

CS411 Database Systems  
*Fall 2009*

HW#2

Due: 3:15pm CST, October 1, 2009

Note: Print your name and NetID in the upper right corner of every page of your submission. Hand in your stapled homework to Donna Coleman in 2106 SC. In case Donna is not in office, slide your homework under the door. Expect to lose points if your handwritten answer is unclear or misread by the grader.

To grade homeworks faster, the homework is partitioned into two parts. **Please, submit each part separately.** For each part, make sure to write down your name and NetID.

This homework is partitioned into two parts as follows:

- Part 1: Problem 1 - Problem 2
- Part 2: Problem 3 - Problem 4

For all questions, please write any assumptions that you think are necessary.

## ***Part 1***

### **Problem 1** Relational Algebra (15 points)

Consider the following relations:

Product(productName, productCategory, productDescription)

Manufacturer(manufacturerName, city)

Supply(manufacturerName, productName, storeName, wholesaleUnitPrice, quantity)

Store( storeName, phoneNumber, city)

Please give queries using relational algebra to answer the following questions. You do not have to worry about duplicate tuples in a relation.

- a) Find the names of all products that fall under the category “electronics”. (3 points)
- b) Find the names of all manufacturers that supply products with “4GB memory” as its description. (3 points)
- c) Find the names and phone numbers of all stores that purchases any product under category “office supplies” for less than the wholesale unit price of \$10. (3 points)
- d) Find the name of the manufacturer that supplies the largest quantity of any product. (3 points)
- e) Find the category of the product that has the minimum wholesale price. (3 points)

## **Problem 2** SQL - Basics (15 points)

This problem uses the same set of relations as problem 1, which are repeated here:

Product(productName, productCategory, productDescription)

Manufacturer(manufacturerName, city)

Supply(manufacturerName, productName, storeName, wholesaleUnitPrice, quantity)

Store(storeName, phoneNumber, city)

Please give the SQL queries to answer the following questions. You do not have to worry about duplicate tuples in a relation and you can assume reasonable data types for the columns. Note that you are not allowed to use the aggregation functions in SQL for these questions.

- a) Find names of all stores that are in the city of “Champaign”. (3 points)
- b) Find the name of the manufacturer that supplies the largest quantity of any product. (4 points)
- c) Find the names and the cities of all manufactures that supply any product of more than 100 units whose wholesale unit price is greater than \$50. (4 points)
- d) Find the names of store-manufacturer pairs where the store and the manufacturer in each pair is located in the same city and there is a supply record of the manufacturer whose total cost (i.e. unit price multiplied by quantity) is greater than \$10,000. (4 points)

## ***Part 2***

### **Problem 3** SQL - Subqueries (15 points)

Consider the following relations:

Computer(maker, modelName, type, price)

PC(modelName, speed, ram, hardDrive)

Laptop(modelName, speed, ram, hardDrive, screenDimension)

Note that both PC and Laptop are Computers, identified by *type* field.

Write the following queries in SQL. You are not allowed to use the aggregation functions in SQL for these questions, and no duplicates should be printed in any of the answers.

- a) Find the maker of the fastest PC. (3 points)
- b) Find the model number of laptops whose speed is slower than that of any PC. (4 points)
- c) Find the list of maker-modelNumber pair where the model in each pair is the most expensive model for the maker. (4 points)

**Problem 4** SQL- Grouping and Aggregates (15 points)

This problem uses the same set of relations as problem 3, which are repeated here:

Computer(maker, modelNumber, type, price)

PC(modelNumber, speed, ram, hardDrive)

Laptop(modelNumber, speed, ram, hardDrive, screenDimension)

Write the following queries in SQL. No duplicates should be printed in any of the answers. This time, you may use the aggregation functions in SQL.

- a) Find the maximum price of PCs. (3 points)
- b) Find the average speed of laptops costing over \$1000. (3 points)
- c) Find the number of distinct makers for each type of computers. (4 points)
- d) Find the maker that makes the largest number of computers. (5 points)