INFS2200/7903 – Relational Database Systems

School of Information Technology and Electrical Engineering (ITEE), UQ

Tutorial 2

Question 1 Suppose that each of the following operations is applied directly to the database in Figure 1. Discuss all integrity constraints violated by each operation, if any, given the schema in Figure 2.

EMPLOYEE

Fname	*Minit*	*Lname*	*SSN*	*BDate*	*Address*	*Sex*	*Salary*	*SuperSSN*	*Dno*
John	B	Smith	123456789	9-Jan-55	731 Fonden	M	3000	333445555	5
Franklin	T	Wong	333445555	8-Dec-45	638 Voss	M	4000	888665555	5
Alicia	J	Zeleya	999887777	19-Jul-58	3321 Castle	F	2500	987654321	4
Jennifer	S	Wallace	987654321	20-Jun-31	291 Berry	F	4300	888665555	4
Ramesh	K	Narayan	666884444	15-Sep-52	975 Fire Oak	M	3800	333445555	5
Joyce	A	English	453453453	31-Jul-62	5631 Rice	F	2500	333445555	5
Ahmad	V	Jabbar	987987987	29-Mar-59	980 Dallas	M	2500	987654321	4
James	E	Borg	888665555	10-Nov-27	450 Stone	M	5500	null	1

WORKS_ON

ESSN	*PNo*	*Hours*
123456789	1	32.5
123456789	2	7.5
666884444	3	40
453453453	1	20
453453453	2	20
333445555	2	10
333445555	3	10
333445555	10	10
333445555	20	10
999887777	30	30
999887777	10	10
987987987	10	35
987987987	30	5
987654321	30	20
987987987	20	15
888665555	20	null

DEPT_LOCATIONS

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

PROJECT

PName	*Pnumber*	*PLocation*	*DNum*
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganisation	20	Houston	1
Newbenefits	30	Stafford	4

DEPARTMENT

Dname	*Dnumber*	*MgrSSN*	*MgrStartDate*
Research	5	333445555	22-May-78
Admin	4	987654321	1-Jan-85
Headquarters	1	888665555	19-Jun-71

DEPENDENT

ESSN	*DepName*	*Sex*	*BDate*	*Relationship*
333445555	Alice	F	5-Apr-76	Daughter
333445555	Theodore	M	25-Oct-73	Son
333445555	Joy	F	3-May-48	Spouse
987654321	Abner	M	29-Feb-32	Spouse
123456789	Michael	M	1-Jan-78	Son
123456789	Alice	F	31-Dec-78	Daughter
123456789	Elizabeth	F	5-May-57	Spouse

Figure 1: Database

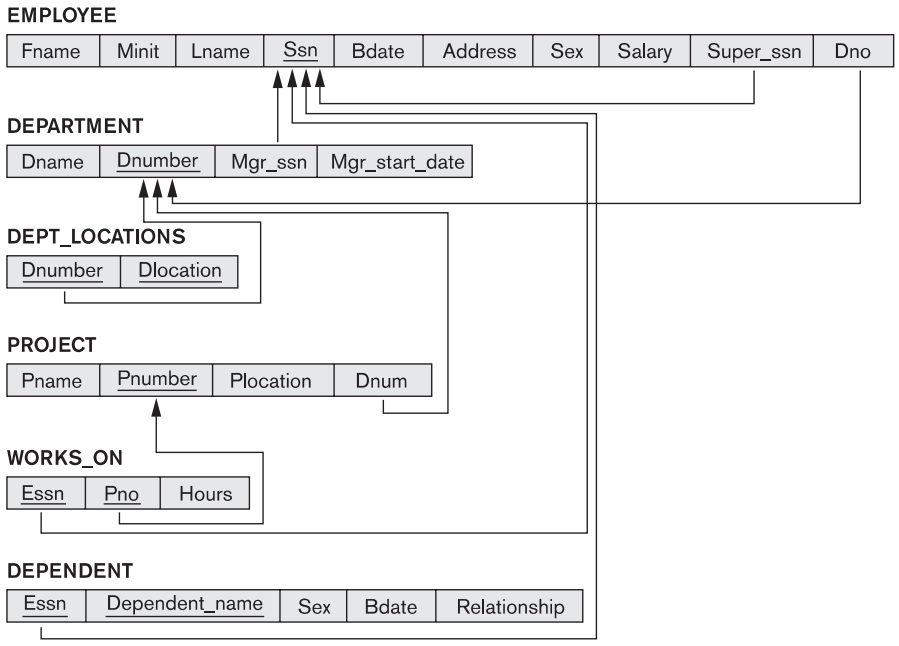

Figure 2: Schema Diagram

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

E. Insert < '453453453', 'John', 'M', '12-DEC-60', 'SPOUSE' > into DEPENDENT.

F. Delete the WORKS_ON tuples with ESSN = '333445555'.

G. Delete the EMPLOYEE tuple with SSN = '987654321'.

H. Delete the PROJECT tuple with PNAME = 'ProductX'.

I. Modify the MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER = 5 to '123456789' and '01-OCT-88', respectively.

J. Modify the SUPERSSN attribute of the EMPLOYEE tuple with SSN = '999887777' to '943775543'.

K. Modify the HOURS attribute of the WORKS_ON tuple with ESSN = '999887777' and PNO = 10 to '5.0'.

Question 2 Consider the following relational schema. An employee can work in more than one department; the pcttime field of the Works relation shows the percentage of time that a given employee works in a given department.

Emp (eid: integer, ename: string, age: integer, salary: real)
Dept (did: integer, dname: string, budget: real, managerid: integer)
Works (eid: integer, did: integer, pcttime: integer)

A. Give an example of a foreign key constraint that involves the Dept relation. What are the options for enforcing this constraint when a user attempts to delete a Dept tuple?

B. Write the SQL statements required to create the above relations, including appropriate versions of all primary and foreign key integrity constraints.

C. Define the Dept relation in SQL so that every department is guaranteed to have a manager.

D. Given the referential integrity constraints you chose for this schema, explain what happens when an SQL statement that deletes the Toy department is executed.

E. Define a table constraint on Emp that will ensure that every employee makes at least $10,000.

F. Define an assertion on Dept that will ensure that all managers have age > *30*.

G. Define an assertion that will ensure that the total percentage of all appointments for an employee is under 100%.

H. Define an assertion that will ensure that the manager must always have a higher salary than any employee that he or she manages.