

# **DATABASE MANAGEMENT SYSTEMS**

## **MC302 Lab**

**ANEESH PANCHAL  
2K20/MC/21**



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## Lab 1 – ER Diagram and Schema Design

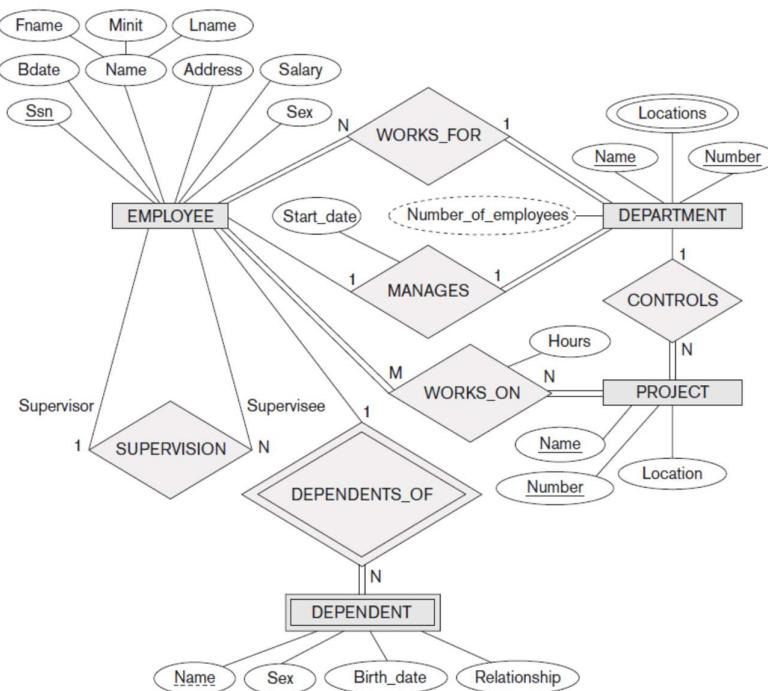
### Company Database

Define the ER diagram for the following problem “Company Database”. The data held by the following tables do not exist independently. Hence, there are a number of inter-relationships that must be considered. Also, sketch the corresponding Database Schema.

The relationships between the tables in the Company Database are as follows:

The Company database keeps track of a company's employees, departments, and projects. Suppose that after the requirements collection and analysis phase, the database designers provided the following description of the "miniworld"-the part of the company to be represented in the database:

1. The company is organized into departments. Each department has a unique name, a unique number, and a particular employee who manages the department. We keep track of the start date when that employee began managing the department. A department may have several locations.
2. A department controls a number of projects, each of which has a unique name, a unique number, and a single location.
3. We store each employee's name, social security number, address, salary, sex, and birth date. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same department.
4. We keep track of the number of hours per week that an employee works on each project. We also keep track of the direct supervisor of each employee.
5. We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's first name, sex, birth date, and relationship to the employee.



**EMPLOYEE**

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
-------	-------	-------	-----	-------	---------	-----	--------	-----------	-----

**DEPARTMENT**

Dname	Dnumber	Mgr_ssn	Mgr_start_date
-------	---------	---------	----------------

**DEPT\_LOCATIONS**

Dnumber	Dlocation
---------	-----------

**PROJECT**

Pname	Pnumber	Plocation	Dnum
-------	---------	-----------	------

**WORKS\_ON**

Essn	Pno	Hours
------	-----	-------

**DEPENDENT**

Essn	Dependent_name	Sex	Bdate	Relationship
------	----------------	-----	-------	--------------

```
CREATE DATABASE COMPANY_DATABASE;
```

```
USE COMPANY_DATABASE;
```

```
CREATE TABLE EMPLOYEE(
    FNAME VARCHAR(15) NOT NULL,
    MINIT CHAR,
    LNAME VARCHAR(15) NOT NULL,
    SSN CHAR(9) NOT NULL,
    BDATE DATE,
    ADDRESS VARCHAR(30),
    SEX CHAR,
    SALARY DECIMAL(10,2),
    SUPER_SSN CHAR(9),
    DNO INT NOT NULL,
    PRIMARY KEY(SSN)
);
```

```
CREATE TABLE DEPARTMENT(
    DNAME VARCHAR(15) NOT NULL,
    DNUMBER INT NOT NULL,
    MGR_SSN CHAR(9) NOT NULL,
    MGR_START_DATE DATE,
    PRIMARY KEY(DNUMBER),
    UNIQUE(DNAME),
    FOREIGN KEY(MGR_SSN) REFERENCES EMPLOYEE(SSN)
);
```

```
CREATE TABLE DEPT_LOCATIONS(
    DLOCATION VARCHAR(15) NOT NULL,
    DNUMBER INT NOT NULL,
    PRIMARY KEY(DNUMBER, DLOCATION),
    FOREIGN KEY(DNUMBER) REFERENCES DEPARTMENT(DNUMBER)
);
```

```
CREATE TABLE PROJECT(
    PNAME VARCHAR(15) NOT NULL,
    PNUMBER INT NOT NULL,
    PLOCATION VARCHAR(15),
```

```

        DNUM INT NOT NULL,
        PRIMARY KEY(PNUMBER),
        UNIQUE(PNAME),
        FOREIGN KEY(DNUM) REFERENCES DEPARTMENT(DNUMBER)
    );

CREATE TABLE WORKS_ON(
    ESSN CHAR(9) 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(9) NOT NULL,
    DEPENDENT_NAME VARCHAR(15) NOT NULL,
    SEX CHAR,
    BDATE DATE,
    RELATIONSHIP VARCHAR(8),
    PRIMARY KEY(ESSN, DEPENDENT_NAME),
    FOREIGN KEY(ESSN) REFERENCES EMPLOYEE(SSN)
);

```

### (Contd.) Insertion of valid values in the tables:

```

USE COMPANY_DATABASE;

INSERT INTO EMPLOYEE VALUES
('John', 'B', 'Smith', '123456789', '1965-01-09', '731 Fondren, Houston,
TX', 'M', 30000, '333445555', 5),
('Franklin', 'T', 'Wong', '333445555', '1955-12-08', '638 Voss, Houston,
TX', 'M', 40000, '888665555', 5),
('Alicia', 'J', 'Zolaya', '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),
('Ahmad', '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 VALUES
('Research', 5, '333445555', '1988-05-22'),
('Administration', 4, '987654321', '1995-01-01'),
('Headquarters', 1, '888665555', '1981-06-19');

INSERT INTO DEPT_LOCATIONS VALUES
('Houston', 1),
('Stafford', 4),
('Bellaire', 5),
('Sugarland', 5),
('Houston', 5);

