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CIS 552: Database Design – Homework 2

In this homework assignment, a single database called "COMPANY" was established. The database includes the following entities: "DEPARTMENT", "DEPT_LOCATION", "EMPLOYEES", "DEPENDENT", "PROJECT", and "WORKS_ON". To prevent the need for later modifications, the tables with foreign key references were created after their parent tables. Data was inserted into the tables based on the information from figure 5.6 in chapter 5 slides and the "company-data.sql" insert script.

To avoid errors or empty result and to provide examples of query results, some modifications were made to the insert scripts.

The script demonstrates the use of SQL syntax and concepts such as data types, column constraints, and relationships between tables. The script helped me understand database design and SQL basics in a practical manner. By writing and executing the script, I have gain hands-on experience with database creation and management.

1. Database creation and data population:

1. Create database COMPANY in any installed RDBMS software on your laptop/ desktop. Create tables, columns, and constraints as per figure 6.1 of ch-6 slides.

```sql
CREATE DATABASE COMPANY;


USE COMPANY;


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)
);
```

```sql
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 (
    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,
    Pnumber INT NOT NULL,
    Plocation VARCHAR(15) NOT NULL,
    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)
);
```

2. Populate data as per figure 5.6 of ch-5 slides. Using <u>insert</u> command <u>or</u> GUI features of the database. (If you want more rows then use the file "company-data.sql" available at myCourse, though it is not required)

```
INSERT INTO EMPLOYEE VALUES
  ('John','E','Smith','123456789','1965-01-09','731 Fondren,
Houston, TX','M',30000,333445555,5);
INSERT INTO EMPLOYEE VALUES
  ('Franklin','T','Wong','333445555','1955-12-08','638 Voss,
Houston, TX','M',40000,888665555,5);
INSERT INTO EMPLOYEE VALUES
  ('Alicia','J','Zelaya','999887777','1968-01-19','3321 Castle,
Spring, TX','F',25000,987654321,4);
INSERT INTO EMPLOYEE VALUES
  ('Jennifer','S','Wallace','987654321','1941-06-20','291 Berry,
Bellaire, TX','F',43000,'888665555',4);
INSERT INTO EMPLOYEE VALUES
  ('Ramesh','K','Narayan','666884444','1962-09-15','975 Fire
Oak, Humble, TX','M',38000,333445555,5);
INSERT INTO EMPLOYEE VALUES
  ('Joyce','A','English','453453453','1972-07-31','5631 Rice,
Houston, TX','F',25000,333445555,5);
INSERT INTO EMPLOYEE VALUES
  ('Ahmad','V','Jabbar','987987987','1969-03-29','980 Dallas,
Houston, TX','M',25000,987654321,4);
INSERT INTO EMPLOYEE VALUES
  ('James','E','Borg','888665555','1937-11-10','450 Stone,
Houston, TX','M',55000,null,1);
INSERT INTO EMPLOYEE VALUES
  ('Sam','S','Snedden','444444401','1977--07-31','987 Windy St,
Milwaukee, WI','M',48000,'444444400',7);
INSERT INTO EMPLOYEE VALUES
  ('Chris','A','Carter','444444402','1960-03-21','565 Jordan,
Milwaukee, WI','F',43000,'222222201',7);


INSERT INTO DEPARTMENT VALUES ('Research', 5, '333445555',
'1988-05-22');
INSERT INTO DEPARTMENT VALUES ('Headquarters', 1, '888665555',
'1981-06-19');
INSERT INTO DEPARTMENT VALUES ('Administration', 4, '987654321',
```

```sql
'1995-01-01');


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


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


INSERT INTO DEPENDENT VALUES ('333445555','Alice','F','1986-04-05','Daughter');
INSERT INTO DEPENDENT VALUES ('333445555','Theodore','M','1983-10-25','Son');
INSERT INTO DEPENDENT VALUES ('333445555','Joy','F','1958-05-03','Spouse');
INSERT INTO DEPENDENT VALUES ('987654321','Abner','M','1942-02-28','Spouse');
INSERT INTO DEPENDENT VALUES ('123456789','Michael','M','1988-01-04','Son');
INSERT INTO DEPENDENT VALUES ('123456789','Alice','F', '1988-12-30','Daughter');
INSERT INTO DEPENDENT VALUES ('123456789','Elizabeth','F','1967-05-05','Spouse');
INSERT INTO DEPENDENT VALUES ('444444402','Chris','M','1969-04-19','Spouse');
INSERT INTO DEPENDENT VALUES ('444444401','Sam','M','1964-02-14','Spouse');


INSERT INTO WORKS_ON VALUES ('123456789',1, 32.5);
INSERT INTO WORKS_ON VALUES ('123456789',2,  7.5);
INSERT INTO WORKS_ON VALUES ('666884444',3, 40.0);
INSERT INTO WORKS_ON VALUES ('453453453',1, 20.0);
INSERT INTO WORKS_ON VALUES ('453453453',2, 20.0);
INSERT INTO WORKS_ON VALUES ('333445555',2, 10.0);
INSERT INTO WORKS_ON VALUES ('333445555',3, 10.0);
INSERT INTO WORKS_ON VALUES ('333445555',10,10.0);
INSERT INTO WORKS_ON VALUES ('333445555',20,10.0);
```

```
INSERT INTO WORKS_ON VALUES ('999887777',30,30.0);
INSERT INTO WORKS_ON VALUES ('999887777',10,10.0);
INSERT INTO WORKS_ON VALUES ('987987987',10,35.0);
INSERT INTO WORKS_ON VALUES ('987987987',30, 5.0);
INSERT INTO WORKS_ON VALUES ('987654321',30,20.0);
INSERT INTO WORKS_ON VALUES ('987654321',20,15.0);
INSERT INTO WORKS_ON VALUES ('888665555',20,20.0);
```

