SE375 SYSTEM PROGRAMMING SPRING 2023-2024
Laboratory Assignment 06
April 3-4, 2024

Multi-threaded text manipulation using Internet to get source files.

Your task is to modify your Java application from last lab. Until this assignment you have used the source text files by reading them from their directories. Today, your task is to get them from a given website. Your program should download the text files to be used. Other than this, your application will do the same as before. Website is: http://homes.ieu.edu.tr/eokur

As a starting point, you can use URL, InputStreamReader and BufferedReader classes to read from a file on the web.

Transformations on the content is as follows as a reminder:

1. Make all characters in the file upper case or lower case (caseThread)
2. Encrypt the file by shifting characters by a specified amount(e.g. a→b if the shift amount is 1) (shiftThread)
3. Color the file red or yellow. (colorThread)

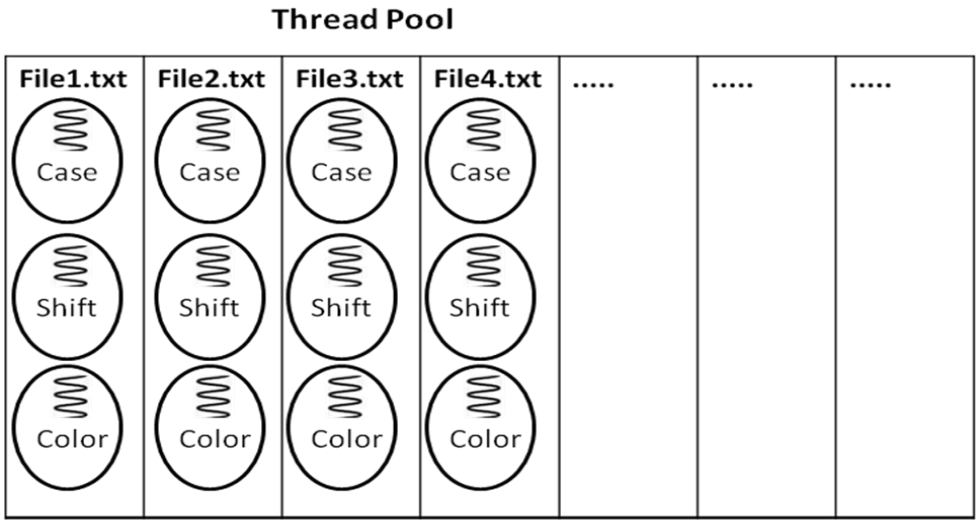
Each thread will also update the total number of transformations applied to that character after completing their task.

Before these transformations, the program will ask the user to enter input values

1. U for upper case, L for lower case
2. The shift amount. A value from 1 to 3
3. R for red, Y for yellow.

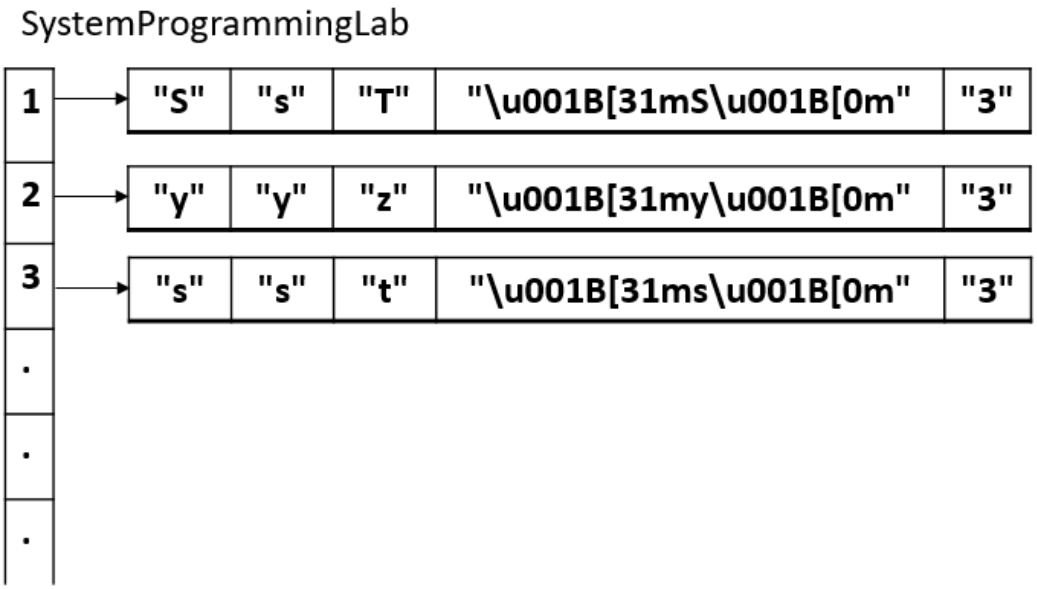
Your program will utilize thread pools to read files from the given website. Initially multiple Hash structures should be created in main() to correspond to each pool thread. Then, pool threads will receive their corresponding Hash structure and the file URL. File access should be done in pool thread, which they will read character by character and place each character on the Hash structure. The key will be integer index of the character in the file and the value would be an array of five elements, which holds the original value, upper or lower case value, the shifted value, the color code and the number of transformations. These are kept as Strings. Then, transformations are done by individual threads (caseThread, shiftThread and colorThread) created and run by the thread which read the file.
Neither the pool thread, nor the sub-threads should not print the results. **The results should be printed after all threads are done working, in the main() method.**

- Whole system should work like this -



Individual threads in the thread pool should work described as below:

If File1.txt contains System Programming Lab the hash structure will look like this for the following user input:
`L,1,R`



Please read below for the meaning of stings "\u001B[31m" and "\u001B[0m". They are used to color a string.

Here's a sample run for a file that contains the text SystemProgrammingLab

```
Please state your choice...
UPPER case or lower case (U or L):
U
Please state your choice...
How many characters to shift (number between 1-3):
1
Please state your choice...
Color of characters (R or Y):
R
Original
SystemProgrammingLab
After Case Change
SYSTEMPROGRAMMINGLAB
After Shift
TztufnQsphsbnnjohMbc
After Color Change
SystemProgrammingLab
Number of Transformations
[3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3]
```

You will be evaluated by your usage of data structures and application of algorithms.

How to Color a String

```
public class lab1 {

    public static final String ANSI_RESET = "\u001B[0m";
    public static final String ANSI_RED = "\u001B[31m";
    public static final String ANSI_YELLOW = "\u001B[33m";

    public static void main(String [] args) {
       String x = "SYSTEM";
       System.out.println(x);
       x = new String(ANSI_RED + "SYSTEM" + ANSI_RESET);
       System.out.println(x);
    }
}
```

Output:

SYSTEM
SYSTEM