LANGARA COLLEGE
DEPARTMENT OF COMPUTING SCIENCE AND INFORMATION SYSTEMS
CPSC 1160 - ALGORITHMS AND DATA STRUCTURES I
Assignment 08 – Lab 08
November 09, 2017

Instructions

- This assignment is worth 10 points, and is due on November 23 at 04:00 PM.
- All the program files (.cpp and .h files) are required to be put in a folder named Lab08; the whole folder then should be submitted as a single zipped file on D2L.
- Analysis of your algorithms is required to be provided in separate document files included in your submission.

Question 1 [3 points]

Implement the Stack ADT as a generic linked structure, and name it `LinkedStack`. Provide the following functionalities for your class (as explained in the lab):

1. A constructor, `LinkedStack()`, to create an empty stack.

2. A destructor, `~LinkedStack()`, to free the stack memory.

3. A function to push a new element into the stack: `void push(T newElement)`.

4. A function to pop and return the element at the top of the stack: `T pop()`; this function throws a `runtime-error` exception (if you know how), or simply prints an error message in case the stack is empty.

5. A function to retrieve the element at the top of the stack: `T getTop()`; this function throws a `runtime-error` exception (if you know how), or simply prints an error message in case the stack is empty.

6. A function to check if the stack is empty: `bool isEmpty()`.

Question 2

Part1 [5 points]

Implement the Queue ADT as a generic linked structure, and name it `LinkedQueue`. Provide the following functionalities for your class:

1. A constructor, `LinkedQueue()`, to create an empty stack.

2. A destructor, `~LinkedQueue()`, to free the queue memory.

3. A function to insert a new element into the end of the queue: `void insert(T newElement)`.

4. A function to delete and return the element at the front of the queue: `T remove()`; this function throws a `runtime-error` exception (if you know how), or simply prints an error message in case the queue is empty.

5. A function to check if the queue is empty: `bool isEmpty()`.

Part2 [3 points]

Analyze the efficiency of the LinkedQueue from the viewpoint of time and memory, and compare this implementation with the contiguous queue implemented in the Assignment 7.