CSLR-51 DBMS - Session 4

1) With continuation to Session 03 exercise, execute all the example queries provided in Subsection 7.1.1 to 7.4.2 (excluding keywords 'TRIGGER', 'VIEW', 'EXCEPT' and 'CONTAINS').

1. `SELECT Fname, Lname FROM Employee WHERE Super_ssn IS NULL;`

   Output :

```
mysql> SELECT Fname, Lname FROM Employee WHERE Super_ssn IS NULL;
+-------+-------+
| Fname | Lname |
+-------+-------+
| James | Borg  |
+-------+-------+
1 row in set (0.00 sec)
```

2. `SELECT DISTINCT Pnumber FROM Project WHERE pnumber IN (SELECT Pnumber FROM Project,Department,Employee WHERE Dnum=Dnumber AND Mgr_ssn=Ssn AND Lname='Smith') OR Pnumber IN (SELECT Pno FROM Works_on,Employee WHERE Essn=Ssn AND Lname='Smith');`

   Output :

```
mysql> SELECT DISTINCT Pnumber FROM Project WHERE pnumber IN (SELECT Pnumber FRO
M Project,Department,Employee WHERE Dnum=Dnumber AND Mgr_ssn=Ssn AND Lname='Smit
h') OR Pnumber IN (SELECT Pno FROM Works_on,Employee WHERE Essn=Ssn AND Lname='S
mith');
+---------+
| Pnumber |
+---------+
|       1 |
|       2 |
+---------+
2 rows in set (0.02 sec)
```

3. `SELECT DISTINCT Essn FROM Works_on WHERE ( Pno, Hours ) IN ( SELECT Pno, Hours FROM Works_on WHERE Essn = '123456789');`

   Output :

```
mysql> SELECT DISTINCT Essn FROM Works_on WHERE ( Pno, Hours ) IN ( SELECT Pno,
Hours FROM Works_on WHERE Essn = '123456789');
+-----------+
| Essn      |
+-----------+
| 123456789 |
+-----------+
1 row in set (0.01 sec)
```

4. **SELECT Lname, Fname FROM Employee WHERE Salary > ALL (SELECT Salary FROM Employee WHERE Dno = 5);**

Output :

```
mysql> SELECT Lname, Fname FROM Employee WHERE Salary > ALL ( SELECT Salary FROM
 Employee WHERE Dno = 5);
+---------+----------+
| Lname   | Fname    |
+---------+----------+
| Borg    | James    |
| Wallace | Jennifer |
+---------+----------+
2 rows in set (0.00 sec)
```

5. **SELECT E.Fname, E.Lname FROM Employee AS E WHERE E.Ssn IN (SELECT D.Essn FROM Dependent AS D WHERE E.Fname = D.Dependent_name AND E.gender = D.gender);**

Output :

```
mysql> SELECT E.Fname, E.Lname FROM Employee AS E WHERE E.Ssn IN ( SELECT D.Essn
 FROM Dependent AS D WHERE E.Fname = D.Dependent_name AND E.gender = D.gender);
Empty set (0.00 sec)
```

6. **SELECT E.Fname, E.Lname FROM Employee AS E, Dependent as D WHERE E.Ssn = D.Essn AND E.gender = D.gender AND E.Fname = D.Dependent_name;**

Output :

```
mysql> SELECT E.Fname, E.Lname FROM Employee AS E, Dependent as D WHERE E.Ssn =
D.Essn AND E.gender = D.gender AND E.Fname = D.Dependent_name;
Empty set (0.00 sec)
```

7. **SELECT E.Fname, E.Lname FROM Employee AS E WHERE EXISTS (SELECT * FROM Dependent AS D WHERE E.Ssn = D.Essn AND E.gender = D.gender AND E.Fname = D.Dependent_name);**

Output :

```
mysql> SELECT E.Fname, E.Lname FROM Employee AS E WHERE EXISTS (SELECT * FROM De
pendent AS D WHERE E.Ssn = D.Essn AND E.gender = D.gender AND E.Fname = D.Depend
ent_name);
Empty set (0.00 sec)
```

8. **SELECT Fname,Lname FROM Employee WHERE NOT EXISTS(SELECT * FROM Dependent WHERE Ssn = Essn);**

