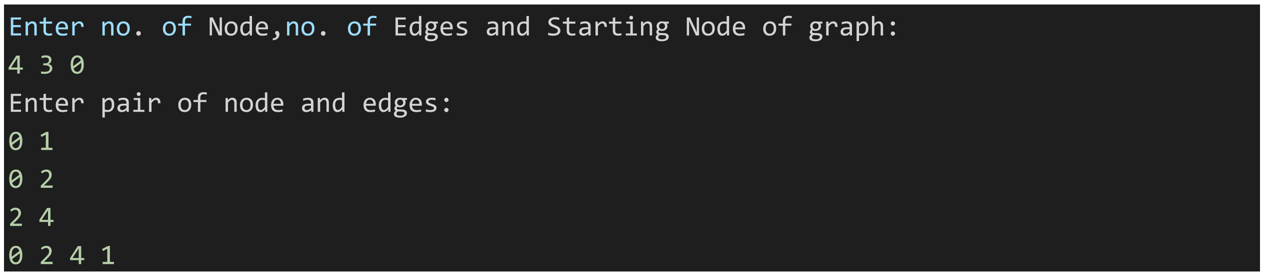
LAB ASSIGNMENT NO:01

DFS PROGRAM

```
#include <iostream>

#include <vector>

#include <stack>

#include <omp.h>

using namespace std;

const int MAX = 100000;

vector<int> graph[MAX];

bool visited[MAX];

void dfs(int node) {

    stack<int> s;

    s.push(node);

   while (!s.empty()) {

        int curr_node = s.top();

 if (!visited[curr_node]) {

            visited[curr_node] = true;

        s.pop();

    cout<<curr_node<<" ";

 #pragma omp parallel for

            for (int i = 0; i < graph[curr_node].size(); i++) {

                int adj_node = graph[curr_node][i];

                if (!visited[adj_node]) {

                    s.push(adj_node);

                }  } }

    }}
```

```
int main() {
    int n, m, start_node;
    cout<<"Enter no. of Node,no. of Edges and Starting Node of graph:\n";
    cin >> n >> m >> start_node;
 //n: node,m:edges
        cout<<"Enter pair of node and edges:\n";
 for (int i = 0; i < m; i++) {
        int u, v;
        cin >> u >> v;
        //u and v: Pair of edges
        graph[u].push_back(v);
        graph[v].push_back(u);
    }
  #pragma omp parallel for
    for (int i = 0; i < n; i++) {
        visited[i] = false;
    }
 dfs(start_node);
 return 0;
}
```

OUTPUT:



```
Enter no. of Node,no. of Edges and Starting Node of graph:
4 3 0
Enter pair of node and edges:
0 1
0 2
2 4
0 2 4 1
```

BFS PROGRAM:

```
#include<iostream>

#include<stdlib.h>

#include<queue>

using namespace std;

class node

{

  public:

  node *left, *right;

int data;

};

class Breadthfs

{

  public:

  node *insert(node *, int);

 void bfs(node *);

 };

node *insert(node *root, int data)

// inserts a node in tree

{

 if(!root)

    {

      root=new node;

        root->left=NULL;

        root->right=NULL;

        root->data=data;

        return root;
```

```
   }
queue<node *> q;
 q.push(root);
  while(!q.empty())
    {
  node *temp=q.front();
 q.pop();
if(temp->left==NULL)
        {
            temp->left=new node;
            temp->left->left=NULL;
            temp->left->right=NULL;
            temp->left->data=data;
            return root;
        }
        else
        {
 q.push(temp->left);
  }
if(temp->right==NULL)
        {
              temp->right=new node;
            temp->right->left=NULL;
            temp->right->right=NULL;
            temp->right->data=data;
            return root;
        } else
        {
q.push(temp->right);
 } }
   }
void bfs(node *head)
{
queue<node*> q;
        q.push(head);
       int qSize;
        while (!q.empty())
        {
            qSize = q.size();
            #pragma omp parallel for
                //creates parallel threads
            for (int i = 0; i < qSize; i++)
            {
                node* currNode;
                #pragma omp critical
                {
                  currNode = q.front();
                  q.pop();
                  cout<<"\t"<<currNode->data;
                  }// prints parent node
                #pragma omp critical
                {
                if(currNode->left)// push parent's left node in queue
                    q.push(currNode->left);
                if(currNode->right)
                    q.push(currNode->right);
                }// push parent's right node in queue
         }
        }}
int main(){
  node *root=NULL;
    int data;
    char ans;
    do
    {
        cout<<"\n enter data=>";
        cin>>data;
        root=insert(root,data);
        cout<<"do you want insert one more node?";
        cin>>ans;
      }while(ans=='y'||ans=='Y');
     bfs(root);
      return 0;
}
```

OUTPUT:

```
enter data=>5
do you want insert one more node?Y
enter data=>89
do you want insert one more node?Y
enter data=>43
do you want insert one more node?Y
```

