

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.AddDep(dep.Prereq, dep.Job)
20     }
21     return graph
22 }
23
24 func getOrderedJobs(graph *JobGraph) []int {
25     orderedJobs := []int{}
26     nodesWithNoPrereqs := []*JobNode{}
27     for _, node := range graph.Nodes {
28         if node.NumOfPrereqs == 0 {
29             nodesWithNoPrereqs = append(nodesWithNoPrereqs, node)
30         }
31     }
32     for len(nodesWithNoPrereqs) > 0 {
33         node := nodesWithNoPrereqs[len(nodesWithNoPrereqs)-1]
34         nodesWithNoPrereqs = nodesWithNoPrereqs[:len(nodesWithNoPrereqs)-1]
35         orderedJobs = append(orderedJobs, node.Job)
36         removeDeps(node, &nodesWithNoPrereqs)
37     }
38     for _, node := range graph.Nodes {
39         if node.NumOfPrereqs > 0 {
40             return []int{}
41         }
42     }
43     return orderedJobs
44 }
45
46 func removeDeps(node *JobNode, nodesWithNoPrereqs []*JobNode) {
47     for len(node.Deps) > 0 {
48         dep := node.Deps[len(node.Deps)-1]
49         node.Deps = node.Deps[:len(node.Deps)-1]
50         dep.NumOfPrereqs--
51         if dep.NumOfPrereqs == 0 {
52             *nodesWithNoPrereqs = append(*nodesWithNoPrereqs, dep)
53         }
54     }
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) AddDep(job, dep int) {
73     jobNode, depNode := g.GetNode(job), g.GetNode(dep)
74     jobNode.Deps = append(jobNode.Deps, depNode)
75     depNode.NumOfPrereqs++
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     }
```