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE NOT EXISTS( SELECT * FROM Dependen
t WHERE Ssn = Essn);
+--------+---------+
| Fname  | Lname   |
+--------+---------+
| Joyce  | English |
| Ramesh | Narayan |
| James  | Borg    |
| Ahmed  | Jabbar  |
| Alicia | Zelaya  |
+--------+---------+
5 rows in set (0.00 sec)
```

9. **SELECT Fname,Lname FROM Employee WHERE EXISTS (SELECT * FROM Dependent WHERE Ssn = Essn) AND EXISTS (SELECT * FROM Department WHERE Ssn = Mgr_ssn);**

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE EXISTS (SELECT * FROM Dependent WH
ERE Ssn = Essn) AND EXISTS (SELECT * FROM Department WHERE Ssn = Mgr_ssn);
+----------+---------+
| Fname    | Lname   |
+----------+---------+
| Franklin | Wlong   |
| Jennifer | Wallace |
+----------+---------+
2 rows in set (0.00 sec)
```

10. **SELECT Fname,Lname FROM Employee WHERE NOT EXISTS ((SELECT Pnumber FROM Project WHERE Dnum = 5) EXCEPT (SELECT Pno FROM Works_on WHERE Ssn = Essn));**

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE NOT EXISTS ((SELECT Pnumber FROM P
roject WHERE Dnum = 5) EXCEPT (SELECT Pno FROM Works_on WHERE Ssn = Essn));
Empty set (0.00 sec)
```

11. **SELECT Lname,Fname FROM Employee WHERE NOT EXISTS (SELECT * FROM Works_on AS B WHERE(B.Pno IN (SELECT Pnumber FROM Project WHERE Dnum = 5) AND NOT EXISTS (SELECT * FROM Works_on AS C WHERE C.Essn = Ssn AND C.Pno = B.Pno)));**

Output :

```
mysql> SELECT Lname,Fname FROM Employee WHERE NOT EXISTS (SELECT * FROM Works_on
 AS B WHERE( B.Pno IN (SELECT Pnumber FROM Project WHERE Dnum = 5) AND NOT EXIST
S (SELECT * FROM Works_on AS C WHERE C.Essn = Ssn AND C.Pno = B.Pno)));
Empty set (0.00 sec)
```

12. **SELECT DISTINCT Essn FROM Works_on WHERE Pno IN (1,2,3);**

Output :

```
mysql> SELECT DISTINCT Essn FROM Works_on WHERE Pno IN (1,2,3);
+-----------+
| Essn      |
+-----------+
| 123456789 |
| 453453453 |
| 333445555 |
| 666884444 |
+-----------+
4 rows in set (0.00 sec)
```

13. **SELECT E.Lname AS Employee_name, S.Lname AS Supervisor_name FROM Employee AS E, Employee AS S WHERE E.Super_ssn = S.ssn;**

Output :

```
mysql> SELECT E.Lname AS Employee_name, S.Lname AS Supervisor_name FROM Employee
 AS E, Employee AS S WHERE E.Super_ssn = S.ssn;
+---------------+----------------+
| Employee_name | Supervisor_name |
+---------------+----------------+
| Smith         | Wlong          |
| Wlong         | Borg           |
| English       | Wlong          |
| Narayan       | Wlong          |
| Wallace       | Borg           |
| Jabbar        | Wallace        |
| Zelaya        | Wallace        |
+---------------+----------------+
7 rows in set (0.00 sec)
```

14. **SELECT Fname,Lname,Addr FROM (Employee JOIN Department ON Dno = Dnumber) WHERE Dname = 'Research';**

Output :

```
mysql> SELECT Fname,Lname,Addr FROM (Employee JOIN Department ON Dno = Dnumber)
WHERE Dname = 'Research';
+----------+---------+-------------------------+
| Fname    | Lname   | Addr                    |
+----------+---------+-------------------------+
| Jhon     | Smith   | 731 Fondren, Houston, TX |
| Franklin | Wlong   | 638 Voss, Houston, TX    |
| Joyce    | English | 5631 Rice, Houston, TX   |
| Ramesh   | Narayan | 975 Fire Oak, Humble, TX |
+----------+---------+-------------------------+
4 rows in set (0.00 sec)
```

15. **SELECT Fname,Lname,Addr FROM (Employee NATURAL JOIN (Department AS Dept)) WHERE Dname = 'Research';**

Output :

