create database project;

use project;

-- Table: Airlines

CREATE TABLE Airlines (

airline\_code VARCHAR(10) PRIMARY KEY,

airline\_name VARCHAR(100) NOT NULL

);

-- Table: Aircraft

CREATE TABLE Aircraft (

registration\_number VARCHAR(20) PRIMARY KEY,

airline\_code VARCHAR(10),

model\_type VARCHAR(50),

capacity INT,

max\_speed INT,

current\_altitude INT,

speed INT,

location VARCHAR(100),

FOREIGN KEY (airline\_code) REFERENCES Airlines(airline\_code)

);

-- Table: Airports

CREATE TABLE Airports (

airport\_code VARCHAR(10) PRIMARY KEY,

airport\_name VARCHAR(100),

city VARCHAR(50),

country VARCHAR(50)

);

-- Table: Runways

CREATE TABLE Runways (

runway\_id VARCHAR(10) PRIMARY KEY,

airport\_code VARCHAR(10),

length INT,

width INT,

status VARCHAR(20), -- e.g., 'Available' or 'In Use'

FOREIGN KEY (airport\_code) REFERENCES Airports(airport\_code)

);

-- Table: Flights

CREATE TABLE Flights (

flight\_number VARCHAR(20) PRIMARY KEY,

aircraft\_id VARCHAR(20),

departure\_time DATETIME,

arrival\_time DATETIME,

origin VARCHAR(10),

destination VARCHAR(10),

status VARCHAR(20), -- e.g., 'On Time', 'Delayed'

FOREIGN KEY (aircraft\_id) REFERENCES Aircraft(registration\_number),

FOREIGN KEY (origin) REFERENCES Airports(airport\_code),

FOREIGN KEY (destination) REFERENCES Airports(airport\_code)

);

-- Table: Airspace

CREATE TABLE Airspace (

sector\_id VARCHAR(10) PRIMARY KEY,

boundary\_description TEXT

);

-- Table: AirTrafficControllers

CREATE TABLE AirTrafficControllers (

employee\_id VARCHAR(20) PRIMARY KEY,

name VARCHAR(100),

contact\_info VARCHAR(100),

sector\_id VARCHAR(10),

FOREIGN KEY (sector\_id) REFERENCES Airspace(sector\_id)

);

-- Table: Weather

CREATE TABLE Weather (

weather\_id INT PRIMARY KEY AUTO\_INCREMENT,

location VARCHAR(100),

date\_time DATETIME,

condition\_description VARCHAR(200)

);

-- Airlines

INSERT INTO Airlines VALUES

('PK', 'Pakistan International Airlines'),

('EK', 'Emirates'),

('BA', 'British Airways'),

('QR', 'Qatar Airways'),

('AA', 'American Airlines'),

('SQ', 'Singapore Airlines'),

('LH', 'Lufthansa');

-- Aircraft

INSERT INTO Aircraft VALUES

('REG100', 'PK', 'Boeing 737', 200, 900, 30000, 800, 'Karachi'),

('REG101', 'EK', 'Boeing 738', 210, 890, 30100, 795, 'Dubai'),

('REG102', 'BA', 'Boeing 739', 220, 880, 30200, 790, 'London'),

('REG103', 'QR', 'Boeing 740', 230, 870, 30300, 785, 'Doha'),

('REG104', 'AA', 'Boeing 741', 240, 860, 30400, 780, 'New York'),

('REG105', 'SQ', 'Boeing 742', 250, 850, 30500, 775, 'Singapore'),

('REG106', 'LH', 'Boeing 743', 260, 840, 30600, 770, 'Berlin');

-- Airports

INSERT INTO Airports VALUES

('AP0', 'Jinnah Intl', 'Karachi', 'Pakistan'),

('AP1', 'Dubai Intl', 'Dubai', 'UAE'),

('AP2', 'Heathrow', 'London', 'UK'),

('AP3', 'Hamad Intl', 'Doha', 'Qatar'),

('AP4', 'JFK', 'New York', 'USA'),

('AP5', 'Changi', 'Singapore', 'Singapore'),

('AP6', 'Berlin Intl', 'Berlin', 'Germany');

