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CSCI 4560
Dr. Dong
Homework 1
9/9/2014

CSCI 4560: Database Management Systems

Requirement: You **MUST** type your answer and print it. Handwriting is not acceptable. Non-print submissions will not be graded and therefore get 0 points.

Submission: Print it and enclose the hardcopy in an envelope/folder (9"x12"), and put your name, instructor name on the envelope. (**Note**: Please do not seal envelope. You can use the same envelope for all your assignments.)

3.11 - Suppose each of the following Update operations is applied directly to the database shown below. Discuss *all* integrity constraints violated by each operation, if any. Each operation is isolated from other operations. (5 points each. Total 55)

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

a) Insert < 'Robert', 'F', 'Scott', '943775543', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1 > into EMPLOYEE.
None violated

b) Insert < 'ProductA', 4, 'Bellaire', 2 > into PROJECT.
Violates referential integrity because Dnum = 2 and there is no Dnumber = 2 in the DEPARTMENT relation.

c) Insert < 'Production', 4, '943775543', '01-OCT-88' > into DEPARTMENT.
Violates key constraint because there is a Dnumber = 4 in the DEPARTMENT relation already, and Dnumber is the PK.
Violates referential integrity because the MGRSSN value 943775543 doesn't exist as a SSN value in the EMPLOYEE relation.

d) Insert < '677678989', null, '40.0' > into WORKS_ON.
Violates entity integrity because because PNO is null.
Violates referential integrity because the ESSN value 677678989 doesn't exist as a SSN value in the EMPLOYEE relation.

e) Insert < '453453453', 'John', M, '12-DEC-60', 'SPOUSE' > into DEPENDENT.
None violated

f) Delete the WORKS_ON tuples with ESSN= '333445555'.
None violated

g) Delete the EMPLOYEE tuple with SSN= '987654321'.
Violates referential integrity because the tuple being deleted is referenced by tuples in the WORKS_ON, DEPENDENT, DEPARTMENT, and EMPLOYEE relations.

h) Delete the PROJECT tuple with PNAME= 'ProductX'.
Violates referential integrity because the tuple being deleted is referenced by tuples in the WORKS_ON relation.

i) Modify the MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.
None violated

j) Modify the SUPERSSN attribute of the EMPLOYEE tuple with SSN= '999887777' to '943775543'.
Violates referential integrity because there is no tuple in the EMPLOYEE relation where SSN = 943775543

k) Modify the HOURS attribute of the WORKS_ON tuple with ESSN= '999887777' and PNO= 10 to '5.0'.
None violated

3.13 - Consider the relation CLASS(Course#, Univ_Section#, InstructorName, Semester, BuildingCode, Room#, TimePeriod, Weekdays, CreditHours). This represents classes taught in a university with unique Univ_Section#. Give what you think should be various (at least two) candidate keys and write in your own words under what constraints each candidate key would be valid. (15 points)
A. {Univ_Section#} if the section number is unique across all semesters, not just for the current one. Valid as a super key, a key, and a primary key
B. If Univ_Section# is not unique across all semesters, then {Univ_Section#, Semester}. Provided that the semester value includes the year. Valid as a super key, a key, and a primary key.

3.16 - Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course:

STUDENT (SSN, Name, Major, Bdate)
COURSE (Course#, Quarter, Grade)
ENROLL (SSN, Course#, Quarter, Grade)
BOOK_ADOPTION (Course#, Quarter, Book_ISBN)
TEXT (Book_ISBN, Book_Title, Publisher, Author)

Specify all the foreign keys for this schema. (15 points)
A. the attribute SSN of the ENROLL relation that references the STUDENT relation.
B. the attribute Course# in the ENROLL relation that references the COURSE relation.
C. the attribute Course* in the BOOK_ADOPTION relation that references the COURSE relation.
D. the attribute Book_ISBN in the BOOK_ADOPTION relation that references the TEXT relation.

3.19 - Consider a STUDENT relation in a UNIVERSITY database with the following attributes (Name, SSN, Local_phone, Address, Cell_phone, Age, GPA). Note that the cell phone may be from a different city and state (or province) from the local phone. A possible tuple of the relation is shown below: (5 points each. Total 20)

Name	SSN	LocalPhone	Address	CellPhone	Age	GPA
George Shaw William Edwards	123-45-6789	555-1234	123 Main St., Anytown, CA 94539	555-4321	19	3.75

a. Identify the critical missing information from the LocalPhone and CellPhone attributes as shown in the example above. (Hint: How do call someone who lives in a different state or province?)

We need the area code and maybe even country code for international numbers

b. Would you store this additional information in the LocalPhone and CellPhone attributes or add new attributes to the schema for STUDENT?
I would store the entire number (including area and / or country code) in one attribute.

c. Consider the Name attribute. What are the advantages and disadvantages of splitting this field from one attribute into three attributes (first name, middle name, and last name)?
Advantages: splitting all of the names into different attributes. i.e. - fName, mName, lName, suffix, etc. would make it easier to sort information based on those attributes.
Disadvantages: It's more columns to maintain, and application interface is more involved.

d. What general guideline would you recommend for deciding when to store information in a single attribute and when to split the information.
One only needs to split information into multiple attributes if the division will be used in the application. i.e. - if the application regularly makes use of the last 4 digits of a SSN, then it might be better to split the SSN into 2 or more attributes.