OCTOBER 10, 2024

HOMEWORK 3 B CS 457 B

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1. Creating the tables

```
1 CREATE TABLE EMPLOYEE (
        Fname VARCHAR(15) NOT NULL,
        Minit CHAR,
       Lname VARCHAR(15) NOT NULL,
4
5
       Ssn CHAR(9) NOT NULL,
6
       Bdate DATE,
       Address VARCHAR(30),
8
        Sex CHAR,
9
        Salary DECIMAL(10,2),
10
        Super_ssn CHAR(9),
11
       Dno INT NOT NULL,
        PRIMARY KEY (Ssn)
12
13 );
14
15 CREATE TABLE DEPARTMENT (
        Dname VARCHAR(15) NOT NULL,
       Dnumber INT NOT NULL,
17
18
        Mgr_ssn CHAR(9) NOT NULL,
19
        Mgr_start_date DATE,
       PRIMARY KEY (Dnumber),
20
21
        UNIQUE (Dname),
22
        FOREIGN KEY (Mgr_ssn) REFERENCES EMPLOYEE(Ssn)
23 );
24
   CREATE TABLE DEPT_LOCATIONS (
25
    Dnumber INT NOT NULL,
       Dlocation VARCHAR(15) NOT NULL,
27
28
        PRIMARY KEY (Dnumber, Dlocation),
29
        FOREIGN KEY (Dnumber) REFERENCES DEPARTMENT(Dnumber)
30 );
31
32 CREATE TABLE PROJECT (
33
       Pname VARCHAR(15) NOT NULL,
34
        Pnumber INT NOT NULL,
35
      Plocation VARCHAR(15),
    Dnum INT NOT NULL,
37
    PRIMARY KEY (Pnumber),
38
        UNIQUE (Pname),
39
        FOREIGN KEY (Dnum) REFERENCES DEPARTMENT(Dnumber)
40 );
41
42 CREATE TABLE WORKS_ON (
    Essn CHAR(9) NOT NULL,
43
44
        Pno INT NOT NULL,
    Hours DECIMAL(3,1) NOT NULL,
45
   PRIMARY KEY (Essn, Pno),
    FOREIGN KEY (Essn) REFERENCES EMPLOYEE(Ssn),
47
48
        FOREIGN KEY (Pno) REFERENCES PROJECT(Pnumber)
49 );
50
   CREATE TABLE DEPENDENT (
51
52
     Essn CHAR(9) NOT NULL,
53
        Dependent_name VARCHAR(15) NOT NULL,
54
        Sex CHAR,
55
       Bdate DATE,
       Relationship VARCHAR(8),
56
57
    PRIMARY KEY (Essn, Dependent_name),
        FOREIGN KEY (Essn) REFERENCES EMPLOYEE(Ssn)
58
59 );
```

2. Inserting The Data.

```
INSERT INTO EMPLOYEE (Fname, Minit, Lname, Ssn, Bdate, Address, Sex, Salary, Super_ssn, Dno) 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', 'Zelaya', '999887777', '1968-01-19', '321 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', '631 Rice, Houston, TX', 'F', 25000, '333445555', 5),
('Ahmad', 'V', 'Jabbar', '987979897', '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');
```

```
1 INSERT INTO WORKS_ON (Essn, Pno, Hours) VALUES
2 ('123456789', 1, 32.5),
   ('123456789', 2, 7.5),
   ('666884444', 3, 40.0),
   ('453453453', 1, 20.0),
6 ('453453453', 2, 20.0),
   ('333445555', 2, 10.0),
8 ('333445555', 3, 10.0),
   ('333445555', 10, 10.0),
9
10 ('333445555', 20, 10.0),
11 ('999887777', 30, 30.0),
12 ('999887777', 10, 10.0),
13 ('987979897', 10, 35.0),
14 ('987979897', 30, 5.0),
15 ('987654321', 30, 20.0),
16 ('987654321', 20, 15.0),
17 ('888665555', 20, NULL);
```

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

QUERIES

1. Retrieving John B Smith's birthdate and address from employee table - SELECT Bdate, Address FROM EMPLOYEE WHERE Fname = 'John' AND Minit = 'B' AND Lname = 'Smith';