-- Runways

INSERT INTO Runways VALUES

('RWY0', 'AP0', 3000, 45, 'Available'),

('RWY1', 'AP1', 3100, 46, 'In Use'),

('RWY2', 'AP2', 3200, 47, 'Available'),

('RWY3', 'AP3', 3300, 48, 'In Use'),

('RWY4', 'AP4', 3400, 49, 'Available'),

('RWY5', 'AP5', 3500, 50, 'In Use'),

('RWY6', 'AP6', 3600, 51, 'Available');

-- Flights

INSERT INTO Flights VALUES

('FL100', 'REG100', NOW(), NOW() + INTERVAL 2 HOUR, 'AP0', 'AP1', 'On Time'),

('FL101', 'REG101', NOW(), NOW() + INTERVAL 3 HOUR, 'AP1', 'AP2', 'Delayed'),

('FL102', 'REG102', NOW(), NOW() + INTERVAL 4 HOUR, 'AP2', 'AP3', 'On Time'),

('FL103', 'REG103', NOW(), NOW() + INTERVAL 5 HOUR, 'AP3', 'AP4', 'Delayed'),

('FL104', 'REG104', NOW(), NOW() + INTERVAL 6 HOUR, 'AP4', 'AP5', 'On Time'),

('FL105', 'REG105', NOW(), NOW() + INTERVAL 7 HOUR, 'AP5', 'AP6', 'Delayed'),

('FL106', 'REG106', NOW(), NOW() + INTERVAL 8 HOUR, 'AP6', 'AP0', 'On Time');

-- Airspace

INSERT INTO Airspace VALUES

('S0', 'Northern region control'),

('S1', 'Southern corridor'),

('S2', 'East zone entry'),

('S3', 'Western defense zone'),

('S4', 'Midland buffer zone'),

('S5', 'Island approach area'),

('S6', 'Mountainous airspace');

-- Controllers

INSERT INTO AirTrafficControllers VALUES

('EMP0', 'Ali Raza', '03001234567', 'S0'),

('EMP1', 'Sara Khan', '03111234567', 'S1'),

('EMP2', 'John Smith', '03221234567', 'S2'),

('EMP3', 'Maria Iqbal', '03331234567', 'S3'),

('EMP4', 'David Lee', '03441234567', 'S4'),

('EMP5', 'Hina Yousaf', '03551234567', 'S5'),

('EMP6', 'Ahmad Nadeem', '03661234567', 'S6');

-- Weather

INSERT INTO Weather (location, date\_time, condition\_description) VALUES

('Karachi', NOW() - INTERVAL 1 DAY, 'Clear skies'),

('Dubai', NOW() - INTERVAL 2 DAY, 'Hot and dry'),

('London', NOW() - INTERVAL 3 DAY, 'Cloudy'),

('Doha', NOW() - INTERVAL 4 DAY, 'Dust storm'),

('New York', NOW() - INTERVAL 5 DAY, 'Rainy'),

('Singapore', NOW() - INTERVAL 6 DAY, 'Humid'),

('Berlin', NOW() - INTERVAL 7 DAY, 'Snowfall');

-- 5 simple quries

-- 1. Show all aircrafts with model and location

SELECT registration\_number, model\_type, location FROM Aircraft;

-- 2. Find flights that are currently marked as 'Delayed'

SELECT flight\_number, status FROM Flights WHERE status = 'Delayed';

-- 3. List all runways that are currently available

SELECT runway\_id, airport\_code FROM Runways WHERE status = 'Available';

-- 4. Display all controllers and their assigned sectors

SELECT employee\_id, name, sector\_id FROM AirTrafficControllers;

