CSLR51 DBMS - Session 3

1. Design the Company Schema given in the text book named "Fundamentals of Database Systems" authored by Ramez Elmasri and Shamkant B. Navathe. The e-copy of the text book is uploaded in the moodle.

Query :

```sql
CREATE TABLE Employee(
    Fname VARCHAR(15) NOT NULL,
    Minit CHAR,
    Lname VARCHAR(15) NOT NULL,
    Ssn CHAR(10) NOT NULL,
    Bdate DATE,
    Addr VARCHAR(30),
    Gender CHAR,
    Salary DECIMAL(10,2),
    Super_Ssn CHAR(10),
    Dno INT NOT NULL,
    PRIMARY KEY(Ssn)
);

CREATE TABLE Department(
    Dname VARCHAR(15) NOT NULL UNIQUE,
    Dnumber INT NOT NULL,
    Mgr_ssn CHAR(10) NOT NULL,
    Mgr_start_date DATE,
    PRIMARY KEY(Dnumber),
    FOREIGN KEY(Mgr_ssn) REFERENCES Employee(Ssn)
);

CREATE TABLE Dept_locations(
    Dnumber INT NOT NULL,
    Dlocation VARCHAR(15) NOT NULL,
    PRIMARY KEY(Dnumber,Dlocation),
    FOREIGN KEY(Dnumber) REFERENCES Department(Dnumber)
);

CREATE TABLE Project(
    Pname VARCHAR(15) NOT NULL UNIQUE,
    Pnumber INT NOT NULL,
    Plocation VARCHAR(15),
    Dnum INT NOT NULL,
    PRIMARY KEY(Pnumber),
    FOREIGN KEY(Dnum) REFERENCES Department(Dnumber)
);
```

```
CREATE TABLE Works_on(
    Essn CHAR(10) NOT NULL,
    Pno INT NOT NULL,
    Hours DECIMAL(3,1) NOT NULL,
    PRIMARY KEY(Essn,Pno),
    FOREIGN KEY(Essn) REFERENCES Employee(Ssn),
    FOREIGN KEY(Pno) REFERENCES Project(Pnumber)
);

CREATE TABLE Dependent(
    Essn CHAR(10) NOT NULL,
    Dependent_name VARCHAR(15) NOT NULL,
    Gender CHAR,
    Bdate DATE,
    Relationship VARCHAR(10),
    PRIMARY KEY(Essn, Dependent_name),
    FOREIGN KEY(Essn) REFERENCES Employee(Ssn)
);
```

Output :

```
mysql> DESCRIBE Employee;
+-----------+---------------+------+-----+---------+-------+
| Field     | Type          | Null | Key | Default | Extra |
+-----------+---------------+------+-----+---------+-------+
| Fname     | varchar(15)   | NO   |     | NULL    |       |
| Minit     | char(1)       | YES  |     | NULL    |       |
| Lname     | varchar(15)   | NO   |     | NULL    |       |
| Ssn       | char(10)      | NO   | PRI | NULL    |       |
| Bdate     | date          | YES  |     | NULL    |       |
| Addr      | varchar(30)   | YES  |     | NULL    |       |
| Gender    | char(1)       | YES  |     | NULL    |       |
| Salary    | decimal(10,2) | YES  |     | NULL    |       |
| Super_Ssn | char(10)      | YES  |     | NULL    |       |
| Dno       | int           | NO   |     | NULL    |       |
+-----------+---------------+------+-----+---------+-------+
10 rows in set (0.01 sec)
```

```
mysql> DESCRIBE Department;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| Dname          | varchar(15) | NO   | UNI | NULL    |       |
| Dnumber        | int         | NO   | PRI | NULL    |       |
| Mgr_ssn        | char(10)    | NO   | MUL | NULL    |       |
| Mgr_start_date | date        | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Dept_locations;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| Dnumber   | int         | NO   | PRI | NULL    |       |
| Dlocation | varchar(15) | NO   | PRI | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Project;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| Pname     | varchar(15) | NO   | UNI | NULL    |       |
| Pnumber   | int         | NO   | PRI | NULL    |       |
| Plocation | varchar(15) | YES  |     | NULL    |       |
| Dnum      | int         | NO   | MUL | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Works_on;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| Essn  | char(10)     | NO   | PRI | NULL    |       |
| Pno   | int          | NO   | PRI | NULL    |       |
| Hours | decimal(3,1) | NO   |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Dependent;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| Essn           | char(10)    | NO   | PRI | NULL    |       |
| Dependent_name | varchar(15) | NO   | PRI | NULL    |       |
| Gender         | char(1)     | YES  |     | NULL    |       |
| Bdate          | date        | YES  |     | NULL    |       |
| Relationship   | varchar(10) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

2. Execute basic queries (Chapter 5) in Company Schema involving only two tables: Employee and Department to simulate the following keywords: CREATE, DELETE, UPDATE (or MODIFY), INSERT, ALTER, Entity Integrity Constraints and Referential Integrity Constraints.

Query :

