CSLR51 – Database Management Systems Laboratory
#Session: 05 || Date: 22/08/2024

1. Relational Database Design – Airlines Travel Schema

a. Find the names of aircraft such that all pilots certified to operate them earn more than Rs. 50,000.

```
mysql> select Aname from aircraft where Aid in (select Aid from Certified natural join Employees group by Aid having min(Salary)>50000);
+----------+
| Aname    |
+----------+
| Airindia |
| Vistara  |
+----------+
2 rows in set (0.01 sec)
```

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

```
mysql> select Eid,Max(cruisingrange) from Certified natural join Aircraft group by Eid having count(*)>3;
+-----+--------------------+
| Eid | Max(cruisingrange) |
+-----+--------------------+
|  10 |               3600 |
+-----+--------------------+
1 row in set (0.01 sec)
```

c.Find the names of pilots whose salary is less than the price of the cheapest route from Trichy to Agartala.

```
mysql> select Ename from Employees where Salary<(select min(price) from Flights where `FROM`="Trichy" and `TO`="Agartala") and Eid in(select Eid from Certified);
+-------+
| Ename |
+-------+
| Jessy |
+-------+
1 row in set (0.00 sec)
```

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

```
mysql> select Aname,avg(Salary) from ((Employees natural join Certified) nat
ural join Aircraft) where cruisingrange>1000 group by Aid;
```

```
+----------+-------------+
| Aname    | avg(Salary) |
+----------+-------------+
| Boeing   |  99500.0000 |
| Airindia | 150500.0000 |
| Boeing   |  87500.0000 |
| Vistara  | 150000.0000 |
+----------+-------------+
4 rows in set (0.01 sec)
```

e.Find the names of pilot/s certified for some Boeing aircraft who drove the maximum distance on all flights departing from Ladakh.

```
mysql> select Ename from Employees natural join Certified where Aid in (select Aid from Aircraft where Aname="Boeing") and Aid in (select Aid from Flights where `From`="Ladakh" and Distance=(select max(Distance) from Flights where `From`="Ladakh"));
+-------+
| Ename |
+-------+
| Mac   |
| Jessy |
+-------+
2 rows in set (0.00 sec)
```

f.Find the aids of all aircraft that can be used on routes from Chandigarh to Surat.

```
mysql> select Aid from Flights where `From`="Chandigarh" and `To`="Surat";
+------+
| Aid  |
+------+
|  102 |
|  101 |
+------+
2 rows in set (0.00 sec)
```

g.Identify the routes that can be piloted by every pilot who makes more than 100,000.

```
mysql> select X.`From`,X.`To` from (select distinct F.`From`,F.`To`,count(distinct C.Eid) as pilot_certification from (((Flights F natural join Aircraft A) natural join Certified C) natural join Employees E) where Salary>100000 group by F.`From`,F.`To` having count(distinct C.Eid)=(select count(distinct Eid) from Employees where Salary>100000 and Eid in  (select Eid from Certified))) X;
+------------+-------+
| From       | To    |
+------------+-------+
| Chandigarh | Surat |
+------------+-------+
```

h.Print the enames of pilots who can operate planes with cruisingrange greater than 3000 miles but are not certified on any Boeing aircraft.

```
mysql> select Ename from ((Certified natural join Aircraft) natural join Employees) where Aid in (select Aid from Aircraft where Aname<>"Boeing") and Eid not in (select Eid from Aircraft natural join Certified where Aname="Boeing") and cruisingrange>3000;
+-------+
| Ename |
+-------+
| Just  |
+-------+
1 row in set (0.00 sec)
```

i.Compute the difference between the average salary of a pilot and the average salary of all employees (including pilots).

```
mysql> select -((select avg(Salary) from Employees)-(select avg(Salary) from Employees where Eid in (select Eid from CEr
tified))) as Difference;
+------------+
| Difference |
+------------+
| 26416.6667 |
+------------+
1 row in set (0.00 sec)
```

