Princess Sumaya جامعـــة
University الأميـرة سميّـة
for Technology للتكنولوجيا

Princess Sumaya University for Technology

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Database Systems

Final Project

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Introduction

We will design a database for an airport system, we chose this topic because the airport has important records that have to be saved in an organized way and these records have relationships connecting them, so creating a database system will satisfy that.

Roles

Omar will write the requirements and draw the EER diagram, Lara will convert the EER diagram to relations (mapping), and Mohammad will write the SQL code.

Requirements

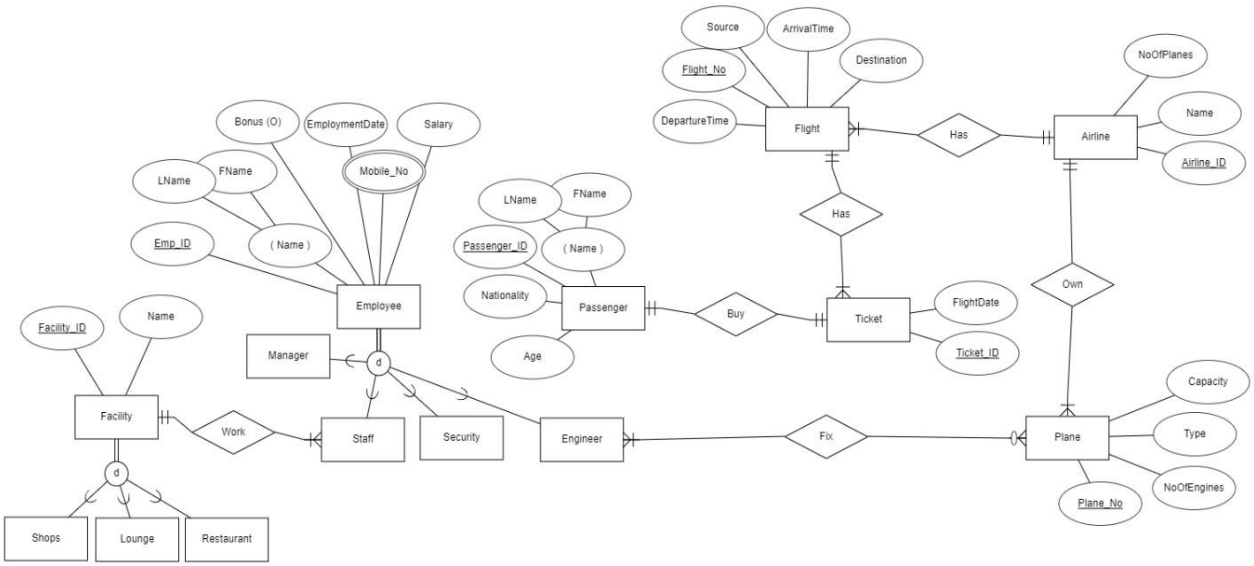
- An airport depends on a number of different types of persons for its successful operation. **People** within the airport are characterized by the following:
  - National ID (unique for each person), Name (composed of first and last name), Mobile No, and Address. (A person can have multiple phone numbers)
- A Person can be a **Passenger** or **Employee** or both
- Employees have a unique Employee ID, Salary, Bonus (can have no value), and Start Date. An Employee can be either **Manager**, **Security**, **Engineer**, or **Other Staff**.
  - A Staff member works in exactly one **Facility**, but a Facility should have at least one Staff member.
  - A Facility has unique Facility ID and Name.
  - A Facility can be **Shop**, **Lounge** or **Restaurant.**

- A Passenger has a Passport Number.
  - A Passenger buys one or many **Tickets**, but a Ticket is bought by exactly one passenger.
  - A Ticket is characterized by the following: Seat Number (unique for every Ticket), Flight Number, Gate, Class, Flight Date.

