National University of Computer and Emerging Sciences

Lab Manual # 11

Programming Fundamentals

(Section BSE-1A)

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Objectives

The objectives of this lab are to cover the following:

- 2D Character arrays
- 2D int arrays

Question No 1 (2-D integer array):

Please implement a function in C++ that detects an upper triangular matrix. Input a 4X4 integer array from the user, pass it as a parameter to the function which detects whether it qualifies as an upper triangular matrix or not. The function returns true or false accordingly. Please give the main function that calls this function and displays a message accordingly.
An upper triangular matrix is one which contains elements above the principal diagonal and rest of the elements are zero. E.g. below is an upper triangular matrix

1 2 3 4
0 5 6 7
0 0 8 9
0 0 0 1

Question No 2 (2-D integer array):

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 pattern 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].

Question No 3 (2-D char array):

Write a function in C++ called

int SearchParagraph(char paragraph[][size], char find[])

that accepts a series of sentences as a 2D character array (array of cstrings) and counts the number of times the find cstring exists in it. You may use the function you wrote in the last lab as a helper function.
Demonstrate the function in a program that asks the user to input a number of sentences (each terminated by pressing the enter key) and a word to find, passes both as parameters to the SearchParagraph function and displays the count returned by the function.