j. Print the name and salary of every nonpilot whose salary is more than the average salary for pilots.

```
mysql> select Ename from Employees where Eid not in (select Eid from Certified) and Salary>(select avg(Salary) from Employees where Eid in (select Eid f
rom Certified));
+--------+
| Ename  |
+--------+
| Hanoon |
+--------+
1 row in set (0.00 sec)
```

k. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles.

```
mysql> select Ename from Employees where Eid in (select distinct C.Eid from Certified C where not exists((select S.Aid from Certified S where C.Eid=S.Eid ) except (select Aid from Aircraft where cruisingrange>1000)));
```

```
+-------+
| Ename |
+-------+
| Mac   |
| Kick  |
| Just  |
+-------+
3 rows in set (0.00 sec)
```

l. Print the names of employees who are certified only on aircrafts with cruising range shorter than 1000 miles, but on at least two such aircrafts.

```
mysql> select Ename from Employees where Eid in (select distinct C.Eid from Certified C where not exists((select S.Aid from Certified S where C.Eid=S.Eid ) except (select Aid from Aircraft where cruisingrange<=1000)) and (SELECT
 count(*) FROM (select distinct E.Aid from Certified E where C.Eid=E.Eid) AS
 A)>=2);
+-------+
| Ename |
+-------+
| Jessy |
+-------+
1 row in set (0.00 sec)
```

m. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles and who are certified on some Boeing aircraft.

```
mysql> select Ename from Employees where Eid in (select distinct C.Eid from Certified C where not exists((select S.Aid from Certified S where C.Eid=S.Eid ) except (select Aid from Aircraft where cruisingrange>1000)) and C.Eid in (select distinct Eid from ((Employees natural join Certified) natural join Aircraft) where Aname="Boeing"));
+-------+
| Ename |
+-------+
| Mac   |
| Kick  |
+-------+
2 rows in set (0.00 sec)
```

n. Find the eids of pilots certified for some Boeing aircraft

```
mysql> select distinct Eid from ((Employees natural join Certified) natural join Aircraft) where Aname="Boeing";
+-----+
| Eid |
+-----+
|  10 |
```

```
|  11 |
+-----+
2 rows in set (0.00 sec)
```

o. Retrieve the names of pilots certified for some Boeing aircraft

```
mysql> select distinct Ename from ((Employees natural join Certified) natura
l join Aircraft) where Aname="Boeing";
+-------+
| Ename |
+-------+
| Mac   |
| Kick  |
+-------+
2 rows in set (0.00 sec)
```

p. Find the aids of all aircraft that can be used on non-stop flights from Kolkata to Madras.

```
mysql> select Aid from Flights where `From`="Kolkata" and `To`="Madras";
+------+
| Aid  |
+------+
|  106 |
+------+
1 row in set (0.00 sec)
```

q. Identify the flights that can be piloted by every pilot whose salary is more than 70,000.

```
mysql> select X.`From`,X.`To` from (select distinct F.`From`,F.`To`,count(distinct C.Eid) as
pilot_certification from (((Flights F natural join Aircraft A) natural join Certified C) natural join
Employees E) where Salary>100000 group by F.`From`,F.`To` having count(distinct
C.Eid)=(select count(distinct Eid) from Employees where Salary>70000 and Eid in  (select Eid
from Certified))) X;
+------------+-------+
| From       | To    |
+------------+-------+
| Chandigarh | Surat |
+------------+-------+
```

r. Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft.

```
mysql>  select Ename from Employees where Eid in (select Eid from Certified natural join
Aircraft where cruisingrange>3000 and Eid in( select distinct Eid from ((Employees natural join
Certified) natural join Aircraft) where Eid
 in (select distinct Eid from ((Employees natural join Certified) natural jo
in Aircraft) where Eid not in ( select Eid from Aircraft natural join Certif
```

```
ied where Aname="Boeing"))));
+-------+
| Ename |
+-------+
| Joe   |
| Just  |
+-------+
2 rows in set (0.00 sec)
```

