

Graph Topology

Problem

Submissions

Leaderboard

Given an undirected graph represented by a list of edges, determine whether the graph has a Mesh topology, Ring topology, or is an Incomplete graph.

-> A Mesh topology is a graph in which there is an edge between every pair of vertices (i.e., it is a complete graph).

-> A Ring topology is a graph in which each vertex is connected to exactly two other vertices, forming a single cycle.

-> If the graph is neither a Mesh topology nor a Ring topology, it is considered an Incomplete graph.

The graph is undirected so an edge from u to v is the same as an edge from v to u .

If a graph has n vertices they are named 0 to n . Note that the edges in the test cases can be wrong, repeated or redundant.

Input Format

1. An integer n representing the number of vertices in the graph.
2. An integer m representing the number of edges in the graph.
3. A list of m edges where each edge is a pair (u, v) indicating an edge between vertices u and v .

Constraints

1. $1 \leq n \leq 100$ (number of vertices)
2. $1 \leq m \leq 1000$ (number of edges)
3. $0 \leq u, v$

Output Format

Output "The graph has a Mesh topology." if the graph satisfies the Mesh topology condition.

Output "The graph has a Ring topology." if the graph satisfies the Ring topology condition.

Output "The graph is incomplete." otherwise.

Sample Input 0

```
4
6
0 1
0 2
0 3
1 2
1 3
2 3
```

Sample Output 0

```
The graph has a Mesh topology.
```

Explanation 0

For Node 0, there are edges with Nodes 1, 2, and 3.

For Node 1, there are edges with Nodes 0, 2, and 3.

For Node 2, there are edges with Nodes 0, 1, and 3.

For Node 3, there are edges with Nodes 0, 1, and 2.

This means that there is an edge between every pair of vertices, satisfying the condition of mesh topology.

Sample Input 1

```
4
4
0 1
1 2
2 3
3 0
```

Sample Output 1

The graph has a Ring topology.

Explanation 1

Starting from a node we can reach all the nodes and return back to it so it is ring topology.

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Contest ends in 9 hours

Submissions: 2

Max Score: 10

Difficulty: Medium

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```
1 #include <stdio.h>
2 #include <stdbool.h>
3
4 bool isMeshTopology(int edges[][2], int m, int n);
5 bool isRingTopology(int edges[][2], int m, int n);
6
7 int main() {
8     int n, m;
9
10    scanf("%d", &n);
11    scanf("%d", &m);
12
13    int edges[1000][2]; // array to store edge
14
15    for (int i = 0; i < m; i++) {
16        scanf("%d %d", &edges[i][0], &edges[i][1]);
17    }
18
19    if (isMeshTopology(edges, m, n)) {
20        printf("The graph has a Mesh topology.\n");
21    } else if (isRingTopology(edges, m, n)) {
22        printf("The graph has a Ring topology.\n");
23    } else {
24        printf("The graph is incomplete.\n");
25    }
26
27    return 0;
28 }
29
30 bool isMeshTopology(int edges[][2], int m, int n) {
31     if (m != n * (n - 1) / 2) {
32         return false;
33     }
34
35     int adjMatrix[100][100] = {0};
```

```
36
37   for (int i = 0; i < m; i++) {
38       int u = edges[i][0];
39       int v = edges[i][1];
40       adjMatrix[u][v] = 1;
41       adjMatrix[v][u] = 1;
42   }
43
44   for (int i = 0; i < n; i++) {
45       for (int j = i + 1; j < n; j++) {
46           if (!adjMatrix[i][j]) {
47               return false;
48           }
49       }
50   }
51
52   return true;
53 }
54
55 bool isRingTopology(int edges[][2], int m, int n) {
56     if (m != n) {
57         return false;
58     }
59
60     int degree[100] = {0};
61
62     for (int i = 0; i < m; i++) {
63         int u = edges[i][0];
64         int v = edges[i][1];
65         degree[u]++;
66         degree[v]++;
67     }
68
69     for (int i = 0; i < n; i++) {
70         if (degree[i] != 2) {
71             return false;
72         }
73     }
74
75     return true;
76 }
```

Line: 61 Col: 1

[Upload Code as File](#) ☐ Test against custom input

Run Code

Submit Code

Testcase 0 ✓

Testcase 1 ✓

Congratulations, you passed the sample test case.Click the **Submit Code** button to run your code against all the test cases.

Input (stdin)

```
4
6
0 1
0 2
0 3
1 2
1 3
2 3
```

Your Output (stdout)

```
The graph has a Mesh topology.
```

Expected Output

The graph has a Mesh topology.

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