```
mysql> SELECT Fname,Lname,Addr FROM (Employee NATURAL JOIN (Department AS Dept))
 WHERE Dname = 'Research';
+----------+---------+-------------------------+
| Fname    | Lname   | Addr                    |
+----------+---------+-------------------------+
| Jhon     | Smith   | 731 Fondren, Houston, TX |
| Franklin | Wlong   | 638 Voss, Houston, TX    |
| Joyce    | English | 5631 Rice, Houston, TX   |
| Ramesh   | Narayan | 975 Fire Oak, Humble, TX |
| James    | Borg    | 450 Stone, Houston, TX   |
| Jennifer | Wallace | 291 Berry, Bellaire, TX  |
| Ahmed    | Jabbar  | 980 Dallas, Houston, TX  |
| Alicia   | Zelaya  | 3321 Castle, Spring, TX  |
+----------+---------+-------------------------+
8 rows in set (0.00 sec)
```

16. **SELECT E.Lname AS Employee_name, S.Lname AS Supervisor_name FROM (Employee AS E LEFT OUTER JOIN Employee AS S ON E.Super_ssn = S.Ssn);**

Output :

```
mysql> SELECT E.Lname AS Employee_name, S.Lname AS Supervisor_name FROM (Employe
e AS E LEFT OUTER JOIN Employee AS S ON E.Super_ssn = S.Ssn);
+---------------+-----------------+
| Employee_name | Supervisor_name |
+---------------+-----------------+
| Smith         | Wlong           |
| Wlong         | Borg            |
| English       | Wlong           |
| Narayan       | Wlong           |
| Borg          | NULL            |
| Wallace       | Borg            |
| Jabbar        | Wallace         |
| Zelaya        | Wallace         |
+---------------+-----------------+
8 rows in set (0.00 sec)
```

17. **SELECT Pnumber,Dnum,Lname,Addr,Bdate FROM ((Project JOIN Department ON Dnum = Dnumber) JOIN Employee ON Mgr_ssn = Ssn) WHERE Plocation = 'Stafford';**

Output :

```
mysql> SELECT Pnumber,Dnum,Lname,Addr,Bdate FROM ((Project JOIN Department ON Dn
um = Dnumber) JOIN Employee ON Mgr_ssn = Ssn) WHERE Plocation = 'Stafford';
+---------+------+---------+-------------------------+------------+
| Pnumber | Dnum | Lname   | Addr                    | Bdate      |
+---------+------+---------+-------------------------+------------+
|      10 |    4 | Wallace | 291 Berry, Bellaire, TX | 1941-06-20 |
|      30 |    4 | Wallace | 291 Berry, Bellaire, TX | 1941-06-20 |
+---------+------+---------+-------------------------+------------+
2 rows in set (0.00 sec)
```

18. **SELECT SUM(Salary),MAX(Salary),MIN(Salary),AVG(Salary) FROM Employee;**

Output :

```
mysql> SELECT SUM(Salary),MAX(Salary),MIN(Salary),AVG(Salary) FROM Employee;
+-------------+-------------+-------------+--------------+
| SUM(Salary) | MAX(Salary) | MIN(Salary) | AVG(Salary)  |
+-------------+-------------+-------------+--------------+
|   281000.00 |    55000.00 |    25000.00 | 35125.000000 |
+-------------+-------------+-------------+--------------+
1 row in set (0.00 sec)
```

19. **SELECT SUM(Salary) AS Total_Sal,MAX(Salary) AS Highest_Sal,MIN(Salary) AS Lowest_Sal,AVG(Salary) AS Avarage_Sal FROM Employee;**

Output :

```
mysql> SELECT SUM(Salary) AS Total_Sal,MAX(Salary) AS Highest_Sal,MIN(Salary) AS
 Lowest_Sal,AVG(Salary) AS Avarage_Sal FROM Employee;
+-----------+-------------+------------+--------------+
| Total_Sal | Highest_Sal | Lowest_Sal | Avarage_Sal  |
+-----------+-------------+------------+--------------+
| 281000.00 |    55000.00 |   25000.00 | 35125.000000 |
+-----------+-------------+------------+--------------+
1 row in set (0.00 sec)
```

20. **SELECT SUM(Salary),MAX(Salary),MIN(Salary),AVG(Salary) FROM (Employee JOIN Department on Dno = Dnumber) WHERE Dname= 'Research';**

Output :

```
mysql> SELECT SUM(Salary),MAX(Salary),MIN(Salary),AVG(Salary) FROM (Employee JOI
N Department on Dno = Dnumber) WHERE Dname= 'Research';
+-------------+-------------+-------------+--------------+
| SUM(Salary) | MAX(Salary) | MIN(Salary) | AVG(Salary)  |
+-------------+-------------+-------------+--------------+
|   133000.00 |    40000.00 |    25000.00 | 33250.000000 |
+-------------+-------------+-------------+--------------+
1 row in set (0.00 sec)
```

21. **SELECT COUNT(*) FROM Employee;**

Output :

