Assignment # 2
CS 2001 – Data Structures (CS)
Fall 2021

Purpose: The objective of this assignment is to assess your learning regarding pointer-based List ADT implementation along with its variants (e.g., Circular and Doubly linked lists).

General Guidelines

1. Peer plagiarism and the late submissions are strictly not allowed
2. Total Marks: 100

Submission Guidelines

3. Your assignment must be submitted in hardcopy (i.e., printed form) and a zipped folder (named as your roll number) containing source files **(.cpp)** for both the tasks should also be uploaded on Slate portal within the given deadline.
4. **Deadline (Monday, 18th October till 04:00 pm)**

Task 1: Use Singly Linked List Only. **Marks [30]**

Your task is to develop a program for a hospital where they need help to calculate and maintain the number of patients, their disease, and their allotted room numbers. You will use a list node to store record of a patient such as patient name, patient CNIC, patient disease, admit date and patient allotted room number.

Suppose if a patient has been recovered then, you will need to delete his/her Node from the list (Use all methods of deletion Start, Middle, and End). The system will use a special function named as *DichargePatient*() that will take patient CNIC as parameter, remove node of the patient, and return success status of the operation.

Whenever a new patient is arrived at the hospital for admitting in a room. The system will use another function *AdmitPatient()* that takes patient's information, checks the availability of a room (assume that hospital only have 20 rooms and only one patient per room is allowed). If multiple rooms are available, then always allocate room with lowest number. Otherwise, print message that no room is available and return false.

Last thing is to equip your program with a search tool. Whenever, the user opts to search for a patient, the system should ask for a list of search possibilities (i.e., search by room number, search by CNIC, search by Disease name etc.). For example, if user opts to search using the CNIC, the system should ask for CNIC from the user, search the node with CNIC and print the information of the patient in this node. If there is no patient with the provided CNIC, then the system should print a proper message.

Task 2: Implement a Circular Doubly Linked List that can store integers having following ADT operations: - Marks [50]

- Insertion – at specific position, at end, at start
- Delete Specific element/digit/item entered
- Delete all (may be implemented as destructor)
- Search an element in list
- Check if list is empty
- Sort the list in descending order
- Print list in actual and reverse order

Note: The implementation of must only have a single head pointer (i.e., you don't have to maintain the tail pointer)