ITU COMPUTER ENGINEERING DEPARTMENT

BLG 223E DATA STRUCTURES

HOMEWORK - 1

Due Date: 22 October, 23:59

Scenario:

Suppose you run a shoe shop and you want to write a stock tracking program for the shoes in the shop. Design and implement a stock tracking program based on a linked list structure to keep your stock information.

Workflow:

1. You will read the **input.txt**. The **positive numbers** are the sizes of pair of shoes you are getting into your stock this morning. First, you will add them to your stock following the rules:
    a. Your stock will be a linked list in a struct form, containing 2 parameters (shoe size and quantity).
    b. The linked list will be in **increasing order** with respect to shoe size.
    c. If the pair of shoe you are adding is not in the list, you will create a node in a proper space and set the quantity of this pair of shoe as 1.
    d. If the pair of shoe you are adding is in the list, you will increment it's quantity by 1.
2. The **negative numbers** are the customers wanting a shoe in specified size. You will sell those shoes following the rules:
    a. If there are more than 1 pair of shoes of that size, you will decrease the quantity of that size of pair of shoe by 1.
    b. If there is only 1 pair of shoe of that size, you will delete the node of that pair of shoe from the linked list.
    c. If there is no pair of shoe of that size, the program will print out the message "NO_STOCK"
3. **Zero (0)** is the command for the printing the stock info. You will print out the remaining stock following the format: "<size>:<quantity>\n". Example:

    36:2

    38:1

    40:3

    41:1
4. At the end, you need to delete all of the nodes of your list to free up the space.

Example:

Input file "input.txt"
36 41 45 38 35 37 45 42 40 36 -35 -40 -36 -35 -38 0 -35 -41 0
Output
NO_STOCK 36:1 37:1 41:1 42:1 45:2 NO_STOCK 36:1 37:1 42:1 45:2

Implementation:

Implement the following methods with appropriate arguments and return types for your structure:

a. **create():** Creates the stock list.
b. **add_stock():** Adds a pair of shoe to the stock list. (workflow 1)
c. **sell():** Sells a pair of shoe. (workflow 2)
d. **current_stock():** Prints the current stock list. (workflow 3)
e. **clear():** Deletes all of the nodes of the list. (workflow 4)

Structure:

```
struct node{
   int size;
   int quant;
   node *next;
};
struct stock{
   node *head;
   void create();
   void add_stock(int);
   void sell(int);
   void current_stock();
   void clear();
};
```

Submission

1. Make sure you write your name and number in all of the files of your project, in the following format:

```
/* @Author

Student Name: <student_name>

Student ID: <student_id>

Date: <date> */
```

2. Use comments wherever necessary in your code to explain what you did.
3. You don't have to use a structure **exactly the same** as the given one. The given structure is for helping you to imagine how it would be.
4. You are **not** allowed to include any **STL container**.
5. Your program should compile and run on Linux environment using g++ (version **4.8.5 or later). You can test your program on ITU's Linux Server using SSH protocol.**
6. To compile the code, you can use the following command:

   g++ main.cpp –o main

   And you can execute your program by using the following command:

   ./main input.txt

7. After you make sure that everything is compiled smoothly, archive all files into a zip file. Submit this file through www.ninova.itu.edu.tr. Ninova enables you to change your submission before the submission deadline.

Do not miss submission deadline. **Do not** leave your submission until the last minute. The submission system tends to become less responsive due to high network traffic.

HOMEWORKS SENT VIA E-MAIL WILL NOT BE GRADED.

Academic dishonesty including but not limited to cheating, plagiarism and collaboration is unacceptable and subject to disciplinary actions. Your homeworks will be checked with a plagiarism checker system, any student found guilty will receive 0 as his/her grade for the homework and subject to disciplinary actions.

If you have any question about the homework, contact the teaching assistant **Fatih Bektaş** via e-mail (**bektas18@itu.edu.tr**) or in **4307**.