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Roll Number: SYCOC303 Division: C

PRN Number: 122B2B303 Batch: C4

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Problem Statement:

- ⇨ **Write a C++ program to implement a singly linked list and perform operations such as insert,delete, display, search element from it and reverse the list.**

==

INPUT:

```
/*
 *    ======================================
 *          Program Name: SinglyLL.cpp
 *    Created on: November 29, 2022
 *      Author: Vinayak Shete
 *  ======================================
 */
#include<iostream>
using namespace std;

struct node
{
      int data;
      struct node* next;
};

class SinglyLL
{
      struct node* head=NULL;
	public:
		void insertAtBeg();
		void insertAtEnd();
		void insertAtPos(int);
		void deleteAtBeg();
		void deleteAtEnd();
		void deleteAtPos();
		void searching();
		void display();
		void reverse();
};

//functions for insertion operation
//inserting at beginning
void SinglyLL::insertAtBeg()
{
	struct node* new_node=new node();
	cout<<"\n=================You are doing Insertion Operation at 
Beginning====================";
	cout<<"\nEnter the number to be stored in the Linked List:";
	cin>>new_node->data;
	new_node->next=NULL;
	//if entering for the first time
	if(head==NULL)
	{
		cout<<"\nYou are entering for the first 
time..\n===============================\n\n";
		head=new_node;
	}
	else
	{
		new_node->next=head;
		head=new_node;
	}
}
```

```
//inserting at end
void SinglyLL::insertAtEnd()
{
      struct node* new_node=new node();
      cout<<"\n=================You are doing Insertion Operation at 
Position====================";
      cout<<"\nEnter the number to be stored in the Linked List:";
      cin>>new_node->data;
      new_node->next=NULL;
      //if entering for the first time
      if(head==NULL)
      {
            cout<<"\nYou are entering for the first 
time..\n===============================";
            head=new_node;
      }
      else
      {
            struct node *temp=head;
            while(temp->next!=NULL)
            {
                  temp=temp->next;
            }
            temp->next=new_node;
      }
}

//inserting at specific position
void SinglyLL::insertAtPos(int position)
{
      struct node* new_node=new node();
      cout<<"\n=================You are doing Insertion Operation at 
Position====================";
      cout<<"\nEnter the number to be stored in the Linked List:";
      cin>>new_node->data;
```

```
        new_node->next=NULL;
        //if entering for the first time
        if(head==NULL)
        {
                cout<<"\nYou are entering for the first
time..\n================================";
                head=new_node;
        }
        else
        {
                struct node *temp=head;
                for(int i=0;i<position-2;i++)
                {
                        temp=temp->next;
                }
                new_node->next=temp->next;
                temp->next=new_node;
        }
}

//functions for deletion operation
//deleting at beginning
void SinglyLL::deleteAtBeg()
{
        cout<<"\n=================You are doing Deletion Operation at
Beginning====================";
        if(head==NULL)
        {
                cout<<"\nList is empty!Deletion operation failed!";
        }
        else
        {
                struct node *temp=head;
                head=temp->next;
                int del_data=temp->data;
```

