

PromptScratchpadOur Solution(s)Video Explanation

Run Code

Solution 1Solution 2

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 package main
4
5 type Dep struct {
6     Prereq int
7     Job    int
8 }
9
10 // O(j + d) time | O(j + d) space
11 func TopologicalSort(jobs []int, deps []Dep) []int {
12     jobGraph := createJobGraph(jobs, deps)
13     return getOrderedJobs(jobGraph)
14 }
15
16 func createJobGraph(jobs []int, deps []Dep) *JobGraph {
17     graph := NewJobGraph(jobs)
18     for _, dep := range deps {
19         graph.AddPrereq(dep.Job, dep.Prereq)
20     }
21     return graph
22 }
23
24 func getOrderedJobs(graph *JobGraph) []int {
25     orderedJobs := []int{}
26     nodes := graph.Nodes
27     for len(nodes) != 0 {
28         node := nodes[len(nodes)-1]
29         nodes = nodes[:len(nodes)-1]
30         containsCycle := depthFirstTraverse(node, &orderedJobs)
31         if containsCycle {
32             return []int{}
33         }
34     }
35     return orderedJobs
36 }
37
38 func depthFirstTraverse(node *JobNode, orderedJobs *[]int) bool {
39     if node.Visited {
40         return false
41     } else if node.Visiting {
42         return true
43     }
44     node.Visiting = true
45     for _, prereqNode := range node.Prereqs {
46         containsCycle := depthFirstTraverse(prereqNode, orderedJobs)
47         if containsCycle {
48             return true
49         }
50     }
51     node.Visited = true
52     node.Visiting = false
53     *orderedJobs = append(*orderedJobs, node.Job)
54     return false
55 }
56
57 type JobGraph struct {
58     Nodes []*JobNode
59     Graph map[int]*JobNode
60 }
61
62 func NewJobGraph(jobs []int) *JobGraph {
63     g := &JobGraph{
64         Graph: map[int]*JobNode{},
65     }
66     for _, job := range jobs {
67         g.AddNode(job)
68     }
69     return g
70 }
71
72 func (g *JobGraph) AddPrereq(job, prereq int) {
73     jobNode := g.GetNode(job)
74     prereqNode := g.GetNode(prereq)
75     jobNode.Prereqs = append(jobNode.Prereqs, prereqNode)
76 }
77
78 func (g *JobGraph) AddNode(job int) {
79     g.Graph[job] = &JobNode{Job: job}
80     g.Nodes = append(g.Nodes, g.Graph[job])
81 }
82
83 func (g *JobGraph) GetNode(job int) *JobNode {
84     if _, found := g.Graph[job]; !found {
85         g.AddNode(job)
86     }
```