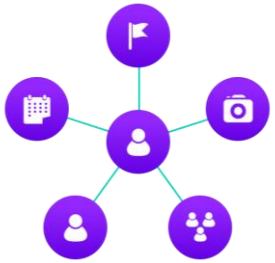
TODO BEFORE

To Read Before #ToBeReady

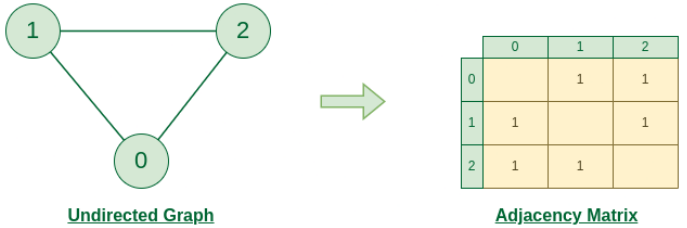
https://github.com/aish21/Algorithms-and-Data-Structures

Great doc covering All ADTS

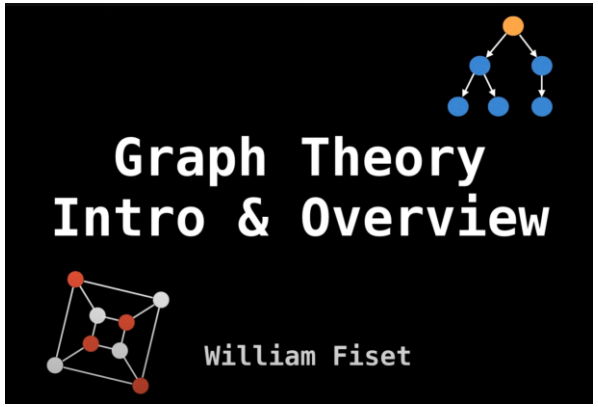
✓ Graph Data Structure



✓ Graph and its representations

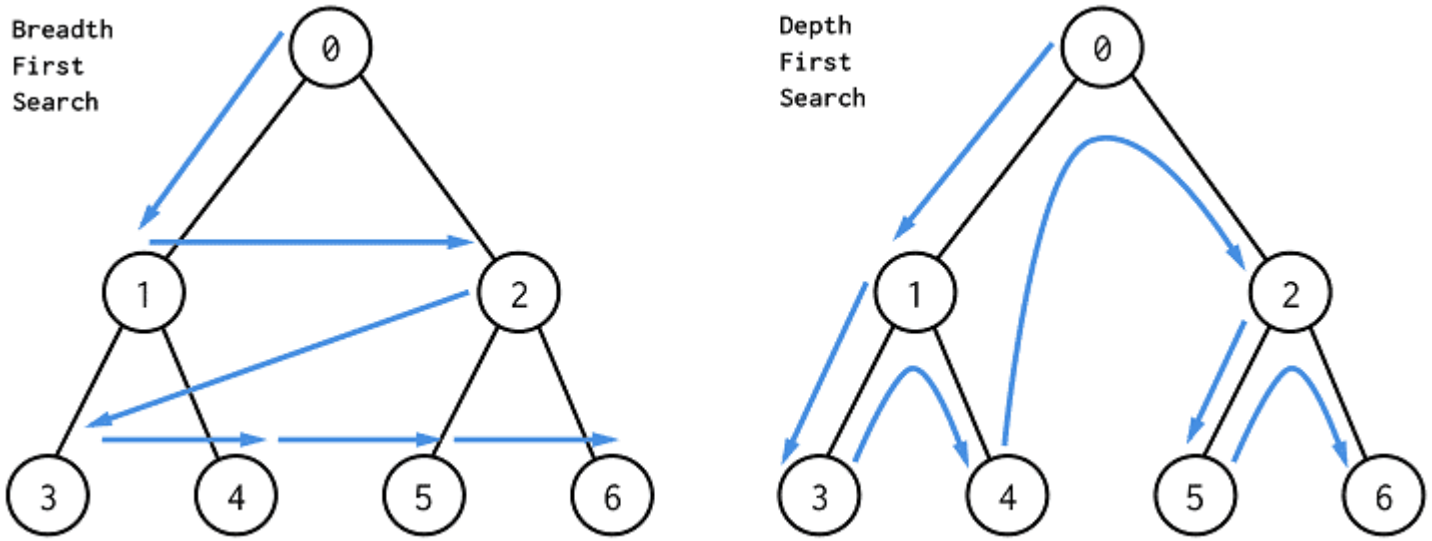


✓ Graph Theory Introduction



ADVANCED ALGORITHM

W10-S2 – Graph Traversal Algorithm



CADT IDT

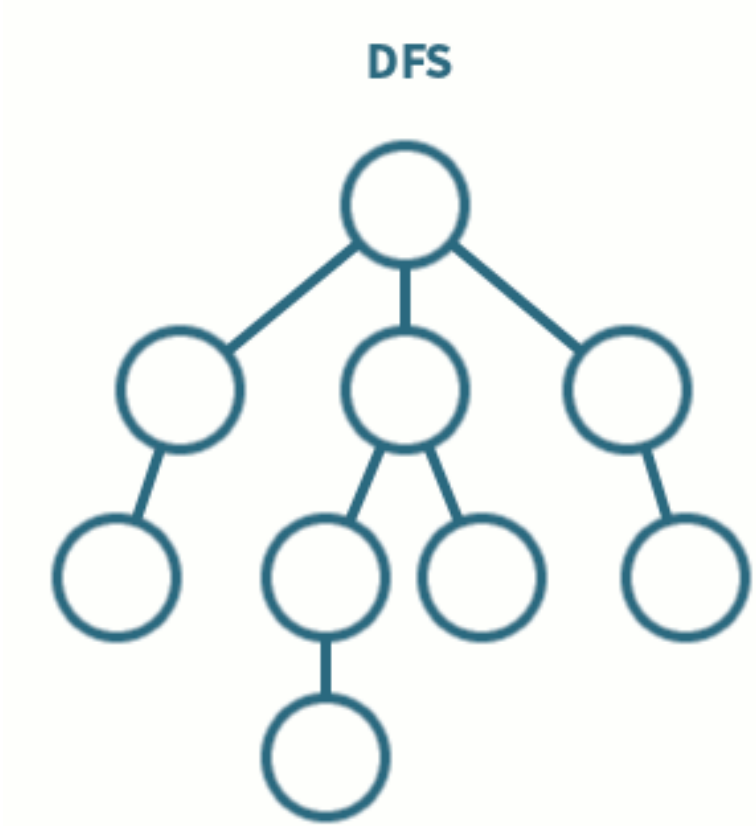
Objectives for today

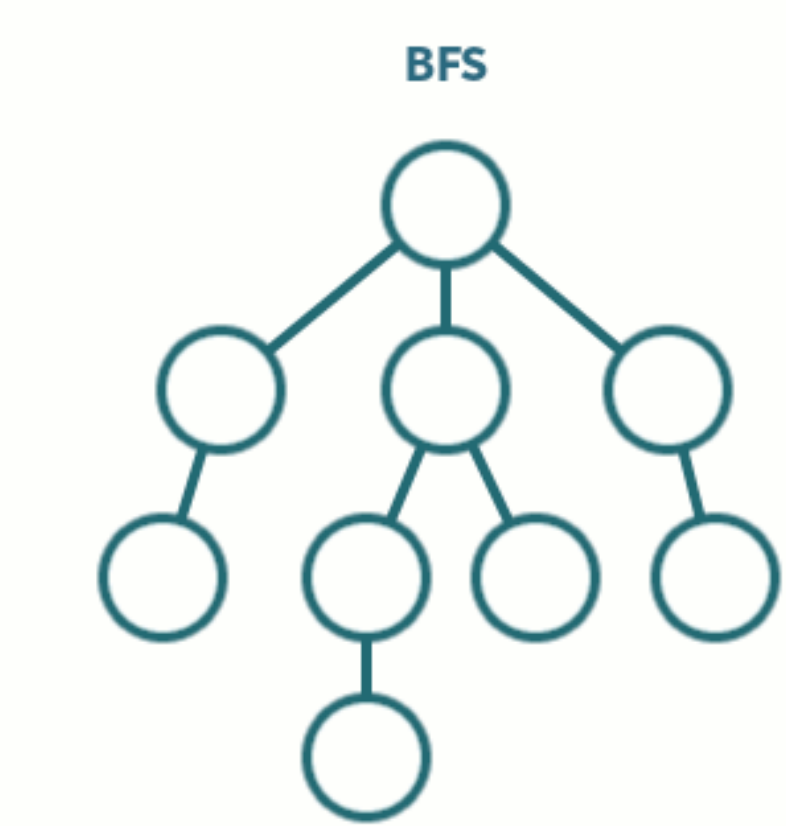
- **Understand** the purpose of graph traversal algorithms.
- **Learn** the step-by-step process of BFS and DFS
- **Explore** practical applications of each algorithm

EXPLAIN

Graph **Traversal**

Visiting all nodes in a **graph** systematically.

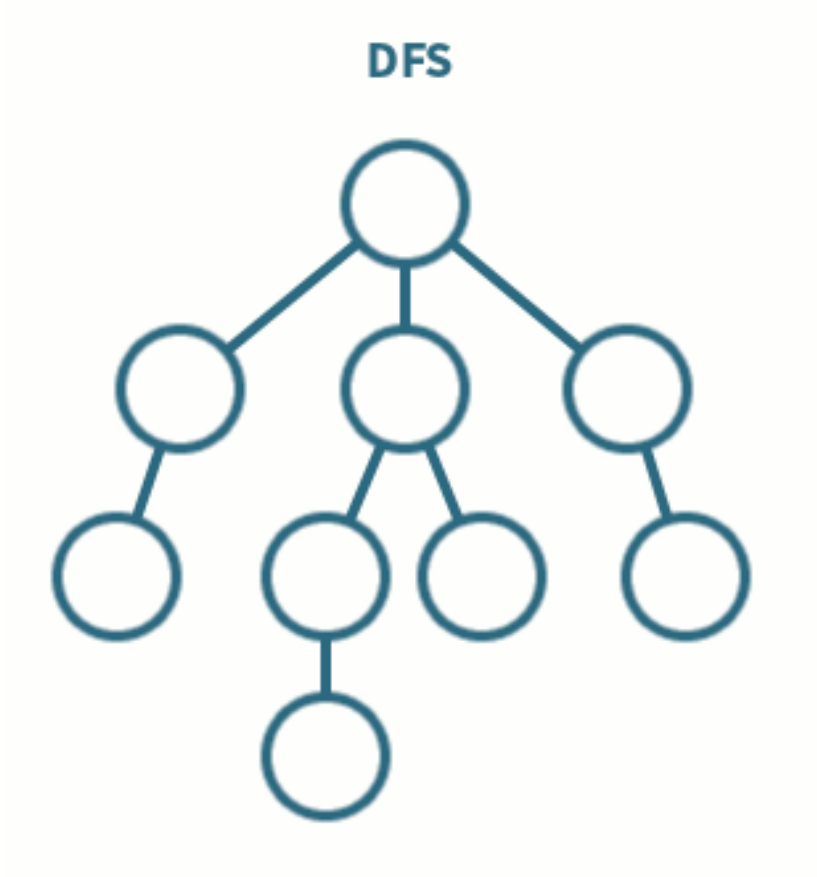




EXPLAIN

Depth-First Search (**DFS**)

Traverse as far as possible along a branch before backtracking.

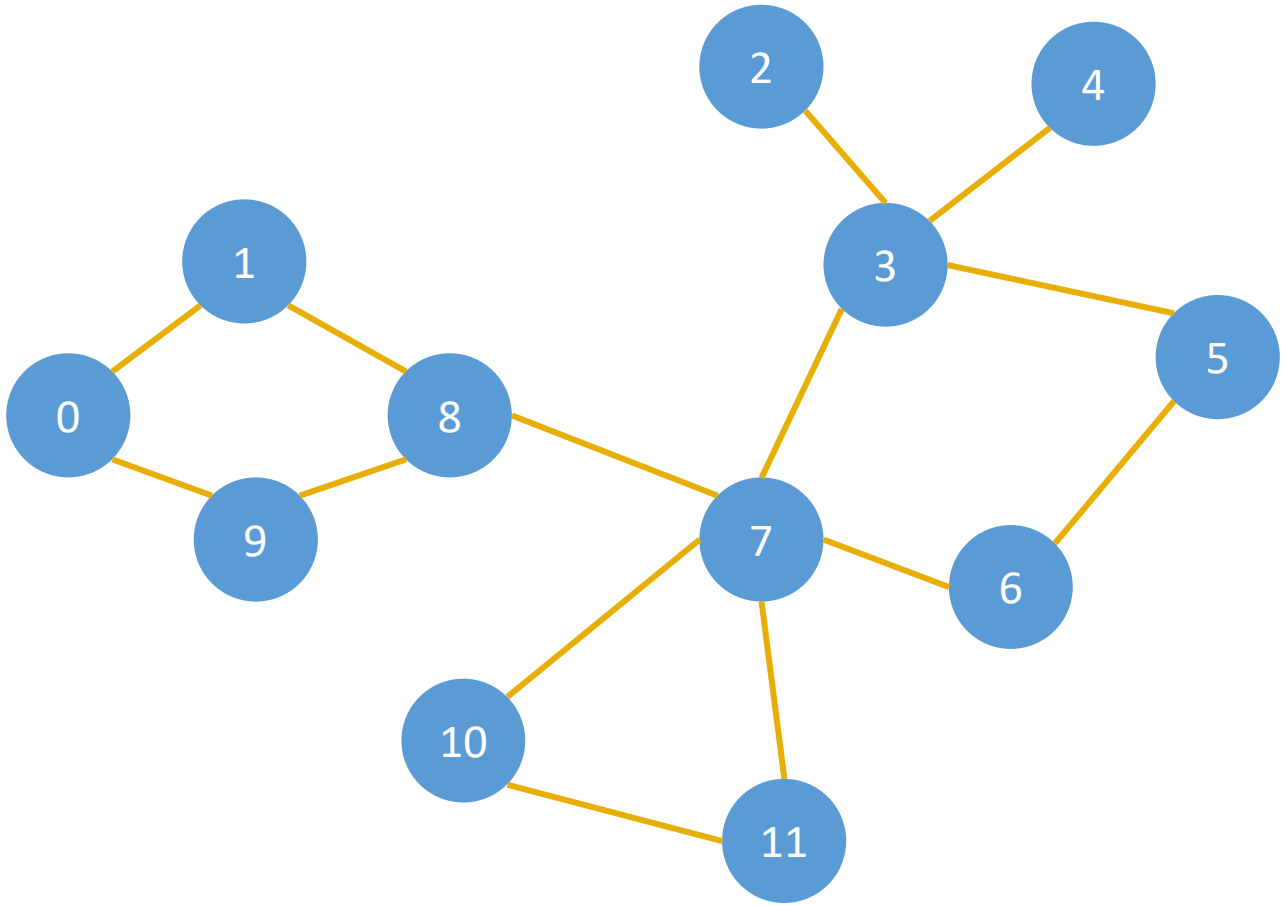


DFS Algorithm

1.Initialize a stack and mark the starting node as visited.
2.Push the starting node onto the stack.
3.While the stack is not empty:
    1. Pop a node from the stack.
    2. Visit all its unvisited neighbors, mark them as visited, and push them onto the stack.

EXPLAIN

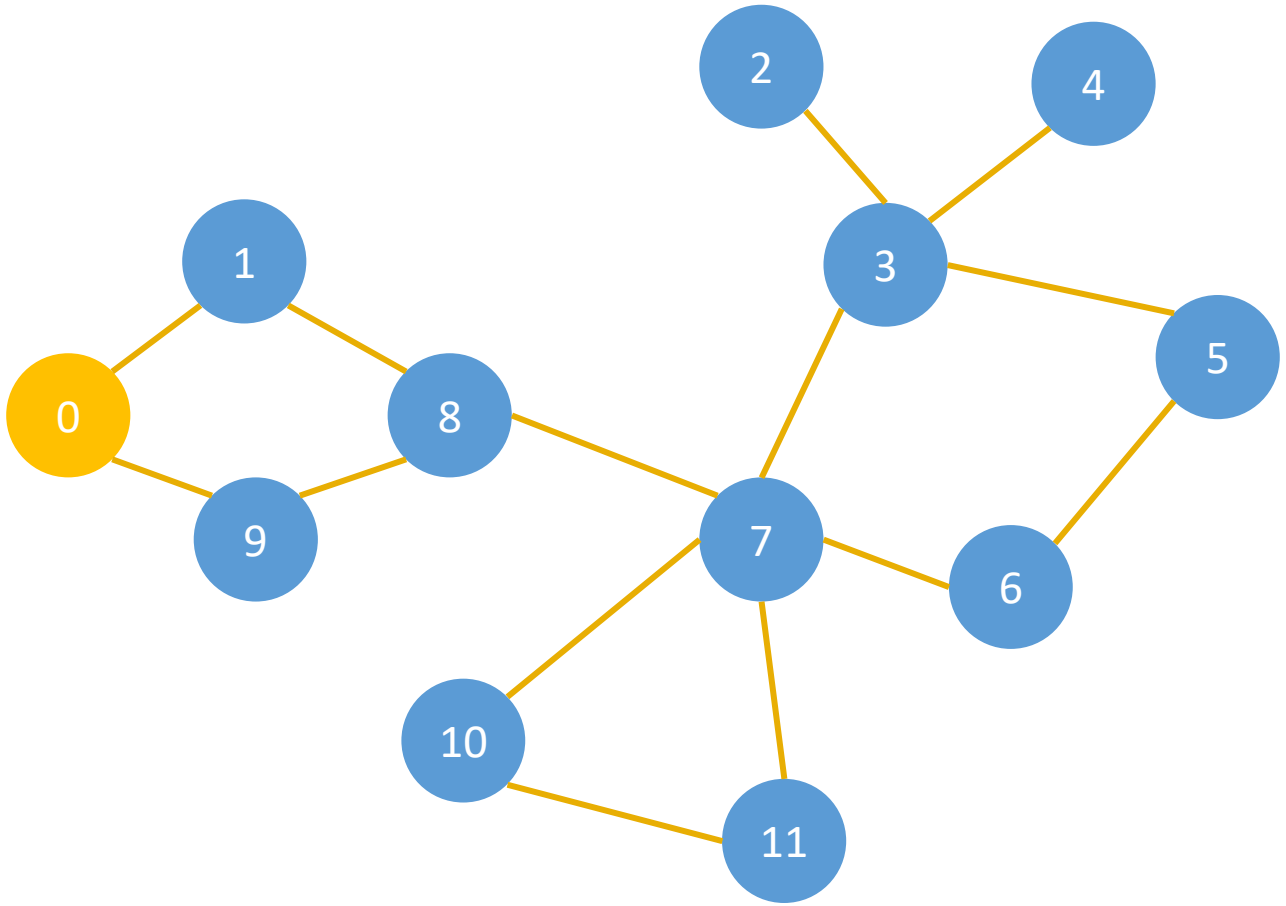
Depth-First Search (**DFS**)



EXPLAIN

Depth-First Search (**DFS**)

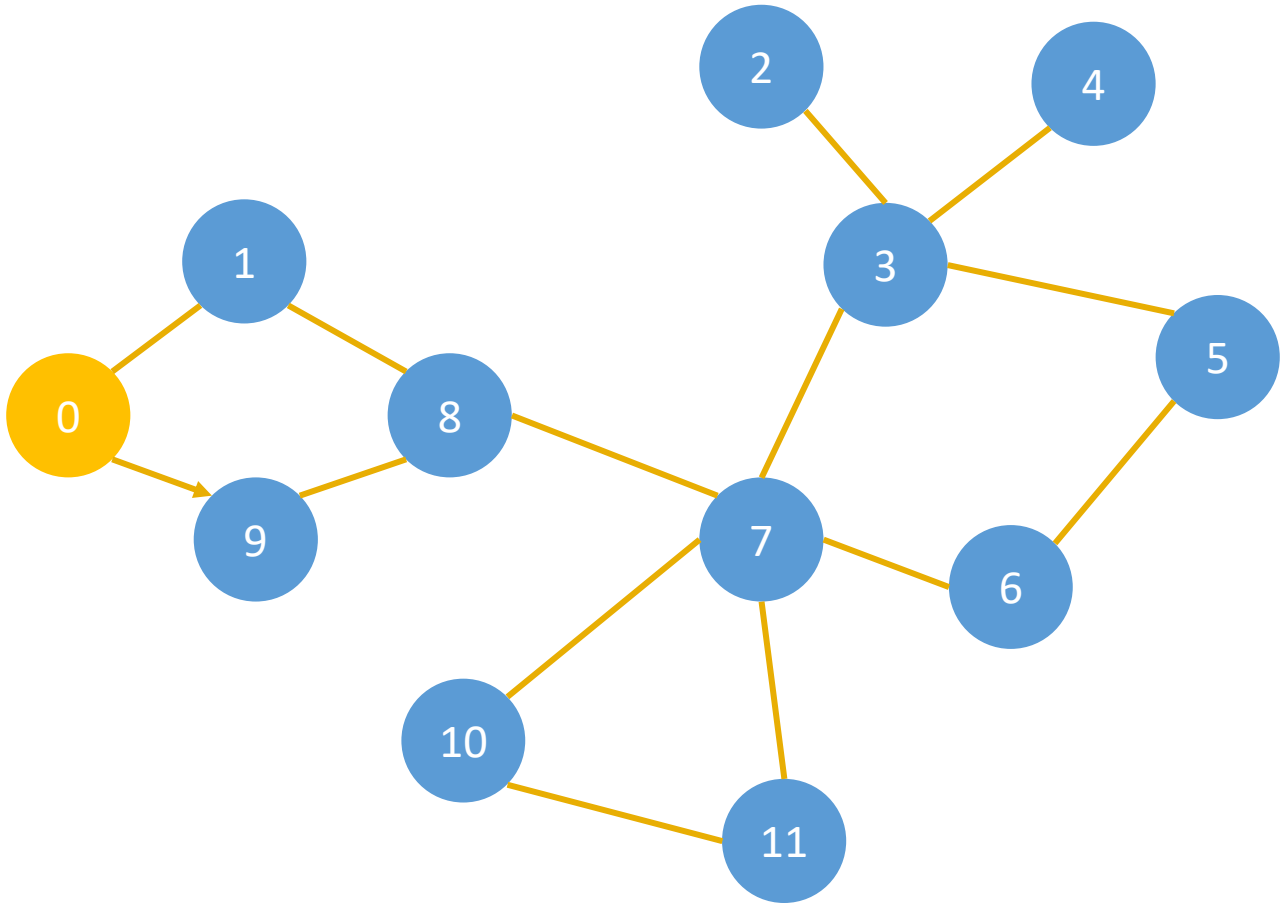
Start DFS at node 0



EXPLAIN

Depth-First Search (**DFS**)

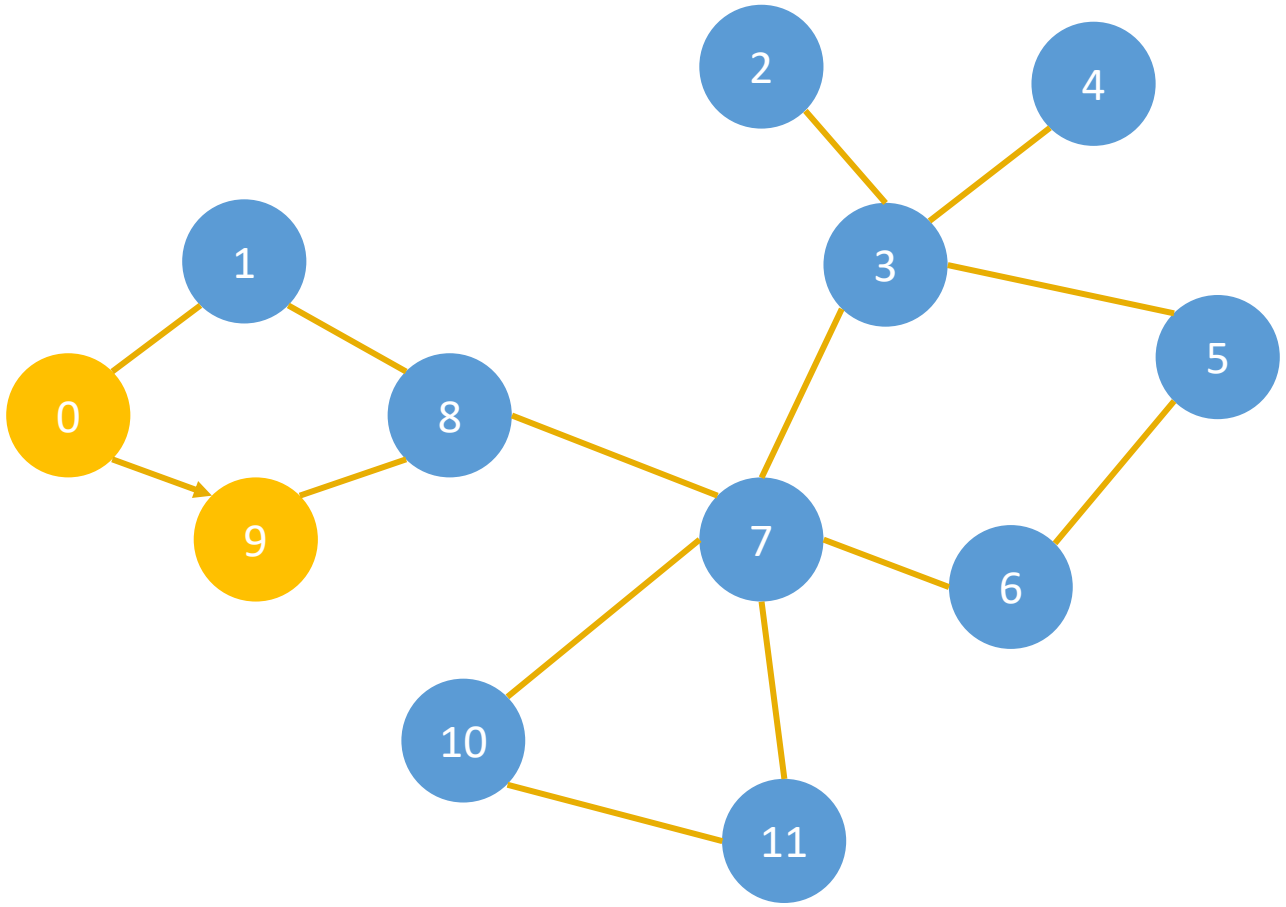
Pick an edge outwards from node 0



EXPLAIN

Depth-First Search (**DFS**)

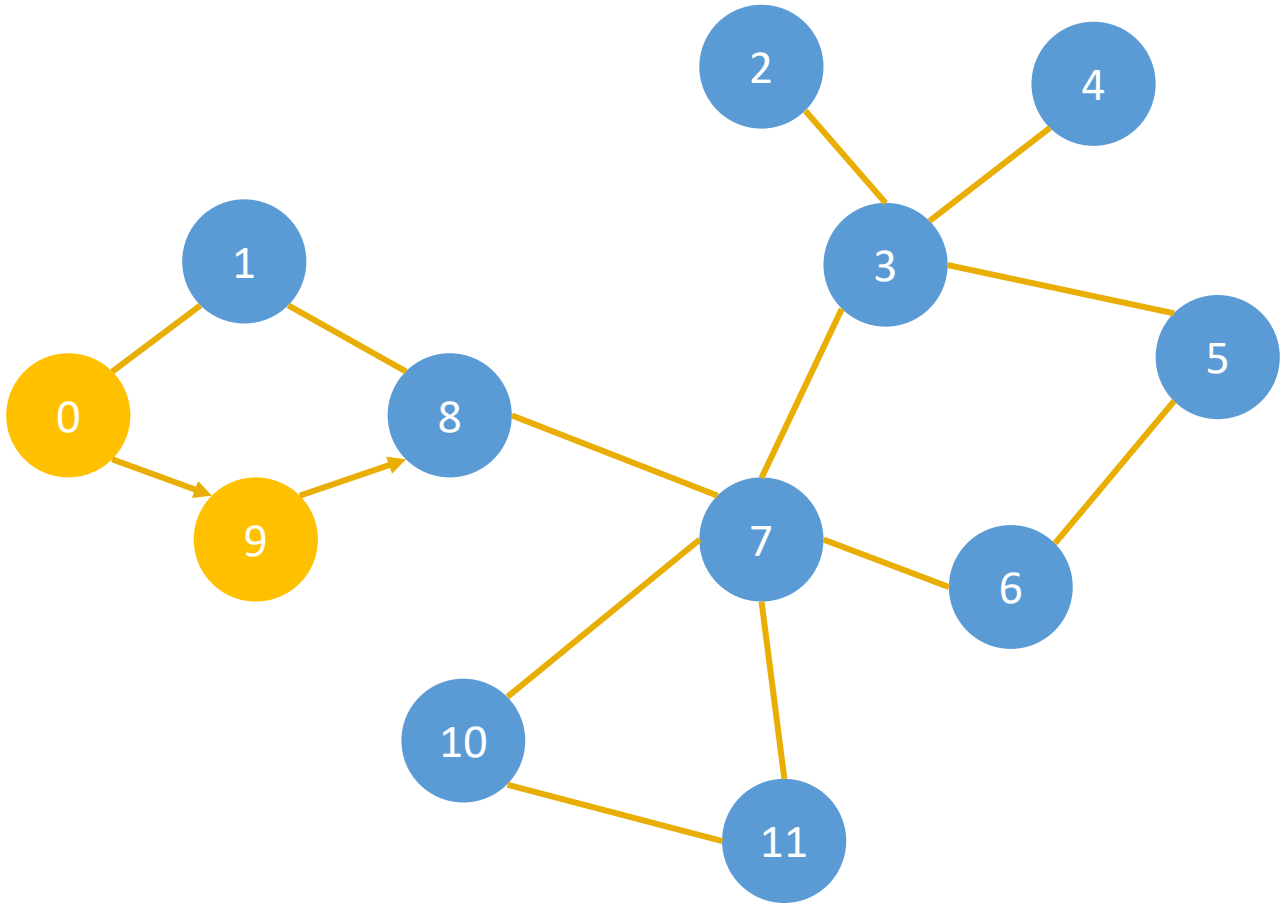
Once at 9 pick an edge outwards from node 9



EXPLAIN

Depth-First Search (**DFS**)