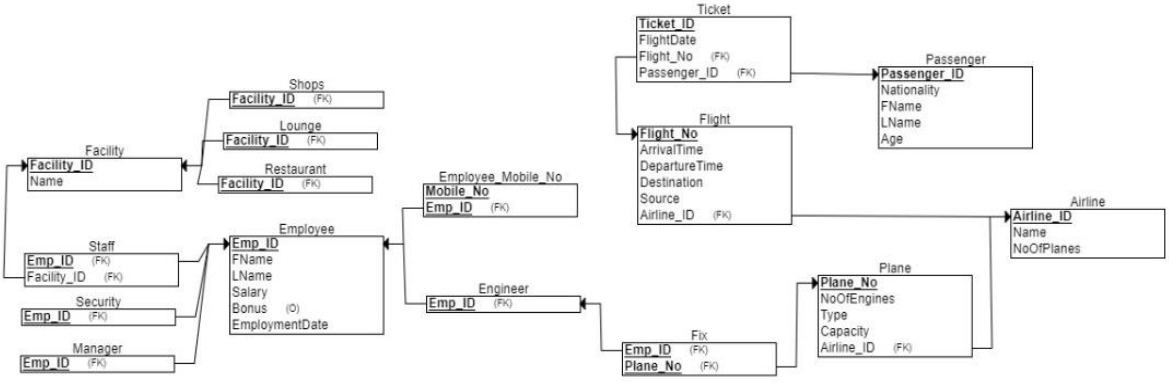
- An Engineer can fix zero or more **Planes**, and a plane can be fixed by one or many engineers.

- Every Plane has a unique Plane Number, Capacity, Type, and Number of Engines. Every Plane is owned by exactly one **Airline**, and each Airline owns one or many Planes.
  - Airlines have a unique Airline_ID, Name, Number of Flights, and Number of Planes.
- An Airline has at least one **Flight**, and a Flight is for exactly one Airline.
  - A Flight is identified by the following: a unique Flight Number, Arrival Time, Departure Time, Destination and Source

