HARDIK KHARE | 70765344

HW 2.1 (25 points)

Write *strstr(string needle, string haystack)* that returns the index of the starting character of the first occurrence of needle in the haystack, or -1 if the needle does not exist in the haystack.

Section 1: Successful compilation of program

hkhare@circinus-27:~/hw2

```
hkhare@circinus-27 02:10:25 ~/hw2
$ cat APHW2Q1.java
import java.util.*;

class APHW2Q1{

        public static String[] takeInput(){
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter needle");
                String needle = sc.nextLine();
                System.out.println("Enter haystack");
                String hay = sc.nextLine();
                return new String[]{needle, hay};
        }

        public static int findNeedleInHay(String needle, String hay) {
                for(int i=0;i<=hay.length()-needle.length();i++){
                        if(hay.charAt(i)==needle.charAt(0)){
                                int j=0;
                                for(;j<needle.length();j++)
                                        if(hay.charAt(i+j)!=needle.charAt(j))
                                                break;
                                if(j==needle.length())
                                return i;
                        }
                }
                return -1;
        }

        public static void main(String args[]){
                String[] input = takeInput();
                System.out.println("Needle at Index: "+findNeedleInHay(input[0],
input[1]));
        }
}
hkhare@circinus-27 02:10:32 ~/hw2
$ javac -Xlint APHW2Q1.java
hkhare@circinus-27 02:11:58 ~/hw2
```

Section 2: program running on *the provided example from the assignment*

```
hkhare@circinus-27 02:00:03 ~/hw2
$ java APHW2Q1
Enter needle
chem
Enter haystack
alchemy
Needle at Index: 2
```

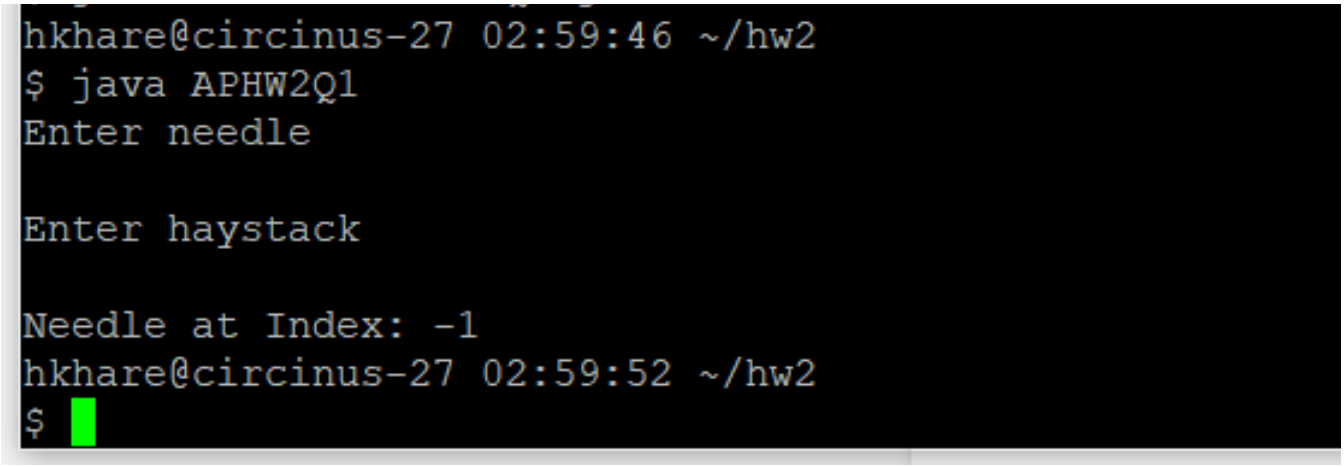
```
hkhare@circinus-27 02:00:34 ~/hw2
$ java APHW2Q1
Enter needle
chem
Enter haystack
heartache
Needle at Index: -1
```

Section 3: Edge Case #1

Description: Both needle and Haystack are empty

Input:
Needle “”
Haystack “”

