Programming Fundamentals
Programming Assignment 1 (StringDiff)

Introduction

In many computer science applications, it is important to determine a similarity of two strings. For example: performing pattern recognition or information retrieval (i.e. searching for some keyword in a document). The degree of similarity is typically measured by defining some distance metric between two strings. For instance, you may define the distance between two strings S1 and S2 of equal length *n*, as the sum of the absolute values of the differences between corresponding character codes in S1 and S2:

$$dist(S1, S2) = \sum_{i=1}^{n} |char_i(S1) - char_i(S2)|$$

where, $char_i$(S) is the number representing the i'th character of string S. For example assume that the characters are encoded using the ASCII character set. Then diff("AB","CD")=4 because A=65, B=66, C=67, D=68 in ASCII, so

$$diff(\text{"AB"}, \text{"}CD\text{"}) = |65 - 67| + |66 - 68| = 2 + 2 = 4$$

Requirements

For this assignment, you are to create a program in Java that first creates two strings (in different ways); then computes the distance between them using the formula given above. Therefore the program will have three parts:

1. (Get String 1 – from user) Prompt the user to enter a string consisting of 5 uppercase characters and save this string in a variable.
2. (Get String 2 – randomly generated) Generate a string with 5 randomly generated characters and save it in a variable.
3. (Calculate Distance) Compute the distance between the two strings and display it to the user.

Additional Requirements

1. The name of your Java Class that contains the main method should be `StringDiff`. All your code should be within the main method.
2. Your code should follow good coding practices, including good use of whitespace (indents and line breaks) and use of both inline and block comments.
3. You need to use meaningful identifier names that conform to standard Java naming conventions.
4. **At the top of each file, you need to put in a block comment with the following information: your name, course name, semester, and assignment name.**
5. The output of your program should **exactly** match the sample program output given at the end.

What to Turn In

You will turn in the single `StringDiff.java` file using BlackBoard.

Sample Program Output 1

```
Programming Fundamentals
NAME: <name>
PROGRAMMING ASSIGNMENT 1

Please enter a string of 5 uppercase characters: ABCDE

The user string is: ABCDE

A random string is: GYVGW

The distance between ABCDE and GYVGW is 69
```

Sample Program Output 2

```
Programming Fundamentals
NAME: <name>
PROGRAMMING ASSIGNMENT 1

Please enter a string of 5 uppercase characters: ZZZZZ

The user string is: ZZZZZ

A random string is: RPWUB

The distance between ZZZZZ and RPWUB is 50
```