```

```
INSERT INTO PROJECT 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 WORKS_ON VALUES
('123456789',1,32.5),
('123456789',2,7.5),
('666884444',3,40),
('453453453',1,20),
('453453453',2,20),
('333445555',2,10),
('333445555',3,10),
('333445555',10,10),
('333445555',20,10),
('999887777',30,30),
('999887777',10,10),
('987987987',10,35),
('987987987',30,5),
('987654321',30,20),
('987654321',20,15),
('888665555',20,0);

INSERT INTO DEPENDENT 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','Michael','M','1988-01-04','Son'),
('123456789','Alice','F','1988-12-30','Daughter'),
('123456789','Elizabeth','F','1967-05-05','Spouse');
```

## Lab 2- Selection and projection-based queries

1. Display all the tables created in the database.

```
SELECT * FROM DEPARTMENT
SELECT * FROM DEPENDENT
SELECT * FROM DEPT_LOCATIONS
SELECT * FROM EMPLOYEE
SELECT * FROM PROJECT
SELECT * FROM WORKS_ON
```

Results Messages				
1	Headquarters	1	888665555	1981-06-19
2	Administration	4	987654321	1995-01-01
3	Research	5	333445555	1988-05-22
1	123456789	Alice	F	1988-12-30 Daughter
2	123456789	Elizabeth	F	1967-05-05 Spouse
3	123456789	Michael	M	1988-01-04 Son
4	333445555	Alice	F	1986-04-05 Daughter
5	333445555	Joy	F	1958-05-03 Spouse
6	333445555	Theodore	M	1983-10-25 Son
7	987654321	Abner	M	1942-02-28 Spouse
1	Houston	1		
2	Stafford	4		
3	Bellaire	5		
4	Houston	5		
5	Sugarland	5		
1	John	B	Smith	123456789 1965-01-09 731 Fondren, Houston, TX M 30000.00 333445555 5
2	Franklin	T	Wong	333445555 1955-12-08 638 Voss, Houston, TX M 40000.00 888665555 5
3	Joyce	A	English	453453453 1972-07-31 5631 Rice, Houston, TX F 25000.00 333445555 5
4	Rame...	K	Naray...	666884444 1962-09-15 975 Fire Oak, Humble, TX M 38000.00 333445555 5
5	James	E	Borg	888665555 1937-11-10 450 Stone, Houston, TX M 55000.00 NULL 1
6	Jennifer	S	Wallace	987654321 1941-06-20 291 Berry, Bellaire, TX F 43000.00 888665555 4
7	Ahmad	V	Jabbar	987987987 1969-03-29 980 Dallas, Houston, TX M 25000.00 987654321 4
8	Alicia	J	Zolaya	999887777 1968-01-19 3321 Castle, Spring, TX F 25000.00 987654321 4
1	ProductX	1		Bellaire 5
2	ProductY	2		Sugarland 5
3	ProductZ	3		Houston 5
4	Comput...	10		Stafford 4
5	Reorga...	20		Houston 1
6	Newbe...	30		Stafford 4
1	123456789	1	32.5	
2	123456789	2	7.5	
3	333445555	2	10.0	
4	333445555	3	10.0	
5	333445555	10	10.0	
6	333445555	20	10.0	
7	453453453	1	20.0	
8	453453453	2	20.0	
9	666884444	3	40.0	
10	888665555	20	0.0	
11	987654321	20	15.0	

Query executed successfully.

2. Display all Employee's SSNs

```
SELECT SSN FROM EMPLOYEE;
```

3. Display Employee Name, Employee Number working in department number 5.

```
SELECT FNAME, LNAME, SSN FROM EMPLOYEE WHERE DNO = 5;
```

4. Retrieve the birth date and address of the employee(s) whose name is 'John B. Smith'.

```
SELECT BDATE, ADDRESS FROM EMPLOYEE WHERE FNAME = 'John' AND MINIT = 'B' AND LNAME = 'Smith';
```

5. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.

```
SELECT P.PNUMBER, P.DNUM, E.LNAME, E.ADDRESS, E.BDATE  
FROM PROJECT P, DEPARTMENT D, EMPLOYEE E  
WHERE P.PLOCATION = 'Stafford' AND P.DNUM = D.DNUMBER AND D.MGR_SSN = E.SSN;
```

6. Display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE\_OUTPUT.

```
SELECT CONCAT(FNAME, ',', MINIT, ',', LNAME, ',', SSN, ',', BDATE, ',', ADDRESS,  
' ,', SEX, ',', SALARY, ',', SALARY, ',', SUPER_SSN, ',', DNO) AS THE_OUTPUT FROM  
EMPLOYEE;
```

Results		Messages			
<b>SSN</b>					
1 123456789					
2	333445555				
3	453453453				
4	666884444				
5	888665555				
6	987654321				
7	987987987				
8	999887777				
<b>FNAME LNAME SSN</b>					
1 John	Smith	123456789			
2 Franklin	Wong	333445555			
3 Joyce	English	453453453			
4 Ramesh	Narayan	666884444			
<b>BDATE ADDRESS</b>					
1 1965-01-09	731 Fondren, Houston, TX				
<b>PNUMBER DNUM LNAME ADDRESS BDATE</b>					
1 10	4	Wallace	291 Berry, Bellaire, TX	1941-06-20	
2 30	4	Wallace	291 Berry, Bellaire, TX	1941-06-20	
<b>THE_OUTPUT</b>					
1 John, B,Smith, 123456789,1965-01-09,731 Fondren, ...					
2 Franklin, T,Wong, 333445555,1955-12-08,638 Voss, ...					
3 Joyce, A,English, 453453453,1972-07-31,5631 Rice, ...					
4 Ramesh, K,Narayan, 666884444,1962-09-15,975 Fire ...					
5 James, E,Borg, 888665555,1937-11-10,450 Stone, H...					
6 Jennifer, S,Wallace, 987654321,1941-06-20,291 Berry...					
7 Ahmad, V,Jabbar, 987987987,1969-03-29,980 Dallas,...					
8 Alicia, J,Zolaya, 999887777,1968-01-19,3321 Castle, ...					

7. For each employee, retrieve the employee's first and last name and the first and last name of his or her immediate supervisor.

```
SELECT E.FNAME, E.LNAME, S.FNAME, S.LNAME FROM EMPLOYEE as E, EMPLOYEE as S WHERE  
E.SUPER_SSN=S.SSN;
```

8. Display Name of all the employees where the third letter of their name is 'A'.

```
SELECT FNAME FROM EMPLOYEE WHERE FNAME LIKE '__A%';
```

9. Display Name of all employees either have two R's or have two A's in their name and are either in Dept No = 7 or their Manager's Employee No = '123456789'.

```
SELECT FNAME FROM EMPLOYEE WHERE (FNAME LIKE '%A%A%' OR FNAME LIKE '%R%R%') AND (DNO =  
5 OR SUPER_SSN = 123456789);
```

10. Display the Current Date.

```
SELECT GETDATE();
```

11. Retrieve the salary of every employee

```
SELECT SALARY FROM EMPLOYEE;
```

	FNAME	LNAME	FNAME	LNAME
1	John	Smith	Franklin	Wong
2	Franklin	Wong	James	Borg
3	Joyce	English	Franklin	Wong
4	Ramesh	Narayan	Franklin	Wong
5	Jennifer	Wallace	James	Borg
6	Ahmad	Jabbar	Jennifer	Wallace
7	Alicia	Zolaya	Jennifer	Wallace

	FNAME
1	Franklin

	FNAME

	PRESENT
1	2023-04-16 18:10:02.960

	SALARY
1	30000.00
2	40000.00
3	25000.00
4	38000.00
5	55000.00
6	43000.00
7	25000.00
8	25000.00

## Lab 4 - Selection and projection-based queries

12. Display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.

```
SELECT CONCAT(UPPER(SUBSTRING(FNAME,1,1)),LOWER(SUBSTRING(FNAME,2,14))) AS NAME,  
LEN(FNAME) FROM EMPLOYEE  
WHERE (FNAME LIKE 'J%' OR FNAME LIKE 'A%' OR FNAME LIKE 'M%');
```

13. Display all valid combinations of Employee's Ssn and Department name in the database.

```
SELECT E.SSN, D.DNAME FROM EMPLOYEE AS E, DEPARTMENT AS D WHERE E.DNO = D.DNUMBER;
```

14. Display the Employee Name and Salary of all the employees earning more than 25000.

```
SELECT FNAME, LNAME, SALARY FROM EMPLOYEE WHERE SALARY > 25000;
```

15. Retrieve the name and address of all employees who work for the 'Research' department.

```
SELECT E.FNAME, E.LNAME, E.ADDRESS FROM EMPLOYEE AS E, DEPARTMENT AS D WHERE E.DNO =  
D.DNUMBER AND D.DNAME = 'Research';
```

16. Make a list of all project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project.

```
(SELECT DISTINCT PNUMBER FROM PROJECT, DEPARTMENT, EMPLOYEE  
WHERE DNUM = 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');
```

Results			
Messages			
1	NAME	NAME_LENGTH	
1	John	4	
2	Joyce	5	
3	James	5	
4	Jennifer	8	
5	Ahmad	5	
6	Alicia	6	
1	SSN	DNAME	
1	123456789	Research	
2	333445555	Research	
3	453453453	Research	
4	666884444	Research	
5	888665555	Headquaters	
6	987654321	Administration	
7	987987987	Administration	
8	999887777	Administration	
1	FNAME	LNAME	
1	John	Smith	
2	Franklin	Wong	
3	Ramesh	Narayan	
4	James	Borg	
5	Jennifer	Wallace	
1	FNAME	LNAME	ADDRESS
1	John	Smith	731 Fondren, Houston, TX
2	Franklin	Wong	638 Voss, Houston, TX
3	Joyce	English	5631 Rice, Houston, TX
4	Rame...	Naray...	975 Fire Oak, Humble, TX
1	PNUMBER		
1	1		
2	2		

17. Retrieve all employees whose address is in Houston, Texas

```
SELECT * FROM EMPLOYEE WHERE ADDRESS LIKE '%Houston, TX%';
```

18. Find all employees who were born during the 1950s.

```
SELECT * FROM EMPLOYEE WHERE BDATE >= '1950-01-01' AND BDATE < '1960-01-01';
```

19. Show the resulting salaries if every employee working on the 'ProductX' project is given a 10% raise.

```
SELECT E.SALARY*1.1 AS PRODUCTX_10 FROM EMPLOYEE AS E, PROJECT AS P, WORKS_ON AS W  
WHERE P.PNAME = 'ProductX' AND W.PNO = P.PNUMBER AND W.ESSN = E.SSN;
```

20. Retrieve all employees in department 5 whose salary is between \$30,000 and \$40,000.

```
SELECT * FROM EMPLOYEE WHERE DNO = 5 AND SALARY >= 30000 AND SALARY <= 40000;
```

21. Find the names of all employees who are directly supervised by 'Franklin Wong'.

```
SELECT E1.FNAME, E1.LNAME FROM EMPLOYEE AS E1, EMPLOYEE AS E2 WHERE E1.SUPER_SSN =  
E2.SSN AND E2.FNAME = 'Franklin' AND E2.LNAME = 'Wong';
```

Results Messages											
	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO	
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5	
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5	
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5	
4	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1	
5	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4	

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO	
1	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5	

	PRODUCTX_10										
1	33000.00										
2	27500.00										

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO	
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5	
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5	
3	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5	

	FNAME	LNAME
1	John	Smith
2	Joyce	English
3	Ramesh	Narayan

## Lab 5 – Some Complex queries

22. Retrieve a list of employees and the projects they are working on, ordered by department and, within each department, ordered alphabetically by last name, then first name.

```
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;
```

23. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.

```
SELECT FNAME, LNAME FROM EMPLOYEE WHERE DNO = 5 AND  
SSN IN (SELECT W.ESSN FROM WORKS_ON AS W WHERE W.HOURS > 10 AND  
W.PNO = (SELECT P.PNUMBER FROM PROJECT AS P WHERE P.PNAME = 'ProductX'));
```

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

```
SELECT E.FNAME, E.LNAME FROM EMPLOYEE AS E  
WHERE E.SSN IN (SELECT ESSN FROM DEPENDENT WHERE E.FNAME = DEPENDENT_NAME);
```

