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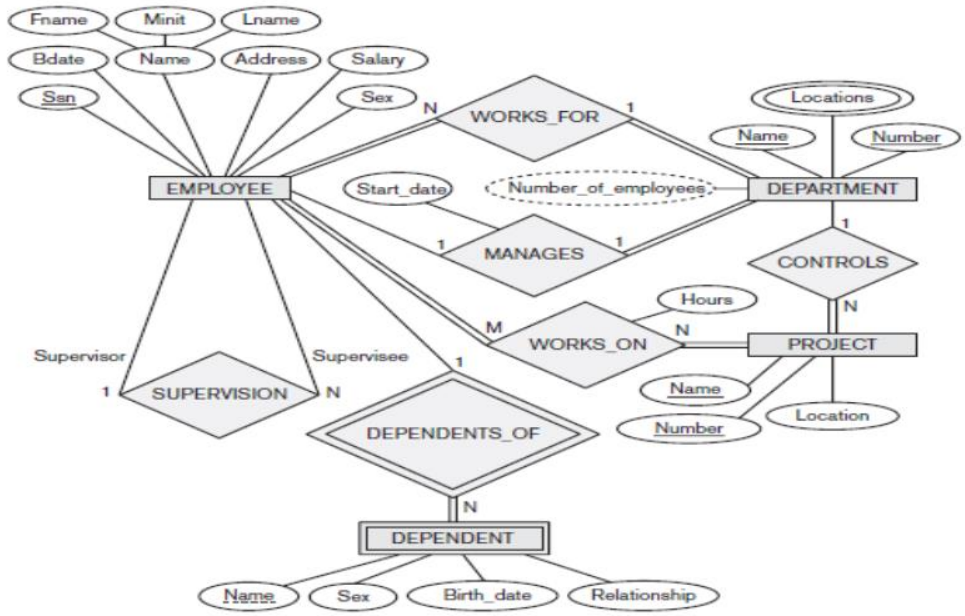
190905522 CSE D 62

DBS Lab 5 (Week 5) ER Model and SQL

Question: Design the database for the following ER Diagram



Solution: We create the schema of this ER Diagram as such:

COMPANY Database Schema

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

Figure 5.5
Schema diagram for the COMPANY relational database schema.

To create and populate the database, we run the command:

@"D:\CSE\CSE Labs\DBS Lab\DbDDL"

```
SQL> @"D:\CSE\CSE Labs\DBS Lab\DbDDL"
```

The DbDDL.sql file consists of the following code:

```
drop table employeeER;
drop table departmentER;
drop table locationsER;
drop table dependentsER;
drop table projectsER;
drop table worksER;

create table employeeER(
    fname varchar(20),
    minit varchar(1),
    lname varchar(20),
    bdate varchar(20),
    address varchar(50),
    ssn number(20),
    sex char(1),
    supervisor number(20),
    salary number(10),
    dept_no number(20),
    primary key(ssn)
);
--
insert into employeeER values('Dipesh','S','Chauhan','14-01-
2002','Winterfell',190905520,'M',190900000,100000,11111111);
insert into employeeER values('Hemangi','J','Jain','28-06-
2001','Winterfell',190905486,'F',190905520,40000,11111111);
insert into employeeER values('Shreya','F','Srikrishna','29-06-
2000','King''s Landing',180905154,'F',190905520,25000,11111111);
insert into employeeER values('Ayush','F','Goyal','01-01-
2000','King''s Landing',190905522,'M',180905154,10000,11111111);
insert into employeeER values('Ina','G','Goel','17-06-
2000','Dorne',190911224,'F',190900000,200000,22222222);
insert into employeeER values('Kaushikee','D','Agnihotri','02-09-
2000','Dorne',190907160,'F',190911224,30000,22222222);
insert into employeeER values('Parikalp','A','Singh','01-01-
2000','Arryn',190905356,'M',190907160,6000,22222222);
insert into employeeER values('Naman','I','Goel','01-01-
2001','Arryn',190905521,'M',190911224,20000,22222222);
insert into employeeER values('Abheesht','R','Roy','11-10-
2000','Winterfell',190911066,'M',190900000,400000,33333333);
```

```
insert into employeeER values('Vedant','R','Das','01-01-
1999','Winterfell',190905160,'M',190911066,20000,33333333);
insert into employeeER values('Nishika','N','Agarwal','01-01-
2002','Arryn',190905523,'F',190911066,30000,33333333);
insert into employeeER values('Pritima','C','Singh','28-03-
1976','Winterfell',190900000,'F',190900000,900000,11111111);
--
alter table employeeER add foreign key (supervisor) references employeeER(ssn)
;
--


create table departmentER(
    name varchar(20),
    dept_no number(20),
    emp_count number(10),
    manager number(20),
    start_date varchar(20),
    primary key(dept_no),
    foreign key(manager) references employeeER(ssn)
);
--
insert into departmentER values('Web Development',11111111,5,190905520,'02-06-
2021');
insert into departmentER values('CyberSecurity',22222222,4,190911224,'02-04-
2021');
insert into departmentER values('Machine Learning',33333333,3,190911066,'24-
03-2021');
--
alter table employeeER add foreign key (dept_no) references departmentER(dept_
no);
--



create table locationsER(
    dept_no number(20),
    area varchar(20),
    primary key (dept_no, area),
    foreign key (dept_no) references departmentER(dept_no)
);
--
insert into locationsER values(11111111, 'Winterfell');
insert into locationsER values(11111111, 'King''s Landing');
insert into locationsER values(22222222, 'Dorne');
insert into locationsER values(22222222, 'Arryn');
insert into locationsER values(33333333, 'Wintefell');
insert into locationsER values(33333333, 'Arryn');
--
```

```
create table dependentsER(
    ssn number(20),
    name varchar(20),
    sex char(1),
    bdate varchar(20),
    relationship varchar(20),
    primary key (ssn, name),
    foreign key (ssn) references employeeER(ssn)
);
--
insert into dependentsER values(190905520,'Pritima','F','28-03-
1976','Mother');
insert into dependentsER values(190905520,'Harshita','F','18-09-
2002','Sister');
--


create table projectsER(
    dept_no number(20),
    location varchar(20),
    name varchar(20),
    project_code number(20),
    primary key(project_code),
    foreign key(dept_no) references departmentER(dept_no)
);
--
insert into projectsER values(11111111, 'Winterfell', 'Web Scraper', 123456);
insert into projectsER values(11111111, 'King''s Landing', 'Forms', 1234567);
insert into projectsER values(22222222, 'Winterfell', 'Password Hashing', 123)
;
insert into projectsER values(33333333, 'Winterfell', 'DCGANS', 1234);
--


create table worksER(
    ssn number(20),
    project_code number(20),
    hours number(10),
    primary key(ssn, project_code),
    foreign key(ssn) references employeeER(ssn),
    foreign key(project_code) references projectsER(project_code)
);
--
insert into worksER values(190905520, 123456, 12);
insert into worksER values(190905520, 1234567, 30);
insert into worksER values(180905154, 123456, 24);
insert into worksER values(190905486, 1234567, 56);
```

```
insert into worksER values(190911224, 123, 105);
insert into worksER values(190905521, 123, 30);
insert into worksER values(190911066, 1234, 300);
insert into worksER values(190905523, 1234, 41);
```

Implement the following queries:

1.Retrieve the birth date and address of the employee(s) whose name is 'John B. Smith'. Retrieve the name and address of all employees who work for the 'Research' department.

```
select bdate, address
from employeeER
where fname = 'Ayush' and minit = 'F' and lname = 'Goyal';
select fname, minit, lname, address
from employeeER natural join departmentER
where name = 'CyberSecurity';
```

```
SQL> select bdate, address
  2  from employeeER
  3  where fname = 'Ayush' and minit = 'F' and lname = 'Goyal';

BDATE               ADDRESS
------------------- --------------------------------------------------
01-01-2000          King's Landing

SQL> select fname, minit, lname, address
  2  from employeeER natural join departmentER
  3  where name = 'CyberSecurity';

FNAME               M LNAME
------------------- - -------------------
ADDRESS
--------------------------------------------------
Ina                 G Goel
Dorne

Kaushikee           D Agnihotri
Dorne

Parikalp            A Singh
Arryn


FNAME               M LNAME
------------------- - -------------------
ADDRESS
--------------------------------------------------
Naman               I Goel
Arryn


SQL>
```

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

```
select project_code, p.dept_no, lname, address, bdate

from employeeER e, (select * from projectsER inner join departmentER using(dept_no) where location = 'Winterfell' ) p

where manager = ssn;
```

```
SQL> select project_code, p.dept_no, lname, address, bdate
  2  from employeeER e, (select * from projectsER inner join departmentER using(dept_no) where location = 'Winterfell' ) p
  3  where manager = ssn;

PROJECT_CODE    DEPT_NO LNAME
------------ ---------- --------------------
ADDRESS                                            BDATE
-------------------------------------------------- --------------------
      123456   11111111 Chauhan
Winterfell                                         14-01-2002

         123   22222222 Goel
Dorne                                              17-06-2000

        1234   33333333 Roy
Winterfell                                         11-10-2000


SQL>
```

3.Find all distinct salaries of employees.

```
select distinct salary

from employeeER;
```

```
SQL> select distinct salary
  2  from employeeER;

    SALARY
----------
    100000
     10000
    200000
     30000
     40000
     25000
    400000
      6000
     20000
    900000

10 rows selected.

SQL>
```

4.For each employee, retrieve the employee’s first and last name and thefirst and last name of his or her immediate supervisor.

```
select a.fname, a.lname, b.fname, b.lname

from employeeER a, employeeER b

where a.supervisor = b.ssn;
```

```
SQL> select a.fname, a.lname, b.fname, b.lname
  2  from employeeER a, employeeER b
  3  where a.supervisor = b.ssn;

FNAME                LNAME                FNAME
-------------------- -------------------- --------------------
LNAME
--------------------
Shreya               Srikrishna           Dipesh
Chauhan

Hemangi              Jain                 Dipesh
Chauhan

Ayush                Goyal                Shreya
Srikrishna
```

5.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 project_code
from projectsER
where project_code in ( select project_code
                        from worksER natural join employeeER
                        where lname = 'Chauhan' ) or project_code in ( select project_code
                                                                       from projectsER inner join ( select d.dept_no, lname
                                                                                                    from departmentER d, employeeER e
                                                                                                    where manager = ssn ) using(dept_no)
                                                                       where lname = 'Chauhan' );
```

```
SQL> select distinct project_code
  2  from projectsER
  3  where project_code in ( select project_code
  4                          from worksER natural join employeeER
  5                          where lname = 'Chauhan' ) or project_code in ( select project_code
  6                                                                         from projectsER inner join ( select d.dept_no, lname
  7                                                                                                      from departmentER d, employeeER e
  8                                                                                                      where manager = ssn ) using(dept_no)
  9                                                                         where lname = 'Chauhan' );

PROJECT_CODE
------------
      123456
     1234567

SQL>
```

6.Retrieve all employees who reside is in Houston, Texas.

