

PromptScratchpadOur Solution(s)Video ExplanationRun Code

Solution 1Solution 2

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1  # Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3  # O(j + d) time | O(j + d) space
4  def topologicalSort(jobs, deps):
5      jobGraph = createJobGraph(jobs, deps)
6      return getOrderedJobs(jobGraph)
7
8
9  def createJobGraph(jobs, deps):
10     graph = JobGraph(jobs)
11     for job, dep in deps:
12         graph.addDep(job, dep)
13     return graph
14
15
16  def getOrderedJobs(graph):
17     orderedJobs = []
18     nodesWithNoPrereqs = list(filter(lambda node: node.numOfPrereqs == 0, graph.nodes))
19     while len(nodesWithNoPrereqs):
20         node = nodesWithNoPrereqs.pop()
21         orderedJobs.append(node.job)
22         removeDeps(node, nodesWithNoPrereqs)
23     graphHasEdges = any(node.numOfPrereqs for node in graph.nodes)
24     return [] if graphHasEdges else orderedJobs
25
26
27  def removeDeps(node, nodesWithNoPrereqs):
28     while len(node.deps):
29         dep = node.deps.pop()
30         dep.numOfPrereqs -= 1
31         if dep.numOfPrereqs == 0:
32             nodesWithNoPrereqs.append(dep)
33
34
35  class JobGraph:
36     def __init__(self, jobs):
37         self.nodes = []
38         self.graph = {}
39         for job in jobs:
40             self.addNode(job)
41
42     def addDep(self, job, dep):
43         jobNode = self.getNode(job)
44         depNode = self.getNode(dep)
45         jobNode.deps.append(depNode)
46         depNode.numOfPrereqs += 1
47
48     def addNode(self, job):
49         self.graph[job] = JobNode(job)
50         self.nodes.append(self.graph[job])
51
52     def getNode(self, job):
53         if job not in self.graph:
54             self.addNode(job)
55         return self.graph[job]
56
57
58  class JobNode:
59     def __init__(self, job):
60         self.job = job
61         self.deps = []
62         self.numOfPrereqs = 0
63
```