

1. For the Relation in Figure 3.6, Specify foreign keys for this schema, stating any assumptions you make.

2. Write appropriate SQL DDL statements to define the database.

3. Suppose each of the following update operations is applied directly to the database of Figure 3.6. Discuss all integrity constraints violated by each operation, if any, and the different ways of enforcing these constraints:

- a. Insert < 'Robert', 'F', 'Scott', '943775543', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1 > into EMPLOYEE.
- b. Insert < 'ProductA', 4, 'Bellaire', 2 > into PROJECT.
- c. Insert < 'Production', 4, '943775543', '01-OCT-88' > into DEPARTMENT.
- d. Insert < '677678989', null, '40.0' > into WORKS\_ON.

4. Specify the following queries in SQL on the COMPANY relational database schema shown in Figure 3.5. Show the result of each query if it is applied to the COMPANY database in Figure 3.6.

- a. Retrieve the names of employees in department 5 who work more than 10 hours per week on the 'ProductX' project.
- b. List the names of employees who have a dependent with the same first name as themselves.
- c. Find the names of employees that are directly supervised by 'Franklin Wong'.

5. Write SQL update statements to do the following on the database schema shown in Figure 1.2.

- a. Insert a Project <'ProjectNew', 25, ' SomeWhere',1> in the database.
- b. Change the Department of Employee 'Alicia' to 1.
- c. Delete the record for the Employee whose name is 'James' and SSN is 888665555.

6. Consider the EMPLOYEE table's constraint EMPSUPERFK as specified in Figure 3.6 is changed to read as follows:

**CONSTRAINT EMPSUPERFK FOREIGN KEY (Super\_ssn) REFERENCES  
EMPLOYEE(Ssn) ON DELETE CASCADE ON UPDATE CASCADE,**

Answer the following questions:

- a. What happens when the following command is run on the database state shown in Figure 3.6? DELETE EMPLOYEE WHERE Lname = 'Borg'
- b. Is it better to CASCADE or SET NULL in case of EMPSUPERFK constraint ON DELETE?

**Figure 3.6**

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