

# IT 314 – Software Engineering

Lab 7

Akshat Jindal | 202201299

Stack Implementation Code

## Program Inspection

*Question 1. How many errors are there in the program? Mention the errors you have identified.*

Once we figure out the error in the printing of the stack in the for loop, and correct the condition, we can simply correct the logic of the stack implementation, namely the top variable of the stack.

*Question 2. Which category of program inspection would you find more effective?*

For this question, the Category A of the program inspection, the Data Reference Errors were the most effective, as the failure of the code was due to the wrong access of the stack data, due to the errors in calculating the top variable value.

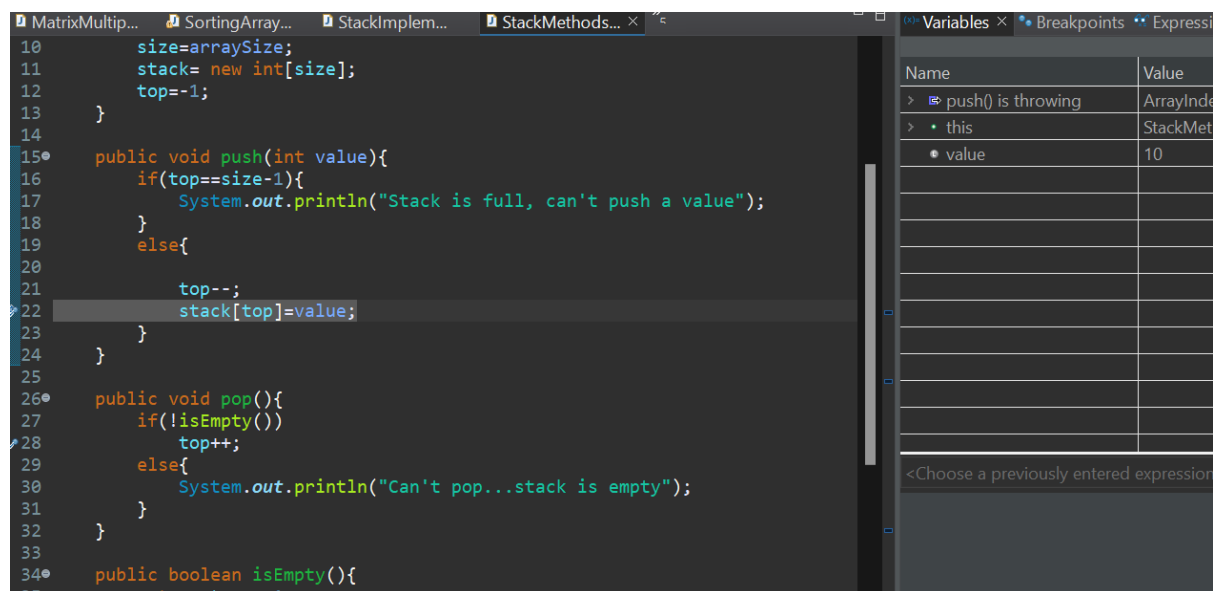
*Question 3. Which type of error you are not able to identified using the program inspection?*

In this example, all the errors in the document were identifiable using the program inspection method.

*Question 4. Is the program inspection technique is worth applicable?*

Due to a slightly longer code, with many functions at that, it was a bit complicated to find the errors using program inspection method.

## Code Debugging



The screenshot shows an IDE with a Java file named 'StackMethods.java'. The code implements a stack with methods: push, pop, and isEmpty. The push method checks if the stack is full (top == size - 1) and prints an error message if so. The pop method checks if the stack is empty (!isEmpty()) and prints an error message if so. The isEmpty method returns true if top == -1. The debugger window on the right shows the current state of the program, with a table of variables and their values.