2. Gets first, last names and address for employees in Research department - SELECT Fname, Lname, Address FROM EMPLOYEE, DEPARTMENT WHERE Dname = 'Research' AND Dno = Dnumber;

| Fname varchar | Lname varchar | Address varchar |
|---------------|---------------|--------------------------|
| John | Smith | 731 Fondren, Houston, TX |
| Franklin | Wong | 638 Voss, Houston, TX |
| Joyce | English | 631 Rice, Houston, TX |
| Ramesh | Narayan | 975 Fire Oak, Humble, TX |

3. Joins the project, department and employee to find the all projects in Stafford location - SELECT Pnumber, Dnum, Lname, Address, Bdate FROM PROJECT, DEPARTMENT, EMPLOYEE WHERE Dnum = Dnumber AND Mgr_ssn = Ssn AND Plocation = 'Stafford';

| Pnumber int | Dnum int 💠 | Lname varchar | Address varchar | Bdate date |
|-------------|------------|------------------|-------------------------|------------|
| 10 | 4 | Wallace | 291 Berry, Bellaire, TX | 1941-06-20 |
| 30 | 4 | Wallace | 291 Berry, Bellaire, TX | 1941-06-20 |

4. This query shows the employee and their supervisors - SELECT e1.Fname, e1.Lname, e2.Fname, e2.Lname FROM EMPLOYEE e1, EMPLOYEE e2 WHERE e1.Super_ssn = e2.Ssn;

| Fname varchar | Lname varchar → | Fname varchar | Lname varchar |
|---------------|--------------------|---------------|---------------|
| John | Smith | Franklin | Wong |
| Franklin | Wong | James | Borg |
| Joyce | English | Franklin | Wong |
| Ramesh | Narayan | Franklin | Wong |
| Jennifer | Wallace | James | Borg |
| Ahmad | Jabbar | Jennifer | Wallace |
| Alicia | Zelaya | Jennifer | Wallace |

5. Find the Manager's SSN for each department -SELECT e.Ssn, d.Dname FROM EMPLOYEE e, DEPARTMENT d WHERE e.Ssn = d.Mgr_ssn;

| Ssn string | Dname varchar |
|---------------|----------------|
| 888665555 | Headquarters |
| 987654321 | Administration |
| 333445555 | Research |

6. Distinct list of salaries - SELECT DISTINCT Salary FROM EMPLOYEE;



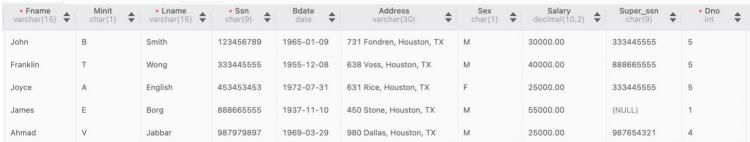
7. Get all salaries including duplicates - SELECT Salary FROM EMPLOYEE;



8. Projects numbers of the projects associated with Smith's dept - SELECT p.Pnumber FROM PROJECT p, EMPLOYEE e WHERE e.Lname = 'Smith' AND p.Dnum = e.Dno;



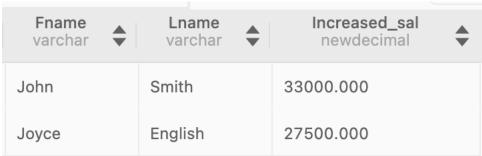
 Returns all employees located in Houston - SELECT * FROM EMPLOYEE WHERE Address LIKE '%Houston%';



10. Returns employees born in the 1950s - SELECT * FROM EMPLOYEE WHERE Bdate LIKE '195%';



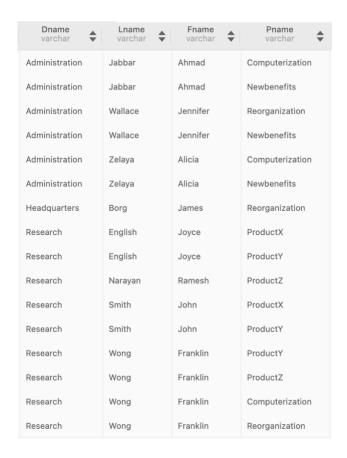
11. Calculates the 10% salary increase for employees associated with ProductX - SELECT E.Fname, E.Lname, 1.1 * E.Salary AS Increased_sal FROM EMPLOYEE AS E, WORKS_ON AS W, PROJECT AS P WHERE E.Ssn = W.Essn AND W.Pno = P.Pnumber AND P.Pname = 'ProductX';



