National University of Computer and Emerging Sciences



**Laboratory Manual**

***(Computer Programming)***

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| Course Instructor | Sarim Baig |
| Lab Instructor(s) | Ahmad Raza  Waqas Manzoor |
| Section | A, B |
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Department of Computer Science

FAST-NU, Lahore

**Lab Manual (3)**

**(Debugging and 2-D Dynamic Arrays)**

**Instructions:**

This is an individual Lab. You are NOT allowed to work/submit in form of group. Absolutely NO collaboration is allowed. Any traces of cheating would result in an “F” grade in this Lab.’

Keep the following good programming practices in mind when writing your code:

• Comment your code intelligently.

• Indent your code properly.

• Use meaningful variable names.

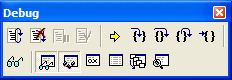
• Use meaningful prompt lines/labels for input/output.

**Note:**

* **Implement all problems with Debugging**
* **Take Screen Shots of all local variable values inside a function in “local variables section” and “watch window”**
* **Use Pointer offset method to access array elements E.g. \*(ptr+1) for 1-D array**

**Problem 1:(No need for Evaluation of Q.1, It’s Just for Practice but you have to compile it)**

Open a new project in visual studio and type a simple program to find the **maximum element**in an array using a **Function** and compile it. Practice with the following debugging commands:

** **

|  |  |  |  |
| --- | --- | --- | --- |
| Short cut key | Icon | Menu | Explanation |
| F-9 |  |  | Insert/Remove breakpoint |
| F-5 |  | Debug-Go | Execute a program until the next breakpoint |
| Shift F-5 |  | Debug-Stop debugging | To stop debugging a program. It will stop executing the program |
| F-10 |  | Debug-StepOver | Go to the next statement |
| F-11 |  | Debug-Step Into | Go inside a function |
| Shift F-11 |  | Debug – Step Out | Come out of the function |
|  |  | Debug - Run to cursor | Execute all statements till the statement on which the cursor is placed or until the next breakpoint |
| Alt -3 |  | Debug-Windows-Watch | Show the window where only the variables in scope are shown |

**Problem 2:**

Write a function **int\*\* AllocateMemory(int& rows, int& cols)** that takes size of matrix (rows and columns) from user, allocates memory for the matrix and return its pointer.

**Problem 3:**

Write a function **void InitializeMatrix(int\*\* matrix, const int& rows, const int& rows)** that initializes the matrix elements to 0.

**Problem 4:**

Write a function**void DisplayMatrix(int\*\* matrix, const int& rows, const int& cols)** that displays the matrix in proper format.

**Problem 5:**

Write an inline function **void DeallocateMemory(int\*\* matrix, const int& rows)** that deallocates all the memory. Make all the above mentioned functions inline.

**Sample Run:**

**Enter total rows: 4  
Enter total columns: 3  
The array is:  
0 0 0  
0 0 0  
0 0 0   
0 0 0**

**Problem 6:**

Write a function called **maxCol** that takes as parameters a pointer to a 2D array and its dimensions. It should return the largest element in each column of the array. Since there is more than one column in 2D array, you have to return an array that contains largest of each column.

For example, if the **Sample Matrix** is

1 4 8

9 1 6

5 7 2

Your function will return array containg maximum elements of all the columns i.e.

9, 7, 8

**Problem 7: (Post Lab till tomorrow 5 PM in Xeon/Spring 2017/Ahmad Raza/CP(A))**

Write a program which takes input of number of rows in 2D array from the user and then asks user to enter numbers from 0 to n where n is equal to number of rows and find out factors of each number. Numbers entered should be greater than 6 and less than 100. If the number does not fall in this range, program should alert user to re-enter the number. Create factors array for each number in above allocated 2D array and store that number on 1st index of factors array. Your program should also de-allocate acquired dynamic memory at the end of the life cycle.

**Sample Output:**

Enter Number between 6 and 100: 12

Enter Number between 6 and 100: 5

Wrong input. Please re-enter the number

Enter Number between 6 and 100: 7

…

…

**Following are the factors of numbers entered:**

Factors of 12 are 1,2,3,4,6,12

Factors of 10 are 1, 2,5,10

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***Remember:*** *Honesty always gives fruit (no matter how frightening is the consequence); and*

*Dishonesty is always harmful (no matter how helping it may seem in a certain situation)!*