```
mysql> SELECT COUNT(*) FROM Employee;
+----------+
| COUNT(*) |
+----------+
|        8 |
+----------+
1 row in set (0.00 sec)
```

22. **SELECT COUNT(*) FROM Employee,Department WHERE Dno = Dnumber AND Dname = 'Research';**

Output :

```
mysql> SELECT COUNT(*) FROM Employee,Department WHERE Dno = Dnumber AND Dname =
'Research';
+----------+
| COUNT(*) |
+----------+
|        4 |
+----------+
1 row in set (0.00 sec)
```

23. **SELECT COUNT(DISTINCT Salary) FROM Employee;**

Output :

```
mysql> SELECT COUNT(DISTINCT Salary) FROM Employee;
+------------------------+
| COUNT(DISTINCT Salary) |
+------------------------+
|                      6 |
+------------------------+
1 row in set (0.00 sec)
```

24. `SELECT Lname,Fname FROM Employee WHERE (SELECT COUNT(*) FROM Dependent WHERE Ssn = Essn) >= 2;`

Output :

```
mysql> SELECT Lname,Fname FROM Employee WHERE (SELECT COUNT(*) FROM Dependent WH
ERE Ssn = Essn) >= 2;
+-------+----------+
| Lname | Fname    |
+-------+----------+
| Smith | Jhon     |
| Wlong | Franklin |
+-------+----------+
2 rows in set (0.00 sec)
```

25. `SELECT Dno,COUNT(*),AVG(Salary) FROM Employee GROUP BY Dno;`

Output :

```
mysql> SELECT Dno,COUNT(*),AVG(Salary) FROM Employee GROUP BY Dno;
+------+----------+---------------+
| Dno  | COUNT(*) | AVG(Salary)   |
+------+----------+---------------+
|    5 |        4 | 33250.000000 |
|    1 |        1 | 55000.000000 |
|    4 |        3 | 31000.000000 |
+------+----------+---------------+
3 rows in set (0.00 sec)
```

26. `SELECT Pnumber,Pname,COUNT(*) FROM Project,Works_on WHERE Pnumber = Pno GROUP BY Pnumber,Pname;`

Output :

```
mysql> SELECT Pnumber,Pname,COUNT(*) FROM Project,Works_on WHERE Pnumber = Pno G
ROUP BY Pnumber,Pname;
+---------+----------------+----------+
| Pnumber | Pname          | COUNT(*) |
+---------+----------------+----------+
|      10 | Computerization |        3 |
|      30 | Newbenefits     |        3 |
|       1 | ProductX        |        2 |
|       2 | ProductY        |        3 |
|       3 | ProductZ        |        2 |
|      20 | Reorganization  |        3 |
+---------+----------------+----------+
6 rows in set (0.00 sec)
```

27. `SELECT PNumber,Pname,COUNT(*) FROM Project,Works_on WHERE Pnumber = Pno GROUP BY Pnumber, Pname HAVING COUNT(*) > 2;`

Output :

```
mysql> SELECT PNumber,Pname,COUNT(*) FROM Project,Works_on WHERE Pnumber = Pno G
ROUP BY Pnumber, Pname HAVING COUNT(*) > 2;
+---------+----------------+----------+
| PNumber | Pname          | COUNT(*) |
+---------+----------------+----------+
|      10 | Computerization |        3 |
|      30 | Newbenefits     |        3 |
|       2 | ProductY        |        3 |
|      20 | Reorganization  |        3 |
+---------+----------------+----------+
4 rows in set (0.00 sec)
```

28. **SELECT Pnumber,Pname,COUNT(*) FROM Project,Works_on,Employee WHERE Pnumber = Pno AND Ssn = Essn AND Dno = 5 GROUP BY Pnumber,Pname;**

Output :

```
mysql> SELECT Pnumber,Pname,COUNT(*) FROM Project,Works_on,Employee WHERE Pnumbe
r = Pno AND Ssn = Essn AND Dno = 5 GROUP BY Pnumber,Pname;
+---------+-----------------+----------+
| Pnumber | Pname           | COUNT(*) |
+---------+-----------------+----------+
|       1 | ProductX        |        2 |
|       2 | ProductY        |        3 |
|       3 | ProductZ        |        2 |
|      10 | Computerization |        1 |
|      20 | Reorganization  |        1 |
+---------+-----------------+----------+
5 rows in set (0.00 sec)
```

29. **SELECT Dno,COUNT(*) FROM Employee WHERE Salary > 40000 GROUP BY Dno HAVING COUNT(*) > 5;**

Output :

