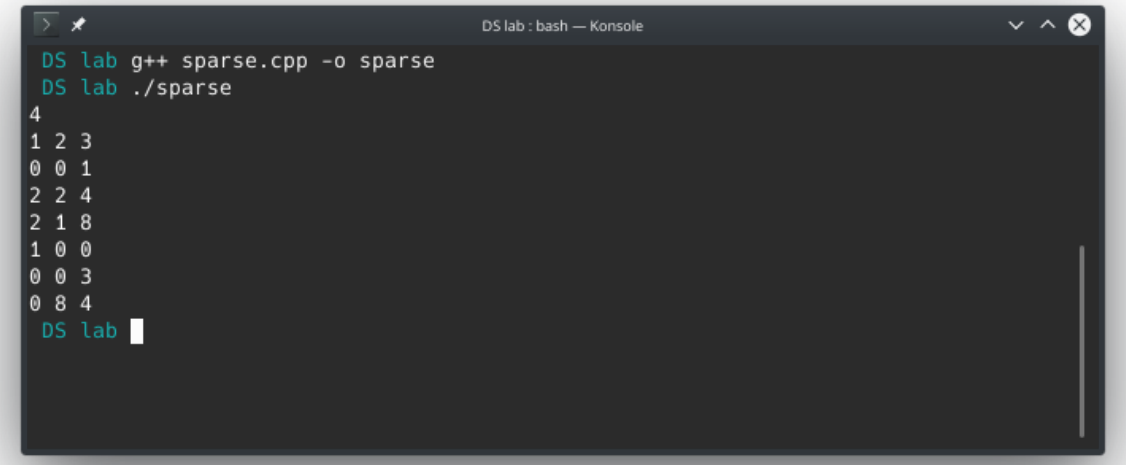
Contents

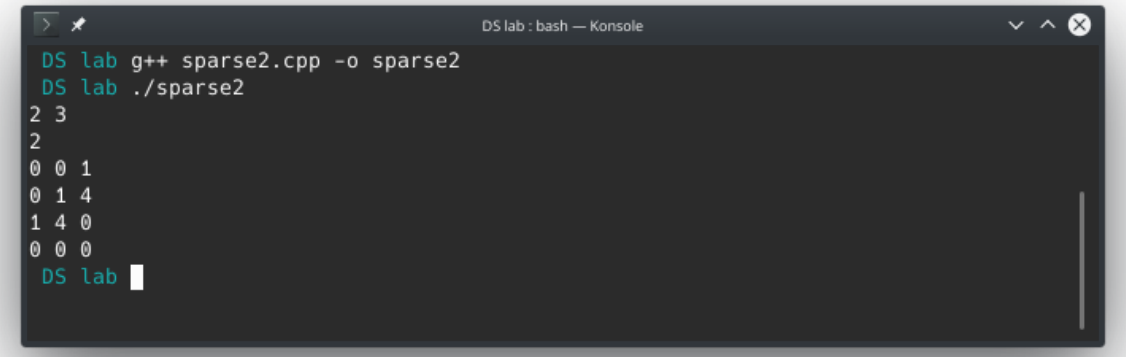
1 To implement 3x3 sparse matrix.

```
#include<bits/stdc++.h>
using namespace std;
#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
int main()
{
ll A[3][3]={0};
ll n,x,y,v;
 cin>>n;
 loop(i,0,n)
 {
cin>>x>>y>>v;
 A[x][y]=v;
 }
 loop(i,0,3)
 { loop(j,0,3)
   cout<<A[i][j]<<" ";
 cout<<endl;
}
}
```



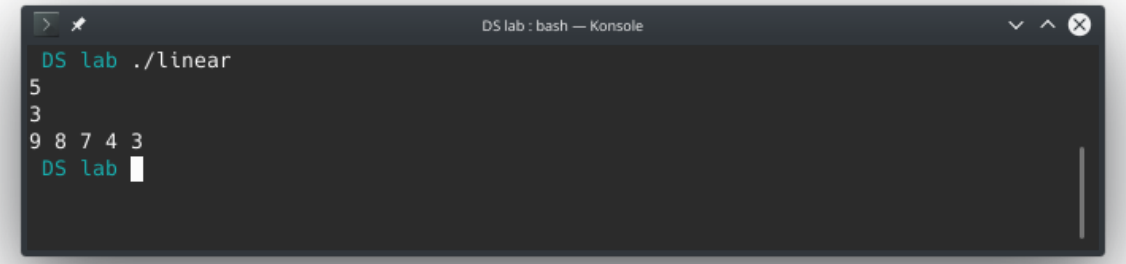
2 To implement rxc sparse matrix.

```
#include<bits/stdc++.h>
using namespace std;
#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
int main()
{
ll n,x,y,v;
ll r,c;
cin>>r>>c;

ll A[r][c];
memset(A,0,sizeof(A));
 cin>>n;
 loop(i,0,n)
 {
cin>>x>>y>>v;
 A[x][y]=v;
 }
 loop(i,0,r)
 { loop(j,0,c)
   cout<<A[i][j]<<" ";
 cout<<endl;
}
}
```



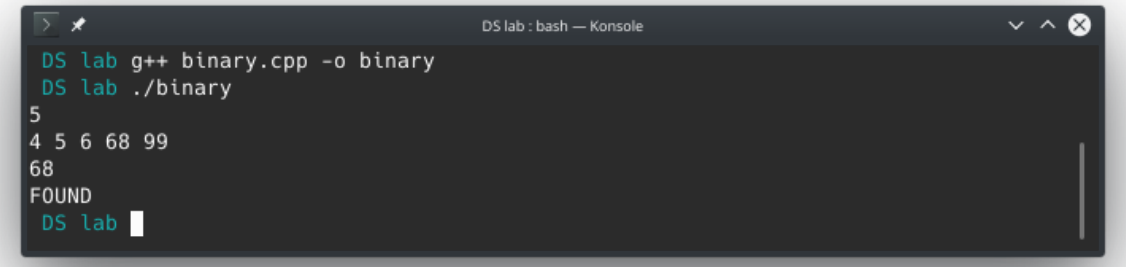
3 Write a program to implement linear search.

```
#include<bits/stdc++.h>
using namespace std;
#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
int main()
{
ll n,x,f=0;
        cin>>n;
 cin>>x;
ll A[n];
 loop(i,0,n)
  cin>>A[i];
 loop(i,0,n)
  if(A[i]==x)
   {
 f=1;
break;
}
if(f) cout<<"FOUND";
else cout<<"NOT FOUND\n";
}
```



4 Write a program to implement binary search.

```
#include<bits/stdc++.h>

using namespace std;
#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
int main()
{



        ll n,x,l,u,f=0;
        cin>>n;
ll A[n];
        loop(i,0,n)
         cin>>A[i];
        cin>>x;
        l=0;
        u=n-1;
        while(l<=u)
        {
         ll m=(u+l)>>1;
         if(A[m]>x)
          u=m-1;
         else if(A[m]<x)
          l=m+1;
         else
         { f=1;break;}
        }
        if(f) cout<<"FOUND\n";
        else cout<<"NOT FOUND\n";

}
```



5 Write a program to implement following operation in stack.

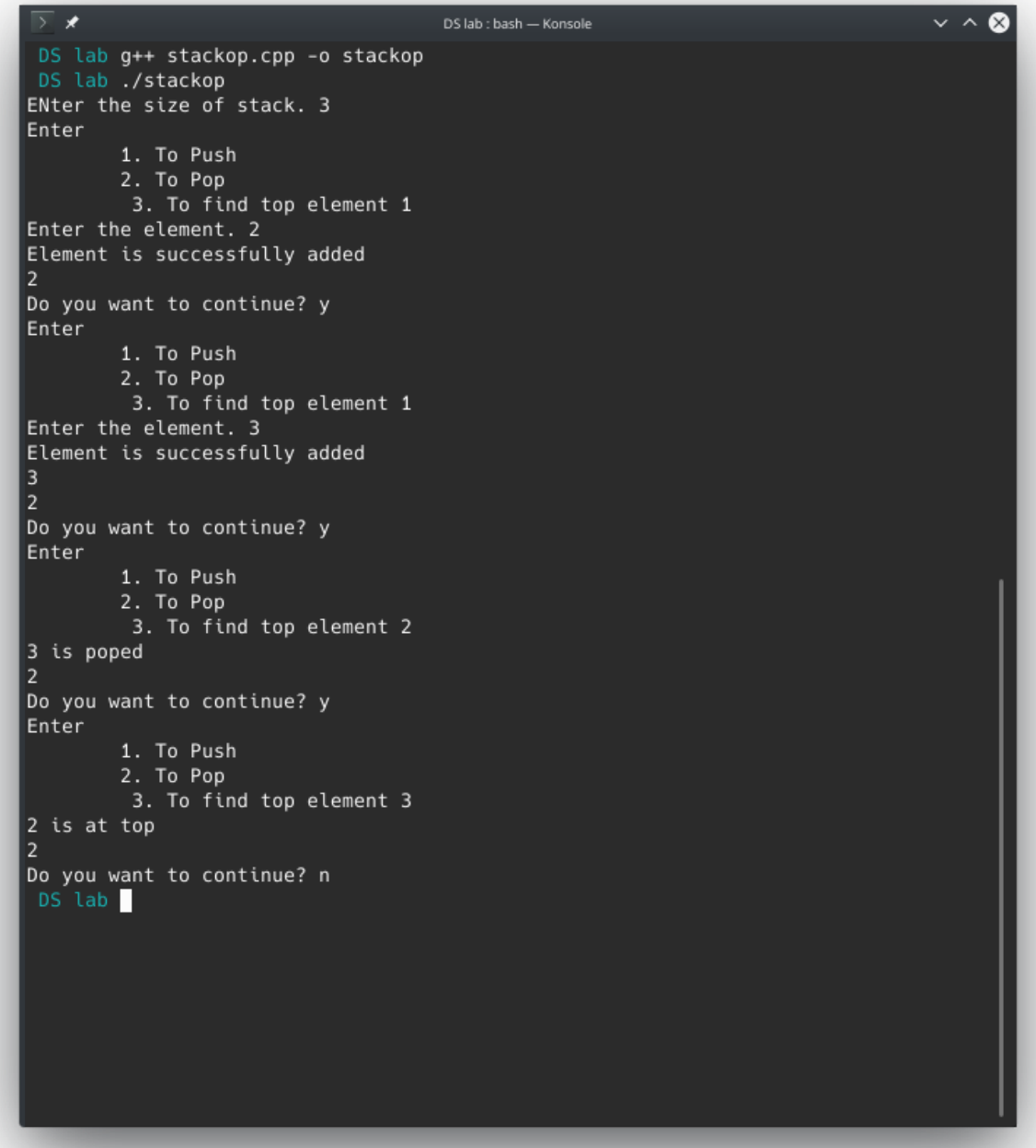
5.1 To push element into stack.

5.2 To pop from stack.

5.3 To print top element.

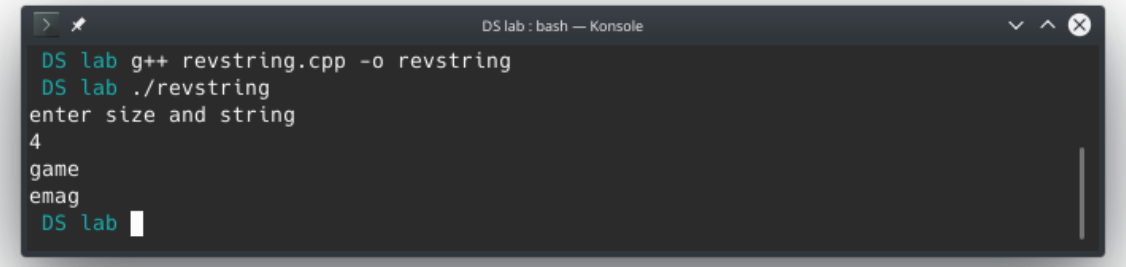
```
#include<bits/stdc++.h>
using namespace std;
int A[1000],top=-1,size;
void push()
{
    if(top==size-1)
        cout<<"Stack is full\n";
    else
    {
          int n;
          cout<<"Enter the element. ";
          cin>>n;
          A[++top]=n;
          cout<<"Element is successfully added\n";
    }
}
void pop()
{
    if(top==-1)
        cout<<"Stack is empty\n";
    else
        cout<<A[top--]<<" is poped\n";
}
void peek()
{
    if(top==-1)
        cout<<"Stack is empty\n";
    else
        cout<<A[top]<<" is at top\n";
}
int main()
{
    char ch;
    cout<<"ENter the size of stack. ";
    cin>>size;
    do
    {
        int c;
        cout<<"Enter \n\t1. To Push\n\t2. To Pop\n\t 3. To find top element ";
        cin>>c;
        switch(c)
          {
              case 1: {
                  push();
              }
              break;
              case 2: pop();
              break;
              case 3:peek();
          }

          for(int i=top;i>=0;i--)
```

```
            cout<<A[i]<<endl;
        cout<<"Do you want to continue? ";
        cin>>ch;
    }while(ch=='y');
}
```



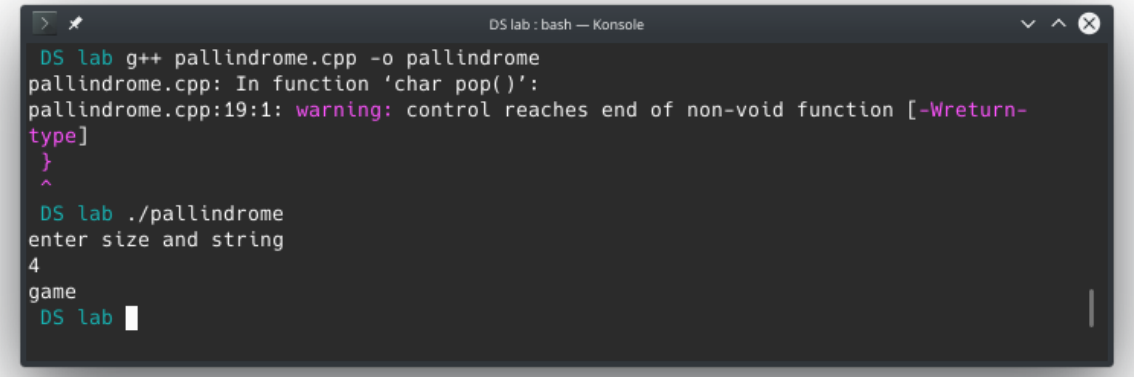
6 Write a program to find the reverse of the string using stack.

```
#include<bits/stdc++.h>
using namespace std;
char A[1000];int top=-1,size;
void push()
{
    if(top==size-1)
        cout<<"Stack is full\n";
    else
    {
         char c;
          cin>>c;
          A[++top]=c;
    }
}
void pop()
{
    if(top==-1)
        cout<<"Stack is empty\n";
    else
        cout<<A[top--];
}
int main()
{

        cout<<"enter size and string\n";
        cin>>size;
        for(int i=0;i<size;i++)
            push();
        for(int i=0;i<size;i++)
            pop();
    cout<<endl;
}
```



7 Write a program to find whether a string is palindrome or not.

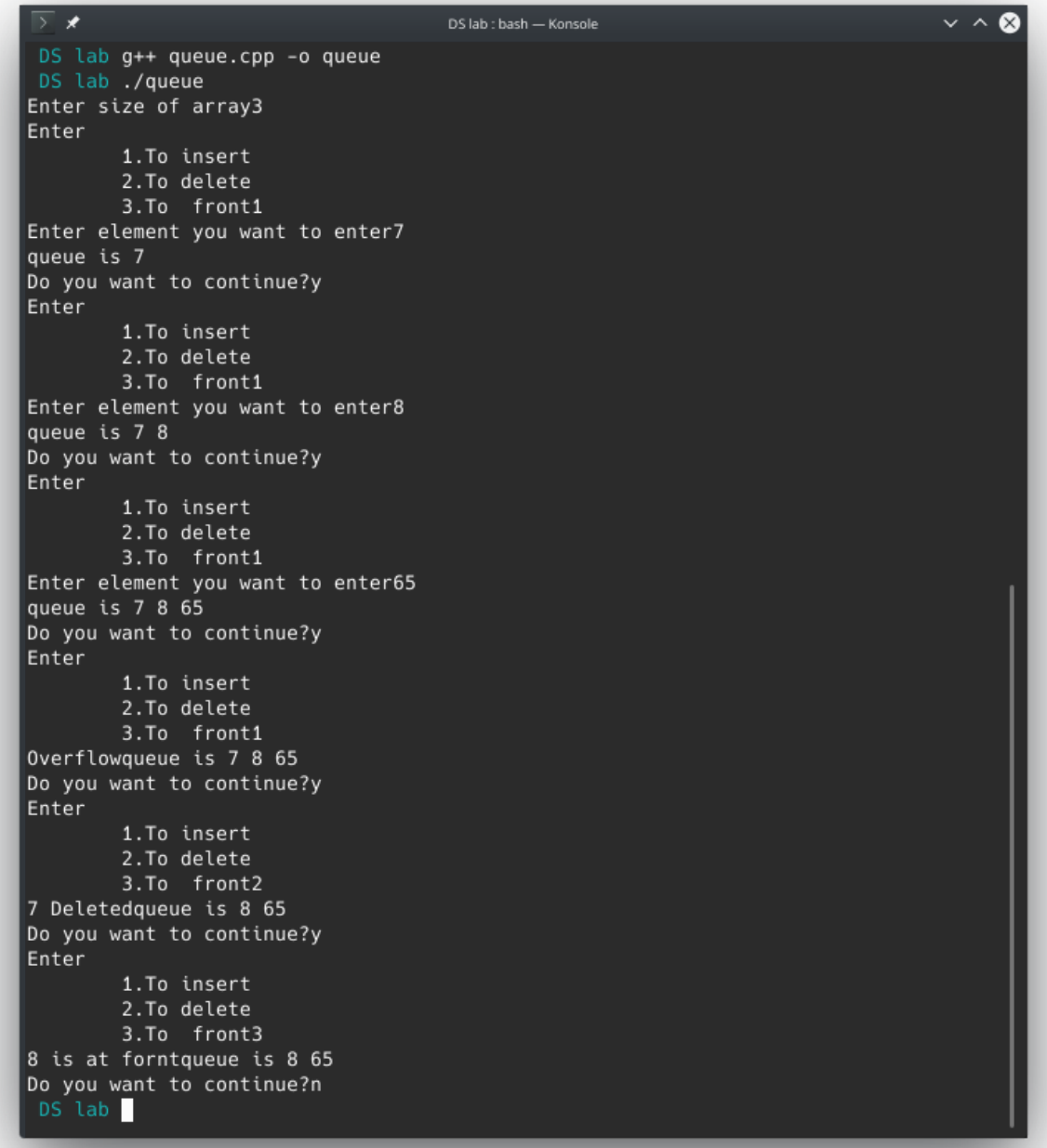
```
#include<bits/stdc++.h>
using namespace std;
char A[1000];int top=-1,size;
void push(char c)
{
    if(top==size-1)
        cout<<"Stack is full\n";
    else
    {
          A[++top]=c;
    }
}
char pop()
{
    if(top==-1)
        cout<<"Stack is empty\n";
    else
    return A[top--];
}
int main()
{

        cout<<"enter size and string\n";
        cin>>size;
        char s[size],a[size];
        cin>>s;
        for(int i=0;i<size;i++)
            push(s[i]);
        for(int i=0;i<size;i++)
            a[i]=pop();
        if(strcmp(a,s)==0)
            cout<<"Palandrom";
        else cout<<"NoT palandrom";
}
```



8 Write a program to implement queue using array.

```
#include<bits/stdc++.h>
using namespace std;

#define ll long
ll A[100],front=-1,n,rear=-1;
void insert()
{
    if(rear==n-1)
        cout<<"Overflow";
    else
    {
        cout<<"Enter element you want to enter";
        ll x;
        cin>>x;
        A[++rear]=x;
    }
}

void dlete()
{
    if(front>=rear)
        cout<<"Underflow\n";
    else
    {
        cout<<A[++front]<<" Deleted";
    }
}

void frnt()
{
    if(front>=rear)
        cout<<"Underflow\n";
    else
    {
        cout<<A[front+1]<<" is at fornt";
    }
}

int main()
{
    ll c;
    char ch;
    cout<<"Enter size of array";
    cin>>n;
    do{
        cout<<"Enter \n\t1.To insert\n\t2.To delete\n\t3.To  front";
        cin>>c;
        switch(c)
        {
            case 1: insert();
            break;
            case 2: dlete();
            break;
            case 3: frnt();
        }
        cout<<"queue is ";
```

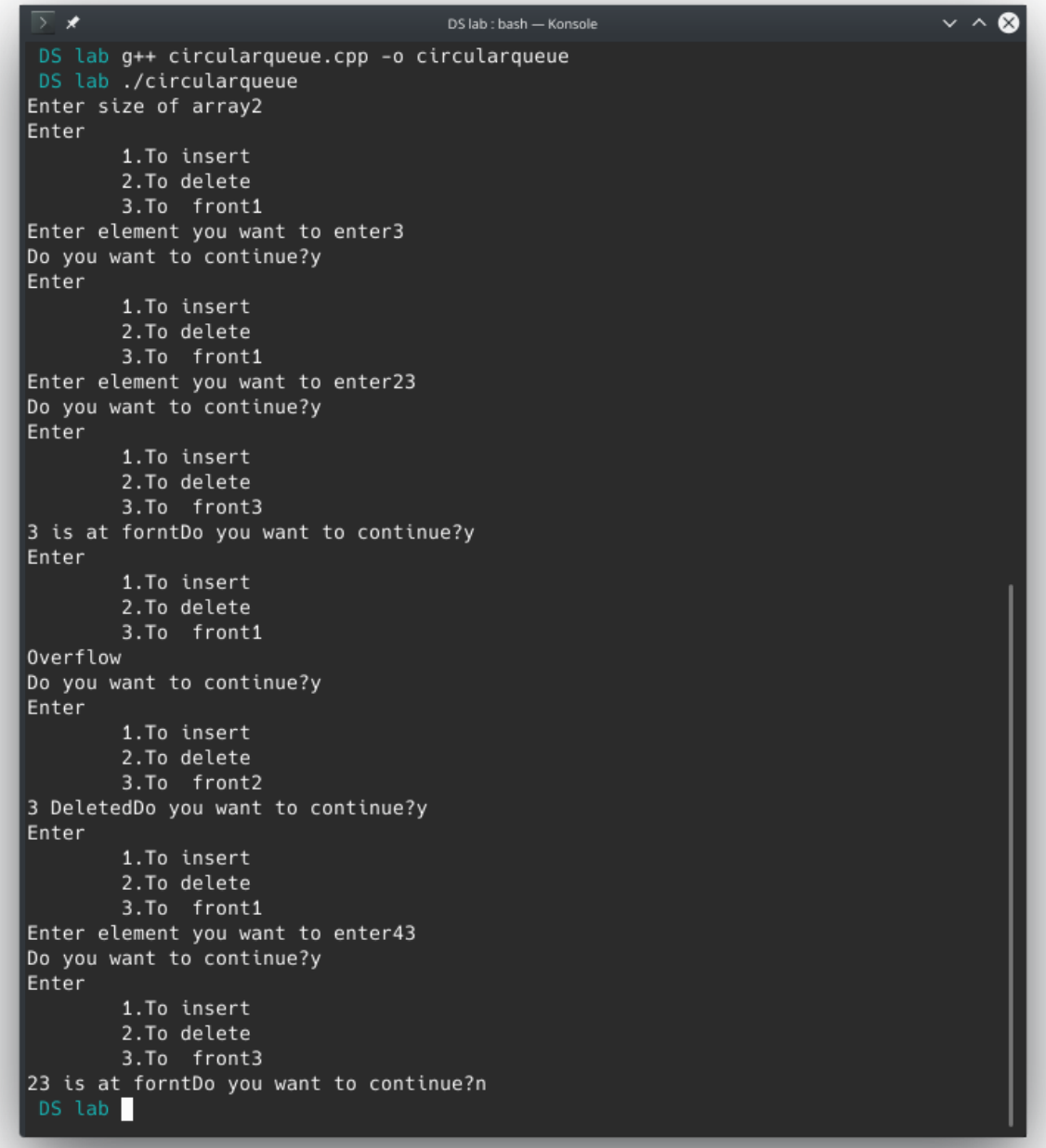
```
        for(ll i=front+1;i<=rear;i++)
              cout<<A[i]<<" ";
             cout<<endl;
        cout<<"Do you want to continue?";
        cin>>ch;
    }while(ch=='y');
}
```



9 Write a program to implement a circular queue using an array.

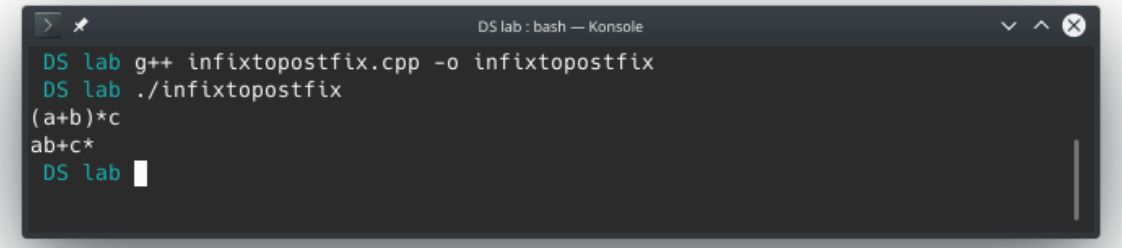
```
#include<bits/stdc++.h>
using namespace std;

#define ll long
ll A[100],front=-1,n,rear=-1;
void insert()
{
    if((rear==n-1 && front==0) || (rear+1==front ))
        cout<<"Overflow \n";

    else
    {
        cout<<"Enter element you want to enter";
        ll x;
        cin>>x;
        rear=(rear+1)%n;
        A[rear]=x;
        if(front==-1)
            front=0;
    }
}

void dlete()
{
    if(front==rear&& rear==-1)
        cout<<"Underflow\n";
    else
    {
        cout<<A[front]<<" Deleted";
        if(front==rear)
            rear=front=-1;
        else
                front=(front+1)%n;
    }
}

void frnt()
{
    if(front==rear&& rear==-1)
        cout<<"Underflow\n";
    else
    {
        cout<<A[front]<<" is at fornt";
    }
}

int main()
{
    ll c;
    char ch;
    cout<<"Enter size of array";
    cin>>n;
    do{
        cout<<"Enter \n\t1.To insert\n\t2.To delete\n\t3.To  front";
        cin>>c;
        switch(c)
```

```
        {
            case 1: insert();
            break;
            case 2: dlete();
            break;
            case 3: frnt();
        }
        cout<<"Do you want to continue?";
        cin>>ch;
    }while(ch=='y');
}
```



