2022-2023

INTRODUCTION TO DATABASE

CCCS-215

Group Members:

Airline Database Management

Abstract:

An airline management system is considered with providing flight that are well scheduled and accurate. Where a passenger can book a flight and have specific tickets for each passenger in different airlines. Furthermore, database is essential to store data and manage flights accurately due to its criticality and mistakes could cost lives. Additionally, managing staff, passengers, and private information are also necessary.

Current Situation and Problems

Availability of flights

Previously, there was no organization with data. There was a loss of time, effort, and money until we get the reservation, but now with Airline Management System. Thanks to its organized mechanisms. It allowed us to book with ease and more quality.

Flight monitoring

Before the system, the process of landing and taking off the planes was difficult to organize and required a lot of effort and a high cost of money. But after organizing it, it became less expensive, easier to organize, and less mistakes.

Staff Management

There was difficulty in communicating and linking employees and management in different departments.
And it was causing delays in some cases and difficulties in rectifying them. But with the system even when mistakes occur. Remedy of it became simple, gaps are few and the organization became easier to provide a distinctive experience for the passengers.

System Requirements:

Product requirement:

- The Airline Management system shall be always available to all airlines. Downtime must not exceed 5 seconds in any one day and must be announced beforehand within 6 hours.

- The system must allow customers to book, modify, and cancel a flight before 3 days of the flight.

- The system must never have more than one aircraft on a route.

- The user must be able to add or update details of user's name, phone number, email, and address.

- The customer shall be able to view a list of available flights and price, booked flights.

Organizational requirement:

- Customers shall authenticate themselves using their Passport numbers and 9-lengthed password.

- Staff members shall authenticate themselves using their Salary ID and 12-lengthed password

External requirement:

- The system must follow Saudi National Cybersecurity Authority (Saudi NCA) regulation.

- Risk assessment must be held every 3 months to ensure the safety of data.

Entity:

1- FLIGHT:

Flight is the method or the way that we use to move a person or an object through a space using an airplane.

2-AIRPLANE:

Fixed-wing aircraft that is propelled forward by thrust from a jet engine, propeller, or rocket engine.

3-SCHEDULE:

A way to manage the data through a fixed time.

4-ROUTE:

Carefully studied way a flight takes to move from a place to another safely.

5-PASSENGER:

Any person that booked a flight.

6-BOOKING:

A method that allows a passenger to go through an airplane to a specific place.

7-TERMINAL:

A huge place with multiple services to arrange the passenger going to their flight.

8-AIRLINES:

An organization providing a regular public service of air transport on one or more routes.
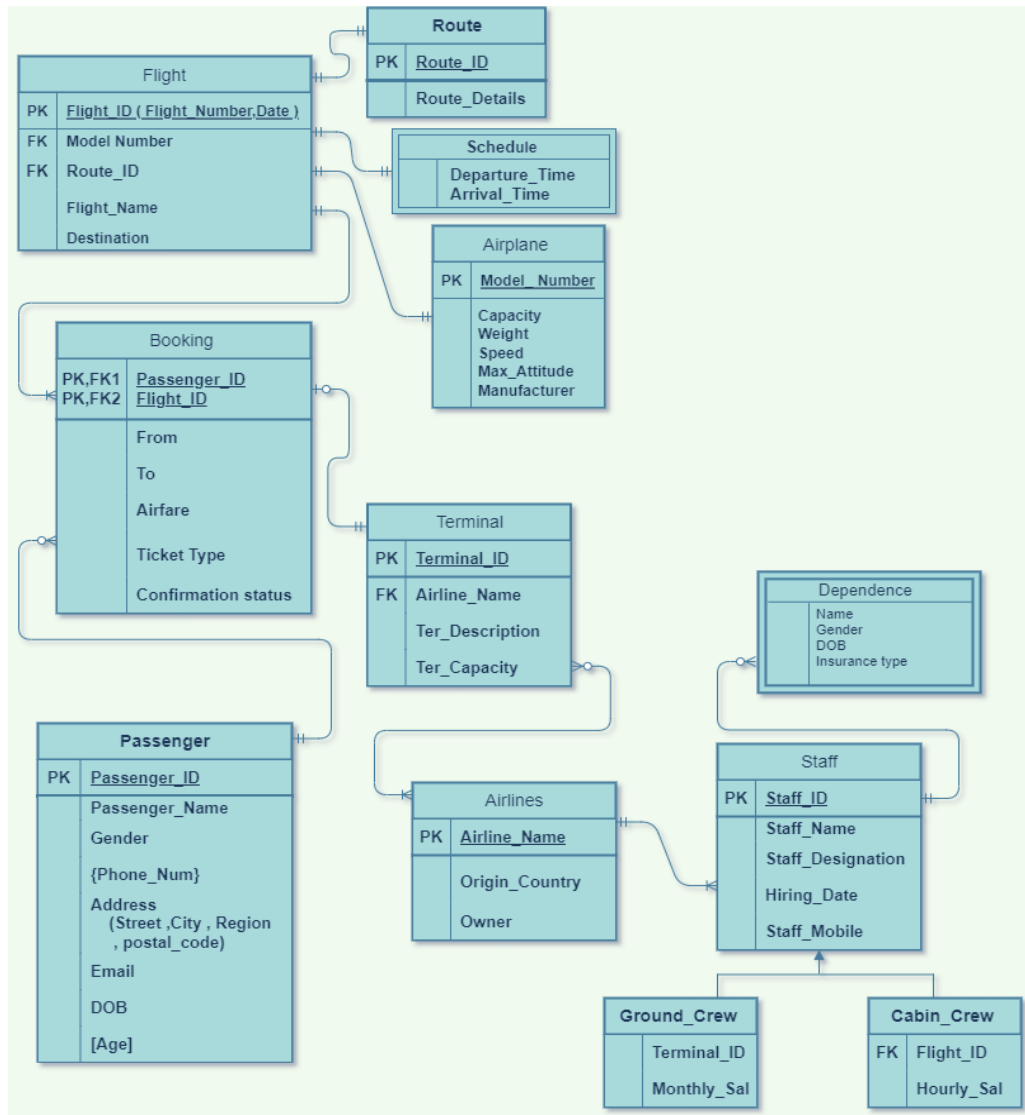
9-STAFF:

Any member of a ground crew or cabin crew and serve at airline companies.
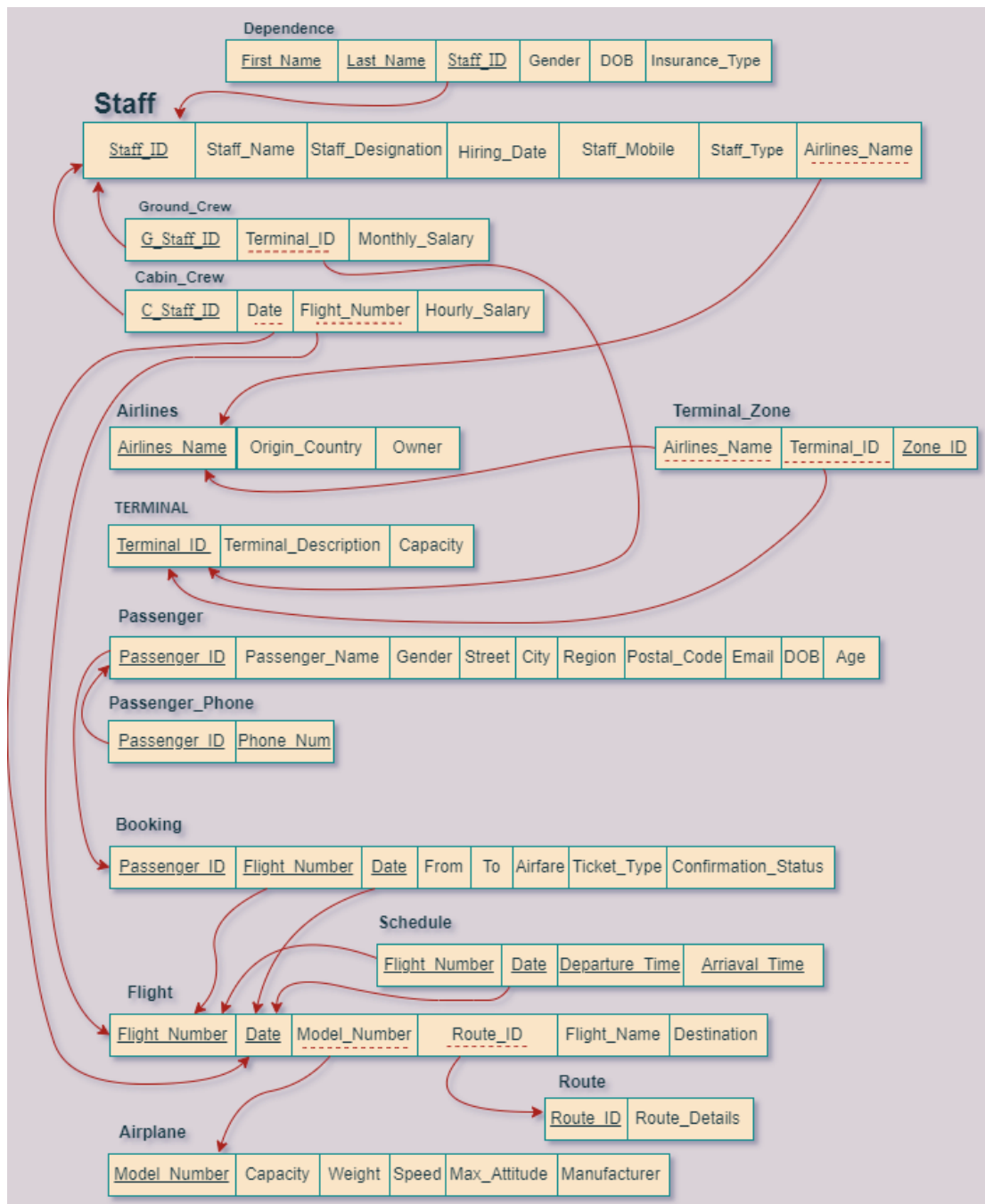
10-DEPENDENCE:

Anything that is related to the staff relatives.

E-R DIAGRAM

RELATIONAL MODEL WITH NORMALIZATION

The **1NF** (First normal form) Any multivalued attributes have been removed .

The **2NF** (Second normal form) all non-key attributes are fully functionally dependent on the entire key (partial dependency has been removed).

The **3NF** (Third normal form) Any transitive dependencies have been removed.

PHYSICAL AND IMPLEMENTATION

CREATE AND INSERT CODE:

CREATE TABLE Passenger(Passenger_ID number primary key, Passenger_Name varchar2(20) not null, Gender varchar2(1) not null,

Street varchar2(20), City varchar2(15) not null, Region varchar2(15) not null, Postal_Code number(5),

Email varchar2(25) not null, DOB date not null);

Insert into Passenger Values(1111,'sameer', 'm', 'first street', 'jeddah','makkah',12345,'notsam@uj.com', date '2001-1-1');

Insert into Passenger Values(2222,'afnan', 'f', 'seconed street', 'jeddah','makkah',12345,'notafn@uj.com', date '2002-2-2');

Insert into Passenger Values(3333,'khalid', 'm', 'third street', 'Khobar','dammam',23456,'notkha@uj.com', date '2003-3-3');

Insert into Passenger Values(4444,'asmaa', 'f', 'forth street', 'Khobar','dammam',23456,'notasm@uj.com', date '2005-5-5');

Insert into Passenger Values(5555,'ahmed', 'm', 'fifth street', 'Dhahran ','dammam',34567,'notahm@uj.com', date '2005-5-5');

