Analysis Document for Assignment 7

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Problem 1

No, I have not worked with more than one partner yet. I will switch partner for next assignment.

Problem 2

The stack data structure is implemented using a doubly-linked list. Peek method uses getFirst method in DoublyLinkedList, pop method uses removeFirst method and push method uses addFirst method.

The stack only operates on the head element of the doubly-linked list and all operation is $O(1)$ complexity. If we use singly-linked list to implement the stack, the operation would be the same - operating the head element. The constant factor will be a little lower compared to that for the doubly-linked list implementation, but the complexity will still be $O(1)$.

So I do not think there will be much performance improvement if use a singly-linked list instead.

Problem 3

It is possible to replace the instance of DoublyLinkedList in the LinkedListStack class with Java's LinkedList. Because DoublyLinkedList and Java's LinkedList basiclly functions the same. Especially the methods we are using, which have the same functionality.

I changed DoublyLinkedList to LinkedList to test and the result confirms this.

Problem 4

LinkedListStack class is very easy to develop.

Since we have implemented DoublyLinkedList, all methods in LinkedListStack can simply call the equivalent methods in DoublyLinkedList to develop. So the development of LinkedListStack only takes minutes.

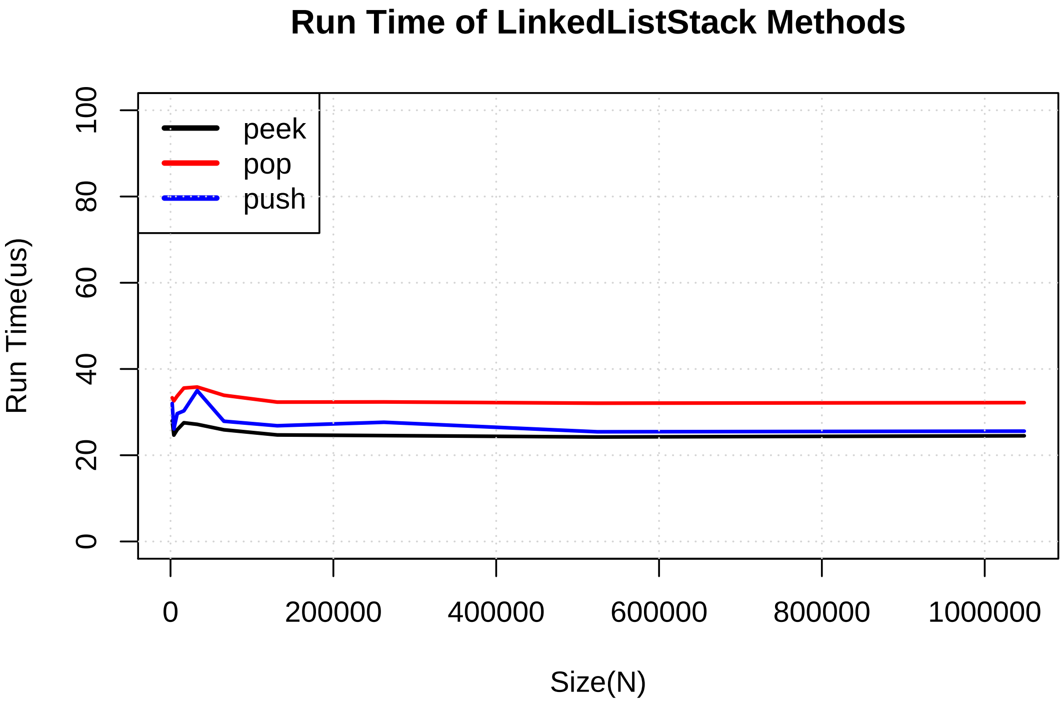
Problem 5

Make a class contains the symbol and its position:

```
class Symbol
{
    public char symbol; //Store the symbol
    public int  line;   //Track line
    public int  col;    //Track column
};
```

Every time we find a symbol which needs to be pushed in the stack, we create this class, containing the symbol itself and its position, and push the class in the stack. So each time when we pop, we can know the posotion of the original symbol.

Problem 6



The running times of the LinkedListStack methods push, pop, and peek are $O(1)$ as expected.

Problem 7

About 8 hours. 6 hours for coding and 2 hours for this document.