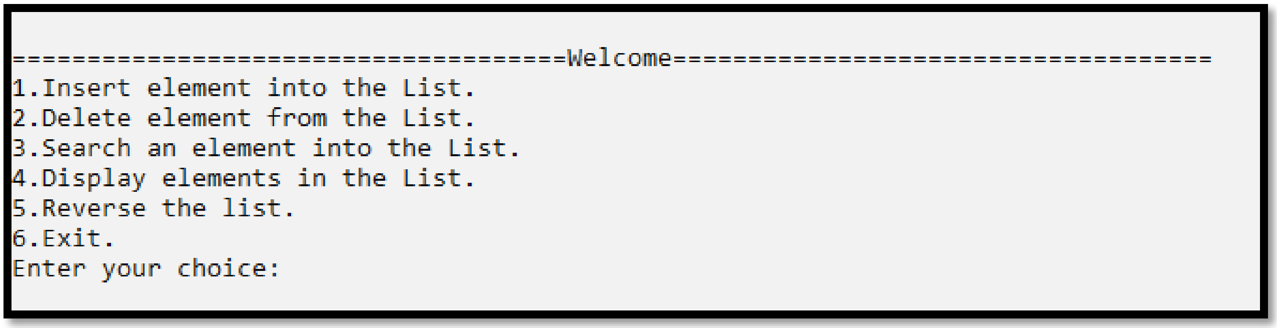
```
            cout<<"\nElement "<<del_data<<" deleted successfully!\n";
            delete(temp);
      }
}

//deleting at beginning
void SinglyLL::deleteAtEnd()
{
      cout<<"\n=================You are doing Deletion Operation at 
End====================";
      if(head==NULL)
      {
            cout<<"\nList is empty!Deletion operation failed!";
      }
      else
      {
            struct node *temp=head;
            struct node *temp1=head->next;
            while(temp1->next!=NULL)
            {
                  temp=temp->next;
                  temp1=temp1->next;
            }
            int del_data=temp1->data;
            temp->next=NULL;
            cout<<"\nElement "<<del_data<<" deleted successfully!\n";
            delete(temp1);
      }
}

//deleting at specific location
void SinglyLL::deleteAtPos()
{
      int position;
      cout<<"\n=================You are doing Deletion Operation at 
Position====================";
      if(head==NULL)
      {
            cout<<"\nList is empty!Deletion operation failed!";
      }
      else
      {
            cout<<"\nEnter the position you want to enter an element at:";
            cin>>position;
            struct node *temp=head;
            struct node *temp1=head->next;
            for(int i=0;i<position-2;i++)
            {
                  temp=temp->next;
                  temp1=temp1->next;
            }
            int del_data=temp1->data;
            temp->next=temp1->next;
            cout<<"\nElement "<<del_data<<" deleted successfully!\n";
            delete(temp1);
      }
}

//function for search an element into the list
void SinglyLL::searching()
{
      int ser_ele;
      int ser_pos=1;
      cout<<"\n=================You are doing Searching 
Operation====================";
      if(head==NULL)
      {
            cout<<"\nList is empty!Searching operation failed!\n";
      }
```

```
    else
    {
        cout<<"\nEnter the element you want to search:";
        cin>>ser_ele;
        struct node *temp=head;
        while(temp->next!=NULL)
        {
            if(temp->data==ser_ele)
            {
                cout<<"\nElement found successfully at "<<ser_pos<<"
position.\n";
                return;
            }
            else
            {
                ser_pos++;
            }

            temp=temp->next;
        }
        cout<<"\nElement is not present in the linked list..\n";
    }
}

//function for reversing the list
void SinglyLL::reverse()
{
    struct node* current=head;
    struct node* prev=NULL;
    struct node* next=NULL;
    cout<<"\n=================You are doing Reversing
Operation====================";
    if(head==NULL)
    {
        cout<<"\nList is empty!Reversing operation failed!\n";
```

```
	}
	else
	{
		while(current!=NULL)
		{
		next=current->next;
		current->next=prev;
		prev=current;
		current=next;
		}
		head=prev;
		cout<<"\nThe list is reversed successfully!\n";
	}
}

//function for displaying the list
void SinglyLL::display()
{
	struct node* temp=head;
	cout<<"\n=====================Displaying the LINKED
LIST====================";
	cout<<"\nLinkedList is:\tHEAD";
	while(temp!=NULL)
	{
		cout<<"-->>"<<temp->data;
		temp=temp->next;
	}
	cout<<"-->>NULL";
	cout<<"\n==============================================================
=====\n\n";
}

int main()
{
	SinglyLL obj;
```

```
      int ch,doch,insch,ins,pos,delch,del;
      int ser_ele,ser_i=0;
      cout<<"\n=====================================Welcome==================
==================\n";
      do
      {
            cout<<"1.Insert element into the List.\n2.Delete element from the
List.\n3.Search an element into the List.\n4.Display elements in the
List.\n5.Reverse the list.\n6.Exit.";
            cout<<"\nEnter your choice:";
            cin>>ch;
            switch(ch)
            {
                  case 1:
                        do{
                              cout<<"\n============Insertion
Operations============";
                              cout<<"\n1.Insert at beginning.\n2.Insert at
specific position.\n3.Insert at end.\nEnter your choice:";
                              cin>>insch;
                              switch(insch)
                              {
                                    case 1:
                                          obj.insertAtBeg();
                                          cout<<"\nElement entered
successfully!\n";
                                          obj.display();
                                          break;

                                    case 2:
                                          cout<<"\nEnter the position you
want to enter an element at:";
                                          cin>>pos;
                                          obj.insertAtPos(pos);
                                          cout<<"\nElement entered
successfully!\n";
                                          obj.display();
                                          break;
                                    case 3:
                                          obj.insertAtEnd();
                                          cout<<"\nElement entered 
successfully!\n";
                                          obj.display();
                                          break;

                              }
                              cout<<"\nDo you want to continue insertion 
operation?[Press 1 for YES | Press 0 for NO}-->";
                              cin>>ins;
                        }while(ins==1);
                        break;

                  case 2:
                        do{
                              cout<<"\n============Deletion 
Operations============";
                              cout<<"\n1.Delete at beginning.\n2.Delete at 
specific position.\n3.Delete at end.\nEnter your choice:";
                              cin>>insch;
                              switch(insch)
                              {
                                    case 1:
                                          obj.deleteAtBeg();
                                          obj.display();
                                          break;

                                    case 2:
                                          obj.deleteAtPos();
                                          obj.display();
                                          break;

                                    case 3:
                                          obj.deleteAtEnd();
                                          obj.display();
                                          break;

                              }
                              cout<<"\nDo you want to continue deletion operation?[Press 1 for YES | Press 0 for NO}-->";
                              cin>>del;
                        }while(del==1);
                        break;

                  case 3:
                        obj.searching();
                        break;

                   case 4:
                        obj.display();
                        break;

                  case 5:
                        obj.reverse();
                        obj.display();
                        break;

                  case 6:
                        goto exit;
                        break;
            }

            cout<<"\nDo you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->";
            cin>>doch;
      }while(doch==1);
      exit:
            cout<<"\n==================================Thank You!========================================";
}
```

OUTPUT:



```
=====================================Welcome====================================
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:
```

The insertion and deletion will contain the 3 sub-options as follows:

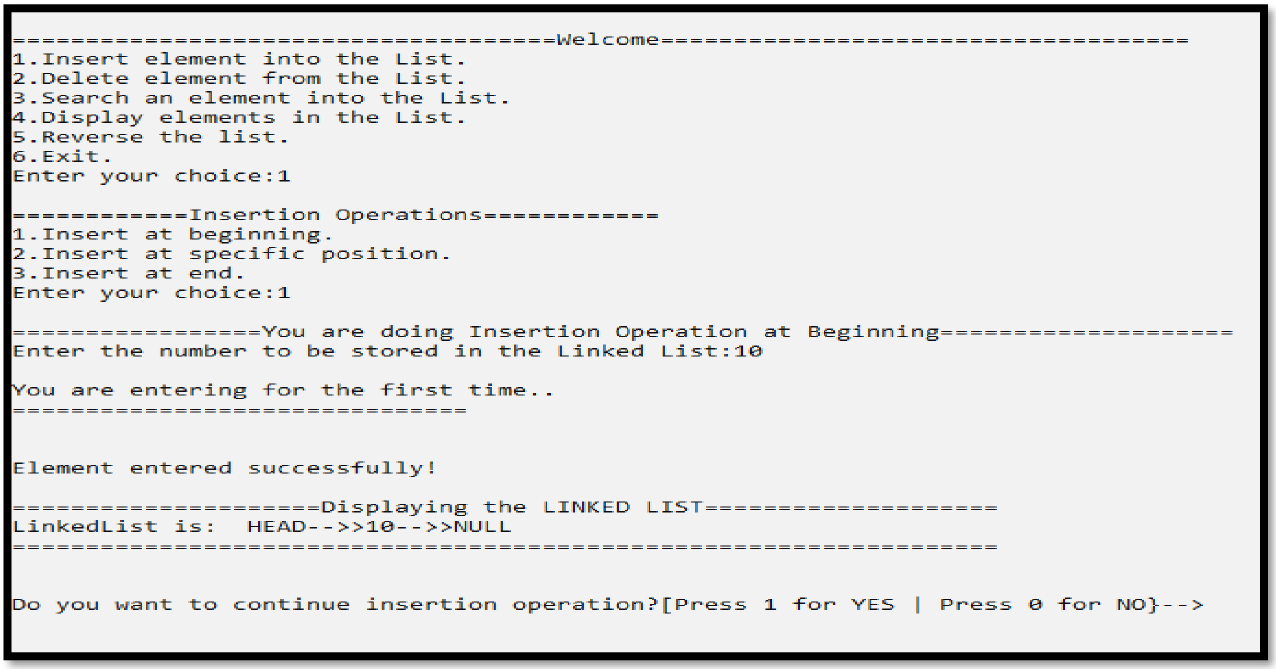
Insertion:

- **Insertion at beginning**
- **Insert at specific postion**
- **Insertion ar end**

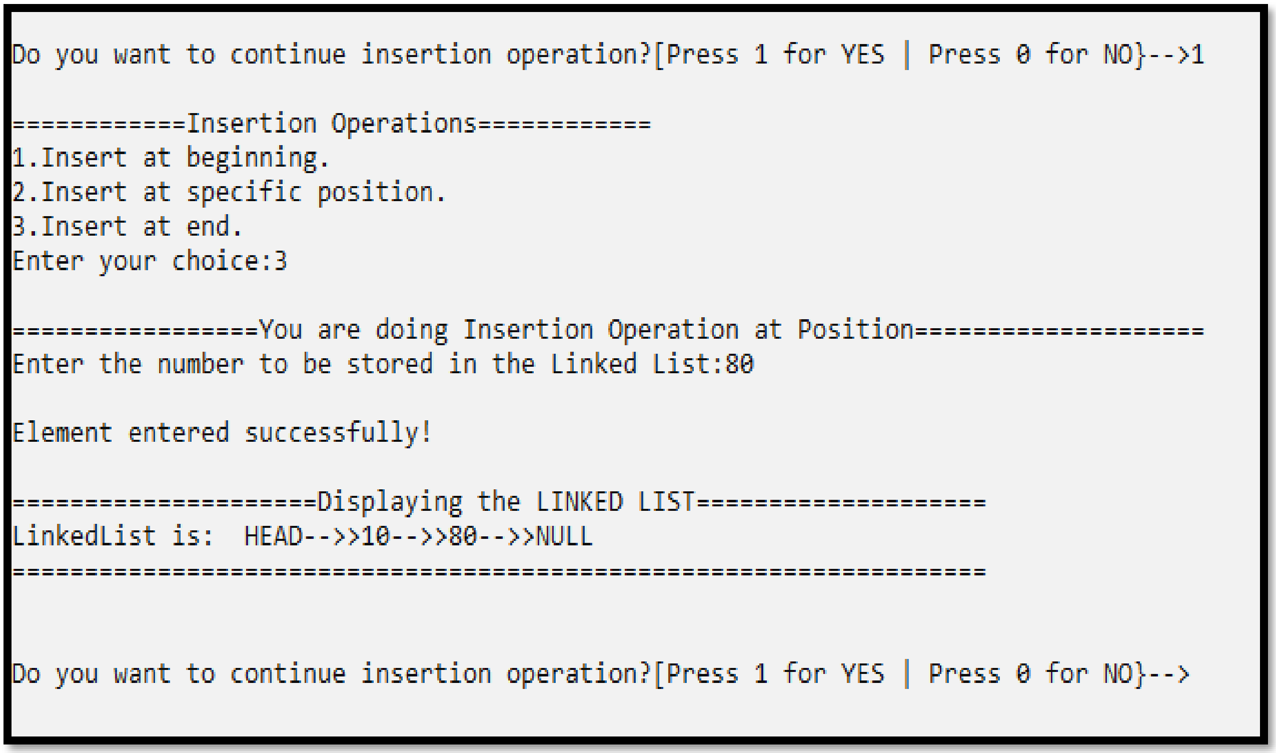
Deletion:

- **Deletion at beginning**
- **Deletion at specific position**
- **Deletion at end**

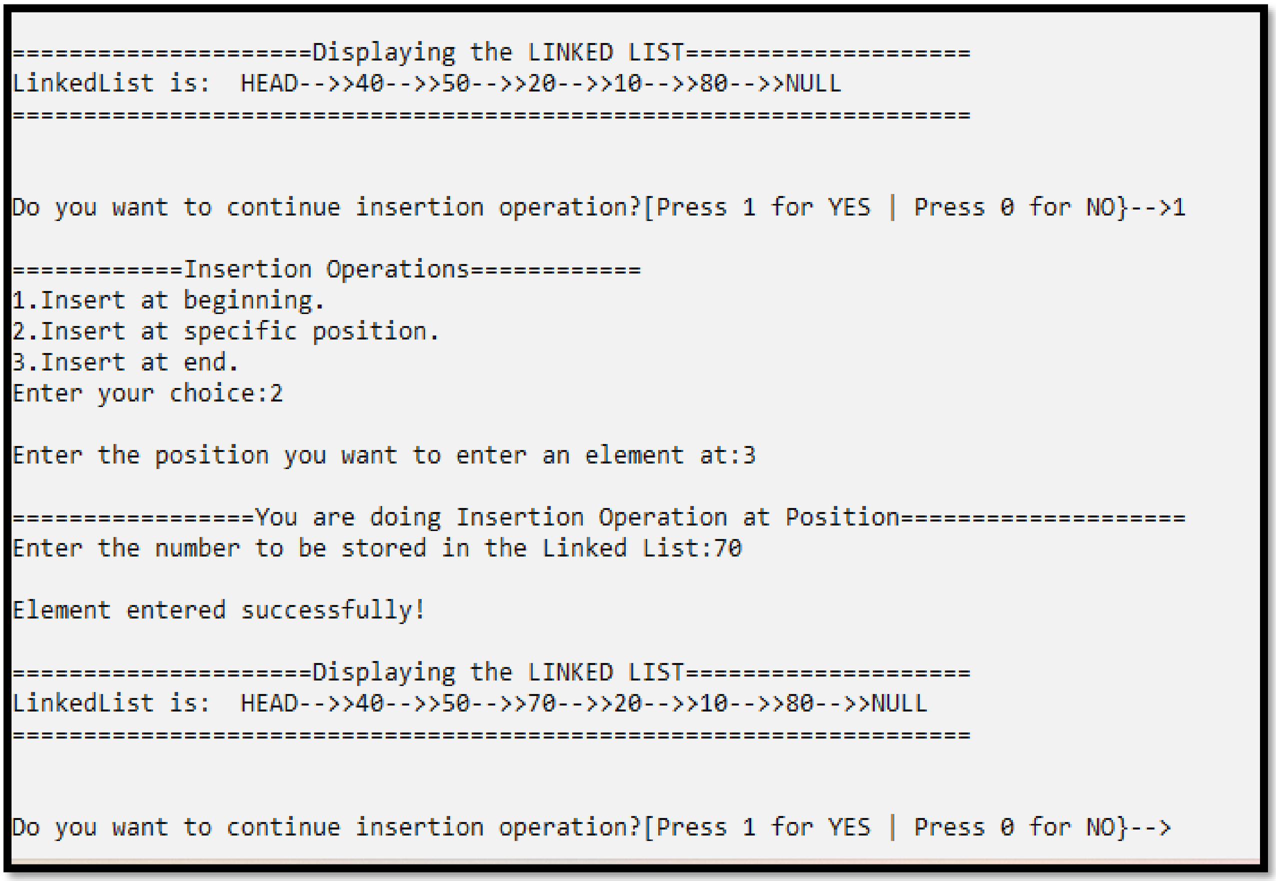
Inserting elements into the Singly Linked List:



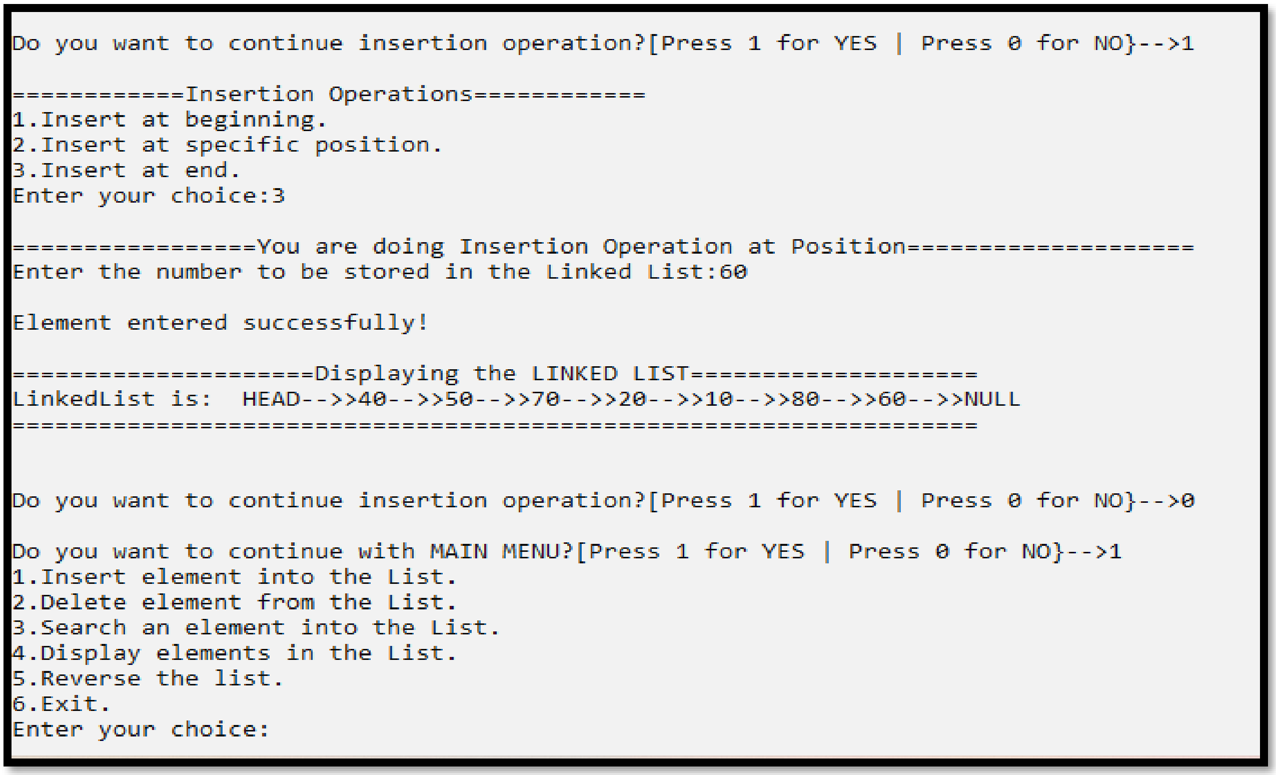
```
=====================================Welcome====================================
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:1

============Insertion Operations============
1.Insert at beginning.
2.Insert at specific position.
3.Insert at end.
Enter your choice:1

=================You are doing Insertion Operation at Beginning====================
Enter the number to be stored in the Linked List:10

You are entering for the first time..
===============================


Element entered successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>10-->>NULL
===================================================================


Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->
```



```
Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->1

============Insertion Operations============
1.Insert at beginning.
2.Insert at specific position.
3.Insert at end.
Enter your choice:3

=================You are doing Insertion Operation at Position====================
Enter the number to be stored in the Linked List:80

Element entered successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>10-->>80-->>NULL
===================================================================


Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->
```

