PROGRAM 5: AIRLINE FLIGHT DATABASE

Consider the following database that keeps track of airline flight information:

FLIGHTS(flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time, price: integer)

AIRCRAFT(aid: integer, aname: string, cruisingrange: integer)

CERTIFIED(eid: integer, aid: integer)

EMPLOYEES(eid: integer, ename: string, salary: integer)

Note that the Employees relation describes pilots and other kinds of employees as well; Every pilot is certified for some aircraft, and only pilots are certified to fly.

```
create database Lab5;

use Lab5;


create table flights(
    flno int,
    fromplace varchar(15),
    toplace varchar(15),
    distance int,
    departs datetime,
    arrives datetime,
    price int,
    primary key (flno));
desc flights;
```

	Field	Type	Null	Key	Default	Extra
▶	flno	int	NO	PRI	NULL	
	fromplace	varchar(15)	YES		NULL	
	toplace	varchar(15)	YES		NULL	
	distance	int	YES		NULL	
	departs	datetime	YES		NULL	
	arrives	datetime	YES		NULL	
	price	int	YES		NULL	

```
create table aircraft(
    aid int,
    aname varchar(15),
    cruisingrange int,
    primary key (aid));
desc aircraft;
```

	Field	Type	Null	Key	Default	Extra
▶	aid	int	NO	PRI	NULL	
	aname	varchar(15)	YES		NULL	
	cruisingrange	int	YES		NULL	

```
create table employees (
    eid int,
    ename varchar(15),
    salary int,
    primary key (eid));
desc employees;
```

	Field	Type	Null	Key	Default	Extra
▶	eid	int	NO	PRI	NULL	
	ename	varchar(15)	YES		NULL	
	salary	int	YES		NULL	

```
create table certified (
    eid int,
    aid int,
    foreign key (eid) references employees(eid),
    foreign key (aid) references aircraft(aid));
desc certified;
```

	Field	Type	Null	Key	Default	Extra
▶	eid	int	YES	MUL	NULL	
	aid	int	YES	MUL	NULL	

```
insert into flights values(101, 'Bangalore', 'Delhi', 2500, '2005-05-13 07:15:31', '2005-05-13 18:15:31', 5000);
insert into flights values(102, 'Bangalore', 'Lucknow', 3000, '2013-05-05 07:15:31', '2013-05-05 11:15:31', 6000);
insert into flights values(103, 'Lucknow', 'Delhi', 500, '2013-05-05 12:15:31', '2013-05-05 17:15:31', 3000);
insert into flights values(107, 'Bangalore', 'Frankfurt', 8000, '2013-05-05 07:15:31', '2013-05-05 22:15:31', 60000);
insert into flights values(104, 'Bangalore', 'Frankfurt', 8500, '2013-05-05 07:15:31', '2013-05-05 23:15:31', 75000);
insert into flights values(105, 'Kolkata', 'Delhi', 3400, '2013-05-05 07:15:31', '2013-05-05 09:15:31', 7000);
insert into flights values(106, 'Bangalore', 'Kolkata', 1000, '2013-05-05 01:15:30', '2013-05-05 09:20:30', 10000);
insert into flights values(108, 'Lucknow', 'Kolkata', 1000, '2013-05-05 11:30:30', '2013-05-05 15:20:30', 10000);
select * from flights;
```

flno	fromplace	toplace	distance	departs	arrives	price
101	Bangalore	Delhi	2500	2005-05-13 07:15:31	2005-05-13 18:15:31	5000
102	Bangalore	Lucknow	3000	2013-05-05 07:15:31	2013-05-05 11:15:31	6000
103	Lucknow	Delhi	500	2013-05-05 12:15:31	2013-05-05 17:15:31	3000
104	Bangalore	Frankfurt	8500	2013-05-05 07:15:31	2013-05-05 23:15:31	75000
105	Kolkata	Delhi	3400	2013-05-05 07:15:31	2013-05-05 09:15:31	7000
106	Bangalore	Kolkata	1000	2013-05-05 01:15:30	2013-05-05 09:20:30	10000
107	Bangalore	Frankfurt	8000	2013-05-05 07:15:31	2013-05-05 22:15:31	60000
108	Lucknow	Kolkata	1000	2013-05-05 11:30:30	2013-05-05 15:20:30	10000
NULL	NULL	NULL	NULL	NULL	NULL	NULL

insert into aircraft values(101, '747', 3000);

insert into aircraft values(102, 'Boeing', 900);

insert into aircraft values(103, '647', 800);

insert into aircraft values(104, 'Dreamliner', 10000);

insert into aircraft values(105, 'Boeing', 3500);

