DSA Lab

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Lab # 6
Linked List Implementation

LAB Journal

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Lab 6:Linked List Implementation

TASK:

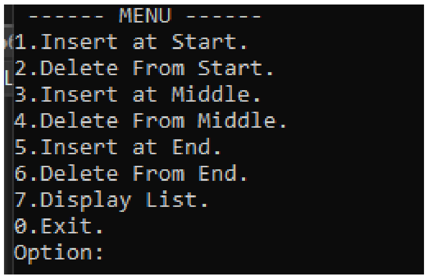
Linked List Implementation

Lab Task GitHub Link:

Link

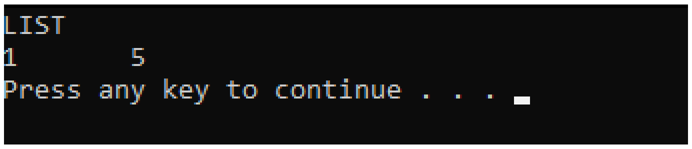
OUTPUT:

MENU



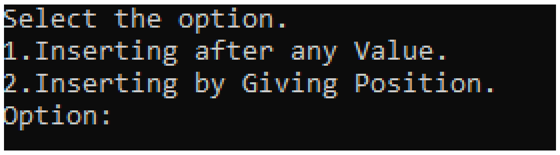
```
 ------ MENU ------
1.Insert at Start.
2.Delete From Start.
3.Insert at Middle.
4.Delete From Middle.
5.Insert at End.
6.Delete From End.
7.Display List.
0.Exit.
Option:
```

INSERTED AT START(1) AND AT END(5)



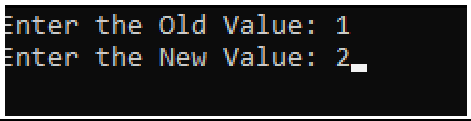
```
LIST
1       5
Press any key to continue . . .
```

INSERT AT MIDDLE

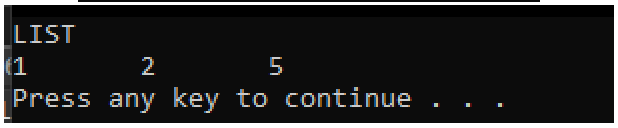


```
Select the option.
1.Inserting after any Value.
2.Inserting by Giving Position.
Option:
```

AFTER ANY VALUE

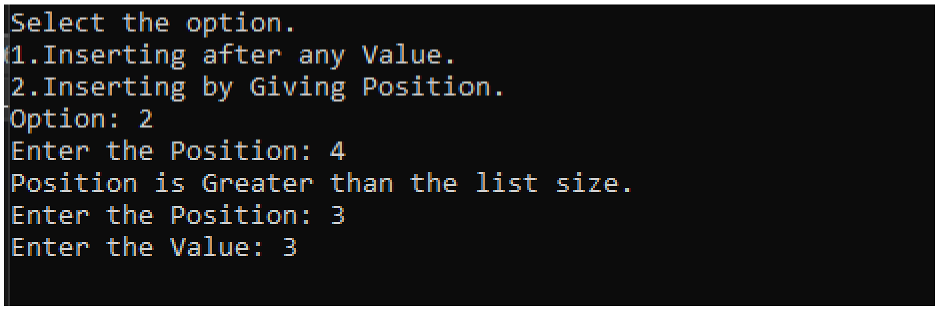


```
Enter the Old Value: 1
Enter the New Value: 2
```

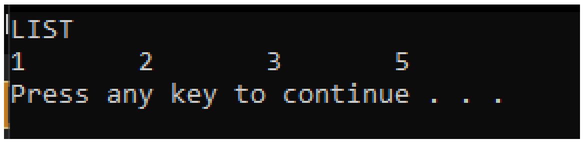


```
LIST
1       2       5
Press any key to continue . . .
```

BY GIVING POSTION



```
Select the option.
1.Inserting after any Value.
2.Inserting by Giving Position.
Option: 2
Enter the Position: 4
Position is Greater than the list size.
Enter the Position: 3
Enter the Value: 3
```



```
LIST
1       2       3       5
Press any key to continue . . .
```

