LAB 1 - Linked List

Haoqi Wu

18 Sep 2019

Description

This lab is designed to work on **Linked List**. This is an individual work and you may not share code with other students.

There are two problems below:

1. Implement a polynomial class using `linked list`
2. Implement an Integer editor using `doubly linked list`

Attention!!

- Only one problem is required to be solved.
- If more than one problems are solved, the one with highest score will be counted.
- Written in Java.

Specification

Problem1

To implement a polynomial class that uses a **linked list** to store the polynomial's terms. Each node of the list holds the coefficient and exponent for one term. The terms are kept in order **from the largest to the smallest exponent**.

In addition, a `toString()` method of the polynomial class should be implemented to provide a more natural representation, as well as the operation to `add()` two polynomials.

The *Term* data structure and *Polynomial* data structure are given below, you gotta complete the code.

```
public class Term {
     // create a term
     public Term(double coef, int exp)
```

```
    // get the value of the coefficient
    public double getCoefficient()

    // set the value of the coefficient
    public void setCoefficient(double coef)

    // get the value of the exponent
    public int getExponent()

    // set the value of the exponent
    public void setExponent(int exp)

    // get the following term
    public Term getNext()

    // set the following term
    public void setNext(Term next)
}
```

```
public class Polynomial {
    // create a polynomial
    public Polynomial(Term firstTerm)

    // get the first term
    public Term getFirst()

    // set the first term
    public void setFirst(Term first)

    // add a single term to the polynomial
    public void addTerm(Term term)

    // add another polynomial, return the sum
    public Polynomial add(Polynomial another)

    // convert to string representation
    // example: 4.0x^3+3.2x^2-2.1x^1+1.0x^0
    // example: -12.0x^9-1.0x^7+3.0x^5+10.0x^2+5.0x^0
    public String toString()
    // write your own code to test your implementation
    public static void main(String[] args)
}
```

Problem 2

To implement a most powerful editor for integer sequences. The sequence is just an empty list when initialized, and the editor for the sequence should support the following 5 operations:

Operation	Description
I x	Insert x after the cursor
L	Move the cursor left unless it's at the first element
R	Move the cursor right unless it's at the last element
D	Delete the element before the cursor
Q k	Suppose the current sequence before the cursor is $a_1, \cdots, a_n$, **Output** $max_{1 \leq i \leq k} S_i$ where $S_i = a_1 + \cdots + a_i$.

Please write a program to implement this editor.

Hint: doubly linked list

Additional: Not required to complete !!

S_i in Q k modified to $S_i = a_j + \cdots + a_i, 1 \leq j \leq i$

Submission

Deadline: In class / 20 Sep 2019 18:00, any uploads after 20 Sep 2019 18:00 wil get **ZERO** points.

Create a zip file named **YourStudentID.zip** that contains your code project and **upload your zip file to the FTP server**.