25. Create a table EMPLOYEE\_BACKUP to back up the EMPLOYEE table

```
SELECT * INTO EMPLOYEE_BACKUP FROM EMPLOYEE;
```

26. Retrieve the names of all employees who do not have supervisors.

```
SELECT * FROM EMPLOYEE WHERE SUPER_SSN IS NULL;
```

27. Retrieve the name of each employee who has a dependent with the same first name and is the same sex as the employee.

```
SELECT E.FNAME, E.LNAME FROM EMPLOYEE AS E  
WHERE E.SSN IN (SELECT ESSN FROM DEPENDENT WHERE E.FNAME = DEPENDENT_NAME AND E.SEX =  
SEX);
```

Results		Messages								
	DNAME	LNAME	FNAME	PNAME						
1	Administration	Jabbar	Ahmad	Computerization						
2	Administration	Jabbar	Ahmad	Newbenefits						
3	Administration	Wallace	Jennifer	Reorganization						
4	Administration	Wallace	Jennifer	Newbenefits						
5	Administration	Zolaya	Alicia	Computerization						
6	Administration	Zolaya	Alicia	Newbenefits						
7	Headquarters	Borg	James	Reorganization						
8	Research	English	Joyce	ProductX						
9	Research	English	Joyce	ProductY						
10	Research	Narayan	Ramesh	ProductZ						
11	Research	Smith	John	ProductX						
12	Research	Smith	John	ProductY						
13	Research	Wong	Franklin	ProductY						
14	Research	Wong	Franklin	ProductZ						
15	Research	Wong	Franklin	Computerization						
16	Research	Wong	Franklin	Reorganization						
	FNAME	LNAME								
1	John	Smith								
2	Joyce	English								
	FNAME	LNAME								
	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
	FNAME	LNAME								

28. For each project, retrieve the project number, the project name, and the number of employees from department 5 who work on the project.

```
SELECT PNUMBER, PNAME, COUNT(*) AS NO_OF_EMPLOYEE  
FROM PROJECT, WORKS_ON  
WHERE PNUMBER = PNO AND ESSN IN (SELECT E.SSN FROM EMPLOYEE AS E WHERE E.DNO = 5)  
GROUP BY PNUMBER, PNAME;
```

29. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than \$40,000.

```
SELECT DNAME, COUNT(*) AS NO_OF_EMPLOYEE FROM DEPARTMENT, EMPLOYEE  
WHERE DNUMBER = DNO AND SALARY > 40000 AND  
DNO IN (SELECT DNO FROM EMPLOYEE GROUP BY DNO HAVING COUNT(*) > 5)  
GROUP BY DNAME;
```

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

```
SELECT FNAME, LNAME FROM EMPLOYEE WHERE SALARY >= (SELECT MIN(SALARY) FROM  
EMPLOYEE) + 10000;
```

31. Display Employee Name and Department Number for the Employee No= 7900.

```
SELECT FNAME, LNAME FROM EMPLOYEE WHERE SSN = '%7900%';
```

32. Display Employee Name and Department No. of all the employees in Dept 5 and Dept 1 in the alphabetical order by name.

```
SELECT FNAME, LNAME, DNO FROM EMPLOYEE WHERE DNO = 5 OR DNO = 1 ORDER BY FNAME;
```

Results			
	PNUMBER	PNAME	
1	10	Computerization	
2	1	ProductX	
3	2	ProductY	
4	3	ProductZ	
5	20	Reorganization	
	DNAME	NO_OF_EMPLOYEE	
	FNAME	LNAME	
1	Franklin	Wong	
2	Ramesh	Narayan	
3	James	Borg	
4	Jennifer	Wallace	
	FNAME	LNAME	
	FNAME	LNAME	DNO
1	Franklin	Wong	5
2	James	Borg	1
3	John	Smith	5
4	Joyce	English	5
5	Rame...	Naray...	5

## Lab 6 – Aggregation function-based queries

33. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary.

```
SELECT SUM(SALARY) AS SUM_SALARY, MIN(SALARY) AS MIN_SALARY, MAX(SALARY) AS  
MAX_SALARY, AVG(SALARY) AS AVG_SALARY FROM EMPLOYEE;
```

34. Find the sum of the salaries of all employees of the ‘Research’ department, as well as the maximum salary, the minimum salary, and the average salary in this department.

```
SELECT SUM(SALARY) AS SUM_SALARY, MIN(SALARY) AS MIN_SALARY, MAX(SALARY) AS  
MAX_SALARY, AVG(SALARY) AS AVG_SALARY  
FROM EMPLOYEE WHERE DNO = (SELECT DNUMBER FROM DEPARTMENT WHERE DNAME = 'Research');
```

35. Retrieve the total number of employees in the company

```
SELECT COUNT(*) AS NO_OF_EMPLOYEE FROM EMPLOYEE;
```

36. Retrieve the number of employees in the ‘Research’ department.

```
SELECT COUNT(*) AS RESEARCH_EMPLOYEE FROM EMPLOYEE WHERE DNO = (SELECT DNUMBER FROM  
DEPARTMENT WHERE DNAME = 'Research');
```

37. Count the number of distinct salary values in the database

```
SELECT COUNT(DISTINCT SALARY) AS DISTINCT_SALARY FROM EMPLOYEE;
```

Results			
	SUM_SALARY	MIN_SALARY	MAX_SALARY
1	281000.00	25000.00	55000.00
	Avg_Salary		
1	35125.000000		
	NO_OF_EMPLOYEE		
1	8		
	RESEARCH_EMPLOYEE		
1	4		
	DISTINCT_SALARY		
1	6		

38. Retrieve the names of all employees who have two or more dependents

```
SELECT FNAME, LNAME FROM EMPLOYEE WHERE (SELECT COUNT(*) FROM DEPENDENT WHERE  
SSN=ESSN) >= 2;
```

39. For each department, retrieve the department number, the number of employees in the department, and their average salary.

```
SELECT DNO, COUNT(*) AS NO_OF_EMPLOYEE, AVG(SALARY) AS AVG_SALARY FROM EMPLOYEE GROUP  
BY DNO;
```

40. For each project, retrieve the project number, the project name, and the number of employees who work on that project.

```
SELECT PNUMBER, PNAME, COUNT(*) AS NO_OF_EMPLOYEE FROM PROJECT, WORKS_ON WHERE PNUMBER  
= PNO GROUP BY PNUMBER, PNAME;
```

