**LAB # 06**

**Singly Linked List implementation of the**

**List ADT**

**Object**

Implementing singly linked list and associated operations.

**Theory**

A linked list is a concrete data structure consisting of a sequence of nodes

Each node stores

* Element : object, list of object, simple data, another linked list of objects
* links to the adjacent node(s)
* STARTNODE keeps reference of first node of the list.
* Link of the last node is NULL, marks end of list

|  |  |
| --- | --- |
| Public Class Name: Node |  |
| Member Variables | Responsibilities |
| Protected <Object> element | public Object getElement()  Returns element from the node |
| Protected Node nextlink | public Node getNext()  Returns link of next node in the LL |
| Constructors | public setElement(Object newElem)  Set element part of the node to new element |
| public Node() | public setNext(Node newNextlink)  Set nextlink part of node to newnextlink |
| public Node(Object e, Node n) |  |

**Basic Operations**

* Search : to search element in Singly LL (both unsorted and sorted LL)
* Insert: Insert element any where in the LL
* Delete: delete any node in LL

**Algorithm to insert node at beginning**:

1. Node newnode = new Node()

2. newnode.setElement(item)

3. newNode.setNextLink(STARTNODE)

4. STARTNODE := newnode

5. N:=N+1

6. Exit

**Algorithm to insert node at particular location**:

1. Node newnode = new Node()

2. newnode.setElement(item)

3. newNode.setNextLink(locptr.getNextLink())

4. locptr.setNextLink(newnode)

5. N:=N+1

6. Exit

**Algorithm to search element** :

1. Set PTR := START, LOC:= NULL

2. Repeat Steps 3-4 while PTR ≠ NULL

3. if ptr.getElement() = ITEM then

4 Set Loc:=PTR and return

5. Else

Set PTR:= ptr.getNextLink()

[end of if]

[end of loop]

7. Return LOC

**Algorithm to delete node at begining**:

1. item:=STARTNODE.getElement()

2. STARTNODE:=STARTNODE.getNextLink()

3. N:=N-1

6. return item

**Algorithm to delete node at particular location**:

If locptr=NULL OR plocptr = NULL then

Print “Item couldnot be deleted”

Return NULL

Else item:=locptr.getElement()

plocptr.setNextLink(locptr.getNextLink())

Locptr.setNextLink(NULL)

N:=N-1

return item

**Task**

1. Write a program that can store 10 records of students in a link list manner. View the list then delete record again view the list after deletion. Search record of the any student.