-- 5. Retrieve all airlines with their codes

SELECT airline\_code, airline\_name FROM Airlines;

-- 5 join quries

-- 1. List all flights with model type and airline name

SELECT F.flight\_number, A.model\_type, L.airline\_name

FROM Flights F

JOIN Aircraft A ON F.aircraft\_id = A.registration\_number

JOIN Airlines L ON A.airline\_code = L.airline\_code;

-- 2. Show all runways with airport names

SELECT R.runway\_id, AP.airport\_name

FROM Runways R

JOIN Airports AP ON R.airport\_code = AP.airport\_code;

-- 3. Display all controllers with their assigned airspace description

SELECT C.name, S.boundary\_description

FROM AirTrafficControllers C

JOIN Airspace S ON C.sector\_id = S.sector\_id;

-- 4. List each flight with origin and destination airport names

SELECT F.flight\_number, O.airport\_name AS Origin, D.airport\_name AS Destination

FROM Flights F

JOIN Airports O ON F.origin = O.airport\_code

JOIN Airports D ON F.destination = D.airport\_code;

-- 5. Show aircraft registration with location and airline name

SELECT A.registration\_number, A.location, L.airline\_name

FROM Aircraft A

JOIN Airlines L ON A.airline\_code = L.airline\_code;

-- 5 nested quries

-- 1. Flights using aircrafts with capacity more than 230

SELECT flight\_number

FROM Flights

WHERE aircraft\_id IN (

SELECT registration\_number FROM Aircraft WHERE capacity > 230

);

-- 2. Airports where at least one runway is available

SELECT airport\_name

FROM Airports

WHERE airport\_code IN (

SELECT airport\_code FROM Runways WHERE status = 'Available'

);

-- 3. Flights departing from cities starting with 'K'

SELECT flight\_number

FROM Flights

WHERE origin IN (

SELECT airport\_code FROM Airports WHERE city LIKE 'K%'

);

-- 4. Controller(s) from the sector with the most controllers (should return all since one per sector)

SELECT name

FROM AirTrafficControllers

WHERE sector\_id = (

SELECT sector\_id FROM (

SELECT sector\_id, COUNT(\*) AS total

FROM AirTrafficControllers

GROUP BY sector\_id

ORDER BY total DESC

LIMIT 1

) AS TopSector

);

-- 5. Airlines operating more than 1 aircraft

SELECT airline\_name

FROM Airlines

WHERE airline\_code IN (

SELECT airline\_code

FROM Aircraft

GROUP BY airline\_code

HAVING COUNT(\*) > 1

);

-- 5 aggrigate fx quries

-- 1. Total number of flights in the system

SELECT COUNT(\*) AS total\_flights FROM Flights;

-- 2. Average aircraft speed

SELECT AVG(speed) AS average\_speed FROM Aircraft;

-- 3. Maximum aircraft capacity

SELECT MAX(capacity) AS max\_capacity FROM Aircraft;

-- 4. Number of controllers per sector

SELECT sector\_id, COUNT(\*) AS controller\_count

FROM AirTrafficControllers

GROUP BY sector\_id;

-- 5. Total runways per airport

SELECT airport\_code, COUNT(\*) AS runway\_count

FROM Runways

GROUP BY airport\_code;

-- 5 wild cart quries

-- 1. Airports in cities starting with 'New'

SELECT \* FROM Airports WHERE city LIKE 'New%';

-- 2. Aircraft models containing 'Boeing'

SELECT \* FROM Aircraft WHERE model\_type LIKE '%Boeing%';

-- 3. Airlines ending with 'Air'

SELECT \* FROM Airlines WHERE airline\_name LIKE '%Air';

-- 4. Flights starting with 'FL1'

SELECT \* FROM Flights WHERE flight\_number LIKE 'FL1%';

-- 5. Controllers with name containing 'Ali'

SELECT \* FROM AirTrafficControllers WHERE name LIKE '%Ali%';