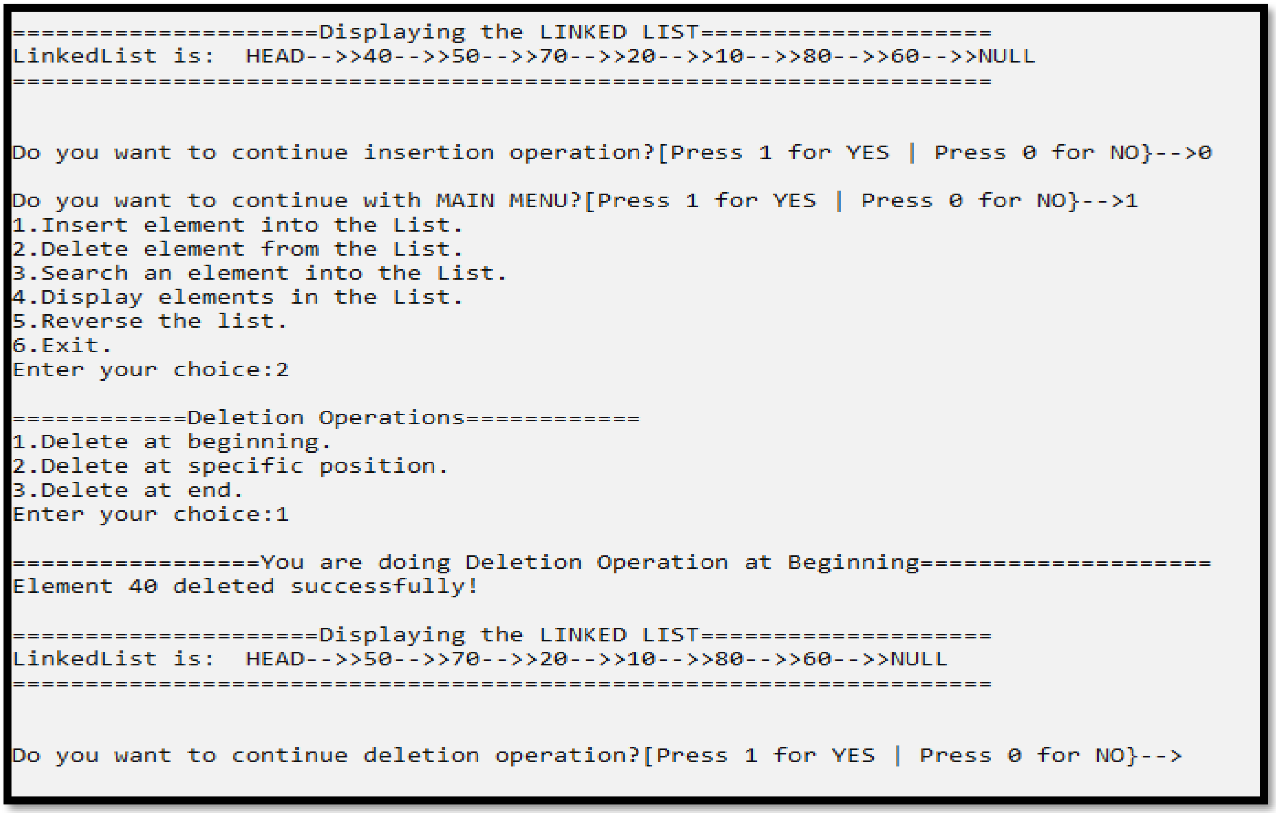


```
=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>40-->>50-->>20-->>10-->>80-->>NULL
==================================================================


Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->1

============Insertion Operations============
1.Insert at beginning.
2.Insert at specific position.
3.Insert at end.
Enter your choice:2

Enter the position you want to enter an element at:3

=================You are doing Insertion Operation at Position====================
Enter the number to be stored in the Linked List:70

Element entered successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>40-->>50-->>70-->>20-->>10-->>80-->>NULL
==================================================================


Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->
```

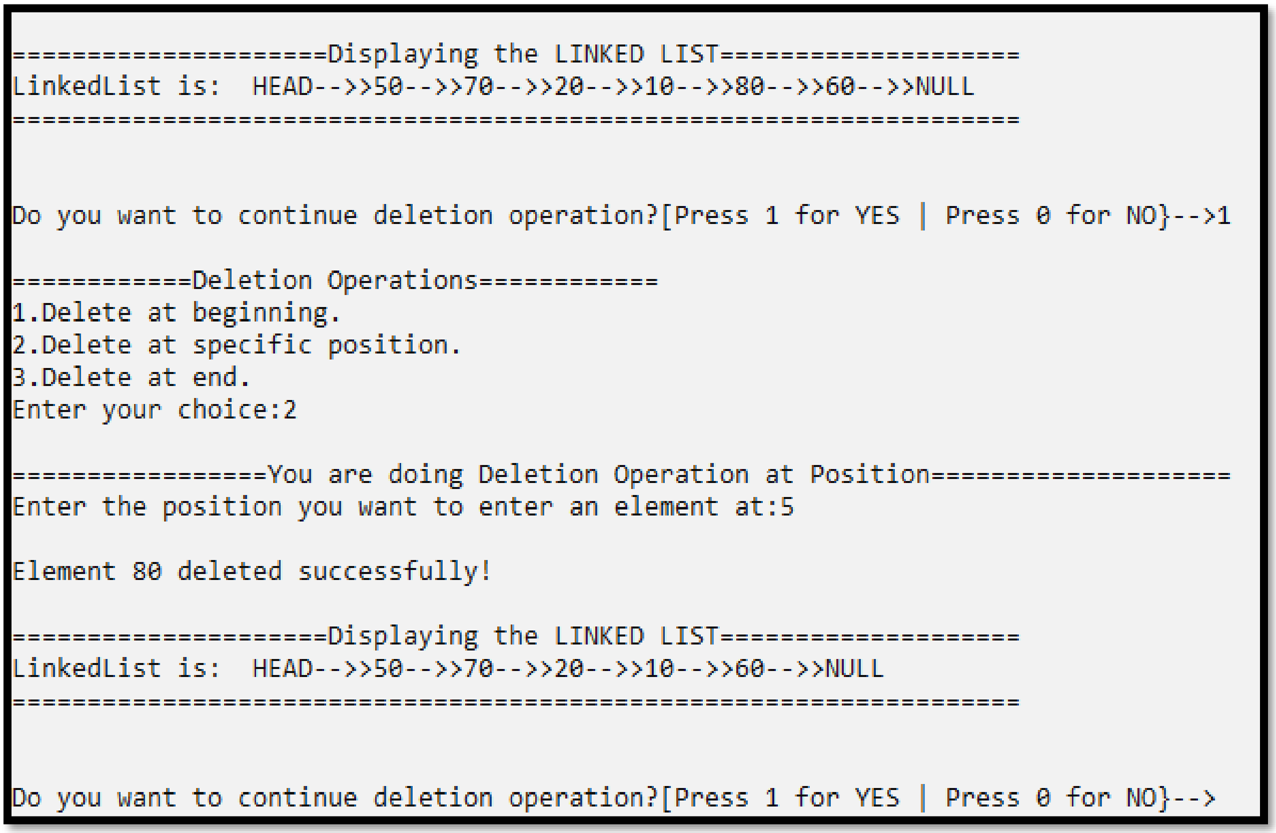


```
Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->1

============Insertion Operations============
1.Insert at beginning.
2.Insert at specific position.
3.Insert at end.
Enter your choice:3

=================You are doing Insertion Operation at Position====================
Enter the number to be stored in the Linked List:60

Element entered successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>40-->>50-->>70-->>20-->>10-->>80-->>60-->>NULL
==================================================================


Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->0

Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:
```