Expected output: -1

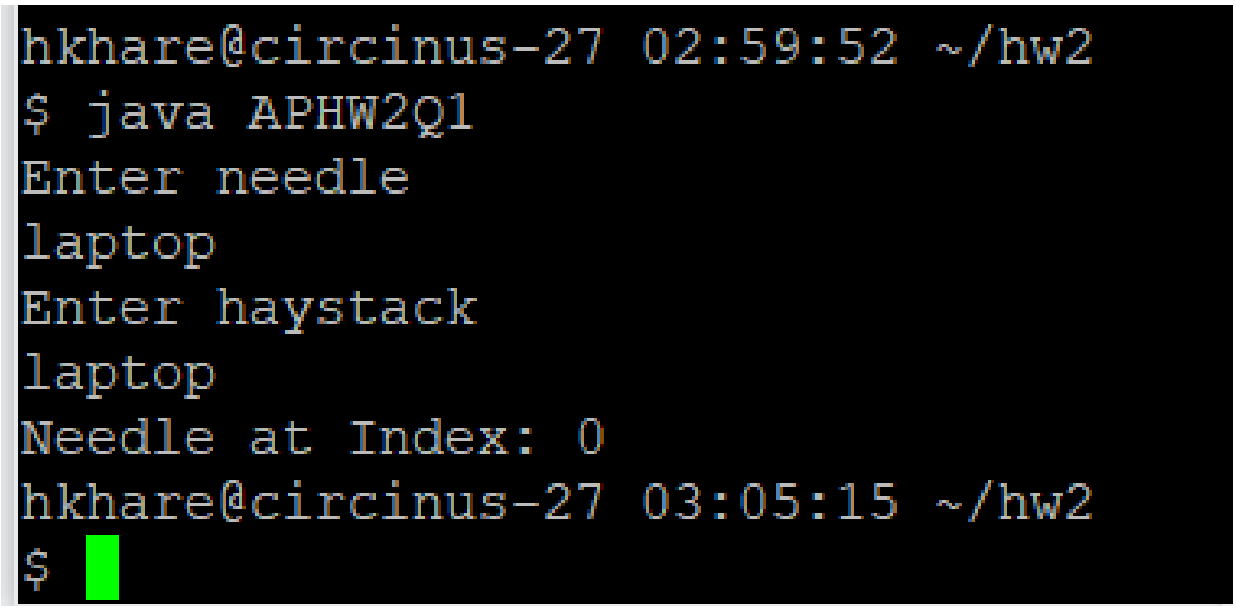


Section 4: Edge Case #2

Description: Both needle and Haystack are equal

Input:
Needle “laptop”
Haystack “laptop”

Expected output: 0

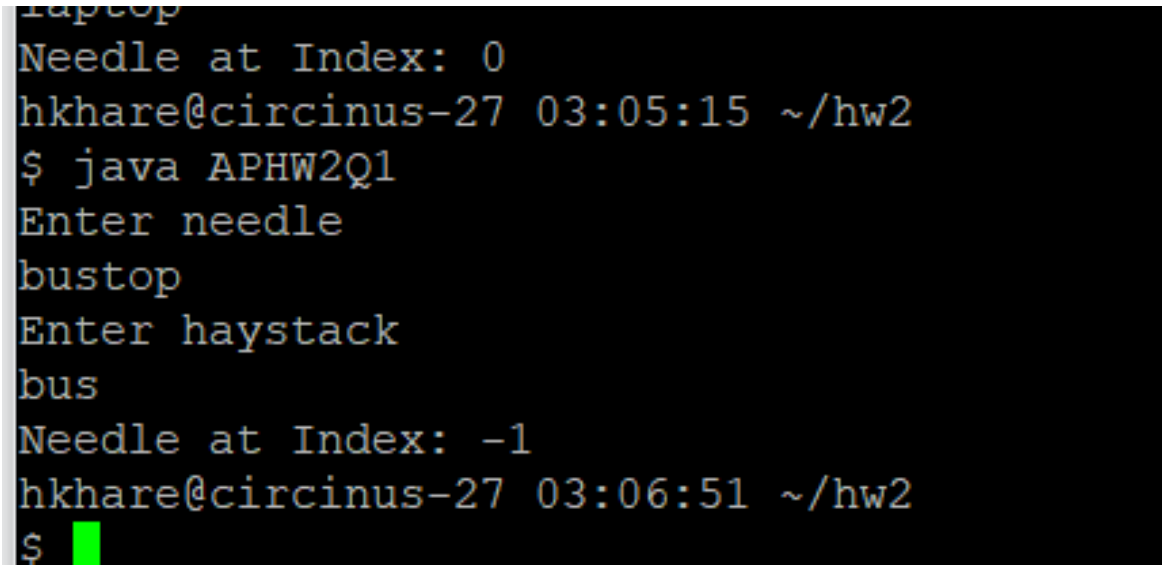


Section 5: Edge Case #3

Description: Needle is longer than haystack

Input:
Needle “bustop”
Haystack “bus”

Expected output: -1



HW 2.4 (25 points)

Write *strstrx(string needle, string haystack)* from problem 1 above but use one of the faster algorithms: Boyer Moore, Rabin Karp, or Knuth-Morris-Pratt.