PASSENGER_ID	PASSENGER_NAME	GENDER	STREET	CITY	REGION	POSTAL_CODE	EMAIL	DOB
1111	sameer	m	first street	jeddah	makkah	12345	notsam@uj.com	01-JAN-01
2222	afnan	f	seconed street	jeddah	makkah	12345	notafn@uj.com	02-FEB-02
3333	khalid	m	third street	Khobar	dammam	23456	notkha@uj.com	03-MAR-03
4444	asmaa	f	forth street	Khobar	dammam	23456	notasm@uj.com	05-MAY-05
5555	ahmed	m	fifth street	Dhahran	dammam	34567	notahm@uj.com	05-MAY-05

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CREATE TABLE Passenger_Phone(Pass_ID, Phone_Num number(10) not null,

foreign key (Pass_ID) references Passenger(Passenger_ID) on delete CASCADE);

Insert into Passenger_Phone values(1111,0511111111);

Insert into Passenger_Phone values(2222,0522222222);

Insert into Passenger_Phone values(3333,0533333333);

Insert into Passenger_Phone values(4444,0544444444);

Insert into Passenger_Phone values(5555,0555555555);

CREATE TABLE Airplane(Model_Number number(8) primary key, Capacity number(3) not null, Weight

number(3) not null, Speed number(3) not null

, Max_Attitude number(2) not null, Manufacturer varchar2(15) not null);

insert into Airplane Values(12345678,111,555,300,50,'Boeing');

insert into Airplane Values(22345678,232,555,250,50,'Boeing');

insert into Airplane Values(32345678,111,555,300,70,'Airbus');

insert into Airplane Values(42345678,333,555,100,90,'Airbus');

insert into Airplane Values(52345678,453,555,100,50,'Airbus');

MODEL_NUMBER	CAPACITY	WEIGHT	SPEED	MAX_ATTITUDE	MANUFACTURER
12345678	111	555	300	50	Boeing
22345678	232	555	250	50	Boeing
32345678	111	555	300	70	Airbus
42345678	333	555	100	90	Airbus
52345678	453	555	100	50	Airbus

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CREATE TABLE Route(Route_ID number(8) primary key, Route_Details varchar2(50) not null);

insert Into Route values(87654321, 'this is a direct flight');

insert Into Route values(87654322, 'this is not a direct flight');

insert Into Route values(87654323, 'this flight will take more than a day');

insert Into Route values(87654324, 'this is not a direct flight');

insert Into Route values(87654325, 'this is a direct flight');

ROUTE_ID	ROUTE_DETAILS
87654321	this is a direct flight
87654322	this is not a direct flight
87654323	this flight will take more than a day
87654324	this is not a direct flight
87654325	this is a direct flight

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CREATE TABLE Flight(Flight_Number number(8), Flight_Date timestamp, Model_Number number(8), Route_ID number(8),

Flight_Name varchar2(15) not null, Destination varchar2(15) not null,

primary key (Flight_Number, Flight_Date),

foreign key (Model_number) references Airplane(Model_Number), foreign key (Route_ID) references Route(Route_ID) on delete CASCADE);

insert into Flight values(11223344,timestamp '2021-01-01 13:30:00',12345678,87654321,'first flight','malaysia');

insert into Flight values(11223345,timestamp '2022-02-02 03:00:00',22345678,87654322,'seconed flight','poland');

insert into Flight values(11223346,timestamp '2023-03-03 10:50:00',32345678,87654323,'third flight','UK');

insert into Flight values(11223347,timestamp '2024-04-04 01:30:00',42345678,87654324,'forth flight','Saudi Arabia');

insert into Flight values(11223348,timestamp '2025-05-05 06:00:00',52345678,87654325,'fifth flight','Saudi Arabia');

