National University of Computer and Emerging Sciences

Lab Manual # 11
Programming Fundamentals
(Section BCS-G)

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Section	BCS-G
Semester	Fall 2021

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Objectives

The objectives of this lab are to cover the following:

- 2 D character Array
- 2 D integer Array

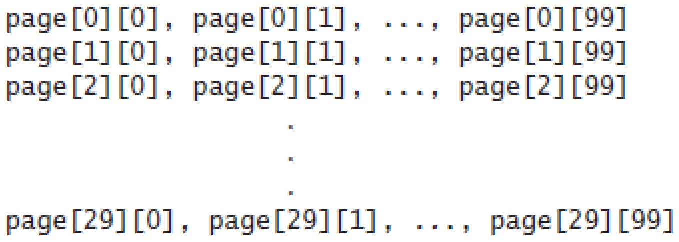
2 D Array

It is sometimes useful to have an array with more than one index, and this is allowed in C++. The following declares an array of characters called page. The array page has two indexes: The first index ranges from 0 to 29, and the second from 0 to 99.

char page[30][100];

The indexed variables for this array each have two indexes. For example, page[0][0], page[15][32], and page[29][99] are three of the indexed variables for this array. Note that each index must be enclosed in its own set of square brackets. As was true of the one-dimensional arrays we have already seen, each indexed variable for a multidimensional array is a variable of the base type.

An array may have any number of indexes, but perhaps the most common number of indexes is two. A two-dimensional array can be visualized as a two-dimensional display with the first index giving the row and the second index giving the column. For example, the array indexed variables of the two-dimensional array page can be visualized as follows:



```
page[0][0], page[0][1], ..., page[0][99]
page[1][0], page[1][1], ..., page[1][99]
page[2][0], page[2][1], ..., page[2][99]
                  .
                  .
                  .
page[29][0], page[29][1], ..., page[29][99]
```

Problems

Question#1

A local zoo wants to keep track of how many pounds of food each of its three monkeys eats each day during a typical week. Write a program that stores this information in a two-dimensional 3x5 array, where each row represents a different monkey and each column represents a different day of the week. The program should first have the user input the data for each monkey. Then it should create a report that includes the following information:

- Average amount of food eaten per day by the whole family of monkeys.
- The least amount of food eaten during the week by any one monkey.
- The greatest amount of food eaten during the week by any one monkey.

Input Validation: *Do not accept negative numbers for pounds of food eaten*.

Question#2

An amateur meteorologist wants to keep track of weather conditions during the past year's three-month summer season and has designated each day as either rainy ('R'), cloudy ('C'), or sunny ('S'). Write a program that stores this information in a 3X30 array of characters, where the row indicates the month (0 = June, 1 = July, 2 = August) and the column indicates the day of the month. Note that data are not being collected for the 31st of any month.

It should create a report that displays, for each month and for the whole three-month period, how many days were rainy, how many were cloudy, and how many were sunny. It should also report which of the three months had the largest number of rainy days.

Question#3

Creates a small phone book. An array is used to store a list of names and another array is used to store the phone numbers that go with each name. For example, Michael Myers’ phone number is 333-8000 and Ash Williams’ phone number is 333-2323. Write the function **lookupName** so the code properly looks up and display the phone number for the input target name.

Question#4

Write a function in C++ called
bool Exists(int data[][6], int pattern[][3])
that accepts a 2-dimensional integer array called data of size 6x6 and another 2-D integer array called pattern of size 3x3 as input parameters. It returns true if it finds the pattern within the array data and false otherwise.
So e.g. if data carries the following values
1 2 7 8 9 6
2 2 3 4 5 6
3 2 3 4 5 6
4 2 3 4 5 6
5 2 9 8 7 6
6 2 7 4 5 6

And find has the values as below
3 4 5
3 4 5
3 4 5
Then your function should return true as the 3X3 matrix exists at data[1][2].

END