EER Model



Relational Schema



SQL Code:

```
create table employee (emp_id number(6) primary key, fName varchar(20), lName varchar(20), salary number(7), bonus number(6), EmloymentDate date);


create table facility (facility_id varchar(6) primary key,name varchar2(20));


create table staff (emp_id number(6) constraint emp_idFK references employee(emp_id),facility_id varchar(6) constraint facility_FK references facility(facility_id));


create table security(emp_id number(6) constraint emp_securityFK references employee(emp_id));

create table manager(emp_id number(6) constraint emp_managerFK references employee(emp_id));

create table shops(facility_id varchar(6) constraint facility_shopsFK references facility(facility_id));

create table lounge(facility_id varchar(6) constraint facility_loungeFK references facility(facility_id));

create table restaurant(facility_id varchar(6) constraint facility_restaurantFK references facility(facility_id));


create table Employee_Mobile_No (mobile_no number(13) primary key,  emp_id number(6) constraint emp_mobileFK references employee(emp_id));


create table engineer (emp_id number(6) constraint emp_engineerFK references employee(emp_id));

create table airline (airline_id varchar2(6) primary key, name varchar2(20),NoOfPlanes number(6));


create table plane(plane_no number(7) primary key, NoOfEngines number(6), type varchar2(20), capacity number(7), airline_id varchar2(6) constraint airline_planeFK references airline(airline_id));


create table flight (flight_no varchar2(10) primary key, source varchar2(15), destination varchar2(15), airline_id varchar2(6) constraint airline_flightFK references airline(airline_id), DepartureTime varchar2(20), ArrivalTime varchar2(20));


create table passenger (passenger_id number(15) primary key, nationality varchar2(15), fName varchar2(15), lName varchar2(15), age number(6));


create table ticket (ticket_id number(15) primary key, flightDate date, flight_no varchar2(10) constraint flight_ticketFK references flight(flight_no), passenger_id number(15) constraint passenger_flightFK references passenger(passenger_id));
```

```
create table fix
(emp_id number(6) constraint fix_emp_engineerFK references employee(emp_id),
 plane_no number(7) constraint fix_planeFK references plane(plane_no));

---------------------------------------------------------------------------------------------

insert into employee values(0001,'Mohammad','Ali',1500,150,'02-NOV-2021');
insert into employee(emp_id,fName,lName,salary,EmloymentDate) values(0002,'Khaled','Asaad',1780,'10-MAY-2020');
insert into employee values(0003,'Kamel','Qatawneh',1250,200,'23-AUG-2022');
insert into employee(emp_id,fName,lName,salary,EmloymentDate) values(0004,'Ahmad','Masalha',1800,'20-OCT-2019');
insert into employee(emp_id,fName,lName,salary,EmloymentDate) values(0005,'Yara','Hadidi',1540,'09-SEP-2021');

---------------------------------------------

insert into Employee_Mobile_No values(0795555555,0001);
insert into Employee_Mobile_No values(0784444444,0002);
insert into Employee_Mobile_No values(0776666666,0002);
insert into Employee_Mobile_No values(0791111111,0003);
insert into Employee_Mobile_No values(0799999999,0005);

-----------------------------------------------

insert into airline values('RJ','Royal Jordanian',26);
insert into airline values('EK','Emirates Airlines',269);
insert into airline values('TK','Turkish Airlines',396);
insert into airline values('QR','Qatar Airways',235);
insert into airline values('MS','EgyptAir',70);

-----------------------------------------------

insert into plane values(21068,2,'Boeing 787-8',250,'RJ');
insert into plane values(19144,2,'Airbus A320-200',170,'RJ');
insert into plane values(8498,4,'Airbus A380',853,'QR');
insert into plane values(34813,2,'Boeing 737 MAX 9',178,'TK');
insert into plane values(52570,4,'Airbus A380',853,'EK');
```

```
insert into flight values('RJ164','Amman','Iraq','RJ','18:30','20:00');
insert into flight values('QR278','Qatar','Amman','QR','7:00','9:30');
insert into flight values('EK333','Amman','Dubai','EK','17:15','20:15');
insert into flight values('TK624','Amman','Turkey','TK','23:00','1:45');
insert into flight values('RJ319','Dubai','Amman','RJ','15:30','20:35');
---------------------------------------------------------------
insert into passenger values(2000735463,'Jordanian','Fathi','Shedefat',24);
insert into passenger values(3487277765,'Turkish','Emir','Yilmaz',60);
insert into passenger values(1788885364,'Iraqi','Ameer','Dulaimy',20);
insert into passenger values(2323984766,'Jordanian','Mohammad','Asaf',41);
insert into passenger values(6567893444,'Palestinian','Sameh','Tafesh',35);
---------------------------------------------------------------
insert into ticket values(512373763838,'02-FEB-2023','RJ319',2000735463);
insert into ticket values(656774673747,'28-JAN-2023','EK333',2000735463);
insert into ticket values(439843840384,'15-JAN-2023','RJ164',1788885364);
insert into ticket values(834857384787,'05-FEB-2023','QR278',6567893444);
insert into ticket values(123547748366,'01-MAR-2023','TK624',3487277765);
---------------------------------------------------------------
insert into facility values('A1','Duty Free');
insert into facility values('B1','McDonalds');
insert into facility values('B2','Burger King');
insert into facility values('C1','First Class Lounge');
insert into facility values('C2','VIP Lounge');
-------------------------------------------------------------
insert into Shops values('A1');
insert into restaurant values('B1');
insert into restaurant values('B2');
insert into lounge values('C1');
insert into lounge values('C2');
```

```
insert into engineer values(0003);
insert into security values(0002);
insert into manager values(0005);
insert into staff values(0001,'A1');
insert into staff values(0004,'C1');
---------------------------------------------------------------
insert into fix values(0003,21068);
insert into fix values(0003,19144);
---------------------------------------------------------------

Update Flight
set DepartureTime = '9:00',ArrivalTime='11:30'
where Flight_No = 'QR278';

Update Airline
Set NoOfPlanes = 30
where Name = 'Royal Jordanian';
---------------------------------------------------------------

Delete From Ticket
where Flight_No = 'TK624';

Delete From Flight
where Flight_No = 'TK624';
---------------------------------------------------------------

1- SELECT a.airline_id, a.name, p.plane_no, p.type
    FROM airline a, plane p
    WHERE a.airline_id = p.airline_id;
```

