UT D

CS4347.0U1 Database Systems

Assignment 5:

<mark>**Due back on: Friday, July 31, 2015 at 11:00pm.**</mark> **Please note it is due back on** **Friday July 31, 2015 at 11:00pm**.

This is from our syllabus: No e-mail submissions are accepted. No late submissions are accepted. Please plan accordingly and do not leave your submissions to the last minute. If you encounter a problem during eLearning submission, please contact 24/7 eLearning Help IMMEDIATELY. This help is available 24/7 at:
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Any submission that is missed will be graded with a zero. Please do not insist for exceptions.

Purpose: Demonstrate the ability to understand and implement update anomalies, functional dependencies, and normalization. Also demonstrate the ability to understand and implement transaction processing & concurrency, and scheduling of concurrent database transactions.

1. (20 POINTS) Given the following table for a College student enrollment:
STUDENT_ENROLLMENT

Ssn	StudentCity	StudentClass	OfferNo	Term	Year	GPA	CourseNumber	CourseDescription
111111111	Plano	Sophomore	1	Fall	2014	3.7	2321	Database Systems
111111111	Plano	Sophomore	2	Fall	2014	3.5	2322	C++
222222222	Dallas	Sophomore	3	Spring	2015	3.3	2323	Networking
222222222	Dallas	Sophomore	2	Fall	2014	3.6	2322	C++

1.A.) (15 POINTS) Criticize this design from the perspective of 3 update anomalies by giving examples for each.

1.B.) (5 POINTS) Suggest an alternative design that will not cause the update anomalies you've mentioned in 1.A.

2. (30 POINTS) Given the following tables and functional dependencies answer the corresponding questions.

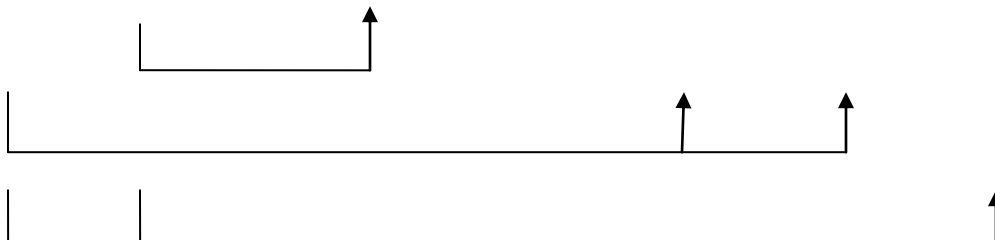**2.A.) (10 POINTS) Why the OFFICE table below is not in 1NF? Normalize it into 1NF. Please show your work.**

OFFICE

OfficeNo	OfficeAddress	TelNo
O0001	1 Main Street Pocatello, ID	1111111111, 2222222222, 3333333333
O0002	2 Clark Street, Frisco, TX	4444444444, 5555555555
O0003	3 Broadway Street, NY	6666666666
O0004	4 Pearl Street, Dallas, TX	7777777777, 8888888888

2.B.) (10 POINTS) Why the STAFF_TASK table below is not in 2NF? Normalize it into 2NF. Please show your work.

STAFF_TASK

StaffNo	OfficeNo	OfficeAddress	StaffName	Title	Hours
S1005	O0002	2 Clark Street, Frisco, TX	Fred Marble	Accountant	20
S1005	O0004	4 Pearl Street, Dallas, TX	Fred Marble	Accountant	13
S3900	O0002	2 Clark Street, Frisco, TX	Ester Trail	Accountant	18
S3900	O0004	4 Pearl Street, Dallas, TX	Ester Trail	Accountant	14

2.C.) (10 POINTS) Why the OFFICE_MANAGER table below is not in 3NF? Normalize it into 3NF. Please show your work.

OFFICE_MANAGER

OfficeNo	OfficeAddress	TelNo	StaffNo	ManagerName
O0001	1 Main Street Pocatello, ID	1111111111	S6155	Uma Elf
O0002	2 Clark Street, Frisco, TX	4444444444	S2004	Nick Nathan
O0003	3 Broadway Street, NY	6666666666	S0130	Beckie Ross
O0004	4 Pearl Street, Dallas, TX	7777777777	S2490	Tim Tail
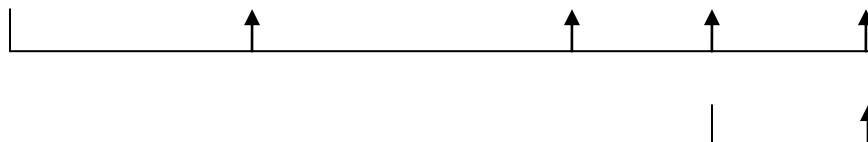
3. (20 POINTS) Determine which of the following schedules is (conflict) serializable and which are not. Please explain why. For each serializable schedule, determine the equivalent serial schedules.

1.A.) r1 (X); r3 (X); w1(X); r2(X); w3(X)

1.B.) r1 (X); r3 (X); w3(X); w1(X); r2(X)

1.C.) r3 (X); r2 (X); w3(X); r1(X); w1(X)

1.D.) r3 (X); r2 (X); r1(X); w3(X); w1(X)

4. (20 POINTS) Consider the three transactions T1, T2, and T3, and the schedules S1 and S2 given below. Draw the serializibility (precedence) graphs for S1 and S2 and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).

T1: r1(x); r1(z); w1(x)
T2: r2(z); r2(y); w2(z); w2(y)
T3: r3(x); r3(y); w3(y)
S1: r1(x); r2(z); r1(z); r3(x); r3(y); w1(x); w3(y); r2(y); w2(z); w2(y)
S2: r1(x); r2(z); r3(x); r1(z); r2(y); r3(y); w1(x); w2(z); w3(y); w2(y)

5. (10 POINTS) Given the following two transactions:
T1: read(X);
    read(Y);
    if (X==0) then Y = Y + 1;
    write(Y)

T2: read(Y);
    read(X);
    if (Y==0) then X = X + 1;
    write(X)

5.A.) (5 POINTS) Add lock and unlock instructions to transactions T1 and T2 so that they implement the two-phase locking (2PL) protocol.

5.B.) (5 POINTS) Can the execution of transactions T1 and T2 with 2PL result in a deadlock? Please explain on a sample schedule.

Naming Convention:

If you are submitting multiple files, please create a ZIP file of all your files and use the following naming convention for your ZIP file:
CS4347-Assignment<number>-<FirstName><LastName>.zip.

So, student John Smith will name his 1st assignment zip file as:

CS4347-Assignment1-JohnSmith.zip

If you are submitting a single file, please name your file as:

CS4347-Assignment1-JohnSmith.doc or .pdf, etc.

Good luck.