

CS2203 / CSX3004 Programming Languages

Week 10 Worksheet

1. Create a new class `Stack` that implements the basic `Stack` functionalities. The services to be provided are as follows:
 - `boolean push(int item)`
Push the given item on to the top of the stack.
 - `boolean pop()`
Pop the top item from the stack.
 - `int getTopItem ()`
Return the top item of the stack without side effects. If the stack is empty, the method will return -1.
 - `boolean isEmpty()`
Return true if the stack is empty; otherwise, return false.
 - `String toString()`
Return a string representation of the stack where the contents are listed inside the square bracket and the top item is listed first.

Then, write a program to test this class.

2. Implement the `OrderedList` class which represents an ordered singly linked list that cannot contain any duplicates. Note that items in the `OrderedList` are always kept in ascending order. Complete the class with the following methods.
 - Default constructor
Create an empty list i.e., head is **null**.
 - `boolean insert(int data)`
Insert the given data into the list at the proper location in the list. If the insertion is successful, the function returns true; otherwise, returns false.
 - `boolean delete(int data)`
Delete the node that contains the given data from the list. If the deletion is successful, the function returns true; otherwise, returns false.
 - `int find(int data)`
Search and return the index to the node that contains the data. Note that the index starts from 0. If it is not found, return -1.
 - `int count()`
Count and return the number of nodes in the list
 - `String toString()`
Return the string representation of this List where all data in the list are enclosed in square brackets [].

Then write the program that accepts a sequence of commands and print out the number of successful insertions, the number of successful deletions, the number of successful searches (through the “find” command), the number of items remaining in the list after executing all commands and the final contents of the list.

There are 3 commands which are “insert”, “delete” and “find”.

Input

Line 1: The number of transactions m on the list, where $1 \leq m \leq 200$.

Line 2 to $m+1$: A string command (“insert”, “delete”, “find”) followed by an integer n (separated by a space).

- “insert” means insert n into the list
- “delete” means delete n from the list
- “find” means find n in the list

Output

Line 1: Display 4 integers (each number is separated by a space) which are:

- the number of successful insertions,
- the number of successful deletions,
- the number of items found (from the command “find”), and
- the number of items remaining in the list

Line 2: The final contents of the list

Sample Input	Sample Output
3 insert 1 delete 5 find 2	1 0 0 1 [1]
8 find 10 insert 3 insert 2 insert 1 delete 4 delete 3 insert 1 find 2	3 1 1 2 [1 2]