2- SELECT a.airline_id, a.name, COUNT(p.airline_id) AS "Number of Planes for each Airline"

FROM airline a, plane p

WHERE a.airline_id = p.airline_id

GROUP BY a.airline_id, a.name;

SELECT a.airline_id, a.name

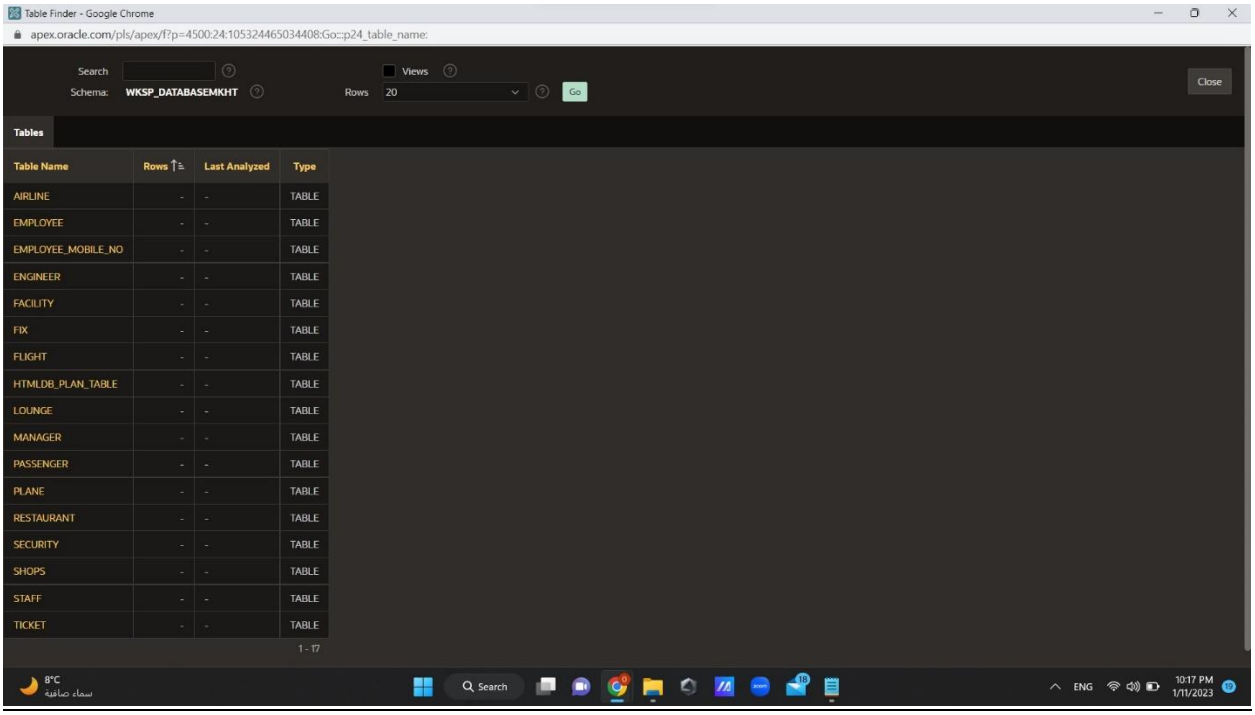
FROM airline a, plane p

WHERE a.airline_id = p.airline_id

GROUP BY a.airline_id, a.name

HAVING MAX(capacity) > 200;

Tables



```
select * from employee;
```

Results | Explain | Describe | Saved SQL | History

EMP_ID	FNAME	LNAME	SALARY	BONUS	EMLOYMENTDATE
3	Kamel	Qatawneh	1250	200	08/23/2022
1	Mohammad	Ali	1500	150	11/02/2021
2	Khaled	Asaad	1780	-	05/10/2020
4	Ahmad	Masalha	1800	-	10/20/2019
5	Yara	Hadidi	1540	-	09/09/2021