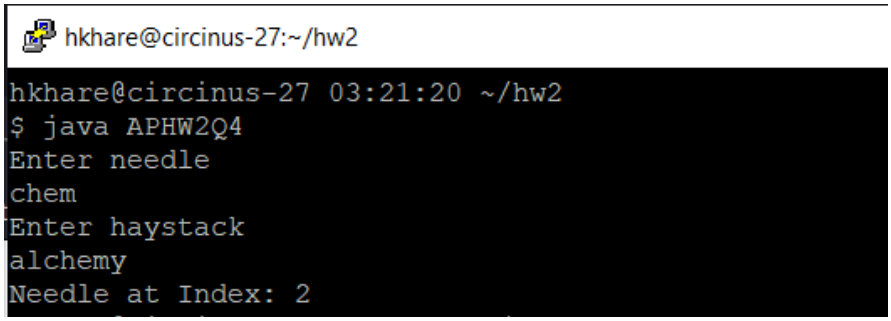
Section 1: Successful compilation of program

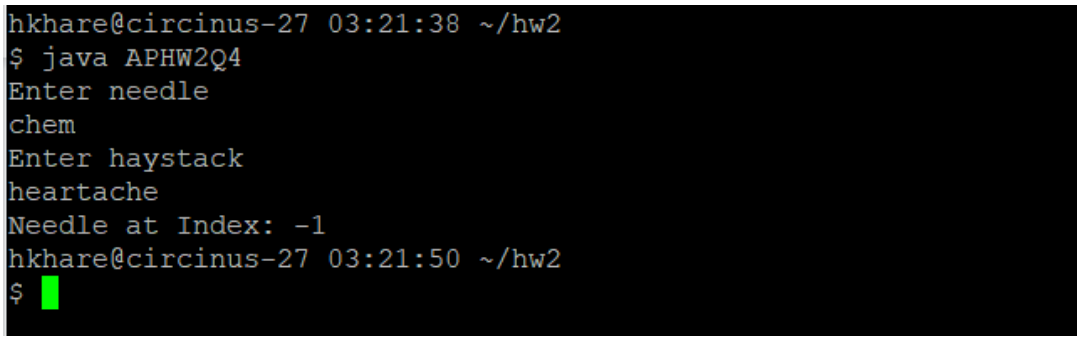
hkhare@circinus-27:~/hw2

```
hkhare@circinus-27 03:14:46 ~/hw2
$ cat APHW2Q4.java
import java.util.*;

class APHW2Q4{

    public static String[] takeInput(){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter needle");
        String needle = sc.nextLine();
        System.out.println("Enter haystack");
        String hay = sc.nextLine();
        return new String[]{needle, hay};
    }

    public static int[] KMPPrefixSumArr(String currStr){
        int left=0,right=1;
        int[] prefix_sum_array = new int[currStr.length()];
        while(right<currStr.length()){
          if(currStr.charAt(right)==currStr.charAt(left)) {
            prefix_sum_array[right++]=++left;
          }else{
            if(left!=0)
              left=prefix_sum_array[left-1];
            else
              prefix_sum_array[right++]=left;
          }
        }
        return prefix_sum_array;
      }

    public static int KMPfindNeedleInHay(String needle, String hay, int[] currlps) {
        int t=0,p=0;
        while(t<hay.length()){
          if(needle.charAt(p)==hay.charAt(t)){
            p++;t++;
            if(p==needle.length())
              return t-needle.length();
          }
          else{
            if(p!=0) p=currlps[p-1];
            else t++;
          }
        }
        return -1;
    }
```

```
    public static void main(String args[]){
        String[] input = takeInput();
        int[] lps = KMPPrefixSumArr(input[0]);
        System.out.println("Needle at Index: "+KMPfindNeedleInHay(input[0],input[1],lps));
    }
}
hkhare@circinus-27 03:14:49 ~/hw2
$ javac -Xlint APHW2Q4.java
hkhare@circinus-27 03:16:36 ~/hw2
$
```

