

PromptScratchpadOur Solution(s)Video Explanation

Run Code

Solution 1Solution 2

```
13     }
14 }
15
16 class JobGraph {
17     var nodes: [JobNode]
18     var graph: [Int: JobNode]
19
20     init(jobs: [Int]) {
21         nodes = [JobNode]()
22         graph = [Int: JobNode]()
23         for job in jobs {
24             addNode(job: job)
25         }
26     }
27
28     func addNode(job: Int) {
29         let jobNode = JobNode(job: job)
30
31         nodes.append(jobNode)
32         graph[job] = jobNode
33     }
34
35     func addDependencyToJob(job: Int, dependency: Int) {
36         let jobNode = getNode(job: job)
37         let dependencyNode = getNode(job: dependency)
38         jobNode.dependencies.append(dependencyNode)
39         dependencyNode.numberOfPrerequisites += 1
40     }
41
42     func getNode(job: Int) -> JobNode {
43         if let node = graph[job] {
44             return node
45         } else {
46             graph[job] = JobNode(job: job)
47             return graph[job]!
48         }
49     }
50 }
51
52 // O(j + d) time | O(j + d) space
53 func topologicalSort(jobs: [Int], dependencies: [[Int]]) -> [Int] {
54     let jobGraph = createJobGraph(jobs: jobs, dependencies: dependencies)
55     return getOrderedJobs(jobGraph: jobGraph)
56 }
57
58 func createJobGraph(jobs: [Int], dependencies: [[Int]]) -> JobGraph {
59     let jobGraph = JobGraph(jobs: jobs)
60
61     for dependency in dependencies {
62         let job = dependency[0]
63         let dep = dependency[1]
64         jobGraph.addDependencyToJob(job: job, dependency: dep)
65     }
66
67     return jobGraph
68 }
69
70 func getOrderedJobs(jobGraph: JobGraph) -> [Int] {
71     var orderedJobs = [Int]()
72     var nodesWithNoPrerequisites = jobGraph.nodes.filter { $0.numberOfPrerequisites == 0 }
73
74     while nodesWithNoPrerequisites.count > 0 {
75         if let jobNode = nodesWithNoPrerequisites.popLast() {
76             orderedJobs.append(jobNode.job)
77             removeDependencies(jobNode: jobNode, nodesWithNoPrerequisites: &nodesWithNoPrerequisites)
78         }
79     }
80
81     let graphHasEdges = jobGraph.nodes.filter { $0.numberOfPrerequisites > 0 }.count > 0
82
83     return graphHasEdges ? [] : orderedJobs
84 }
85
86 func removeDependencies(jobNode: JobNode, nodesWithNoPrerequisites: inout [JobNode]) {
87     while jobNode.dependencies.count > 0 {
88         if let dependency = jobNode.dependencies.popLast() {
89             dependency.numberOfPrerequisites -= 1
90
91             if dependency.numberOfPrerequisites == 0 {
92                 nodesWithNoPrerequisites.append(dependency)
93             }
94         }
95     }
96 }
97 }
98 }
```