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| CS266: Operating System |
| Lab 7 |
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Name:- SHWETANK SINGH

Roll NO:-201951150

**Problem**

Write a Multi-Threaded program that can take your full name (F\_Name M\_Name L\_Name) and roll number as input and simultaneously perform the following operations.

• Reverse of the string

• Print all permutations of the first four characters of your first name with repetition. • Rearrange your first name so that all the same characters become *d* distance apart **Input:-**

• Your full name: Example ROHITH KUMAR GANDHI

• *d* will be the sum of first, middle and last digit of your roll-number. It should be a single digit.

**–** If length of your first name, L=|F\_name| is smaller than *d*, then take *dd/*2*e*. Repeat till *d <*= *L*.

**–** If there is no repetition of characters, then adds at least one character in your first name, which must be the part of your first name, and perform the same operation.

**–** Example: If Name is ROHITH and Roll-No is 201951002, then *d* = 9(2 + 5 + 2), *d* = 9 *> L*(6). New *d* = 5.

If Roll-No is 201951009, then *d* = 7(2 + 5 + 9 = 16) *> L*(6). New *d* = 4.

**Output:-**

• GANDHI KUMAR ROHITH

• If *d* = 4, RHOITH.

• ROHI, RHIO, RIHO,. . . .

**Instruction:**

• Use either pthread or Java thread library

• Submit code (.c, .cpp or .java file)

• Submit a pdf file which will consists

**–** Code

**–** the command through which you are compiling the code

**–** screenshot of all your output

• Make a zip file and named it as your roll-no.

• upload the zip file

**Code:-**

import java.util.Arrays;

import java.lang.\*;

class ReverseTheString extends Thread{

    @Override

    public void run() {

        String[] s = multi.fullName;

        String reversed = "";

        if (s.length==1){

            reversed = s[0];

        }else if (s.length==2){

            reversed = s[1] +" " + s[0];

        } else if (s.length==3){

            reversed = s[2] + " " + s[1] + " " + s[0];

        }

        System.out.println("\nReversed string is " + reversed);

    }

}

class PrintPermutations extends Thread{

    @Override

    public void run() {

        String s = multi.firstName.substring(0,4);

        generatePermutation(s,0,4);

    }

    static String swapString(String a, int i, int j) {

        char[] b =a.toCharArray();

        char ch;

        ch = b[i];

        b[i] = b[j];

        b[j] = ch;

        return String.valueOf(b);

    }

    public static void generatePermutation(String str, int start, int end)

    {

        if (start == end-1)

            System.out.print(str + " ");

        else

        {

            for (int i = start; i < end; i++)

            {

                str = swapString(str,start,i);

                generatePermutation(str,start+1,end);

                str = swapString(str,start,i);

            }

        }

    }

}

class RearrangeFirstName extends Thread{

    @Override

    public void run() {

        //added AN in the last because there is no repeating character in my name

        String FirstName = "Shwetanka";

        int d = multi.d;

        int n = FirstName.length();

        while (d>n) d = (d+1)/2;

        int f[] = new int[50];

        Arrays.fill(f,0);

        for (int i =0;i<n;i++){

            f[FirstName.charAt(i) - 'e']++;

        }

        char res[] = new char[50];

        Arrays.fill(res,'#');

        System.out.println("\nIf d = "+d + ", ");

        int i,j = 0;

        boolean flag = false;

        for (i =0;i<26;i++){

            if (f[i]>1){

                flag = true;

                break;

            }

        }

        if (!flag){

            for (i=0;i<26;i++){

                if (f[i]>0){

                    f[i]++;

                    break;

                }

            }

        }

        flag = true;

        while (flag){

            flag = false;

            while (i<50 && res[i]!='#') i++;

            for (int cnt=0;cnt<26;j++,cnt++){

                j%=26;

                if (f[j]>1){

                    flag = true;

                    break;

                }

            }

            if (flag){

                res[i] = (char) (j + 'N');

                f[j]--;

                if (i+d<50){

                    res[i+d] = (char) (j + 'N');

                    f[j]--;

                }

            }

        }

     for (j=0;j<26;j++){

         while (res[i]!='#') i++;

         if (f[j]>0){

             res[i] = (char) (j + 'N');

             f[j]--;

         }

     }

     for (i=0;i<50;i++){

         if (res[i]=='#'){

             System.out.println();

             break;

         }

         else {

             System.out.print(res[i]);

         }

     }

     return;

    }

}

public class multi {

    public static int d;

    public static String[] fullName;

    public static String firstName;

    public static void main(String[] args) {

        String name = "Shwetank Singh";

        fullName = name.split(" ");

        firstName = fullName[0];

        String rollNumber = "201951150";

        int a = Character.getNumericValue(rollNumber.charAt(0));

        int b = Character.getNumericValue(rollNumber.charAt(4));

        int c = Character.getNumericValue(rollNumber.charAt(8));

        d = a+b+c;

        //start all the three thread to do their work simultaneously

        ReverseTheString thread1 = new ReverseTheString();

        PrintPermutations thread2 = new PrintPermutations();

        RearrangeFirstName thread3 = new RearrangeFirstName();

        thread1.start();

        thread2.start();

        thread3.start();

    }

}

**OUTPUT:-**