5 rows returned in 0.01 seconds Download

```
select * from employee_mobile_no;
```

Results | Explain | Describe | Saved SQL | History

MOBILE_NO	EMP_ID
784444444	2
791111111	3
795555555	1
776666666	2
799999999	5

5 rows returned in 0.01 seconds Download

```
select * from staff;
```

Results | Explain | Describe | Saved SQL | History

EMP_ID	FACILITY_ID
4	C1
1	A1

2 rows returned in 0.07 seconds Download

```
select * from security;
```

Results | Explain | Describe | Saved SQL | History

EMP_ID
2

1 rows returned in 0.01 seconds Download

```
select * from manager;
```

Results | Explain | Describe | Saved SQL | History

EMP_ID
5

1 rows returned in 0.07 seconds Download

```
select * from engineer;
```

Results | Explain | Describe | Saved SQL | History

EMP_ID
3

1 rows returned in 0.01 seconds Download

```
select * from fix;
```

Results | Explain | Describe | Saved SQL | History

EMP_ID	PLANE_NO
3	21068
3	19144

2 rows returned in 0.01 seconds Download

```
select * from facility;
```

Results | Explain | Describe | Saved SQL | History

FACILITY_ID	NAME
A1	Duty Free
B1	McDonalds
C2	VIP Lounge
B2	Burger King
C1	First Class Lounge

5 rows returned in 0.01 seconds Download

```
select * from shops;
```

Results | Explain | Describe | Saved SQL | History

FACILITY_ID
A1

1 rows returned in 0.01 seconds Download

```
1
2  select * from restaurant;
3
```

Results | Explain | Describe | Saved SQL | History

FACILITY_ID
B1
B2

2 rows returned in 0.08 seconds Download

```
1
2  select * from lounge;
3
```

Results | Explain | Describe | Saved SQL | History

FACILITY_ID
C1
C2

2 rows returned in 0.07 seconds Download

```
1
2  select * from airline;
3
```

Results | Explain | Describe | Saved SQL | History

AIRLINE_ID	NAME	NOOFPLANES
TK	Turkish Airlines	396
EK	Emirates Airlines	269
QR	Qatar Airways	235
MS	EgyptAir	70
RJ	Royal Jordanian	26

5 rows returned in 0.01 seconds Download

```
1
2  select * from plane;
3
```

Results | Explain | Describe | Saved SQL | History

PLANE_NO	NOOFENGINES	TYPE	CAPACITY	AIRLINE_ID
52570	4	Airbus A380	853	EK
8498	4	Airbus A380	853	QR
21068	2	Boeing 787-8	250	RJ
19144	2	Airbus A320-200	170	RJ
34813	2	Boeing 737 MAX 9	178	TK

5 rows returned in 0.01 seconds Download

```
1
2  select * from flight;
3
```

Results | Explain | Describe | Saved SQL | History

FLIGHT_NO	SOURCE	DESTINATION	AIRLINE_ID	DEPARTURETIME	ARRIVALTIME
RJ164	Amman	Iraq	RJ	18:30	20:00
RJ319	Dubai	Amman	RJ	15:30	20:35
TK624	Amman	Turkey	TK	23:00	1:45
QR278	Qatar	Amman	QR	7:00	9:30
EK333	Amman	Dubai	EK	17:15	20:15

5 rows returned in 0.01 seconds Download

```
1
2  select * from ticket;
3
```

Results | Explain | Describe | Saved SQL | History

TICKET_ID	FLIGHTDATE	FLIGHT_NO	PASSENGER_ID
512373763838	02/02/2023	RJ319	2000735463
656774673747	01/28/2023	EK333	2000735463
834857384787	02/05/2023	QR278	6567893444
123547748366	03/01/2023	TK624	3487277765
439843840384	01/15/2023	RJ164	1788885364