Section 2: program running on *the provided example from the assignment*



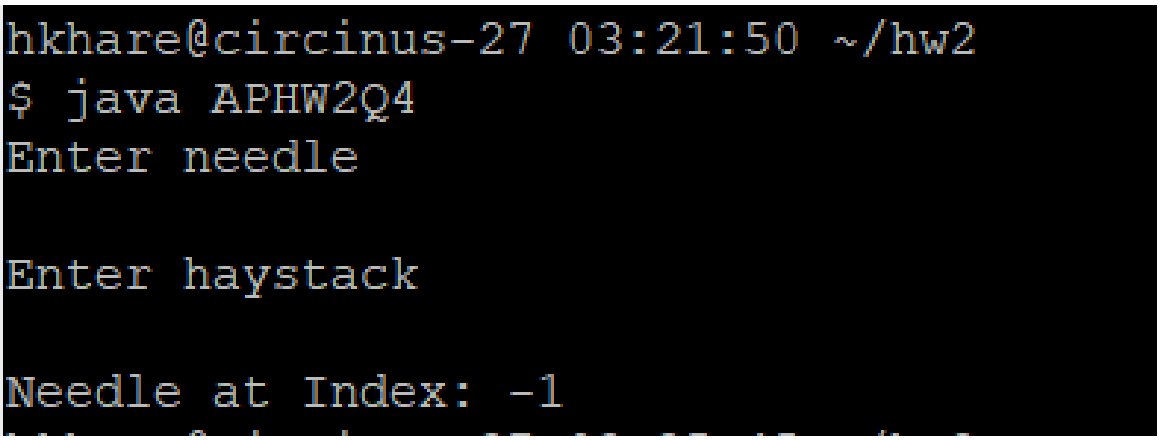


Section 3: Edge Case #1

Description: Both needle and Haystack are empty

Input:
Needle “”
Haystack “”

Expected output: -1

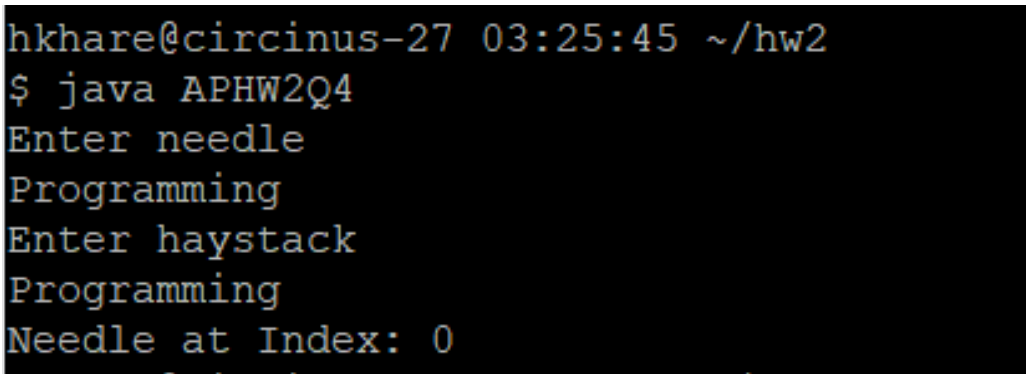


Section 4: Edge Case #2

Description: Both needle and Haystack are equal

Input:
Needle “Programming”
Haystack “Programming”