10 Write a program to convert infix to postfix.

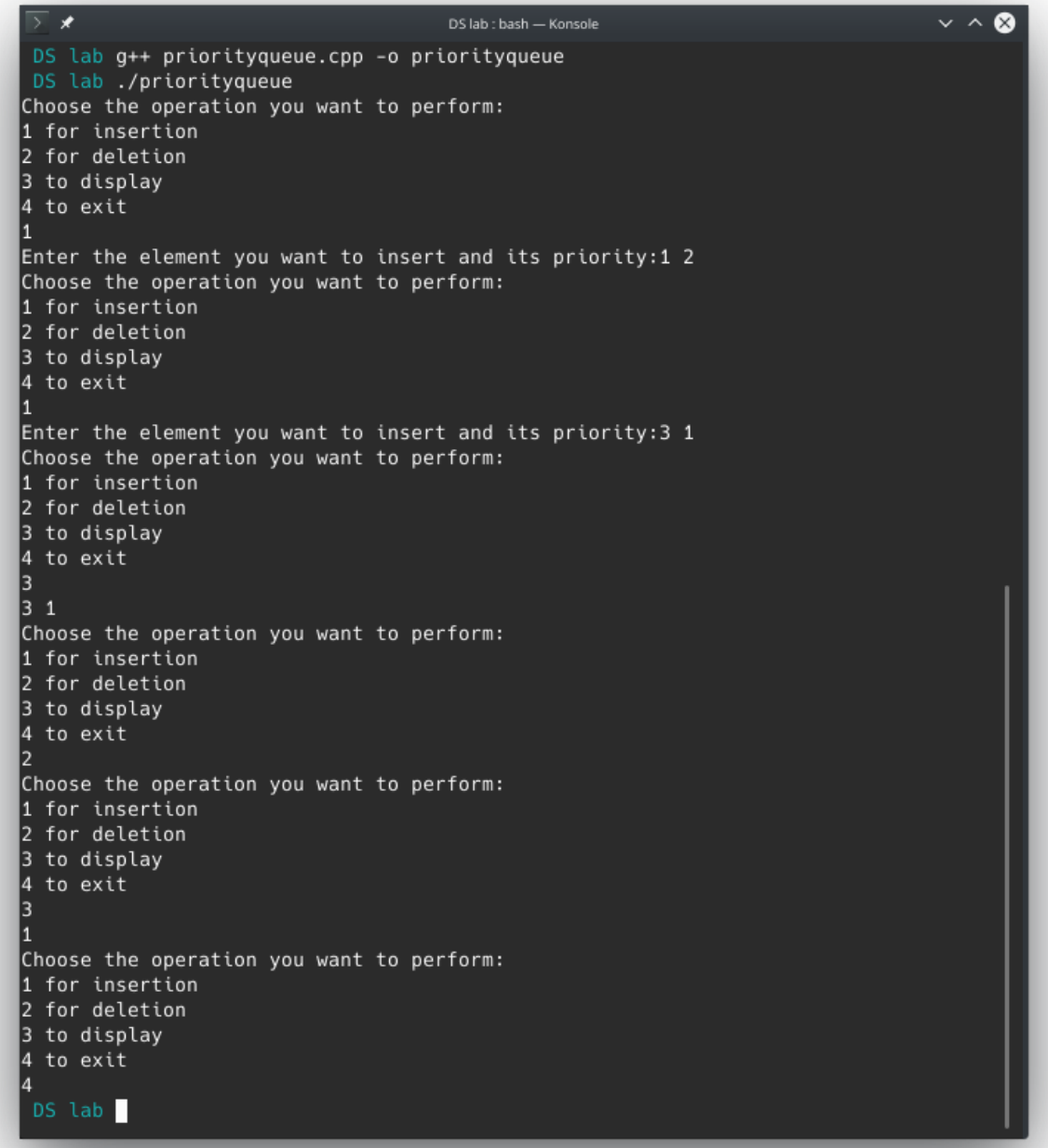
```
#include<bits/stdc++.h>
using namespace std;
#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)

#define pb push_back
ll check(char c)
{
    if(c=='*' || c=='/')
        return 2;
    else
        return 1;
}
int main()
{
    string s;
    stack<char> op;
    string ans;
    cin>>s;
    loop(i,0,s.length())
    {
        if(s[i]=='+' || s[i]=='-' || s[i]=='*' || s[i]=='/' )
        {
            while(!op.empty() && (check(op.top())>check(s[i])))
            {
                ans.pb(op.top());
                op.pop();
                if(op.empty())
                    break;
            }
            op.push(s[i]);
         }

        else if(s[i]=='(')
            op.push(s[i]);
        else if(s[i]==')')
        {
            while(!op.empty() && op.top()!='('){
             ans.pb(op.top());
             op.pop();
            }
            op.pop();
        }
        else
            ans.pb(s[i]);

    }
    while(!op.empty()){
        ans.pb(op.top());
        op.pop();
    }
    cout<<ans<<endl;
}
```


DS lab : bash — Konsole
DS lab g++ infixtopostfix.cpp -o infixtopostfix
DS lab ./infixtopostfix
(a+b)*c
ab+c*
DS lab

11 Write a program to implement priority queue.

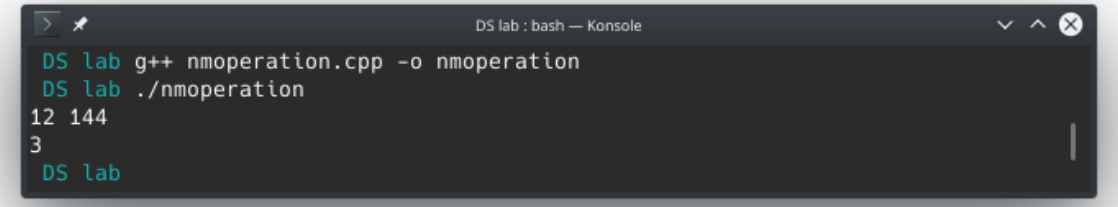
```
#include<bits/stdc++.h>
using namespace std;

#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)

ll n=0;

ll A[10];
void heap(int i)
{
        ll l=2*i;
        ll r=2*i+1;
        ll lar;
        if(l<=n && A[l]>A[i])
                lar=l;
        else
                lar=i;
        if(r<=n && A[r]>A[lar])
                lar=r;
        if(lar!=i)
        {
                ll t=A[lar];
                A[lar]=A[i];
                A[i]=t;
                heap(lar);
        }
}

void del()
{

        if(n==0)
                cout<<"Can't";
        else{
                cout<<A[1]<<"is deleted \n";
                A[1]=A[n];
                n--;
                heap(1);
        }
}
void ins()
{
        cout<<"Enter value ";
        ll x;
        cin>>x;
        n=n+1;
        A[n]=x;

        ll i=n;
        while(i>1 && A[i/2]<A[i])
        {       ll t=A[i/2];
                A[i/2]=A[i];
                A[i]=t;
                i=i/2;
        }
}
```

```
int main()
{

        ll ch;
        do{
                cout<<"Enter 1.To push \n\t2.To pop \n\t3. To top() \n\t4.Exit ";
                cin>>ch;

                switch(ch){
                        case 1: ins();
                         break;
                        case 2: del();
                         break;
                        case 3: cout<<A[1];
                }
        }while(ch!=4);
}
```


DS lab : bash — Konsole
DS lab g++ priorityqueue.cpp -o priorityqueue
DS lab ./priorityqueue
Choose the operation you want to perform:
1 for insertion
2 for deletion
3 to display
4 to exit
1
Enter the element you want to insert and its priority:1 2
Choose the operation you want to perform:
1 for insertion
2 for deletion
3 to display
4 to exit
1
Enter the element you want to insert and its priority:3 1
Choose the operation you want to perform:
1 for insertion
2 for deletion
3 to display
4 to exit
3
3 1
Choose the operation you want to perform:
1 for insertion
2 for deletion
3 to display
4 to exit
2
Choose the operation you want to perform:
1 for insertion
2 for deletion
3 to display
4 to exit
3
1
Choose the operation you want to perform:
1 for insertion
2 for deletion
3 to display
4 to exit
4
DS lab

