CSE2(0/2)25 Data Structures

PROJECT #2 (Due December 20, 2024, Friday)

In this project, you are required to write a program to compare the performance of Splay trees with a modified version of Splay trees (mod-Splay) based on the two criteria: the total number of comparisons and the number of rotations.

You will be given a text file as input, and your program will read the characters in the text and insert the non-existing ones as keys in the corresponding tree (Splay or mod-Splay) or otherwise (i.e., if existent) find them and update their occurrence frequency in the text. For splay tree, you will make the necessary splay(s) after reading each character in the text (i.e., if the access is to a key other than the root). For the mod-splay tree, you will make the necessary splay(s) once the **occurrence frequency of the key accessed (and that is not at the root) becomes the highest in the entire splay tree** (i.e., greater than that at the root!).

The number of comparisons will be considered for both the successful and the unsuccessful searches (i.e., insertions). Further a splay in both splay and mod-splay trees costs as many *tu*s as the number of depth levels the keys have moved through.

The output of your program will be:

- tree obtained at the end of the program's execution (print the tree using pre-order traversal)
- **the total cost (= the cost component from the comparisons + the cost component from the rotations) of the construction and search within**

both trees.

In this project you are expected to develop an algorithm that can find a solution to the above problem and ***implement this algorithm in ANSI C that runs under UNIX***.

Please write a brief report that presents output of your program.

You are responsible for demonstrating your program to your TA Mehmet Kaya on the scheduled day that will be announced later.

By the due date you are to **electronically submit (i.e., to canvas)** the **source code of your program (file name: sur*name1-surname2*.c)**

Note that projects submitted after the project's due date will be **deducted 10 points each day** they are late (until 5 days). After **5 days** following the due date, no project will be accepted and evaluated. Please keep this in mind and **promptly start working on your projects**!

You are allowed to work in groups in two on this project. Each group must submit their original work! No similarities on any project will be tolerated. Any potential violation of this rule will lead **everyone involved** (i.e., **source and receiver, both groups!!!**) to **failing from all projects** and necessary disciplinary actions will be taken.

Good luck!!! ☺