s. Find the eids of employees who make the highest salary in every airlines.

```
mysql> select Aname,max(Salary) from ((Employees natural join Certified)natural join Aircraft)
group by Aname;
+----------+-------------+
| Aname    | max(Salary) |
+----------+-------------+
| Boeing   |      150000 |
| Airindia |      151000 |
| Vistara  |      150000 |
| Starsky  |      151000 |
+----------+-------------+
4 rows in set (0.00 sec)

mysql> SELECT e.eid,ename
    -> FROM Employees e
    -> JOIN Certified c ON e.eid = c.eid
    -> JOIN (
    ->     SELECT c.aid, MAX(e.salary) AS max_salary
    ->     FROM Employees e
    ->     JOIN Certified c ON e.eid = c.eid
    ->     GROUP BY c.aid
    -> ) max_salaries ON c.aid = max_salaries.aid AND e.salary = max_salaries.max_salary;
+-----+-------+
| eid | ename |
+-----+-------+
|  10 | Mac   |
|  10 | Mac   |
|  10 | Mac   |
|  12 | Just  |
|  12 | Just  |
|  13 | Jessy |
+-----+-------+
6 rows in set (0.00 sec)
```

t. Retrieve the eids of employees who make the second highest salary.

```
mysql> select Eid,Salary from Employees where Salary=(select Salary from Emp
loyees order by Salary desc limit 1,1);
+-----+--------+
| Eid | Salary |
+-----+--------+
|  10 | 150000 |
|  15 | 150000 |
+-----+--------+
2 rows in set (0.00 sec)
```

u. Find the eids of employees who are certified for the largest number of aircraft.

```
mysql> (select Eid,count(*) as total from Certified group by Eid order by count(*) desc limit 0,1)
;
+-----+-------+
| Eid | total |
+-----+-------+
|  10 |     4 |
+-----+-------+
1 row in set (0.00 sec)
```

v. Find the eids of employees who are certified for exactly three aircrafts.

```
mysql> (select Eid,count(*) as total from Certified group by Eid having coun
t(*)=3);
+-----+-------+
| Eid | total |
+-----+-------+
|  12 |     3 |
+-----+-------+
1 row in set (0.00 sec)
```

w. Find the total amount paid to pilots who drove greater than 500,000 miles together across all their journey on the routes from Chennai to Dublin and return route also. You need to consider all direct flights along with the connecting flights as well.

```
mysql> select sum(total) from (select sum(Salary)/count(Salary) as total from ((Employees
natural join Certified) natural join Flights) where (`From`="Chennai" and `To`="Dublin") or
(`From`="Dublin" and `To`="Chennai") group by Eid having sum(distance)>500000) A;
+-------------+
| sum(total)  |
+-------------+
| 176000.0000 |
+-------------+
```

1 row in set (0.01 sec)

x. Is there a sequence of flights from Tiruchirappalli to Frankfurt? Each flight in the sequence is required to depart from the city that is the destination of the previous flight; the first flight must leave Tiruchirappalli, the last flight must reach Frankfurt, and there is no restriction on the number of intermediate flights. Your query must determine whether a sequence of flights from Tiruchirappalli to Frankfurt exists for any input Flights relation instance.

```
mysql> WITH RECURSIVE FlightPath AS (
    ->     SELECT f.`From`, f.`To`
    ->     FROM Flights f
    ->     WHERE f.`From` = 'Tiruchirappalli'
    ->     UNION
    ->     SELECT fp.`From`, f.`To`
    ->     FROM FlightPath fp
    ->     JOIN Flights f ON fp.`To` = f.`From`
    -> )
    -> SELECT 'Yes, a sequence exists' AS result
    -> FROM FlightPath
    -> WHERE `To` = 'Frankfurt';
+-----------------------+
| result                |
+-----------------------+
| Yes, a sequence exists |
+-----------------------+
1 row in set (0.00 sec)
```

y. Find the pilots who have never atleast 1 certified flight has never flied.

```
mysql> select distinct C.Eid from Certified C where exists( (select distinct Aid from Certified  W
where W.Eid=C.Eid) except( select distinct Aid from Flights));
+-----+
| Eid |
+-----+
|   9 |
|  12 |
|  13 |
+-----+
3 rows in set (0.00 sec)
```

2.With continuation to Session 04 exercise, execute all the example queries provided in Subsections 7.1.1 to 7.4.2 in text book by Navathe et al. pertaining to keywords ‘TRIGGER’, ‘VIEW’, ‘EXCEPT’ and ‘CONTAINS’.