```
mysql> SELECT Dno,COUNT(*) FROM Employee WHERE Salary > 40000 GROUP BY Dno HAVIN
G COUNT(*) > 5;
Empty set (0.00 sec)
```

30. **SELECT Dno,COUNT(*) FROM Employee WHERE Salary > 40000 AND Dno IN (SELECT Dno FROM Employee GROUP BY Dno HAVING COUNT(*) > 5) GROUP BY Dno;**

Output :

```
mysql> SELECT Dno,COUNT(*) FROM Employee WHERE Salary > 40000 AND Dno IN (SELECT
 Dno FROM Employee GROUP BY Dno HAVING COUNT(*) > 5) GROUP BY Dno;
Empty set (0.00 sec)
```

31. **WITH RECURSIVE SUP_EMP(SupSsn,EmpSsn) AS (SELECT Super_ssn,Ssn FROM Employee UNION SELECT E.Ssn,S.SupSsn FROM Employee as E,SUP_EMP as S WHERE E.Super_ssn = S.EmpSsn) SELECT * FROM SUP_EMP;**

Output :

```
mysql> WITH RECURSIVE SUP_EMP(SupSsn,EmpSsn) AS (SELECT Super_ssn,Ssn FROM Emplo
yee UNION SELECT E.Ssn,S.SupSsn FROM Employee as E,SUP_EMP as S WHERE E.Super_ss
n = S.EmpSsn) SELECT * FROM SUP_EMP;
+-----------+-----------+
| SupSsn    | EmpSsn    |
+-----------+-----------+
| 333445555 | 123456789 |
| 888665555 | 333445555 |
| 333445555 | 453453453 |
| 333445555 | 666884444 |
| NULL      | 888665555 |
| 888665555 | 987654321 |
| 987654321 | 987987987 |
| 987654321 | 999887777 |
| 123456789 | 888665555 |
| 333445555 | NULL      |
| 453453453 | 888665555 |
| 666884444 | 888665555 |
| 987654321 | NULL      |
| 987987987 | 888665555 |
| 999887777 | 888665555 |
| 333445555 | 999887777 |
| 333445555 | 987987987 |
| 987654321 | 666884444 |
| 987654321 | 453453453 |
| 987654321 | 123456789 |
+-----------+-----------+
20 rows in set (0.00 sec)
```

2. Execute the following Queries over the Company Schema you have already created.

1. **For each department whose average employee salary is more than 30,000, retrieve the department name and the number of employees working for that department.**

   Query : SELECT Dname AS Dept_name,Count(*) AS No_of_Emp FROM Department JOIN Employee ON Dno = Dnumber WHERE (SELECT AVG(Salary) FROM Employee WHERE Dno = Dnumber) > 30000 GROUP BY Dname ORDER BY Count(*);

   Output :

```
mysql> SELECT Dname AS Dept_name,Count(*) AS No_of_Emp FROM Depart
ment JOIN Employee ON Dno = Dnumber WHERE (SELECT AVG(Salary) FROM
 Employee WHERE Dno = Dnumber) > 30000 GROUP BY Dname ORDER BY Cou
nt(*);
+----------------+-----------+
| Dept_name      | No_of_Emp |
+----------------+-----------+
| Headquarters   |         1 |
| Administration |         3 |
| Research       |         4 |
+----------------+-----------+
3 rows in set (0.00 sec)
```

2. **i. Retrieve the number of female employees in each department making more than 30,000.**

   Query : SELECT Dname AS Dept_name,Count(*) AS No_of_female_emp FROM Department JOIN Employee ON Dno = Dnumber WHERE Salary > 30000 AND Gender = 'F' GROUP BY Dname ORDER BY Count(*);

   Output :

```
mysql> SELECT Dname AS Dept_name,Count(*) AS No_of_female_emp FROM
 Department JOIN Employee ON Dno = Dnumber WHERE Salary > 30000 AN
D Gender = 'F' GROUP BY Dname ORDER BY Count(*);
+----------------+------------------+
| Dept_name      | No_of_female_emp |
+----------------+------------------+
| Administration |                1 |
+----------------+------------------+
1 row in set (0.00 sec)
```

   ii. For each department whose average employee salary is more than 30,000, retrieve the department name and number of male employees working for that department.

   Query : SELECT Dname AS Dept_name,Count(*) AS No_of_male_emp FROM Department JOIN Employee ON Dno = Dnumber WHERE (SELECT AVG(Salary) FROM

Employee WHERE Dno = Dnumber) > 30000 AND Gender = 'M' GROUP BY Dname ORDER BY Count(*);

Output :

