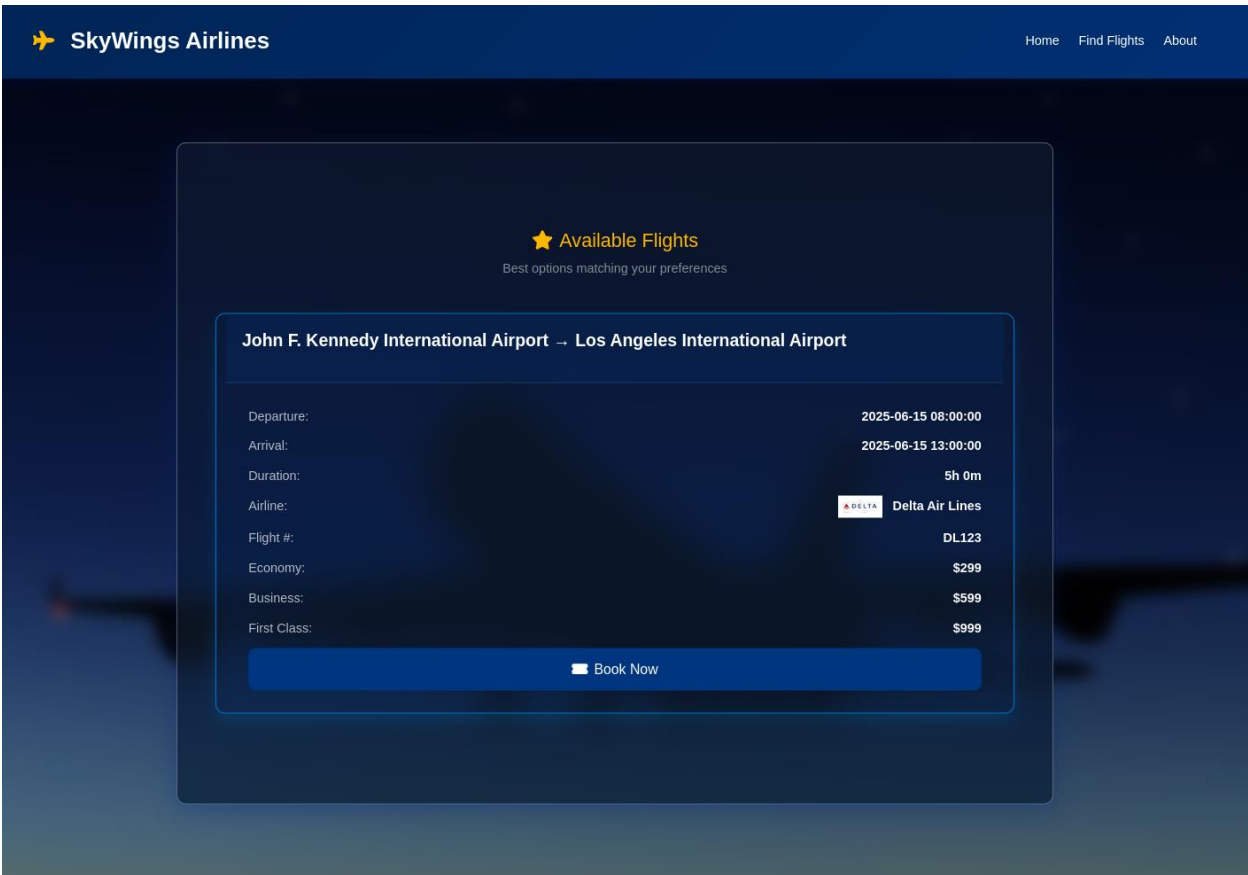| **SQL Statement** |
| --- |
|
SELECT first_name, last_name, phone_number
FROM passenger
WHERE id IN (
   SELECT passenger_id
   FROM ticket
   WHERE flight_id IN (
     SELECT id
     FROM flight
     WHERE from_airport_code = 'JFK' AND to_airport_code = 'LHR'
)
); |

Phase (III): GUI

Form (I) Screen Shot

Form (II) Screen Shot

SkyWings Airlines

Home   Find Flights   About

⭐ 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**
Economy:	**$299**
Business:	**$599**
First Class:	**$999**

🎫 Book Now

Form (III) Screen Shot

SkyWings Airlines

Home   Find Flights   About

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

Form (IV) Screen Shot

Home Find Flights About

Select Your Seats

Choose the perfect seat for each passenger

1

Passenger 1 of 1

Name	Type
Assem Mohamed	Adult

Airline	Flight Number	Route
Delta Air Lines	DL123	John F. Kennedy International Airport → Los Angeles International Airport

First Class - $999.00

Business - $599.00

1A	1B
2A	2B

Economy - $299.00

10A	10B
11A	11B

Confirm All Selections & Complete Booking