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SID : 202212012
Subject : DSA
Topic : Graph
Lab : 8

Q1 : Implement DFS on a given graph.

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

class Graph
{
public:
    map<int, bool> visited;
    map<int, list<int>> adj;
    void addEdge(int v, int w);
    void DFS(int v);
};

void Graph::addEdge(int v, int w)
{
    adj[v].push_back(w);
}

void Graph::DFS(int v)
{
    visited[v] = true;
    cout << v << " ";
    list<int>::iterator i;
    for (i = adj[v].begin(); i != adj[v].end(); ++i)
        if (!visited[*i])
            DFS(*i);
}

int main()
{
    Graph g;
    g.addEdge(9, 4);

    g.addEdge(9, 3);
    g.addEdge(4, 4);
    g.addEdge(4, 5);
    g.addEdge(3, 6);
    g.addEdge(3, 7);
    g.addEdge(4, 8);
    g.addEdge(5, 9);
    g.addEdge(7, 90);
    g.addEdge(7, 9);
    g.addEdge(8, 94);
}
```

```

    cout << " Output: \n";

    g.DFS(9);

    return 0;
}

```

O/P :

The screenshot shows a C++ IDE with a file named `x.cpp`. The code implements a Depth-First Search (DFS) algorithm on a graph. The graph has 10 nodes (0-9) and the following edges: (9,4), (9,3), (4,4), (4,5), (3,6), (3,7), (4,8), (5,9), (7,9), (7,9), (8,9), (8,94). The DFS starts at node 9 and visits nodes in the order: 9, 4, 5, 8, 94, 3, 6, 7, 90. The output is printed as "Output: \n" followed by the sequence of visited nodes.

```

C++ x.cpp > main()
22     if (!visited[*i])
23     |     DFS(*i);
24     }
25 int main()
26 {
27     Graph g;
28     g.addEdge(9, 4);
29
30     g.addEdge(9, 3);
31     g.addEdge(4, 4);
32     g.addEdge(4, 5);
33     g.addEdge(3, 6);
34     g.addEdge(3, 7);
35     g.addEdge(4, 8);
36     g.addEdge(5, 9);
37     g.addEdge(7, 90);
38     g.addEdge(7, 9);
39     g.addEdge(8, 94);
40     cout << " Output: \n";
41     g.DFS(9);
42     return 0;
43 }

```

TERMINAL

```

devadnani@Devs-MacBook-Pro CP % cd "/Users/devadnani/Desktop/CP"
devadnani@Devs-MacBook-Pro CP % cd "/Users/devadnani/Desktop/CP/" && g++ -std=c++11 x.cpp -o x && "/Users/devadnani/Desktop/CP/"x
Output:
9 4 5 8 94 3 6 7 90
devadnani@Devs-MacBook-Pro CP %

```

Q2 :

```
#include <iostream>
#include <queue>
using namespace std;

class Node
{
public:
    int data;
    Node *left;
    Node *right;

    Node(int data)
    {
        this->data = data;
        this->left = NULL;

        this->right = NULL;
    }
};

Node *bt(Node *head)
{
    int data;
    cin >> data;

    if (data == -1)
    {
        return NULL;
    }

    head = new Node(data);
    cout << "Enter the data in left of " << data << endl;
    head->left = bt(head->left);
    cout << "Enter the data in right of " << data << endl;
    head->right = bt(head->right);

    return head;
}
```

```

void makeStringTree(Node *root, string &str)
{
    if (root == NULL)
        return;
    str.push_back(root->data + '0');
    if (!root->left && !root->right)
        return;
    str.push_back('(');
    makeStringTree(root->left, str);
    str.push_back(')');
    if (root->right)
    {
        str.push_back('(');
        makeStringTree(root->right, str);
        str.push_back(')');
    }
}

int main()
{
    Node *rt = NULL;
    cout << "Enter -1 to add NULL " << endl;
    cout << "Enter the data: " << endl;
    rt = bt(rt);
    string str = "";
    makeStringTree(rt, str);
    cout << str;
    return 0;
}

```

O/P :

Get StartedC++ x.cpp

51 if (root->right)
52 {
53 str.push_back('(');
54 makeStringTree(root->right, str);
55 str.push_back(')');
56 }
57 }
58
59 int main()
60 {

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

devadnani@Devs-MacBook-Pro CP % cd "/Users/devadnani/Desktop/CP/" && g++ -std=c++11 x.cpp -o x && "/Users/devadnani/Desktop/CP/"x
Enter -1 to add NULL
Enter the data:
1
Enter the data in left of 1
2
Enter the data in left of 2
3
Enter the data in left of 3
-1
Enter the data in right of 3
-1
Enter the data in right of 2
4
Enter the data in left of 4
-1
Enter the data in right of 4
-1
Enter the data in right of 1
5
Enter the data in left of 5
6
Enter the data in left of 6
-1
Enter the data in right of 6
-1
Enter the data in right of 5
7
Enter the data in left of 7
-1
Enter the data in right of 7
-1
1(2(3(4))(5(6)(7)))
devadnani@Devs-MacBook-Pro CP %

Run Testcases 0 0 Select Postgres Server

Ln 69, Col 14 Spaces: 4 UTF-8 LF C++ Mac