Expected output: 0

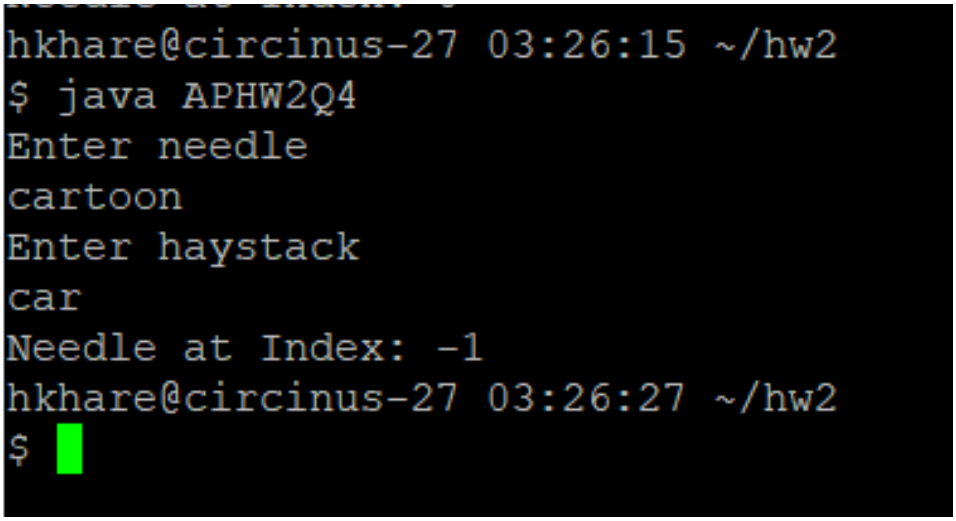


Section 5: Edge Case #3

Description: Needle is longer than haystack

Input:
Needle “cartoon”
Haystack “car”

Expected output: -1



Problem 3: https://leetcode.com/problems/encode-and-decode-strings/

Encode and Decode Strings

Submission Detail

316 / 316 test cases passed.

Runtime: **10 ms**

Memory Usage: **52.4 MB**

harry3997

My List

My Playground

Notebook

Submissions

Sessions

Progress

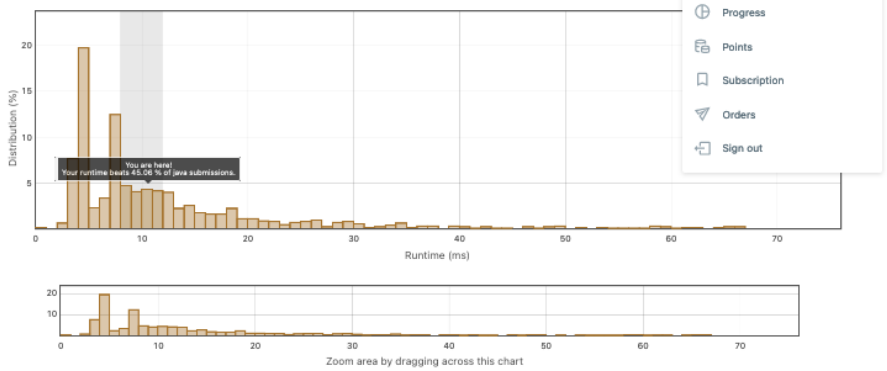
Points

Subscription

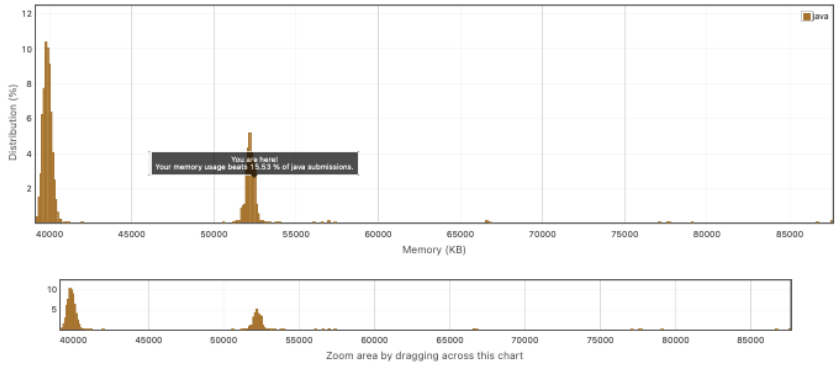
Orders

Sign out

Accepted Solutions Runtime Distribution



Accepted Solutions Memory Distribution



Invite friends to challenge **Encode and Decode Strings**

Submitted Code: 1 day, 6 hours ago

Language: java

Edit Code

```java
public class Codec {
    public String chklen(String s) {
        if(s.length()<10)
            return "00"+Integer.toString(s.length());
        else if(s.length()<100)
            return "0"+Integer.toString(s.length());
        return Integer.toString(s.length());
    }

    // Encodes a list of strings to a single string.
    public String encode(List<String> strs) {
        StringBuilder enc=new StringBuilder();
        for(String s:strs){
            enc.append(chklen(s));
            enc.append(s);
        }
        return enc.toString();
    }

    // Decodes a single string to a list of strings.
    public List<String> decode(String s) {
        List<String> res = new ArrayList<>();
        int i=0;
        while(i<s.length()){
            int lt=Integer.valueOf(s.substring(i,i+3));
            res.add(s.substring(i+3,i+3+lt));
            i=i+3+lt;
        }
        return res;
    }
}

// Your Codec object will be instantiated and called as such:
// Codec codec = new Codec();
// codec.decode(codec.encode(strs));
```

