COMSATS University Islamabad, Vehari Campus

Department of Computer Science

Class: BSCS-SP22-4B **Date: 23 Oct 2023**

Subject: Data Structure & Algorithm Lab **Instructor: Yasmeen Jana**

Max Marks: 25 **Reg. No:**

Max Time: 90 Minutes

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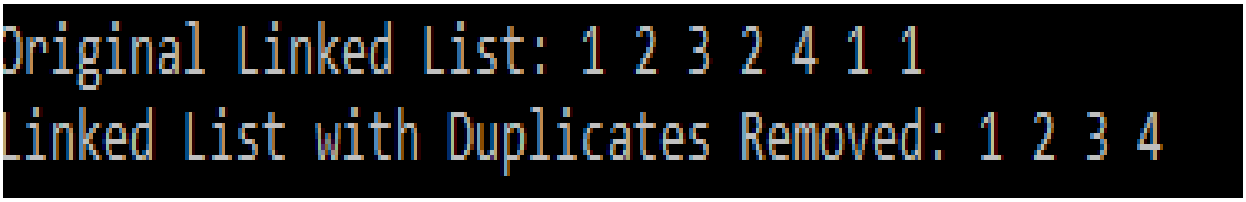
Activity 1:

Write a C++ code to create a singly linked list using "SLL()" function and Remove duplicates from an unsorted linked list as RemoveDup() function and display linked list with unique values. **(15)**
For Example:

Input: linked list = 12->11->12->21->41->43->21
Output: 12->11->21->41->43.



Hint:
Use two loops, Outer loop is used to pick the elements one by one and the Inner loop compares the picked element with the rest of the elements.

Activity 2:

Write a C++ code to create a Queue using a linked list. The code should contain functions for Enqueue(), Dequeue(), and Display(). **(10)**

