창의적 소프트웨어 프로그래밍 Lab 18

Handed out : Fri, Nov 25, 2022

Due : Mon, Nov 28, 2022, 23:59 (NO SCORE for late submissions!)

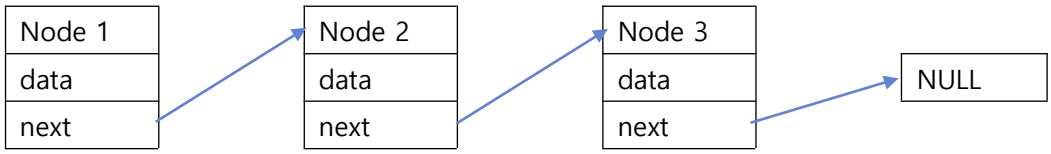
Submit your file on LMS.

1. Write a program for templated singly linked list.

   A. The list stores the following Node class template instances.

   B.
```
template <class T>
class Node
{
	public:
		T data;
		Node<T>* next;
}
```

   C. Diagram of singly linked list:



   D. Complete the following class template List that implements singly linked list.

      i. Hint: Set the next of the last node of the liked list to NULL.

   E.
```
template <class T>
class List {
private:
    Node<T> *head;
public:
    List() : head(NULL) {};
    ~List();//free resources
    List(T* arr, int n_nodes);//create a list with n_nodes
    void insert_at(int idx, const T& data);
    void remove_at(int idx);
    void pop_back();
    void push_back(const T& val);
    void pop_front();
    void push_front(const T& val);
    friend ostream& operator<<(ostream& out, List& rhs);//print out nodes
};
```

   F. Use the following main function to test your List class template.

G.

```
int main(){
		int array[5] = {12, 7, 9, 21, 13 };
		List<int> li(array, 5);
		cout<< li << endl; //12,7,9,21,13

		li.pop_back();
		cout<< li << endl; //12,7,9,21

		li.push_back(15);
		cout<< li << endl; //12,7,9,21,15

		li.pop_front();
		cout<< li << endl; //7,9,21,15

		li.push_front(8);
		cout<< li << endl; //8,7,9,21,15

		li.insert_at(4, 19);
		cout<< li << endl; //8,7,9,21,19,15

		li.remove_at(1);
		cout<< li << endl; //8,9,21,19,15

		return 0;
	}
```

H. Input: None

I. Output: Printed results of running main() function

J. Files to submit:

i. main.cpp – Use the given main() code as is.

ii. list.h – Implementation of class template List (Write the function bodies in the header file)

iii. A CMakeLists.txt to generate the executable

```
$ ./list
12,7,9,21,13
12,7,9,21
12,7,9,21,15
7,9,21,15
8,7,9,21,15
8,7,9,21,19,15
8,9,21,19,15
$
```