CODE:

```
#include<iostream>
#include<string>
using namespace std;

int Insertinput() {
	system("cls");
	int value;
	cout << "Enter the value to insert: ";
	cin >> value;
	if (cin.fail()) {
		cin.clear();
		cin.ignore();
		cout << "Please Enter the Integer Value!!!" << endl;
		system("pause");
		value = Insertinput();
	}
	return value;
}
int deleteinput() {
	system("cls");
	int value;
	cout << "Enter the value to Delete: ";
	cin >> value;
	if (cin.fail()) {
		cin.clear();
		cin.ignore();
		cout << "Please Enter the Integer Value!!!" << endl;
		system("pause");
		value = deleteinput();
	}
	return value;
}
class LinkedList {
private:
	struct Node
	{
		int info;
		Node* next;
	};
	typedef struct Node* NODEPTR;
	NODEPTR listptr ,head;
public:
	LinkedList() {
		listptr = NULL;
		head = NULL;
	}
	Node* getnode() {
		Node* newNode = new Node();
	}
	//insert at Start Of list
	void insertAtStart(int value) {
		NODEPTR p = nullptr;
		    p = new Node();
			p->info = value;
			p->next = head;
			head = p;
			if (listptr == NULL)
				listptr = head;
			cout << "Inserted!!" << endl;

	}
	void deletionFromStart() {
		if (head == NULL) {
			cout << "List Is EMPTY!!!!!" << endl;
			return;
		}
		else {
			NODEPTR temp;
			temp = new Node();
			temp = head;
			head = head->next;
			delete temp;
			cout << "Deleted!!" << endl;
		}
	}
	//Insert at Middle of list
	void insertAtMiddleA(int oldValue, int newValue) {
		NODEPTR p,q;
		p = new Node();
		q = new Node();
		for (p = head; p != 0 && p->info != oldValue; p = p->next)
			;
		if (p == 0) {
			cout << "List is empty" << endl;
			exit(1);
		}

		q->info = newValue;
		q->next = p->next;
		p->next = q;
		cout << "Inserted At Middle!!" << endl;
```

```
}
void insertAtMiddleB(int postion, int NewValue) {
	NODEPTR p = head , q, r;
	q = new Node();
	r = new Node();
	if (p == NULL) {
		cout << "List is EMPTY!!" << endl;
		return;
	}
	for (int i = 1; i < postion; i++) {
		if (i == postion - 1) {
			r = p;
		}
		p = p->next;
	}
	q->info = NewValue;
	q->next = p;
	if(q->next == p)
		r->next = q;
	cout << "Inserted At Middle!!" << endl;
}
void deleteFromMiddle(int value) {
	NODEPTR p ,q;
	p = new Node();
	q = new Node();
	for (p = head; p != 0 && p->info != value; p = p->next) {
		q = p;
	}
	if (p == 0) {
		cout << "List is Empty" << endl;
		return;
	}
	if (p->info == value) {
		q->next = p->next;
		delete p;
		cout << "deleted!!" << endl;
	}
}
//push at end
void push(int value)
	{
	NODEPTR p = new Node();
	p->info = value;
	if (head == nullptr) {
		head = p;
		return;
	}
	NODEPTR q = head;
	while (q->next != nullptr) {
		q = q->next;
	}
	q->next = p;
	}
void deleteAtEnd() {
	if (head == nullptr) {
		cout << "List is empty, nothing to delete." << endl;
		return;
	}
```

```
			if (head->next == nullptr) {
				delete head;
				head = nullptr;
				return;
			}


			NODEPTR temp = head;
			while (temp->next->next != nullptr) {
				temp = temp->next;
			}


			delete temp->next;
			temp->next = nullptr;
			cout << "Deleted!!";

		}
		//Display List
		void display()
		{
			NODEPTR ptr;
			ptr = head;
			cout << "LIST" << endl;
			while (ptr != NULL)
			{
				cout << ptr->info << "\t";
				ptr = ptr->next;
			}

		}
		bool contains(int value) {
			NODEPTR temp = head;
			while (temp != nullptr) {
				if (temp->info == value) {
					return true;
				}
				temp = temp->next;
			}
			return false;
		}


		int size() {
			int count = 0;
			NODEPTR temp = head;
			while (temp != nullptr) {
				count++;
				temp = temp->next;
			}
			return count;
		}
	};

	int main() {
		LinkedList List;
		do
```

```cpp
	{
		system("cls");
		char option;
		cout << " ------ MENU ------ " << endl;
		cout << "1.Insert at Start." << endl;
		cout << "2.Delete From Start." << endl;
		cout << "3.Insert at Middle." << endl;
		cout << "4.Delete From Middle." << endl;
		cout << "5.Insert at End." << endl;
		cout << "6.Delete From End." << endl;
		cout << "7.Display List." << endl;
		cout << "0.Exit." << endl;
		cout << "Option: ";
		cin >> option;

		if (option == '1')
		{
			int value;
			system("cls");
			value = Insertinput();
			List.insertAtStart(value);
			cout << "Inserted" << endl;
			system("pause");
		}
		else if (option == '2')
		{
			system("cls");
			List.deletionFromStart();
			cout << "Deleted" << endl;
			system("pause");
		}
		else if (option == '3')
		{
			char op;
			system("cls");
			do
			{
			cout << "Select the option." << endl;
			cout << "1.Inserting after any Value." << endl;
			cout << "2.Inserting by Giving Position." << endl;
			cout << "Option: ";
			cin >> op;
			if (op == '1') {
				do
				{
					system("cls");
					int OLDvalue, NEWvalue;
				  cout << "Enter the Old Value: ";
				   cin >> OLDvalue;