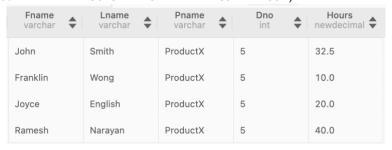
12. Find employees between 30K and 40K salaries in Department Number 5 - SELECT * FROM EMPLOYEE WHERE (Salary BETWEEN 30000 AND 40000) AND Dno = 5;



13. Show's the departments, employees and the projects they are working on, ordered by department and employee name - SELECT Dname, Lname, Fname, Pname FROM DEPARTMENT, EMPLOYEE, WORKS_ON, PROJECT WHERE Dnumber = Dno AND Ssn = Essn AND Pno = Pnumber ORDER BY Dname, Lname, Fname;



14. Return employees who've worked more than 10 hours on ProjectX - SELECT DISTINCT Fname, Lname, Pname, Dno, Hours FROM EMPLOYEE AS E, PROJECT AS P, WORKS_ON AS W WHERE E.Dno = 5 AND P.Pname = 'ProductX' AND W.Hours >= 10 AND W.Essn = E.Ssn;



15. Returns the employees whose first names matches with thei dependent's name which resulted in a empty set - SELECT Fname, Lname FROM EMPLOYEE, DEPENDENT WHERE Fname = Dependent_name AND Ssn = Essn;

Empty set (0.00 sec)

16. Employees managed by Franklin Wong - SELECT Fname, Lname FROM EMPLOYEE WHERE Super_ssn = (SELECT Ssn FROM EMPLOYEE WHERE Fname = 'Franklin' AND Lname = 'Wong');



17. Find employees without a manager - SELECT * FROM EMPLOYEE WHERE Super_ssn IS NULL;



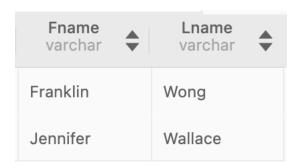
18. Employees who share their first name and gender with their dependents which none of them do so it resulted in a empty set - SELECT Fname, Lname FROM EMPLOYEE E, DEPENDENT Dp WHERE E.Fname = Dependent name AND Dp.Sex = E.Sex;

Empty set (0.00 sec)

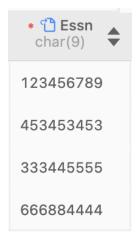
19. Employees without any dependents - SELECT Fname, Lname FROM EMPLOYEE WHERE NOT EXISTS (SELECT * FROM DEPENDENT WHERE Ssn = Essn);



20. Employees who are a manager and have dependents - SELECT Fname, Lname FROM EMPLOYEE WHERE EXISTS (SELECT * FROM DEPENDENT WHERE Ssn = Essn) AND EXISTS (SELECT * FROM DEPARTMENT WHERE Ssn = Mgr ssn);



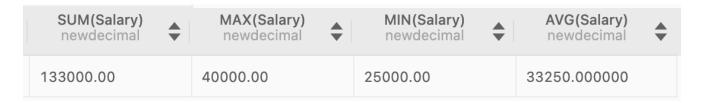
21. Returns the SSN of the employees working on projects 1,2 or 3 - SELECT DISTINCT Essn FROM WORKS ON WHERE Pno IN (1, 2, 3);



 a. Summarized all the employee salaries - SELECT SUM(Salary), MAX(Salary), MIN(Salary), AVG(Salary) FROM EMPLOYEE;



 Summarized all the salaries for the employees in the Research department - SELECT SUM(Salary), MAX(Salary), MIN(Salary), AVG(Salary) FROM EMPLOYEE, DEPARTMENT WHERE Dno = Dnumber AND Dname = 'Research';



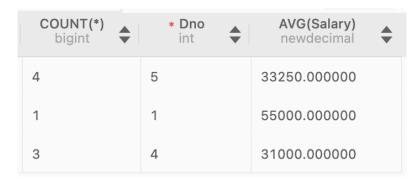
23. Returns the total number of employees - SELECT COUNT(*) FROM EMPLOYEE;



24. Counts the distinct salary values - SELECT COUNT(DISTINCT Salary) FROM EMPLOYEE;



25. Groups employees by department and show count and average salary - SELECT COUNT(*), Dno, AVG(Salary) FROM EMPLOYEE GROUP BY Dno;



