

CS 111, Programming Fundamentals II

Lab 9: Sort Binary String



Computer Science

This lab is meant to give you practice solving a problem recursively.

Introduction

We've discussed in lecture that anything that is done with a for loop can also be done recursively. In some cases, a recursive solution is much easier to understand and implement. In other cases, a simple for loop does the trick without any extra headache. For this lab you will write a recursive solution to a problem that can be easily solved with a for loop. The recursive solution for it is also straight forward and only a few lines of code.

You are given a file named **SortBinaryString.java**. There is a class definition with a few methods, including the main method. For this assignment you only have to implement one method. The other methods are there to test your solution. You are welcome to take a look and explore the other methods, but **don't modify them**. Any changes will be undone.

I. `sortBinary()`

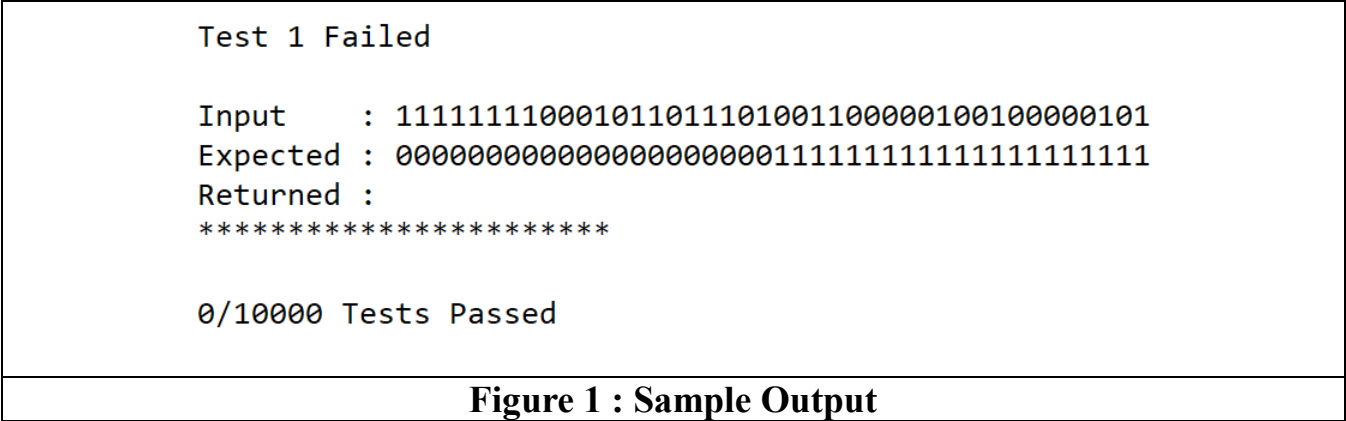
The method named ***sortBinary()*** is the only method that you have to implement. This method returns a String and takes in a String as a parameter. Don't modify the method header by adding additional parameters. Only add code inside of the method. This method takes in a string literal of 0's and 1's. Write a **recursive solution** which returns the string in sorted order. That is, all the 0's should come before all of the 1's. For example if the String input is "0101", then the method should return "0011". If the input string is "10011", then the output string should be "00111". If the input is "11", it should simply return "11". Below are a few more examples of inputs and their expected outputs.

Input	Expected Output
001	001
1001	0011
10111	01111
01110	00111
11110000	00001111

The test cases will produce random test strings which vary in size between 1 and 100 characters. The distribution of 1's and 0's is also random. Your method should return a string which contains the 0's and 1's sorted. The main method is already implemented and set up to test your solution. There is a return statement inside of the method ***sortBinary()***, which returns an empty string. Remove it when implementing your solution, it is simply there so that the program can compile.

II. Sample Output

When testing your program you will get an output that says “All Tests Passed”, if your solution is correct. Otherwise, it will tell you on which test case your solution failed on. In **Figure 1** you can see that “**Test 1 Failed**”, it tells you what the input string was, what was expected and the actual string your solution returned. In this case the returned string was just an empty string.



III. Upload your work to Canvas

For this lab, make sure that you upload the following file to the Lab 9 assignment in your Canvas account:

SortBinaryString.java

Rubric

File / Lab	Points
Method <i>SortBinary</i> implemented recursively and correctly	80
All test cases passed	15
Comments and format	5
Total	100