COMP10120 Practical Set 3: Arrays, Duration and Scope

Part 1

1. Write a C program to model a simple savings account for a customer. The program should have functions to capture the following functionality:

    - Lodge funds
    - Withdraw funds
    - Get the current Balance
    - Get the total number of transactions

    Provide test code in the main function to demonstrate the program. **The program must demonstrate the use of a global variable <u>and</u> a local static variable.**

Part 2

2. Write a <u>C program</u> which initially creates 2 two-dimensional integer arrays: *arrayA* and *arrayB*. The size of the arrays should be equal and specified by user input. Each array should be filled with random numbers between 5 and 100. The program should then create new arrays for each of the following situations:

    - An array containing the product of corresponding cells in *arrayA* and *arrayB*
    - An array containing the sum of corresponding cells in *arrayA* and *arrayB*
    - An array containing the average of corresponding cells in *arrayA* and *arrayB*
    - An array containing the sum of corresponding rows in *arrayA* and *arrayB*
    - An array containing the sum of corresponding columns in *arrayA* and *arrayB*

    The program should print the contents of each array that was created. Finally, the program should select and print a random cell value from *arrayA*.

3. Write a <u>C Program</u> which prompts the user to enter the size of 2 two-dimensional arrays (they can be different dimensions). The user should also be requested to fill the arrays. The program should then compute the product of the arrays using matrix multiplication rules and print the resulting array. **Note: If the two matrixes are such that they can't be multiplied then an error message should be displayed on the screen[1,2].**
    [1]http://www.mathwarehouse.com/algebra/matrix/multiply-matrix.php
    [2]http://www.mathwarehouse.com/algebra/matrix/multiply-matrix.php#how-do-we-multiply-two-matrices

4. You work in an insurance company, you have installed trackers into several of your customers' cars in order to monitor their driving and offer a discount if they are 'good' drivers. Write a <u>C Program</u> that creates a two-dimensional array to record the average daily acceleration of 5 of your customers over the past 10 trips. The data are shown below. The

program should prompt you (the user) for a driver number and then return the data of that driver along with a summary of the data and some advice regarding the discount. If the total average acceleration is more than 5 or more OR any single trip average is more 6 or more, then no discount should be applied to the customer. For example, if the user enters 1 the program responds with:

Driver 1 Summary:

Acceleration Recordings: 3,1,3,4,6,7,3,2,5,3

Max average acceleration for Driver 1 was in trip 7

Average acceleration over all of Driver 1 trips: 3.7

Discount: No Discount to be applied

The average acceleration of all drivers over all trips is: 3.46

Driver data:
Driver 1 – 3, 1, 3, 4, 6, 7, 3, 2, 5, 3
Driver 2 – 2, 2, 2, 3, 4, 4, 3, 3, 3, 2
Driver 3 – 5, 6, 7, 6, 5, 3, 3, 3, 3, 3
Driver 4 – 3, 3, 3, 3, 4, 4, 3, 2, 1, 3
Driver 5 – 2, 3, 4, 6, 6, 2, 5, 1, 3, 3
T*he units of acceleration in this case are mph per second.*

Portfolio Ideas

1. Write a C program that creates a two dimensional integer array. The size of the array should be specified by user input. The array should then be filled by prompting the user to enter data (an integer) for each element. It should not be possible to add duplicates to the array.

    The program should print the following results:
    1. The contents of the array (this should look like a table).
    2. The sum of each row.
    3. The sum of each column.
    4. The sum of all values in the array.
    5. The average of each row.
    6. The average of each column.
    7. The average of the complete array.
    8. The frequency of each number which occurs in the array.
    9. A random number from the array.

2. Write a C program which is used to keep track of the number of people passing a turn style at the local stadium. The program should have four functions, one which is called when a person enters the stadium and one which is called when a person leaves the stadium. When a person leaves, they cannot re-enter the stadium. It costs €20 for a ticket to concert so a function should keep a track of total amount of money that has been taken and print that to the screen. The final function should report the current number of people at the concert. Provide test code in the main function to demonstrate the program. **The program must demonstrate the use of a global variable and a local static variable.**