12 Given two integers n and m, in a single operation n can be multiplied by either 2 or 3. Write a program to find the minimum number of given operati to convert n into m. If it is impossible to convert n to m with the given operation then print -1.

```
#include<stdio.h>

int main()
{
        int n,m,flag=1,c2=0,c3=0;
        double n1,m1;

        scanf("%d %d",&n,&m);

        n1 = n;
        m1 = m;

        m1/=n1;
        m/=n;

        if(m<m1)
        {
                printf("-1 \n");
                return 0;
        }

        while(flag)
        {
                flag = 0;

                if(m%2==0)
                {
                        m/=2;
                        c2++;
                        flag = 1;
                }
                else if(m%3==0)
                {
                        m/=3;
                        c3++;
                        flag = 1;
                }
                else if(m==1)
                {
                        printf("%d \n",c2+c3);
                        return 0;
                }
        }

        printf("-1 \n");

        return 0;
}
```


DS lab : bash — Konsole
DS lab g++ nmoperation.cpp -o nmoperation
DS lab ./nmoperation
12 144
3
DS lab

13 Write a program to implement following operation.

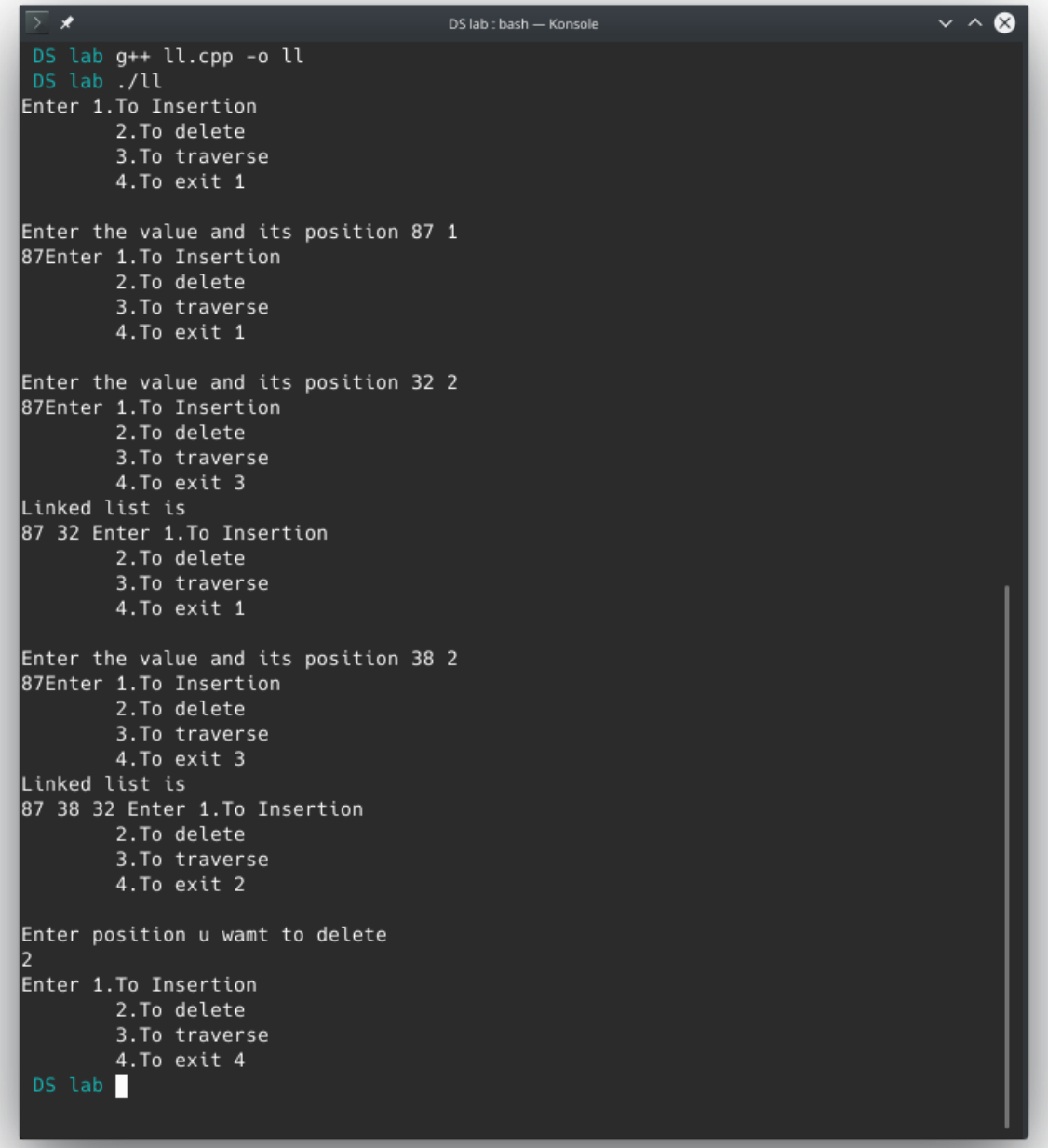
13.1 To insert an element in linked list.

13.2 To delete an element from linked list.

13.3 To traverse

```
#include<bits/stdc++.h>
using namespace std;

#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)

struct node
{
    int data;
    node *next;
}*head=NULL;

void inser()
{
    ll x,n;
    cout<<"\nEnter the value and its position ";
    cin>>x>>n;
    node* temp= new node;
    node* temp1=new node;
    temp1->data=x;
    temp1->next=NULL;
    temp=head;
    ll j=temp1->data;
    if(n==1){
        temp1->next=head;
        head=temp1;
    }
    else{
    ll c=1;
    while(c!=n-1 && temp->next!=NULL){
        c++;
        temp=temp->next;
    }
        temp1->next=temp->next;
        temp->next=temp1;
     j=temp->data;
     ll k=temp1->data;
     ll n=head->data;
    }
     j=head->data;
    cout<<head->data;
}
void delet()
{
    cout<<"\nEnter position u wamt to delete\n";
    ll x;
    cin>>x;
    x--;
    node *temp=new node;
    temp=head;
    while(--x && temp!=NULL)
        temp=temp->next;
```

```
        if(head==NULL || x!=0)
            cout<<"Ma chuda\nbhuddi khol ke input do\n";
        else{

    temp->next=temp->next->next;
        }
}

void traverse()
{
    node *temp=new node;
    cout<<"Linked list is \n";

    temp=head;
    ll j=head->data;
    ll k=temp->data;
    while(temp!=NULL)
        {
            cout<<temp->data<<" ";
            temp=temp->next;
        }
}



int main()
{

   ll ch;
   do{
        cout<<"Enter 1.To Insertion \n\t2.To delete \n\t3.To traverse\n\t4.To exit
            ";
        cin>>ch;

        switch(ch)
        {
            case 1:
             inser();
             break;
            case 2:
             delet();
             break;
            case 3:
             traverse();
        }


        }while(ch!=4);

}
```