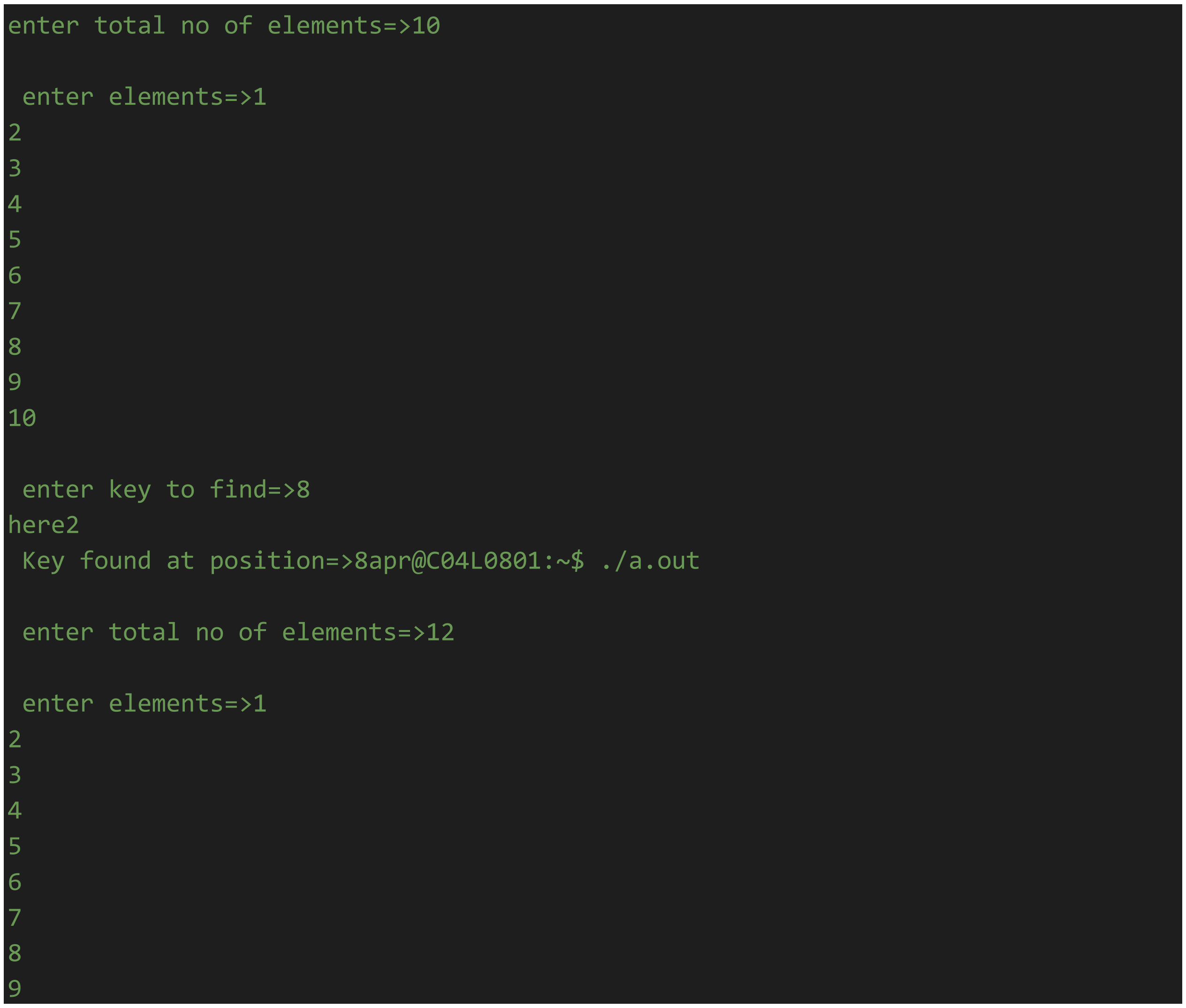
```
enter data=>2
do you want insert one more node?N
5        89        43        2
```

BINARY SEARCH TREE:

```
#include<iostream>
#include<stdlib.h>
#include<omp.h>
using namespace std;
int binary(int *, int, int, int);
int binary(int *a, int low, int high, int key)
{
     int mid;
    mid=(low+high)/2;
    int low1,low2,high1,high2,mid1,mid2,found=0,loc=-1;
  #pragma omp parallel sections
    {
        #pragma omp section
            {
            low1=low;
            high1=mid;
             while(low1<=high1)
            {
if(!(key>=a[low1] && key<=a[high1]))
                {
                    low1=low1+high1;
                    continue;
                }
             mid1=(low1+high1)/2;
            if(key==a[mid1])
                {
                    found=1;
                    loc=mid1;
                    low1=high1+1;
                }
            else if(key>a[mid1])
                {
  low1=mid1+1;
                }
                  else if(key<a[mid1])
                    high1=mid1-1;
             }
        }
      #pragma omp section
            {
                low2=mid+1;
            high2=high;
            while(low2<=high2)
            {
     if(!(key>=a[low2] && key<=a[high2]))
                {
                    low2=low2+high2;
                    continue;
            cout<<"here2";
```

```
                mid2=(low2+high2)/2;
                if(key==a[mid2])
                {
                    found=1;
                    loc=mid2;
                    low2=high2+1;
                }
                else if(key>a[mid2])
                {
           low2=mid2+1;
                }
                else if(key<a[mid2])
                high2=mid2-1;
        }
            }}
  return loc;
}int main()
{
      int *a,i,n,key,loc=-1;
    cout<<"\n enter total no of elements=>";
    cin>>n;
    a=new int[n];
   cout<<"\n enter elements=>";
    for(i=0;i<n;i++)
    {
      cin>>a[i];
        }
   cout<<"\n enter key to find=>";
  cin>>key;
   loc=binary(a,0,n-1,key);
   if(loc==-1)
     cout<<"\n Key not found.";
  else
     cout<<"\n Key found at position=>"<<loc+1;
 return 0;
}
```

OUTPUT



```
enter total no of elements=>10

 enter elements=>1
2
3
4
5
6
7
8
9
10

 enter key to find=>8
here2
 Key found at position=>8apr@C04L0801:~$ ./a.out

 enter total no of elements=>12

 enter elements=>1
2
3
4
5
6
7
8
9
```

```
10
11
12

 enter key to find=>15

 Key not found
```