Back to problem

Problem 4: https://leetcode.com/problems/string-without-aaa-or-bbb/

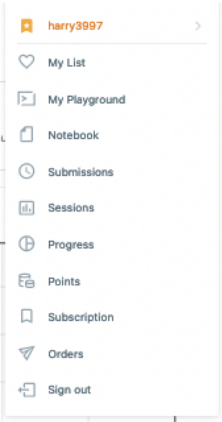
String Without AAA or BBB

Submission Detail

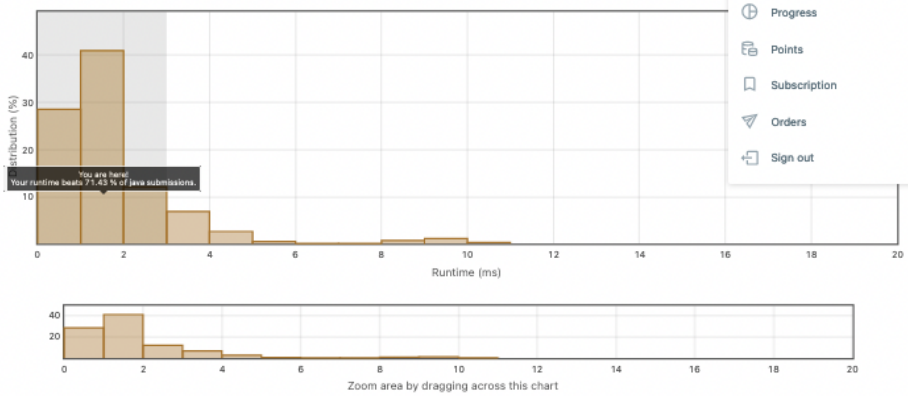
103 / 103 test cases passed.

Runtime: **1 ms**

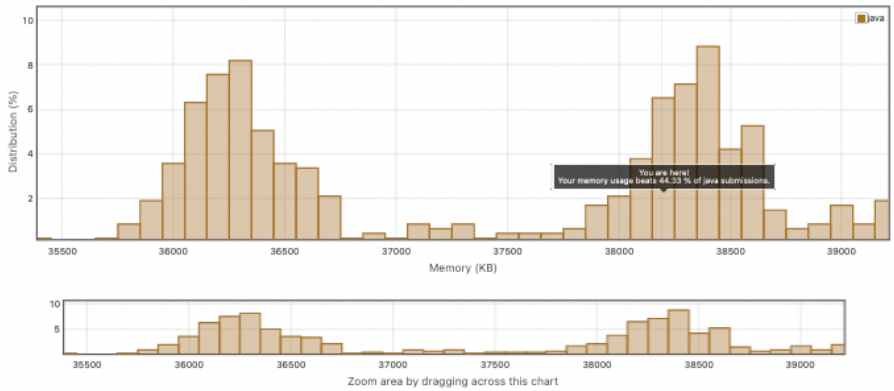
Memory Usage: **38.2 MB**



Accepted Solutions Runtime Distribution



Accepted Solutions Memory Distribution



Invite friends to challenge **String Without AAA or BBB**

Submitted Code: 1 day, 6 hours ago

Language: java

Edit Code

```java
class Solution {
    public String strWithout3a3b(int a, int b) {
        StringBuilder sb = new StringBuilder();
        String one="a",two="b";
        int cto=a,ctt=b;
        if(b>a){
            one="b";two="a";
            cto=b;ctt=a;
        }

        while(cto!=ctt&&cto>1&&ctt>0){
            sb.append(one);sb.append(one);sb.append(two);
            cto-=2;ctt--;
        }

        while(true){
            if(cto==0&&ctt==0) break;
            if(cto!=0){
                sb.append(one);
                cto--;
            }
            if(ctt!=0){
                sb.append(two);
                ctt--;
            }
        }
        return sb.toString();
    }
}
```