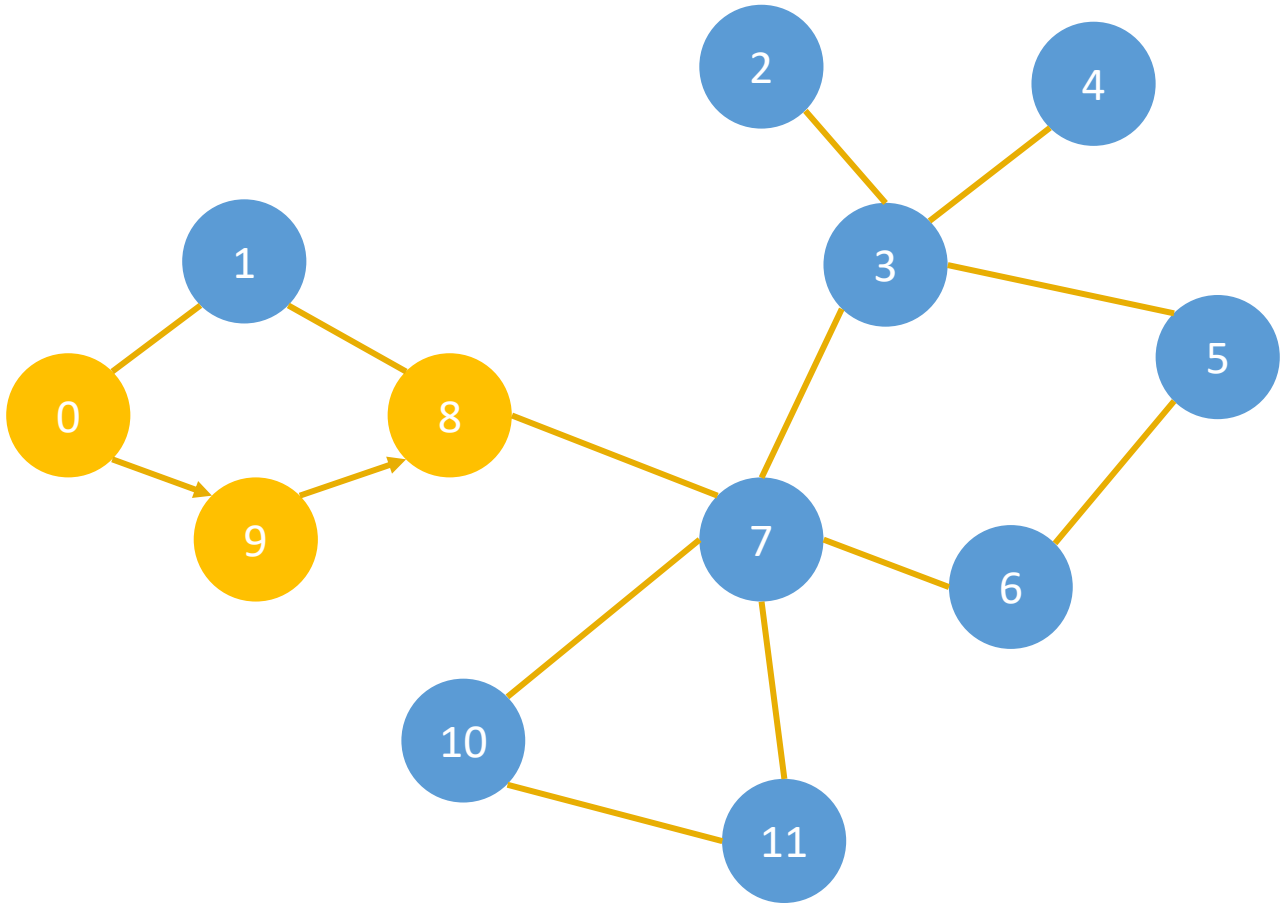
Go to node 8



EXPLAIN

Depth-First Search (**DFS**)

Pick an edge outwards from 8…



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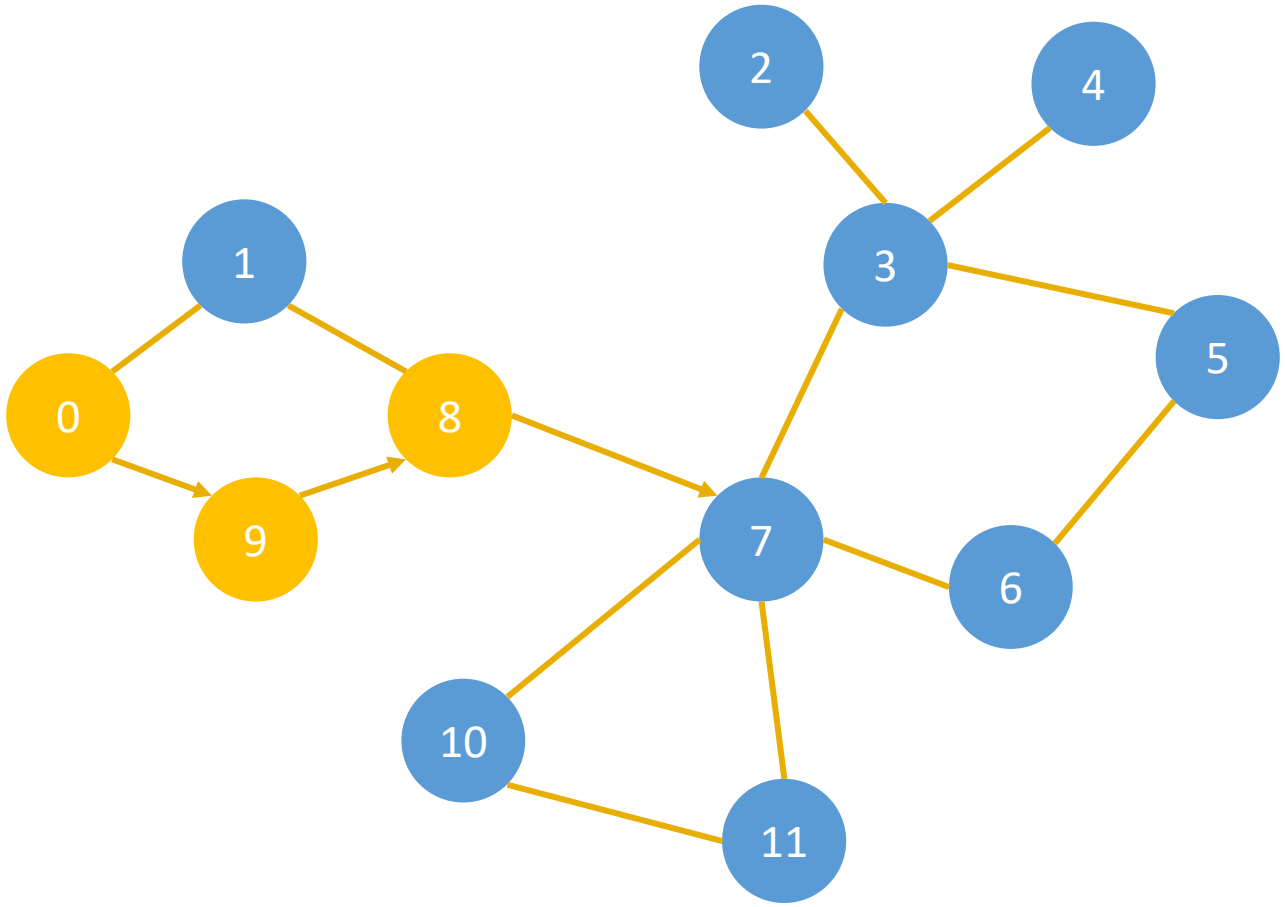

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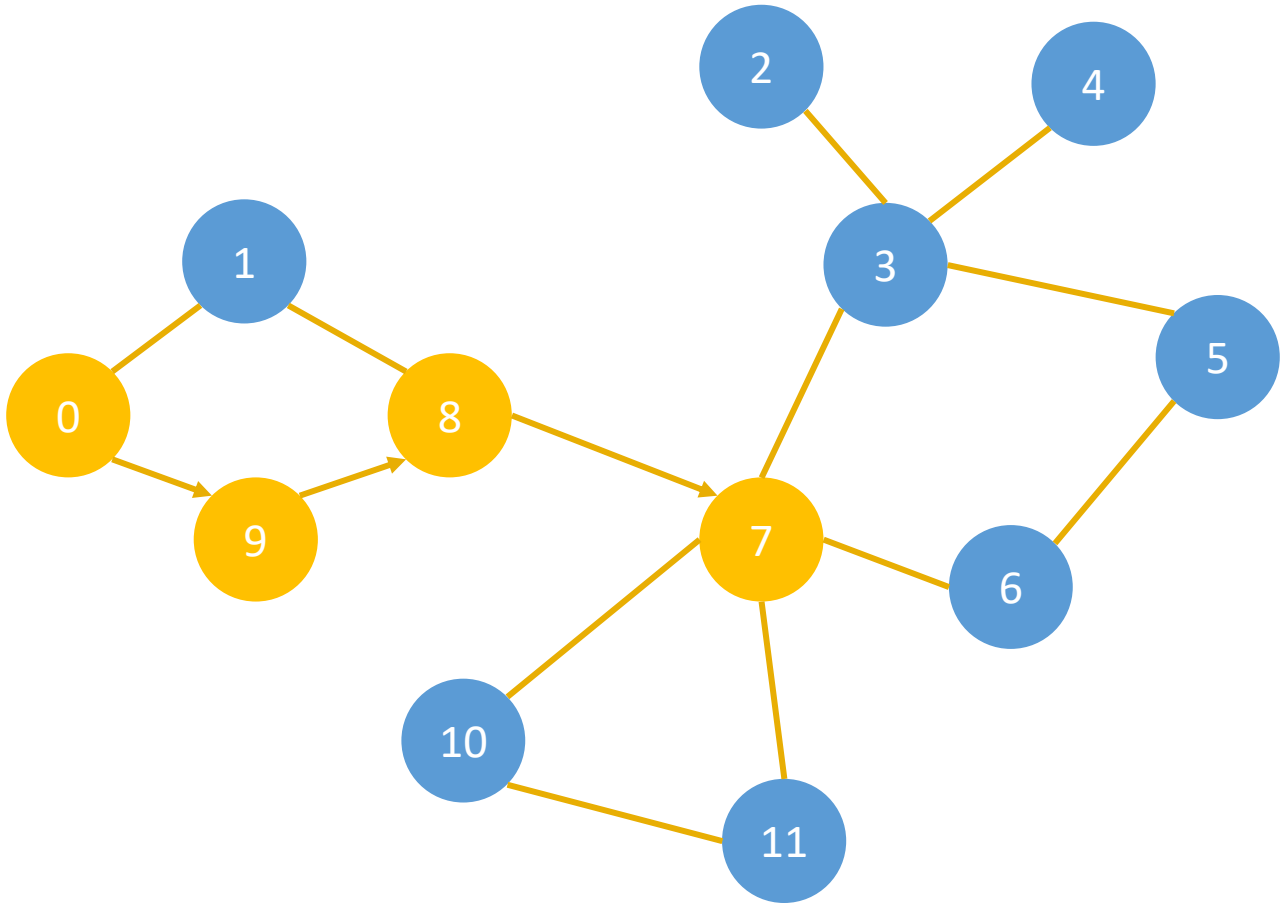

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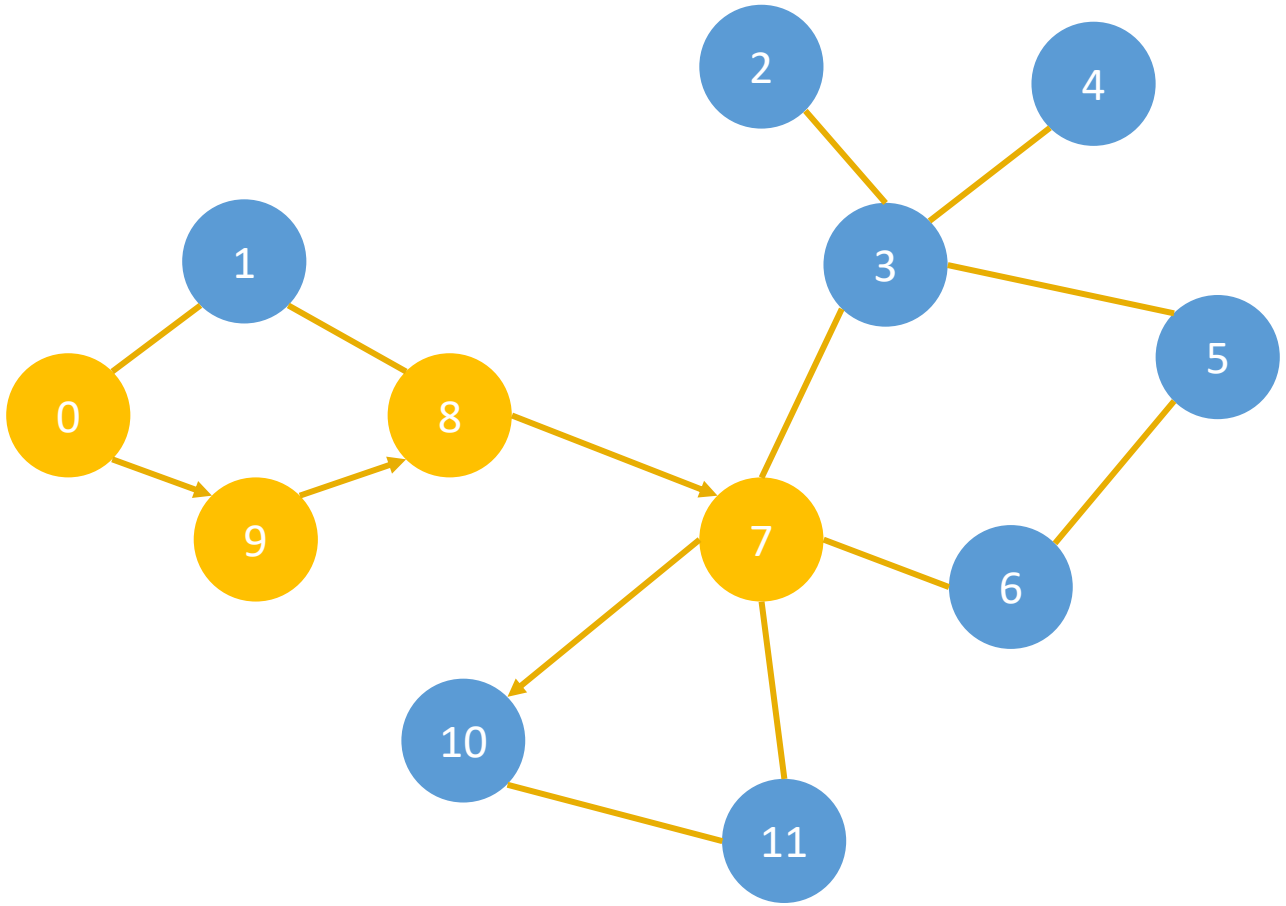

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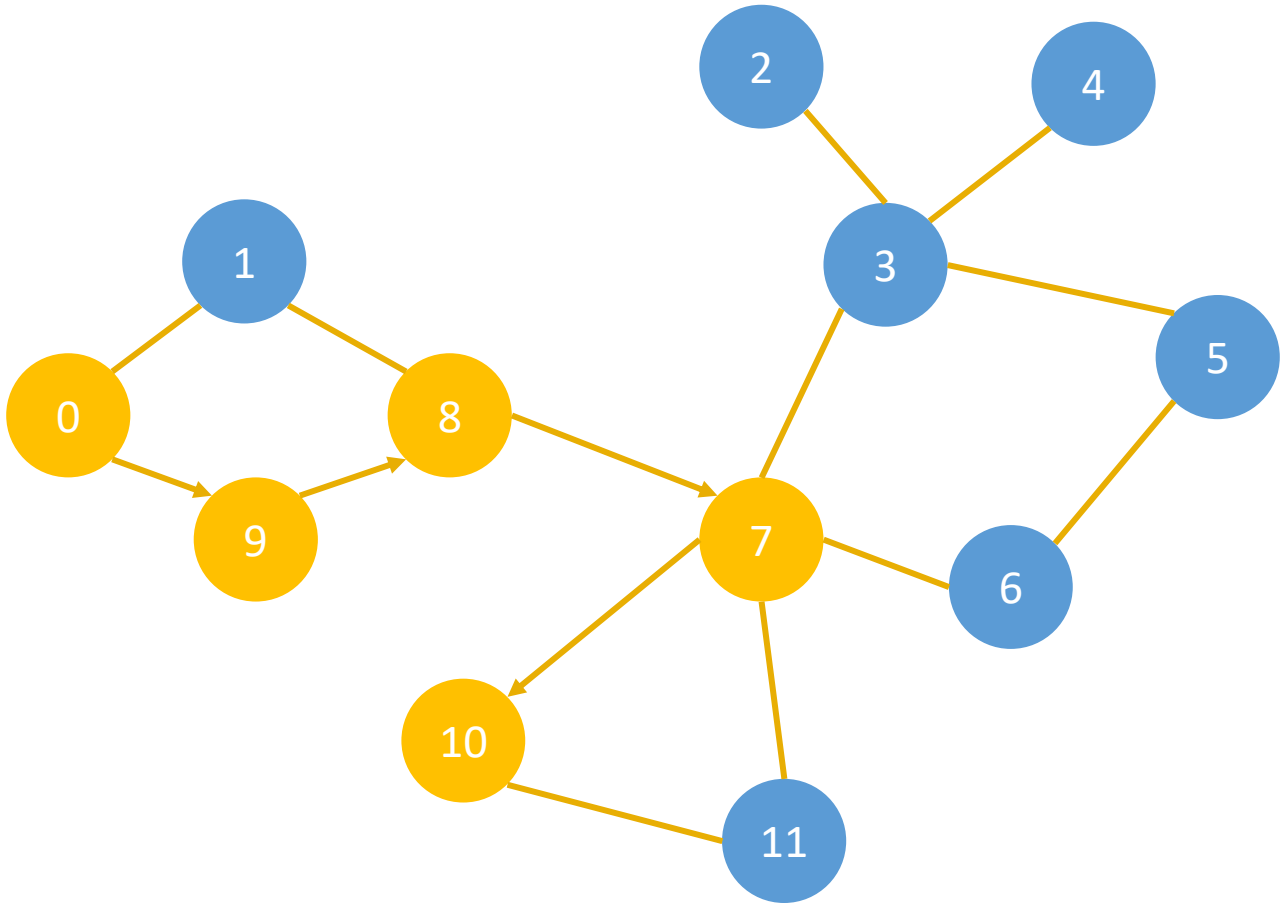

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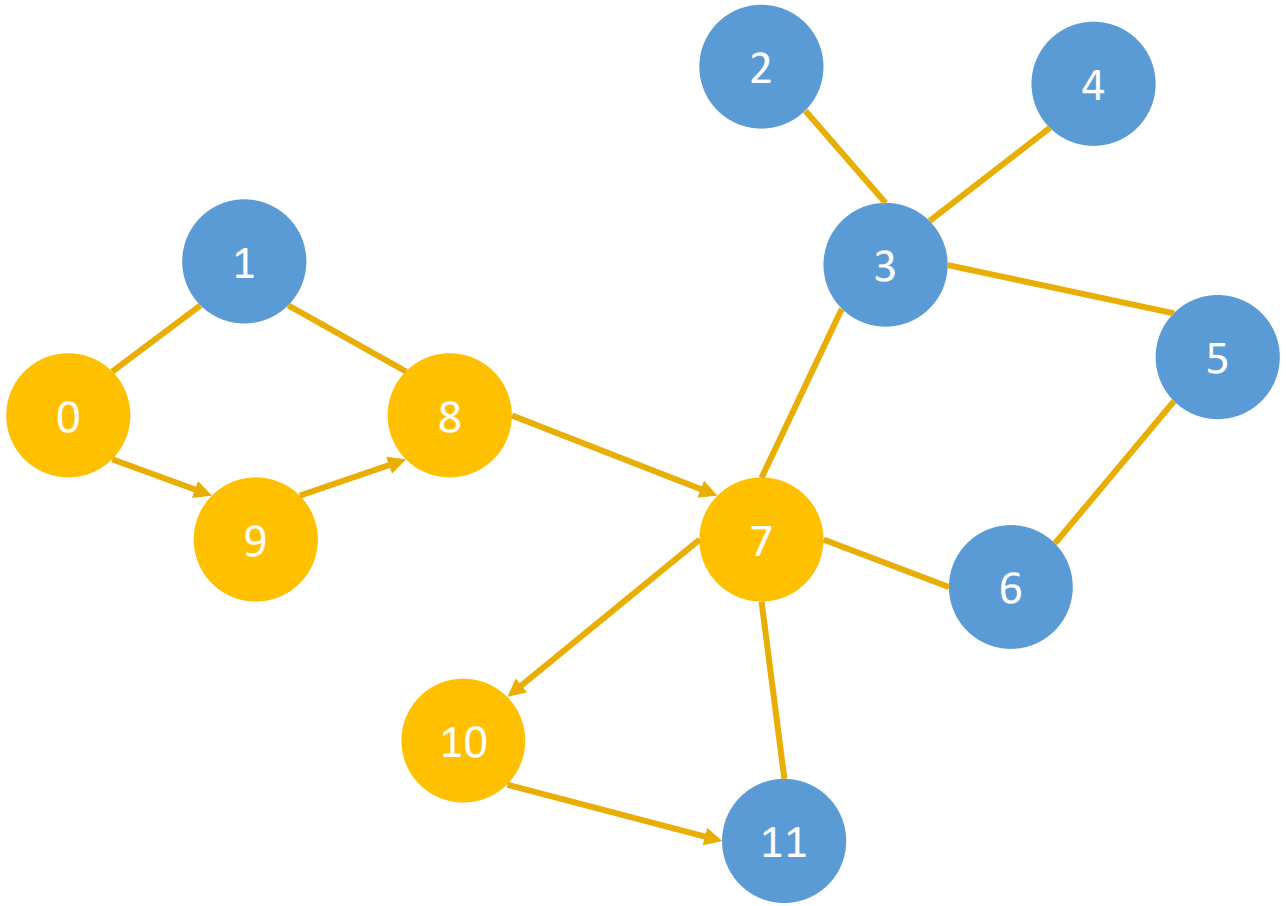

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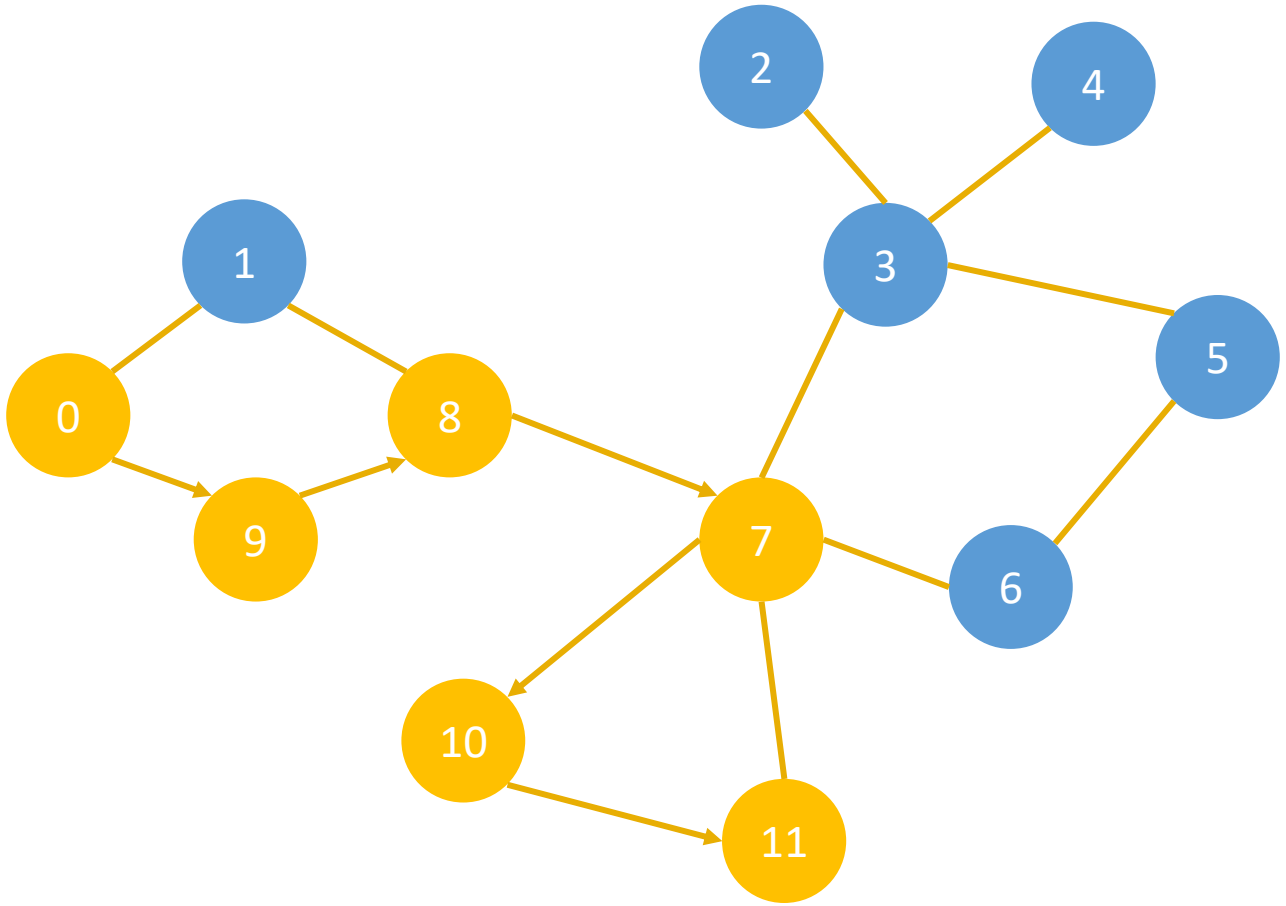

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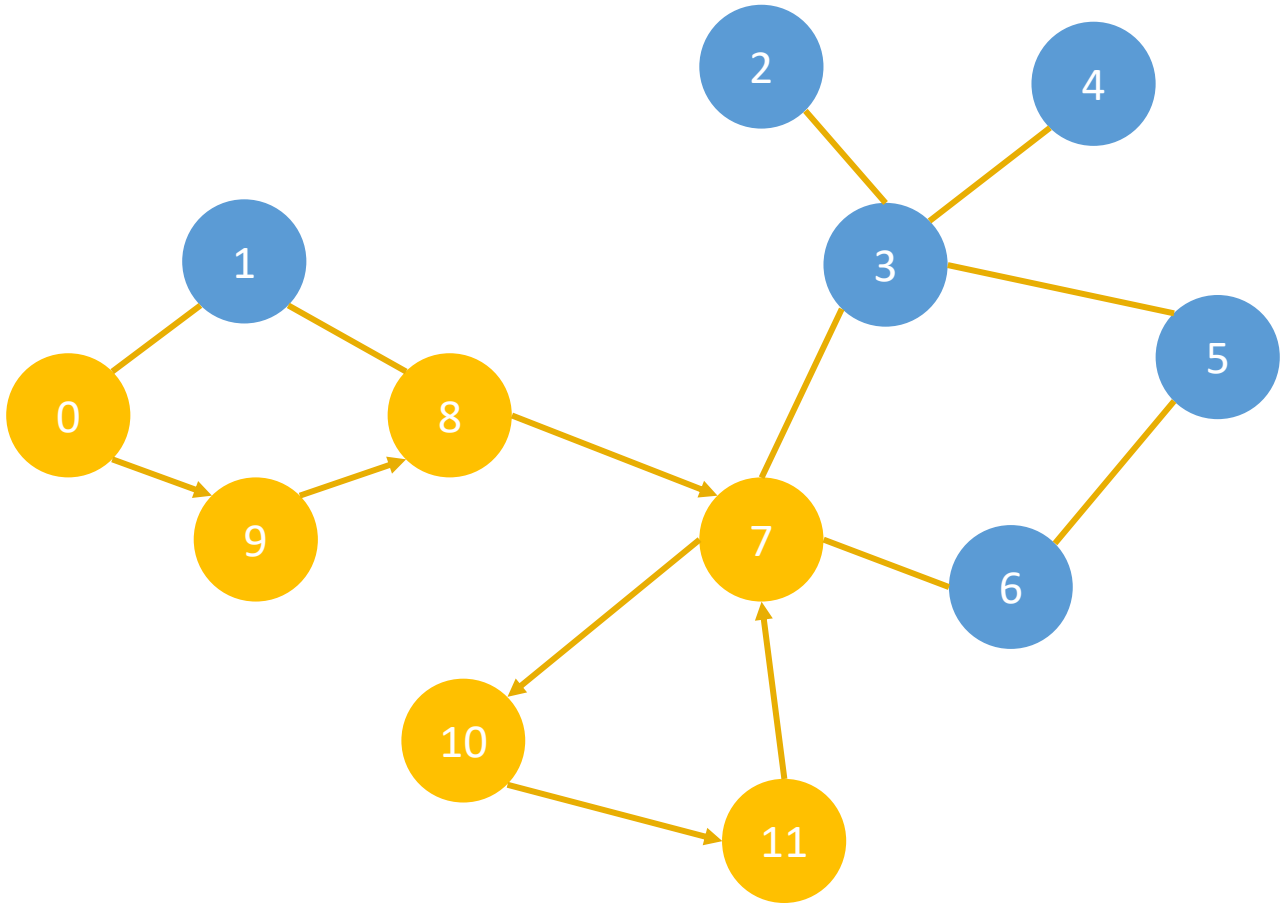