EXCEPT:

```
mysql> select Fname from Employee where not exists((select Pnumber from Project where
Dnum=5) except (select Pno from Works_on where Essn=Ssn));
+----------+
| Fname    |
+----------+
| Alam XYZ |
+----------+
1 row in set (0.05 sec)
```

VIEW:

```
mysql> create view Works_on1 as select Fname,Lname,Pname,Hours from Employee
,Project,Works_on where Ssn=Essn and Pno=Pnumber;
Query OK, 0 rows affected (0.03 sec)
```

Retrieve the last name and first
name of all employees who work on the ‘ProjectX’ project,

```
mysql> select Fname, Lname from Works_on1 where Pname="ProjectX";
+----------+--------+
| Fname    | Lname  |
+----------+--------+
| Alam XYZ | Marini |
| Mukesh   | Ragav  |
| Andrea   | Khan   |
+----------+--------+
3 rows in set (0.00 sec)
```

```
mysql> create view Dept_info(Dept_name,No_of_emp,Total_sal) as select Dname,
count(*),sum(Salary) from Department,Employee where Dno=Dnumber group by Dno;
Query OK, 0 rows affected (0.01 sec)
mysql> select * from Dept_info;
+----------------+-----------+-----------+
| Dept_name      | No_of_emp | Total_sal |
+----------------+-----------+-----------+
| CS             |         2 | 141000.00 |
| IT             |         6 | 228000.00 |
| Headquarters   |         1 |  39000.00 |
| Administration |         1 |  41000.00 |
| Research       |         1 |  30000.00 |
| Clinic         |         2 | 130000.00 |
+----------------+-----------+-----------+
6 rows in set (0.01 sec)
```

```
mysql> drop view Works_on1;
Query OK, 0 rows affected (0.02 sec)
```

```
mysql> update Works_on1 set Fname="Allen" where Lname="Mar";
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> create view Dept5emp as select * from Employee where Dno=5;
Query OK, 0 rows affected (0.01 sec)

mysql> create view basic_emp_detail as select Fname,Lname,Address from Emplo
yee;
Query OK, 0 rows affected (0.01 sec)
```

TRIGGER:

```
mysql> create table log(Super_ssn int,Ssn int);
Query OK, 0 rows affected (0.05 sec)

mysql> delimiter //
mysql> create procedure inform_supervisor(super_ssn int ,ssn int)
    -> begin
    -> insert into log values(super_ssn,ssn);
    -> end//
Query OK, 0 rows affected (0.01 sec)


mysql> delimiter //
mysql> create trigger Salary_violation1
    -> before insert on Employee
    -> for each row
    -> begin
    -> if NEW.Salary>(select Salary from Employee where Ssn=NEW.Super_ssn)
    -> then call inform_supervisor(NEW.Super_ssn,NEW.Ssn);
    -> end if;
    -> end//
Query OK, 0 rows affected (0.01 sec)

mysql> delimiter ;

mysql> create trigger Salary_violation_update
    -> before update on Employee
    -> for each row
    -> begin
    -> if NEW.Salary>(select Salary from Employee where NEW.Super_ssn=Ssn)
    -> then call inform_supervisor(NEW.Super_ssn,NEW.Ssn);
    -> end if;
```

```
    -> end//
Query OK, 0 rows affected (0.02 sec)

mysql> insert into Employee values("Rahul","R","Anand",'653298699','1962-12-30','177 Oak
Forest,Katy,TX','M',80000,'653298665',5);
Query OK, 1 row affected (0.01 sec)

mysql> select * from log;
+-----------+-----------+
| Super_ssn | Ssn       |
+-----------+-----------+
| 653298665 | 653298699 |
+-----------+-----------+
1 row in set (0.00 sec)
```