Results		Messages	
	FNAME	LNAME	
1	John	Smith	
2	Franklin	Wong	
	DNO	NO_OF_EMPLOYEE	AVG_SALARY
1	1	1	55000.000000
2	4	3	31000.000000
3	5	4	33250.000000
	PNUMBER	PNAME	NO_OF_EMPLOYEE
1	10	Computerization	3
2	30	Newbenefits	3
3	1	ProductX	2
4	2	ProductY	3
5	3	ProductZ	2
6	20	Reorganization	3

41. For each project on which more than two employees work, retrieve the project number, the project name, and the number of employees who work on the project.

```
SELECT P.PNUMBER, P.PNAME, COUNT(W.PNO) AS NO_OF_EMPLOYEE
FROM PROJECT AS P, WORKS_ON AS W
WHERE P.PNUMBER = W.PNO GROUP BY P.PNUMBER, P.PNAME, W.PNO HAVING COUNT(W.PNO)>2;
```

42. List the names of managers who have at least one dependent.

```
SELECT FNAME, LNAME FROM EMPLOYEE, DEPARTMENT WHERE SSN = MGR_SSN AND (SELECT COUNT(*)
FROM DEPENDENT WHERE SSN=ESSN)>=1;
```

43. Retrieve all distinct salary values in COMPANY.

```
SELECT DISTINCT SALARY FROM EMPLOYEE;
```

44. Display Name and Salaries represented by asterisks, where each asterisk (\*) signifies \$100.

```
SELECT FNAME, REPLICATE('*',SALARY/100) AS STAR REPRESENTATION FROM EMPLOYEE;
```

45. Display the no. of managers in the COMPANY.

```
SELECT COUNT(DISTINCT MGR_SSN) FROM DEPARTMENT;
```

46. Display the Department Name, Location Name, No. of Employees and the average salary in that department.

```
SELECT D.DNAME, LOC.DLOCATION, COUNT(E.DNO) AS NO_OF_EMPLOYEE, AVG(E.SALARY) AS
AVG_SALARY FROM DEPARTMENT AS D, EMPLOYEE AS E, DEPT_LOCATIONS AS LOC
WHERE D.DNUMBER = E.DNO AND D.DNUMBER = LOC.DNUMBER GROUP BY D.DNAME, LOC.DLOCATION,
E.DNO;
```

47. Display the Employee No. And Name for all employees who earn more than the average salary.

```
SELECT SSN, FNAME, LNAME FROM EMPLOYEE WHERE SALARY > (SELECT AVG(SALARY) FROM
EMPLOYEE);
```

Results Messages			
	PNUMBER	PNAME	NO_OF_EMPLOYEE
1	10	Computerization	3
2	30	Newbenefits	3
3	2	ProductY	3
4	20	Reorganization	3

	FNAME	LNAME
1	Jennifer	Wallace
2	Franklin	Wong

	SALARY
1	25000.00
2	30000.00
3	38000.00
4	40000.00
5	43000.00
6	55000.00

	FNAME	STAR_REPRESENTATION
1	John	*****
2	Franklin	*****
3	Joyce	*****
4	Ramesh	*****
5	James	*****
6	Jennifer	*****
7	Ahmad	*****
8	Alicia	*****

	NO_OF_MANAGERS
1	3

	DNAME	DLOCATION	NO_OF_EMPLOYEE	AVG_SALARY
1	Administration	Stafford	3	31000.000000
2	Headquarters	Houston	1	55000.000000
3	Research	Bellaire	4	33250.000000
4	Research	Houston	4	33250.000000
5	Research	Sugarland	4	33250.000000

	SSN	FNAME	LNAME
1	333445555	Franklin	Wong
2	666884444	Ramesh	Narayan
3	888665555	James	Borg
4	987654321	Jennifer	Wallace

## Lab 7 – Update/Delete-based queries

48. Increment the salary of managers in the COMPANY by 50%.

```
SELECT * FROM EMPLOYEE;
UPDATE EMPLOYEE SET SALARY = SALARY*1.5
WHERE SSN IN (SELECT MGR_SSN FROM DEPARTMENT);
SELECT * FROM EMPLOYEE;
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	60000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	82500.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	64500.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

49. Decrement the salary of manager of project number 10 by 10%.

```
SELECT * FROM EMPLOYEE;
UPDATE EMPLOYEE SET SALARY = SALARY*0.9
WHERE SSN IN (SELECT MGR_SSN FROM DEPARTMENT WHERE DNUMBER = (SELECT DNUM FROM PROJECT
WHERE PNUMBER = 10));
SELECT * FROM EMPLOYEE;
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	38700.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

50. Update the name of project to 'XYZ' lead in department no 5.

```
UPDATE PROJECT SET PNAME = 'XYZ' WHERE DNUM = 5;
```

Msg 2627, Level 14, State 1, Line 1 Violation of UNIQUE KEY constraint 'UQ_PROJECT_7978DCF9FRDDF43A'. Cannot insert duplicate key in object 'dbo.PROJECT'. The duplicate key value is (XYZ). The statement has been terminated.
Completion time: 2023-04-17T00:37:15.1911056+05:30

51. Remove the dependents of employee with SNN = '123456789'

```
SELECT * FROM DEPENDENT;
DELETE FROM DEPENDENT WHERE ESSN = 123456789;
SELECT * FROM DEPENDENT;
```

	ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
1	123456789	Alice	F	1988-12-30	Daughter
2	123456789	Elizabeth	F	1967-05-05	Spouse
3	123456789	Michael	M	1988-01-04	Son
4	333445555	Alice	F	1986-04-05	Daughter
5	333445555	Joy	F	1958-05-03	Spouse
6	333445555	Theodore	M	1983-10-25	Son
7	987654321	Abner	M	1942-02-28	Spouse

	ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
1	333445555	Alice	F	1986-04-05	Daughter
2	333445555	Joy	F	1958-05-03	Spouse
3	333445555	Theodore	M	1983-10-25	Son
4	987654321	Abner	M	1942-02-28	Spouse

52. Change the location of research department to 'New York'.

```
UPDATE DEPT_LOCATIONS SET DLOCATION = 'New York'
WHERE DNUMBER = (SELECT D.DNUMBER FROM DEPARTMENT D WHERE D.DNAME = 'Research');
```

Messages
Msg 2627, Level 14, State 1, Line 1 Violation of PRIMARY KEY constraint 'PK_DEPT_LOC__2F9748E091653BCD'. Cannot insert duplicate key in object 'dbo.DEPT_LOCATIONS'. The duplicate key value is (5, New York). The statement has been terminated.
Completion time: 2023-04-17 20:00:38.05.1487072+05:30

53. Increment the salary of all the employees working on 'ProductX'.

```
SELECT * FROM EMPLOYEE;
UPDATE EMPLOYEE SET SALARY = 2*SALARY
WHERE SSN IN (SELECT ESSN FROM WORKS_ON WHERE PNO = (SELECT PNUMBER FROM PROJECT WHERE
PNAME = 'ProductX')));
SELECT * FROM EMPLOYEE;
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	60000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	50000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

54. Assign all the employees working under manager 333445555 to manager 987654321.

