DOMAIN WINTER WINNING CAMP

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Branch: BE-CSE **Section/Group: TPP_FL_603-A**

DAY 7:

QUES 1: Find Center of Star Graph

There is an undirected star graph consisting of n nodes labeled from 1 to n. A star graph is a graph where there is one center node and exactly n - 1 edges that connect the center node with every other node.

You are given a 2D integer array edges where each edges[i] = [ui, vi] indicates that there is an edge between the nodes ui and vi. Return the center of the given star graph.

Solution:

```
#include <iostream>
#include <vector>
using namespace std;
class Solution {
public:
    int findCenter(vector<vector<int>>& edges) {
        if (edges[0][0] == edges[1][0] || edges[0][0] == edges[1][1])
            return edges[0][0];
        return edges[0][1];
    }
};
int main() {
    Solution solution;
    vector<vector<int>> edges = {{1, 2}, {2, 3}, {4, 2}};
    cout << "Center of the star graph: " << solution.findCenter(edges) << endl;
    return 0;
```

}

```
Center of the star graph: 2
```

QUES 2: Find the Town Judge

In a town, there are n people labeled from 1 to n. There is a rumor that one of these people is secretly the town judge.

If the town judge exists, then:

1. The town judge trusts nobody.
2. Everybody (except for the town judge) trusts the town judge.
3. There is exactly one person that satisfies properties 1 and 2.

You are given an array trust where trust[i] = [ai, bi] representing that the person labeled ai trusts the person labeled bi. If a trust relationship does not exist in trust array, then such a trust relationship does not exist.

Solution:

```
#include <iostream>
#include <vector>
using namespace std;
class Solution {
public:
    int findJudge(int n, vector<vector<int>>& trust) {
        vector<int> trustScore(n + 1, 0);
        for (auto& t : trust) {
            trustScore[t[0]]--;
            trustScore[t[1]]++;
        }
        for (int i = 1; i <= n; i++) {
            if (trustScore[i] == n - 1) {
                return i; // Judge is trusted by everyone except themselves
```

```
            }
        }
        return -1;
    }
};
int main() {
    Solution solution;
    int n = 2;
    vector<vector<int>> trust = {{1, 2}};
    cout << "Town Judge: " << solution.findJudge(n, trust) << endl;
    return 0;
}
```

```
Town Judge: 2
```

QUES 3: BFS of graph link

Given a connected undirected graph represented by an adjacency list adj, which is a vector of vectors where each adj[i] represents the list of vertices connected to vertex i. Perform a Breadth First Traversal (BFS) starting from vertex 0, visiting vertices from left to right according to the adjacency list, and return a list containing the BFS traversal of the graph.

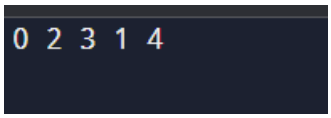
Note: Do traverse in the same order as they are in the adjacency list.

Solution:

```
#include <iostream>
#include <vector>
#include <queue>
using namespace std;
class Solution {
public:
    vector<int> bfsOfGraph(int V, vector<vector<int>>& adj) {
```

```
        vector<int> result;
        vector<bool> visited(V, false);
        queue<int> q;
        q.push(0);
        visited[0] = true;
        while (!q.empty()) {
            int node = q.front();
            q.pop();
            result.push_back(node);
            for (int neighbor : adj[node]) {
                if (!visited[neighbor]) {
                    q.push(neighbor);
                    visited[neighbor] = true;
                }
            }
        }
        return result;
    }
};
int main() {
    Solution solution;
    vector<vector<int>> adj = {{2, 3, 1}, {0}, {0, 4}, {0}, {2}};
    int V = adj.size();
    vector<int> bfsTraversal = solution.bfsOfGraph(V, adj);
    for (int node : bfsTraversal) {
        cout << node << " ";
    }
    cout << endl;
```

```
    return 0;
}
```



QUES 4: DFS of Graph

Given a connected undirected graph represented by an adjacency list adj, which is a vector of vectors where each adj[i] represents the list of vertices connected to vertex i. Perform a Depth First Traversal (DFS) starting from vertex 0, visiting vertices from left to right as per the adjacency list, and return a list containing the DFS traversal of the graph.

Note: Do traverse in the same order as they are in the adjacency list.

Solution:

```
#include <iostream>
#include <vector>
using namespace std;
class Solution {
public:
    void dfs(int node, vector<vector<int>>& adj, vector<bool>& visited, vector<int>& result)
{
        visited[node] = true;
        result.push_back(node);
        for (int neighbor : adj[node]) {
            if (!visited[neighbor]) {
                dfs(neighbor, adj, visited, result);
            }
        }
    }
    vector<int> dfsOfGraph(int V, vector<vector<int>>& adj) {
        vector<int> result;
```

```
        vector<bool> visited(V, false);
        dfs(0, adj, visited, result);
        return result;
    }
};
int main() {
    Solution solution;
    vector<vector<int>> adj = {{2, 3, 1}, {0}, {0, 4}, {0}, {2}};
    int V = adj.size();
    vector<int> dfsTraversal = solution.dfsOfGraph(V, adj);
    for (int node : dfsTraversal) {
        cout << node << " ";
    }
    cout << endl;
    return 0;
}
```

```
0 2 4 3 1
```

QUES 5: Matrix

Given an m x n binary matrix mat, return the distance of the nearest 0 for each cell.

The distance between two adjacent cells is 1.

Solution:

```
#include <iostream>
#include <vector>
#include <queue>
using namespace std;
class Solution {
```

```
public:
    vector<vector<int>> updateMatrix(vector<vector<int>>& mat) {
        int m = mat.size(), n = mat[0].size();
        vector<vector<int>> dist(m, vector<int>(n, -1));
        queue<pair<int, int>> q;
        for (int i = 0; i < m; ++i)
            for (int j = 0; j < n; ++j)
                if (mat[i][j] == 0) {
                    dist[i][j] = 0;
                    q.push({i, j});
                }
        vector<int> directions = {-1, 0, 1, 0, -1};
        while (!q.empty()) {
            auto [x, y] = q.front();
            q.pop();
            for (int i = 0; i < 4; ++i) {
                int newX = x + directions[i], newY = y + directions[i + 1];
                if (newX >= 0 && newX < m && newY >= 0 && newY < n &&
dist[newX][newY] == -1) {
                    dist[newX][newY] = dist[x][y] + 1;
                    q.push({newX, newY});
                }
            }
        }
        return dist;
    }
};
int main() {
    Solution solution;
    vector<vector<int>> mat = {{0, 0, 0}, {0, 1, 0}, {0, 0, 0}};
```

```
    vector<vector<int>> result = solution.updateMatrix(mat);
    for (auto& row : result) {
        for (int cell : row) cout << cell << " ";
        cout << endl;
    }
    return 0;
}
```

```
0 0 0
0 1 0
0 0 0
```