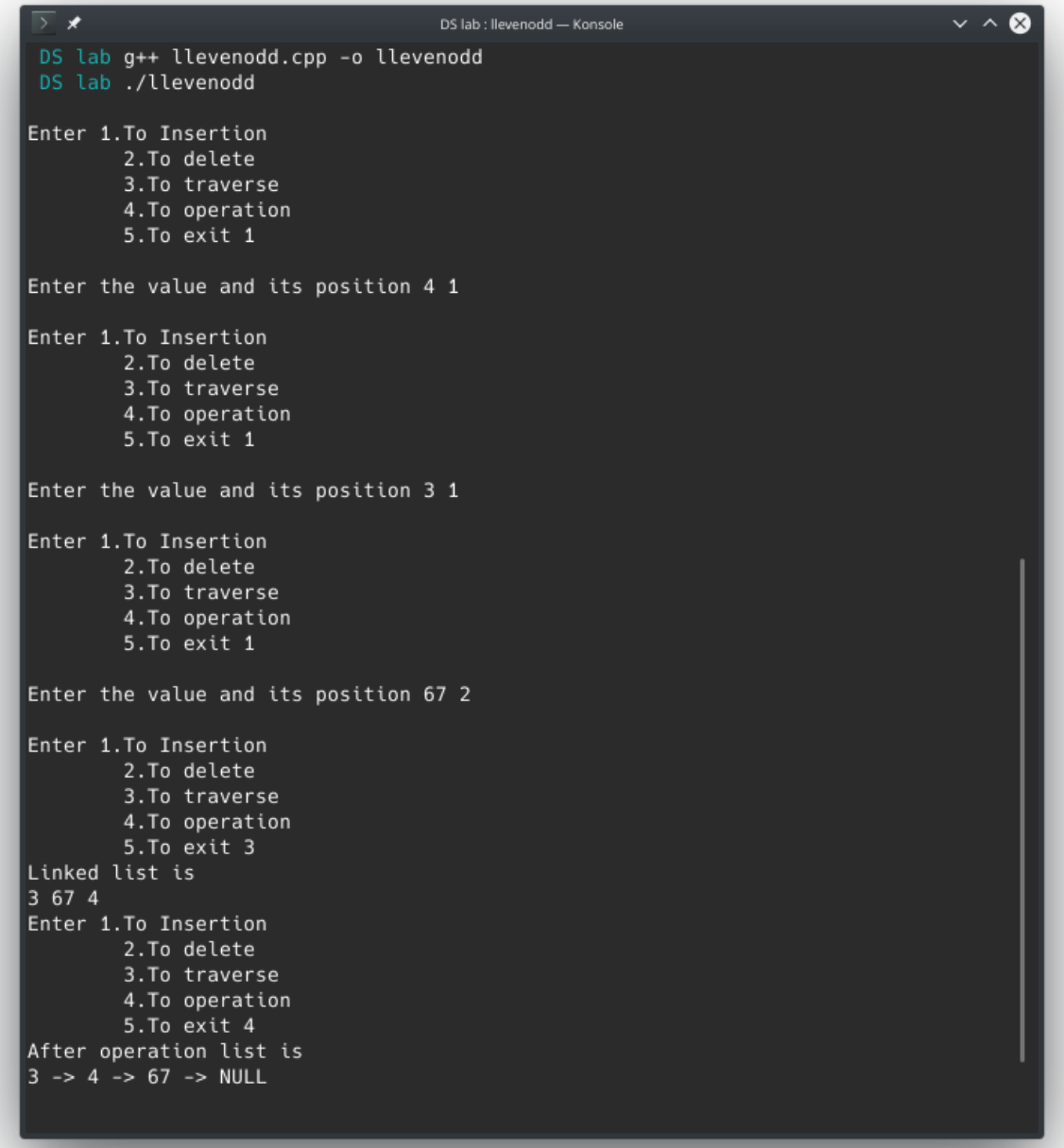

DS lab : bash — Konsole
DS lab g++ ll.cpp -o ll
DS lab ./ll
Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 1
Enter the value and its position 87 1
87Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 1
Enter the value and its position 32 2
87Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 3
Linked list is
87 32 Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 1
Enter the value and its position 38 2
87Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 3
Linked list is
87 38 32 Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 2
Enter position u wamt to delete
2
Enter 1.To Insertion
2.To delete
3.To traverse
4.To exit 4
DS lab

14 Given a Linked List of integers, write a program to print the linked list such that all even numbers appear before all the odd numbers in the linked list. Also, keep the order of even and odd numbers same.

```
#include<bits/stdc++.h>
using namespace std;

#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)

struct node
{
    int data;
    node *next;
}*head=NULL;

void inser()
{
    ll x,n;
    cout<<"\nEnter the value and its position ";
    cin>>x>>n;
    node* temp= new node;
    node* temp1=new node;
    temp1->data=x;
    temp1->next=NULL;
    temp=head;
    ll j=temp1->data;
    if(n==1){
        temp1->next=head;
        head=temp1;
    }
    else{
    ll c=1;
    while(c!=n-1 && temp->next!=NULL){
        c++;
        temp=temp->next;
    }
        temp1->next=temp->next;
        temp->next=temp1;
     j=temp->data;
     ll k=temp1->data;
     ll n=head->data;
    }
     j=head->data;
}
void delet()
{
    cout<<"\nEnter position u wamt to delete\n";
    ll x;
    cin>>x;
    x--;
    node *temp=new node;
    temp=head;
    while(--x && temp!=NULL)
        temp=temp->next;
        if(head==NULL || x!=0)
            cout<<"Ma chuda\nbhuddi khol ke input do\n";
```

```
        else{

    temp->next=temp->next->next;
        }
}

void traverse()
{
    node *temp=new node;
    cout<<"Linked list is \n";

    temp=head;
    ll j=head->data;
    ll k=temp->data;
    while(temp!=NULL)
        {
            cout<<temp->data<<" ";
            temp=temp->next;
        }
}



void op()
{
    node *temp=new node;
    cout<<"After operation list is \n";
    vector<ll> O,E;

    temp=head;
    ll j=head->data;
    ll k=temp->data;
    ll c=0;
    while(temp!=NULL)
        {
            c++;
            if(c%2)
                O.push_back(temp->data);
            else
                E.push_back(temp->data);

            temp=temp->next;
        }
        loop(i,0,O.size())
         cout<<O[i]<<" -> ";
        loop(i,0,E.size())
         cout<<E[E.size()-i-1]<<" -> ";
        cout<<"NULL\n";

}



int main()
{

   ll ch;
   do{
```

```
        cout<<"\nEnter 1.To Insertion \n\t2.To delete \n\t3.To traverse\n\t4.To
            operation \n\t5.To exit ";
        cin>>ch;

        switch(ch)
        {
            case 1:
             inser();
             break;
            case 2:
             delet();
             break;
            case 3:
             traverse();
             break;
            case 4: op();
         }


         }while(ch!=5);

}
```


DS lab : llevenodd — Konsole
DS lab g++ llevenodd.cpp -o llevenodd
DS lab ./llevenodd
Enter 1.To Insertion
2.To delete
3.To traverse
4.To operation
5.To exit 1
Enter the value and its position 4 1
Enter 1.To Insertion
2.To delete
3.To traverse
4.To operation
5.To exit 1
Enter the value and its position 3 1
Enter 1.To Insertion
2.To delete
3.To traverse
4.To operation
5.To exit 1
Enter the value and its position 67 2
Enter 1.To Insertion
2.To delete
3.To traverse
4.To operation
5.To exit 3
Linked list is
3 67 4
Enter 1.To Insertion
2.To delete
3.To traverse
4.To operation
5.To exit 4
After operation list is
3 -> 4 -> 67 -> NULL

15 Write a program to perform following operation on doubly linked list.

15.1 To add an element at head.

15.2 To add an element after a node.

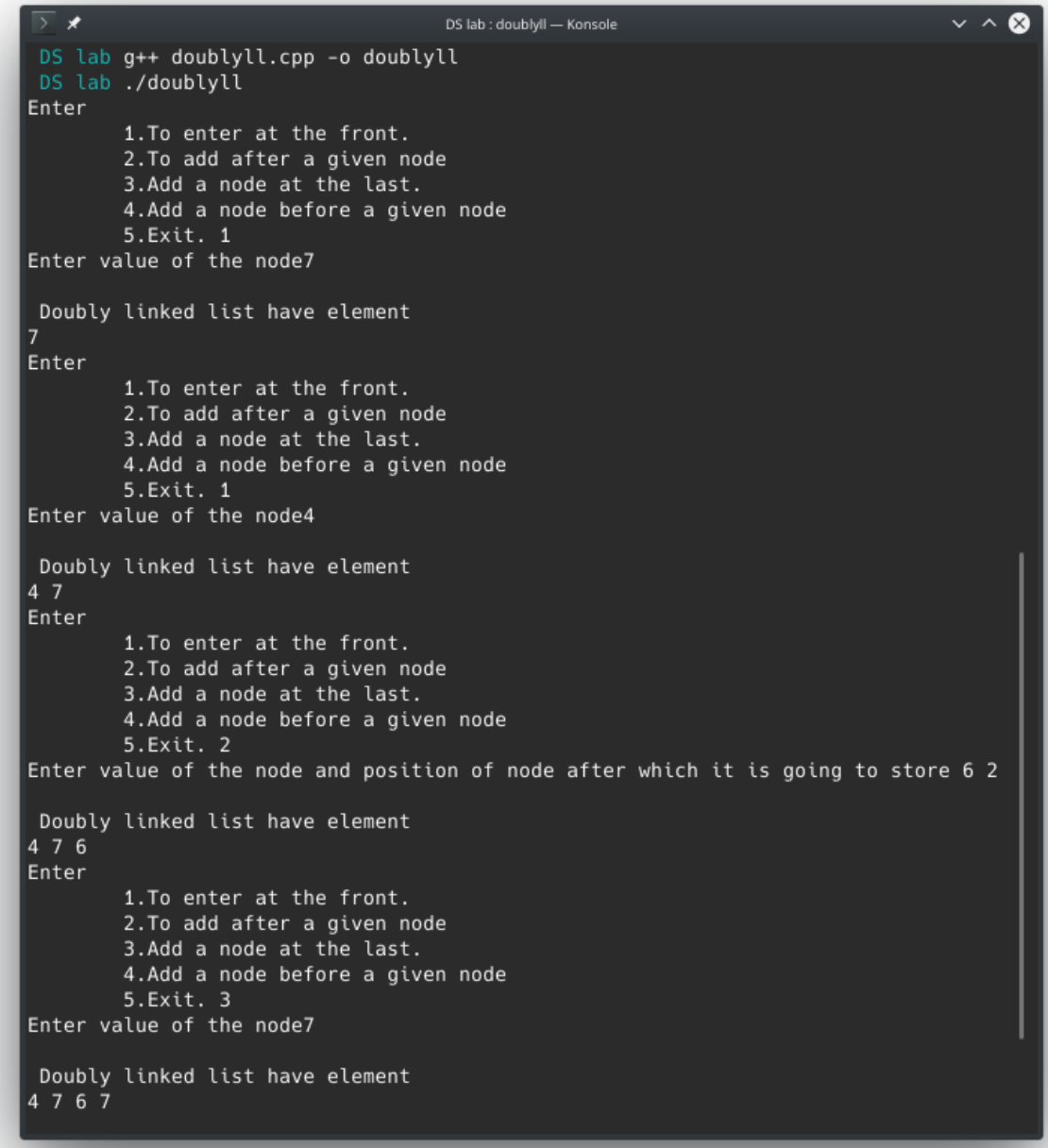
15.3 To add an element at tail.