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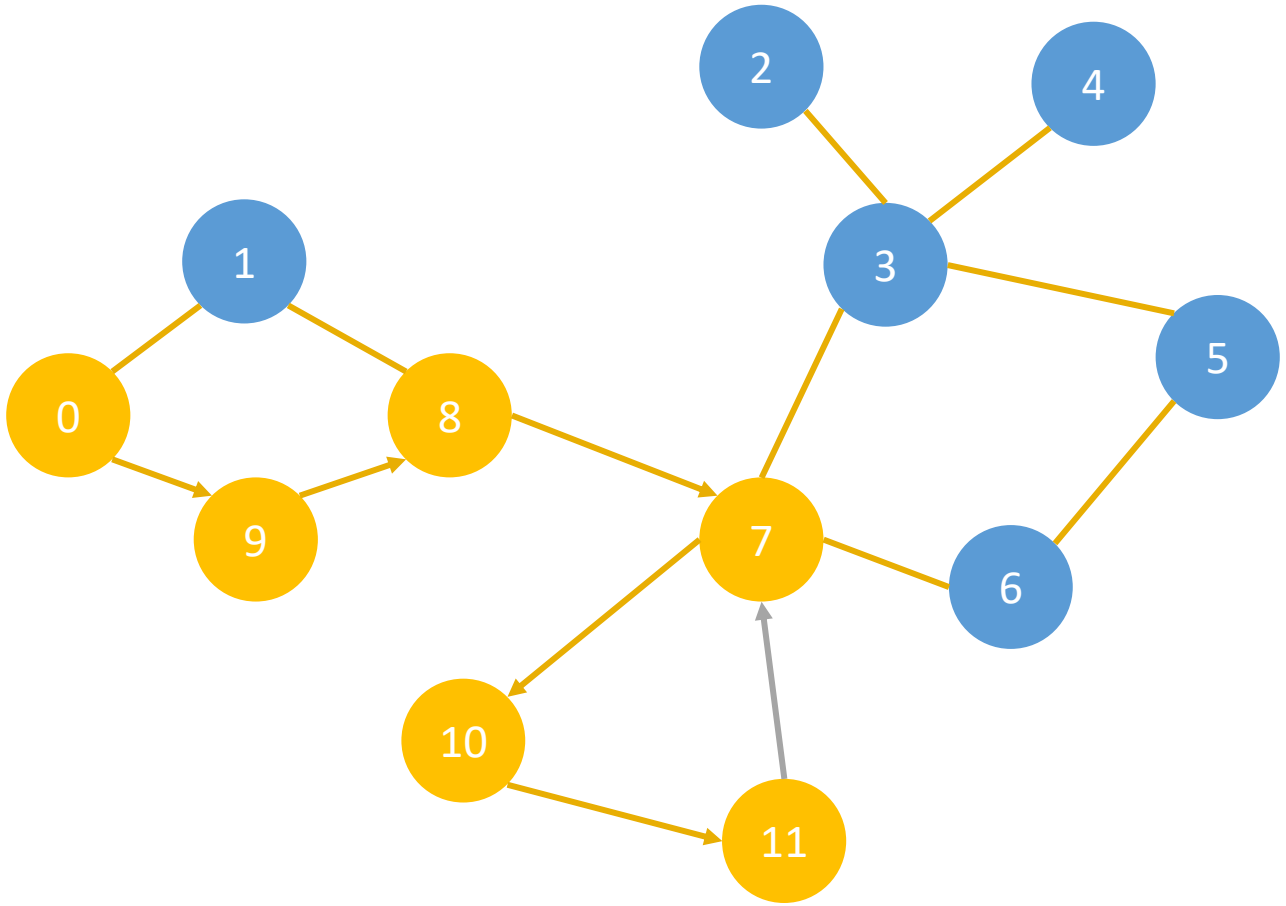

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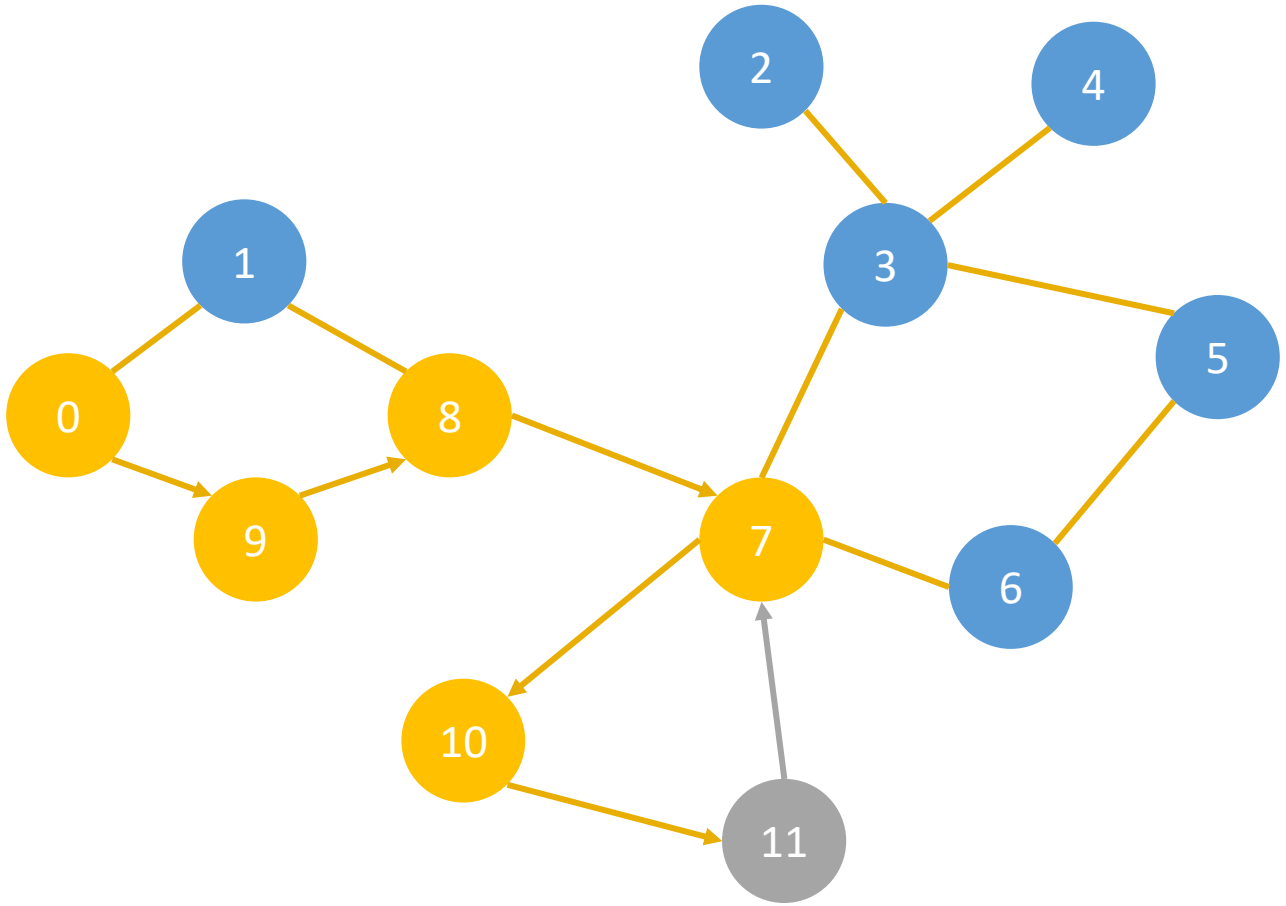

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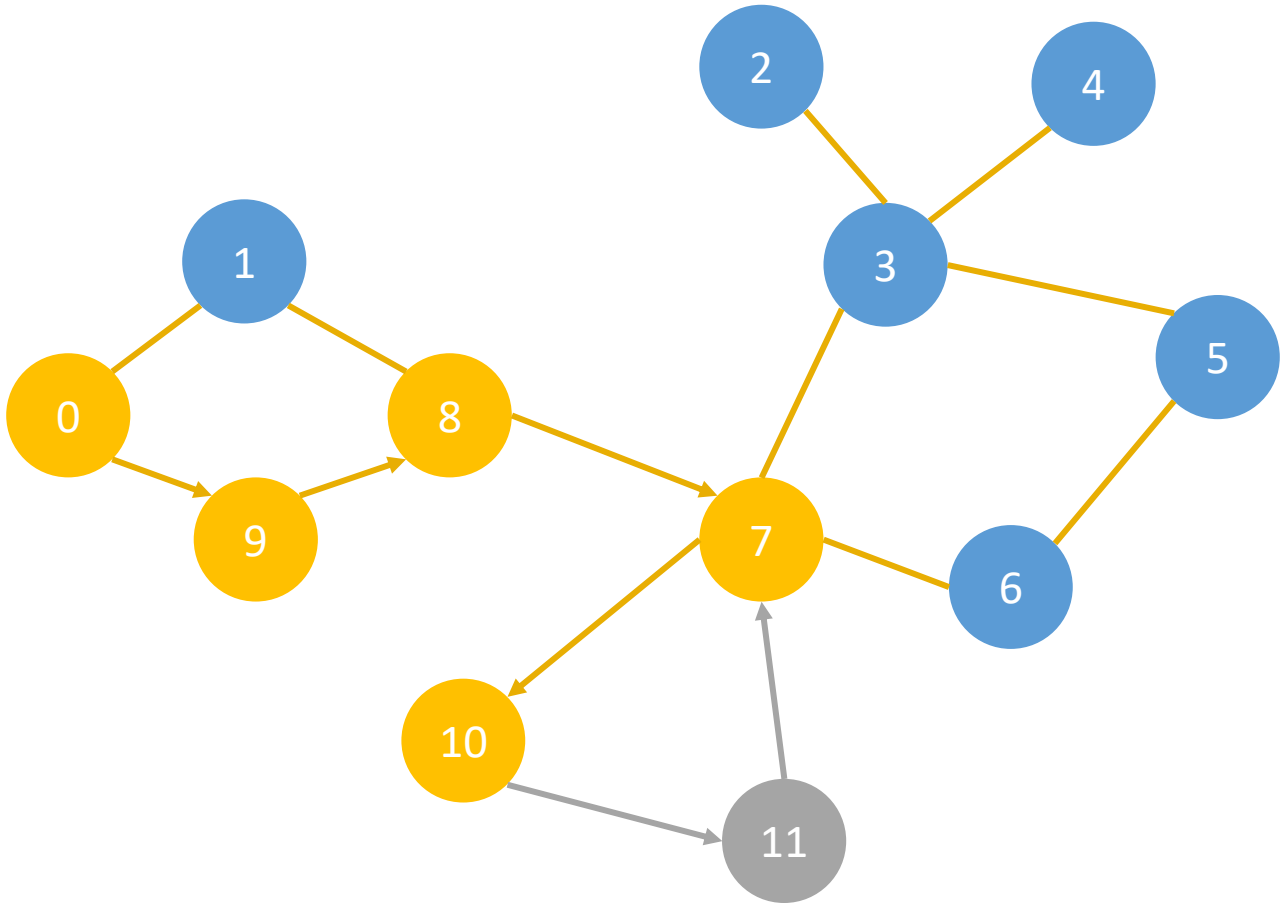

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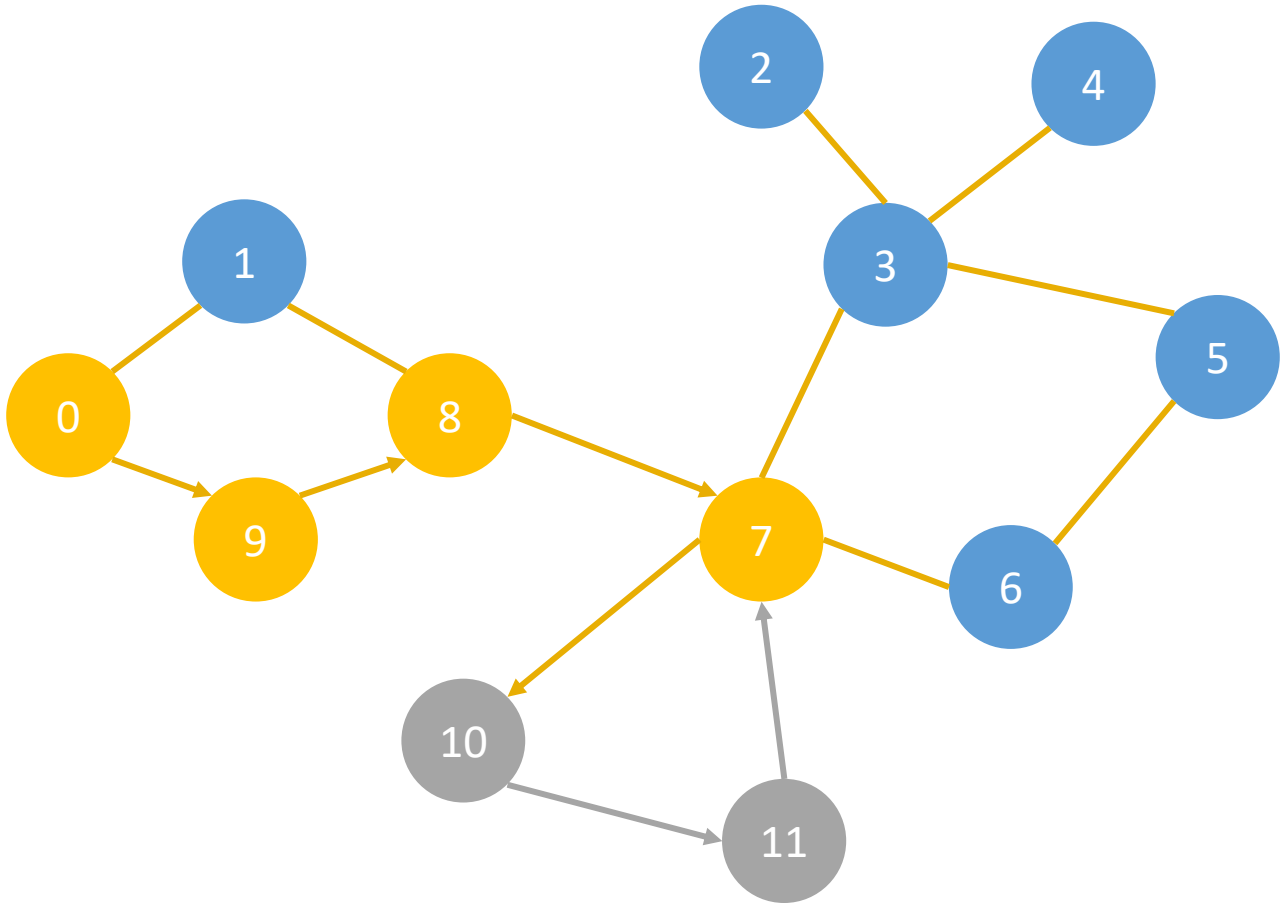

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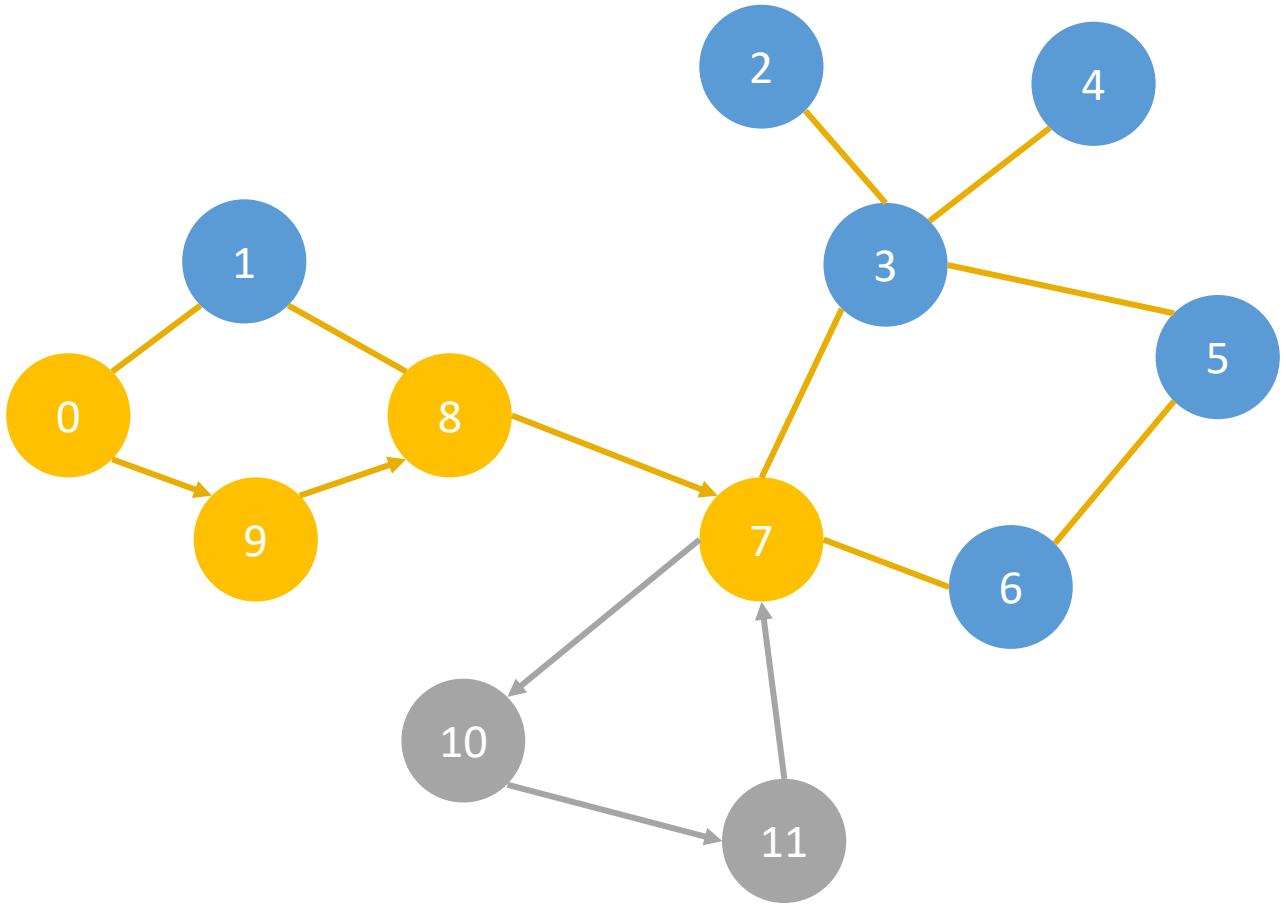

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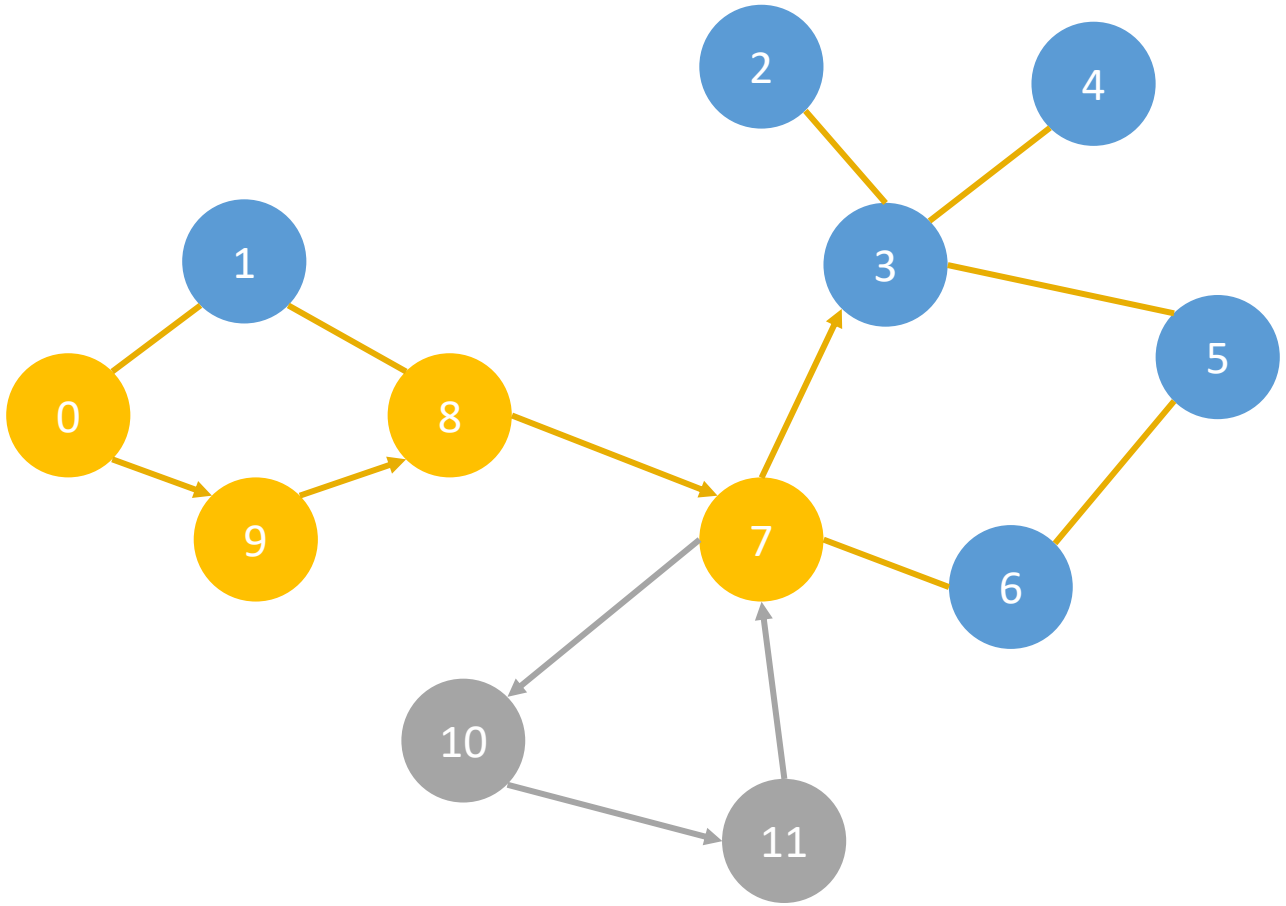

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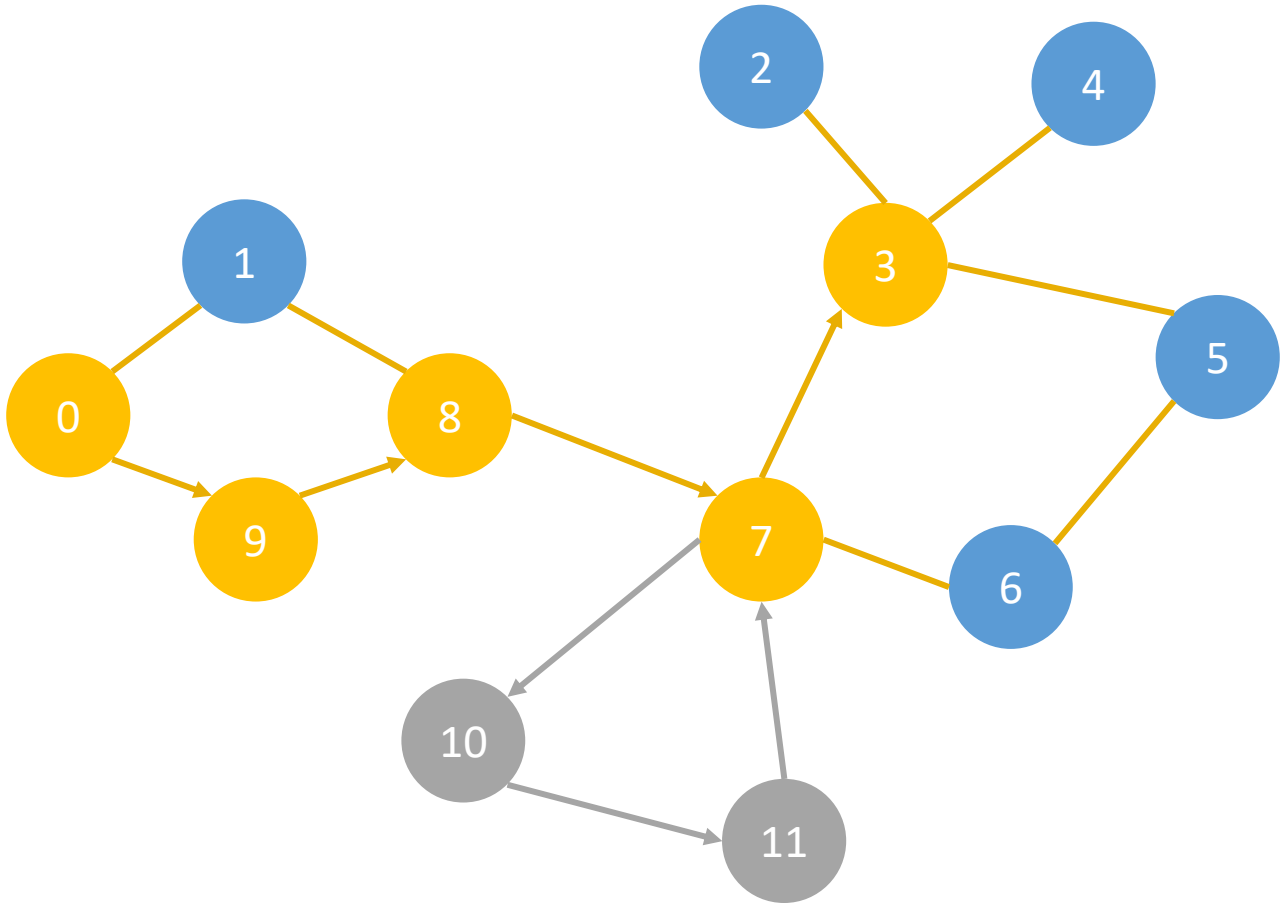

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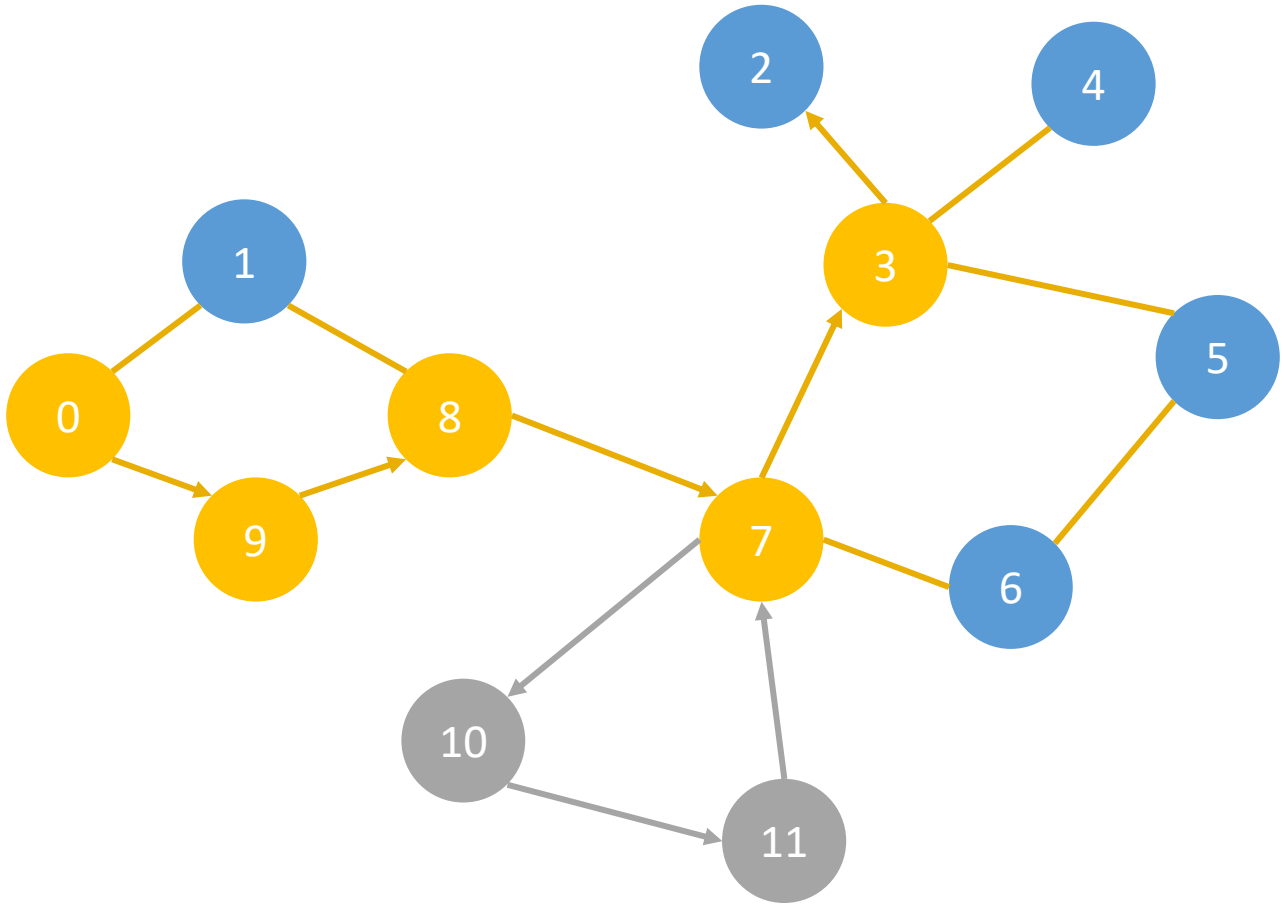

