Indian Institute of Information Technology Vadodara

CS266: Operating System

Lab 7

Roll No. 201951105 **Name: Nishant Andoriya**

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/2e*. 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 NT in the last because there is no repeating character in my name
        String FirstName = "NISHANTNT";
        int d = multi.d;
        int n = FirstName.length();
        while (d>n) d = (d+1)/2;
        int f[] = new int[26];
        Arrays.fill(f,0);
        for (int i =0;i<n;i++){
            f[FirstName.charAt(i) - 'A']++;
        }
        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 = "NISHANT ANDORIYA";
        fullName = name.split(" ");
        firstName = fullName[0];
        String rollNumber = "201951105";
        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:-