**CSCD 327 – Take-Home Midterm Exam II**

**Due: August 11, 2014, 11:59pm**

**Please submit online via Canvas system.**

**No late submission will be accepted.**

**No discussion, no collaboration please!!!**

Your name:

1. (20 points) SQL Queries

Consider the following relational schema (primary keys are underlined):

Product(pid, name, price, mfgr)

Buys(cid, pid)

Customer(cid, cname, age)

1. Consider the following SQL query:

SELECT C.cid, C.cname

FROM Customer C, Buys B

WHERE C.cid = B.cid

GROUP BY C.cid

HAVING count(pid) > 100

Rewrite the above SQL query **without** using the “HAVING” clause so that the resulting query still produces the same query result.

1. Write the following query **in SQL**: Find the *cids* of customers who buy **only** the products made by manufactory “D” (i.e., mfgr = ‘D’).
2. Write the following query **in SQL**: “Find the *cids* and *cnames* of all customers who have purchased the **second most expensive** product.” You can assume that no two products have the same price. Please don’t use “ORDER BY … LIMIT …” in your answer.

Consider the following relational schema, where the primary keys are underlined,

*Students(sid, sname, address, department\_id)*

*Courses(cid, cname, year, semester, department\_id)*

*Departments(department\_id, dname, college)*

*Grades(sid, cid, grade)*

1. Write the following queries in **SQL**: Give all students who have selected Database course (i.e., *cname* = ‘Database’) in Fall 2012 a 10 percent grade raise.
2. **(5 points)** **Stored Procedure**

Consider the following stored procedure defined in MySQL.

|  |
| --- |
| DELIMITER $$  CREATE PROCEDURE MyProcedure(IN String VARCHAR(80), OUT newString VARCHAR(80), OUT Length INTEGER)  BEGIN  SET newString = UPPER(String);  SET Length = LENGTH(newString);  **SELECT String, newString, Length;**  END$$  DELIMITER ; |

What are the outputs after executing the following statements?

|  |
| --- |
| **CALL MyProcedure('My Stored Procedure', @newString, @Length);**  **SELECT @newString, @Length;** |

1. **(13 points) Design Theory**
2. Given a relation schema R = (A, B, C, D, E), and a set of functional dependencies F = {A 🡪 C, BD 🡪 E, AD 🡪 E} held on R. **AB** is a candidate key.
   1. (4 points) Is R in BCNF? If not, decompose it into smaller relations such that these smaller relations are in BCNF.
   2. (4 points) Is the decomposition a lossless-join decomposition? Is the decomposition dependency preserving? **Justify your answer**.
3. For relation R(A, B, C, D, E) and given set of functional dependencies F={AB🡪C, C🡪D, D🡪B, D🡪E}
   1. (3 points) List all the candidate keys of relation R.
   2. (2 points) Indicate all the 3NF violations.
4. **(12 points) ERD**

A university database contains information about professors (identified by social security number, or SSN) and courses (identified by Course\_ID). Professors ***teach*** courses; each of the following situations concerns the ***teach*** relationship set. For each situation, draw an ER diagram that describes it (assuming no further constraints hold).

1. Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (**Assume this condition applies in all subsequent questions.**)
2. Every professor must teach some course.
3. Every professor teaches exactly one course (no more, no less).
4. Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor.