E-LeetCoding: Graphs Session

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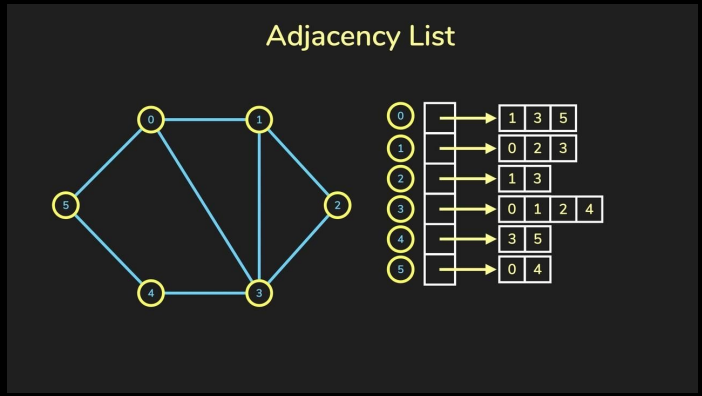
How are graphs stored?

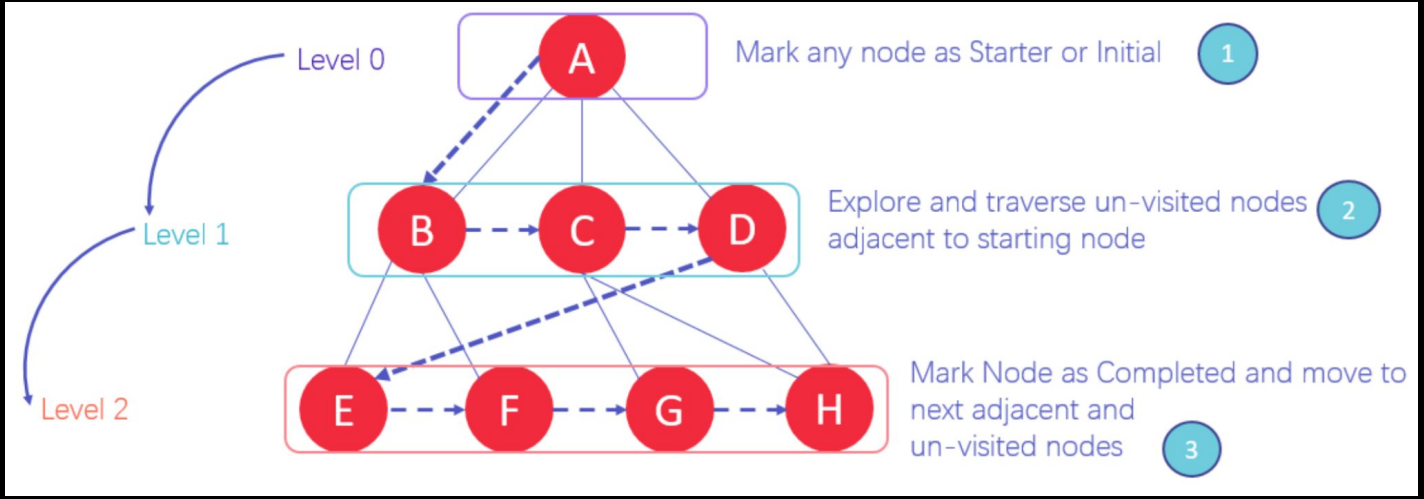
Adjacency List

- Implemented as dictionary or hash map with the key being a vertex and the value being a set/list of the vertex's neighbours



What is Breadth First Search (BFS)

- Start at a vertex and travel as far out the path as you can, then visit the next level once all nodes at this level have been explored
- Keep track of the children we've discovered but not yet explored
  - Usually using a queue



BFS Recursion Pseudocode

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Typical function signature looks like this:

bfs(current vertex, adjacency list, visited vertices)

Pseudocode:

1. Add current vertex to visited vertices
2. Add the neighbours of the current vertex (using adjacency list) to a queue
3. Visit all the other vertices at that level (these vertices are at the front of our queue)
    a. pop from queue once this node has been explored

We repeat steps 2 and 3 (adding to the queue and popping from the queue) until our queue is empty -- this means we have explored all the vertices in the graph

Problem Statement

Course Schedule: https://leetcode.com/problems/course-schedule/

- There are a total of numCourses courses you have to take, labeled from 0 to numCourses - 1.
- You are given an array prerequisites where prerequisites[i] = [ai, bi] indicates that you must take course bi first if you want to take course ai
- For example, the pair [0, 1], indicates that to take course 0 you have to first take course 1
- Can you take all courses?
- How do we make this a graph question?

Let’s Implement!

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