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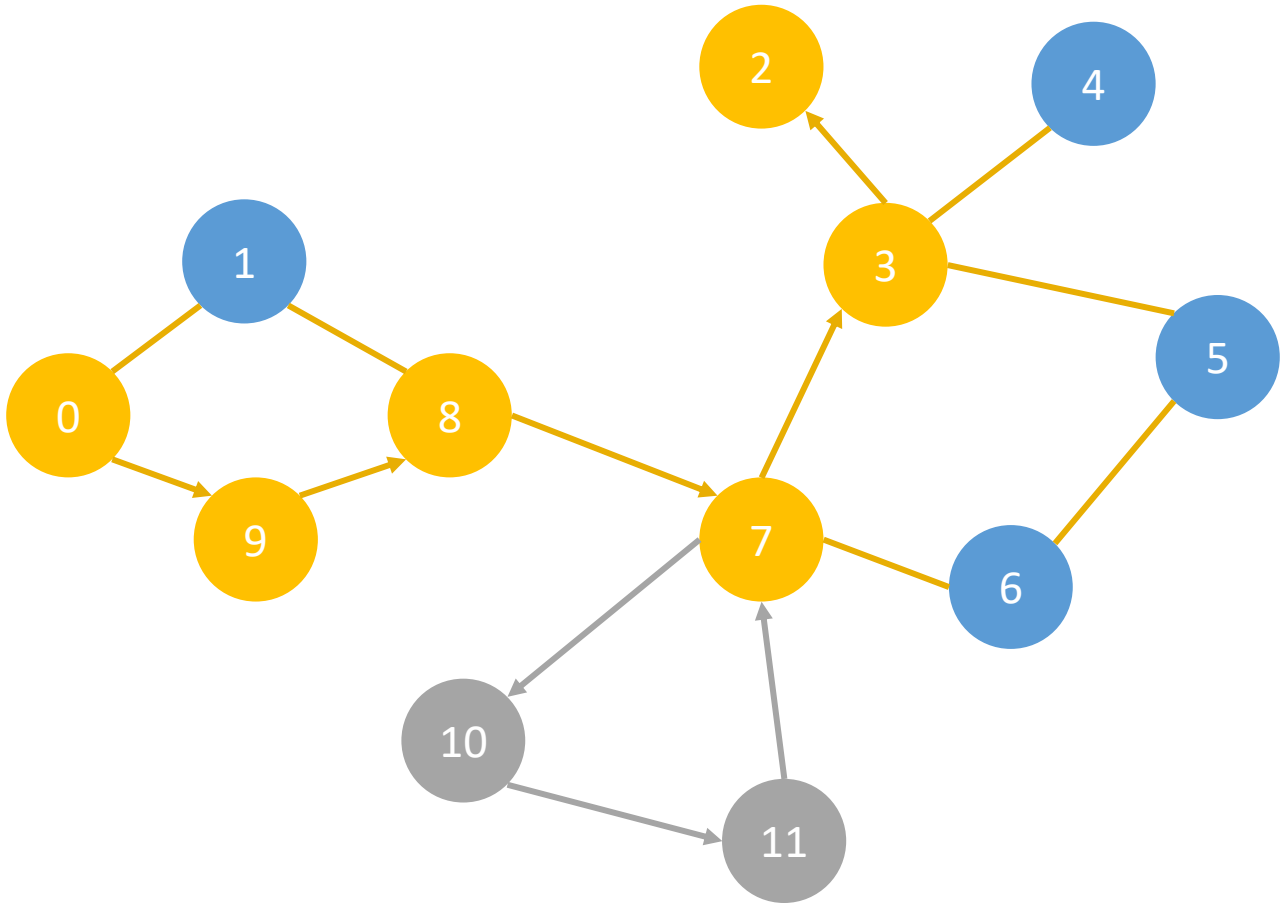
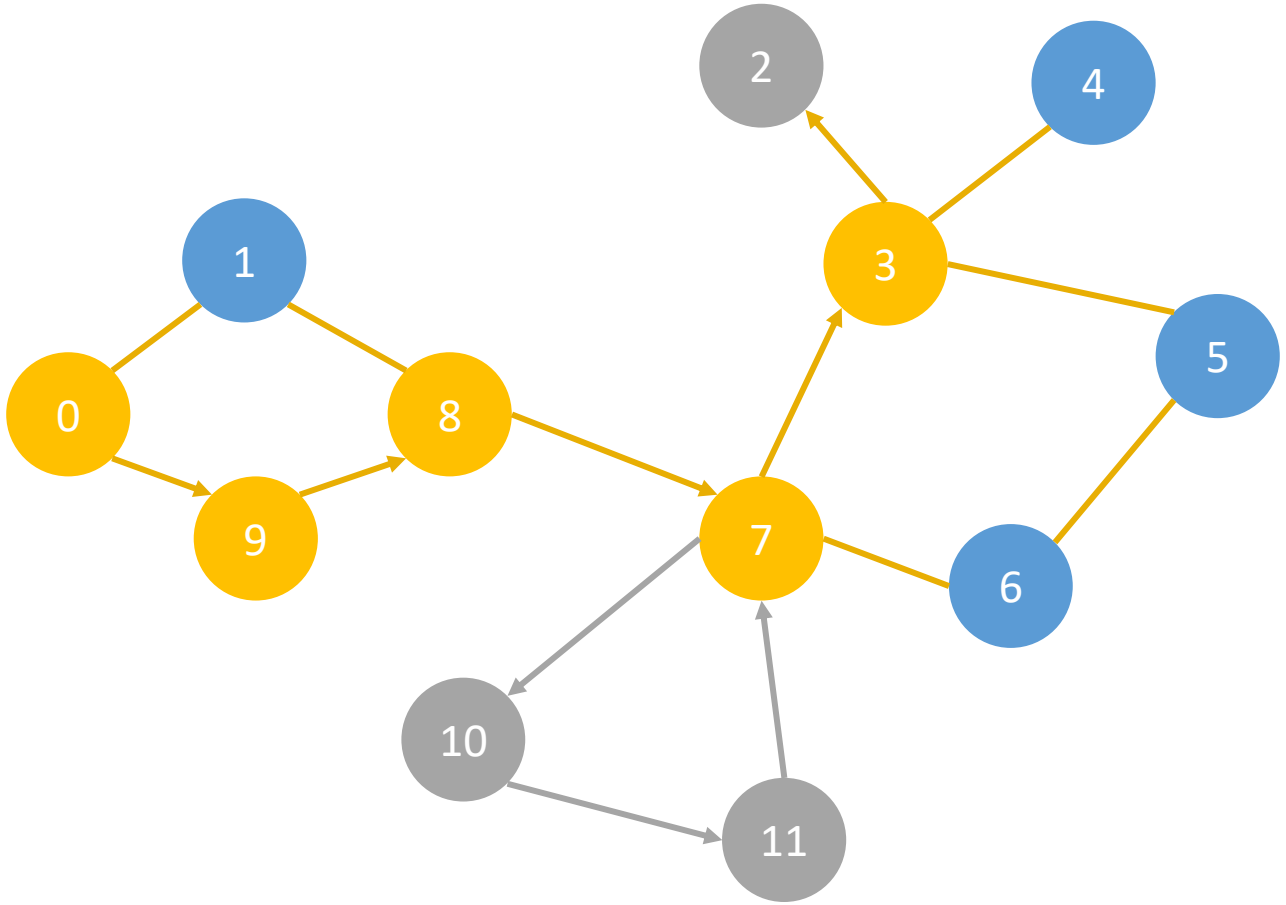


EXPLAIN

Depth-First Search (**DFS**)

Backtrack when a dead end is reached



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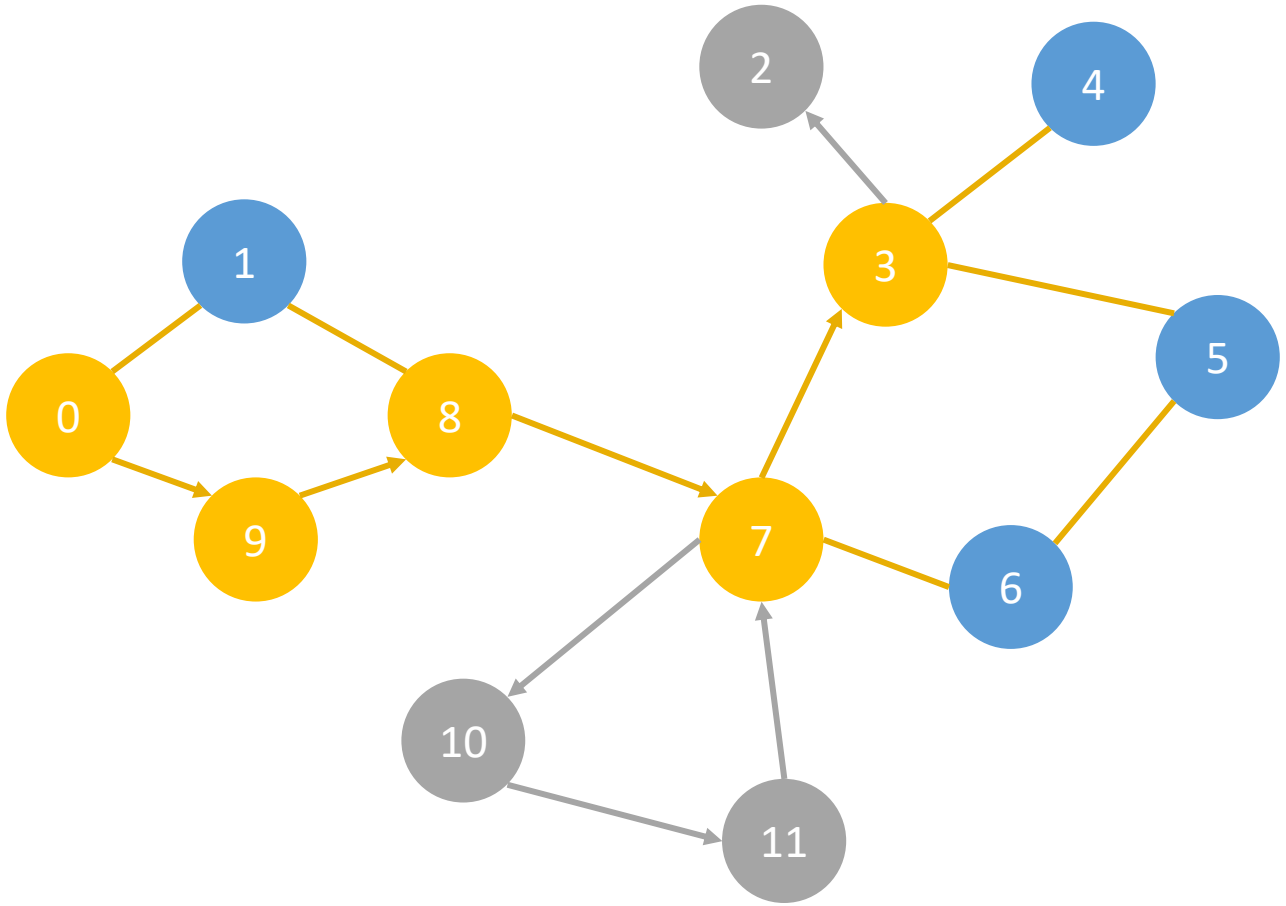

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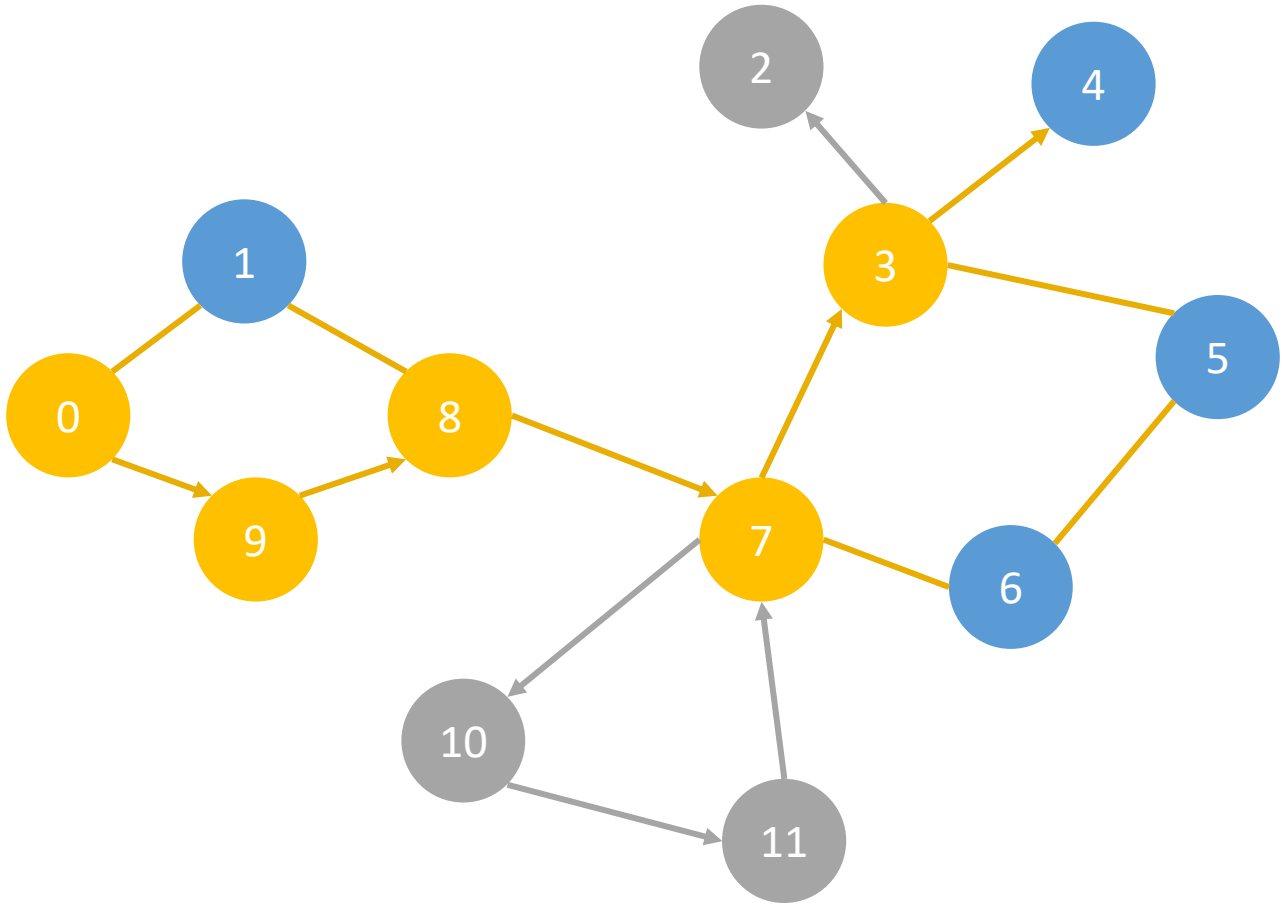

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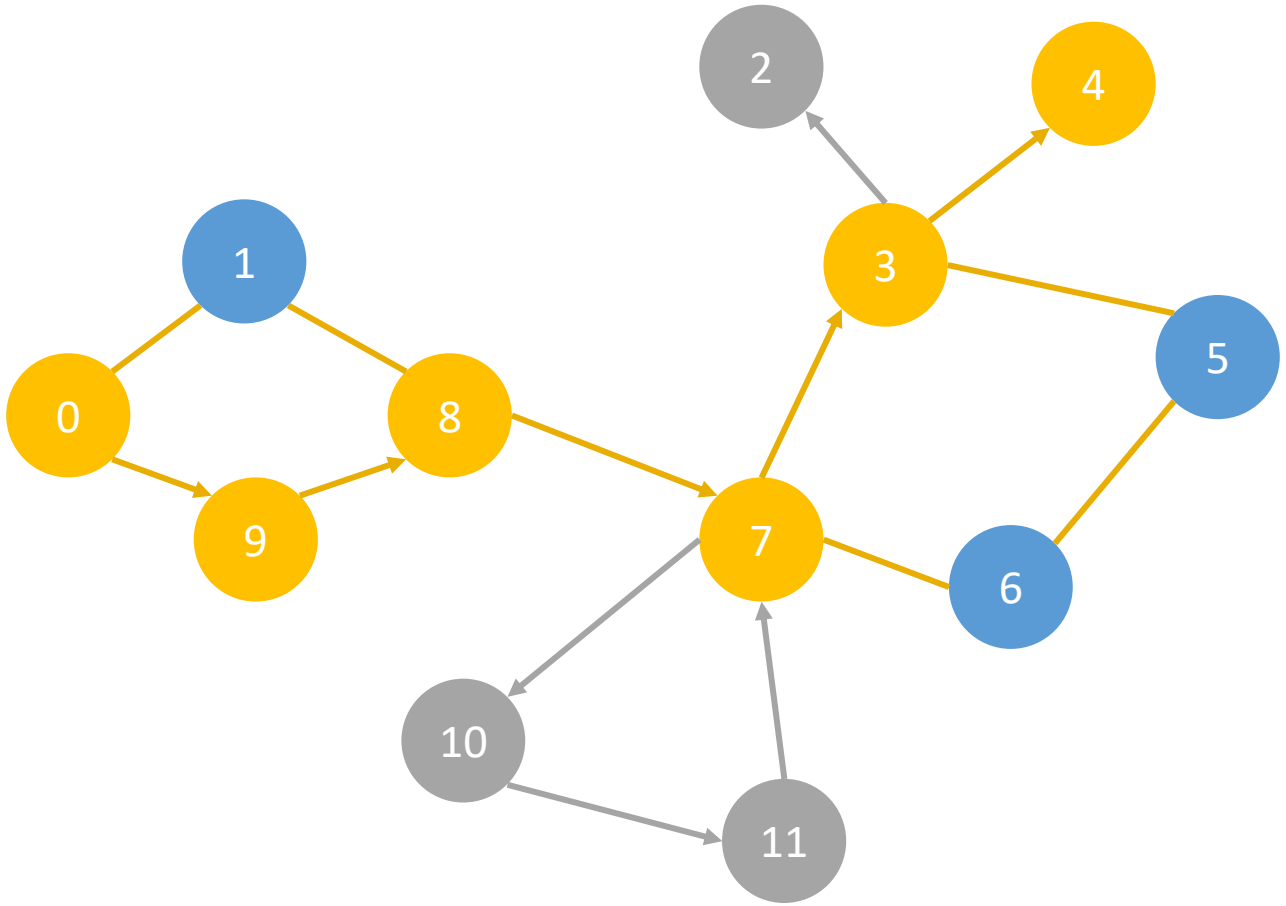

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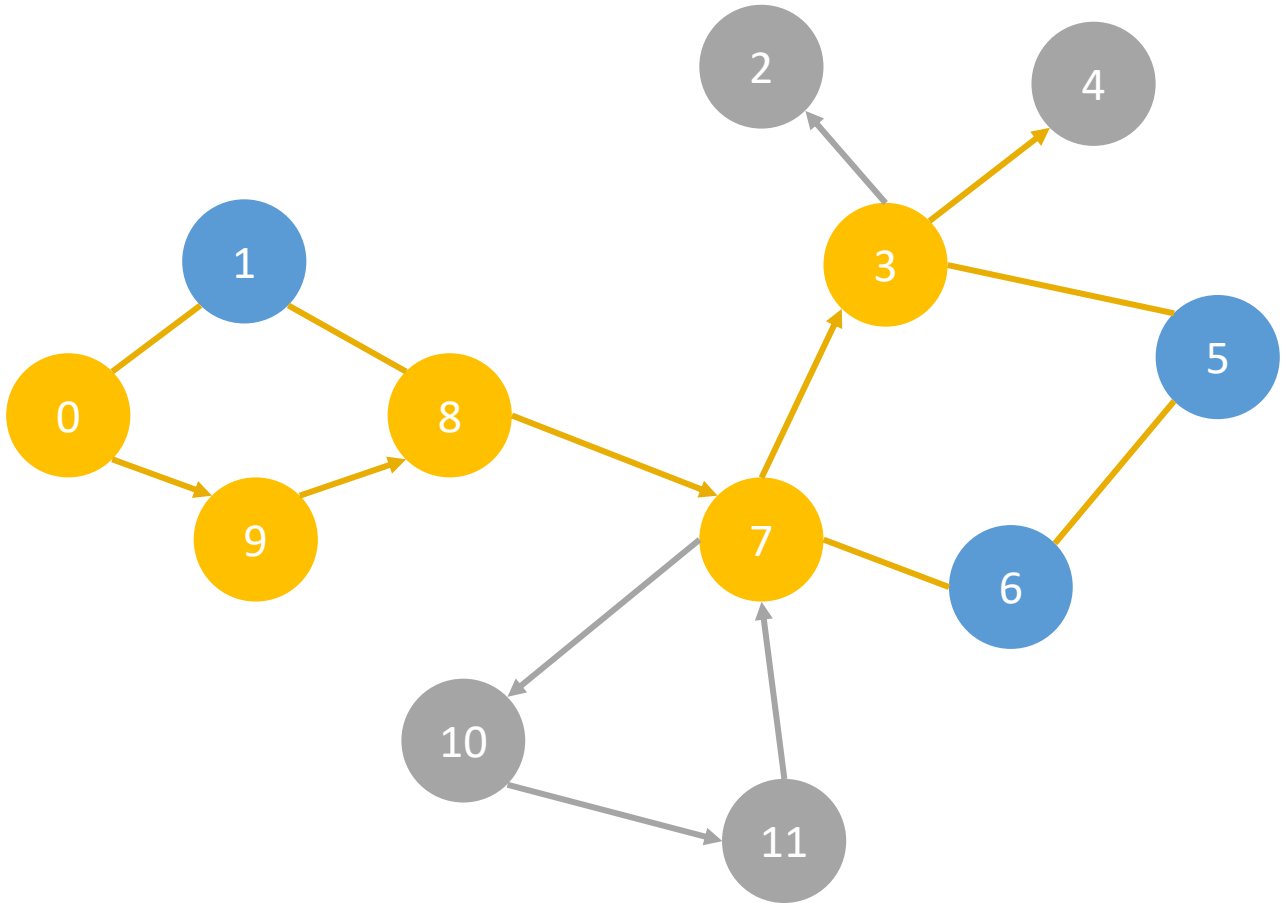

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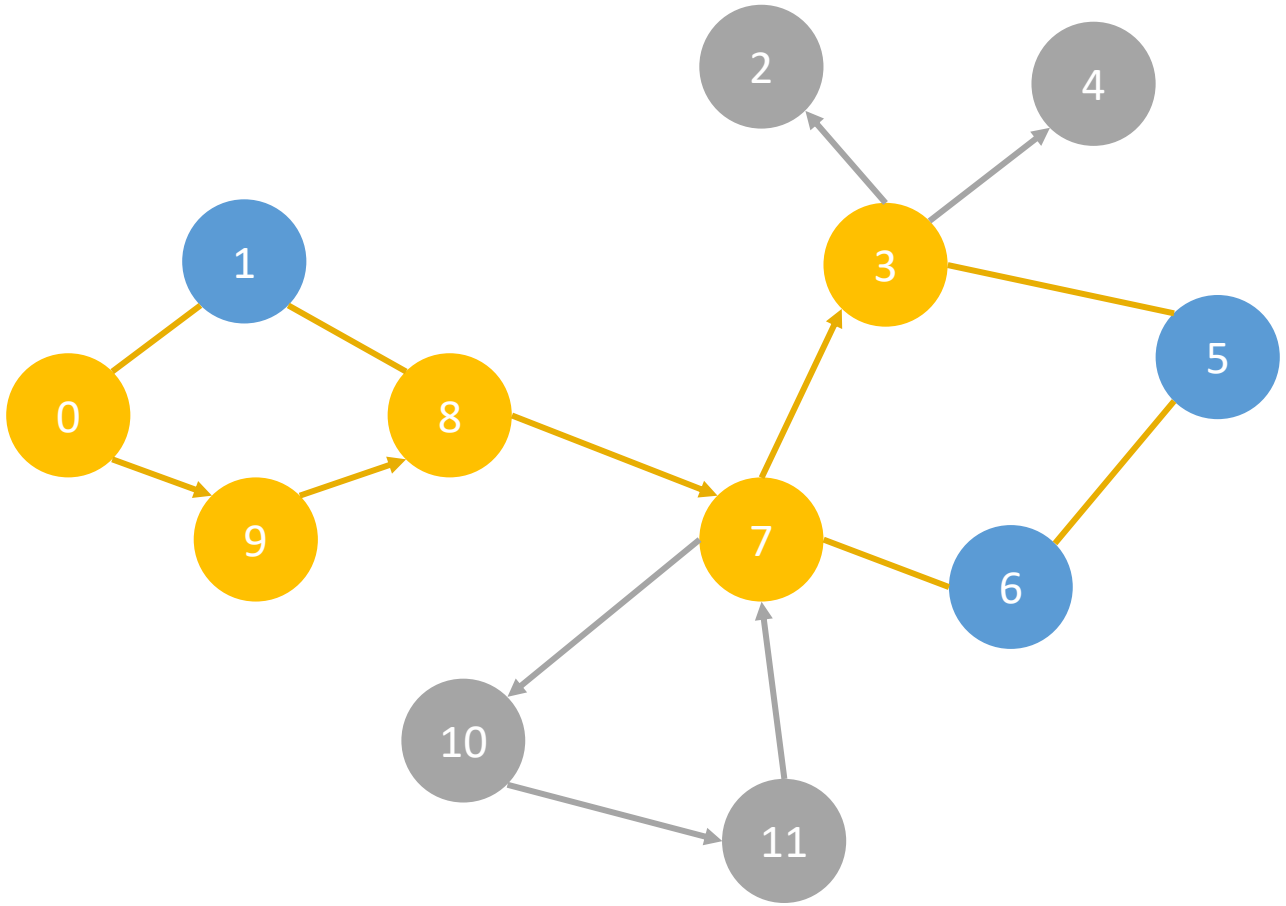

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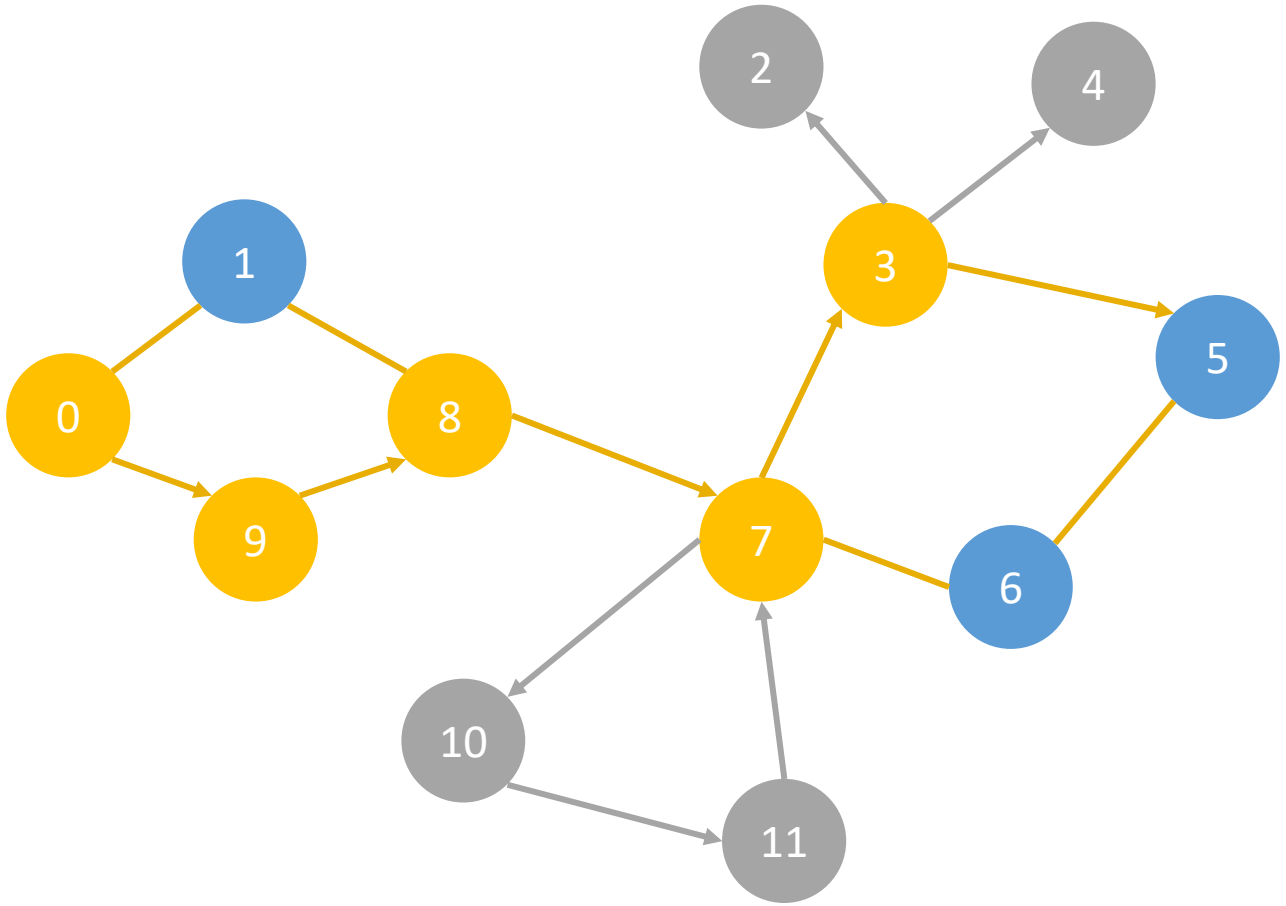

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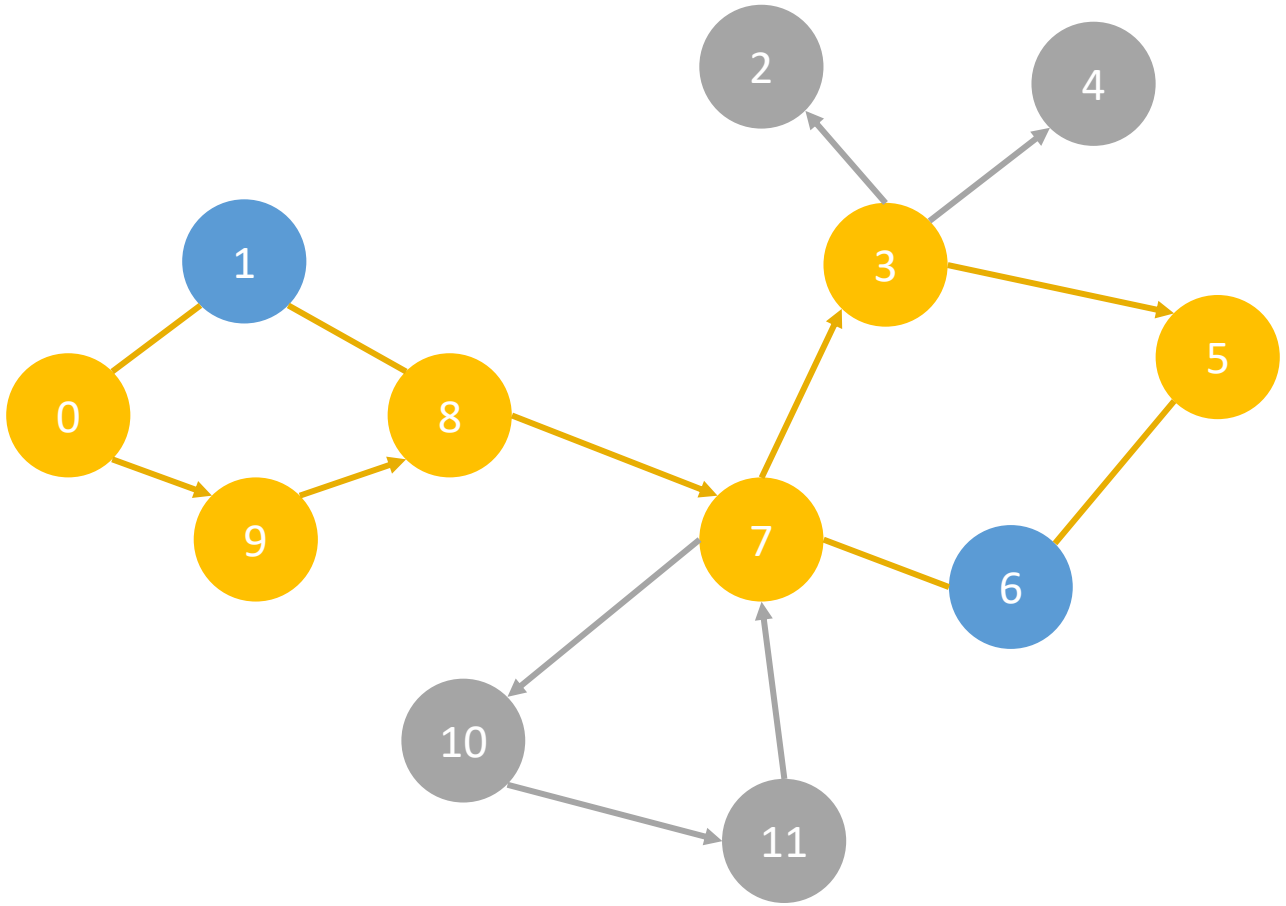

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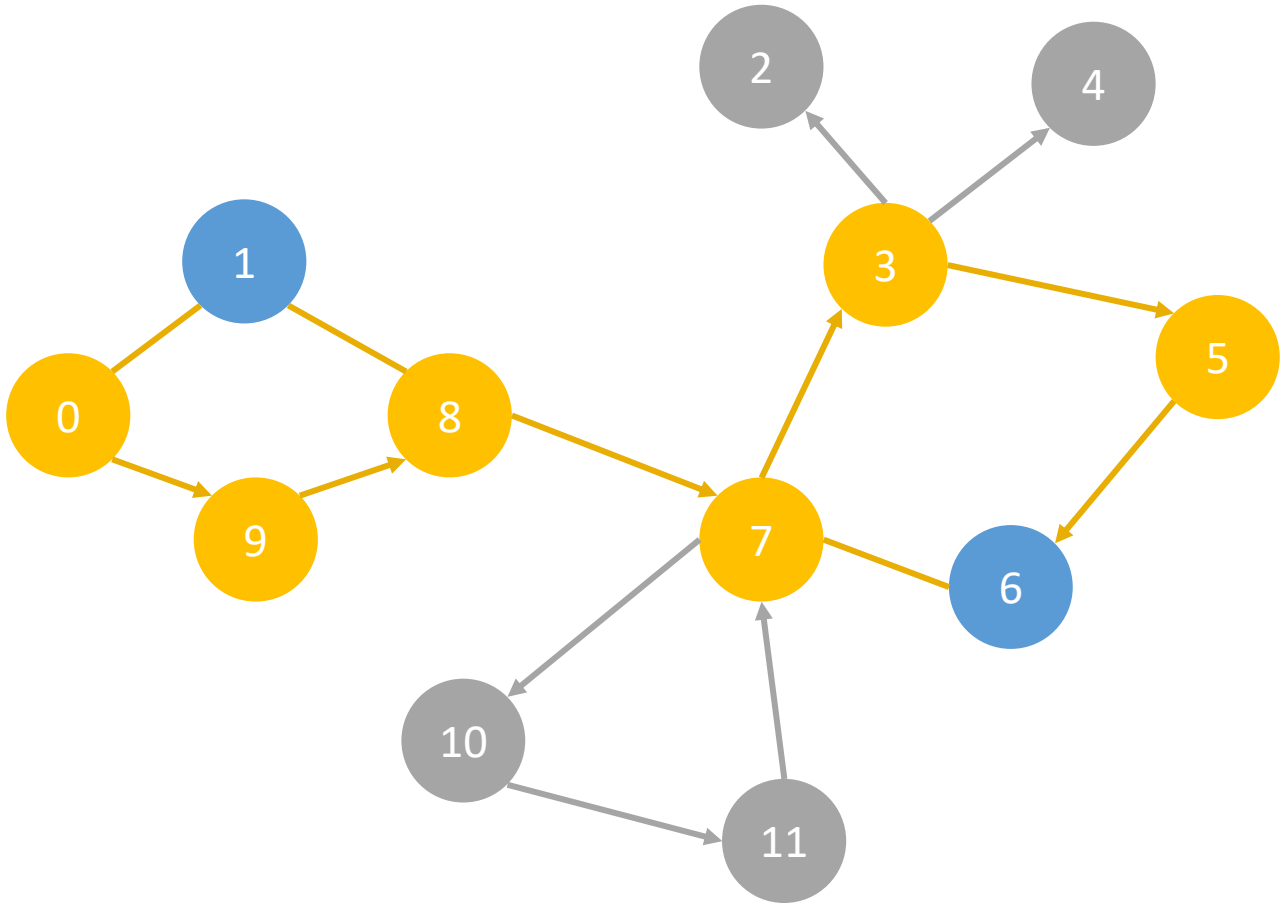

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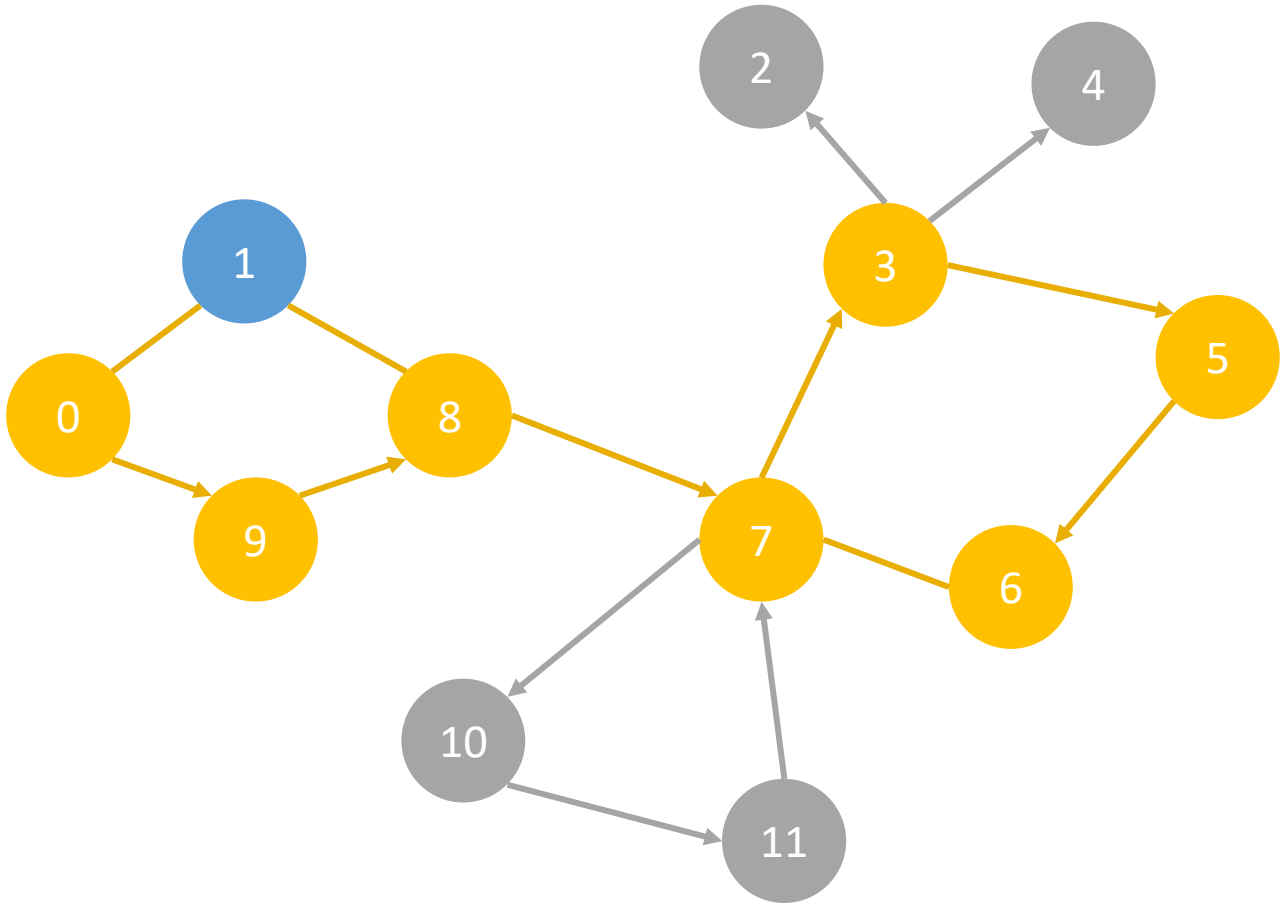

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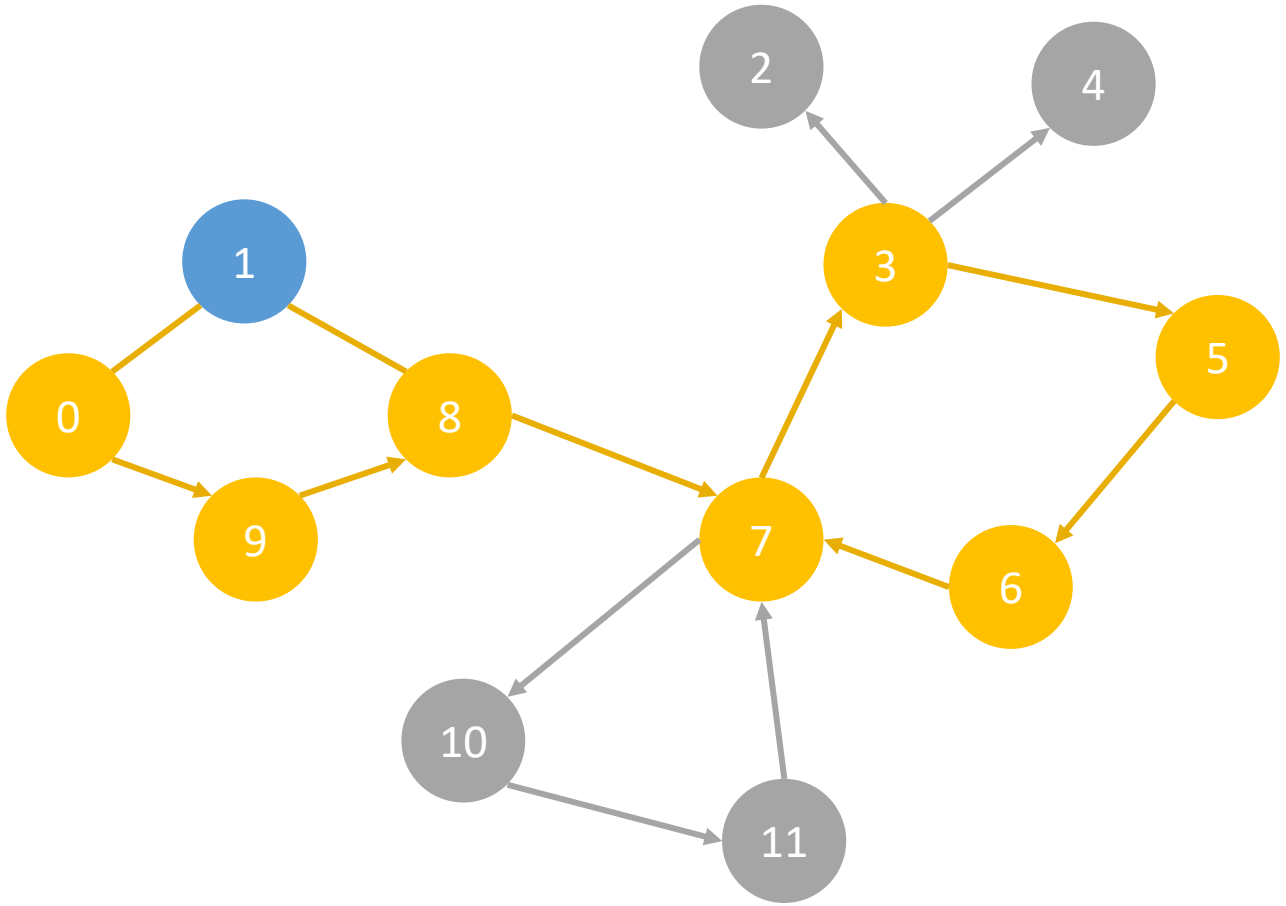

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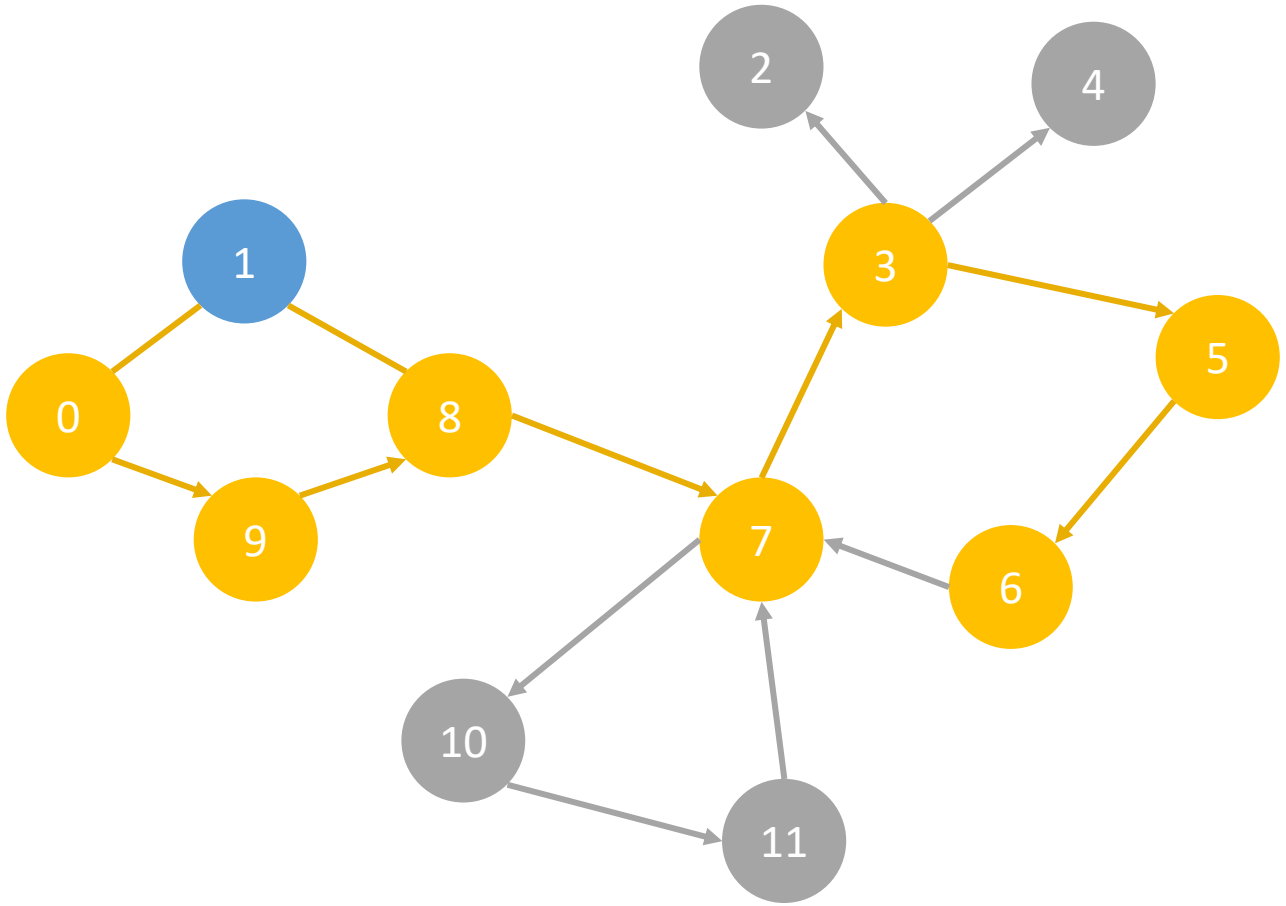

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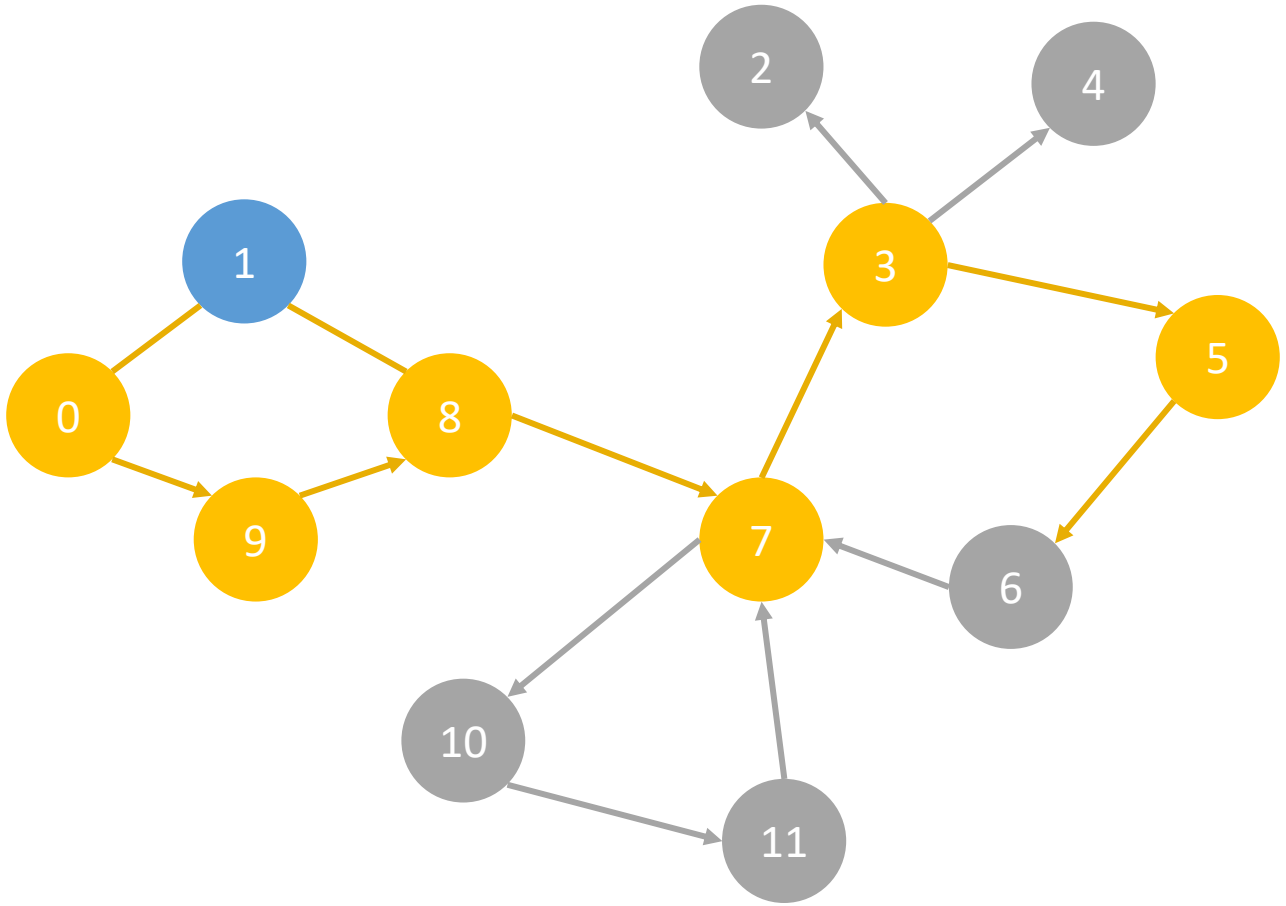

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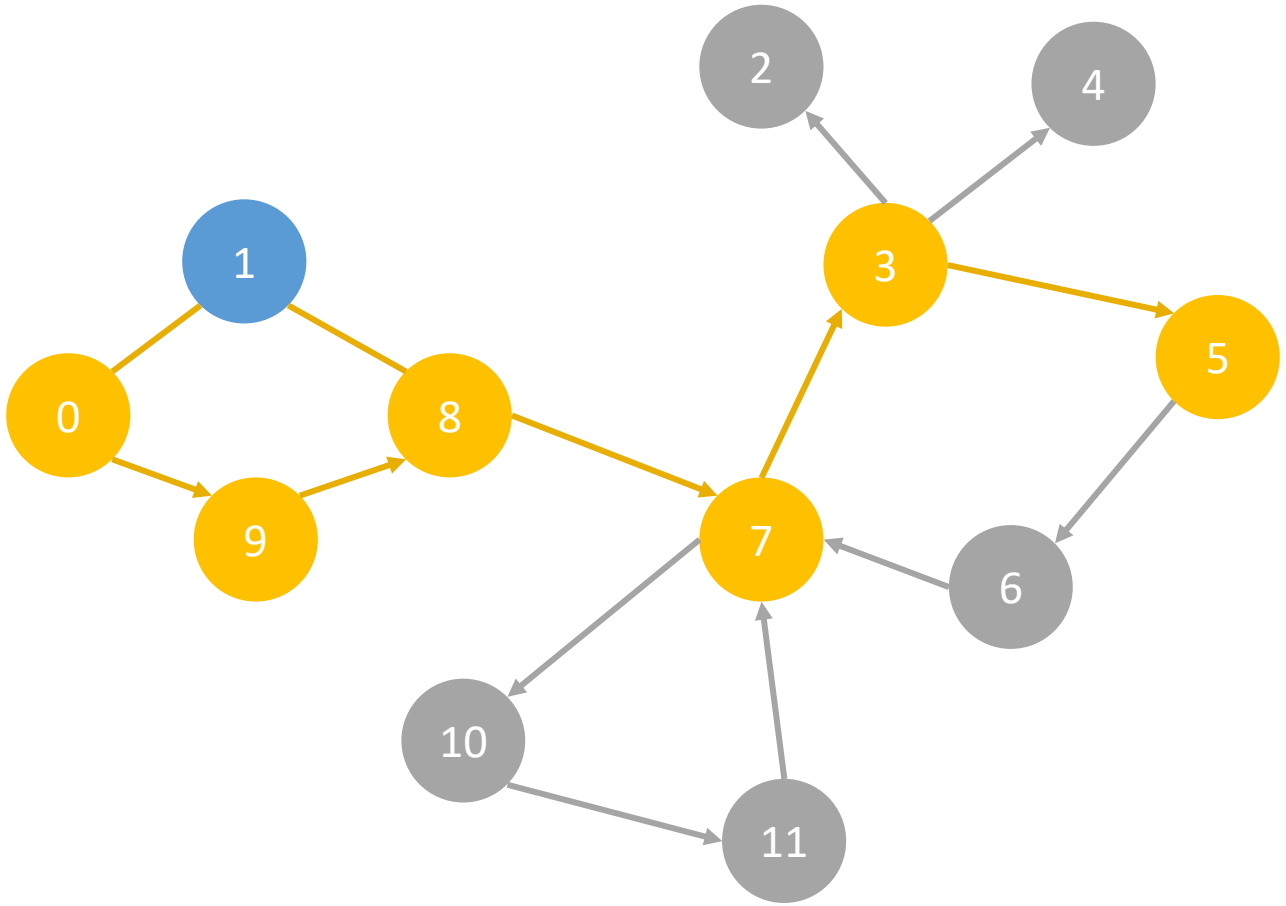

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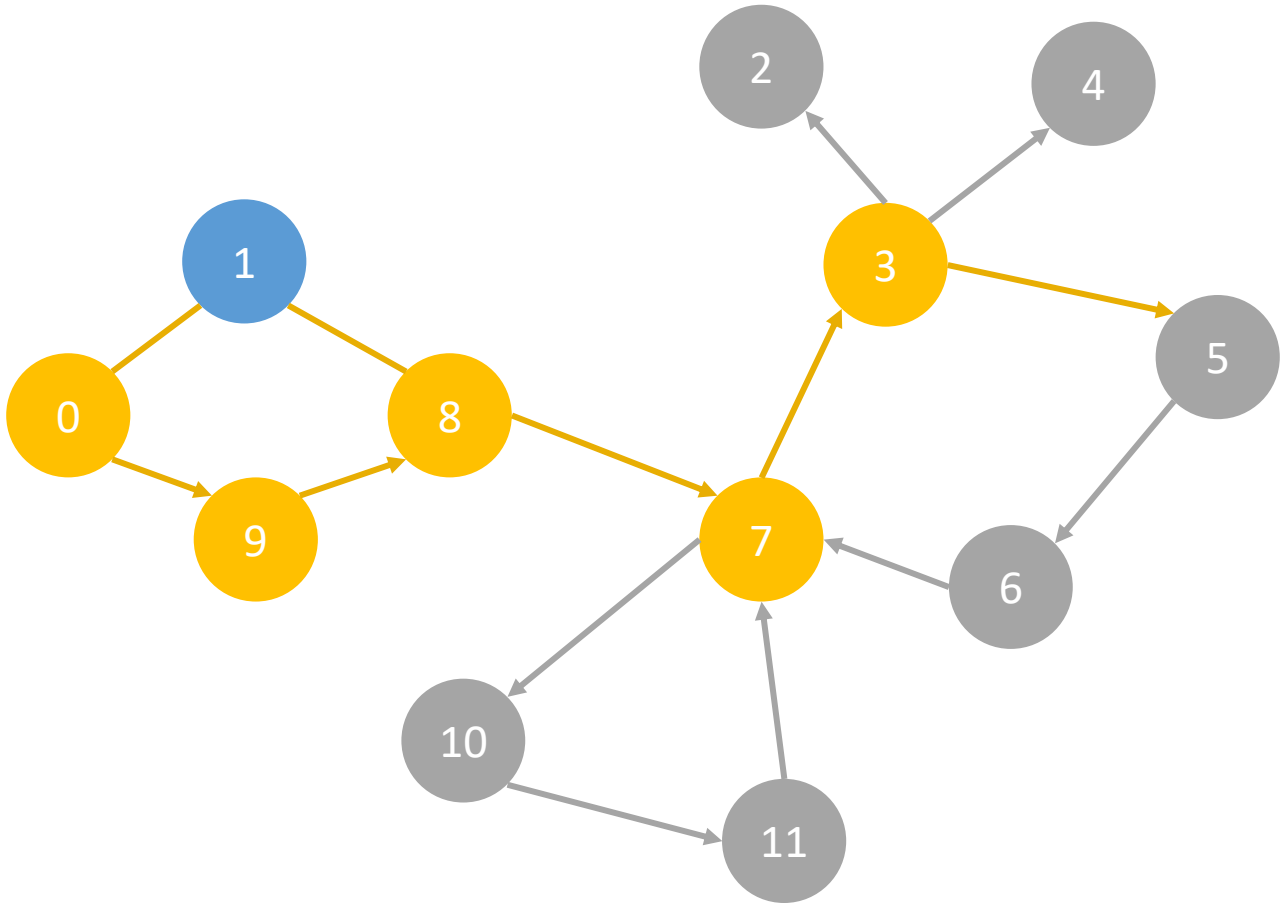

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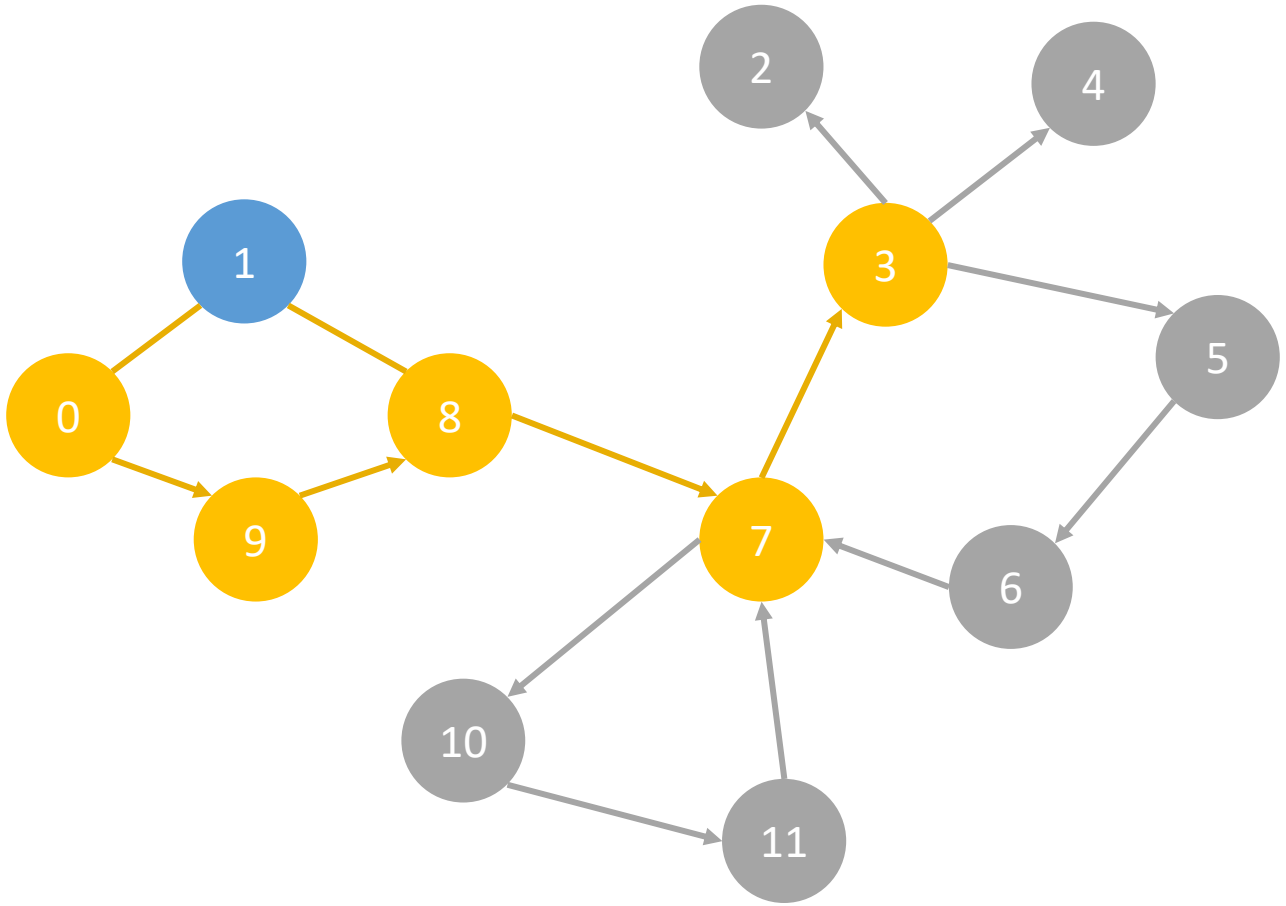

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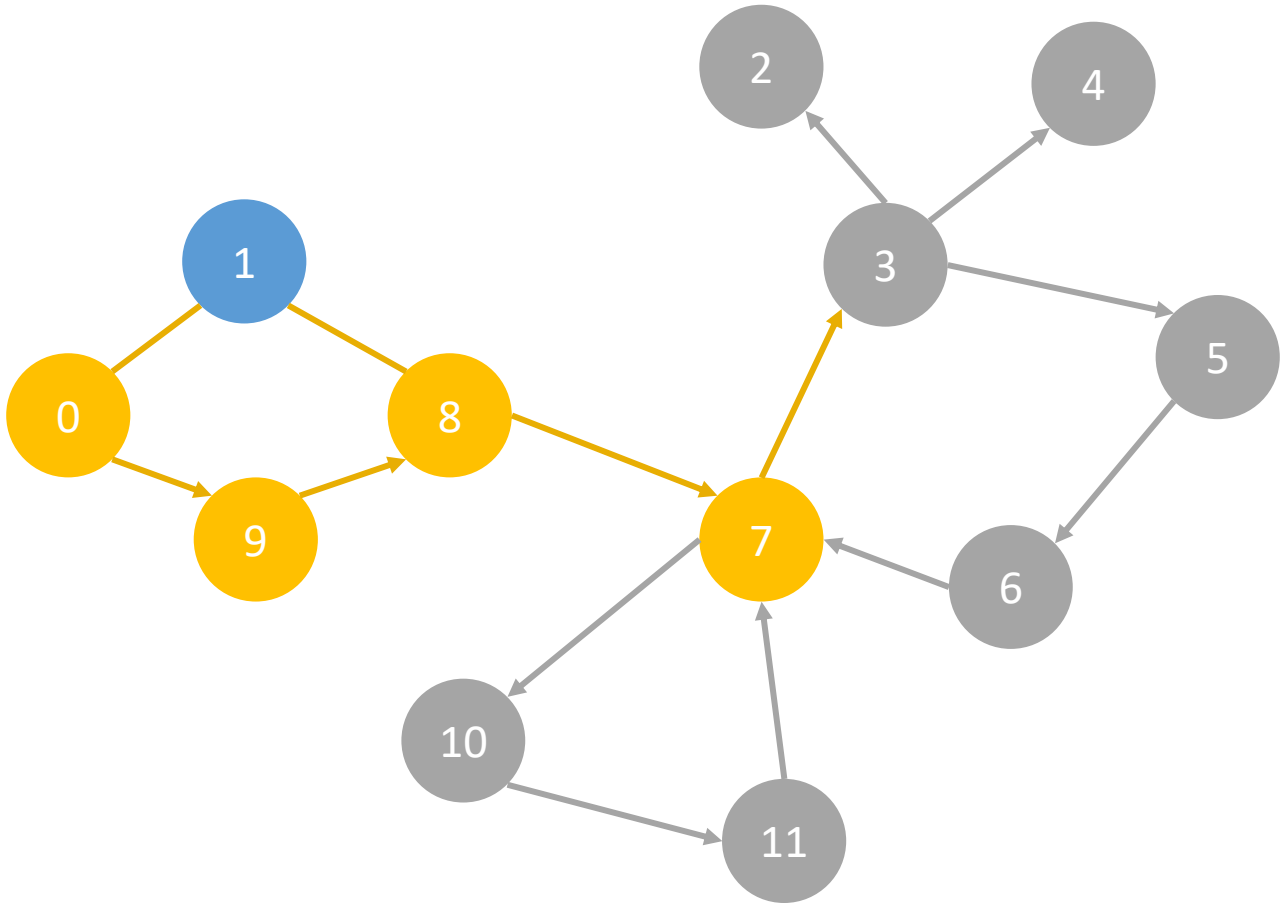

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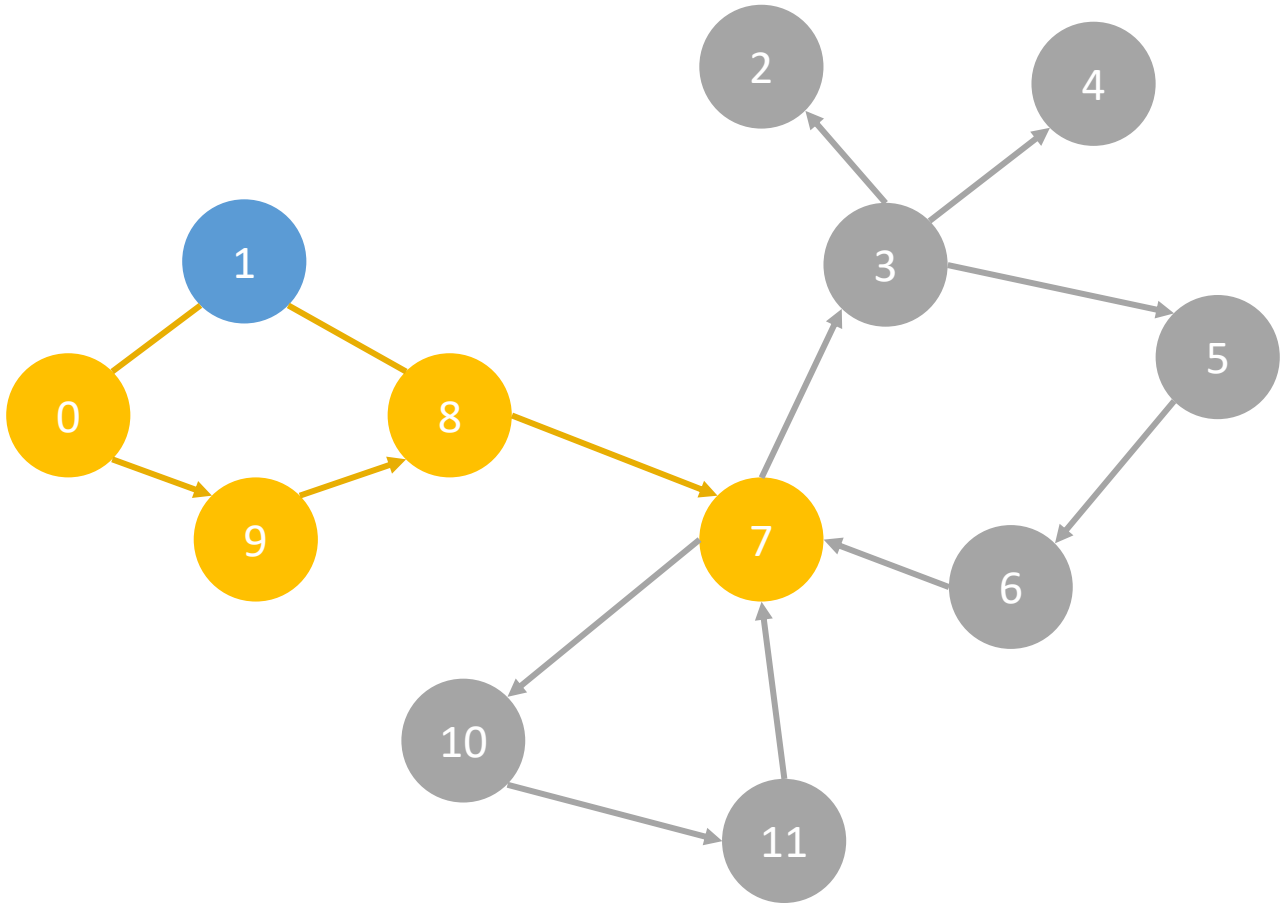

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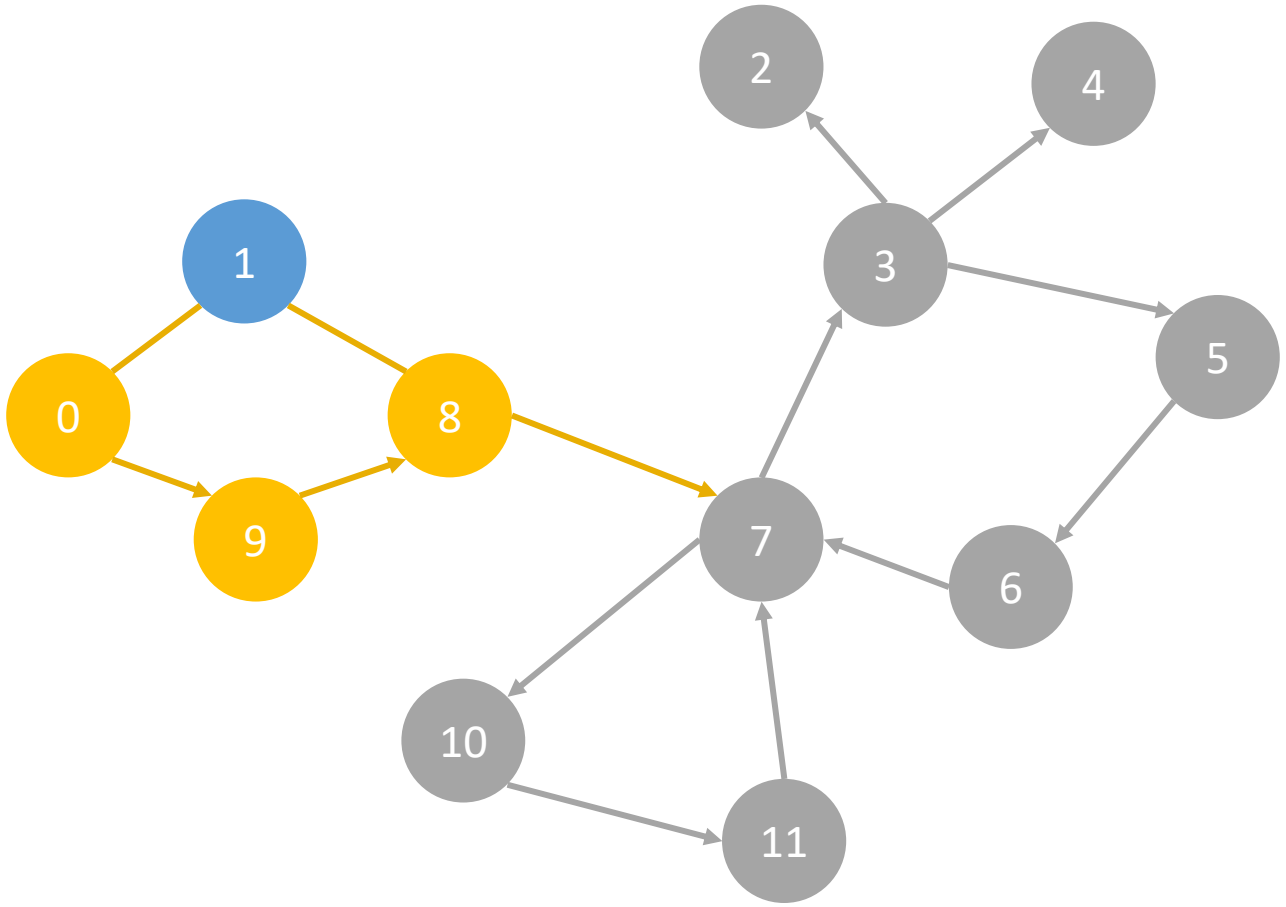

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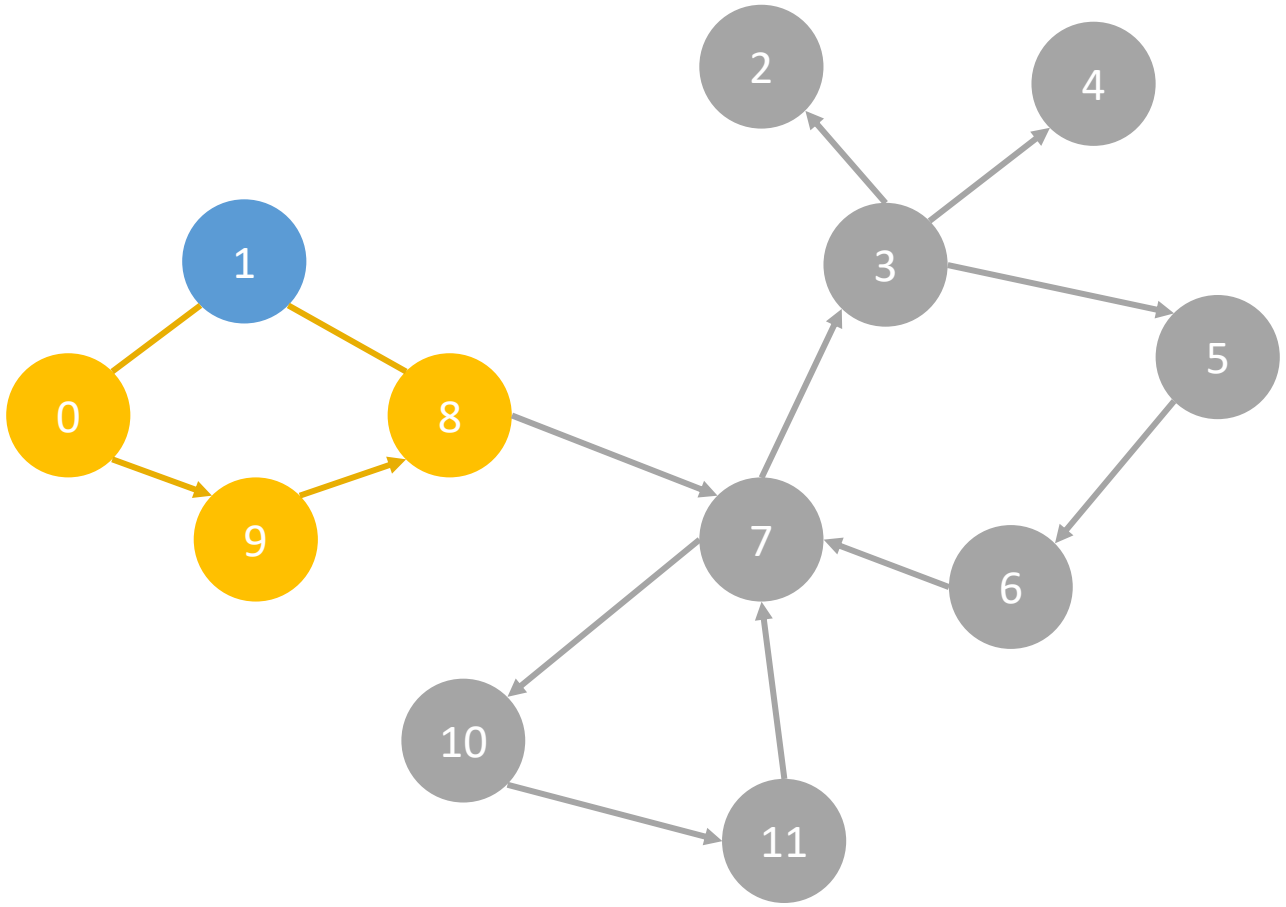

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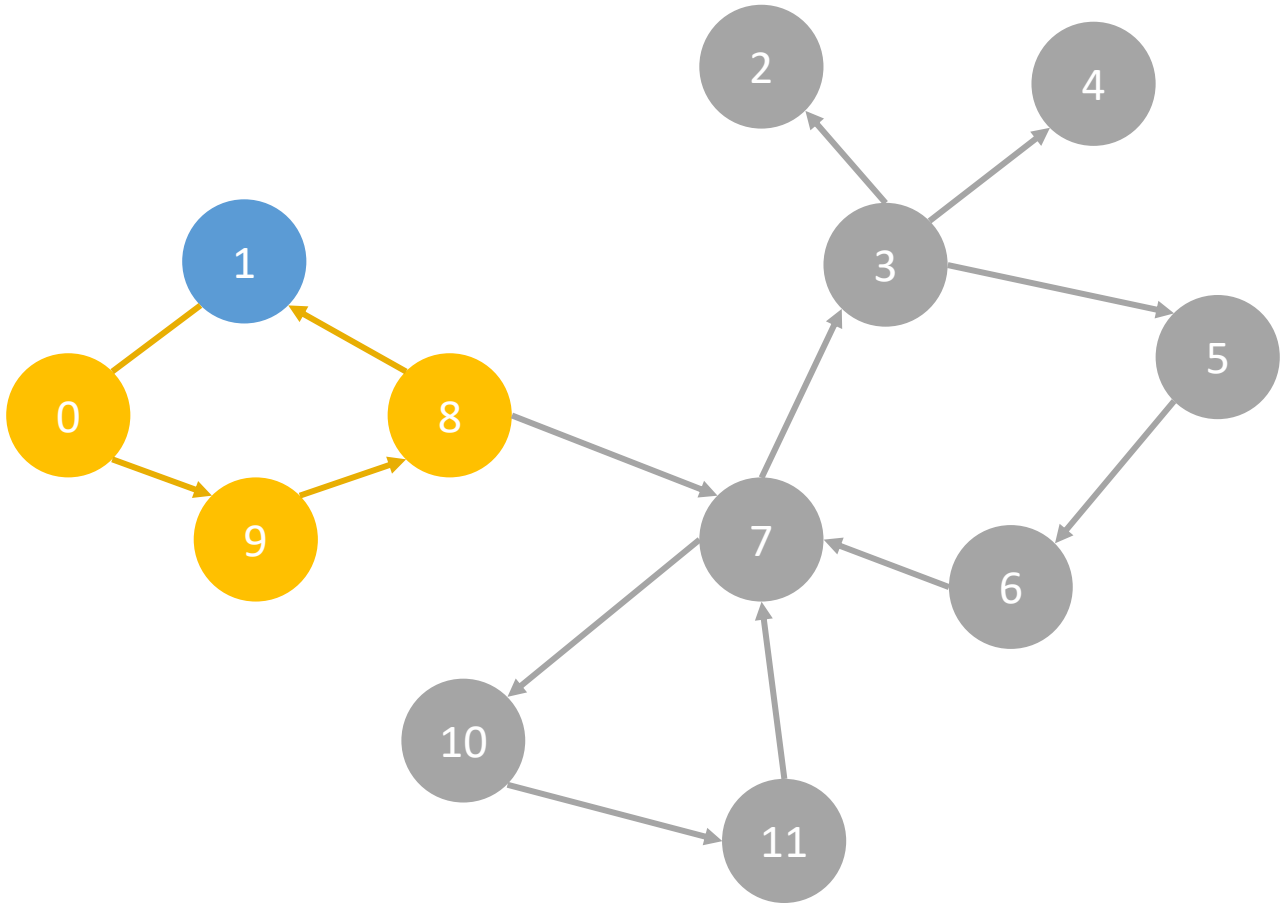

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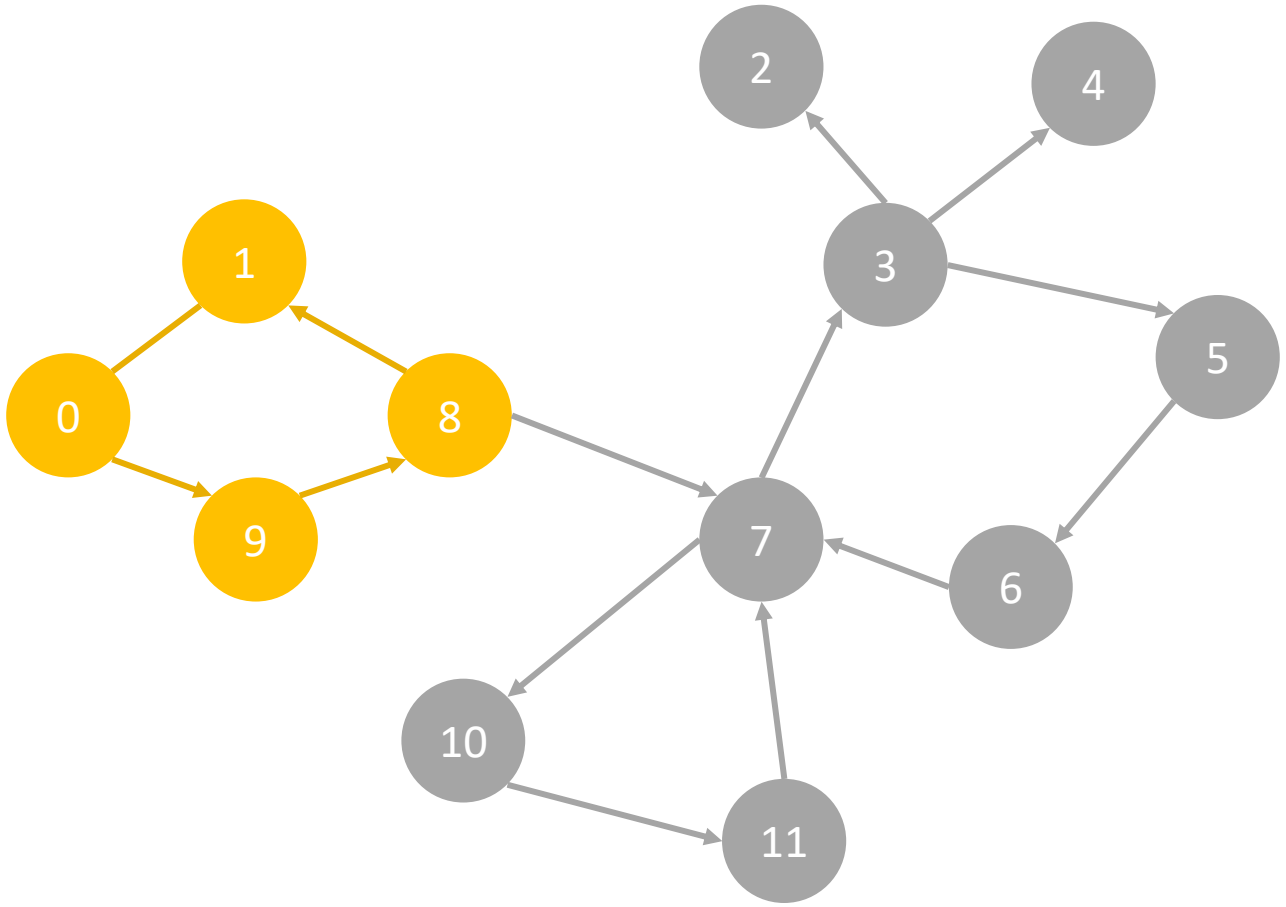

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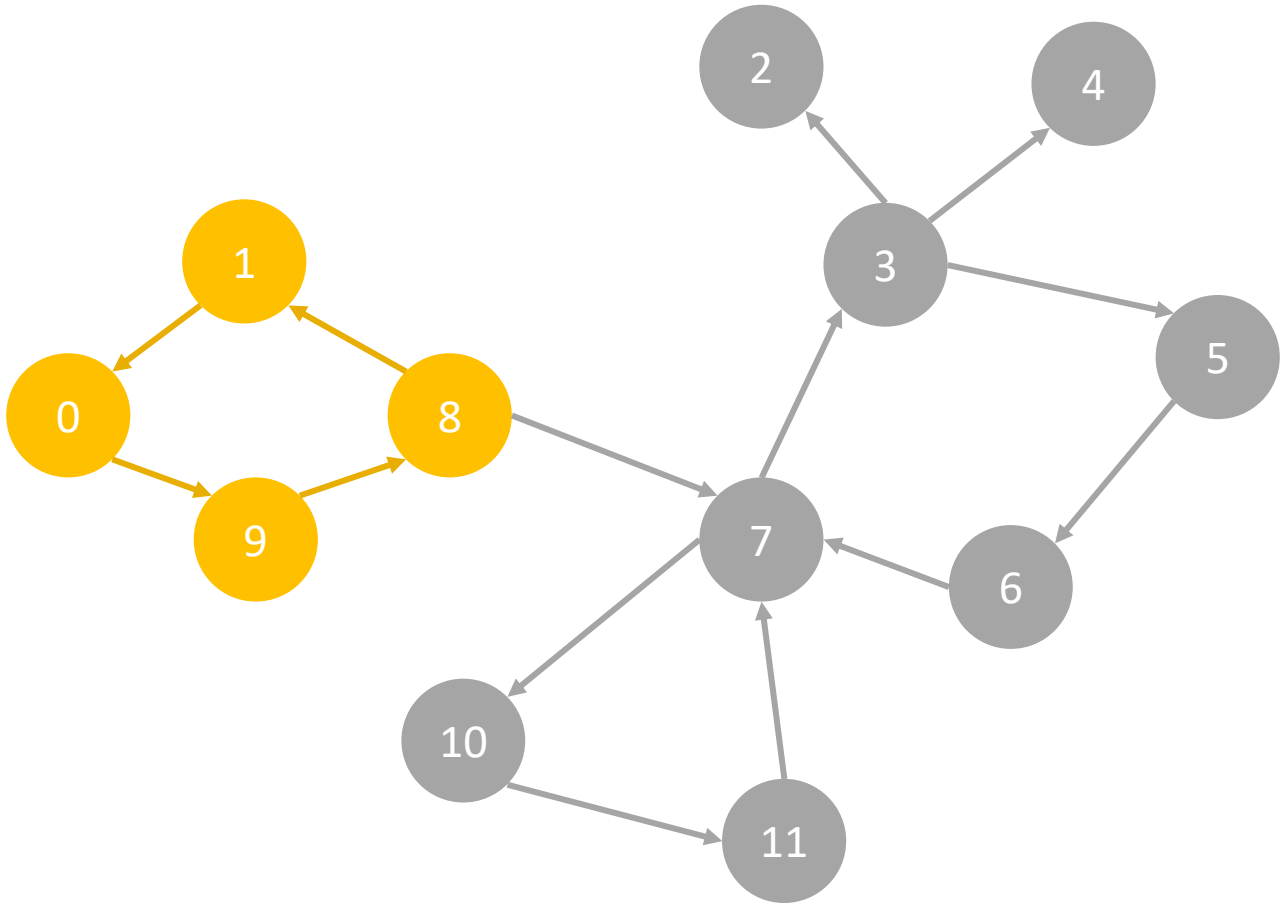

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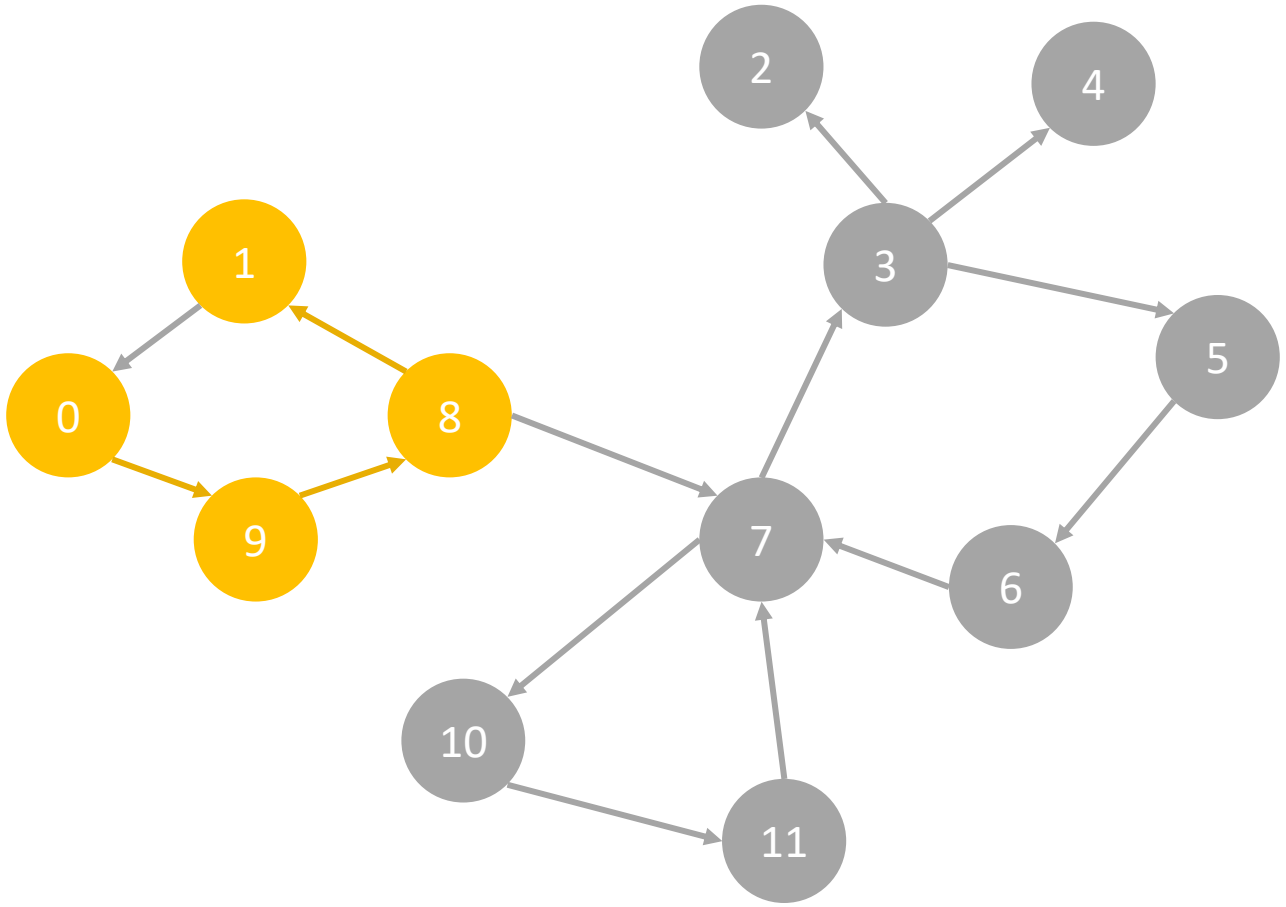

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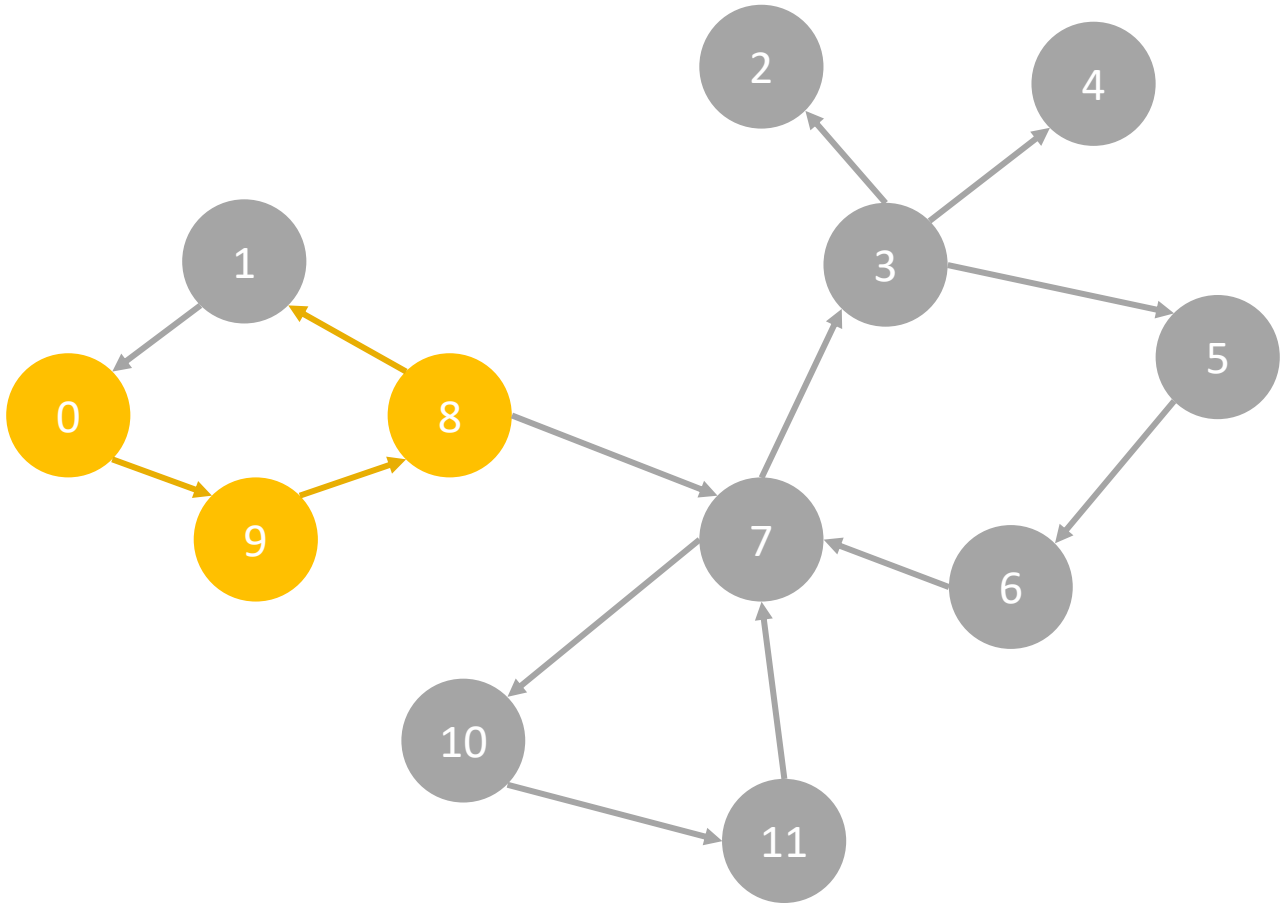

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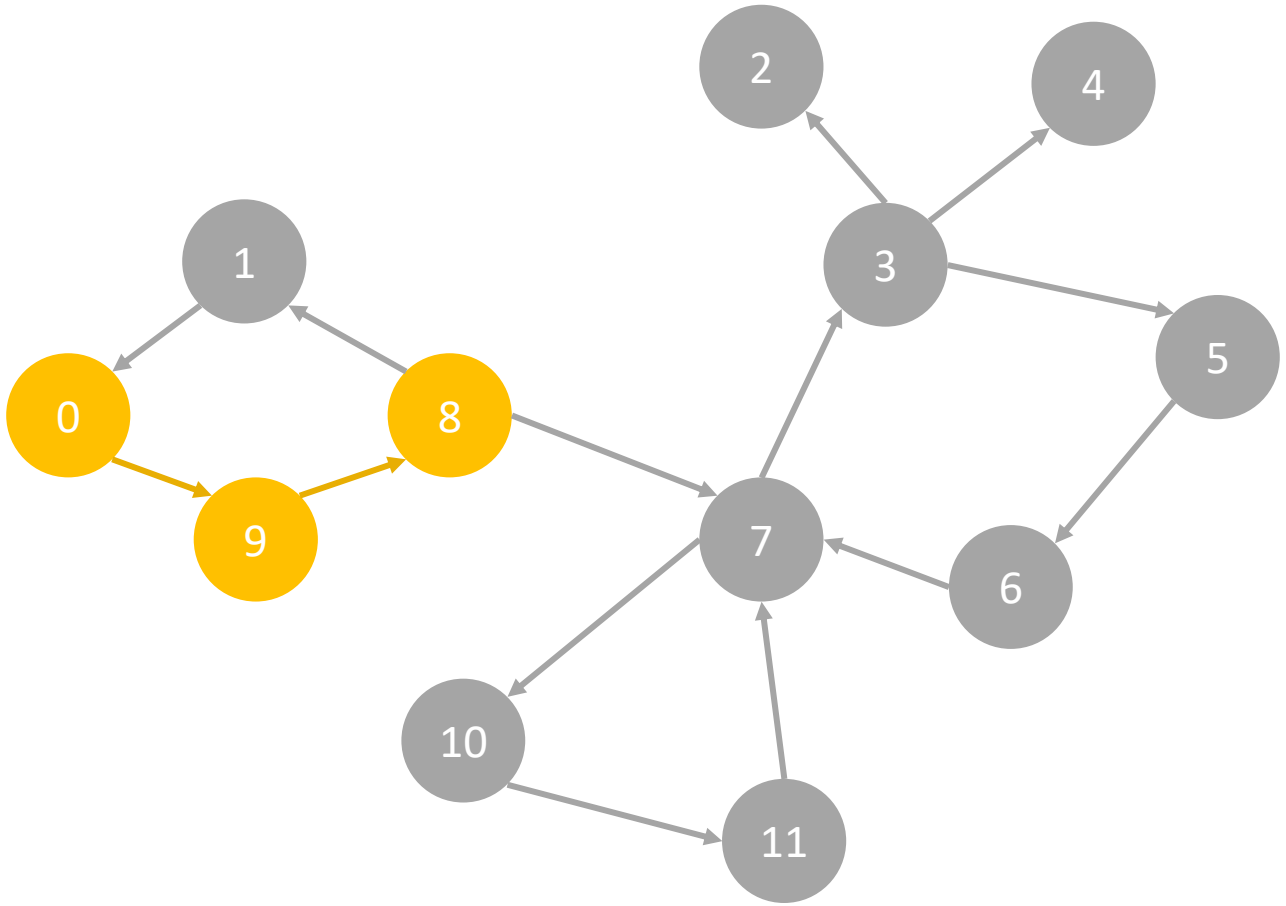
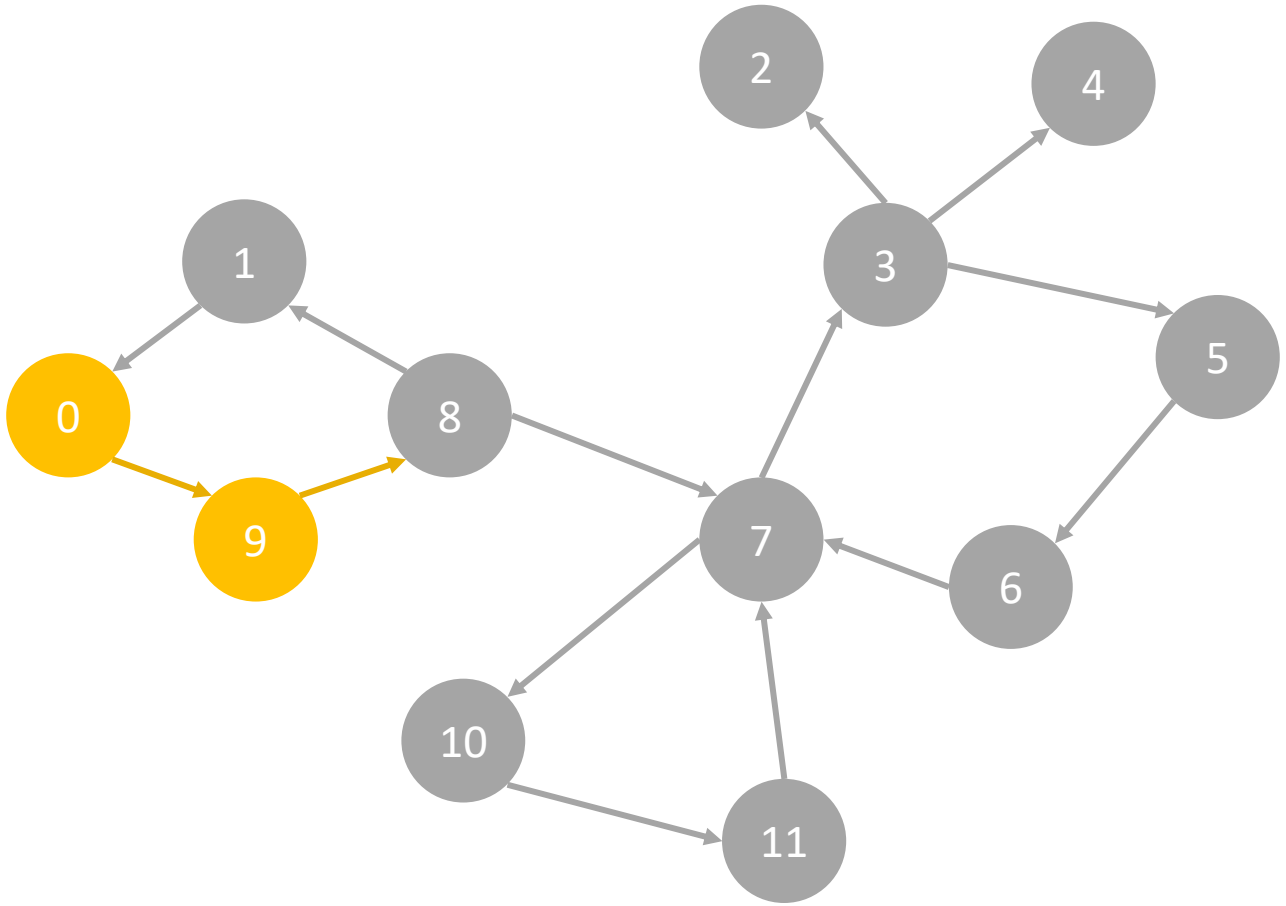


EXPLAIN

Depth-First Search (**DFS**)



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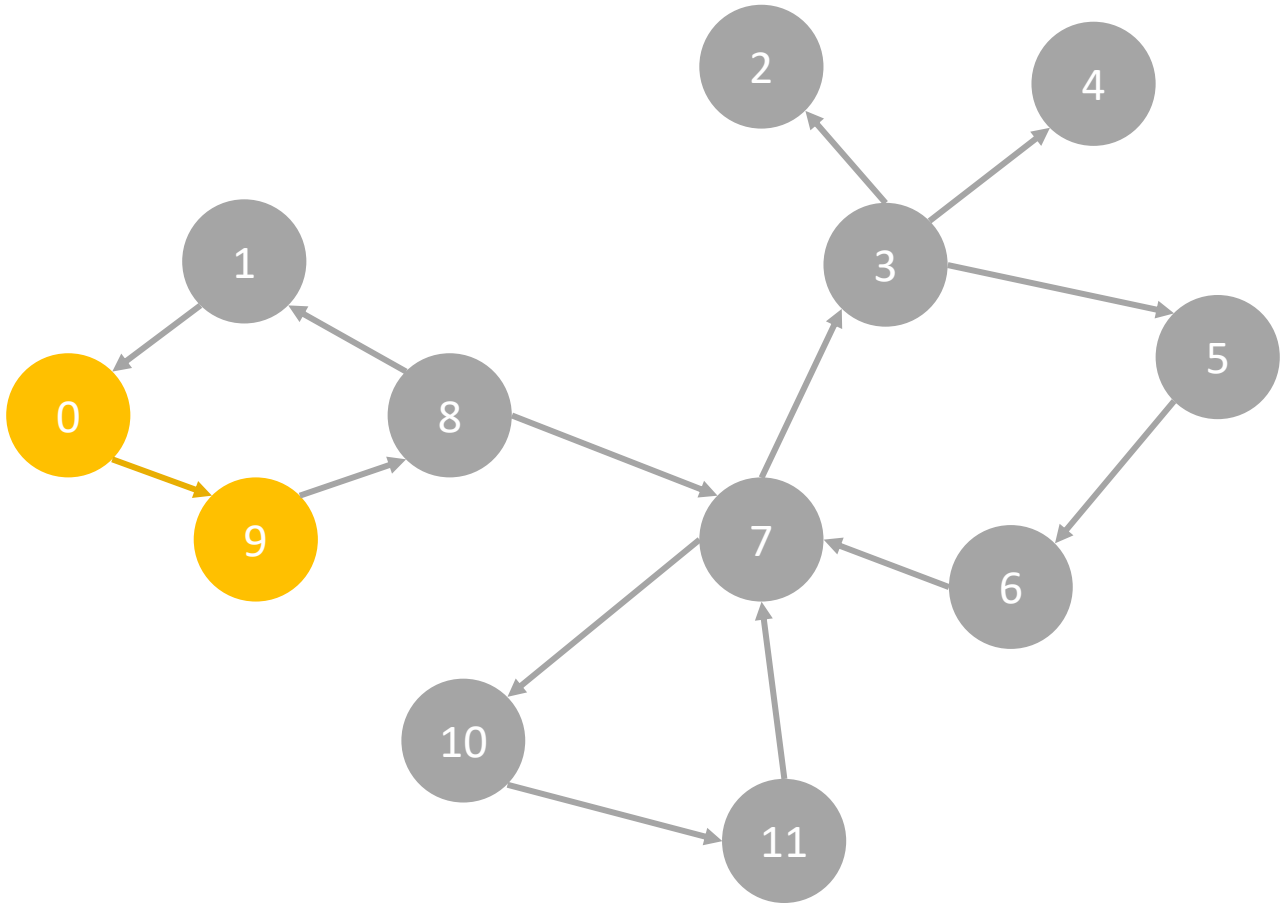

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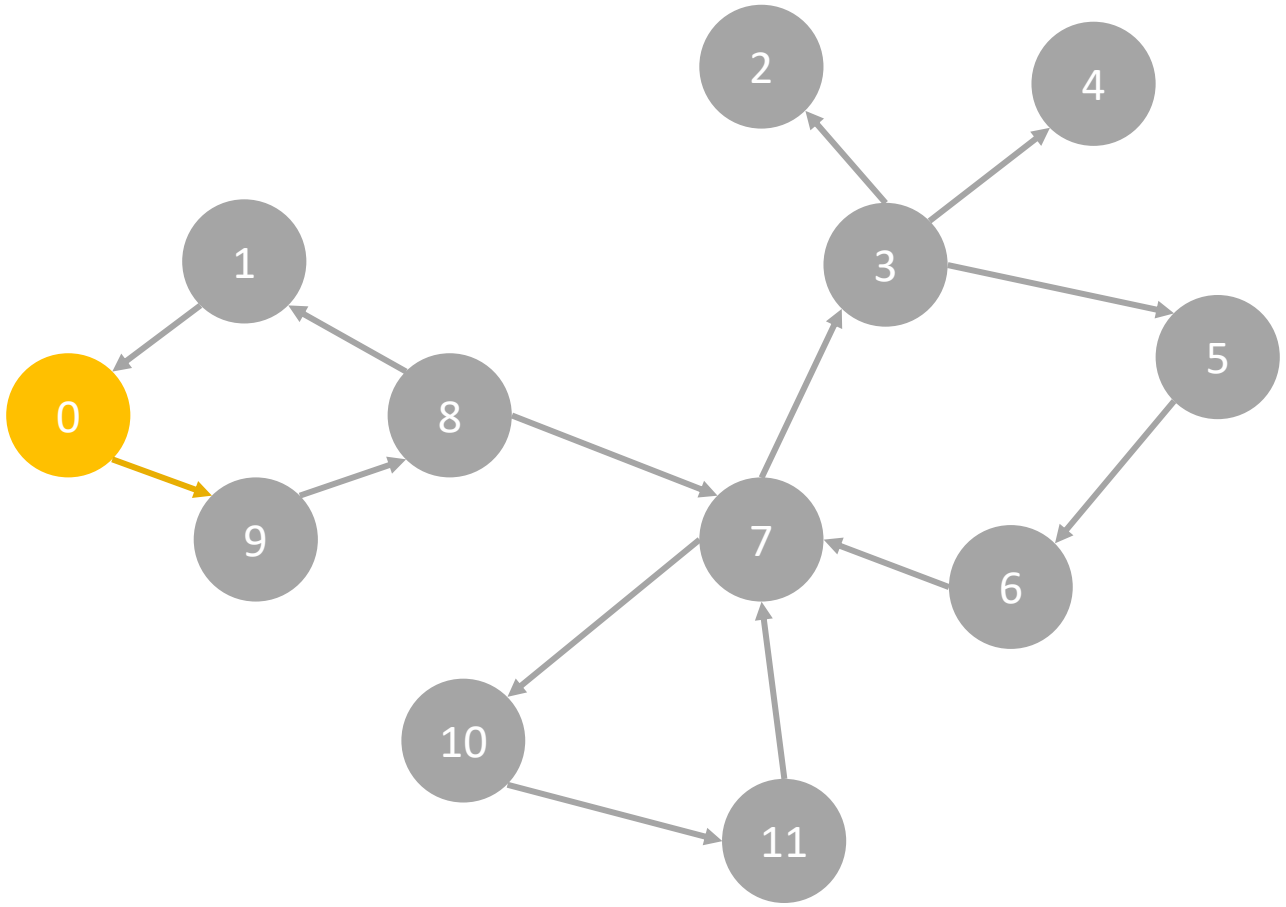

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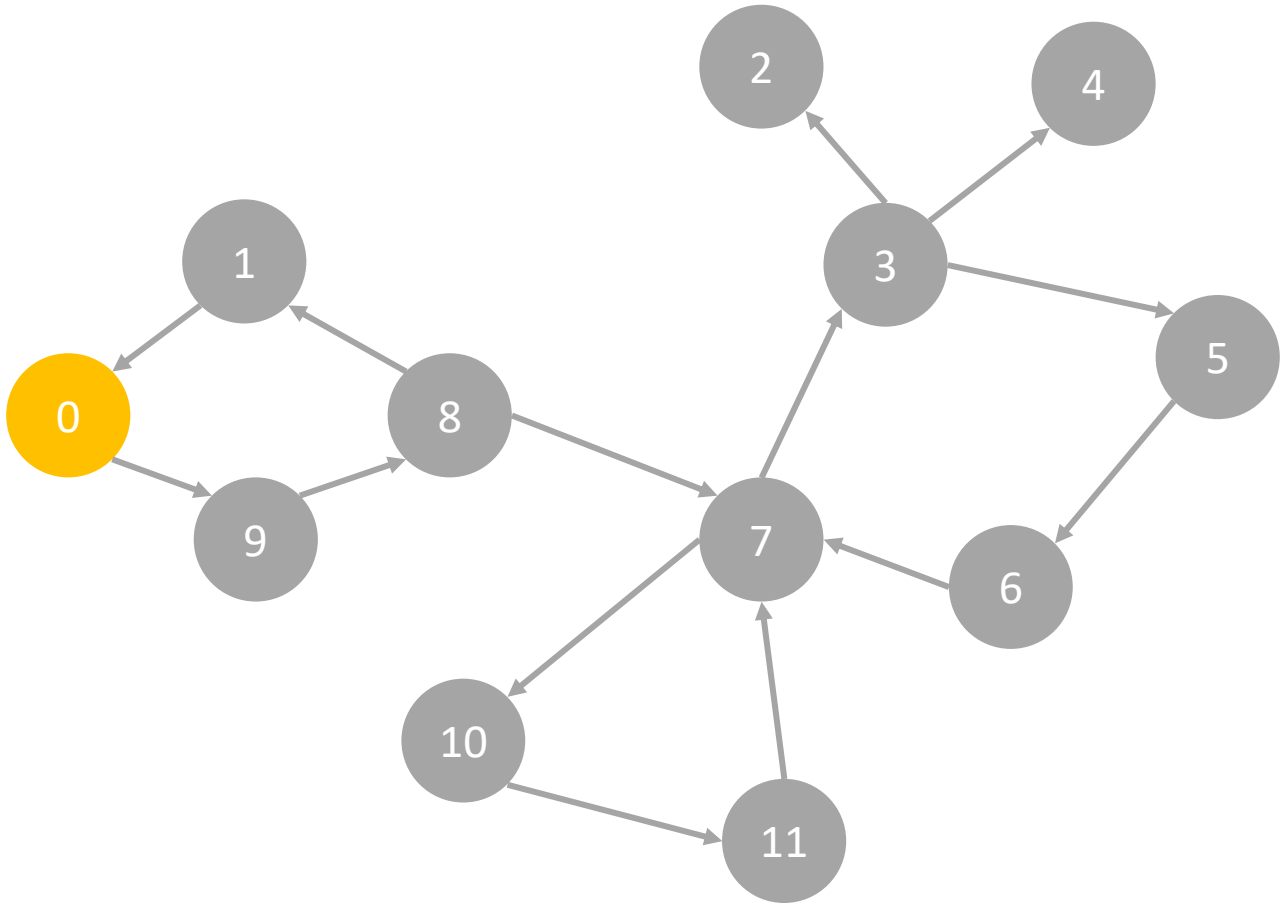

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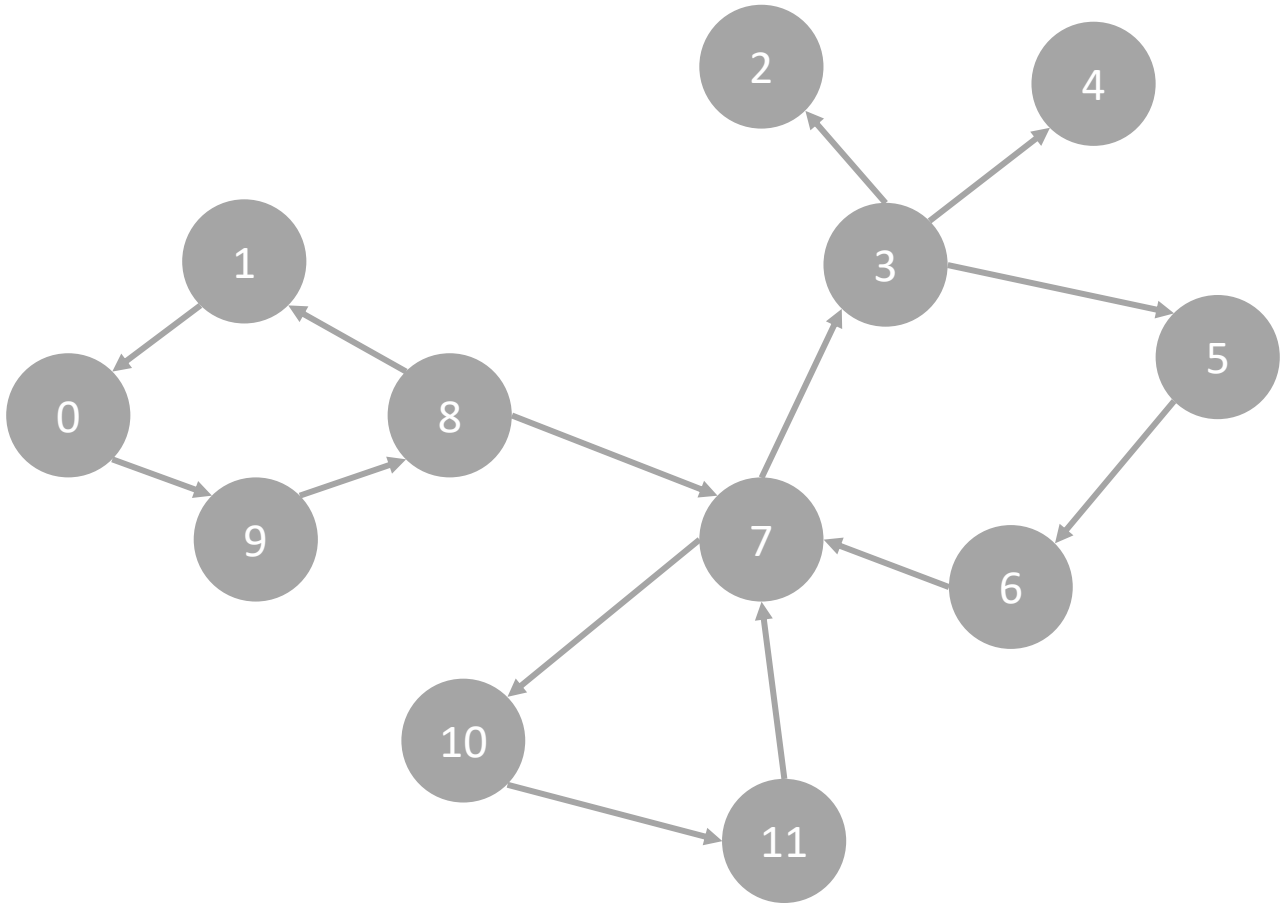
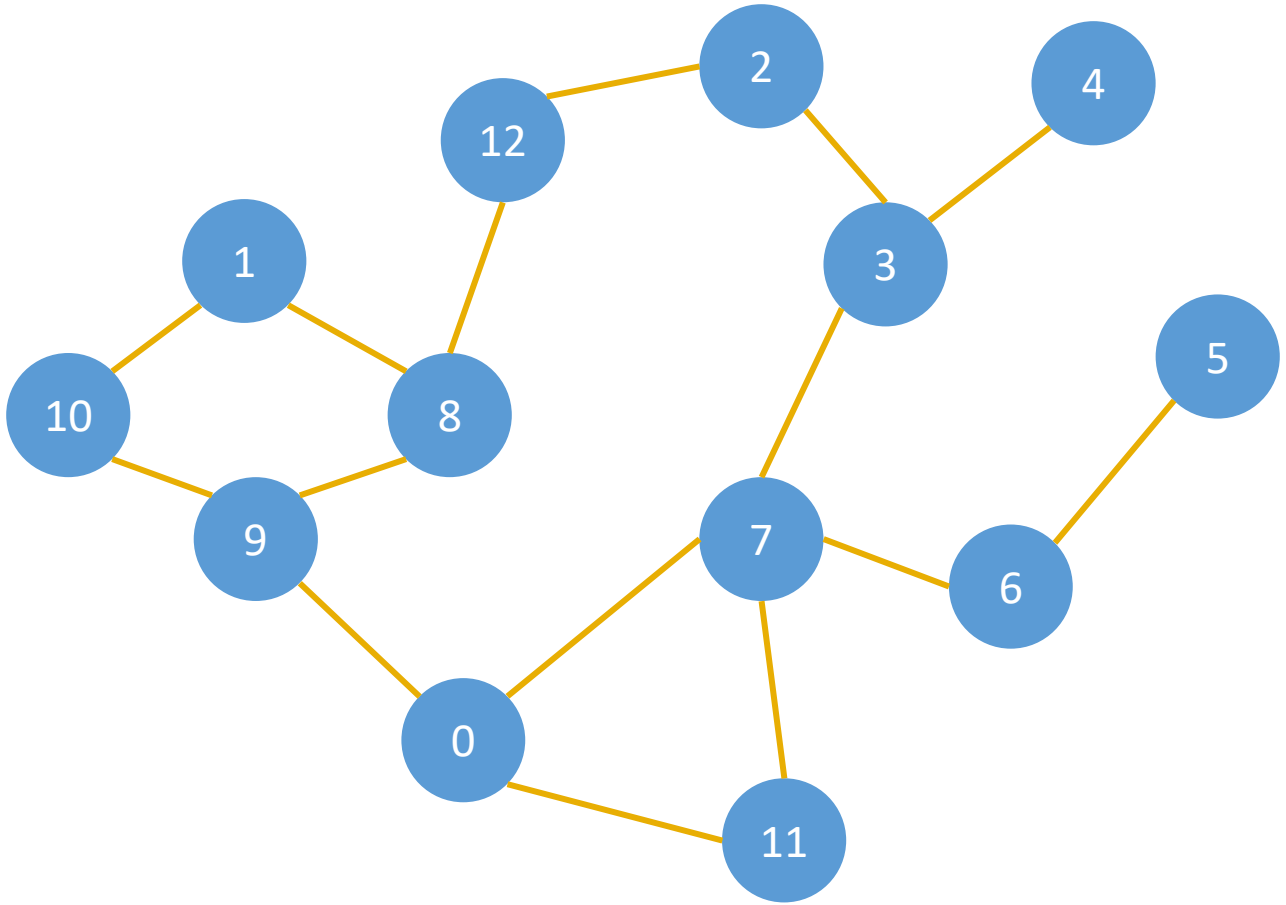


QUIZ

Depth-First Search (**DFS**)

Traverse the graph below:



EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, starting from the source node.

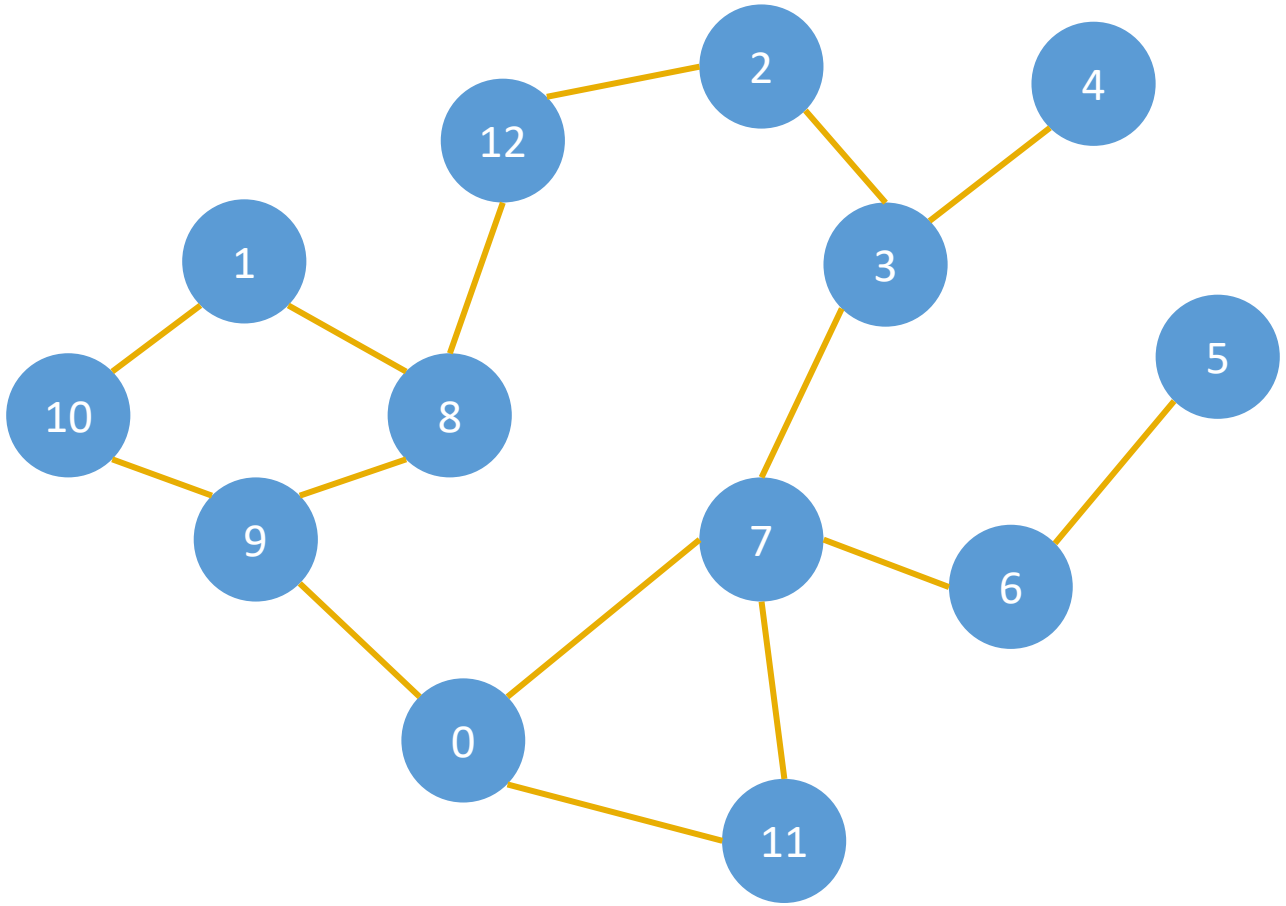
BFS Algorithm

1. Initialize a queue and mark the starting node as visited.
2. Add the starting node to the queue.
3. While the queue is not empty:
    1. Dequeue a node.
    2. Visit all its unvisited neighbors, mark them as visited, and enqueue them.