```
SELECT * FROM EMPLOYEE;
UPDATE EMPLOYEE SET SUPER_SSN = 987654321 WHERE SUPER_SSN = 333445555;
SELECT * FROM EMPLOYEE;
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	987654321	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	987654321	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	987654321	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

55. Delete all the employees having age greater than 65.

```
DELETE FROM EMPLOYEE WHERE (SELECT DATEDIFF(YEAR,BDATE,GETDATE()) + 0) > 65;
```

```
Msg 547, Level 16, State 0, Line 1
The DELETE statement conflicted with the REFERENCE constraint "FK__DEPARTMENT_MGR_S__3A81B327". The conflict occurred in database "COMPANY_DATABASE", table "dbo.DEPARTMENT", column 'MGR_SSN'.
The statement has been terminated.

Completion time: 2023-04-17T00:39:38.1867620+05:30
```

56. Make '333445555' as the default manager for any department.

```
ALTER TABLE DEPARTMENT ADD DEFAULT 333445555 FOR MGR_SSN;
```

```
Msg 0, Level 0, State 0, Line 0
Commands completed successfully.

Completion time: 2023-04-17T00:40:05.1607509+05:30
```

## Lab 8 – Some more Update/Delete-based, View-based and Alter-based queries

57. Create the virtual tables(views) for the schemas given below.

**WORKS\_ON1**

Fname	Lname	Pname	Hours
-------	-------	-------	-------

**DEPT\_INFO**

Dept_name	No_of_emps	Total_sal
-----------	------------	-----------

```
CREATE VIEW WORKS_ON1 AS
SELECT E.FNAME AS FNAME, E.LNAME AS LNAME, P.PNAME AS PNAME, W.HOURS AS HOURS
FROM EMPLOYEE E, PROJECT P, WORKS_ON W
WHERE E.SSN = W.ESSN AND P.PNUMBER = W.PNO;
```

	Results				Messages
	FNAME	LNAME	PNAME	HOURS	
1	John	Smith	ProductX	32.5	
2	John	Smith	ProductY	7.5	
3	Franklin	Wong	ProductY	10.0	
4	Franklin	Wong	ProductZ	10.0	
5	Franklin	Wong	Computerization	10.0	
6	Franklin	Wong	Reorganization	10.0	
7	Joyce	English	ProductX	20.0	
8	Joyce	English	ProductY	20.0	
9	Ramesh	Narayan	ProductZ	40.0	
10	James	Borg	Reorganization	0.0	
11	Jennifer	Wallace	Reorganization	15.0	
12	Jennifer	Wallace	Newbenefits	20.0	
13	Ahmad	Jabbar	Computerization	35.0	
14	Ahmad	Jabbar	Newbenefits	5.0	
15	Alicia	Zolaya	Computerization	10.0	
16	Alicia	Zolaya	Newbenefits	30.0	

```
CREATE VIEW DEPT_INFO AS
SELECT DNAME, COUNT(*) EMP_COUNT, SUM(SALARY) AS SALARY
FROM DEPARTMENT, EMPLOYEE WHERE DNO = DNUMBER GROUP BY DNAME;
```

	Results			Messages
	DNAME	EMP_COUNT	SALARY	
1	Administration	3	93000.00	
2	Headquarters	1	55000.00	
3	Research	4	133000.00	

58. Consider the WORKS\_ON1 view, and issue the command to update the PNAME attribute of ‘John Smith’ from ‘ProductX’ to ‘ProductY’.

```
UPDATE WORKS_ON1 SET PNAME = 'ProductY' WHERE FNAME = 'John' AND PNAME = 'ProductX';
```

Results		Messages
(16 rows affected)		Msg 2627, Level 14, State 1, Line 2 Violation of UNIQUE KEY constraint 'UQ__PROJECT__7978DCF9FEDDF43A'. Cannot insert duplicate key in object 'dbo.PROJECT'. The duplicate key value is (ProductY). The statement has been terminated.

59. Get rid of the view WORKS\_ON1.

```
DROP VIEW WORKS_ON1;
```

```
(Messages
 Commands completed successfully.

Completion time: 2023-04-17T23:36:42.4461908+05:30)
```

60. Create a view that has the department name, manager name, and manager salary for every department.

```
CREATE VIEW DEPT AS
SELECT D.DNAME AS DNAME, E.FNAME AS FNAME, E.LNAME AS LNAME, E.SALARY AS SALARY
FROM EMPLOYEE E, DEPARTMENT D
WHERE E.SSN = D.MGR_SSN;
```

```
Results Messages
+-----+-----+-----+-----+
| DNAME | FNAME | LNAME | SALARY |
+-----+-----+-----+-----+
| 1     | Headquaters | James | Borg   | 55000.00
| 2     | Administration | Jennifer | Wallace | 43000.00
| 3     | Research | Franklin | Wong   | 40000.00
+-----+-----+-----+-----+
```

61. Create a view that has the employee name, supervisor name, and employee salary for each employee who works in the 'Research' department.

```
CREATE VIEW RESEARCH AS
SELECT E1.FNAME AS FNAME, E2.FNAME AS SFNAME, E1.SALARY AS SALARY
FROM EMPLOYEE E1,EMPLOYEE E2, DEPARTMENT D
WHERE E1.SUPER_SSN = E2.SSN AND E1.DNO = (SELECT D.DNUMBER WHERE DNAME = 'Research');
```

```
Results Messages
+-----+-----+-----+
| FNAME | SFNAME | SALARY |
+-----+-----+-----+
| 1     | John   | Franklin | 30000.00
| 2     | Franklin | James   | 40000.00
| 3     | Joyce  | Franklin | 25000.00
| 4     | Ramesh | Franklin | 38000.00
+-----+-----+-----+
```

