National University of Computer and Emerging Sciences



**Laboratory Manual**

***(Object Oriented Programming)***

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**Lab Manual (1)**

**(Debugging, Pointers and 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.

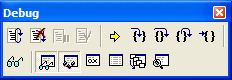
• Indent your code properly.

• Use meaningful variable names.

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

**Problem 1:**

Open a new project in visual studio and type a simple program to find the maximum element in an array 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 |
| Alt-4 |  | Debug-Windows-Variables | Show the window in which you can type a variable name to see its value |
| Alt-7 |  | debug-windows-call stack | You can see the activation of stack of functions here |

**Problem 2:**

1. Declare two variables Sum1 and Sum2.
2. Declare two integer variables A and B and take input in them.
3. Declare three integer pointers Pointer1, Pointer2 and Pointer3.
4. Assign the address of variable A to pointer variable Pointer1.
5. Assign the address of variable B to pointer variable Pointer2.
6. Subtract the value of variable pointed to by Pointer1 from the value of variable pointed to by Pointer2 (You should not use variables A and B in this statement). Assign the result of Subtraction to variable Sum1.
7. Assign the value of pointer variable Pointer1 to pointer variable Pointer3.
8. Assign the value of pointer variable Pointer2 to pointer variable Pointer1.
9. Assign the value of pointer variable Pointer3 to pointer variable Pointer2.
10. Again subtract the value of variable pointed to by Pointer1 from the value of variable pointed to by Pointer2, and assign the result of subtraction to variable Sum2.
11. Print the sum of variables Sum1 and Sum2.

**Problem 3:**

1. Introduce 2 variables i (int), j (float) and initialize to 5, 1.5 respectively.
2. Introduce 2 variables xPtr (int\*), yPtr (float\*) and assign address of i, j respectively.
3. Print values of i, j and addresses in xPtr, yPtr.
4. xPtr ++; yPtr ++;
5. Print addresses in xPtr,yPtr.
6. xPtr --; yPtr --;
7. Print addresses in xPtr, yPtr.
8. xPtr = xPtr + 3; yPtr = yPtr + 4;
9. Print addresses in xPtr, yPtr.

**Problem 4:**

Create a function **swap** that has two pointer variables in parameter and swap the data of these two variables. This function should not return any value.

Create two variables in the main function and initialize with some values. Call the function swap and pass the addresses of variables x and y in this function as argument. Now print the values of x and y in main function and observe the output.

**Problem 5:**

Write a C++ program in which you have to create a static array of **size 10** in main function. Now create a function named “**Incrementer**” . This function adds 3 to each element of the array. You have to add to the elements using pointer only. Array subscript notation cannot be used.

**Problem 6:**

Write a C++ program that keeps taking integer input from the user until user enters -1 and displays the data in reverse order.

Your program should save the input in a dynamically allocated array. Initially create a dynamic array of five integers. Each time the array gets filled your program should double the size of array and continue taking the input. After receiving **-1** (i.e. end of data input) your program should print the integers in the reverse order as entered by the user.

You have to make use of the following functions for this task:

* **void Input (int \* & iarr, int & size);** //why is size passed by reference for this?
* **void reverse (int \* iarr, int size);**
* **void Output (int \* iarr, int size);**

***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)!*