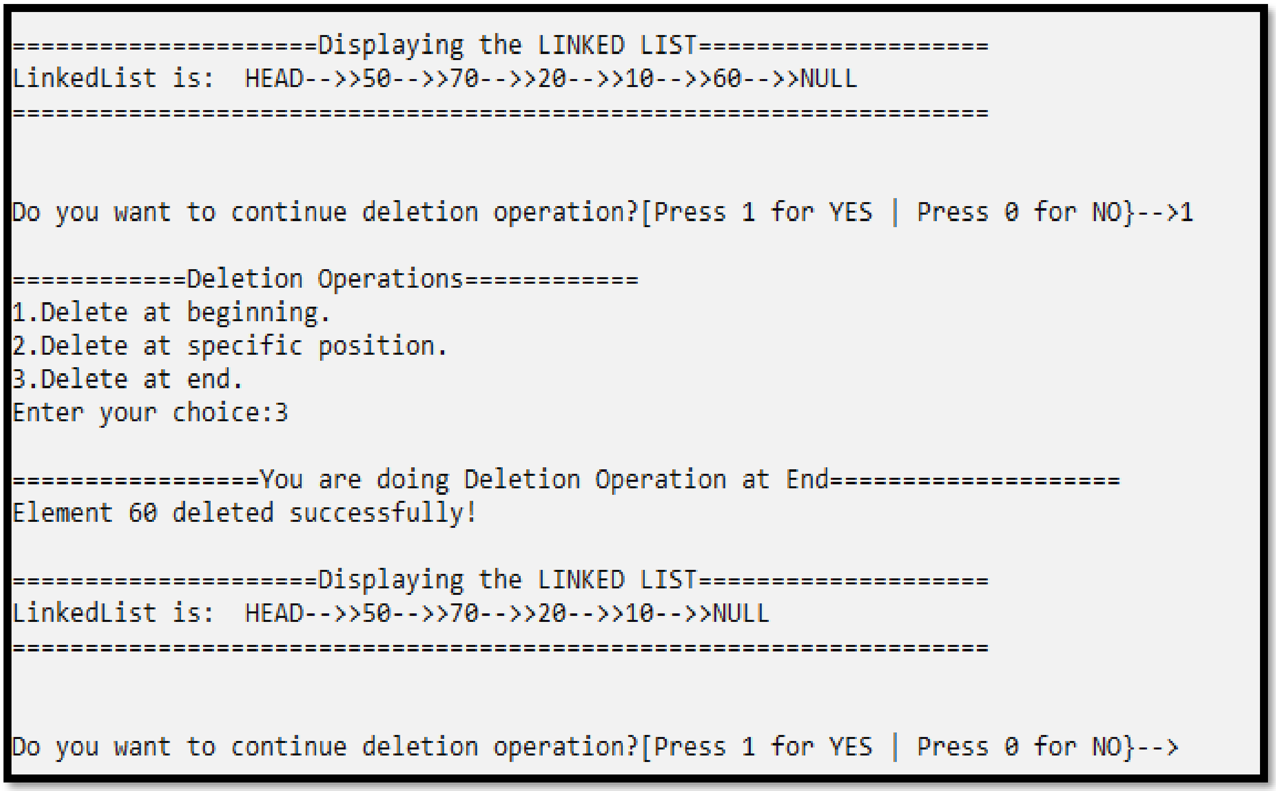
Deleting elements from Singly Linked List:



```
=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>40-->>50-->>70-->>20-->>10-->>80-->>60-->>NULL
===================================================================


Do you want to continue insertion operation?[Press 1 for YES | Press 0 for NO}-->0

Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:2

============Deletion Operations============
1.Delete at beginning.
2.Delete at specific position.
3.Delete at end.
Enter your choice:1

=================You are doing Deletion Operation at Beginning====================
Element 40 deleted successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>50-->>70-->>20-->>10-->>80-->>60-->>NULL
===================================================================


Do you want to continue deletion operation?[Press 1 for YES | Press 0 for NO}-->
```