15.4 To add an element before a node.

```
#include<bits/stdc++.h>
using namespace std;

#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
ll c=0;

struct node{
    ll val;
    node * next;
    node * prev;
}*head=NULL;
void insert(ll y,ll x)
{

    node *temp=new node;
    temp->val=x;
    temp->next=NULL;
    temp->prev=NULL;
    if(head==NULL){
        if(y==0)
            head=temp,c++;
        else
            cout<"dimag to sahi hai ";
    }
    else
    {
        if(y==0)
        {
            c++;
            node *temp1=head;
            temp1->prev=temp;
            head=temp;
            head->next=temp1;
            return ;
        }
        ll co=0;
        ll f=0;
        node * temp1=head;
        while(temp1!=NULL)
        {
            co++;
            if(y==co){
                f=1;
                break;
            }
            temp1=temp1->next;
        }
        if(f)
```

```
        {
            c++;
            temp->next=temp1->next;
            if(temp1->next!=NULL)
            temp1->next->prev=temp;
            temp1->next=temp;
            temp->prev=temp1;
        }
        else
             cout<<"Dimag to sahi hai "<<endl;
    }
}



void disp()
{
    node *temp=head;
    cout<<"\n Doubly linked list have element\n";
    while(temp!=NULL)
    {
        cout<<temp->val<<" ";
        temp=temp->next;
    }
    cout<<endl;
}



int main()
{
    ll ch,x,y;
    do{
        cout<<"Enter \n\t1.To enter at the front.\n\t2.To add after a given node\n
            \t3.Add a node at the last.\n\t4.Add a node before a given node\n\t5.
            Exit. ";
        cin>>ch;
        switch(ch){
            case 1:
             cout<<"Enter value of the node";
             cin>>x;
             insert(0,x);
             break;
            case 2:
             cout<<"Enter value of the node and position of node after which it is
                  going to store ";
             cin>>x>>y;
             insert(y,x);
             break;
            case 3:
             cout<<"Enter value of the node";
             cin>>x;
             insert(c,x);
             break;
            case 4:
             cout<<"Enter value of the node and position of node before which it
                is going to stoe ";
             cin>>x>>y;
             insert(y-1,x);
```

```
                break;
            }
            if(c)
            disp();
        }while(ch!=5);
}
```

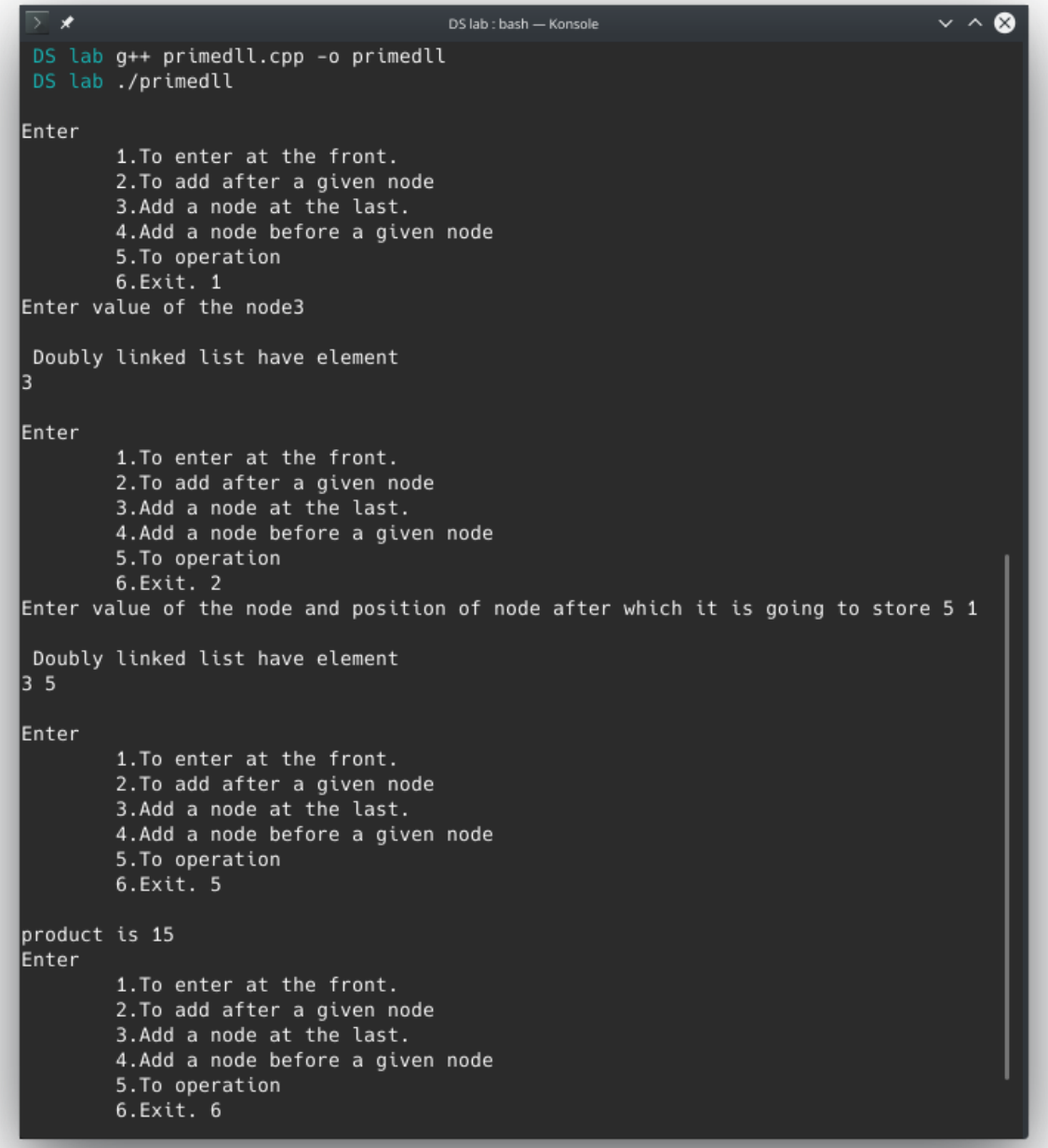


16 Given a doubly linked list containing N nodes. The task is to find the product of all prime nodes.

```
#include<bits/stdc++.h>
using namespace std;

#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
ll c=0;

struct node{
    ll val;
    node * next;
    node * prev;
}*head=NULL;
void insert(ll y,ll x)
{

    node *temp=new node;
    temp->val=x;
    temp->next=NULL;
    temp->prev=NULL;
    if(head==NULL){
        if(y==0)
            head=temp,c++;
        else
            cout<"dimag to sahi hai ";
    }
    else
    {
        if(y==0)
        {
            c++;
            node *temp1=head;
            temp1->prev=temp;
            head=temp;
            head->next=temp1;
            return ;
        }
        ll co=0;
        ll f=0;
        node * temp1=head;
        while(temp1!=NULL)
        {
            co++;
            if(y==co){
                f=1;
                break;
            }
            temp1=temp1->next;
        }
        if(f)
        {
            c++;
            temp->next=temp1->next;
            if(temp1->next!=NULL)
            temp1->next->prev=temp;
            temp1->next=temp;
            temp->prev=temp1;
```

```
        }
        else
            cout<<"Dimag to sahi hai "<<endl;
    }
}


ll A[10000]={0};

void func()
{
    ll f=1,ans=1;
    node *temp=head;
    while(temp!=NULL)
    {
        if(A[temp->val]==0){
            f=1;
            ans*=temp->val;
        }
        temp=temp->next;
    }
    if(f)
    cout<<"\nproduct is "<<ans;
    else cout<<"No prime no \n";
}


void disp()
{
    node *temp=head;
    cout<<"\n Doubly linked list have element\n";
    while(temp!=NULL)
    {
        cout<<temp->val<<" ";
        temp=temp->next;
    }
    cout<<endl;
}



int main()
{
    for(ll i=2;i*i<=10000;i++)
        if(A[i]==0)
        for(ll j=2*i;j<=10000;j+=i)
                A[j]=1;

    ll ch,x,y;
    do{
        cout<<"\nEnter \n\t1.To enter at the front.\n\t2.To add after a given node
            \n\t3.Add a node at the last.\n\t4.Add a node before a given node\n\t5.
            To operation \n\t6.Exit. ";
        cin>>ch;
        switch(ch){
            case 1:
             cout<<"Enter value of the node";
             cin>>x;
             insert(0,x);
```

```
            break;
           case 2:
            cout<<"Enter value of the node and position of node after which it is
                 going to store ";
            cin>>x>>y;
            insert(y,x);
            break;
           case 3:
            cout<<"Enter value of the node";
            cin>>x;
            insert(c,x);
            break;
           case 4:
            cout<<"Enter value of the node and position of node before which it
                is going to store ";
            cin>>x>>y;
            insert(y-1,x);
            break;
           case 5: func();
        }
        if(c && ch!=5)
        disp();
    }while(ch!=6);
}
```