Name	Value
> push() is throwing	ArrayIndexOutOfBoundsException
> this	StackMethods
• value	10

<Choose a previously entered expression>

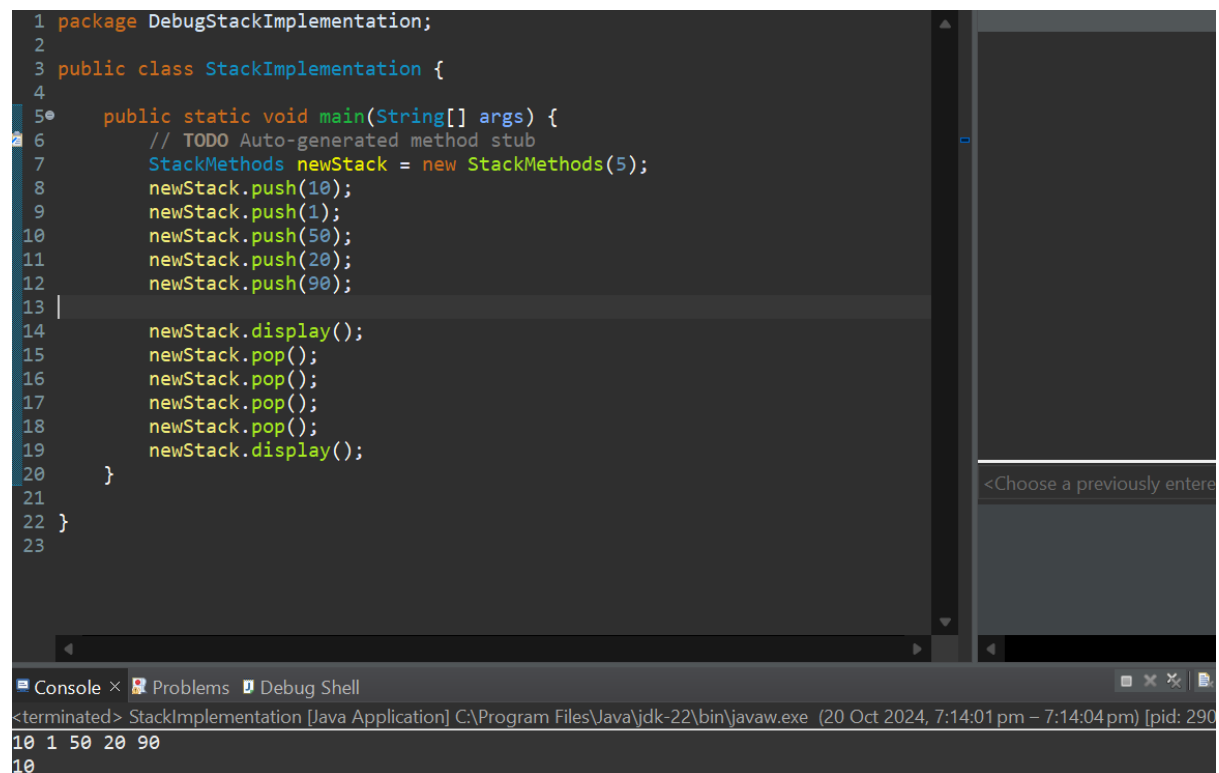
*Question 1. How many errors are there in the program? Mention the errors you have identified.*

There were 2 errors in this program. The for loop condition at the end for printing, as well as the changes in the top variable when implementing stack pop or push.

Question 2. How many breakpoints you need to fix those errors? What are the steps you have taken to fix the error you identified in the code fragment?

With the line breaks at the end of the push, pop and in the loop of the display functions, we can iteratively observe the values of top, and how the referenced value changes. Once we figure out the calculation error, we can simply update the top variable correctly.

Question 3. Submit your complete executable code.