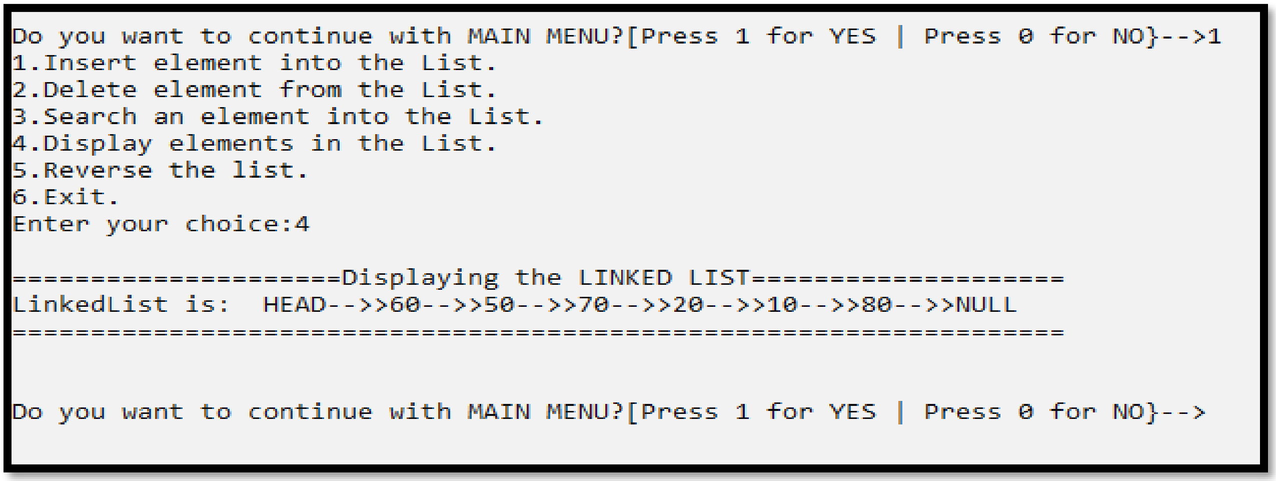


```
=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>50-->>70-->>20-->>10-->>80-->>60-->>NULL
===================================================================


Do you want to continue deletion operation?[Press 1 for YES | Press 0 for NO}-->1

============Deletion Operations============
1.Delete at beginning.
2.Delete at specific position.
3.Delete at end.
Enter your choice:2

=================You are doing Deletion Operation at Position====================
Enter the position you want to enter an element at:5

Element 80 deleted successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>50-->>70-->>20-->>10-->>60-->>NULL
===================================================================


Do you want to continue deletion operation?[Press 1 for YES | Press 0 for NO}-->
```



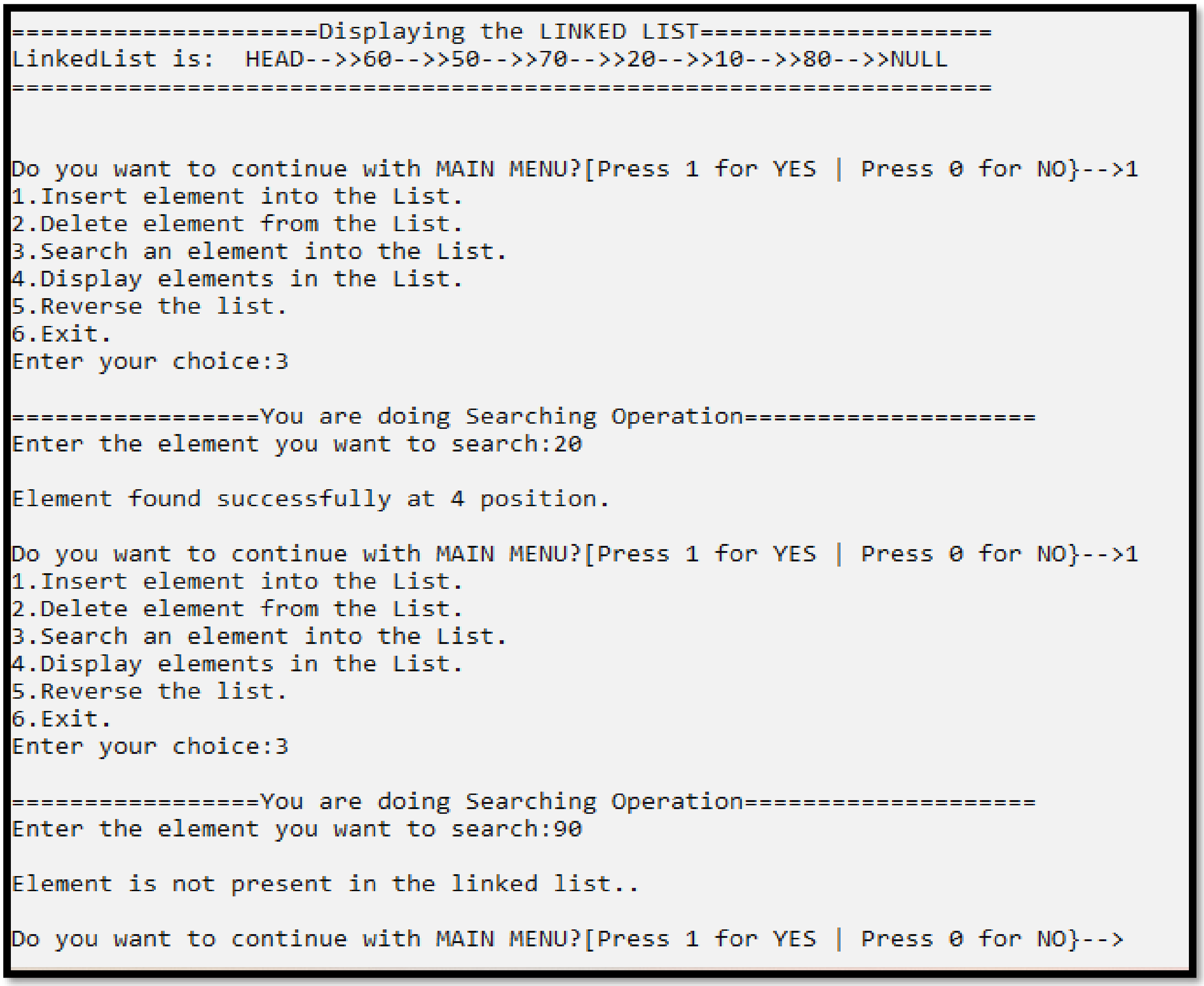
```
=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>50-->>70-->>20-->>10-->>60-->>NULL
===================================================================


Do you want to continue deletion operation?[Press 1 for YES | Press 0 for NO}-->1

============Deletion Operations============
1.Delete at beginning.
2.Delete at specific position.
3.Delete at end.
Enter your choice:3

=================You are doing Deletion Operation at End====================
Element 60 deleted successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>50-->>70-->>20-->>10-->>NULL
===================================================================


Do you want to continue deletion operation?[Press 1 for YES | Press 0 for NO}-->
```