					 //checking that user input the integer or not!
					 if (cin.fail()) {
						cin.clear();
						cin.ignore();
						cout << "Please Enter the Integer Value!!!"
     << endl;

						system("pause");
						continue;
					 }
```

```
                                        if (List.contains(OLDvalue)) {

                                        }
                                        else {
                                              cout << "Value not found, please enter
correct value!" << endl;
                                              continue;
                                        }
                                     cout <<"Enter the New Value: ";
                                   cin >>NEWvalue;
                                       //checking that user input the integer or not!
                                       if (cin.fail()) {
                                             cin.clear();
                                             cin.ignore();
                                             cout << "Please Enter the Integer Value!!!"
<< endl;
                                             cout << "Enter the New Value: ";
                                             cin >> NEWvalue;
                                       }
                                         List.insertAtMiddleA(OLDvalue,NEWvalue);


                                       break;
                                 } while (true);
                                 break;
                           }
                           else if (op == '2')
                           {
                                 do
                                 {
                                       int pos, NEWvalue;
                                       cout << "Enter the Position: ";
                                       cin >> pos;
                                       if (pos <= List.size()) {}
                                       else {
                                             cout << "Position is Greater than the list
size." << endl;
                                             continue;
                                       }
                                       //checking that user input the integer or not!
                                       if (cin.fail()) {
                                             cin.clear();
                                             cin.ignore();
                                             cout << "Please Enter the Integer Value!!!"
<< endl;
                                             continue;
                                       }
                                       cout << "Enter the Value: ";
                                       cin >> NEWvalue;
                                       //checking that user input the integer or not!
                                       if (cin.fail()) {
                                             cin.clear();
                                             cin.ignore();
                                             cout << "Please Enter the Integer Value!!!"
<< endl;
                                             continue;
                                       }
```

```cpp
                                List.insertAtMiddleB(pos, NEWvalue);

                                break;

                        } while (true);
                        break;
                }
                else
                {
                        cout << "Invalid Input!" << endl;
                        system("pause");
                }
                } while (true);
        }
        else if (option == '4')
        {
                system("cls");
                int value;
                value = deleteinput();
                List.deleteFromMiddle(value);
                system("pause");
        }
        else if (option == '5')
        {
                system("cls");
                int value;
                value = Insertinput();
                List.push(value);
                cout << "Inserted!!";
                system("pause");
        }
        else if (option == '6')
        {
                system("cls");
                cout << "Deleted!!" << endl;
                List.deleteAtEnd();
                system("pause");
        }
        else if (option == '7')
        {
                system("cls");
                List.display();
                cout << endl;
                system("pause");

        }
        else if (option == '0')
        {
                exit(1);
        }
        else {
                cout << "Invalid Option,Please Enter Correct one!!!" << endl;
                system("pause");

        }

} while (true);
```

```
    }
```