```
select *
from employeeER
where address = 'Winterfell';
```

```
SQL> select *
  2  from employeeER
  3  where address = 'Winterfell';

FNAME               M LNAME               BDATE
------------------- - -------------------- --------------------
ADDRESS                                                 SSN S SUPERVISOR
-------------------------------------------------- ---------- - ----------
    SALARY    DEPT_NO
---------- ----------
Dipesh              S Chauhan             14-01-2002
Winterfell                                       190905520 M  190900000
    100000   11111111

Hemangi             J Jain                28-06-2001
Winterfell                                       190905486 F  190905520
     40000   11111111
```

7.Show the resulting salaries if every employee working on the ‘ProductX’ project is given a 10 percent raise.

select fname, lname, salary*1.01 as increasedsalary

from employeeER e, worksER w, projectsER p

where e.ssn = w.ssn and w.project_code = p.project_code and p.name = 'DCGANS';

```
SQL> select fname, lname, salary*1.01 as increasedsalary
  2  from employeeER e, worksER w, projectsER p
  3  where e.ssn = w.ssn and w.project_code = p.project_code and p.name = 'DCGANS';

FNAME               LNAME               INCREASEDSALARY
------------------- ------------------- ---------------
Abheesht            Roy                          404000
Nishika             Agarwal                       30300

SQL>
```

8.Retrieve all employees in department 5 whosesalary is between 30,000 and 40,000.

select *

from employeeER

where dept_no = 11111111 and salary between 30000 and 40000;

```
SQL> select *
  2  from employeeER
  3  where dept_no = 11111111 and salary between 30000 and 40000;

FNAME               M LNAME               BDATE
------------------- - -------------------- --------------------
ADDRESS                                                 SSN S SUPERVISOR
-------------------------------------------------- ---------- - ----------
    SALARY    DEPT_NO
---------- ----------
Hemangi             J Jain                28-06-2001
Winterfell                                       190905486 F  190905520
     40000   11111111


SQL>
```

9.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 fname, lname, project_code, dept_no

from employeeER natural join worksER order by dept_no, lname, fname;

```
SQL> select fname, lname, project_code, dept_no
  2  from employeeER natural join worksER order by dept_no, lname, fname;

FNAME                LNAME                PROJECT_CODE    DEPT_NO
-------------------- -------------------- ------------ ----------
Dipesh               Chauhan                   1234567   11111111
Dipesh               Chauhan                    123456   11111111
Hemangi              Jain                      1234567   11111111
Shreya               Srikrishna                 123456   11111111
Ina                  Goel                          123   22222222
Naman                Goel                          123   22222222
Nishika              Agarwal                      1234   33333333
Abheesht             Roy                          1234   33333333

8 rows selected.

SQL>
```

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

select *

from employeeER

where supervisor is null;

```
SQL> select *
  2  from employeeER
  3  where supervisor is null;

no rows selected

SQL>
```

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

select fname, lname

from employeeER e inner join dependentsER d using(ssn)

where fname = name and d.sex = e.sex;

```
SQL> select fname, lname
  2  from employeeER e inner join dependentsER d using(ssn)
  3  where fname = name and d.sex = e.sex;

no rows selected

SQL>
```

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

select fname, lname

from employeeER left outer join dependentsER using(ssn)

where name is null;

```
SQL> select fname, lname
  2  from employeeER left outer join dependentsER using(ssn)
  3  where name is null;

FNAME                LNAME
-------------------- --------------------
Vedant               Das
Nishika              Agarwal
Ina                  Goel
Abheesht             Roy
Pritima              Singh
Kaushikee            Agnihotri
Ayush                Goyal
Parikalp             Singh
Hemangi              Jain
Shreya               Srikrishna
Naman                Goel

11 rows selected.

SQL>
```

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

```
select distinct fname, lname
from ( select *
    from employeeER, departmentER
    where manager = ssn ) left outer join dependentsER d using(ssn)
where d.name is not null;
```

```
SQL> select distinct fname, lname
  2  from ( select *
  3         from employeeER, departmentER
  4         where manager = ssn ) left outer join dependentsER d using(ssn)
  5  where d.name is not null;

FNAME                LNAME
-------------------- --------------------
Dipesh               Chauhan

SQL>
```

14.Retrieve the Social Security numbers of all employees who work on project numbers 1, 2, or 3.