62. Create a view that has the project name, controlling department name, number of employees, and total hours worked per week on the project for each project.

```
CREATE VIEW PROJ AS
SELECT PNAME AS PROJECT, DNAME AS DEPT,
(SELECT COUNT(*) FROM WORKS_ON W WHERE W.PNO = P.PNUMBER) AS EMPLOYEES,
(SELECT SUM(W.HOURS) FROM WORKS_ON W WHERE W.PNO = P.PNUMBER GROUP BY PNO) AS HOURS
FROM PROJECT P, DEPARTMENT D WHERE P.DNUM = D.DNUMBER;
```

```
Results Messages
+-----+-----+-----+-----+
| PROJECT | DEPT | EMPLOYEES | HOURS |
+-----+-----+-----+-----+
| 1       | ProductX | Research | 2      | 52.5
| 2       | ProductY | Research | 3      | 37.5
| 3       | ProductZ | Research | 2      | 50.0
| 4       | Computerization | Administration | 3      | 55.0
| 5       | Reorganization | Headquarters | 3      | 25.0
| 6       | Newbenefits | Administration | 3      | 55.0
+-----+-----+-----+-----+
```

63. Create a view that has the project name, controlling department name, number of employees, and total hours worked per week on the project for each project with more than one employee working on it.

```
CREATE VIEW NEW_PROJ AS
SELECT PNAME AS PROJECT, DNAME AS DEPT,
(SELECT COUNT(*) FROM WORKS_ON W WHERE W.PNO = P.PNUMBER) AS EMPLOYEES,
(SELECT SUM(W.HOURS) FROM WORKS_ON W WHERE W.PNO = P.PNUMBER GROUP BY PNO) AS HOURS
FROM PROJECT P, DEPARTMENT D
WHERE P.DNUM = D.DNUMBER AND (SELECT COUNT(*) FROM WORKS_ON W WHERE W.PNO = P.PNUMBER GROUP BY W.PNO)>1;
```

	PROJECT	DEPT	EMPLOYEES	HOURS
1	ProductX	Research	2	52.5
2	ProductY	Research	3	37.5
3	ProductZ	Research	2	50.0
4	Computerization	Administration	3	55.0
5	Reorganization	Headquarters	3	25.0
6	Newbenefits	Administration	3	55.0

64. Create a view for a certain user who is only allowed to see employee information for employees who work for department 5.

```
CREATE VIEW DEPT5 AS
SELECT * FROM EMPLOYEE WHERE DNO = 5;
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5

65. Remove the attribute Address from the EMPLOYEE base table.

```
SELECT * FROM EMPLOYEE;
ALTER TABLE EMPLOYEE
DROP COLUMN ADDRESS;
SELECT * FROM EMPLOYEE;
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

	FNAME	MINIT	LNAME	SSN	BDATE	SEX	SALARY	SUPER_SSN	DNO
1	John	B	Smith	123456789	1965-01-09	M	30000.00	333445555	5
2	Franklin	T	Wong	333445555	1955-12-08	M	40000.00	888665555	5
3	Joyce	A	English	453453453	1972-07-31	F	25000.00	333445555	5
4	Ramesh	K	Narayan	666884444	1962-09-15	M	38000.00	333445555	5
5	James	E	Borg	888665555	1937-11-10	M	55000.00	NULL	1
6	Jennifer	S	Wallace	987654321	1941-06-20	F	43000.00	888665555	4
7	Ahmad	V	Jabbar	987987987	1969-03-29	M	25000.00	987654321	4
8	Alicia	J	Zolaya	999887777	1968-01-19	F	25000.00	987654321	4

## Lab 9 – Some more Nested Queries and complex subqueries

66. Retrieve the names of employees who have no dependents.

```
SELECT * FROM EMPLOYEE WHERE SSN NOT IN (SELECT ESSN FROM DEPENDENT);
```

	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
1	Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000.00	333445555	5
2	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000.00	333445555	5
3	James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000.00	NULL	1
4	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000.00	987654321	4
5	Alicia	J	Zolaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000.00	987654321	4

67. Retrieve all supervisees of a supervisory employee e at all levels—that is, all employees e' directly supervised by e, all employees e'' directly supervised by each employee e', all employees e''' directly supervised by each employee e'', and so on.

```
WITH RECURSIVE SUP_EMP(SUPER_SSN, SSN) AS(
SELECT SUPER_SSN, SSN FROM EMPLOYEE
UNION
SELECT E.SSN, S.SUPER_SSN
FROM EMPLOYEE AS E , SUP_EMP AS S
WHERE E.SUPER_SSN = S.SSN)
SELECT * FROM SUP_EMP;
```

	SUPER_SSN	SSN
▶	333445555	123456789
	888665555	333445555
	333445555	453453453
	333445555	666884444
HULL		888665555
	888665555	987654321
	987654321	987987987
	987654321	999887777
	987654321	123456789
	123456789	888665555
	333445555	HULL
	453453453	888665555
	666884444	888665555
	987654321	HULL
	987987987	888665555
	999887777	888665555
	333445555	999887777
	333445555	987987987
	987654321	666884444
	987654321	453453453
	987654321	123456789

68. For every project located in ‘Stafford’, list the project number, the controlling department number, and the department manager’s last name, address, and birth date.

```
SELECT P.PNUMBER, P.DNUM, E.LNAME, E.ADDRESS, E.BDATE FROM PROJECT AS P, DEPARTMENT AS D, EMPLOYEE AS E
WHERE P.PLOCATION = 'Stafford' AND P.DNUM = D.DNUMBER AND D.MGR_SSN = E.SSN;
```

69. Make a list of all project numbers for projects that involve an employee whose last name is ‘Smith’, either as a worker or as a manager of the department that controls the project.

```
(SELECT W.PNO FROM WORKS_ON AS W, EMPLOYEE AS E WHERE E.LNAME = 'Smith' AND E.SSN = W.ESSN)
UNION
(SELECT W.PNO FROM WORKS_ON AS W, PROJECT AS P, EMPLOYEE AS E, DEPARTMENT AS D
WHERE E.LNAME = 'Smith' AND W.PNO = P.PNUMBER AND P.DNUM = D.DNUMBER AND D.MGR_SSN = E.SSN);
```

Results					
Messages					
PNUMBER	DNUM	LNAME	ADDRESS	BDATE	
1	10	4	Wallace	291 Berry, Beilaire, TX	1941-06-20
2	30	4	Wallace	291 Berry, Beilaire, TX	1941-06-20
PNO					
1	1				
2	2				

70. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.

```
SELECT DISTINCT(E.FNAME) FROM EMPLOYEE AS E, WORKS_ON AS W, PROJECT AS P
WHERE P.PNAME = 'ProductX' AND P.PNUMBER = W.PNO AND W.HOURS > 10 AND W.ESSN = E.SSN
AND E.DNO = 5;
```

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

```
SELECT E.FNAME FROM EMPLOYEE AS E, DEPENDENT AS D WHERE E.FNAME = D.DEPENDENT_NAME AND
E.SSN = D.ESSN;
```

72. Retrieve a list of employees and the projects they are working on, ordered by department and, within each department, ordered alphabetically by last name, then first name.

```
SELECT E.FNAME, E.LNAME, P.PNAME FROM EMPLOYEE AS E, DEPARTMENT AS D, WORKS_ON AS W,
PROJECT AS P
WHERE W.ESSN = E.SSN AND W.PNO = P.PNUMBER AND P.DNUM = D.DNUMBER
ORDER BY D.DNAME, E.LNAME, E.FNAME;
```

73. Show the resulting salaries if every employee working on the 'ProductX' project is given a 15 percent raise.

```
SELECT E.SALARY*1.15 AS SALARY_15 FROM PROJECT AS P, WORKS_ON AS W, EMPLOYEE AS E
WHERE P.PNAME = 'ProductX' AND P.PNUMBER = W.PNO and W.ESSN = E.SSN;
```

Results					
Messages					
FNAME					
1	John				
2	Joyce				
FNAME					
FNAME	LNAME	PNAME			
1	Ahmad	Jabbar	Computerization		
2	Ahmad	Jabbar	Newbenefits		
3	Jennifer	Wallace	Newbenefits		
4	Franklin	Wong	Computerization		
5	Alicia	Zolaya	Computerization		
6	Alicia	Zolaya	Newbenefits		
7	James	Borg	Reorganization		
8	Jennifer	Wallace	Reorganization		
9	Franklin	Wong	Reorganization		
10	Joyce	English	ProductX		
11	Joyce	English	ProductY		
12	Rame...	Naray...	ProductZ		
13	John	Smith	ProductX		
14	John	Smith	ProductY		
15	Franklin	Wong	ProductY		
16	Franklin	Wong	ProductZ		
SALARY_15					
1	34500.0000				
2	28750.0000				

## Lab 10 – Some more Nested Queries and complex subqueries

74. 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.

```
SELECT DNAME, COUNT(*) Emp_Count FROM DEPARTMENT, EMPLOYEE WHERE DNO = DNUMBER GROUP BY DNAME HAVING AVG(SALARY) > 30000;
```

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

```
SELECT FNAME FROM EMPLOYEE WHERE DNO = (SELECT DNO FROM EMPLOYEE WHERE SALARY = (SELECT Max(SALARY) FROM EMPLOYEE));
```

76. Retrieve the names of all employees whose supervisor's supervisor has '888665555' for Ssn.

```
SELECT E1.FNAME FROM EMPLOYEE AS E1, EMPLOYEE AS E2 WHERE E1.SUPER_SSN = E2.SSN AND E2.SUPER_SSN = 888665555;
```

77. Display Name of all employees who don't have Manager.

```
SELECT FNAME FROM EMPLOYEE WHERE SUPER_SSN IS NULL;
```

78. Display Employee full name, Age, Department Name and Department No for all the employees.

```
SELECT E.FNAME, E.LNAME, (SELECT DATEDIFF(YEAR, E.BDATE, GETDATE()) + 0) AS AGE, D.DNAME, D.DNUMBER  
FROM EMPLOYEE AS E, DEPARTMENT AS D WHERE D.DNUMBER = E.DNO;
```

Results		Messages	
DNAME		NO_OF_EMPLOYEE	
1	Administration	3	
2	Headquaters	1	
3	Research	4	
FNAME			
1	James		
FNAME			
1	John		
2	Joyce		
3	Ramesh		
4	Ahmad		
5	Alicia		
FNAME			
1	James		
FNAME		LNAME	
1	John	Smith	58
2	Franklin	Wong	68
3	Joyce	English	51
4	Ramesh	Narayan	61
5	James	Borg	86
6	Jennifer	Wallace	82
7	Ahmad	Jabbar	54
8	Alicia	Zolaya	55
AGE		DNAME	
1	John	Research	5
2	Franklin	Research	5
3	Joyce	Research	5
4	Ramesh	Research	5
5	James	Headqu...	1
6	Jennifer	Adminis...	4
7	Ahmad	Adminis...	4
8	Alicia	Adminis...	4
DNUMBER			

79. Display Name and Employee no. Along with their Manager's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.

```
SELECT E1.FNAME AS ENAME, E1.SSN AS ESSN, E2.FNAME AS MNAME, E2.SSN AS MSSN  
FROM EMPLOYEE AS E1 LEFT OUTER JOIN EMPLOYEE AS E2 ON E1.SUPER_SSN = E2.SSN;
```

80. Display the following for each employee <FName> earns < Salary> monthly but wants < 3 \*

Current Salary >. Label the Column as Dream Salary.

```
SELECT CONCAT(FNAME, ' earns ', SALARY, ' monthly but wants ', 3*SALARY) AS DREAM_SALARY  
FROM EMPLOYEE;
```

	ENAME	ESSN	MNAME	MSSN
1	John	123456789	Franklin	333445555
2	Franklin	333445555	James	888665555
3	Joyce	453453453	Franklin	333445555
4	Ramesh	666884444	Franklin	333445555
5	James	888665555	NULL	NULL
6	Jennifer	987654321	James	888665555
7	Ahmad	987987987	Jennifer	987654321
8	Alicia	999887777	Jennifer	987654321

	DREAM_SALARY
1	John earns 30000.00 monthly but wants 90000.00
2	Franklin earns 40000.00 monthly but wants 120000.00
3	Joyce earns 25000.00 monthly but wants 75000.00
4	Ramesh earns 38000.00 monthly but wants 114000.00
5	James earns 55000.00 monthly but wants 165000.00
6	Jennifer earns 43000.00 monthly but wants 129000.00
7	Ahmad earns 25000.00 monthly but wants 75000.00
8	Alicia earns 25000.00 monthly but wants 75000.00