# Department of Computing

# School of Electrical Engineering and Computer Science

**CS-250: Data Structure and Algorithms**

**Class: BEEE 11 (Grp1+2)**

# Lab 4: Implementation of Linked List with its Operations

**Date: 26th February, 2024**

**Time: 10:00am – 12:50 pm**

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# Lab 4: Implementation of Linked List with its Operations

**Introduction**

Students have learned the fundamental concepts of linked lists in the lectures. This lab will introduce students with the practical implementation of a linked list and different operations that can be performed on a linked list.

**Objectives**

Objective of this lab is to get familiar with singly linked list and implement them in C++.

**Tools/Software Requirement**

Visual Studio C++

**Helping Material**

Lecture slides. Text book.

**Description**

**Singly Linked List**

A Linked List is a data structure consisting of a group of nodes which together represent a sequence. Under the simplest form, each node is composed of two parts i.e. data part and a reference part (also known as, a link) to the next node in the sequence. This structure allows efficient insertion or removal of elements from any position in the sequence.

## Singly-linked-list.svg

## The basic operation consist of

* ***Creating*** the list.
* ***Initialize*** pointers to NULL.
* ***Inserting*** nodes at beginning, last and from a specific location.
* ***Deletion*** of nodes from beginning, last and from a specific location.
* ***Traversing*** the list.
* ***Destroying*** the list.

**Lab Tasks**

Write a C++ program that can

1. Create a simple linked list using functions to insert nodes at the head.

2. Make a function that can insert another node at 3rd location.

3. Make a function that can display the lists made in 1 and 2.

4. Write a function that can delete node from the linked list selected by the user. Display it as well.

5. Write a function that can count the number of nodes present in list.

6. Create menu in main function to give call to all of the above functions depending upon user’s input.

**Important Note:** Please note that you have to develop your solution in C++ (OOP) i.e. using classes and objects. Solution written in a procedural style will not be accepted.

**Hint:** First you will create the relevant classes, and the functions will belong to the List class.

//class of node

class Node {

public:

int value;

node \*next;

};

Required functions for list class are:

void insertAtHead(int new\_value);

void insertAtLocation(int location,int new\_value)

void delete(int del\_value)

void displayList()

void countList()

**Solution**

|  |
| --- |
| Solution |
| Task 1 Code:  Task 1 Output Screenshot: |

### Deliverables

Compile a single word document by filling in the solution part and submit this Word file on LMS. Insert the solution/answer in this document. You must show the implementation of the tasks in the designing tool, along with your complete Word document to get your work graded. You must also submit this Word document on the LMS.