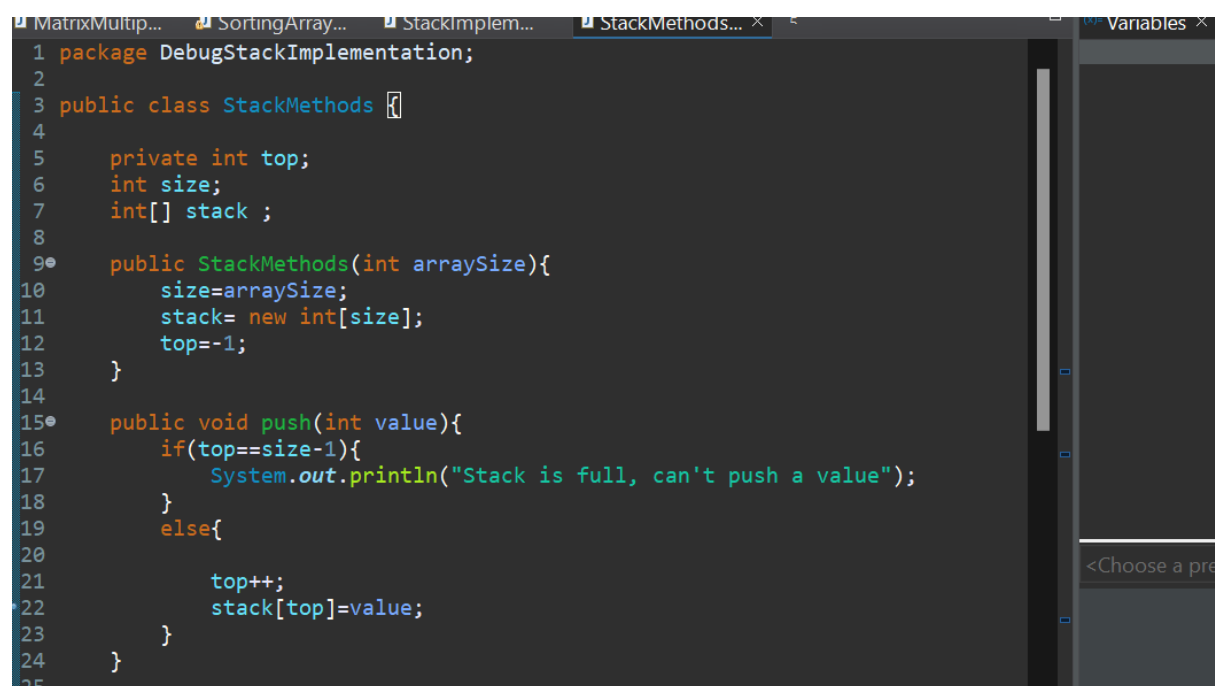


```
1 package DebugStackImplementation;
2
3 public class StackImplementation {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7         StackMethods newStack = new StackMethods(5);
8         newStack.push(10);
9         newStack.push(1);
10        newStack.push(50);
11        newStack.push(20);
12        newStack.push(90);
13
14        newStack.display();
15        newStack.pop();
16        newStack.pop();
17        newStack.pop();
18        newStack.pop();
19        newStack.display();
20    }
21 }
22
23
```

Console × Problems × Debug Shell

<terminated> StackImplementation [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (20 Oct 2024, 7:14:01 pm – 7:14:04 pm) [pid: 290]

10 1 50 20 90  
10



```
1 package DebugStackImplementation;
2
3 public class StackMethods {
4
5     private int top;
6     int size;
7     int[] stack ;
8
9     public StackMethods(int arraySize){
10         size=arraySize;
11         stack= new int[size];
12         top=-1;
13     }
14
15     public void push(int value){
16         if(top==size-1){
17             System.out.println("Stack is full, can't push a value");
18         }
19         else{
20
21             top++;
22             stack[top]=value;
23         }
24     }
25 }
```

```
25
26•   public void pop(){
27       if(!isEmpty())
28           top--;
29       else{
30           System.out.println("Can't pop...stack is empty");
31       }
32   }
33
34•   public boolean isEmpty(){
35       return top==-1;
36   }
37
38•   public void display(){
39
40       for(int i=0;i<=top;i++){
41           System.out.print(stack[i]+ " ");
42       }
43       System.out.println();
44   }
45 }
46
```

<Choose a pre