```
INSERT INTO Employee(Fname,Minit,Lname,Ssn,Bdate,Addr,Gender,Salary,Super_Ssn,Dno)
VALUES
('Jhon','B','Smith','123456789','1965-01-09','731 Fondren, Houston,
TX','M',30000,'333445555',5),
('Franklin','T','Wlong','333445555','1955-12-08','638 Voss, Houston,
TX','M',40000,'888665555',5),
('Alicia','J','Zelaya','999887777','1968-01-19','3321 Castle, Spring,
TX','F',25000,'987654321',4),
('Jennifer','S','Wallace','987654321','1941-06-20','291 Berry, Bellaire,
TX','F',43000,'888665555',4),
('Ramesh','K','Narayan','666884444','1962-09-15','975 Fire Oak, Humble,
TX','M',38000,'333445555',5),
('Joyce','A','English','453453453','1972-07-31','5631 Rice, Houston,
TX','F',25000,'333445555',5),
('Ahmed','V','Jabbar','987987987','1969-03-29','980 Dallas, Houston,
TX','M',25000,'987654321',4),
('James','E','Borg','888665555','1937-11-10','450 Stone, Houston,
TX','M',55000,NULL,1);

INSERT INTO Department(Dname,Dnumber,Mgr_ssn,Mgr_start_date) VALUES
('Research',5,'333445555','1988-05-22'),
('Administration',4,'987654321','1995-01-01'),
('Headquarters',1,'888665555','1981-06-19');

INSERT INTO Dept_locations(Dnumber,Dlocation) VALUES
(1,'Houston'),
(4,'Stafford'),
(5,'Bellaire'),
(5,'Sugarland'),
(5,'Houston');

INSERT INTO Project(Pname,Pnumber,Plocation,Dnum) VALUES
('ProductX',1,'Bellaire',5),
('ProductY',2,'Sugarland',5),
('ProductZ',3,'Houston',5),
('Computerization',10,'Stafford',4),
('Reorganization',20,'Houston',1),
('Newbenefits',30,'Stafford',4);

INSERT INTO Dependent(Essn,Dependent_name,Gender,Bdate,Relationship) VALUES
('333445555','Alice','F','1986-04-05','Daughter'),
('333445555','Theodore','M','1983-10-25','Son'),
('333445555','Joy','F','1958-05-03','Spouse'),
('987654321','Abner','M','1942-02-28','Spouse'),
('123456789','Michae','M','1988-01-04','Son'),
```

```
('123456789','Alice','F','1988-12-30','Daughter'),
('123456789','Elizabeth','F','1967-05-05','Spouse');

INSERT INTO Works_on(Essn,Pno,Hours) VALUES
('123456789',1,32.5),
('123456789',2,7.5),
('666884444',3,40.0),
('453453453',1,20.0),
('453453453',2,20.0),
('333445555',2,10.0),
('333445555',3,10.0),
('333445555',10,10.0),
('333445555',20,10.0),
('999887777',30,30.0),
('999887777',10,10.0),
('987987987',10,35.0),
('987987987',30,5.0),
('987654321',30,20.0),
('987654321',20,15.0),
('888665555',20,15.0);
```

Ouptut:

```
mysql> TABLE Employee;
+----------+-------+---------+-----------+------------+------------------------+--------+----------+-----------+-----+
| Fname    | Minit | Lname   | Ssn       | Bdate      | Addr                   | Gender | Salary   | Super_Ssn | Dno |
+----------+-------+---------+-----------+------------+------------------------+--------+----------+-----------+-----+
| Jhon     | B     | Smith   | 123456789 | 1965-01-09 | 731 Fondren, Houston, TX | M      | 30000.00 | 333445555 |   5 |
| Franklin | T     | Wlong   | 333445555 | 1955-12-08 | 638 Voss, Houston, TX    | M      | 40000.00 | 888665555 |   5 |
| Joyce    | A     | English | 453453453 | 1972-07-31 | 5631 Rice, Houston, TX   | F      | 25000.00 | 333445555 |   5 |
| Ramesh   | K     | Narayan | 666884444 | 1962-09-15 | 975 Fire Oak, Humble, TX | M      | 38000.00 | 333445555 |   5 |
| James    | E     | Borg    | 888665555 | 1937-11-10 | 450 Stone, Houston, TX   | M      | 55000.00 | NULL      |   1 |
| Jennifer | S     | Wallace | 987654321 | 1941-06-20 | 291 Berry, Bellaire, TX  | F      | 43000.00 | 888665555 |   4 |
| Ahmed    | V     | Jabbar  | 987987987 | 1969-03-29 | 980 Dallas, Houston, TX  | M      | 25000.00 | 987654321 |   4 |
| Alicia   | J     | Zelaya  | 999887777 | 1968-01-19 | 3321 Castle, Spring, TX  | F      | 25000.00 | 987654321 |   4 |
+----------+-------+---------+-----------+------------+------------------------+--------+----------+-----------+-----+
8 rows in set (0.00 sec)
```

```
mysql> TABLE Department;
+----------------+---------+-----------+----------------+
| Dname          | Dnumber | Mgr_ssn   | Mgr_start_date |
+----------------+---------+-----------+----------------+
| Headquarters   |       1 | 888665555 | 1981-06-19     |
| Administration |       4 | 987654321 | 1995-01-01     |
| Research       |       5 | 333445555 | 1988-05-22     |
+----------------+---------+-----------+----------------+
3 rows in set (0.00 sec)
```

```
mysql> TABLE Dept_locations;
+---------+-----------+
| Dnumber | Dlocation |
+---------+-----------+
|       1 | Houston   |
|       4 | Stafford  |
|       5 | Bellaire  |
|       5 | Houston   |
|       5 | Sugarland |
+---------+-----------+
5 rows in set (0.00 sec)
```

```
mysql> TABLE Project;
+----------------+---------+-----------+------+
| Pname          | Pnumber | Plocation | Dnum |
+----------------+---------+-----------+------+
| ProductX       |       1 | Bellaire  |    5 |
| ProductY       |       2 | Sugarland |    5 |
| ProductZ       |       3 | Houston   |    5 |
| Computerization |      10 | Stafford  |    4 |
| Reorganization |      20 | Houston   |    1 |
| Newbenefits    |      30 | Stafford  |    4 |
+----------------+---------+-----------+------+
6 rows in set (0.00 sec)
```

```
mysql> TABLE Works_on;
+-----------+-----+-------+
| Essn      | Pno | Hours |
+-----------+-----+-------+
| 123456789 |   1 |  32.5 |
| 123456789 |   2 |   7.5 |
| 333445555 |   2 |  10.0 |
| 333445555 |   3 |  10.0 |
| 333445555 |  10 |  10.0 |
| 333445555 |  20 |  10.0 |
| 453453453 |   1 |  20.0 |
| 453453453 |   2 |  20.0 |
| 666884444 |   3 |  40.0 |
| 888665555 |  20 |  15.0 |
| 987654321 |  20 |  15.0 |
| 987654321 |  30 |  20.0 |
| 987987987 |  10 |  35.0 |
| 987987987 |  30 |   5.0 |
| 999887777 |  10 |  10.0 |
| 999887777 |  30 |  30.0 |
+-----------+-----+-------+
16 rows in set (0.00 sec)
```