5 rows returned in 0.00 seconds Download

```
1
2  select * from passenger;
3
```

Results | Explain | Describe | Saved SQL | History

PASSENGER_ID	NATIONALITY	FNAME	LNAME	AGE
3487277765	Turkish	Emir	Yilmaz	60
1788885364	Iraqi	Ameer	Dulaimy	20
2323984766	Jordanian	Mohammad	Asaf	41
6567893444	Palestinian	Sameh	Tafesh	35
2000735463	Jordanian	Fathi	Shedefat	24

5 rows returned in 0.01 seconds Download

Update Statement 1: Flight ‘QR278’ delayed 2 hours due to weather conditions

```
Update Flight
set DepartureTime = '9:00',ArrivalTime='11:30'
where Flight_No = 'QR278';

Select * from Flight;
```

Results | Explain | Describe | Saved SQL | History

FLIGHT_NO	SOURCE	DESTINATION	AIRLINE_ID	DEPARTURETIME	ARRIVALTIME
RJ164	Amman	Iraq	RJ	18:30	20:00
RJ319	Dubai	Amman	RJ	15:30	20:35
TK624	Amman	Turkey	TK	23:00	1:45
QR278	Qatar	Amman	QR	9:00	11:30
EK333	Amman	Dubai	EK	17:15	20:15

5 rows returned in 0.00 seconds Download

Update Statement 2: Royal Jordanian Airline bought 4 new planes

```
Update Airline
Set NoOfPlanes = 30
where Name = 'Royal Jordanian';

select * from airline;
```

Results | Explain | Describe | Saved SQL | History

AIRLINE_ID	NAME	NOOFPLANES
TK	Turkish Airlines	396
EK	Emirates Airlines	269
QR	Qatar Airways	235
MS	EgyptAir	70
RJ	Royal Jordanian	30

5 rows returned in 0.07 seconds Download

Delete Statement 1: Flight ‘TK624’ from Amman to Turkey canceled

```
Delete From Ticket
where Flight_No = 'TK624';

Delete From Flight
where Flight_No = 'TK624';

select * from flight;
```

Results | Explain | Describe | Saved SQL | History

FLIGHT_NO	SOURCE	DESTINATION	AIRLINE_ID	DEPARTURETIME	ARRIVALTIME
RJ164	Amman	Iraq	RJ	18:30	20:00
RJ319	Dubai	Amman	RJ	15:30	20:35
QR278	Qatar	Amman	QR	9:00	11:30
EK333	Amman	Dubai	EK	17:15	20:15

4 rows returned in 0.01 seconds Download

Join Statement 1: retrieve airline_id, airline name, plane_no, and plane type where airline.airline_id = plane.airline_id

```
SELECT Airline.Airline_ID, Airline.Name, Plane.Plane_No, Plane.Type
FROM     Airline,Plane
WHERE  Airline.Airline_ID = Plane.Airline_ID;
```

Results | Explain | Describe | Saved SQL | History

AIRLINE_ID	NAME	PLANE_NO	TYPE
EK	Emirates Airlines	52570	Airbus A380
QR	Qatar Airways	8498	Airbus A380
RJ	Royal Jordanian	21068	Boeing 787-8
RJ	Royal Jordanian	19144	Airbus A320-200
TK	Turkish Airlines	34813	Boeing 737 MAX 9

5 rows returned in 0.01 seconds Download

Join Statement 2: retreive airline_id and name and Number of Planes for each Airline

```
SELECT a.airline_id, a.name, COUNT(p.airline_id) AS "Number of Planes for each Airline"
FROM airline a, plane p
WHERE a.airline_id = p.airline_id
GROUP BY a.airline_id, a.name;
```

Results | Explain | Describe | Saved SQL | History

AIRLINE_ID	NAME	Number of Planes for each Airline
TK	Turkish Airlines	1
EK	Emirates Airlines	1
QR	Qatar Airways	1
RJ	Royal Jordanian	2