Displaying the Singly Linked List:



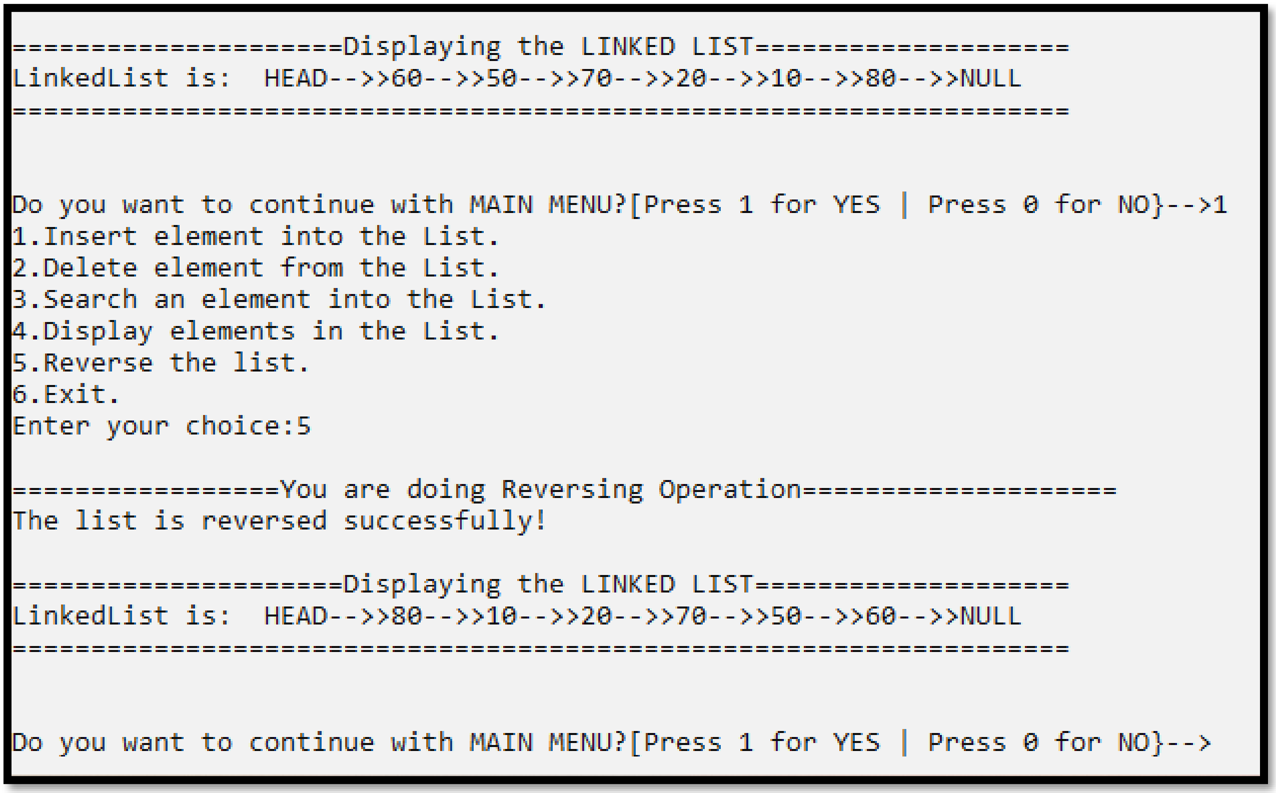
```
Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:4

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>60-->>50-->>70-->>20-->>10-->>80-->>NULL
===================================================================


Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->
```

Searching an element into the list:

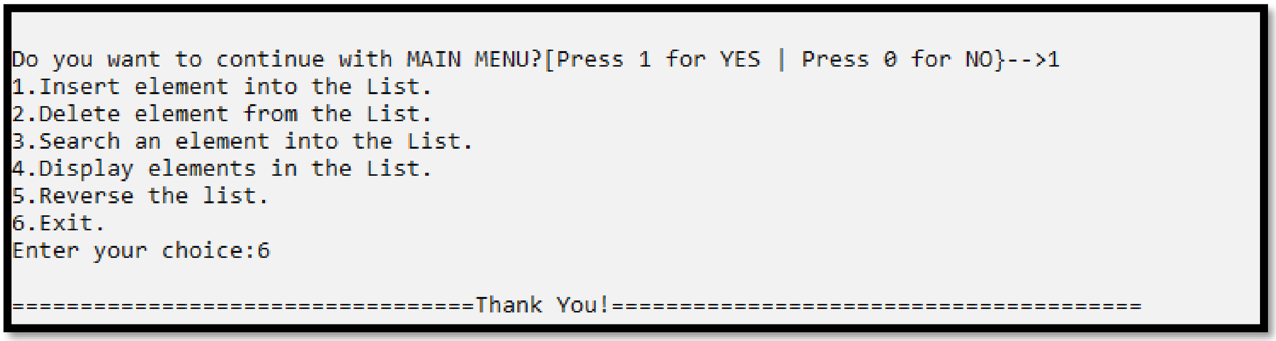


```
=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>60-->>50-->>70-->>20-->>10-->>80-->>NULL
===================================================================


Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:3

=================You are doing Searching Operation=====================
Enter the element you want to search:20

Element found successfully at 4 position.

Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:3

=================You are doing Searching Operation=====================
Enter the element you want to search:90

Element is not present in the linked list..

Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->
```

Reversing the Singly Linked List:



```
=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>60-->>50-->>70-->>20-->>10-->>80-->>NULL
===================================================================


Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:5

=================You are doing Reversing Operation====================
The list is reversed successfully!

=====================Displaying the LINKED LIST====================
LinkedList is:  HEAD-->>80-->>10-->>20-->>70-->>50-->>60-->>NULL
===================================================================


Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->
```



```
Do you want to continue with MAIN MENU?[Press 1 for YES | Press 0 for NO}-->1
1.Insert element into the List.
2.Delete element from the List.
3.Search an element into the List.
4.Display elements in the List.
5.Reverse the list.
6.Exit.
Enter your choice:6

==================================Thank You!=======================================
```

===