26. Groups employees by department and show count as Employee_NUM and average salary - SELECT COUNT(*) AS Employee_NUM, Dno, AVG(Salary) FROM EMPLOYEE GROUP BY Dno;

| Employee_NUM bigint | ♦ * Dno int | AVG(Salary) newdecimal |
|---------------------|----------------------|------------------------|
| 4 | 5 | 33250.000000 |
| 1 | 1 | 55000.000000 |
| 3 | 4 | 31000.000000 |

27. This shows all projects with more than 2 employees - SELECT Pnumber, Pname, COUNT(*) FROM PROJECT, WORKS_ON WHERE Pnumber = Pno GROUP BY Pnumber, Pname HAVING COUNT(*) > 2;

| Pnumber int | Pname varchar | COUNT(*) bigint |
|-------------|-----------------|-----------------|
| 10 | Computerization | 3 |
| 30 | Newbenefits | 3 |
| 2 | ProductY | 3 |
| 20 | Reorganization | 3 |

28. This shows all projects within department 5 with more than 2 employees - SELECT Pnumber, Pname, COUNT(*) > 2 FROM PROJECT, WORKS_ON, EMPLOYEE WHERE Pnumber = Pno AND Ssn = Essn AND Dno = 5 GROUP BY Pnumber, Pname;

| Pnumber int | Pname varchar | COUNT(*) > 2 bigint |
|-------------|-----------------|---------------------|
| 1 | ProductX | 0 |
| 2 | ProductY | 1 |
| 3 | ProductZ | 0 |
| 10 | Computerization | 0 |
| 20 | Reorganization | 0 |

29. This query shows departments with average salaries more than 40K and more than 5 employees - SELECT Dnumber, COUNT(*) FROM DEPARTMENT, EMPLOYEE WHERE Dnumber = Dno AND Salary > 40000 AND Dno IN (SELECT Dno FROM EMPLOYEE GROUP BY Dno HAVING COUNT(*) > 5) GROUP BY Dnumber;

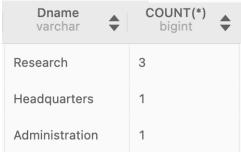
Empty set (0.00 sec)

30. Shows departments where average salaries exceed 30K - SELECT Dname, COUNT(*) FROM DEPARTMENT, EMPLOYEE WHERE Dnumber = Dno GROUP BY Dname HAVING AVG(Salary) > 30000;



31.

a. Male employees with average salaries exceeding 30K - SELECT Dname, COUNT(*) FROM DEPARTMENT, EMPLOYEE WHERE Dnumber = Dno AND Sex = 'M' AND Dno IN (SELECT Dno FROM EMPLOYEE GROUP BY Dno HAVING AVG(Salary) > 30000) GROUP BY Dname;



b. A view that lists the department names, manager names, and their salaries - CREATE VIEW V1 AS SELECT Dname, CONCAT(Fname, " ", Lname) AS Manager_Name, Salary FROM DEPARTMENT, EMPLOYEE WHERE Mgr ssn = Ssn;

| * Dname varchar(15) | Manager_Name varchar(31) | Salary decimal(10,2) |
|---------------------|--------------------------|-------------------------|
| Headquarters | James Borg | 55000.00 |
| Administration | Jennifer Wallace | 43000.00 |
| Research | Franklin Wong | 40000.00 |

c. A view that shows employees in the 'Research' Department, their supervisors name and employee salaries - CREATE VIEW Employee_Supervisor_Salary AS SELECT E.Fname AS Employee_Fname, E.Lname AS Employee_Lname, S.Fname AS Supervisor_Fname, S.Lname AS Supervisor_Lname, E.Salary FROM EMPLOYEE E JOIN EMPLOYEE S ON E.Super_ssn = S.Ssn JOIN DEPARTMENT D ON E.Dno = D.Dnumber WHERE D.Dname = 'Research';



d. This view summarizes each project's employee involvement and total working hours - CREATE VIEW V3 AS SELECT Pname, Dname, (SELECT COUNT(*) FROM WORKS_ON W1 WHERE W1.Pno = P1.Pnumber) AS Num_Employee, (SELECT SUM(W2.Hours) FROM WORKS_ON W2 WHERE W2.Pno = P1.Pnumber GROUP BY Pno) AS Total_Hours FROM PROJECT P1, DEPARTMENT D1 WHERE P1.Dnum = D1.Dnumber;

| Pname varchar(15) | * Dname varchar(15) | Num_Employee bigint | Total_Hours decimal(25,1) |
|-------------------|---------------------|---------------------|---------------------------|
| Computerization | Administration | 3 | 55.0 |
| Newbenefits | Administration | 3 | 55.0 |
| Reorganization | Headquarters | 3 | 25.0 |
| ProductX | Research | 2 | 52.5 |
| ProductY | Research | 3 | 37.5 |
| ProductZ | Research | 2 | 50.0 |