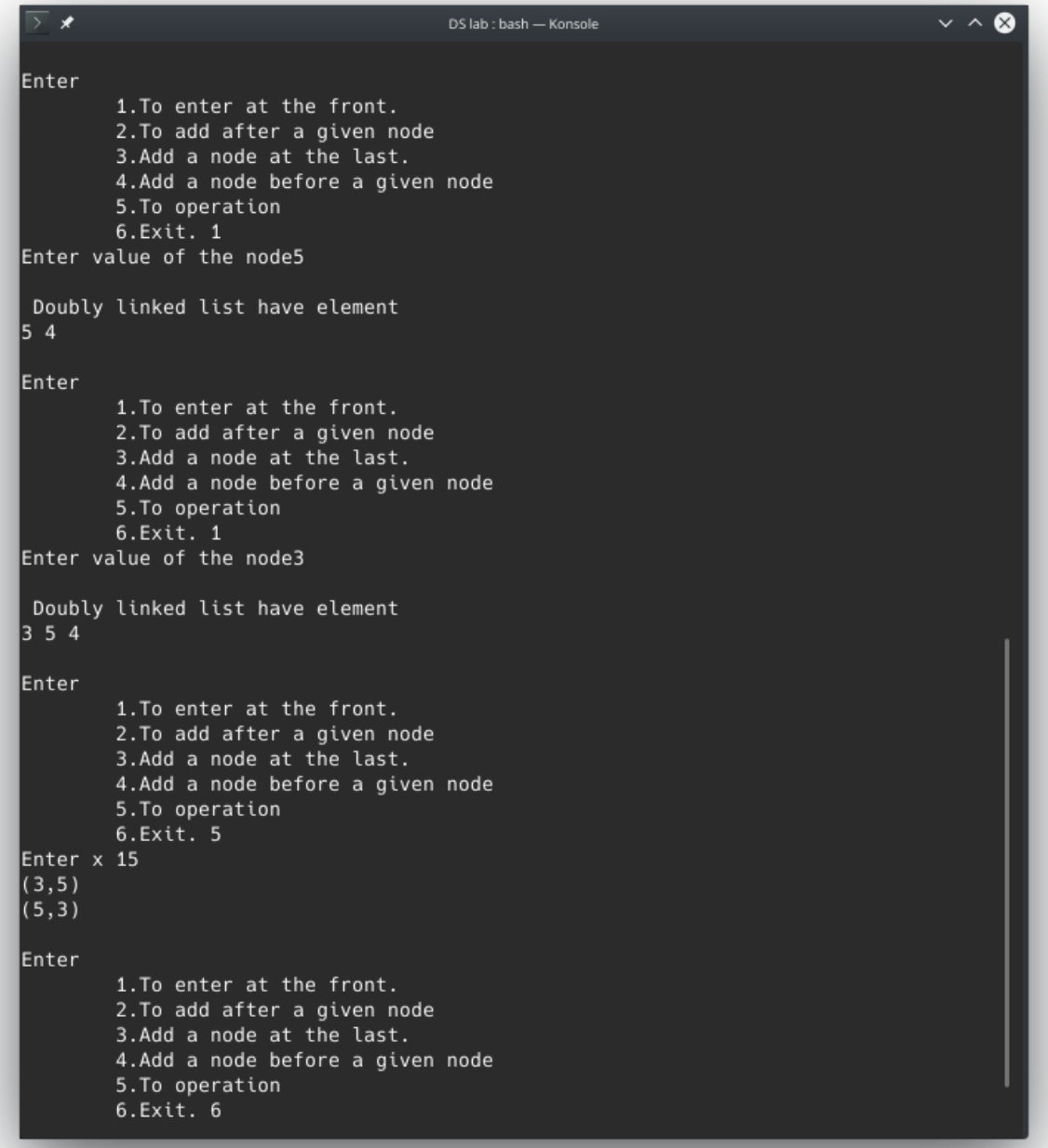

DS lab : bash — Konsole
DS lab g++ primedll.cpp -o primedll
DS lab ./primedll
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 1
Enter value of the node3
Doubly linked list have element
3
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 2
Enter value of the node and position of node after which it is going to store 5 1
Doubly linked list have element
3 5
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 5
product is 15
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 6

17 Given a sorted doubly linked list of positive distinct elements, write a program to find pairs in the doubly linked list whose product is equal to given value x, without using any extra space.

```
#include<bits/stdc++.h>
using namespace std;

#define ll long long
#define loop(i,a,b) for(ll i=a;i<b;i++)
ll c=0;

struct node{
    ll val;
    node * next;
    node * prev;
}*head=NULL;
void insert(ll y,ll x)
{

    node *temp=new node;
    temp->val=x;
    temp->next=NULL;
    temp->prev=NULL;
    if(head==NULL){
        if(y==0)
            head=temp,c++;
        else
            cout<"dimag to sahi hai ";
    }
    else
    {
        if(y==0)
        {
            c++;
            node *temp1=head;
            temp1->prev=temp;
            head=temp;
            head->next=temp1;
            return ;
        }
        ll co=0;
        ll f=0;
        node * temp1=head;
        while(temp1!=NULL)
        {
            co++;
            if(y==co){
                f=1;
                break;
            }
            temp1=temp1->next;
        }
        if(f)
        {
            c++;
            temp->next=temp1->next;
            if(temp1->next!=NULL)
            temp1->next->prev=temp;
```

```
            temp1->next=temp;
            temp->prev=temp1;
        }
        else
             cout<<"Dimag to sahi hai "<<endl;
    }
}



void func()
{
        node * temp1,*temp2;
        temp1=head;
        ll x;
        cout<<"Enter x ";
        cin>>x;
        while(temp1!=NULL)
        {
            temp2=head;
            while(temp2!=NULL)
            {
                if(temp1->val*temp2->val==x)
                    cout<<"("<<temp1->val<<","<<temp2->val<<")\n";
                temp2=temp2->next;
            }

                temp1=temp1->next;
        }
}


void disp()
{
    node *temp=head;
    cout<<"\n Doubly linked list have element\n";
    while(temp!=NULL)
    {
        cout<<temp->val<<" ";
        temp=temp->next;
    }
    cout<<endl;
}



int main()
{

    ll ch,x,y;
    do{
        cout<<"\nEnter \n\t1.To enter at the front.\n\t2.To add after a given node
            \n\t3.Add a node at the last.\n\t4.Add a node before a given node\n\t5.
            To operation \n\t6.Exit. ";
        cin>>ch;
        switch(ch){
            case 1:
             cout<<"Enter value of the node";
             cin>>x;
```

```
            insert(0,x);
            break;
           case 2:
            cout<<"Enter value of the node and position of node after which it is
                going to store ";
            cin>>x>>y;
            insert(y,x);
            break;
           case 3:
            cout<<"Enter value of the node";
            cin>>x;
            insert(c,x);
            break;
           case 4:
            cout<<"Enter value of the node and position of node before which it
               is going to stoe ";
            cin>>x>>y;
            insert(y-1,x);
            break;
           case 5: func();
        }
        if(c && ch!=5)
        disp();
    }while(ch!=6);
}
```


DS lab : bash — Konsole
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 1
Enter value of the node5
Doubly linked list have element
5 4
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 1
Enter value of the node3
Doubly linked list have element
3 5 4
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 5
Enter x 15
(3,5)
(5,3)
Enter
1.To enter at the front.
2.To add after a given node
3.Add a node at the last.
4.Add a node before a given node
5.To operation
6.Exit. 6