

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, fname: string, cruisingrange: integer) certified (eid: integer, aid: integer)
employee (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.

write each of the following queries in sql.

```
create database airline_flight
```

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

```
create table aircraft( aid int, fname varchar(15), cruisingrange int, primary key (aid) )
```

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

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

```
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);
```

```
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);
```

```
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);
```

```
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);
```

The screenshot shows the phpMyAdmin interface with the following details:

Database Structure: The sidebar shows the database structure with the following tables under the `airline_flight` schema:

- aircraft
- certified
- employees
- flights

flights Table: The main pane displays the `flights` table with the following data:

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

aircraft Table: The sidebar shows the `airline_flight` schema with the following tables:

- aircraft
- certified
- employees
- flights

The `aircraft` table is selected, showing the following data:

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

Employees Table Data:

	eid	ename	salary
1	701	A	50000
2	702	B	100000
3	703	C	150000
4	704	D	90000
5	705	E	40000
6	706	F	60000
7	707	G	90000

Aircraft Table Data:

	aid	aname	cruisingrange
1	101	747	3000
2	102	Boeing	900
3	103	647	800
4	104	Dreamliner	10000
5	105	Boeing	3500
6	106	707	1500
7	107	Dream	120000
8	108	707	760
9	109	747	1000

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
    )
);
```

Aircraft Table Data:

	aname
1	747
2	Dreamliner
3	Dream
4	707

ii. for each pilot who is certified for more than three aircrafts, find the eid and the maximum cruising range 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;
```

Showing rows 0 - 1 (2 total, Query took 0.0065 seconds.)

```
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
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table

+ Options

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');

Showing rows 0 - 1 (2 total, Query took 0.0065 seconds.)

```
select ename from employees where salary < ( select min(price) from flights where fromplace='Bangalore' and toplace='Frankfurt')
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

ename
A
E

Check all | With selected: Edit Copy Delete | Edit Copy Delete Export

iv. for all aircraft with cruising range 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;

Showing rows 0 - 4 (5 total, Query took 0.0107 seconds.)

```
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
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table

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avg(e.salary)	aid
75000.0000	101
11333.3333	104
50000.0000	105
50000.0000	106
11333.3333	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 a.name = 'Boeing'));

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');

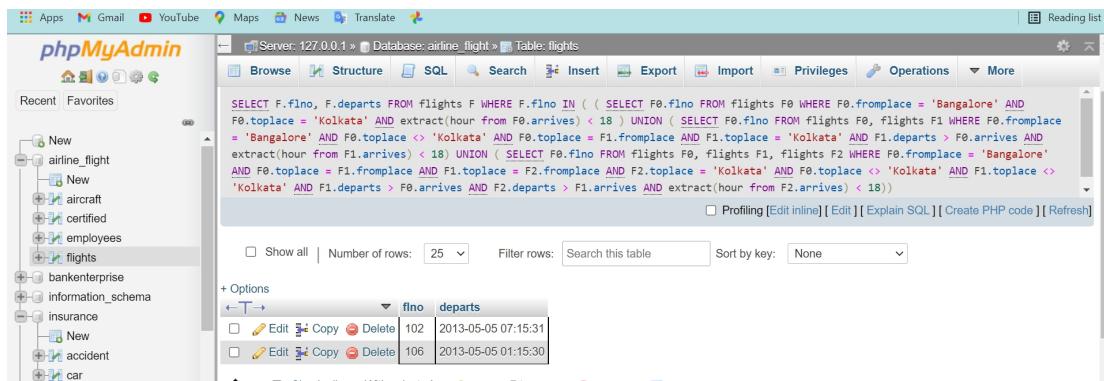
vii. a customer wants to travel from madison to new york with no more than two changes of flight. list the choice of departure times from madison if the customer wants to arrive in new york by 6 p.m.

```

SELECT F.flno, F.deperts
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.deperts > 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.deploys > F0.arrives
AND F2.deploys > F1.arrives
AND extract(hour from F2.arrives) < 18);



The screenshot shows the phpMyAdmin interface with the following details:

- Left Panel:** Shows the database structure with a tree view of tables: New, airline_flight, aircraft, certified, employees, flights, bankenterprise, information_schema, and insurance.
- Top Bar:** Includes links for Apps, Gmail, YouTube, Maps, News, Translate, and a Reading list icon.
- Header:** Displays "Server: 127.0.0.1 > Database: airline_flight > Table: flights".
- Toolbar:** Includes buttons for Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, Operations, and More.
- SQL Tab:** Contains a complex multi-table query:SELECT F.fino, F.deploys FROM flights F WHERE F.fino IN ((SELECT F0.fino FROM flights F0 WHERE F0.fromplace = 'Bangalore' AND F0.toplace = 'Kolkata' AND extract(hour from F0.arrives) < 18) UNION (SELECT F0.fino FROM flights F0, flights F1 WHERE F0.fromplace = 'Bangalore' AND F0.toplace <> 'Kolkata' AND F0.fromplace = F1.fromplace AND F1.toplace = 'Kolkata' AND F1.deploys > F0.arrives AND extract(hour from F1.arrives) < 18) UNION (SELECT F0.fino 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.deploys > F0.arrives AND F2.deploys > F1.arrives AND extract(hour from F2.arrives) < 18))
- Browse Tab:** Shows the results of the query in a table format:

	fino	deploys
<input type="checkbox"/>	102	2013-05-05 07:15:31
<input type="checkbox"/>	106	2013-05-05 01:15:30

- Buttons:** Includes links for Profiling, Edit inline, Explain SQL, Create PHP code, and Refresh.