INFSCI 0020 Program Design and Software Tools
Homework 5, Due April 6

In this assignment you will develop a Deque template class using doubly linked list, similar to the Queue template class shown in Fig17.13. A Deque object allows insertions and deletions at both the *front* as well as the *back* of a list and hence is sometimes called a *double ended queue*. The key member functions needed for a Deque class include;

pussFront	: insert an element in the front of the Deque
pushBack	: insert an element in the back of the Deque
popFront	: removes and returns an element from the front of the Deque
popBack	: removes and returns an element from the back of the Deque

Additionally, include the following support functions:

getSize	: return the size of the Deque
isDequeEmpty	: returns true if the Deque is empty
printDeque	: prints the elements of the Deque from front

You can define any additional member function as you deem fit. You need to define appropriate member variables – a look at the Queue class in Chapter 17 of the book will help you decide appropriate member variables.

To implement the Deque class, you will use a doubly linked list - call it class DoublyLinkedList. Hence you have to first implement the class DoublyLinkedList. You can start with the implementation of the ListNode, List and Queue classes explained in the book. Note that to implement Queue, you use ListNode (Fig 17.3) and List template classes (Fig 17.4). To implement Deque, you will essentially use modified versions of ListNode, as you now need a forward link and a backward link. Your DoublyLinkedList template class will essentially be a modification of the List template class. Note that insertion and deletion operation will be different now. Start with the zipped files provided on the web for the book's implementation of the Queue.

***Client program*:**

Write a client program that will allow testing for all the functions. Provide the following *menu* to allow choosing the operations users want to perform:

1. Push an element at the front of the Deque
2. Push an element at the back of the Deque
3. Pop an element from the front of the Deque
4. Pop an element from the back of the Deque
5. Print the size of the Deque
6. Print the elements of the Deque
7. Exit the program

Your client program should demonstrate these functionalities for int and double.

***Extra points*:** Implementing the above menu and testing component as a template function will give you 10 extra points. Note that use of a template function means you will reuse your code for demonstrating above functionalities for a Deque of integer elements and double elements.