FLIGHT_NUMBER	FLIGHT_DATE	MODEL_NUMBER	ROUTE_ID	FLIGHT_NAME	DESTINATION
11223344	01-JAN-21 01.30.00.000000 PM	12345678	87654321	first flight	malaysia
11223345	02-FEB-22 03.00.00.000000 AM	22345678	87654322	seconed flight	poland
11223346	03-MAR-23 10.50.00.000000 AM	32345678	87654323	third flight	UK
11223347	04-APR-24 01.30.00.000000 AM	42345678	87654324	forth flight	Saudi Arabia
11223348	05-MAY-25 06.00.00.000000 AM	52345678	87654325	fifth flight	Saudi Arabia

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CREATE TABLE Schedule(Flight_Number number(8), Flight_Date timestamp, Departure_Time timestamp not null, Arrival_Time timestamp not null,

foreign key (Flight_Number, Flight_Date) references Flight(Flight_Number, Flight_Date) on delete CASCADE);

Insert into Schedule values(11223344,timestamp '2021-01-01 13:30:00', timestamp '2021-01-01 14:00:00', timestamp '2021-01-01 20:30:00');

Insert into Schedule values(11223345,timestamp '2022-02-02 03:00:00', timestamp '2022-02-02 3:30:00',timestamp '2022-02-02 7:00:00');

Insert into Schedule values(11223346,timestamp '2023-03-03 10:50:00', timestamp '2023-03-03 11:15:00', timestamp '2023-03-04 12:00:00');

Insert into Schedule values(11223347,timestamp '2024-04-04 01:30:00', timestamp '2024-04-04 01:45:00',timestamp '2024-04-04 07:30:00');

Insert into Schedule values(11223348,timestamp '2025-05-05 06:00:00', timestamp '2025-05-05 06:15:00',timestamp '2025-05-05 08:00:00');

FLIGHT_NUMBER	FLIGHT_DATE	DEPARTURE_TIME	ARRIVAL_TIME
11223344	01-JAN-21 01.30.00.000000 PM	01-JAN-21 02.00.00.000000 PM	01-JAN-21 08.30.00.000000 PM
11223345	02-FEB-22 03.00.00.000000 AM	02-FEB-22 03.30.00.000000 AM	02-FEB-22 07.00.00.000000 AM
11223346	03-MAR-23 10.50.00.000000 AM	03-MAR-23 11.15.00.000000 AM	04-MAR-23 12.00.00.000000 PM
11223347	04-APR-24 01.30.00.000000 AM	04-APR-24 01.45.00.000000 AM	04-APR-24 07.30.00.000000 AM
11223348	05-MAY-25 06.00.00.000000 AM	05-MAY-25 06.15.00.000000 AM	05-MAY-25 08.00.00.000000 AM

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CREATE TABLE Booking(Passenger_ID number(8), Flight_Number number(8), Flight_Date timestamp not null,

Flight_From varchar2(15) not null, Flight_To varchar2(15) not null,

Airfare number(5) not null, Ticket_Type varchar2(8) not null,

Confirmation_Status number(1) not null,

primary key(Passenger_ID, Flight_Number, Flight_Date),

foreign key(Passenger_ID) references Passenger(Passenger_ID) on delete CASCADE,

foreign key(Flight_Number, Flight_Date) references Flight(Flight_Number, Flight_Date) on delete CASCADE);

insert into Booking values(1111,11223344,timestamp '2021-01-01 13:30:00', 'KSA', 'Malaysia', 3200, 'economy', 1);

insert into Booking values(2222,11223345,timestamp '2022-02-02 03:00:00', 'UK', 'Poland', 2500, 'economy', 0);

insert into Booking values(3333,11223346,timestamp '2023-03-03 10:50:00', 'Russia', 'UK', 5500, 'Business', 0);

insert into Booking values(4444,11223347,timestamp '2024-04-04 01:30:00', 'Iraq', 'KSA', 1200, 'Business', 1);

insert into Booking values(5555,11223348,timestamp '2025-05-05 06:00:00', 'USA', 'KSA', 1700, 'economy', 1);

