

PromptScratchpadOur Solution(s)Video Explanation

Run Code

Solution 1Solution 2

```
4
5  class Program {
6      // O(j + d) time | O(j + d) space
7      public static List<Integer> topologicalSort(List<Integer> jobs, List<Integer[]> deps) {
8          JobGraph jobGraph = createJobGraph(jobs, deps);
9          return getOrderedJobs(jobGraph);
10     }
11
12     public static JobGraph createJobGraph(List<Integer> jobs, List<Integer[]> deps) {
13         JobGraph graph = new JobGraph(jobs);
14         for (Integer[] dep : deps) {
15             graph.addPrereq(dep[1], dep[0]);
16         }
17         return graph;
18     }
19
20     public static List<Integer> getOrderedJobs(JobGraph graph) {
21         List<Integer> orderedJobs = new ArrayList<Integer>();
22         List<JobNode> nodes = new ArrayList<JobNode>(graph.nodes);
23         while (nodes.size() > 0) {
24             JobNode node = nodes.get(nodes.size() - 1);
25             nodes.remove(nodes.size() - 1);
26             boolean containsCycle = depthFirstTraverse(node, orderedJobs);
27             if (containsCycle) return new ArrayList<Integer>();
28         }
29         return orderedJobs;
30     }
31
32     public static boolean depthFirstTraverse(JobNode node, List<Integer> orderedJobs) {
33         if (node.visited) return false;
34         if (node.visiting) return true;
35         node.visiting = true;
36         for (JobNode prereqNode : node.prereqs) {
37             boolean containsCycle = depthFirstTraverse(prereqNode, orderedJobs);
38             if (containsCycle) return true;
39         }
40         node.visited = true;
41         node.visiting = false;
42         orderedJobs.add(node.job);
43         return false;
44     }
45
46     static class JobGraph {
47         public List<JobNode> nodes;
48         public Map<Integer, JobNode> graph;
49
50         public JobGraph(List<Integer> jobs) {
51             nodes = new ArrayList<JobNode>();
52             graph = new HashMap<Integer, JobNode>();
53             for (Integer job : jobs) {
54                 addNode(job);
55             }
56         }
57
58         public void addPrereq(Integer job, Integer prereq) {
59             JobNode jobNode = getNode(job);
60             JobNode prereqNode = getNode(prereq);
61             jobNode.prereqs.add(prereqNode);
62         }
63
64         public void addNode(Integer job) {
65             graph.put(job, new JobNode(job));
66             nodes.add(graph.get(job));
67         }
68
69         public JobNode getNode(Integer job) {
70             if (!graph.containsKey(job)) addNode(job);
71             return graph.get(job);
72         }
73     }
74
75     static class JobNode {
76         public Integer job;
77         public List<JobNode> prereqs;
78         public boolean visited;
79         public boolean visiting;
80
81         public JobNode(Integer job) {
82             this.job = job;
83             prereqs = new ArrayList<JobNode>();
84             visited = false;
85             visiting = false;
86         }
87     }
88 }
89
```