

IT 314 – Software Engineering

Lab 7

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Sorting Array Code

Program Inspection

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

There are a few syntax errors in the code, specially the first of the double for loop, which is closed with a premature semi-colon and with a wrong boundary condition of greater than equal to n rather than less than.

After the syntax errors are solved, the condition for the increasing elements is flawed, which would result in the output being in decreasing order. Hence, we correct the check condition of the loop.

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

For this question, the Category D of the program inspection, the Comparison errors were the most effective, as the failure of the code was due to incorrectly comparing the elements.

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 the small length of the code and easy to find comparison errors, the program inspection technique is worth applicable here.

Code Debugging

The screenshot shows an IDE with a Java file named `SortingArray.java`. The code is as follows:

```
10 Scanner s = new Scanner(System.in);
11 System.out.print("Enter no. of elements you want in array:");
12 n = s.nextInt();
13 int a[] = new int[n];
14 System.out.println("Enter all the elements:");
15 for (int i = 0; i < n; i++)
16 {
17     a[i] = s.nextInt();
18 }
19 for (int i = 0; i < n; i++)
20 {
21     for (int j = i + 1; j < n; j++)
22     {
23         if (a[i] <= a[j])
24         {
25             temp = a[i];
26             a[i] = a[j];
27             a[j] = temp;
28         }
29     }
30 }
31 System.out.print("Ascending Order:");
32 for (int i = 0; i < n - 1; i++)
33 {
34     System.out.print(a[i] + ",");
35 }
36 System.out.print(a[n - 1]);
```

The right sidebar shows the **Variables** pane with the following data:

Name	Value
no method return value	
args	String[0] (id=20)
n	5
temp	17
s	Scanner (id=22)
a	(id=28)
i	2
j	4

The **Expressions** pane shows the expression `[20, 19, 18, 16, 18]`.

The **Console** pane at the bottom shows the following output:

```
SortingArray [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (20 Oct 2024, 6:50:53 pm) [pid: 23556]
Enter no. of elements you want in array:5
Enter all the elements:
20 16 19 17 18
```