insert into aircraft values(106, '707', 1500);

insert into aircraft values(107, 'Dream', 120000);

insert into aircraft values(108, '707', 760);

insert into aircraft values(109, '747', 1000);

select * from aircraft;

aid	aname	cruisingrange
101	747	3000
102	Boeing	900
103	647	800
104	Dreamliner	10000
105	Boeing	3500
106	707	1500
107	Dream	120000
108	707	760
109	747	1000
NULL	NULL	NULL

insert into employees values(701, 'A', 50000);

```
insert into employees values(702, 'B', 100000);
insert into employees values(703, 'C', 150000);
insert into employees values(704, 'D', 90000);
insert into employees values(705, 'E', 40000);
insert into employees values(706, 'F', 60000);
insert into employees values(707, 'G', 90000);
select * from employees;
```

	eid	ename	salary
▶	701	A	50000
	702	B	100000
	703	C	150000
	704	D	90000
	705	E	40000
	706	F	60000
	707	G	90000
*	NULL	NULL	NULL

```
insert into certified values(701, 101);
insert into certified values(701, 102);
insert into certified values(701, 106);
insert into certified values(701, 105);
insert into certified values(702, 104);
insert into certified values(703, 104);
insert into certified values(704, 104);
insert into certified values(702, 107);
insert into certified values(703, 107);
insert into certified values(704, 107);
insert into certified values(702, 101);
insert into certified values(702, 108);
```

insert into certified values(701, 109);

select * from certified;

	eid	aid
▶	701	101
	701	102
	701	106
	701	105
	702	104
	703	104
	704	104
	702	107
	703	107
	704	107
	702	101
	702	108
	701	109

i.Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80,000.

```
select distinct a.aname from aircraft a where a.aid in (
        select c.aid from certified c, employees e where
   c.eid = e.eid and not exists(
                select * from employees e1 where e1.eid=e.eid and e1.salary<80000
   ));
```

	aname
▶	747
	Dreamliner
	Dream
	707

ii.For each pilot who is certified for more than three aircrafts, find the eid and the maximum cruisingrange of the aircraft for which she or he is certified.

```
select max(a.cruisingrange), c.eid from certified c, aircraft a
```

where c.aid = a.aid group by c.eid having count(c.eid)>3;

	max(a.cruisingrange)	eid
▶	3500	701
	120000	702

iii.Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.

select ename from employees where salary <(

select min(price) from flights where fromplace='Bangalore' and toplace='Frankfurt');

	ename
▶	A
	E

iv.For all aircraft with cruisingrange over 1000 Kms, find the name of the aircraft and the average salary of all pilots certified for this aircraft.

select avg(e.salary), c.aid from certified c, employees e where c.aid in(

select aid from aircraft where cruisingrange>1000) and e.eid = c.eid group by c.aid;

	avg(e.salary)	aid
▶	75000.0000	101
	113333.3333	104
	50000.0000	105
	50000.0000	106
	113333.3333	107

v.Find the names of pilots certified for some Boeing aircraft.

select ename from employees where eid in(

select eid from certified where aid in(

select aid from aircraft where aname = 'Boeing'));

	ename
▶	A

vi.Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.

```
select aname from aircraft where cruisingrange > any
(select distance from flights where fromplace='Bangalore' and toplace='Delhi');
```

	aname
▶	747
	Dreamliner
	Boeing
	Dream

vii.A customer wants to travel from Bangalore to Kolkata New with no more than two changes of flight. List the choice of departure times from Madison if the customer wants to arrive in Kolkata by 6 p.m.

```
select F.flno, F.departs
from flights F
Where F.flno in ( ( select F0.flno
 from flights F0
 where F0.fromplace = 'Bangalore' and F0.toplace = 'Kolkata'
 and extract(hour from F0.arrives) < 18 )
 union
( select F0.flno
 from flights F0, flights F1
 where F0.fromplace = 'Bangalore' and F0.toplace <> 'Kolkata'
 and F0.toplace = F1.fromplace and F1.toplace = 'Kolkata'
 and F1.departs > F0.arrives
 and extract(hour from F1.arrives) < 18)
```

```
 union
( select F0.flno
 from flights F0, flights F1, flights F2
 where F0.fromplace = 'Bangalore'
 and F0.toplace = F1.fromplace
 and F1.toplace = F2.fromplace
 and F2.toplace = 'Kolkata'
 and F0.toplace <> 'Kolkata'
 and F1.toplace <> 'Kolkata'
 and F1.departs > F0.arrives
 and F2.departs > F1.arrives
 and extract(hour from F2.arrives) < 18));
```

flno	departs
102	2013-05-05 07:15:31
106	2013-05-05 01:15:30