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.
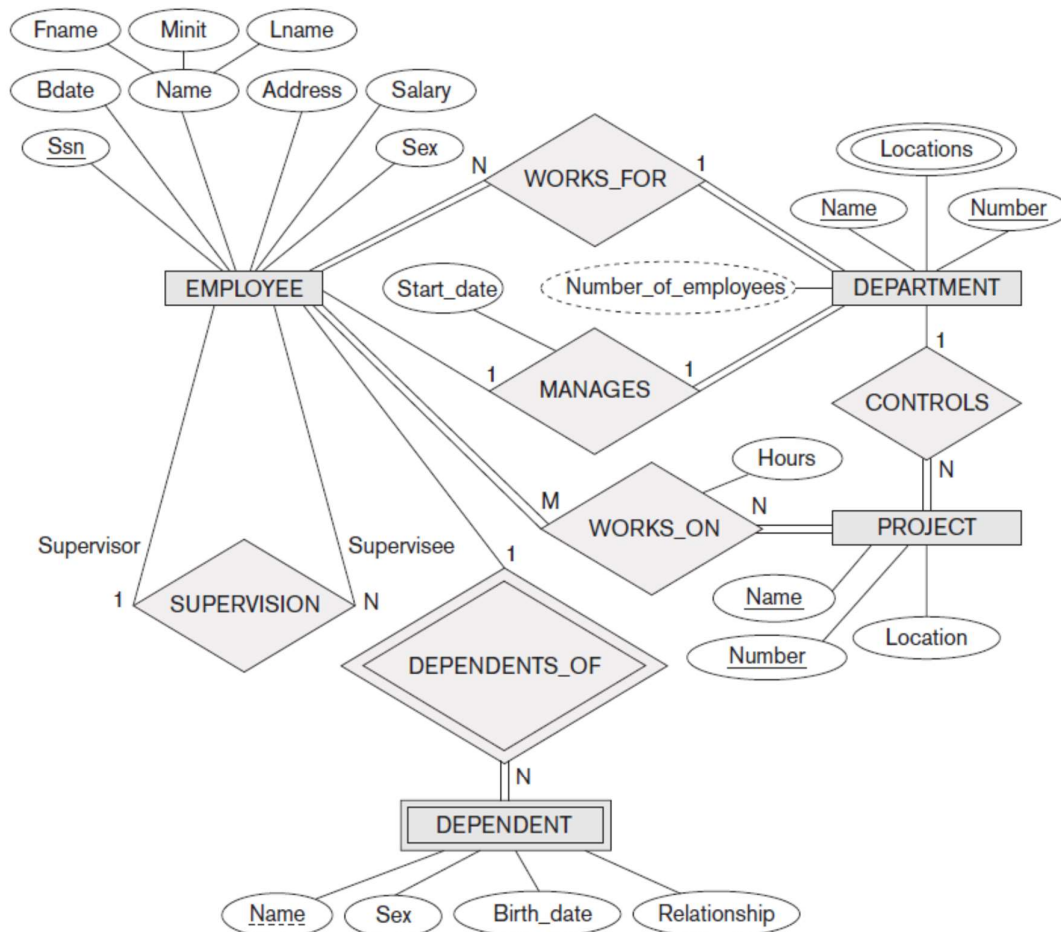
Figure 3.2
An ER schema diagram for the COMPANY database. The diagrammatic notation is introduced gradually throughout this chapter and is summarized in Figure 3.14.

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.

Lab 2 – Create the tables designed in ER diagram and schema and insert the valid values in the table.

Figure 5.6

One possible database state for the COMPANY relational database schema.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
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	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

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

DEPT_LOCATIONS

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship
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

```sql
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
        ( 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),
          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) );


CREATE TABLE EMPLOYEE
    ( ... ,
      Dno       INT         NOT NULL     DEFAULT 1,
    CONSTRAINT EMPPK
      PRIMARY KEY (Ssn),
    CONSTRAINT EMPSUPERFK
      FOREIGN KEY (Super_ssn) REFERENCES EMPLOYEE(Ssn)
                ON DELETE SET NULL       ON UPDATE CASCADE,
    CONSTRAINT EMPDEPTFK
      FOREIGN KEY(Dno) REFERENCES DEPARTMENT(Dnumber)
                ON DELETE SET DEFAULT    ON UPDATE CASCADE);
CREATE TABLE DEPARTMENT
    ( ... ,
      Mgr_ssn CHAR(9)       NOT NULL     DEFAULT '888665555',
      ... ,
    CONSTRAINT DEPTPK
      PRIMARY KEY(Dnumber),
    CONSTRAINT DEPTSK
      UNIQUE (Dname),
    CONSTRAINT DEPTMGRFK
      FOREIGN KEY (Mgr_ssn) REFERENCES EMPLOYEE(Ssn)
                ON DELETE SET DEFAULT    ON UPDATE CASCADE);
CREATE TABLE DEPT_LOCATIONS
    ( ... ,
    PRIMARY KEY (Dnumber, Dlocation),
    FOREIGN KEY (Dnumber) REFERENCES DEPARTMENT(Dnumber)
                ON DELETE CASCADE        ON UPDATE CASCADE);
```

