Bahria University,

Karachi Campus

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LAB EXPERIMENT NO.

\_\_\_\_**12**\_\_\_\_\_

LIST OF TASKS

|  |  |
| --- | --- |
| TASK NO | OBJECTIVE |
| 1 | Create a program to implement Graphs With Adjacency matrix |
| 2 | Create a program to implement Graphs With Adjacency list. |
| 3 | Create a program to implement BFS. |
| 4 | Create a program to implement DFS. |
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Submitted On

04/01/2023

(Date: DD/MM/YY)

**Task # 1:** Create a program to implement Graphs With Adjacency matrix

**Solution**

using System;

namespace BST{

class Program{

static void Main(string[] args){

Console.WriteLine("Enter the number of Nodes : ");

int n = int.Parse(Console.ReadLine());

string[] arr = new string[n];

for (int i = 0; i < n; i++){

Console.WriteLine((i + 1) + " is connected to nodes?");

arr[i] = Console.ReadLine();}

int[,] array = new int[n, n];

for (int i = 0; i < array.GetLength(0); i++){

for (int j = 0; j < array.GetLength(1); j++){

string temp = "" + (j + 1);

if (arr[i].Contains(temp)){

array[i, j] = 1;}

else{

array[i, j] = 0;}}}

Console.Write(" ");

for (int i = 0; i < n; i++){

Console.Write(i + 1 + " ");}

Console.WriteLine();

for (int i = 0; i < array.GetLength(0); i++){

Console.Write((i + 1) + " ");

for (int j = 0; j < array.GetLength(1); j++){

Console.Write(array[i, j] + " ");}

Console.WriteLine();}

Console.WriteLine("Good Bye..!");}}}

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**Task # 2:** Create a program to implement Graphs With Adjacency list.

**Solution**

using System;

namespace BST{

class Program{

static void Main(string[] args){

Console.WriteLine("Enter the number of nodes");

int n = int.Parse(Console.ReadLine());

string[] arr = new string[n];

for (int i = 0; i < n; i++){

Console.WriteLine((i + 1) + " is connected to nodes?");

arr[i] = Console.ReadLine();}

List<int>[] obj = new List<int>[n];

for (int i = 0; i < n; i++){

obj[i] = new List<int>();

string[] temp = arr[i].Split(',');

for (int a = 0; a < temp.Length; a++){

obj[i].Add(int.Parse(temp[a]));}}

for (int i = 0; i < n; i++){

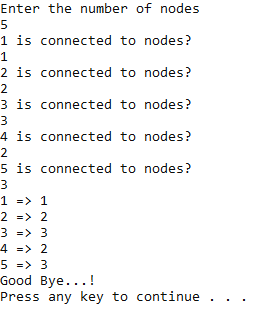
Console.Write((i + 1) + " => ");

for (int l = 0; l < obj[i].Count; l++){

Console.Write(obj[i][l] + " ");}

Console.WriteLine();}

Console.WriteLine("Good Bye...!");}}}

**Output**

**Task # 3:** Create a program to implement BFS.

**Solution**

static void Main(string[] args){

Graph g = new Graph(6);

g.AddEdge(0, 1);

g.AddEdge(1, 2);

g.AddEdge(2, 3);

g.AddEdge(3, 4);

g.AddEdge(4, 5);

Console.WriteLine("Following is Breadth First");

g.BFS(1);

Console.WriteLine();}

class Graph{

private int \_V;

LinkedList<int>[] \_adj;

public Graph(int V){

\_adj = new LinkedList<int>[V];

for (int i = 0; i < \_adj.Length; i++){

\_adj[i] = new LinkedList<int>();}

\_V = V;}

public void AddEdge(int v, int w){

\_adj[v].AddLast(w);}

public void BFS(int s){

bool[] visited = new bool[\_V];

for (int i = 0; i < \_V; i++)

visited[i] = false;

LinkedList<int> queue = new LinkedList<int>();

visited[s] = true;

queue.AddLast(s);

while (queue.Any()){

s = queue.First();

Console.Write(s + " ");

queue.RemoveFirst();

LinkedList<int> list = \_adj[s];

foreach (var val in list){

if (!visited[val]){

visited[val] = true;

queue.AddLast(val);}}}}}

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**Task # 4:** Create a program to implement DFS.

**Solution**

static void Main(string[] args){

Graph graph = new Graph(11);

graph.AddEdge(1, 2, false);

graph.AddEdge(2, 3, false);

graph.AddEdge(3, 4, false);

graph.AddEdge(1, 5, false);

graph.AddEdge(5, 6, false);

graph.AddEdge(6, 7, false);

graph.AddEdge(5, 8, false);

graph.AddEdge(1, 9, false);

graph.AddEdge(9, 10, false);

graph.DFS();

Console.WriteLine();}

public class Graph{

LinkedList<int>[] linkedListArray;

public Graph(int v){

linkedListArray = new LinkedList<int>[v];}

public void AddEdge(int u, int v, bool blnBiDir = true){

if (linkedListArray[u] == null){

linkedListArray[u] = new LinkedList<int>();

linkedListArray[u].AddFirst(v);}else{

var last = linkedListArray[u].Last;

linkedListArray[u].AddAfter(last, v);}

if (blnBiDir){

if (linkedListArray[v] == null){

linkedListArray[v] = new LinkedList<int>();

linkedListArray[v].AddFirst(u);}else{

var last = linkedListArray[v].Last;

linkedListArray[v].AddAfter(last, u);}}}

internal void DFSHelper(int src, bool[] visited){

visited[src] = true;

Console.Write(src + " ");

if (linkedListArray[src] != null){

foreach (var item in linkedListArray[src]){

if (!visited[item] == true){

DFSHelper(item, visited);}}}}

internal void DFS(){

Console.WriteLine("\t\tDFS");

bool[] visited = new bool[linkedListArray.Length + 1];

DFSHelper(1, visited);}}

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