```
mysql> TABLE Dependent;
+-----------+----------------+--------+------------+--------------+
| Essn      | Dependent_name | Gender | Bdate      | Relationship |
+-----------+----------------+--------+------------+--------------+
| 123456789 | Alice          | F      | 1988-12-30 | Daughter     |
| 123456789 | Elizabeth      | F      | 1967-05-05 | Spouse       |
| 123456789 | Michae         | M      | 1988-01-04 | Son          |
| 333445555 | Alice          | F      | 1986-04-05 | Daughter     |
| 333445555 | Joy            | F      | 1958-05-03 | Spouse       |
| 333445555 | Theodore       | M      | 1983-10-25 | Son          |
| 987654321 | Abner          | M      | 1942-02-28 | Spouse       |
+-----------+----------------+--------+------------+--------------+
7 rows in set (0.00 sec)
```

3. Execute all the example queries in Chapter 6 pertaining to the Company Schema you have created in Q. No. 1.

1) **Query:** SELECT Fname, Lname, Addr FROM Employee, Department WHERE Dname = 'Research' AND Dnumber = Dno;

   Output:

```
mysql> SELECT Fname, Lname, Addr FROM Employee, Department WHERE Dname = 'Research' AND Dnumber = Dno;
+----------+---------+-----------------------+
| 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)
```

2) **Query:** SELECT Pnumber, Dnum, Lname, Addr, Bdate FROM Project, Department, Employee WHERE Dnum = Dnumber AND Mgr_ssn = Ssn AND Plocation = 'Stafford';

   Output:

```
mysql> SELECT Pnumber, Dnum, Lname, Addr, Bdate FROM Project, Department, Employee WHERE Dnum = Dnumb
er AND Mgr_ssn = Ssn AND 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)
```

3) **Query:** SELECT E.Fname, E.Lname, S.Fname, S.Lname FROM Employee AS E, Employee
   AS S WHERE E.Super_ssn = S.Ssn;

   Output:

```
mysql> SELECT E.Fname, E.Lname, S.Fname, S.Lname FROM Employee AS E, Employee AS S WHERE E.Super_ssn
= S.Ssn;
+----------+---------+----------+---------+
| Fname    | Lname   | Fname    | Lname   |
+----------+---------+----------+---------+
| Jhon     | Smith   | Franklin | Wlong   |
| Franklin | Wlong   | James    | Borg    |
| Joyce    | English | Franklin | Wlong   |
| Ramesh   | Narayan | Franklin | Wlong   |
| Jennifer | Wallace | James    | Borg    |
| Ahmed    | Jabbar  | Jennifer | Wallace |
| Alicia   | Zelaya  | Jennifer | Wallace |
+----------+---------+----------+---------+
7 rows in set (0.00 sec)
```

4) **Query:** SELECT E.Fname, E.LName, E.Addr FROM Employee AS E, Department AS D
   WHERE D.Dname = 'Research' AND D.Dnumber = E.Dno;

   Output:

```
mysql> SELECT E.Fname, E.LName, E.Addr FROM Employee AS E, Department AS D WHERE D.Dname = 'Research'
 AND D.Dnumber = E.Dno;
+----------+---------+-------------------------+
| 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)
```

5) **Query:** SELECT Ssn FROM Employee;

   Output:

```
mysql> SELECT Ssn FROM Employee;
+-----------+
| Ssn       |
+-----------+
| 123456789 |
| 333445555 |
| 453453453 |
| 666884444 |
| 888665555 |
| 987654321 |
| 987987987 |
| 999887777 |
+-----------+
8 rows in set (0.00 sec)
```

6) **Query:** SELECT Ssn, Dname FROM Employee, Department;
   Output:

```
mysql> SELECT Ssn, Dname FROM Employee, Department;
+-----------+----------------+
| Ssn       | Dname          |
+-----------+----------------+
| 123456789 | Research       |
| 123456789 | Headquarters   |
| 123456789 | Administration |
| 333445555 | Research       |
| 333445555 | Headquarters   |
| 333445555 | Administration |
| 453453453 | Research       |
| 453453453 | Headquarters   |
| 453453453 | Administration |
| 666884444 | Research       |
| 666884444 | Headquarters   |
| 666884444 | Administration |
| 888665555 | Research       |
| 888665555 | Headquarters   |
| 888665555 | Administration |
| 987654321 | Research       |
| 987654321 | Headquarters   |
| 987654321 | Administration |
| 987987987 | Research       |
| 987987987 | Headquarters   |
| 987987987 | Administration |
| 999887777 | Research       |
| 999887777 | Headquarters   |
| 999887777 | Administration |
+-----------+----------------+
24 rows in set (0.00 sec)
```

7) **Query:** SELECT * FROM Department WHERE Dnumber = 5;
   Output:

```
mysql> SELECT * FROM Department WHERE Dnumber = 5;
+----------+---------+-----------+----------------+
| Dname    | Dnumber | Mgr_ssn   | Mgr_start_date |
+----------+---------+-----------+----------------+
| Research |       5 | 333445555 | 1988-05-22     |
+----------+---------+-----------+----------------+
1 row in set (0.00 sec)
```

8) **Query:** SELECT * FROM Employee, Department WHERE Dname = 'Research' AND Dno = Dnumber;

Output:

```
mysql> SELECT * FROM Employee, Department WHERE Dname = 'Research' AND Dno = Dnumber;
+----------+-------+---------+-----------+------------+-----------------------+--------+----------+-----------+-----+----------+---------+-----------+----------------+
| Fname    | Minit | Lname   | Ssn       | Bdate      | Addr                  | Gender | Salary   | Super_Ssn | Dno | Dname    | Dnumber | Mgr_ssn   | Mgr_start_date |
+----------+-------+---------+-----------+------------+-----------------------+--------+----------+-----------+-----+----------+---------+-----------+----------------+
| Jhon     | B     | Smith   | 123456789 | 1965-01-09 | 731 Fondren, Houston, TX | M    | 30000.00 | 333445555 |   5 | Research |       5 | 333445555 | 1988-05-22     |
| Franklin | T     | Wlong   | 333445555 | 1955-12-08 | 638 Voss, Houston, TX | M      | 40000.00 | 888665555 |   5 | Research |       5 | 333445555 | 1988-05-22     |
| Joyce    | A     | English | 453453453 | 1972-07-31 | 5631 Rice, Houston, TX | F     | 25000.00 | 333445555 |   5 | Research |       5 | 333445555 | 1988-05-22     |
| Ramesh   | K     | Narayan | 666884444 | 1962-09-15 | 975 Fire Oak, Humble, TX | M   | 38000.00 | 333445555 |   5 | Research |       5 | 333445555 | 1988-05-22     |
+----------+-------+---------+-----------+------------+-----------------------+--------+----------+-----------+-----+----------+---------+-----------+----------------+
4 rows in set (0.00 sec)
```

9) **Query:** SELECT * FROM Employee, Department;

Output:

```
mysql> SELECT * FROM Employee, Department;
+----------+-------+---------+-----------+------------+-----------------------+--------+----------+-----------+-----+----------------+---------+-----------+----------------+
| Fname    | Minit | Lname   | Ssn       | Bdate      | Addr                  | Gender | Salary   | Super_Ssn | Dno | Dname          | Dnumber | Mgr_ssn   | Mgr_start_date |
+----------+-------+---------+-----------+------------+-----------------------+--------+----------+-----------+-----+----------------+---------+-----------+----------------+
| Jhon     | B     | Smith   | 123456789 | 1965-01-09 | 731 Fondren, Houston, TX | M    | 30000.00 | 333445555 |   5 | Research       |       5 | 333445555 | 1988-05-22     |
| Jhon     | B     | Smith   | 123456789 | 1965-01-09 | 731 Fondren, Houston, TX | M    | 30000.00 | 333445555 |   5 | Administration |       4 | 987654321 | 1995-01-01     |
| Jhon     | B     | Smith   | 123456789 | 1965-01-09 | 731 Fondren, Houston, TX | M    | 30000.00 | 333445555 |   5 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| Franklin | T     | Wlong   | 333445555 | 1955-12-08 | 638 Voss, Houston, TX | M      | 40000.00 | 888665555 |   5 | Research       |       5 | 333445555 | 1988-05-22     |
| Franklin | T     | Wlong   | 333445555 | 1955-12-08 | 638 Voss, Houston, TX | M      | 40000.00 | 888665555 |   5 | Administration |       4 | 987654321 | 1995-01-01     |
| Franklin | T     | Wlong   | 333445555 | 1955-12-08 | 638 Voss, Houston, TX | M      | 40000.00 | 888665555 |   5 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| Joyce    | A     | English | 453453453 | 1972-07-31 | 5631 Rice, Houston, TX | F     | 25000.00 | 333445555 |   5 | Research       |       5 | 333445555 | 1988-05-22     |
| Joyce    | A     | English | 453453453 | 1972-07-31 | 5631 Rice, Houston, TX | F     | 25000.00 | 333445555 |   5 | Administration |       4 | 987654321 | 1995-01-01     |
| Joyce    | A     | English | 453453453 | 1972-07-31 | 5631 Rice, Houston, TX | F     | 25000.00 | 333445555 |   5 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| Ramesh   | K     | Narayan | 666884444 | 1962-09-15 | 975 Fire Oak, Humble, TX | M   | 38000.00 | 333445555 |   5 | Research       |       5 | 333445555 | 1988-05-22     |
| Ramesh   | K     | Narayan | 666884444 | 1962-09-15 | 975 Fire Oak, Humble, TX | M   | 38000.00 | 333445555 |   5 | Administration |       4 | 987654321 | 1995-01-01     |
| Ramesh   | K     | Narayan | 666884444 | 1962-09-15 | 975 Fire Oak, Humble, TX | M   | 38000.00 | 333445555 |   5 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| James    | E     | Borg    | 888665555 | 1937-11-10 | 450 Stone, Houston, TX | M     | 55000.00 | NULL      |   1 | Research       |       5 | 333445555 | 1988-05-22     |
| James    | E     | Borg    | 888665555 | 1937-11-10 | 450 Stone, Houston, TX | M     | 55000.00 | NULL      |   1 | Administration |       4 | 987654321 | 1995-01-01     |
| James    | E     | Borg    | 888665555 | 1937-11-10 | 450 Stone, Houston, TX | M     | 55000.00 | NULL      |   1 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| Jennifer | S     | Wallace | 987654321 | 1941-06-20 | 291 Berry, Bellaire, TX | F    | 43000.00 | 888665555 |   4 | Research       |       5 | 333445555 | 1988-05-22     |
| Jennifer | S     | Wallace | 987654321 | 1941-06-20 | 291 Berry, Bellaire, TX | F    | 43000.00 | 888665555 |   4 | Administration |       4 | 987654321 | 1995-01-01     |
| Jennifer | S     | Wallace | 987654321 | 1941-06-20 | 291 Berry, Bellaire, TX | F    | 43000.00 | 888665555 |   4 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| Ahmed    | V     | Jabbar  | 987987987 | 1969-03-29 | 980 Dallas, Houston, TX | M    | 25000.00 | 987654321 |   4 | Research       |       5 | 333445555 | 1988-05-22     |
| Ahmed    | V     | Jabbar  | 987987987 | 1969-03-29 | 980 Dallas, Houston, TX | M    | 25000.00 | 987654321 |   4 | Administration |       4 | 987654321 | 1995-01-01     |
| Ahmed    | V     | Jabbar  | 987987987 | 1969-03-29 | 980 Dallas, Houston, TX | M    | 25000.00 | 987654321 |   4 | Headquarters   |       1 | 888665555 | 1981-06-19     |
| Alicia   | J     | Zelaya  | 999887777 | 1968-01-19 | 3321 Castle, Spring, TX | F    | 25000.00 | 987654321 |   4 | Research       |       5 | 333445555 | 1988-05-22     |
| Alicia   | J     | Zelaya  | 999887777 | 1968-01-19 | 3321 Castle, Spring, TX | F    | 25000.00 | 987654321 |   4 | Administration |       4 | 987654321 | 1995-01-01     |
| Alicia   | J     | Zelaya  | 999887777 | 1968-01-19 | 3321 Castle, Spring, TX | F    | 25000.00 | 987654321 |   4 | Headquarters   |       1 | 888665555 | 1981-06-19     |
+----------+-------+---------+-----------+------------+-----------------------+--------+----------+-----------+-----+----------------+---------+-----------+----------------+
24 rows in set (0.00 sec)
```

10) **Query:** SELECT ALL Salary FROM Employee;

Output:

```
mysql> SELECT ALL Salary FROM Employee;
+----------+
| Salary   |
+----------+
| 30000.00 |
| 40000.00 |
| 25000.00 |
| 38000.00 |
| 55000.00 |
| 43000.00 |
| 25000.00 |
| 25000.00 |
+----------+
8 rows in set (0.00 sec)
```

11) **Query:** SELECT DISTINCT Salary FROM Employee;
    Output:

```
mysql> SELECT DISTINCT Salary FROM Employee;
+----------+
| Salary   |
+----------+
| 30000.00 |
| 40000.00 |
| 25000.00 |
| 38000.00 |
| 55000.00 |
| 43000.00 |
+----------+
6 rows in set (0.00 sec)
```

12) **QUERY:** (SELECT DISTINCT Pnumber FROM Project,Department,Employee WHERE Dno =
    Dnumber AND Mgr_ssn = Ssn AND LName = 'Smith') UNION (SELECT DISTINCT Pnumber
    FROM Project, Works_on, Employee WHERE Pnumber = PNO and Essn = Ssn AND LName =
    'Smith');
    Output:

```
mysql> (SELECT DISTINCT Pnumber FROM Project,Department,Employee WHERE Dno = Dnumber AND Mgr_ssn =
 Ssn AND LName = 'Smith') UNION (SELECT DISTINCT Pnumber FROM Project, Works_on, Employee WHERE Pn
umber = PNO and Essn = Ssn AND LName = 'Smith');
+---------+
| Pnumber |
+---------+
|       1 |
|       2 |
+---------+
2 rows in set (0.00 sec)
```

13) **Query:** SELECT Fname, Lname FROM Employee WHERE Addr LIKE '%Houston, TX%';
    Output:

```
mysql> SELECT Fname, Lname FROM Employee WHERE  Addr LIKE '%Houston, TX%';
+----------+---------+
| Fname    | Lname   |
+----------+---------+
| Jhon     | Smith   |
| Franklin | Wlong   |
| Joyce    | English |
| James    | Borg    |
| Ahmed    | Jabbar  |
+----------+---------+
5 rows in set (0.00 sec)
```

14) **Query:** SELECT Fname, Lname FROM Employee WHERE Bdate LIKE '__7_____';

Output:

```
mysql> SELECT Fname, Lname FROM Employee WHERE Bdate LIKE '__7_____';
+-------+---------+
| Fname | Lname   |
+-------+---------+
| Joyce | English |
+-------+---------+
1 row in set (0.00 sec)
```

15) **Query:** SELECT E.Fname, E.Lname, 1.1 * E.Salary AS Increased_sal FROM Employee AS E, Works_on AS W, Project AS P WHERE E.Ssn = W.Essn AND W.Pno = P.Pnumber AND P.Pname = 'ProductX';

Output:

```
mysql> SELECT E.Fname, E.Lname, 1.1 * E.Salary AS Increased_sal FROM Employee AS E, Works_on AS W,
 Project AS P WHERE E.Ssn = W.Essn AND W.Pno = P.Pnumber AND P.Pname = 'ProductX';
+-------+---------+---------------+
| Fname | Lname   | Increased_sal |
+-------+---------+---------------+
| Jhon  | Smith   |     33000.000 |
| Joyce | English |     27500.000 |
+-------+---------+---------------+
2 rows in set (0.00 sec)
```

16) **Query:** SELECT * FROM Employee WHERE (Salary BETWEEN 30000 AND 40000) AND Dno = 5;

Output:

```
mysql> SELECT * FROM Employee WHERE (Salary BETWEEN 30000 AND 40000 ) AND Dno = 5;
+----------+-------+---------+-----------+------------+------------------------+--------+----------+-----------+-----+
| Fname    | Minit | Lname   | Ssn       | Bdate      | Addr                   | Gender | Salary   | Super_Ssn | Dno |
+----------+-------+---------+-----------+------------+------------------------+--------+----------+-----------+-----+
| Jhon     | B     | Smith   | 123456789 | 1965-01-09 | 731 Fondren, Houston, TX | M    | 30000.00 | 333445555 |   5 |
| Franklin | T     | Wlong   | 333445555 | 1955-12-08 | 638 Voss, Houston, TX    | M    | 40000.00 | 888665555 |   5 |
| Ramesh   | K     | Narayan | 666884444 | 1962-09-15 | 975 Fire Oak, Humble, TX | M    | 38000.00 | 333445555 |   5 |
+----------+-------+---------+-----------+------------+------------------------+--------+----------+-----------+-----+
3 rows in set (0.00 sec)
```

17) **Query:** SELECT D.Dname, E.Lname, E.Fname, P.Pname FROM Department AS D, Employee AS E, Works_on AS W, Project AS P WHERE D.Dnumber = E.Dno AND E.Ssn = W.Essn AND W.Pno = P.Pnumber ORDER BY D.Dname, E.Lname, E.Fname;

Output:

```
mysql> SELECT D.Dname, E.Lname, E.Fname, P.Pname FROM Department AS D, Employee AS E, Works_on AS W, Project AS P WHERE D.Dnumber
= E.Dno AND E.Ssn = W.Essn AND W.Pno = P.Pnumber ORDER BY D.Dname, E.Lname, E.Fname;
+----------------+----------+-----------+-----------------+
| Dname          | Lname    | Fname     | Pname           |
+----------------+----------+-----------+-----------------+
| Administration | Jabbar   | Ahmed     | Computerization  |
| Administration | Jabbar   | Ahmed     | Newbenefits     |
| Administration | Wallace  | Jennifer  | Reorganization  |
| Administration | Wallace  | Jennifer  | Newbenefits     |
| Administration | Zelaya   | Alicia    | Computerization  |
| Administration | Zelaya   | Alicia    | Newbenefits     |
| Headquarters   | Borg     | James     | Reorganization  |
| Research       | English  | Joyce     | ProductX        |
| Research       | English  | Joyce     | ProductY        |
| Research       | Narayan  | Ramesh    | ProductZ        |
| Research       | Smith    | Jhon      | ProductX        |
| Research       | Smith    | Jhon      | ProductY        |
| Research       | Wlong    | Franklin  | ProductY        |
| Research       | Wlong    | Franklin  | ProductZ        |
| Research       | Wlong    | Franklin  | Computerization  |
| Research       | Wlong    | Franklin  | Reorganization  |
+----------------+----------+-----------+-----------------+
16 rows in set (0.00 sec)
```

18) **Query:** UPDATE Project SET Plocation = 'Bellaire' , Dnum = 5 WHERE Pnumber = 10;

Output:

```
mysql> TABLE Project;
+----------------+---------+-----------+------+
| Pname          | Pnumber | Plocation | Dnum |
+----------------+---------+-----------+------+
| ProductX       |       1 | Bellaire  |    5 |
| ProductY       |       2 | Sugarland |    5 |
| ProductZ       |       3 | Houston   |    5 |
| Computerization |     10 | Bellaire  |    5 |
| Reorganization |      20 | Houston   |    1 |
| Newbenefits    |      30 | Stafford  |    4 |
+----------------+---------+-----------+------+
6 rows in set (0.00 sec)
```

19) **Query:** ALTER TABLE Dept_locations MODIFY Dlocation varchar(20);

Output:

```
mysql> DESCRIBE Dept_locations;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| Dnumber   | int         | NO   | PRI | NULL    |       |
| Dlocation | varchar(20) | NO   | PRI | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```