```
mysql> SELECT Dname AS Dept_name,Count(*) AS No_of_male_emp FROM D
epartment JOIN Employee ON Dno = Dnumber WHERE (SELECT AVG(Salary)
 FROM Employee WHERE Dno = Dnumber) > 30000 AND Gender = 'M' GROUP
 BY Dname ORDER BY Count(*);
+----------------+----------------+
| Dept_name      | No_of_male_emp |
+----------------+----------------+
| Headquarters   |              1 |
| Administration |              1 |
| Research       |              3 |
+----------------+----------------+
3 rows in set (0.00 sec)
```

3. **Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.**

Query : SELECT Fname,Lname FROM Employee WHERE Dno IN (SELECT Dno FROM Employee WHERE Salary = (SELECT MAX(Salary) FROM Employee));

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE Dno IN (SELECT Dno F
ROM Employee WHERE Salary = (SELECT MAX(Salary) FROM Employee));
+-------+-------+
| Fname | Lname |
+-------+-------+
| James | Borg  |
+-------+-------+
1 row in set (0.00 sec)
```

4. **Retrieve the names of employees who make at least 10,000 more than the employee who is paid the least in the company.**

Query : SELECT Fname,Lname FROM Employee WHERE Salary >= 10000 + (SELECT MIN(Salary) FROM Employee);

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE Salary >= 10000 + (S
ELECT MIN(Salary) FROM Employee);
+----------+---------+
| Fname    | Lname   |
+----------+---------+
| Franklin | Wlong   |
| Ramesh   | Narayan |
| James    | Borg    |
| Jennifer | Wallace |
+----------+---------+
4 rows in set (0.00 sec)
```

5. **Retrieve the names of all employees in department 5 who work more than 10 hours per week on the Product X's project.**

Query : SELECT Fname,Lname FROM Employee WHERE Dno = 5 AND Ssn IN (SELECT Essn FROM Works_on WHERE Pno = (SELECT Pnumber FROM Project WHERE Pname = 'ProductX') AND Hours > 10);

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE Dno = 5 AND Ssn IN (
SELECT Essn FROM Works_on WHERE Pno = (SELECT Pnumber FROM Project
 WHERE Pname = 'ProductX') AND Hours > 10);
+-------+---------+
| Fname | Lname   |
+-------+---------+
| Jhon  | Smith   |
| Joyce | English |
+-------+---------+
2 rows in set (0.00 sec)
```

6. **List the names of all employees who have a dependent with the same first name as themselves.**

Query : SELECT Fname,Lname FROM Employee WHERE EXISTS (SELECT * FROM Dependent WHERE Dependent_name = Fname);

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE EXISTS (SELECT * FRO
M Dependent WHERE Dependent_name = Fname);
Empty set (0.00 sec)
```

7. **Find the names of all employees who are directly supervised by 'Tejaswi Kumar'.**

Query : SELECT Fname,Lname FROM Employee WHERE Super_ssn = (SELECT Ssn FROM Employee WHERE Fname = 'Tejaswi' AND Lname = 'Kumar');

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE Super_ssn = (SELECT
Ssn FROM Employee WHERE Fname = 'Tejaswi' AND Lname = 'Kumar');
Empty set (0.00 sec)
```

8. **Find the names of employees who work on all the projects controlled by department number 5.**

Query : SELECT Fname,Lname FROM Employee WHERE (SELECT Count(*) FROM Works_on WHERE Pno IN (SELECT Pnumber FROM Project WHERE Dnum = 5) AND Essn = Ssn) = (SELECT Count(*) FROM Project WHERE Dnum = 5);

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE (SELECT Count(*) FRO
M Works_on WHERE Pno IN (SELECT Pnumber FROM Project WHERE Dnum =
5) AND Essn = Ssn) = (SELECT Count(*) FROM Project WHERE Dnum = 5)
;
Empty set (0.00 sec)
```

9. **For each project, list the project name and the total hours per week (by all employees) spent on that project.**

Query : SELECT Pname AS Project_name,SUM(Hours) AS Total_hours FROM Project JOIN Works_on ON Pnumber = Pno GROUP BY Pname ORDER BY SUM(Hours);

Output :