PASSENGER_ID	FLIGHT_NUMBER	FLIGHT_DATE	FLIGHT_FROM	FLIGHT_TO	AIRFARE	TICKET_TYPE	CONFIRMATION_STATUS
1111	11223344	01-JAN-21 01.30.00.000000 PM	KSA	Malaysia	3200	economy	1
2222	11223345	02-FEB-22 03.00.00.000000 AM	UK	Poland	2500	economy	0
3333	11223346	03-MAR-23 10.50.00.000000 AM	Russia	UK	5500	Business	0
4444	11223347	04-APR-24 01.30.00.000000 AM	Iraq	KSA	1200	Business	1
5555	11223348	05-MAY-25 06.00.00.000000 AM	USA	KSA	1700	economy	1

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CREATE TABLE Terminal(Terminal_ID number(8) primary key, Terminal_Description varchar2(50) not null, Terminal_Capacity number(4) not null);

Insert into Terminal values(010,'East',10);

Insert into Terminal values(020,'South',20);

Insert into Terminal values(030,'West',30);

Insert into Terminal values(040,'North',40);

Insert into Terminal values(050,'South',50);

TERMINAL_ID	TERMINAL_DESCRIPTION	TERMINAL_CAPACITY
10	East	10
20	South	20
30	West	30
40	North	40
50	South	50

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CREATE TABLE Airlines(Airline_Name varchar2(15) primary key, Origin_Country varchar2(20) not null, Owner varchar2(15) not null);

Insert into Airlines values('Saudi','Saudi Arabia','Government');

Insert into Airlines values('UAE','UAEC','Government');

Insert into Airlines values('Qatar','Doha','Government');

Insert into Airlines values('Oman','Muscut','Government');

Insert into Airlines values('Bahrian','Manamah','Private Company');

AIRLINE_NAME	ORIGIN_COUNTRY	OWNER
Saudi	Saudi Arabia	Government
UAE	UAEC	Government
Qatar	Doha	Government
Oman	Muscut	Government
Bahrian	Manamah	Private Company

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CREATE TABLE Terminal_Zone(Airline_Name varchar2(15), Terminal_ID number(8), Zone_ID number(8) primary key,

foreign key (Airline_Name) references Airlines(Airline_Name),

foreign key (Terminal_ID) references Terminal(Terminal_ID));

Insert into Terminal_Zone values('Saudi',010,111);

Insert into Terminal_Zone values('UAE',020,222);

Insert into Terminal_Zone values('Qatar',030,333);

Insert into Terminal_Zone values('Oman',040,444);

Insert into Terminal_Zone values('Bahrian',050,555);

AIRLINE_NAME	TERMINAL_ID	ZONE_ID
Saudi	10	111
UAE	20	222
Qatar	30	333
Oman	40	444
Bahrian	50	555

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CREATE TABLE Staff(Staff_ID number(8) primary key, Staff_Name varchar2(15) not null,

Staff_Designation varchar2(15) not null,

Hiring_Date date, Staff_Mobile number(10) not null, Staff_Type varchar2(15) not null, Airlines_Name

varchar2(15), unique(Staff_Name, Staff_Mobile),

foreign key (Airlines_Name) references Airlines(Airline_Name));

Insert into Staff values(123,'Ahmed','KAU',date'2020-2-2',0552921172,'HR','Saudi');

Insert into Staff values(124,'Sami','DMM',date'2020-2-3',0552921112,'CL','Saudi');

Insert into Staff values(125,'Samir','RUH',date'2020-2-4',0552921113,'SR','UAE');

Insert into Staff values(126,'Saeed','MED',date'2020-2-5',0552921114,'FR','Qatar');

Insert into Staff values(127,'Ameen','MAK',date'2020-2-6',0552921115,'UR','Qatar');

Insert into Staff values(134,'Nawaf','Jed',date'2022-3-2',0542921172,'Pilot','UAE');