32. Similar to V3 but limited to projects that have more than 1 employee - CREATE VIEW V4 AS SELECT Pname, Dname, (SELECT COUNT(*) FROM WORKS_ON W1 WHERE W1.Pno = P1.Pnumber) AS Num_Employee, (SELECT SUM(W2.Hours) FROM WORKS_ON W2 WHERE W2.Pno = P1.Pnumber GROUP BY Pno) AS Total_Hours FROM PROJECT P1, DEPARTMENT D1 WHERE P1.Dnum = D1.Dnumber AND (SELECT COUNT(*) FROM WORKS_ON W2 WHERE W2.Pno = P1.Pnumber GROUP BY W2.Pno) > 1;

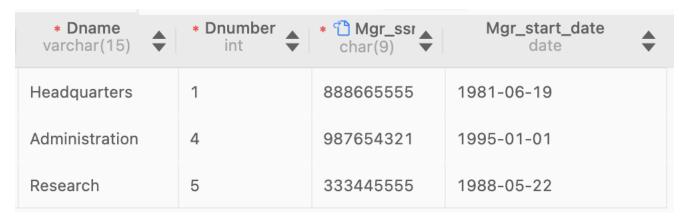
| Pname varchar(15) | * Dname varchar(15) | Num_Employee bigint | Total_Hours decimal(25,1) |
|-------------------|---------------------|---------------------|---------------------------|
| Computerization | Administration | 3 | 55.0 |
| Newbenefits | Administration | 3 | 55.0 |
| Reorganization | Headquarters | 3 | 25.0 |
| ProductX | Research | 2 | 52.5 |
| ProductY | Research | 3 | 37.5 |
| ProductZ | Research | 2 | 50.0 |

TABLE DATA

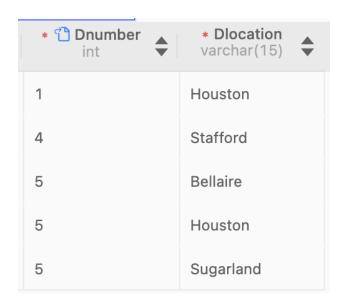
1. EMPLOYEE TABLE



2. DEPARTMENT TABLE



3. DEPT_LOCATIONS TABLE



4. PROJECT TABLE

| * Pname varchar(15) | * Pnumber int | Plocation varchar(15) ◆ | * 🖰 Dnum aint |
|---------------------|---------------|-------------------------|---------------|
| ProductX | 1 | Bellaire | 5 |
| ProductY | 2 | Sugarland | 5 |
| ProductZ | 3 | Houston | 5 |
| Computerization | 10 | Stafford | 4 |
| Reorganization | 20 | Houston | 1 |
| Newbenefits | 30 | Stafford | 4 |

5. WORKS_ON TABLE

| * Essn char(9) | * Pno int | Hours decimal(3,1) |
|----------------|-----------|--------------------|
| 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 | (NULL) |
| 987654321 | 20 | 15.0 |
| 987654321 | 30 | 20.0 |
| 987979897 | 10 | 35.0 |
| 987979897 | 30 | 5.0 |
| 999887777 | 10 | 10.0 |
| 999887777 | 30 | 30.0 |

6. DEPENDENT TABLE

| * Char(9) | * Dependent_name varchar(15) | Sex char(1) | Bdate date | Relationship varchar(8) |
|-----------|------------------------------|-------------|------------|-------------------------|
| 123456789 | Alice | F | 1988-12-30 | Daughter |
| 123456789 | Elizabeth | F | 1967-05-05 | Spouse |
| 123456789 | Michael | М | 1988-01-04 | Son |
| 333445555 | Alice | F | 1986-04-05 | Daughter |
| 333445555 | Joy | F | 1958-05-03 | Spouse |
| 333445555 | Theodore | М | 1983-10-25 | Son |
| 987654321 | Abner | М | 1942-02-28 | Spouse |