2. Queries – Data extraction:

Design and write the following queries in SQL on the COMPANY relational database, which you created as above and run it and show the result of each query.

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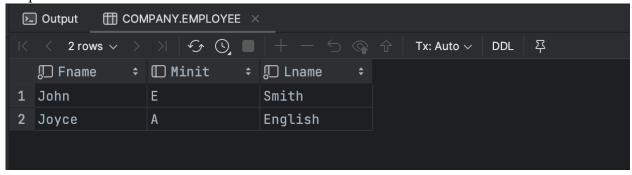
Query:

```
SELECT Fname, Minit, Lname
FROM EMPLOYEE
WHERE Dno=5 AND Ssn in (SELECT distinct (Essn) from WORKS_ON where  Hours > 10 AND Pno = 1);
```

Output:

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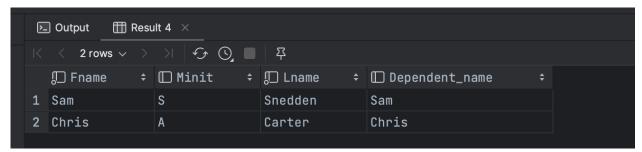
Query:

```
SELECT Fname, Minit, Lname, Dependent_name
FROM EMPLOYEE
LEFT JOIN DEPENDENT ON EMPLOYEE.Ssn = DEPENDENT.Essn
WHERE Dependent_name = Fname;
```

Output:

	Fname	Minit	Lname	Dependent_name
1	Sam	S	Snedden	Sam
2	Chris	A	Carter	Chris

3. Find the names of all employees who are directly supervised by 'John smith'.

Query:

```
21
22 ✓  SELECT EMP2.Fname, EMP2.Minit, EMP2.Lname
23     FROM EMPLOYEE EMP1
24     LEFT JOIN EMPLOYEE EMP2 ON EMP2.Super_ssn = EMP1.Ssn
25     WHERE CONCAT(EMP1.Fname,' ',EMP1.Lname) = 'John Smith';
26     |
```

Output:

	Fname	Minit	Lname
1	Chris	A	Carter
2	Sam	S	Snedden