

Tarjan.java

```
1 import java.util.*;
2
3 class Tarjan {
4     /** number of vertices */
5     private int V;
6     /** preorder number counter */
7     private int preCount;
8     /** low number of v */
9     private int[] low;
10    /** to check if v is visited */
11    private boolean[] visited;
12    /** to store given graph */
13    private List<Integer>[] graph;
14    /** to store all scc */
15    private List<List<Integer>> sccComp;
16    private Stack<Integer> stack;
17
18    /** function to get all strongly connected components */
19    public List<List<Integer>> getSCComponents(List<Integer>[]
graph) {
20        V = graph.length;
21        this.graph = graph;
22        low = new int[V];
23        visited = new boolean[V];
24        stack = new Stack<Integer>();
25        sccComp = new ArrayList<>();
26
27        for (int v = 0; v < V; v++)
28            if (!visited[v])
29                dfs(v);
30        return sccComp;
31    }
32
33    public void dfs(int v) {
34        low[v] = preCount++;
35        visited[v] = true;
36        stack.push(v);
37        int min = low[v];
38        for (int w : graph[v]) {
39            if (!visited[w])
40                dfs(w);
```

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41         if (low[w] < min)
42             min = low[w];
43     }
44     if (min < low[v]) {
45         low[v] = min;
46         return;
47     }
48     List<Integer> component = new ArrayList<Integer>();
49     int w;
50     do {
51         w = stack.pop();
52         component.add(w);
53         low[w] = V;
54     } while (w != v);
55     sccComp.add(component);
56 }
57
58 public static void main(String[] args) {
59     Scanner scan = new Scanner(System.in);
60     System.out.println("Tarjan algorithm Test\n");
61     System.out.println("Enter number of Vertices");
62     int V = scan.nextInt();
63     List<Integer>[] g = new List[V];
64     for (int i = 0; i < V; i++)
65         g[i] = new ArrayList<Integer>();
66
67     /** accept all edges */
68     System.out.println("\nEnter number of edges");
69     int E = scan.nextInt();
70     System.out.println("Enter " + E + " x, y coordinates");
71     for (int i = 0; i < E; i++) {
72         int x = scan.nextInt();
73         int y = scan.nextInt();
74         g[x].add(y);
75     }
76     Tarjan t = new Tarjan();
77     System.out.println("\nSCC : ");
78     List<List<Integer>> scComponents = t.getSCComponents(g);
79     System.out.println(scComponents);
80 }
81 }
```