// A union-find algorithm to detect cycle in a graph

#include <bits/stdc++.h>

using namespace std;

 // a structure to represent an edge in graph

class Edge {

public:

    int src, dest;

};

// a structure to represent a graph

class Graph {

public:

    // V-> Number of vertices, E-> Number of edges

    int V, E;

    // graph is represented as an array of edges

    Edge\* edge;

};

// Creates a graph with V vertices and E edges

Graph\* createGraph(int V, int E)

{

    Graph\* graph = new Graph();

    graph->V = V;

    graph->E = E;

     graph->edge = new Edge[graph->E \* sizeof(Edge)];

     return graph;

}

// A utility function to find the subset of an element i

int find(int parent[], int i)

{

    if (parent[i] == i)

        return i;

    return find(parent, parent[i]);

}

 // A utility function to do union of two subsets

void Union(int parent[], int x, int y) { parent[x] = y; }

 // The main function to check whether a given graph contains cycle or not

int isCycle(Graph\* graph)

{

    // Allocate memory for creating V subsets

    int\* parent = new int[graph->V];

    // Initialize all subsets as single element sets

    for(int i = 0; i < graph->V; i++) {

        parent[i] = i;

    }

    // Iterate through all edges of graph, find subset of both vertices of //every edge, if both subsets are same, then there is cycle in graph.

    for (int i = 0; i < graph->E; ++i) {

        int x = find(parent, graph->edge[i].src);

        int y = find(parent, graph->edge[i].dest);

         if (x == y)

            return 1;

         Union(parent, x, y);

    }

    return 0;

}

 int main()

{

    int V = 3, E = 3;

    Graph\* graph = createGraph(V, E);

     // add edge 0-1

    graph->edge[0].src = 0;

    graph->edge[0].dest = 1;

     // add edge 1-2

    graph->edge[1].src = 1;

    graph->edge[1].dest = 2;

     // add edge 0-2

    graph->edge[2].src = 0;

    graph->edge[2].dest = 2;

    if (isCycle(graph))

        cout << "Graph contains cycle";

    else

        cout << "Graph doesn't contain cycle";

     return 0;

}