GROUP PROJECT 4

Assigned: 11/14/2016; Due 1:30 PM, 11/30/2016

(BOTH a Hard copy and Soft copy of your solutions need to be submitted; a hard copy is submitted in class AND a soft copy is submitted to the class website; Late submission will not be accepted; Read the "Group Project Grading Policy" posted on the class website.)

Problem 1 (40%):
Given the following relational scheme where each attribute is atomic:

R (A, B, C, D, E, F, G)

and a set of functional dependencies:

SetOfFDs = {A -> B, B -> AC, F -> ACDE, ADE -> FG}

a)   Find ALL candidate keys for scheme R; show your work.
b) For each of the normal forms (1NF, 2NF, 3NF, BCNF), **explain in detail** why R satisfies/does not satisfy with respect to the set of functional dependencies SetOfFDs.
c) Use the decomposition algorithm discussed in class to obtain the *lowest normal form* that the scheme R *does not satisfy* with respect to SetOfFDs; show your work. For each resulting scheme, give its **complete** set of functional dependencies and candidate keys. You must explain why your resulting schemes are in the desired normal form.
d) Explain in detail why your decomposition obtained in (c) is/is not loss-less join.
e) Explain in detail why your decomposition obtained in (c) is/is not dependency-preserving.

Problem 2 (30%):
Select a database application of your choice, describe the application in details including a set of requirements and the corresponding functional dependencies that should hold among the attributes. Then, design the relational schemas for your database so that every schema is in 3NF or BCNF. Your relational database must contain at least 4 relational schemas.   You must justify that each of your relational schemas is in 3NF or BCNF. The application must not come from the textbooks/ lecture notes / homework assignments / class projects / exams / examples / qualifying exams used for CS 4513 at the University of Oklahoma. If you have copied the application from some other sources, you must provide the references of the sources in your answers. If you designed an ER diagram for this problem, do not turn it in; we will not grade your ER diagram.
Notes for Problem 2: you need to justify the functional dependencies you provide by explaining which functional dependency represents which requirement(s) in your application. Without the justifications, your solution for problem 2 will not be graded and a zero score will be given for your problem 2.

Problem 3 (30%):
You have been employed by the Centers for Disease Control and Prevention (CDC) to design and implement a database system that stores the information about past and current Zika patients and Zika related activities in the U.S. and other countries for the public to access through the Internet. The information includes both the information provided by the CDC and the information that the system will obtain from the Web and social media. Read the Lecture Topic 7 "Evaluating and

Controlling Technology" and its associated Chapter 7 in the "Gift of Fire" textbook. Give CONCISE answers to the following questions:

a) What factors would you consider when getting the information from the Web and social media and storing it in the system? Explain the impacts of those factors on EACH of the following: 1) users, 2) CDC, and 3) society.

b) Assuming that you have decomposed one of your database tables T into two tables T1 and T2, and the decomposition is a lossy join decomposition. Give an example of the contents of tables T, T1 and T2 (use meaningful table names instead of T, T1 and T2, and meaningful contents with respect to the Zika tracking application), and then discuss the impacts of such lossy join decomposition (using the table contents you have provided) on EACH of the following: 1) users, 2) CDC, and 3) society.

SUBMISSION:
- Your solutions must be typed; no hand-written solutions will be graded.
- Submit your solutions for all three problems in one single PDF file with the file name convention (GP4_Group X where X is your group number) to the class website. Submit a hard copy of your file in class. Both soft copy and hard copy are due at 1:30 PM, 11/30/2016. No late submission will be accepted.
- Within 24 hours after the due time, submit the grades you give to your group members in a text file (file extention .txt; file name GP4_Group Grading_Your First name_Your Last name) to the Dropbox of Group Project 4 (do not use Email). In this file, include your name, your group number, the names of your group members and the grades you give to them. If you do not submit your member grades by that time, we will assume that you give equal points to all your group members (i.e. 10 points to each of your group members). **Read the "Group Project Grading Policy" posted on the class website.**