Insert into Staff values(128,'Nasir','ISO',date'2020-2-7',0552921116,'OR','Oman');

Insert into Staff values(129,'Fawaz','ISU',date'2020-2-8',0552921117,'GR','Oman');

Insert into Staff values(131,'Fawzi','ISL',date'2020-2-9',0552921118,'MR','Bahrian');

Insert into Staff values(132,'Khalid','IST',date'2020-4-2',0552921119,'LR','Bahrian');

STAFF_ID	STAFF_NAME	STAFF_DESIGNATION	HIRING_DATE	STAFF_MOBILE	STAFF_TYPE	AIRLINES_NAME
123	Ahmed	KAU	02-FEB-20	552921172	HR	Saudi
124	Sami	DMM	03-FEB-20	552921112	CL	Saudi
125	Samir	RUH	04-FEB-20	552921113	SR	UAE
126	Saeed	MED	05-FEB-20	552921114	FR	Qatar
127	Ameen	MAK	06-FEB-20	552921115	UR	Qatar
134	Nawaf	Jed	02-MAR-22	542921172	Pilot	UAE
128	Nasir	ISO	07-FEB-20	552921116	OR	Oman
129	Fawaz	ISU	08-FEB-20	552921117	GR	Oman
131	Fawzi	ISL	09-FEB-20	552921118	MR	Bahrian
132	Khalid	IST	02-APR-20	552921119	LR	Bahrian

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10 rows selected.

CREATE TABLE Dependence(First_Name varchar2(15), Last_Name varchar2(15), Staff_ID number(8),

Gender varchar2(1) not null, DOB date not null, Insurance_Type varchar2(15) not null,

primary key (First_Name, Last_Name, Staff_ID),

foreign key (Staff_ID) references Staff(Staff_ID));

Insert into Dependence values('Ali','Sameer',123,'M',date'2002-1-1','Premium');

Insert into Dependence values('Mohanned','Saleh',124,'M',date'2002-1-2','Premium');

Insert into Dependence values('Khalid','Ahmed',125,'M',date'2002-1-3','Economy');

Insert into Dependence values('Yasser','Ameen',126,'M',date'2002-1-4','VIP');

Insert into Dependence values('Moed','Nawaf',127,'M',date'2002-1-5','Fully');

FIRST_NAME	LAST_NAME	STAFF_ID	GENDER	DOB	INSURANCE_TYPE
Ali	Sameer	123	M	01-JAN-02	Premium
Mohanned	Saleh	124	M	02-JAN-02	Premium
Khalid	Ahmed	125	M	03-JAN-02	Economy
Yasser	Ameen	126	M	04-JAN-02	VIP
Moed	Nawaf	127	M	05-JAN-02	Fully

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CREATE TABLE Ground_Crew(G_Staff_ID number(8) primary key, Terminal_ID number(8),

Monthly_Salary number(6,2) not null,

foreign key (G_Staff_ID) references Staff(Staff_ID),

foreign key (Terminal_ID) references Terminal(Terminal_ID));

Insert into Ground_Crew values(123,010,5000);

Insert into Ground_Crew values(124,020,3500);

Insert into Ground_Crew values(125,030,1000);

Insert into Ground_Crew values(126,040,2000);

Insert into Ground_Crew values(127,050,4000);

G_STAFF_ID	TERMINAL_ID	MONTHLY_SALARY
123	10	5000
124	20	3500
125	30	1000
126	40	2000
127	50	4000

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CREATE TABLE Cabin_Crew(C_Staff_ID number(8) primary key, Flight_Date timestamp, Flight_Number number(8), Hourly_Salary number(4,2),

foreign key (C_Staff_ID) references Staff(Staff_ID),

foreign key (Flight_Number, Flight_Date) references Flight(Flight_Number, Flight_Date));

Insert into Cabin_Crew values(134,timestamp '2021-01-01 13:30:00',11223344,10);

Insert into Cabin_Crew values(128,timestamp '2022-02-02 03:00:00',11223345,20);