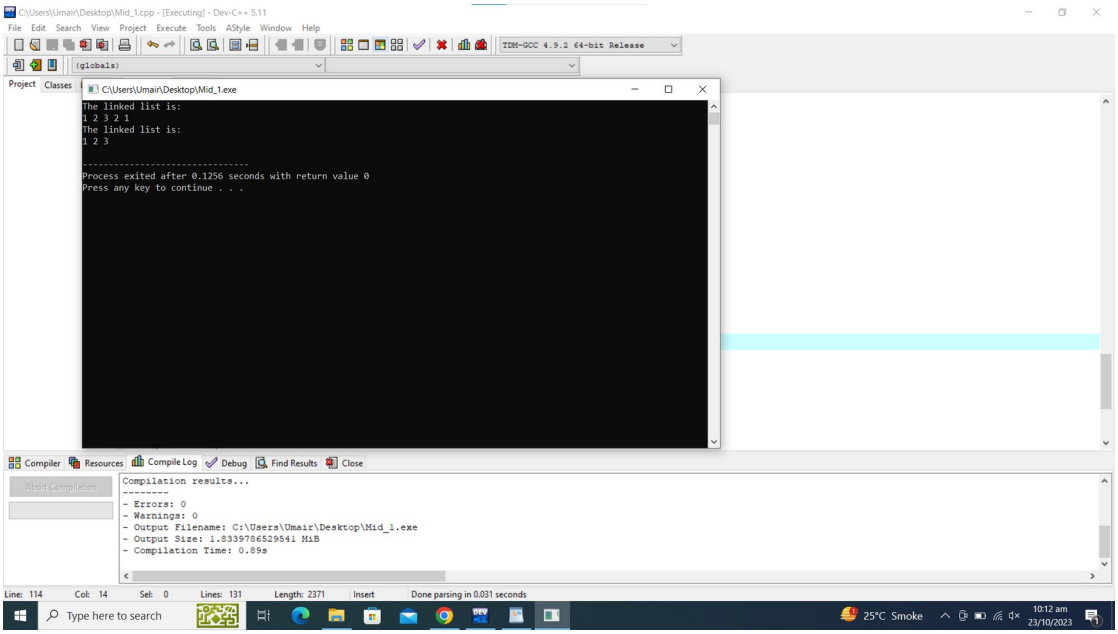
Program 1:

```
#include<iostream>
using namespace std;
class Node{
	private:
		int data;
		Node *next;
	public:
		Node *head;
		Node(){
			head=NULL;
		}
			void insert_beg(int n){
			if(head==NULL){
				head=new Node();
				head->data=n;
				head->next=NULL;
			}
			else{
				Node *ptr;
				ptr=new Node();
				ptr->next=head;
				ptr->data=n;
				head=ptr;
			}
		}



		void insert_end(int n){
			if(head==NULL){
				head=new Node;
				head->data=n;
				head->next=NULL;
			}
			else{
				Node *ptr, *p;
				ptr=head;
				while(ptr->next!=NULL){
					ptr=ptr->next;
				}
				p= new Node();
				p->data=n;
				p->next=NULL;
				ptr->next=p;
			}
```

```
}

void del_beg(){
	if(head==NULL){
		cout<<"List is empty"<<endl;
	}
	else{
		Node *ptr;
		ptr=head;
		head=ptr->next;
		delete ptr;
		ptr=NULL;

	}
}



void del_end(){
	if(head==NULL){
		cout<<"list is empty"<<endl;
	}
	else{
		Node *p1,*p2;
		p1=head;
		while(p1->next!=NULL){
			p2=p1;
			p1=p1->next;
		}
		p2->next=NULL;
		delete p1;
		p1=NULL;
	}
}
void display(){
	if(head==NULL){
		cout<<"There is no list "<<endl;
	}
	else{
		Node *ptr;
		ptr=head;
		cout<<"The linked list is: "<<endl;
		while(ptr!=NULL){
			cout<<ptr->data<<" ";
			ptr=ptr->next;
		}
```

```
                cout<<endl;
            }

        }
        void remove_duplicates() {
    if (head == NULL || head->next == NULL) {
        cout<<"the list is empty or there is only one element"<<endl;
        return;
    }

    Node* current = head;
    while (current != NULL) {
        Node* runner = current;
        while (runner->next != NULL) {
            if (current->data == runner->next->data) {
                // Duplicate element found, remove it
                Node* temp = runner->next;
                runner->next = runner->next->next;
                delete temp;
            } else {
                runner = runner->next;
            }
        }
        current = current->next;
    }
  }

};
int main(){
        Node n;
        n.insert_beg(1);
        n.insert_beg(2);
        n.insert_beg(3);
        n.insert_beg(2);
        n.insert_beg(1);
        n.display();
        n.remove_duplicates();
        n.display();
        return 0;
}
```

Output:

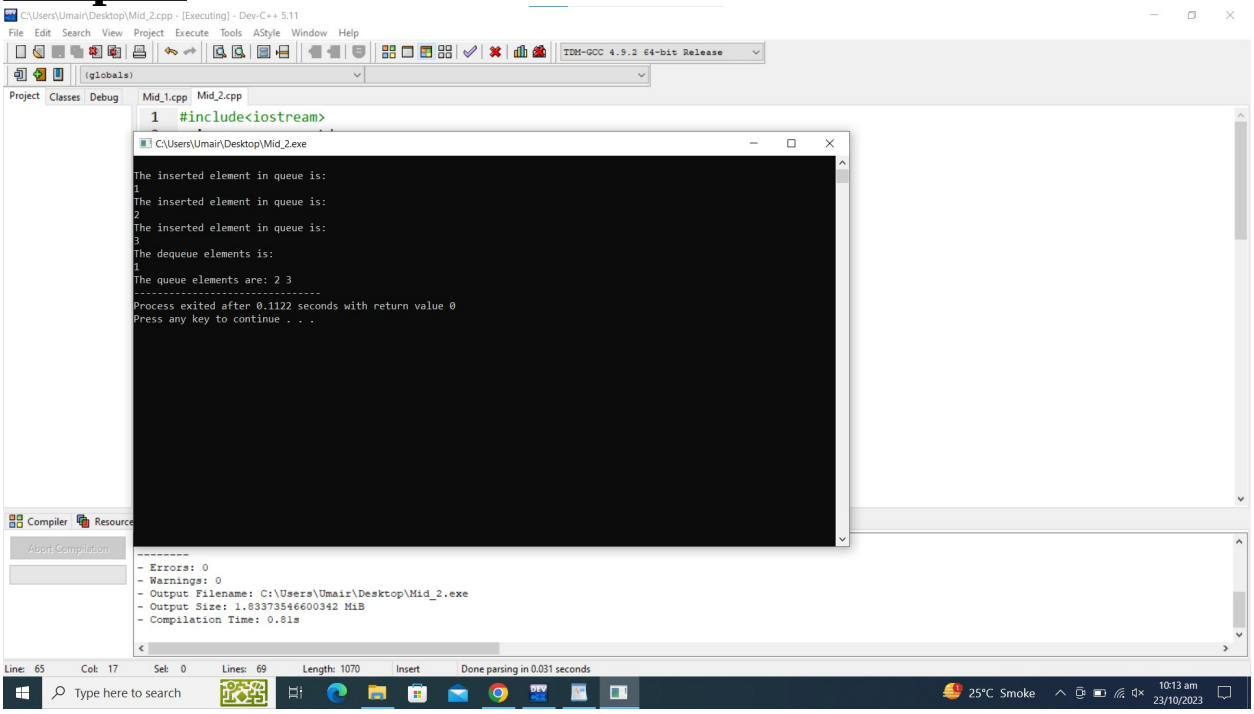


Program 2:

```
#include<iostream>
using namespace std;
class Node {
  private:
  int data;
  Node *next;
  public:
        Node *front,*rear=NULL;

        void enqueue(int x){
        Node *p=new Node;
        p->data=x;
        p->next=NULL;
        if(front==NULL || rear==NULL){
                front=p;
                rear=p;
                cout<<"\nThe inserted element in queue is: \n"<<rear->data;

        }
        else{
                rear->next=p;
                rear=p;
      cout<<"\nThe inserted element in queue is: \n"<<rear->data;
                        }
}
```

```
void dequeue(){
        Node *d=new Node();
        d=front;
        if(d==NULL)
        {
                cout<<"\nEmpty queue";
        }
        else{

                cout<<"\nThe dequeue elements is: \n";
                cout<<front->data;
                front=front->next;
           delete d;
                d=NULL;
                }

}
void display() {
   Node *temp = front;
   cout << "\nThe queue elements are: ";
   if (temp == NULL) {
      cout << "empty";
   }
   while (temp != NULL) {
      cout << temp->data << " ";
      temp = temp->next;
   }
}



};
int main(){
        Node n;
        n.enqueue(1);
        n.enqueue(2);
        n.enqueue(3);
        n.dequeue();
        n.display();

        return 0;
}
```

Output:


C:\Users\Umair\Desktop\Mid_2.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project Classes Debug
Mid_1.cpp Mid_2.cpp
1 #include<iostream>
C:\Users\Umair\Desktop\Mid_2.exe
The inserted element in queue is:
1
The inserted element in queue is:
2
The inserted element in queue is:
3
The dequeue elements is:
1
The queue elements are: 2 3
Process exited after 0.1122 seconds with return value 0
Press any key to continue . . .
Compiler Resources
Abort Compilation
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\Umair\Desktop\Mid_2.exe
- Output Size: 1.83373546600342 MiB
- Compilation Time: 0.81s
Line: 65 Col: 17 Sel: 0 Lines: 69 Length: 1070 Insert Done parsing in 0.031 seconds
Type here to search
25°C Smoke
10:13 am
23/10/2023