

Graph.java

```
1  package com.hongchuan.app;
2  // Java program to print DFS traversal from a given given graph
3  import java.io.*;
4  import java.util.*;
5
6  // This class represents a directed graph using adjacency list
7  // representation
8  public class Graph
9  {
10     private int V;    // No. of vertices
11
12     // Array of lists for Adjacency List Representation
13     private LinkedList<Integer> adj[];
14
15     ArrayList<Integer> trace = new ArrayList<Integer>(0);
16     // Constructor
17     public Graph(int v)
18     {
19         V = v;
20         adj = new LinkedList[V];
21 3         for (int i=0; i<v; ++i)
22             adj[i] = new LinkedList();
23     }
24
25     public ArrayList<Integer> getTrace(){
26 1         return trace;
27     }
28     //Function to add an edge into the graph
29     public void addEdge(int v, int w)
30     {
31         adj[v].add(w);    // Add w to v's list.
32     }
33
34     // A function used by DFS
35     public void DFSUtil(int v,boolean visited[])
36     {
37         // Mark the current node as visited and print it
38         visited[v] = true;
39         trace.add(v);
40         // System.out.print(v+" ");
41
42         // Recur for all the vertices adjacent to this vertex
43         Iterator<Integer> i = adj[v].listIterator();
44 1         while (i.hasNext())
```

```

45         {
46             int n = i.next();
47 1             if (!visited[n])
48 1                 DFSUtil(n, visited);
49         }
50     }
51
52     // The function to do DFS traversal. It uses recursive DFSUtil()
53     public void DFS(int v)
54     {
55         // Mark all the vertices as not visited(set as
56         // false by default in java)
57         boolean visited[] = new boolean[V];
58
59         // Call the recursive helper function to print DFS traversal
60 1         DFSUtil(v, visited);
61     }
62
63     // public static void main(String args[])
64     // {
65     //     Graph g = new Graph(4);
66
67     //     g.addEdge(0, 1);
68     //     g.addEdge(0, 2);
69     //     g.addEdge(1, 2);
70     //     g.addEdge(2, 0);
71     //     g.addEdge(2, 3);
72     //     g.addEdge(3, 3);
73
74     //     System.out.println("Following is Depth First Traversal "+
75     //                         "(starting from vertex 2)");
76
77     //     g.DFS(0);
78     //     System.out.println(g.getTrace());
79     // }
80 }
81 // This code is contributed by Aakash Hasija

```

Mutations

- 21 1. changed conditional boundary → KILLED
- 2. Changed increment from 1 to -1 → KILLED
- 3. negated conditional → KILLED
- 26 1. mutated return of Object value for
com/hongchuan/app/Graph::getTrace to (if (x != null) null else throw
new RuntimeException) → KILLED
- 44 1. negated conditional → KILLED
- 47 1. negated conditional → KILLED
- 48 1. removed call to com/hongchuan/app/Graph::DFSUtil → KILLED

[60](#) 1. removed call to com/hongchuan/app/Graph::DFSUtil → KILLED

Active mutators

- INCREMENTS_MUTATOR
- VOID_METHOD_CALL_MUTATOR
- RETURN_VALS_MUTATOR
- MATH_MUTATOR
- NEGATE_CONDITIONALS_MUTATOR
- INVERT_NEGS_MUTATOR
- CONDITIONALS_BOUNDARY_MUTATOR

Tests examined

- com.hongchuan.app.GraphTest.testCase3(com.hongchuan.app.GraphTest) (1 ms)
- com.hongchuan.app.GraphTest.testCase2(com.hongchuan.app.GraphTest) (1 ms)
- com.hongchuan.app.GraphTest.testCase1(com.hongchuan.app.GraphTest) (7 ms)

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