CMIS 2720 Data Structures and Algorithms for Games

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Assignment #2

Due date: February 22, 2023

In this assignment, you will learn the following:

- How to manipulate a linked list
- How to manipulate a stack

General information

1. You must write your programs in C#.
2. This assignment contains two separate programs: A2a and A2b.
3. Submit a zip file to iCollege under the folder Assessments → Assignments → Assignment2. The zip file should contain two separate C# files:
    a. firstname_lastname_A2a.cpp
    b. firstname_lastname_A2b.cpp

A2a requirements

1. I have provided a partially implemented doubly linked list in C#.
2. Your assignment is to implement three additional methods: AddBefore(), FindLast(), and Clear().
3. I have written some test code to test the methods implemented by you.

4. In the source code, write the time complexity (in big O notation) for the following methods:

    a. AddFirst()
    b. AddLast()
    c. Find()
    d. FindLast()
    e. RemoveFirst()
    f. RemoveLast()
    g. Clear()

A2b requirements

1. Implement a stack yourself. Do not use the Stack<T> class in .NET.
    a. There are many examples of stack implementation online. I will also provide some examples. You can use them as references, but try to write your own code.

2. Write a method to check if the curly brackets { } ~~double quotation marks~~ in a paragraph are balanced, using the stack implemented by you.
    a. Ask the user to enter a string ~~paragraph~~.
    b. Check if the curly brackets { } ~~double quotation marks~~ in the paragraph are balanced.
    c. Display a message saying if the curly brackets { } ~~double quotation marks~~ are balanced or not.
    d. Display several characters next to the first imbalanced curly brackets ~~quotation mark~~.

~~Here is an example passage with multiple double quotation marks.~~

~~*Prof Green is experimenting with "cell modules" in which materials are stacked on top of silicon and customised to collect the photons in the sunlight spectrum that might ordinarily be lost in a standard set-up. "We hold the world record for efficiency in a cell module of 40.6%," he told BBC News. "But it's hard to see how this approach can be made cheap enough for commercial production. There's a lot of interest right now in a material called perovskite - a common mineral - but the cells use heavy elements, like lead. The cells also aren't as stable as silicon."*~~

Here is a regular expression with multiple curly brackets.

"(\\d{2}).(\\d{2}).(\\d{4})"

3. You must use stack in your implementation. If your program does not use stack, you will get 0 credit for this part.

4. In the source code, write the time complexity (big O notation) of your algorithm as a comment at beginning of the program.