# CS561 – Programming Assignment 1

## Due Dates: Sec. A-10/28/2015 (Wed.) & Sec. B-10/29/2015 (Thu.)

**Objectives**

- To become familiar with the concept of *database application programming* and *query evaluation/processing*.

**Description**

"<u>Simple Database Application Program #1</u>" (`sdap1.pgc`)

- Generate 2 separate reports based on the following queries (one report for query #1 and another for query #2):

  1. For each combination of *customer* and *product*, compute the <u>maximum</u> and <u>minimum</u> sales quantities along with the <u>corresponding dates</u> (i.e., dates of those maximum and minimum sales quantities) and the <u>state</u> in which the sale transaction took place. If there are >1 occurrences of the max or min, choose one – do not display all.

     For the same combination of *product* and *customer*, compute the <u>average</u> sales quantity.

  2. For each combination of *customer* and *product*, output the <u>maximum sales quantities for NY and NJ</u> and <u>minimum sales quantities for CT in 3 separate columns</u>. Like the first report, display the <u>corresponding dates</u> (i.e., dates of those maximum and minimum sales quantities). Furthermore, for NY and NJ, include only the sales that occurred between 2000 and 2005; for CT, include all sales.

For this assignment, you can use a simple data structure (e.g., an array) to maintain the list of "information" being captured (we will discuss the type of information you will need to capture and maintain internally for the report over the next couple of lectures).

The following is a sample output – quantities displayed are for illustration only (not the actual values). (NOTE – the following output must be generated with a <u>single scan</u> of the 'sales' table).

```
CUSTOMER  PRODUCT   MAX_Q  DATE        ST  MIN_Q  DATE        ST  AVG_Q
========  =======   =====  ==========  ==  =====  ==========  ==  =====
Bloom     Pepsi      2893  01/01/2006  NJ     12  09/25/2001  NY   1435
Sam       Milk        159  02/15/2002  NJ      1  03/23/2004  CT     56
Emily     Bread      3087  07/01/2005  NY      2  02/02/2001  NJ   1512


CUSTOMER  PRODUCT   NY_MAX  DATE        NJ_MAX  DATE        CT_MIN  DATE
========  =======   ======  ==========  ======  ==========  ======  ==========
Sam       Egg         1908  01/11/2001     234  07/24/2005       2  11/03/2008
Helen     Cookies      392  03/31/2002    2342  09/14/2000      11  07/23/2002
Bloom     Butter      7045  09/22/2003     923  03/10/2004       8  09/11/2006
```

Make sure that:

1. "**select * from sales**" is the <u>ONLY SQL statement</u> allowed in your program.

2. Character string data (e.g., customer name and product name) are <u>left justified</u>.

3. Numeric data (e.g., Maximum/minimum Sales Quantities) are <u>right justified</u>.

4. The Date fields are in the format of <u>MM/DD/YYYY</u> (i.e., 01/02/2002 instead of 1/2/2002).

**Grading**
- (80 pts.) Logic/Correctness
- (20 pts.) Programming Style (e.g., comments, indentation, use of functions, etc.)
  **NOTE: A program with compilation errors will earn no more than 50 points**.

**Sample Command Line**

`$ sdap1 [sales], where 'sales' is an optional argument for the table name.`

**Submission**

Submit your source code (file) (with your name and CWID on it) on Canvas.

Please include a "README" file with detailed instructions on how to compile and run the code, especially if you are using a language other than C, C++ or Java.

Please remember the following points when you're working on your programming assignments:

1. Your program <u>must compile and execute based on the instructions provided in the README file</u> (i.e., if your programs contain special functions for other compilers and does not compile based on README, you WILL lose 50% of the grade for the assignment).

2. Programming style is 20% of the grade. Please make sure to <u>provide comments for the program, functions, etc. as well as in-line comments as needed</u>. Also, make sure to use <u>meaningful names</u> for your classes, variables, methods/functions, etc. Use <u>proper indentation</u>.

3. In the <u>header comments</u> for your program (i.e., at the beginning of your program), please provide:

   a. <u>General instructions on how to execute your program</u> (e.g., command line for the program and whatever arguments it requires). This can be a simple copy & paste of the README file, or you can provide a simplified bullet listing of the steps for compiling and executing the code.

   b. <u>Justification of your choice of data structures for your program</u> – e.g., if you're using a linked list to maintain whatever information necessary for your program, justify why it's a data structure of your choice, as opposed to, say, arrays. If you're using other more sophisticated data structures, please provide a brief description of the data structures and again justify as to why you chose the data structures for your program.

   c. <u>A detailed description of the algorithm of your program</u>, e.g., how you're computing and maintaining the aggregates (e.g., min, max, avg) for your query output. You can do this with a detailed pseudo code.

4. Remember the <u>only SQL statement allowed in your program is the simple select statement,</u> <u>"select * from sales"</u>. Points will be deducted if you use any other SQL statements in your programs.

5. You are <u>NOT allowed to read in the entire table ('sales') and store them in memory</u> before processing the rows. Instead, you need to <u>read each row (one row at a time), process it and discard it</u>.

Most importantly, **<span style="color:red">make sure it's your own work</span>**! If we determine that your program is a copy of someone else's, both you and that someone else will receive 0 for the assignment and possibly additional penalties for the course.

Student Name:_____

| Major Area | Item | Max | Deduct | Score | % | Total |
|---|---|---|---|---|---|---|
| *Compilation* | If fails, subtract … | **50** | | | | |
| | Correct max( ) for NY | 10 | | | | |
| | Correct max( ) for NJ | 10 | | | | |
| | Correct min( ) for CT | 10 | | | | |
| | Correct max( ) | 5 | | | | |
| | Correct min( ) | 5 | | | | |
| | Correct max & min DATES | 5 | | | | |
| | Correct STATE | 5 | | | | |
| | Correct avg( ) | 5 | | | | |
| | Output Format | 20 | | | | |
| | Single Scan (YES/NO) | 25 | | | | |
| | **Total** | **100** | | | **80%** | |
| *Style* | Header Comment | 30 | | | | |
| | Function Comment | 10 | | | | |
| | Line Comment | 10 | | | | |
| | Indentation | 10 | | | | |
| | Line/Block Spacing | 10 | | | | |
| | Meaningful Identifier Names | 20 | | | | |
| | Other | 10 | | | | |
| | **Total** | **100** | | | **20%** | |
| *Total* | | **100** | | | **100%** | |