Assignment No. 1

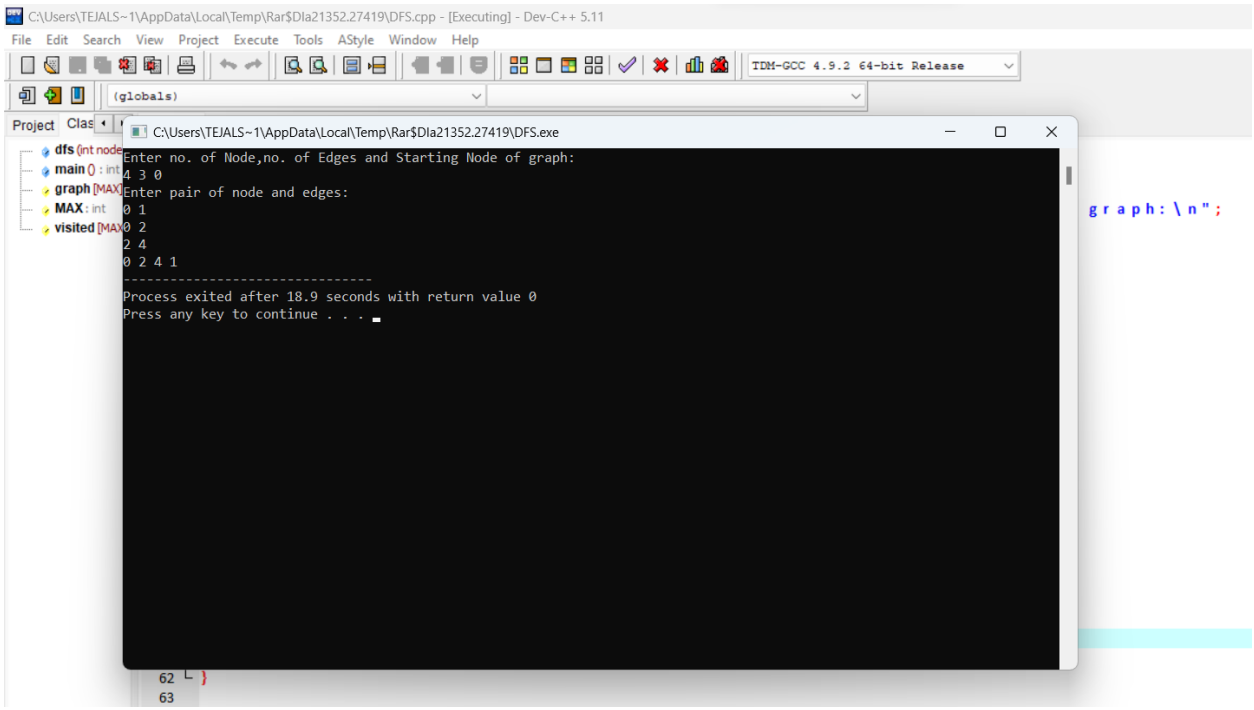
Depth First Search

Code -

```
#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 -


C:\Users\TEJALS~1\AppData\Local\Temp\Rar$DIa21352.27419\DFS.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 64-bit Release
(globals)
Project
C:\Users\TEJALS~1\AppData\Local\Temp\Rar$DIa21352.27419\DFS.exe
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
Process exited after 18.9 seconds with return value 0
Press any key to continue . . .
graph:\n";

Breadth First Search

Code -

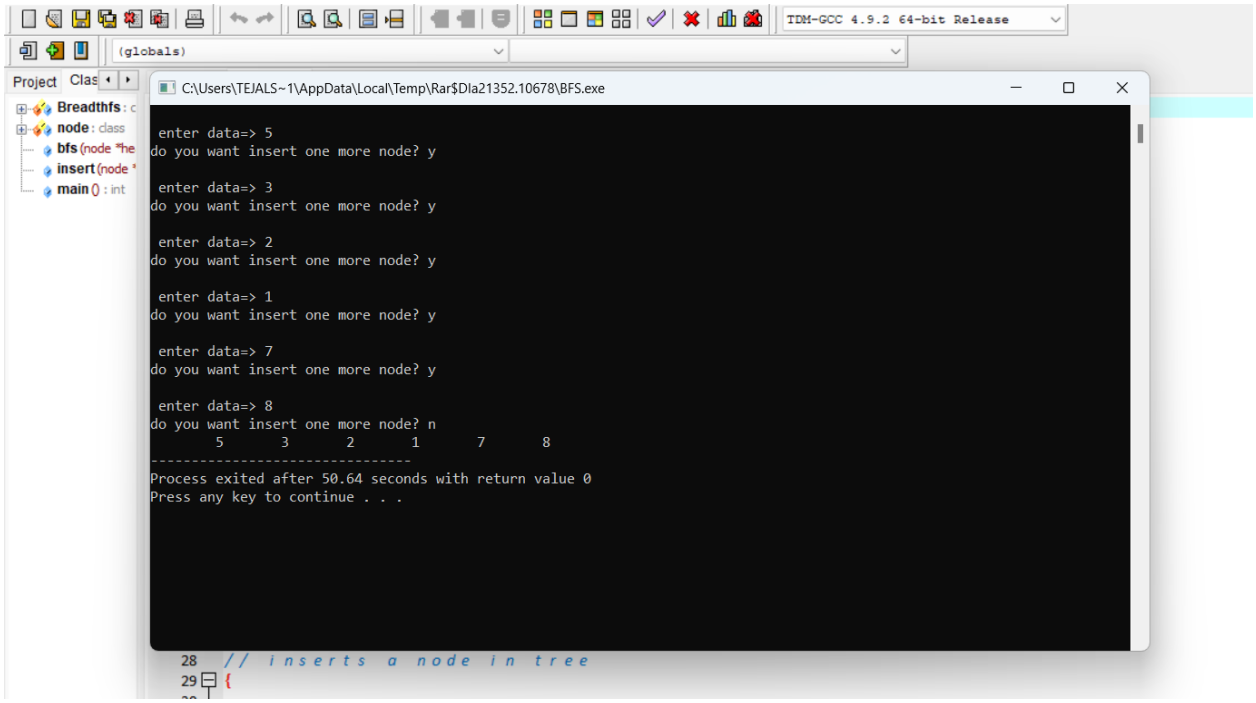
```
#include<iostream>
#include<stdlib.h>
#include<queue>
using namespace std;


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 -


TDM-GCC 4.9.2 64-bit Release
(globals)
Project
Breadthfs : c
node : class
bfs (node *he
insert (node *
main () : int
C:\Users\TEJALS~1\AppData\Local\Temp\Rar$DIa21352.10678\BFS.exe
enter data=> 5
do you want insert one more node? y
enter data=> 3
do you want insert one more node? y
enter data=> 2
do you want insert one more node? y
enter data=> 1
do you want insert one more node? y
enter data=> 7
do you want insert one more node? y
enter data=> 8
do you want insert one more node? n
5 3 2 1 7 8
Process exited after 50.64 seconds with return value 0
Press any key to continue . . .
28 // inserts a node in tree
29 {