

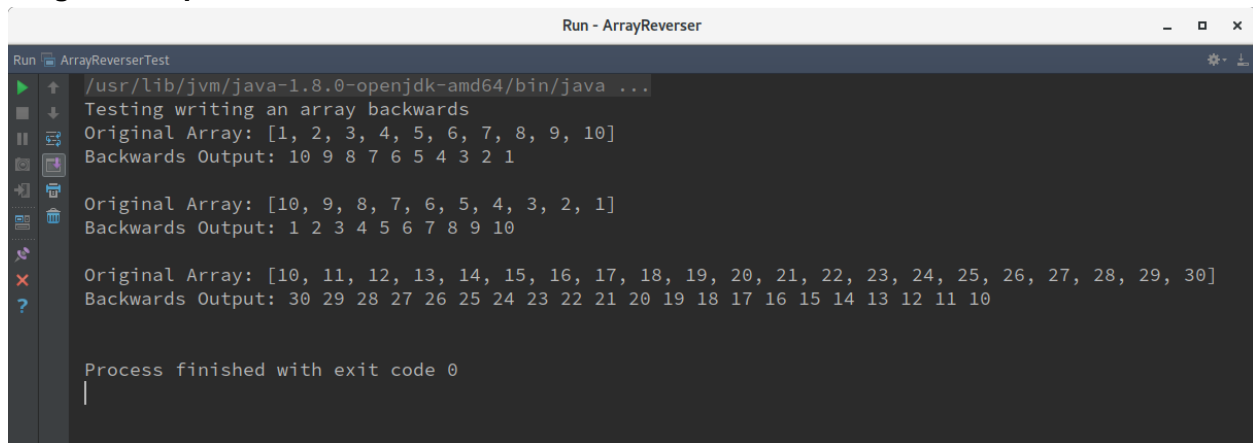
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CSC400: Data Structures and Algorithms
Critical Thinking Module 5
Option #2
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Program Pseudocode

```
Function reverseArray {  
    If (startIndex < endIndex) {  
        swap array[startingIndex], array[endingIndex]  
        reverseArray(array, startingIndex + 1, endingIndex -1)  
    }  
}
```

Program Screenshots

Program Output



The screenshot shows a Java IDE window titled "Run - ArrayReverser". The console output displays three test cases for an array reversal program. Each test case shows the original array and the resulting backwards output. The first test case uses an array [1, 2, 3, 4, 5, 6, 7, 8, 9, 10] and produces the output [10, 9, 8, 7, 6, 5, 4, 3, 2, 1]. The second test case uses an array [10, 9, 8, 7, 6, 5, 4, 3, 2, 1] and produces the output [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]. The third test case uses an array [10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30] and produces the output [30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10]. The program finishes with an exit code of 0.

```
Run - ArrayReverser  
Run ArrayReverserTest  
/usr/lib/jvm/java-1.8.0-openjdk-amd64/bin/java ...  
Testing writing an array backwards  
Original Array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]  
Backwards Output: 10 9 8 7 6 5 4 3 2 1  
  
Original Array: [10, 9, 8, 7, 6, 5, 4, 3, 2, 1]  
Backwards Output: 1 2 3 4 5 6 7 8 9 10  
  
Original Array: [10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30]  
Backwards Output: 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10  
  
Process finished with exit code 0  
|
```

ArrayReverser Class

```
1  /**
2   * Name: Micah Courey
3   * Project Name: CSC400-CTA5 Option #2
4   * Project Purpose: The program writes a given array backwards considering the first element of the array first.
5   * Algorithm Used: The reverseArray method uses recursion.
6   * Program Inputs: No user inputs are implemented, instead the ArrayReverserTest class is used to input arrays and test the method.
7   * Program Outputs: The program outputs the array and the array contents written backwards.
8   * Program Limitations: The program currently does not allow user input because it was not required in the assignment specification.
9   * Program Errors: Error handling is not implemented.
10  */
11
12  public class ArrayReverser {
13
14      public static int[] reverseArray(int[] array, int start, int end) {
15          if (start < end) {
16              int temp = array[start];
17              array[start] = array[end];
18              array[end] = temp;
19              reverseArray(array, start + 1, end - 1);
20          }
21          else {
22              for (int i : array) {
23                  System.out.print(i + " ");
24              }
25          }
26          return array;
27      }
28  }
```

ArrayReverserTest Class

```
1  /**
2   * Name: Micah Courey
3   * Project Name: CSC400-CTA5 Option #2
4   * Project Purpose: The program writes a given array backwards considering the first element of the array first.
5   * Algorithm Used: The reverseArray method uses recursion.
6   * Program Inputs: No user inputs are implemented, instead the ArrayReverserTest class is used to input arrays and test the method.
7   * Program Outputs: The program outputs the array and the array contents written backwards.
8   * Program Limitations: The program currently does not allow user input because it was not required in the assignment specification.
9   * Program Errors: Error handling is not implemented.
10  */
11
12  import java.util.Arrays;
13
14  public class ArrayReverserTest {
15      public static void main(String[] args) {
16          int[] oneToTen = {1,2,3,4,5,6,7,8,9,10};
17          int[] tenToOne = {10,9,8,7,6,5,4,3,2,1};
18          int[] tenToThirty = {10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30};
19
20          System.out.println("Testing writing an array backwards");
21          testArrayReverser(oneToTen, 0, 9);
22          testArrayReverser(tenToOne, 0, 9);
23          testArrayReverser(tenToThirty, 0, 20);
24      }
25
26      public static void testArrayReverser(int[] myArray, int startInt, int endInt) {
27          System.out.println("Original Array: " + Arrays.toString(myArray));
28          System.out.print("Backwards Output: ");
29          ArrayReverser.reverseArray(myArray, startInt, endInt);
30          System.out.println("\n");
31      }
32  }
```