```
mysql> SELECT Pname AS Project_name,SUM(Hours) AS Total_hours FROM
 Project JOIN Works_on ON Pnumber = Pno GROUP BY Pname ORDER BY SU
M(Hours);
+-----------------+-------------+
| Project_name    | Total_hours |
+-----------------+-------------+
| ProductY        |        37.5 |
| Reorganization  |        40.0 |
| ProductZ        |        50.0 |
| ProductX        |        52.5 |
| Computerization |        55.0 |
| Newbenefits     |        55.0 |
+-----------------+-------------+
6 rows in set (0.00 sec)
```

10. **Retrieve the names of all employees who work on every project.**

Query : SELECT Fname,Lname FROM Employee WHERE (SELECT Count(*) FROM Works_on WHERE Essn = Ssn) = (SELECT Count(*) FROM Project);

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE (SELECT Count(*) FRO
M Works_on WHERE Essn = Ssn) = (SELECT Count(*) FROM Project);
Empty set (0.00 sec)
```

11. **Retrieve the names of all employees who do not work on any project.**

Query : SELECT Fname,Lname FROM Employee WHERE (SELECT Count(*) FROM Works_on WHERE Essn = Ssn) = 0;

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE (SELECT Count(*) FRO
M Works_on WHERE Essn = Ssn) = 0;
Empty set (0.00 sec)
```

12. Retrieve the average salary of all female employees.

Query : SELECT AVG(Salary) AS Avg_Female_Salary FROM Employee WHERE Gender = 'F';

Output :

```
mysql> SELECT AVG(Salary) AS Avg_Female_Salary FROM Employee WHERE
 Gender = 'F';
+-------------------+
| Avg_Female_Salary |
+-------------------+
|      31000.000000 |
+-------------------+
1 row in set (0.00 sec)
```

13. Find the names and addresses of all employees who work on at least one project located in Madurai but whose department has no location in Houston.

Query : SELECT Fname,Lname,Addr FROM Employee WHERE EXISTS(SELECT * FROM (Works_on JOIN (Project JOIN Dept_locations ON Dnum = Dnumber) ON Pnumber = Pno) WHERE Essn = Ssn AND Plocation = 'Houston' AND Dlocation != 'Houston');

Output :

```
mysql> SELECT Fname,Lname,Addr FROM Employee WHERE EXISTS(SELECT *
 FROM (Works_on JOIN (Project JOIN Dept_locations ON Dnum = Dnumbe
r) ON Pnumber = Pno) WHERE Essn = Ssn AND Plocation = 'Houston' AN
D Dlocation != 'Houston');
+----------+---------+-------------------------+
| Fname    | Lname   | Addr                    |
+----------+---------+-------------------------+
| Franklin | Wlong   | 638 Voss, Houston, TX   |
| Ramesh   | Narayan | 975 Fire Oak, Humble, TX |
+----------+---------+-------------------------+
2 rows in set (0.00 sec)
```

14. List the last names of all department managers who have no dependents.

Query : SELECT Lname FROM Employee JOIN Department ON Dnumber = Dno WHERE NOT EXISTS (SELECT * FROM Dependent WHERE Essn = Mgr_ssn);

Output :

```
mysql> SELECT Lname FROM Employee JOIN Department ON Dnumber = Dno
 WHERE NOT EXISTS (SELECT * FROM Dependent WHERE Essn = Mgr_ssn);
+-------+
| Lname |
+-------+
| Borg  |
+-------+
1 row in set (0.00 sec)
```

15. Display employee names (e'') who are supervised by an e' who is immediately supervised by an employee with lname "XYZ".

Query : SELECT Fname,Lname FROM Employee AS E1 WHERE EXISTS (SELECT Ssn FROM Employee AS E2 WHERE E1.Super_ssn = E2.Ssn AND EXISTS (SELECT Ssn FROM Employee AS E3 WHERE E2.Super_ssn = E3.Ssn AND E3.Lname = 'Borg'));

Output :

```
mysql> SELECT Fname,Lname FROM Employee AS E1 WHERE EXISTS (SELECT
 Ssn FROM Employee AS E2 WHERE E1.Super_ssn = E2.Ssn AND EXISTS (S
ELECT Ssn FROM Employee AS E3 WHERE E2.Super_ssn = E3.Ssn AND E3.L
name = 'Borg'));
+--------+---------+
| Fname  | Lname   |
+--------+---------+
| Jhon   | Smith   |
| Joyce  | English |
| Ramesh | Narayan |
| Ahmed  | Jabbar  |
| Alicia | Zelaya  |
+--------+---------+
5 rows in set (0.00 sec)
```

16. Display names of all employees who work on some project controlled by department number 10.

Query : SELECT Fname,Lname FROM Employee WHERE Ssn IN (SELECT Essn FROM Works_on WHERE Pno = (SELECT Pnumber FROM Project WHERE Dnum = 10));

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE Ssn IN (SELECT Essn
FROM Works_on WHERE Pno = (SELECT Pnumber FROM Project WHERE Dnum
= 10));
Empty set (0.00 sec)
```

17. Print all the ssn and the first name of supervisors who supervise at least 2 projects in ascending order of the number of employee he/she supervise under him/her.

Query : SELECT E.Super_Ssn AS Ssn, S.Fname, COUNT(DISTINCT W.Pno) AS Num_Projects, COUNT(DISTINCT E.Ssn) AS Num_Employees FROM Employee E JOIN Works_on W ON E.Ssn = W.Essn JOIN Employee S ON E.Super_Ssn = S.Ssn GROUP

BY E.Super_Ssn, S.Fname HAVING COUNT(DISTINCT W.Pno) >= 2 ORDER BY Num_Employees ASC;

Output :

```
mysql> SELECT E.Super_Ssn AS Ssn, S.Fname, COUNT(DISTINCT W.Pno) AS Num_
Projects, COUNT(DISTINCT E.Ssn) AS Num_Employees FROM Employee E JOIN Wo
rks_on W ON E.Ssn = W.Essn JOIN Employee S ON E.Super_Ssn = S.Ssn GROUP
BY E.Super_Ssn, S.Fname HAVING COUNT(DISTINCT W.Pno) >= 2 ORDER BY Num_E
mployees ASC;
+-----------+----------+--------------+---------------+
| Ssn       | Fname    | Num_Projects | Num_Employees |
+-----------+----------+--------------+---------------+
| 888665555 | James    |            5 |             2 |
| 987654321 | Jennifer |            2 |             2 |
| 333445555 | Franklin |            3 |             3 |
+-----------+----------+--------------+---------------+
3 rows in set (0.00 sec)
```

18. Display all male employee names who also have dependents along with their dependent names.

Query : SELECT Fname,Lname,Dependent_name FROM Employee AS E JOIN Dependent ON E.Ssn = Essn WHERE E.Gender ='M';

Output :

```
mysql> SELECT Fname,Lname,Dependent_name FROM Employee AS E JOIN D
ependent ON E.Ssn = Essn WHERE E.Gender ='M';
+----------+-------+----------------+
| Fname    | Lname | Dependent_name |
+----------+-------+----------------+
| Jhon     | Smith | Alice          |
| Jhon     | Smith | Elizabeth      |
| Jhon     | Smith | Michae         |
| Franklin | Wlong | Alice          |
| Franklin | Wlong | Joy            |
| Franklin | Wlong | Theodore       |
+----------+-------+----------------+
6 rows in set (0.00 sec)
```

19. Display those employees whose salary exceeds the department managers salary that the employee(s) work for.

Query : SELECT Fname,Lname FROM Employee AS E WHERE Salary > (SELECT Salary FROM Employee AS F WHERE F.Ssn = (SELECT Mgr_ssn FROM Department WHERE Dnumber = E.Dno));

Output :

```
mysql> SELECT Fname,Lname FROM Employee AS E WHERE Salary > (SELEC
T Salary FROM Employee AS F WHERE F.Ssn = (SELECT Mgr_ssn FROM Dep
artment WHERE Dnumber = E.Dno));
Empty set (0.00 sec)
```

20. Display employee names who either work in the Research department or supervise an employee working for the Research department.

Query : SELECT Fname,Lname FROM Employee WHERE Ssn = (SELECT Mgr_ssn FROM Department WHERE Dname = 'Research') OR (Super_ssn = (SELECT Mgr_ssn FROM Department WHERE Dname = 'Research'));

Output :

```
mysql> SELECT Fname,Lname FROM Employee WHERE Ssn = (SELECT Mgr_ss
n FROM Department WHERE Dname = 'Research') OR (Super_ssn = (SELEC
T Mgr_ssn FROM Department WHERE Dname = 'Research'));
+----------+---------+
| Fname    | Lname   |
+----------+---------+
| Jhon     | Smith   |
| Franklin | Wlong   |
| Joyce    | English |
| Ramesh   | Narayan |
+----------+---------+
4 rows in set (0.00 sec)
```