4 rows returned in 0.27 seconds Download

Join Statement with aggregate function : retreive the airline id and airline name that has the maximum capacity of its planes greater than 200 (the largest capacity of its planes is greater than 200)

```
SELECT a.airline_id, a.name
FROM airline a, plane p
WHERE a.airline_id = p.airline_id
GROUP BY a.airline_id, a.name
HAVING MAX(capacity) > 200;
```

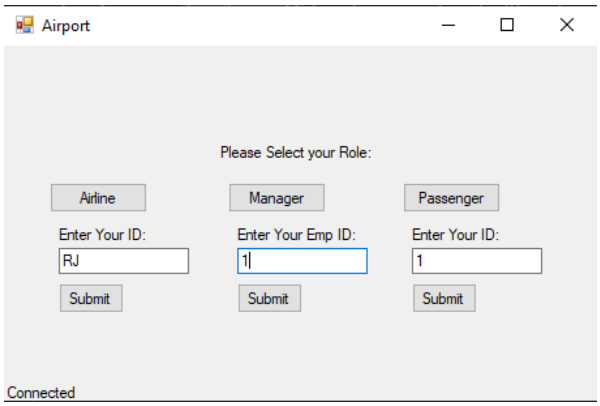
Results | Explain | Describe | Saved SQL | History

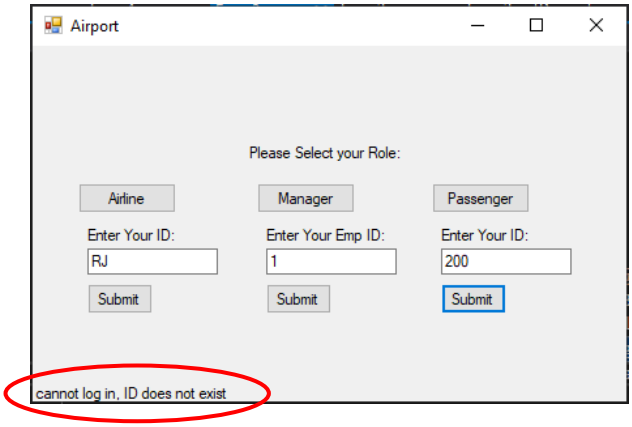
AIRLINE_ID	NAME
EK	Emirates Airlines
QR	Qatar Airways
RJ	Royal Jordanian

3 rows returned in 0.08 seconds Download

Bonus:

Checks for ID when logging in, if ID does not exist, an error occurs

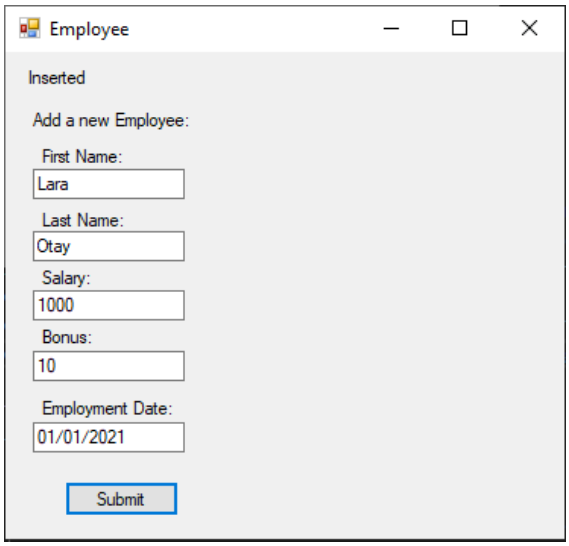




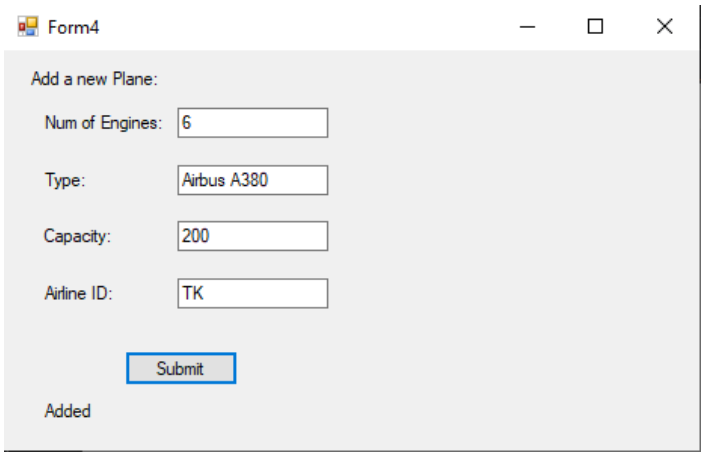
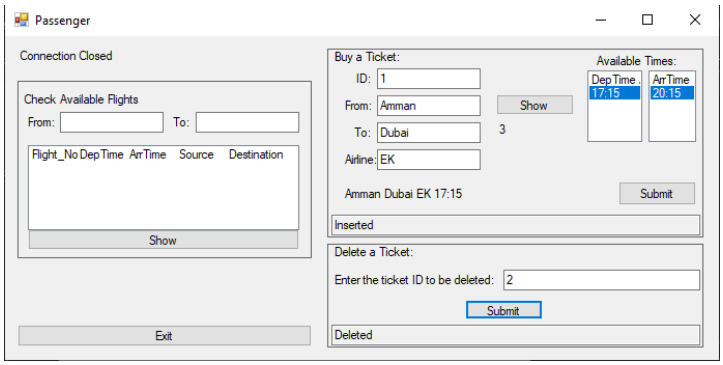
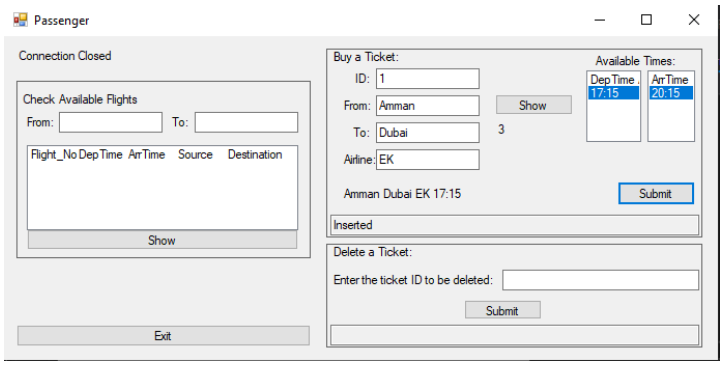
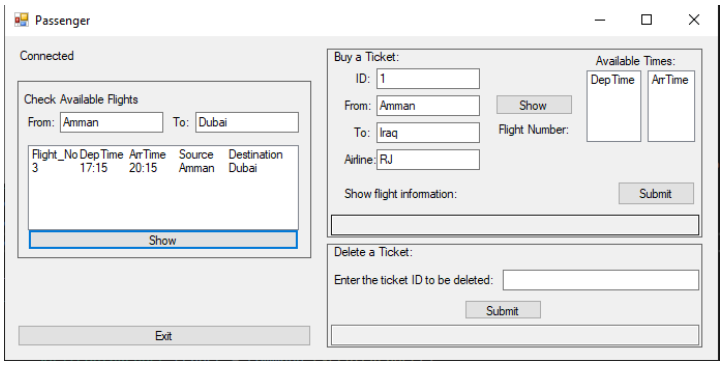
Here there is no passenger with ID 200

	passenger_id	nationality	fName	lName	age
	Filter	Filter	Filter	Filter	Filter
1	1	Jordanian	Fathi	Shedefat	24
2	2	Turkish	Emir	Yilmaz	60
3	3	Iraqi	Ameer	Dulaimy	20
4	4	Jordanian	Mohammad	Asaf	41
5	5	Palestinian	Sameh	Tafesh	35

For the manager, he/she can add a new employee:



For an Airline, a new plane can be added:



For a passenger, he/she can view flights from and to a city, buy ticket, or delete a ticket