Insert into Cabin_Crew values(129,timestamp '2023-03-03 10:50:00',11223346,30);

Insert into Cabin_Crew values(131,timestamp '2024-04-04 01:30:00',11223347,40);

Insert into Cabin_Crew values(132,timestamp '2025-05-05 06:00:00',11223348,50);

C_STAFF_ID	FLIGHT_DATE	FLIGHT_NUMBER	HOURLY_SALARY
134	01-JAN-21 01.30.00.000000 PM	11223344	10
128	02-FEB-22 03.00.00.000000 AM	11223345	20
129	03-MAR-23 10.50.00.000000 AM	11223346	30
131	04-APR-24 01.30.00.000000 AM	11223347	40
132	05-MAY-25 06.00.00.000000 AM	11223348	50

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5 rows selected.

QUERY CODE:

/* FIRST QUERY */

SELECT FLIGHT_NUMBER,AIRFARE FROM BOOKING WHERE AIRFARE > 2000;

FLIGHT_NUMBER	AIRFARE
11223344	3200
11223345	2500
11223346	5500

Download CSV
3 rows selected.

SELECT
PASSENGER_ID,PASSENGER_NAME,GENDER,STREET,CITY,POSTAL_CODE,EMAIL,DOB

FROM PASSENGER ORDER BY PASSENGER_NAME;

PASSENGER_ID	PASSENGER_NAME	GENDER	STREET	CITY	POSTAL_CODE	EMAIL	DOB
2222	afnan	f	seconed street	jeddah	12345	notafn@uj.com	02-FEB-02
5555	ahmed	m	fifth street	Dhahran	34567	notahm@uj.com	05-MAY-05
4444	asmaa	f	forth street	Khobar	23456	notasm@uj.com	05-MAY-05
3333	khalid	m	third street	Khobar	23456	notkha@uj.com	03-MAR-03
1111	sameer	m	first street	jeddah	12345	notsam@uj.com	01-JAN-01

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5 rows selected.

SELECT GENDER, COUNT(GENDER) FROM PASSENGER GROUP BY GENDER;

GENDER	COUNT(GENDER)
f	2
m	3

Download CSV
2 rows selected.

SELECT MAX(SPEED) AS MAX_SPEED,MIN(SPEED) AS MIN_SPEED,AVG(SPEED) AS
AVG_SPEED FROM AIRPLANE;

MAX_SPEED	MIN_SPEED	AVG_SPEED
300	100	210

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SELECT FLIGHT_FROM,FLIGHT_TO FROM BOOKING WHERE FLIGHT_NUMBER IN
(SELECT FLIGHT_NUMBER FROM BOOKING);

SQL Worksheet

```
1  SELECT FLIGHT_FROM,FLIGHT_TO FROM BOOKING WHERE FLIGHT_NUMBER IN (SELECT FLIGHT_NUMBER FROM BOOKING);
```

FLIGHT_FROM	FLIGHT_TO
KSA	Malaysia
UK	Poland
Russia	UK
Iraq	KSA
USA	KSA

Download CSV
5 rows selected.

/* SIXTH QUERY */

SELECT PASSENGER_ID,PASSENGER_NAME,GENDER,STREET, CITY , FLIGHT_FROM, FLIGHT_TO, TICKET_TYPE FROM PASSENGER NATURAL JOIN BOOKING;

SQL Worksheet

```
1  SELECT PASSENGER_ID,PASSENGER_NAME,GENDER,STREET, CITY , TICKET_TYPE FROM PASSENGER NATURAL JOIN BOOKING;
2
```

PASSENGER_ID	PASSENGER_NAME	GENDER	STREET	CITY	TICKET_TYPE
1111	sameer	m	first street	jeddah	economy
2222	afnan	f	seconed street	jeddah	economy
3333	khalid	m	third street	Khobar	Business
4444	asmaa	f	forth street	Khobar	Business
5555	ahmed	m	fifth street	Dhahran	economy

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