```
select ssn
from worksER
where project_code = 123456 or project_code = 1234 or project_code = 1234567;
```

```
SQL> select ssn
  2  from worksER
  3  where project_code = 123456 or project_code = 1234 or project_code = 1234567;

       SSN
----------
 190905520
 190905520
 180905154
 190905486
 190911066
 190905523

6 rows selected.

SQL>
```

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

```
select sum(salary) as sumsalary, max(salary) as maxsalary, min(salary) as minsalary, avg(salary) as avgsalary

from employeeER;
```

```
SQL> select sum(salary) as sumsalary, max(salary) as maxsalary, min(salary) as minsalary, avg(salary) as avgsalary
  2  from employeeER;

 SUMSALARY  MAXSALARY  MINSALARY  AVGSALARY
---------- ---------- ---------- ----------
   1781000     900000       6000 148416.667

SQL>
```

16.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 sumsalary, max(salary) as maxsalary, min(salary) as minsalary, avg(salary) as avgsalary

from ( select *

    from employeeER inner join departmentER using(dept_no) ) group by name having name = 'CyberSecurity';
```

```
SQL> select sum(salary) as sumsalary, max(salary) as maxsalary, min(salary) as minsalary, avg(salary) as avgsalary
  2  from ( select *
  3         from employeeER inner join departmentER using(dept_no) ) group by name having name = 'CyberSecurity';

 SUMSALARY  MAXSALARY  MINSALARY  AVGSALARY
---------- ---------- ---------- ----------
    256000     200000       6000      64000

SQL>
```

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

```
with proj(project_code, no_of_emp)

as (select project_code, count(*)

   from worksER group by project_code )

select project_code, name, no_of_emp

from proj inner join projectsER using(project_code);
```

```
SQL> with proj(project_code, no_of_emp)
  2  as (select project_code, count(*)
  3      from worksER group by project_code )
  4  select project_code, name, no_of_emp
  5  from proj inner join projectsER using(project_code);

PROJECT_CODE NAME                NO_OF_EMP
------------ ------------------- ----------
      123456 Web Scraper                  2
         123 Password Hashing             2
     1234567 Forms                        2
        1234 DCGANS                       2

SQL>
```

18.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.

```
with proj(project_code, no_of_emp)
as (select project_code, count(*)
   from worksER group by project_code )
select project_code, name, no_of_emp
from proj inner join projectsER using(project_code)
where no_of_emp > 2;
```

```
SQL> with proj(project_code, no_of_emp)
  2  as (select project_code, count(*)
  3      from worksER group by project_code )
  4  select project_code, name, no_of_emp
  5  from proj inner join projectsER using(project_code)
  6  where no_of_emp > 2;

no rows selected

SQL> with proj(project_code, no_of_emp)
  2  as (select project_code, count(*)
  3      from worksER group by project_code )
  4  select project_code, name, no_of_emp
  5  from proj inner join projectsER using(project_code)
  6  where no_of_emp >= 2;

PROJECT_CODE NAME                NO_OF_EMP
------------ ------------------- ----------
      123456 Web Scraper                 2
         123 Password Hashing            2
     1234567 Forms                       2
        1234 DCGANS                      2

SQL>
```

19.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.

```
with firsts(dept_no, no) as (select dept_no, count(*)
                             from employeeER group by dept_no ),
second(dept_no, no) as (select dept_no, count(*)
                        from employeeER
                        where salary > 40000 group by dept_no )
select a.dept_no, b.no
from firsts a, second b
where a.dept_no = b.dept_no and a.no > 5;
```

```
SQL> with firsts(dept_no, no) as (select dept_no, count(*)
  2      from employeeER group by dept_no ),
  3  second(dept_no, no) as (select dept_no, count(*)
  4      from employeeER
  5      where salary > 40000 group by dept_no )
  6  select a.dept_no, b.no
  7  from firsts a, second b
  8  where a.dept_no = b.dept_no and a.no > 5;

no rows selected

SQL>
```

THE END