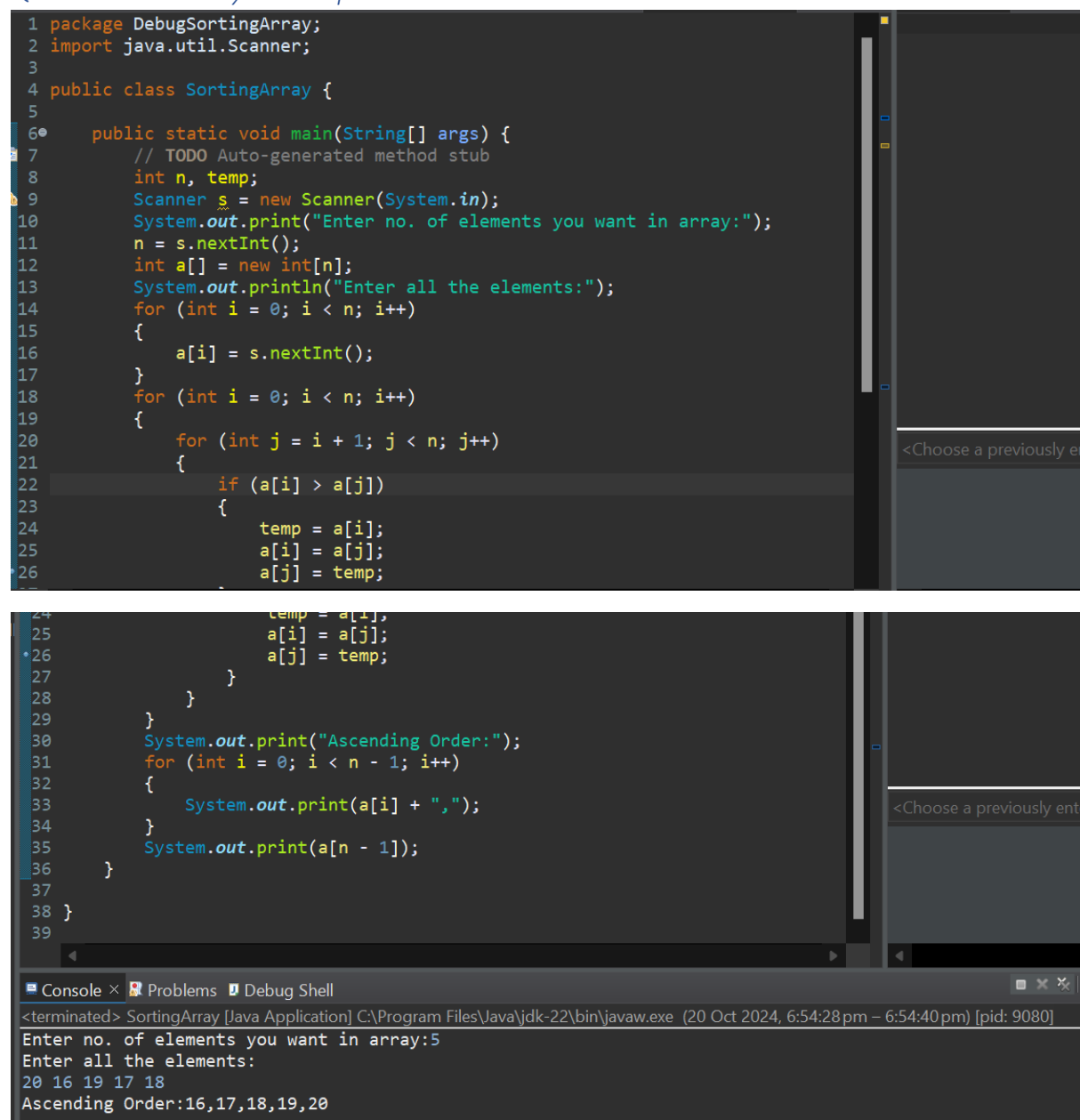
Question 1. How many errors are there in the program? Mention the errors you have identified.

There were 2 errors in this program. Once the syntax errors were taken out of the question, the only thing left to do was to correct the check condition, so the output array would be in an ascending order, rather than descending order.

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 a breakpoint on line 26 of the code, we were able to figure out that the code was incorrectly sorting the array in the descending order, even though it was required to be sorted in the ascending order. We were able to fix it by changing the check condition of the if loop.

Question 3. Submit your complete executable code.



```
1 package DebugSortingArray;
2 import java.util.Scanner;
3
4 public class SortingArray {
5
6     public static void main(String[] args) {
7         // TODO Auto-generated method stub
8         int n, temp;
9         Scanner s = new Scanner(System.in);
10        System.out.print("Enter no. of elements you want in array:");
11        n = s.nextInt();
12        int a[] = new int[n];
13        System.out.println("Enter all the elements:");
14        for (int i = 0; i < n; i++)
15        {
16            a[i] = s.nextInt();
17        }
18        for (int i = 0; i < n; i++)
19        {
20            for (int j = i + 1; j < n; j++)
21            {
22                if (a[i] > a[j])
23                {
24                    temp = a[i];
25                    a[i] = a[j];
26                    a[j] = temp;
27                }
28            }
29        }
30        System.out.print("Ascending Order:");
31        for (int i = 0; i < n - 1; i++)
32        {
33            System.out.print(a[i] + ",");
34        }
35        System.out.print(a[n - 1]);
36    }
37 }
38 }
39 }
```

Console Output:

```
<terminated> SortingArray [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (20 Oct 2024, 6:54:28 pm – 6:54:40 pm) [pid: 9080]
Enter no. of elements you want in array:5
Enter all the elements:
20 16 19 17 18
Ascending Order:16,17,18,19,20
```