

Activity No. 4.2

4.2 Stacks

Course Code: CPE010

Program: Computer Engineering

Course Title: Data Structures and Algorithms

Date Performed: 8/28/2025

Section: CPE21S4

Date Submitted: 8/28/2025

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6. Output

```
1 //Stack.h
2 #ifndef STACK_H
3 #define STACK_H
4 #include <iostream>
5
6 template<typename T>
7 class stack
8 {
9     private:
10         int top = -1;
11         T arr[100];
12
13     public:
14         //constructor
15         stack()
16         {
17             if (!isEmpty())
18                 std::cout << "The stack is empty!\n";
19             else
20                 std::cout << "The value of the stack is: " << arr[top] << std::endl;
21         }
22
23         //push
24         void push(T value)
25         {
26             if (!isFull())
27                 std::cout << "Stack overflow!\n" << std::endl;
28             else
29             {
30                 arr[++top] = value;
31                 std::cout << "Successfully pushed " << value << std::endl;
32             }
33         }
34
35         //isEmpty
36         bool isEmpty()
37         {
38             return (top < 0);
39         }
40
41         //isFull
42         bool isFull()
43         {
44             return (top == 100 - 1);
45         }
46
47         //pop
48         void pop()
49         {
50             if (!isEmpty())
51                 std::cout << "The stack is empty!\n";
52             else
53                 std::cout << "Successfully pop " << arr[top--] << std::endl;
54         }
55
56         //display
57         void display()
58         {
59             if (!isEmpty())
60                 std::cout << "The stack is empty!\n";
61             else
62             {
63                 for (int i = top; i >= 0; i--)
64                     std::cout << arr[i] << std::endl;
65             }
66         }
67
68     };
69
70 #endif
```

The first screenshot shows the full code in a C++ IDE. The second screenshot shows the same code with a specific line highlighted in blue:

```
for (int i = top; i >= 0; i--)
    std::cout << arr[i] << std::endl;
```

The screenshot shows a C++ IDE with a project named 'STACK' and a file named 'main.cpp'. The code implements a stack using an array of size 10. It includes functions for push, pop, and display. The output window shows the following sequence of operations:

```
1. int main() {
2.     int stack[10];
3.     int top = -1;
4.     // Push elements
5.     push(10);
6.     push(5);
7.     push(1);
8.     // Display stack
9.     display();
10.    // Pop elements
11.    pop();
12.    pop();
13.    // Display stack
14.    display();
15.    return 0;
16. }
```

The output window displays the following text:

```
The stack is empty
Successfully pushed 10
Successfully pushed 5
Successfully pushed 1
The value of the stack is: 1
Successfully pop 1
The value of the stack is: 5
5
10

-----
Process exited after 0.01545 seconds with return value 0
Press any key to continue . . .
```

7. Supplementary Activity

8. Conclusion

To conclude, we can use stacks in arrays with declaring its fixed size. Through using the operations in stack, we can change the elements inside via adding or removing by following the properties of LIFO. In this activity, I think I had learned well how does stack work and arrays.

9. Assessment Rubric

