COMSATS University Islamabad, Vehari Campus

Department ofComputer Science

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

Subject: Data Structure & Algorithm Lab **Instructor: Yasmeen Jana** **Max Marks: 25** **Reg. No: SP22-BCS-092**

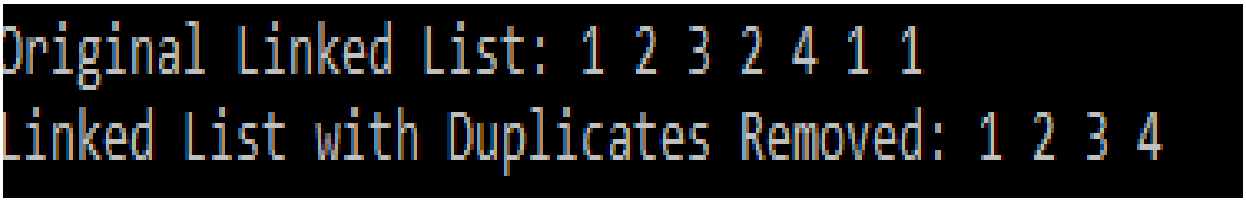
Max Time: 90 Minutes

Email: yasmeenjana@cuivehari.edu.pk

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.

Program

```
#include<iostream>
using namespace std;
class Node{
        private:
                int data;
```

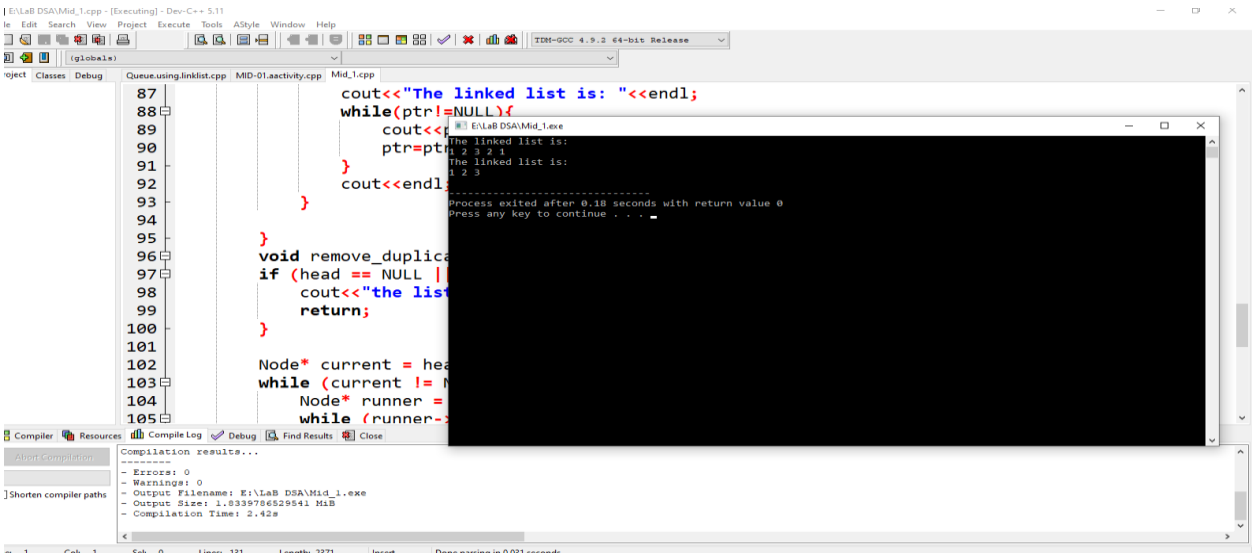
```
        Node *next;
public:
        Node *head;
        Node(){
                head=NULL;
        }
                void insert_beg(int n){
                if(head==NULL){
                        head=new Node();
                        head->data=n;
                        head->next=NULL;
                }
                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



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

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

   void  Enqueue(int n){
        Node *p;
        p=new Node();
        p->data=n;
        p->next=NULL;

        if(front==NULL || rear==NULL){
                front=p;
                rear=p;
                cout<<"The Inserted elements in Queue is :"<<rear->data<<endl;
                }
                else{
                rear->next=p;
                rear=p;
      cout<<"The inserted element in Queue is: "<<rear->data<<endl;
                        }
        }
        void Dequeue(){
        Node *ptr;
        ptr=new Node();
        ptr=front;
        if(ptr==NULL)
        {
                cout<<"Empty queue"<<endl;
        }
```

```
        else{
                if(ptr==NULL)
                {cout<<"The Dequeue elements is: "<<endl;
                cout<<ptr->data;
                front=front->next;
                delete ptr;
                ptr=NULL;
                }

                else{
                cout<<"The Dequeue elements is: ";
                cout<<front->data;
                front=front->next;
           delete ptr;
                ptr=NULL;
                }
        }
}
  void Display(){
          Node *temp;
           temp=front;
           cout<<" The Queue Elemwnts are :";
           if(temp==NULL){
                cout<<"The Queue is an Empty : ";
                }
                while(temp!=NULL){
                        cout<<temp->data<<"  ";
                        temp=temp->next;
                }

  }
};

int main (){
        Node en;
        en.Enqueue(9);
        en.Enqueue(8);
        en.Enqueue(6);
        en.Enqueue(9);
```

```
    en.Display();
    en.Dequeue();
    en.Display();
    return 0;
}
```

OUTPUT