National University of Computer and Emerging Sciences

Laboratory Manual

for

Data Structures Lab

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Objectives:

In this lab, students will practice:

1. Singly Linked List

Question 1

1. Implement a template class 'Node' that contains two data members: A template variable 'data' and a Node pointer 'next'. You may define any member functions, if required, for the template class.

2. Now using the above class, implement a **singly linked list** which supports the following operations:

   a. Insert at start `void insertAtStart(T const element);`

   b. Insert at end `void insertAtEnd(T const element);`

   c. Print `void print() const;`

   d. Search an element `bool search(T const& element) const;`

   e. Insert value v1 after the node having value v2

   ```
   bool insertAfter(T const v1, T const v2);
   ```

   f. Delete From Start `void deleteFromStart();`

   g. Delete from the end `void DeleteAtEnd();`

   h. Delete all occurrences of v1

   ```
   void deleteAllOccurrences (T v1);
   ```

   i. Destructor

3. Now create a main function which has the following instructions:
   a. Define a linked list object of type int.
   b. Insert 2, 6, and 7 at start
   c. Insert 9 at the end.
   d. Now insert 7, 8, and 9 at start.
   e. Delete from start.
   f. Now print the linked list.
   g. Search for 2, 9 and 10.
   h. Now delete from end.
   i. Now print the linked list.
   j. insertAtEnd(100)
   k. inserAfter(2,9)

l. inserAtEnd(2)
m. deleteAllOccurrences(s)
n. print the linked list

Question 2

Now write a member function to reverse the linked list. Also tell the time complexity of your code in the comment.

Note: You are not allowed to declare new linked list for this task…