Lab 3 - Selection and projection-based queries

1. Display all the tables created in the database.
2. Display all Employee's SSNs
3. Display Employee Name, Employee Number working in department number 5.
4. Retrieve the birth date and address of the employee(s) whose name is 'John B. 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.
6. Display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
7. For each employee, retrieve the employee's first and last name and the first and last name of his or her immediate supervisor.
8. Display Name of all the employees where the third letter of their name is _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 Manger's Employee No = '123456789'.
10. Display the Current Date.
11. Retrieve the salary of every employee

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'.
13. Display all valid combinations of Employee's Ssn and Department name in the database.
14. Display the Employee Name and Salary of all the employees earning more than 25000.
15. Retrieve the name and address of all employees who work for the 'Research' department.
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.
17. Retrieve all employees whose address is in Houston, Texas
18. Find all employees who were born during the 1950s.
19. Show the resulting salaries if every employee working on the 'ProductX' project is given a 10% raise.
20. Retrieve all employees in department 5 whose salary is between $30,000 and $40,000.
21. Find the names of all employees who are directly supervised by 'Franklin Wong'.

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.
23. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.
24. List the names of all employees who have a dependent with the same first name as themselves.
25. Create a table EMPLOYEE_BACKUP to back up the EMPLOYEE table
26. Retrieve the names of all employees who do not have supervisors.
27. Retrieve the name of each employee who has a dependent with the same first name and is the same sex as the employee.
28. For each project, retrieve the project number, the project name, and the number of employees from department 5 who work on the project.
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.
30. Retrieve the names of employees who make at least $10,000 more than the employee who is paid the least in the company.
31. Display Employee Name and Department Number for the Employee No= 7900.

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

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.
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.
35. Retrieve the total number of employees in the company
36. Retrieve the number of employees in the 'Research' department.
37. Count the number of distinct salary values in the database
38. Retrieve the names of all employees who have two or more dependents
39. For each department, retrieve the department number, the number of employees in the department, and their average salary.
40. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
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.
42. List the names of managers who have at least one dependent.
43. Retrieve all distinct salary values in COMPANY.
44. Display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
45. Display the no. of managers in the COMPANY.
46. Display the Department Name, Location Name, No. of Employees and the average salary in that department.
47. Display the Employee No. And Name for all employees who earn more than the average salary.

Lab 7 – Update/Delete-based queries

48. Increment the salary of managers in the COMPANY by 50%.
49. Decrement the salary of manager of project number 10 by 10% .
50. Update the name of project to 'XYZ' lead in department no 5.
51. Remove the dependents of employee with SNN = '123456789'
52. Change the location of research department to 'New York'.
53. Increment the salary of all the employees working on 'productX'.
54. Assign all the employees working under manager 333445555 to manager 987654321.
55. Delete all the employees having age greater than 65.
56. **Make** '333445555' as the default manager for any department.

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

58. Consider the WORKS_ON1 view, and issue the command to update the PNAME attribute of 'John Smith' from 'ProductX' to 'ProductY'.
59. Get rid of the view WORKS_ON1.
60. Create a view that has the department name, manager name, and manager salary for every department.
61. Create a view that has the employee name, supervisor name, and employee salary for each employee who works in the 'Research' department.
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.
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.
64. Create a view for a certain user who is only allowed to see employee information for employees who work for department 5.
65. Remove the attribute Address from the EMPLOYEE base table.

Lab 9 – Some more Nested Queries and complex subqueries
66. Retrieve the names of employees who have no dependents.
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.
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.
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.
70. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.
71. List the names of all employees who have a dependent with the same first name as themselves.
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.
73. Show the resulting salaries if every employee working on the 'ProductX' project is given a 15 percent raise.

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.
75. Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.
76. Retrieve the names of all employees whose supervisor's supervisor has '888665555' for Ssn.
77. Display Name of all employees who don't have Manager.
78. Display Employee full name, Age, Department Name and Department No for all the employees.
79. Display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.
80. Display the following for each employee <FName> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.