



Institute of Geographical Information Systems

CS-212 - Object Oriented Programming LAB

Semester: Fall 2025

Class: SCEE-IGIS - 2024

Name: Ali Nawaz

CMS ID : 00000526123

Submitted to: Ma'am Alvina Anjum

Due Date: Sep 17, 2025

LAB 02: Advanced Pointer Manipulation and Dynamic Memory Allocation

Question No 1:

Write a C++ program that:

1. Declares a pointer to an integer.
2. Declares a fixed-size array of integers
3. Uses the pointer to input values into the array (through pointer arithmetic).
4. Prints out the values in the array and the addresses of each element using the pointer.

Screenshot:

```
1  /*
2
3
4
5
6
7
8  #include <iostream>
9  using namespace std;
10
11 int main()
12 {
13     int *ptr;
14     const int SIZE = 5;
15     int arr[SIZE];
16     ptr = arr;
17
18     cout << "Enter " << SIZE << " integers: ";
19     for (int i = 0; i < SIZE; i++)
20     {
21         cin >> *(ptr + i);
22     }
23
24     cout << "\nArray values and addresses:" << endl;
25     cout << "Index\tValue\tAddress" << endl;
26
27     for (int i = 0; i < SIZE; i++)
28     {
29         cout << i << "\t" << *(ptr + i) << "\t" << (ptr + i) << endl;
30     }
31
32     return 0;
33 }
```

Output:

```
Enter 5 integers: 1
2
3
4
5
Array values and addresses:
Index Value Address
0 1 0x16f66ea34
1 2 0x16f66ea38
2 3 0x16f66ea3c
3 4 0x16f66ea40
4 5 0x16f66ea44
```

Question No 2:

Write a C++ program that:

1. Declares two integer variables.
2. Declares two pointers pointing to these variables.
3. Uses the pointers to swap the values of the two integers.
4. Prints the values before and after swapping.

Screenshot:

The screenshot shows a Visual Studio Code editor with a C++ program in `Problem2.cpp`. The program implements a swap function using pointers. It includes `<iostream>` and uses the `std` namespace. In the `main` function, two integers `a` and `b` are declared and initialized with values 4 and 5 respectively. Two pointers `p1` and `p2` are then declared and assigned to point to `a` and `b`. The program prints the values of `a` and `b` before swapping. A comment indicates the next step is to swap using pointers. The swap is performed by creating a temporary variable `temp` to store the value of `*p1`, then assigning `*p2` to `*p1`, and finally assigning `temp` to `*p2`. After the swap, the program prints the values of `a` and `b` again, which are now 5 and 4. The program returns 0.

```
1  /*
2  Write a C++ program that:
3  1. Declares two integer variables.
4  2. Declares two pointers pointing to these variables.
5  3. Uses the pointers to swap the values of the two integers.
6  4. Prints the values before and after swapping.
7  */
8  #include <iostream>
9  using namespace std;
10
11 int main()
12 {
13     int a, b;
14     cout << "Enter two numbers: ";
15     cin >> a >> b;
16
17     int *p1 = &a;
18     int *p2 = &b;
19
20     cout << "\nBefore swap: a = " << a << ", b = " << b << endl;
21
22     // Swapping using pointers
23     int temp = *p1;
24     *p1 = *p2;
25     *p2 = temp;
26
27     cout << "After swap: a = " << a << ", b = " << b << endl;
28
29     return 0;
30 }
```

The terminal output shows the execution of the program:

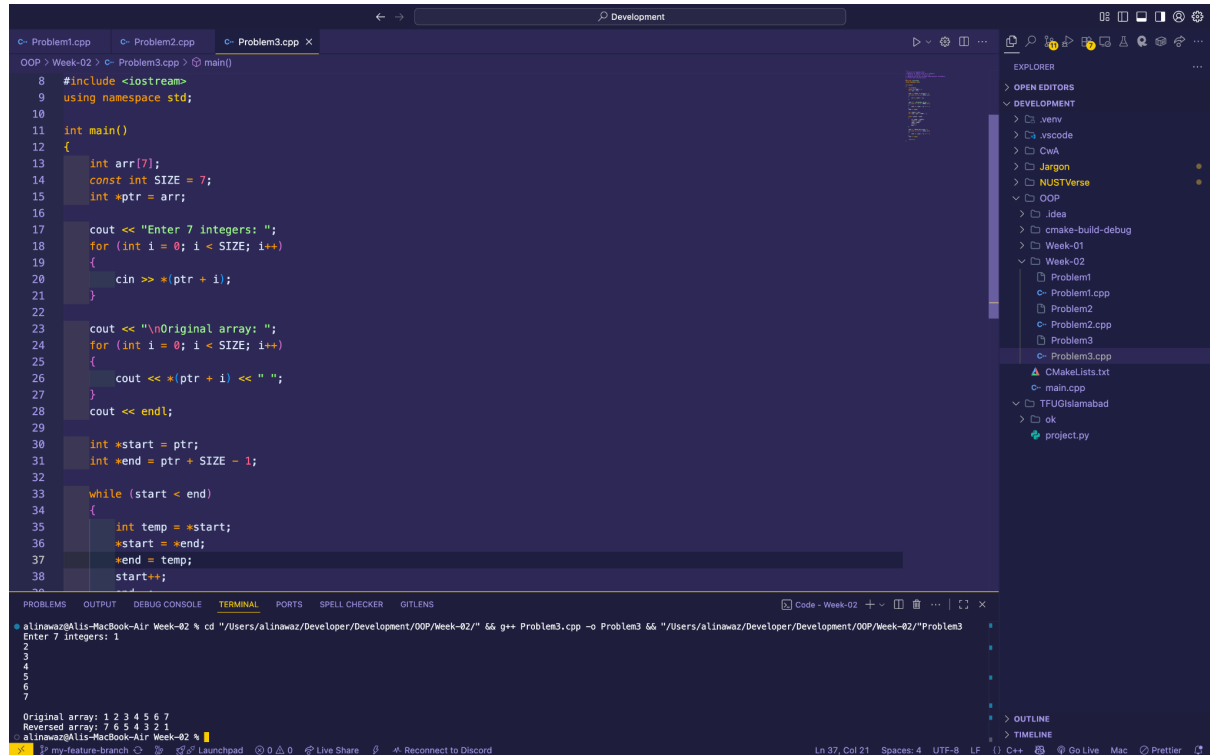
```
alinalawaz@Alis-MacBook-Air Week-02 % cd "/Users/alinalawaz/Developer/Development/OOP/Week-02/" && g++ Problem2.cpp -o Problem2 && "/Users/alinalawaz/Developer/Development/OOP/Week-02/"Problem2
Enter two numbers: 4
5
Before swap: a = 4, b = 5
After swap: a = 5, b = 4
alinalawaz@Alis-MacBook-Air Week-02 %
```

Question No 3:

Write a C++ program that:

1. Declares a static array of 7 integers.
2. Declares a pointer to the array.
3. Reverses the array in-place using pointer arithmetic.
4. Prints the reversed array.

Screenshot:



```
8 #include <iostream>
9 using namespace std;
10
11 int main()
12 {
13     int arr[7];
14     const int SIZE = 7;
15     int *ptr = arr;
16
17     cout << "Enter 7 integers: ";
18     for (int i = 0; i < SIZE; i++)
19     {
20         cin >> *(ptr + i);
21     }
22
23     cout << "\nOriginal array: ";
24     for (int i = 0; i < SIZE; i++)
25     {
26         cout << *(ptr + i) << " ";
27     }
28     cout << endl;
29
30     int *start = ptr;
31     int *end = ptr + SIZE - 1;
32
33     while (start < end)
34     {
35         int temp = *start;
36         *start = *end;
37         *end = temp;
38         start++;
39         end--;
40     }
41
42     cout << "\nReversed array: ";
43     for (int i = 0; i < SIZE; i++)
44     {
45         cout << *(ptr + i) << " ";
46     }
47     cout << endl;
48 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SPELL CHECKER GITLENS

```
alinasz@Alis-MacBook-Air: Week-02 % cd "/Users/alinasz/Developer/Development/OOP/Week-02/" && g++ Problem3.cpp -o Problem3 && "/Users/alinasz/Developer/Development/OOP/Week-02/"Problem3
Enter 7 integers: 1
2
3
4
5
6
7
Original array: 1 2 3 4 5 6 7
Reversed array: 7 6 5 4 3 2 1
alinasz@Alis-MacBook-Air: Week-02 %
```

my-feature-branch Launchpad 0.0.0 Live Share Reconnect to Discord

Ln 37, Col 21 Spaces: 4 UTF-8 LF C++ Go Live Mac Prettier