EXPLAIN

Breadth-First Search (**BFS**)

A **BFS** starts at some arbitrary node of a graph and explores the neighbour nodes first, before moving to the next level neighbours.



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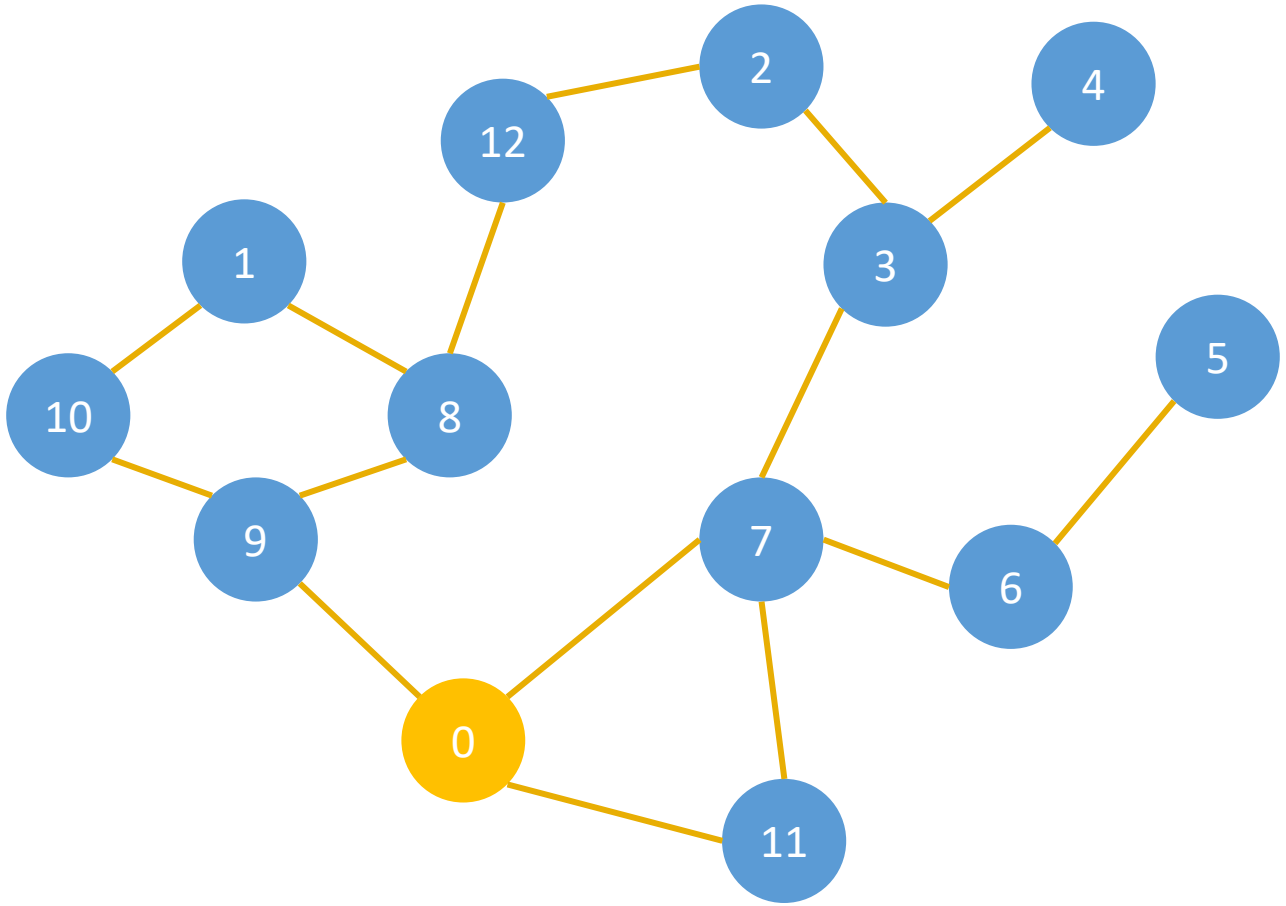

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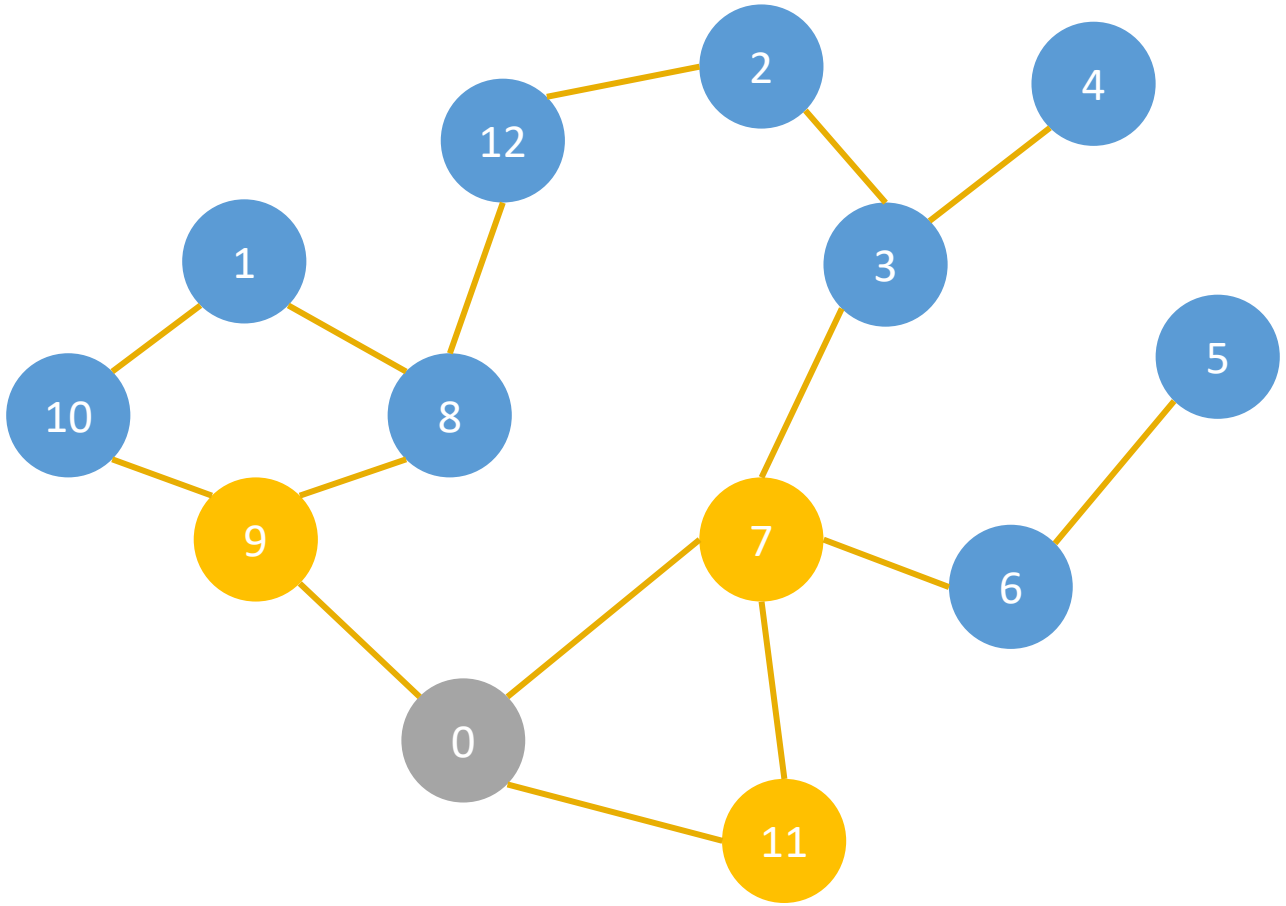

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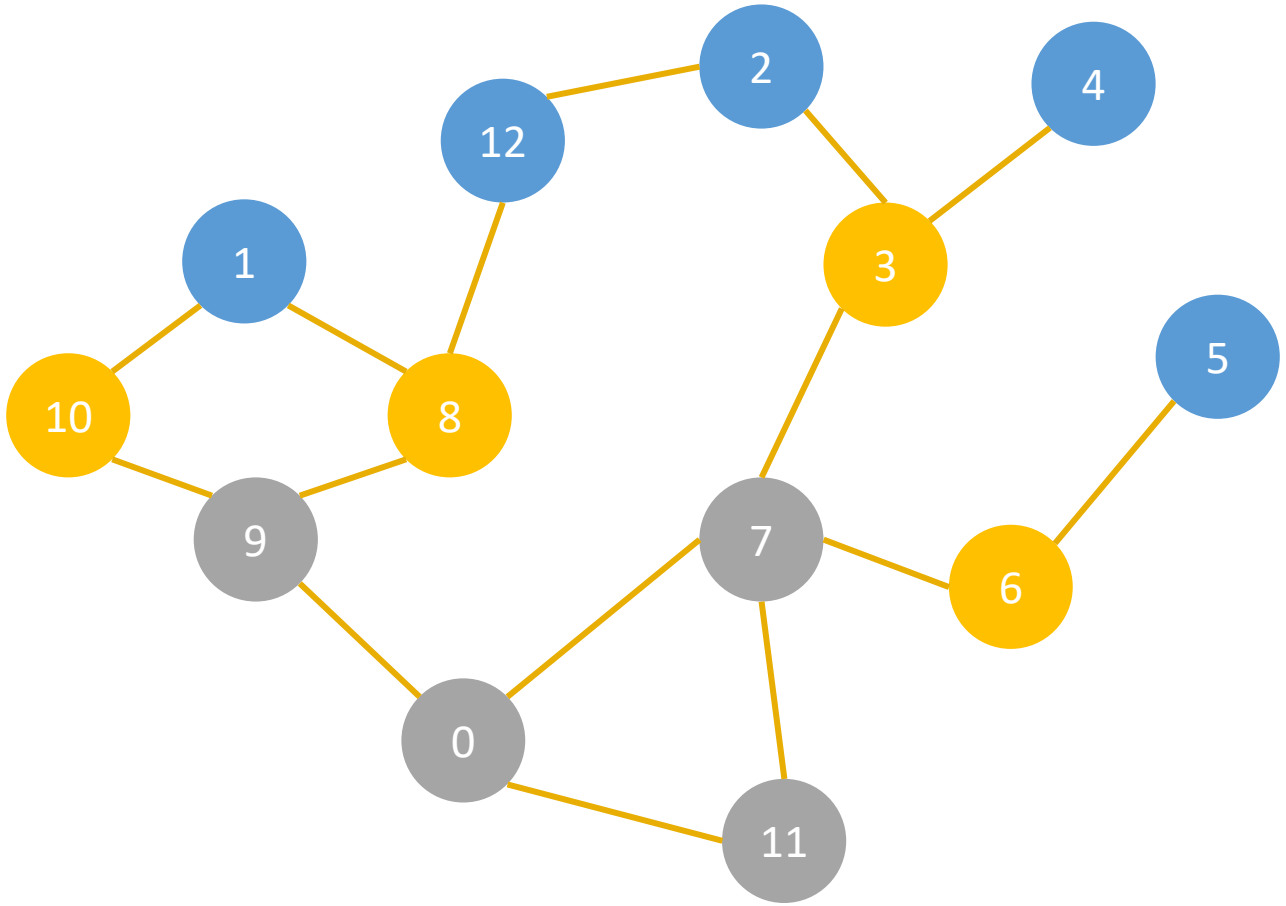

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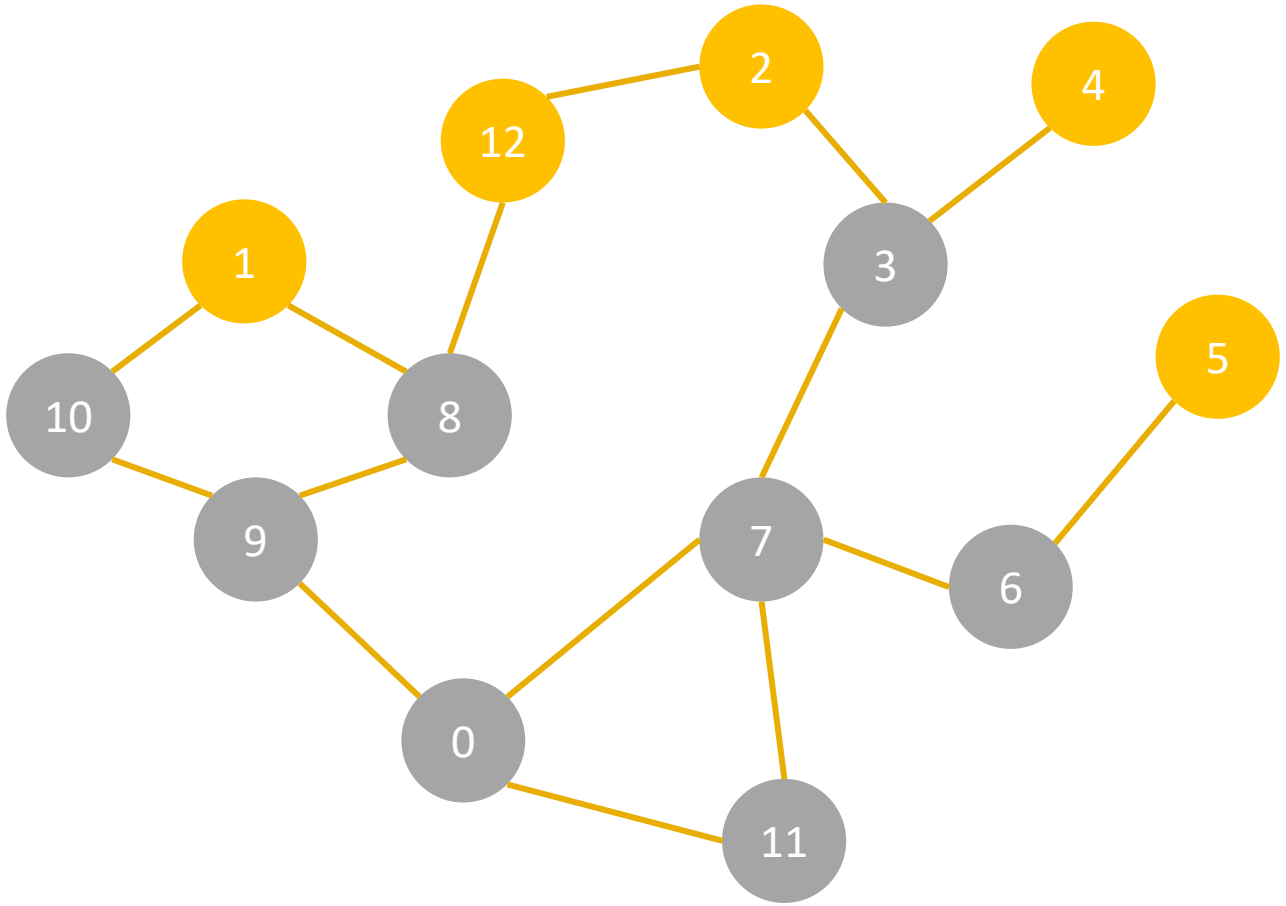

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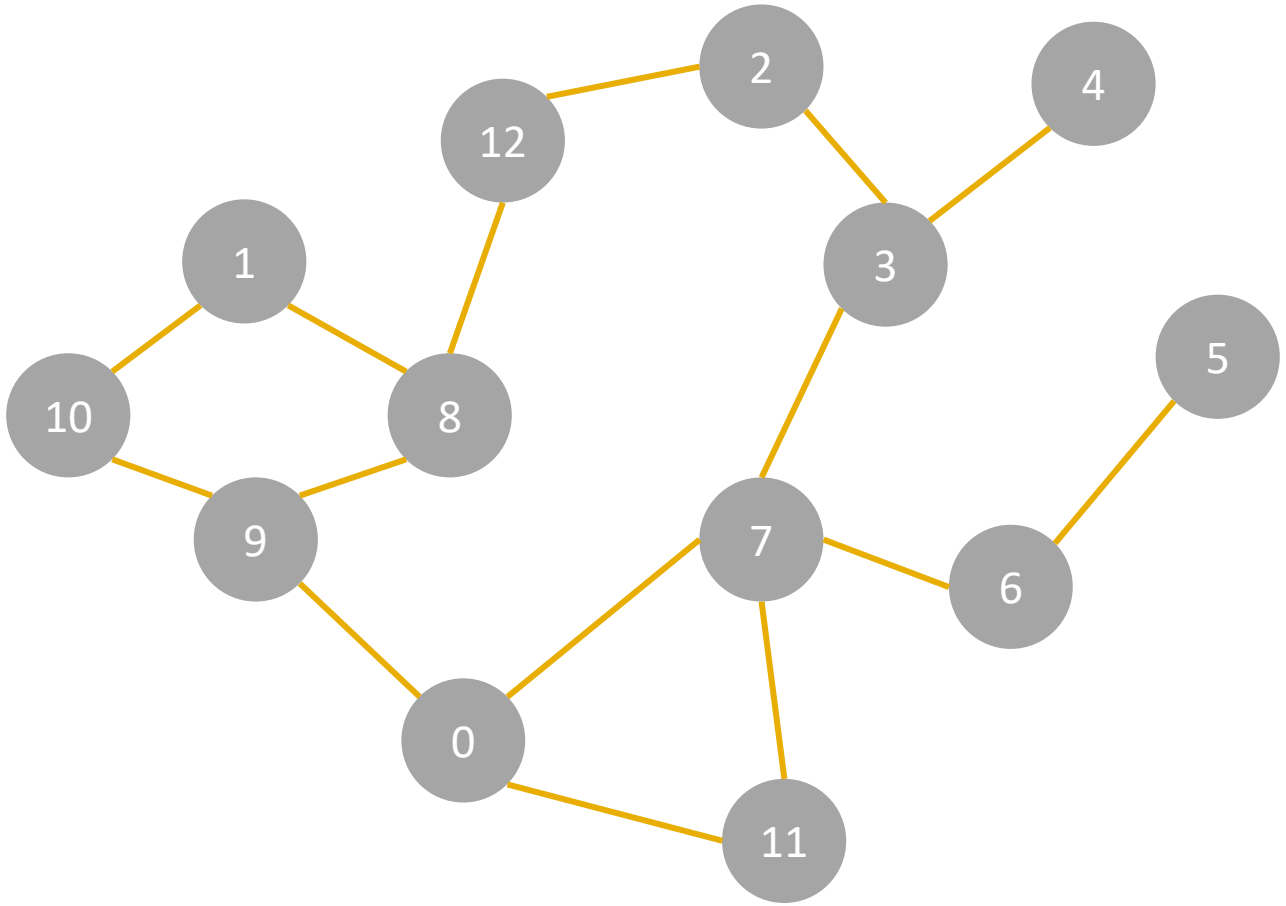

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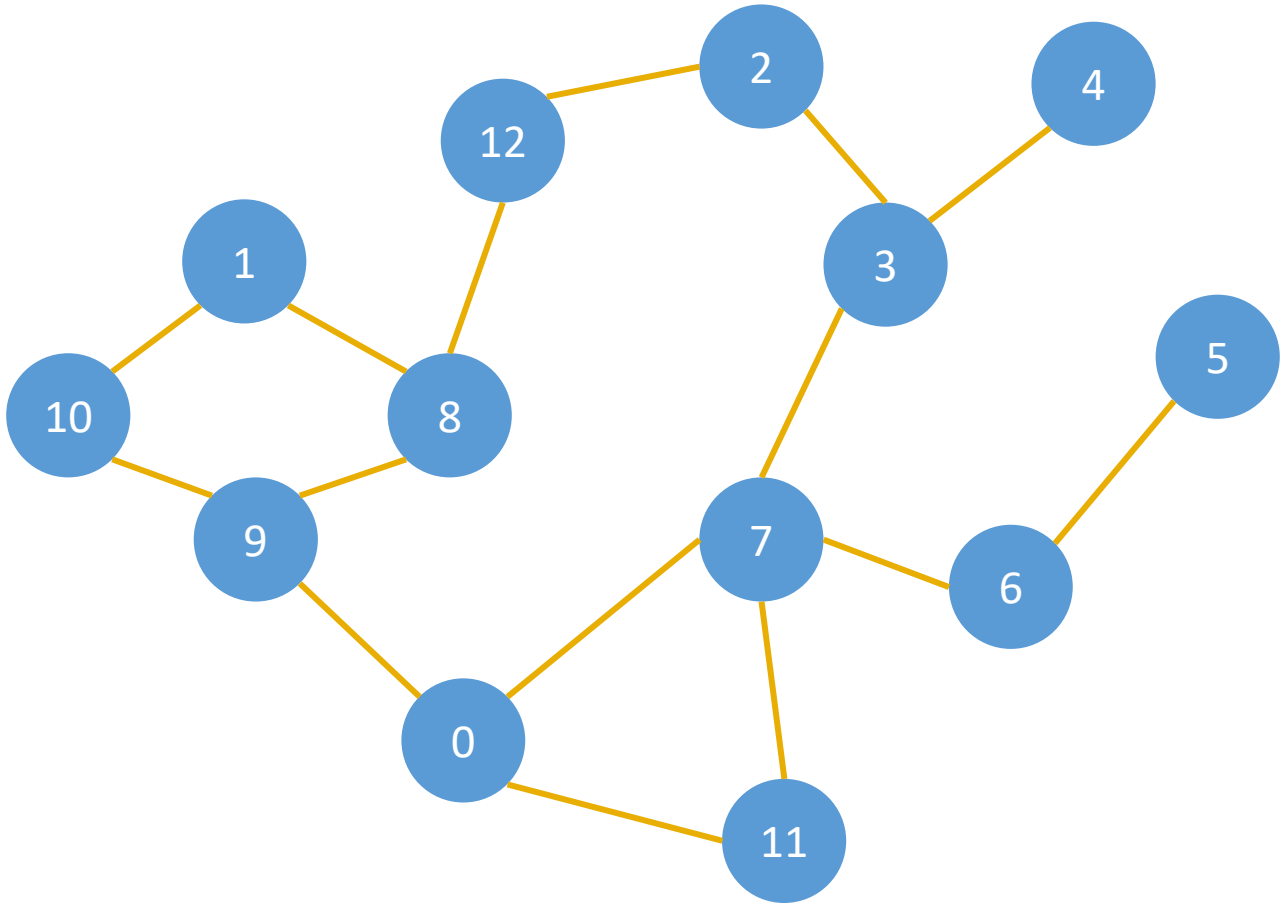

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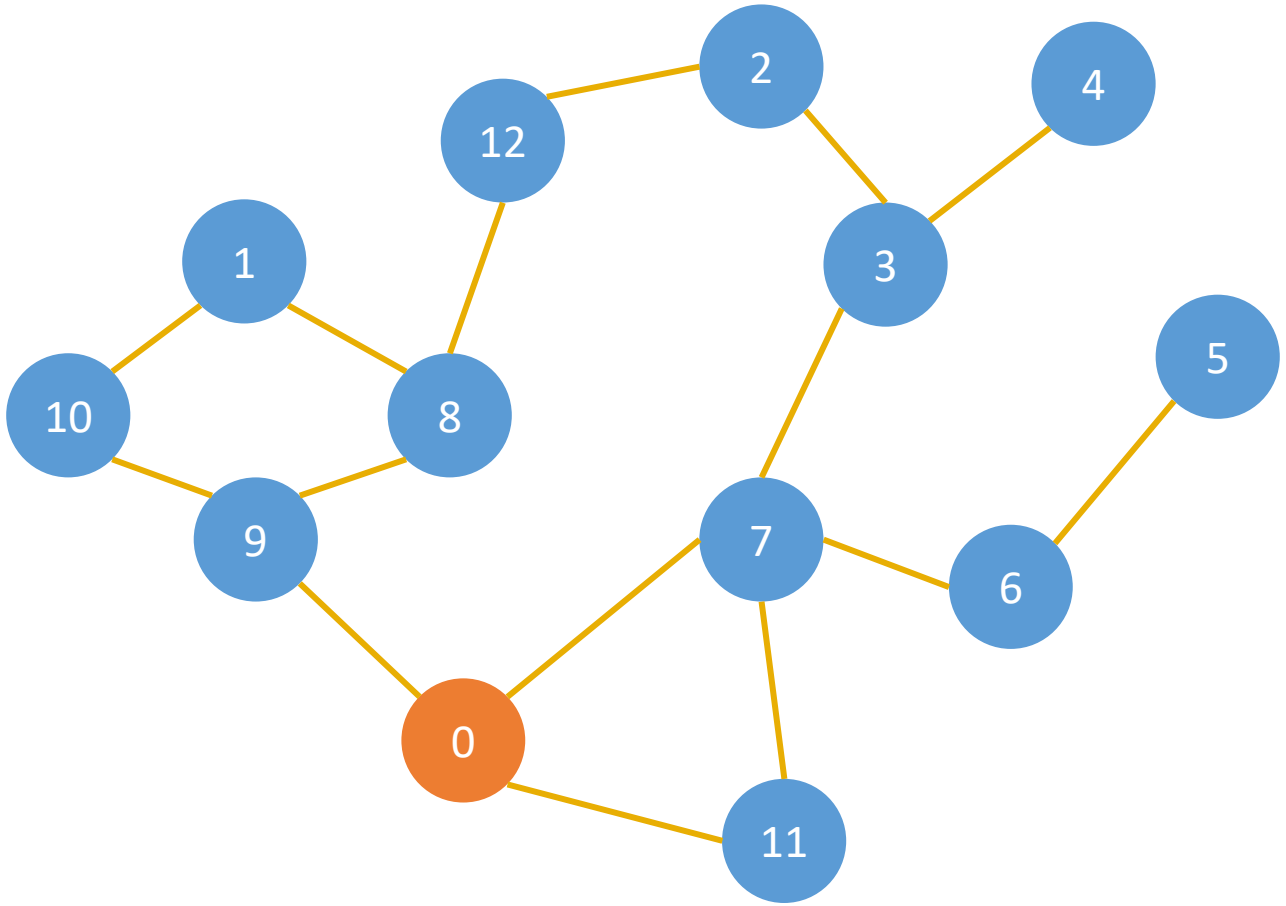

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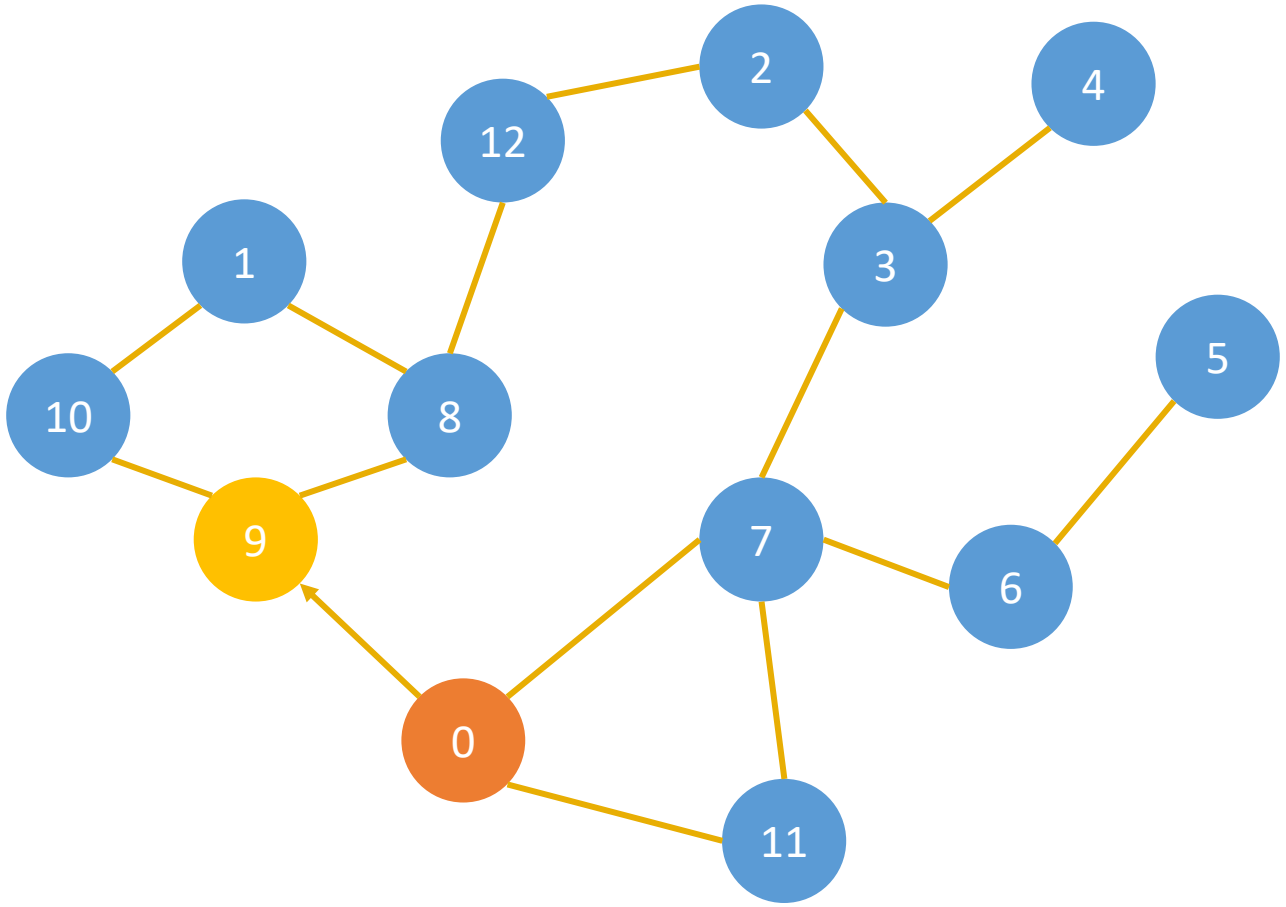

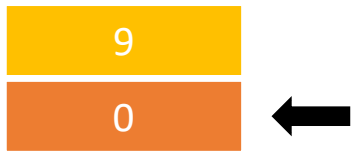

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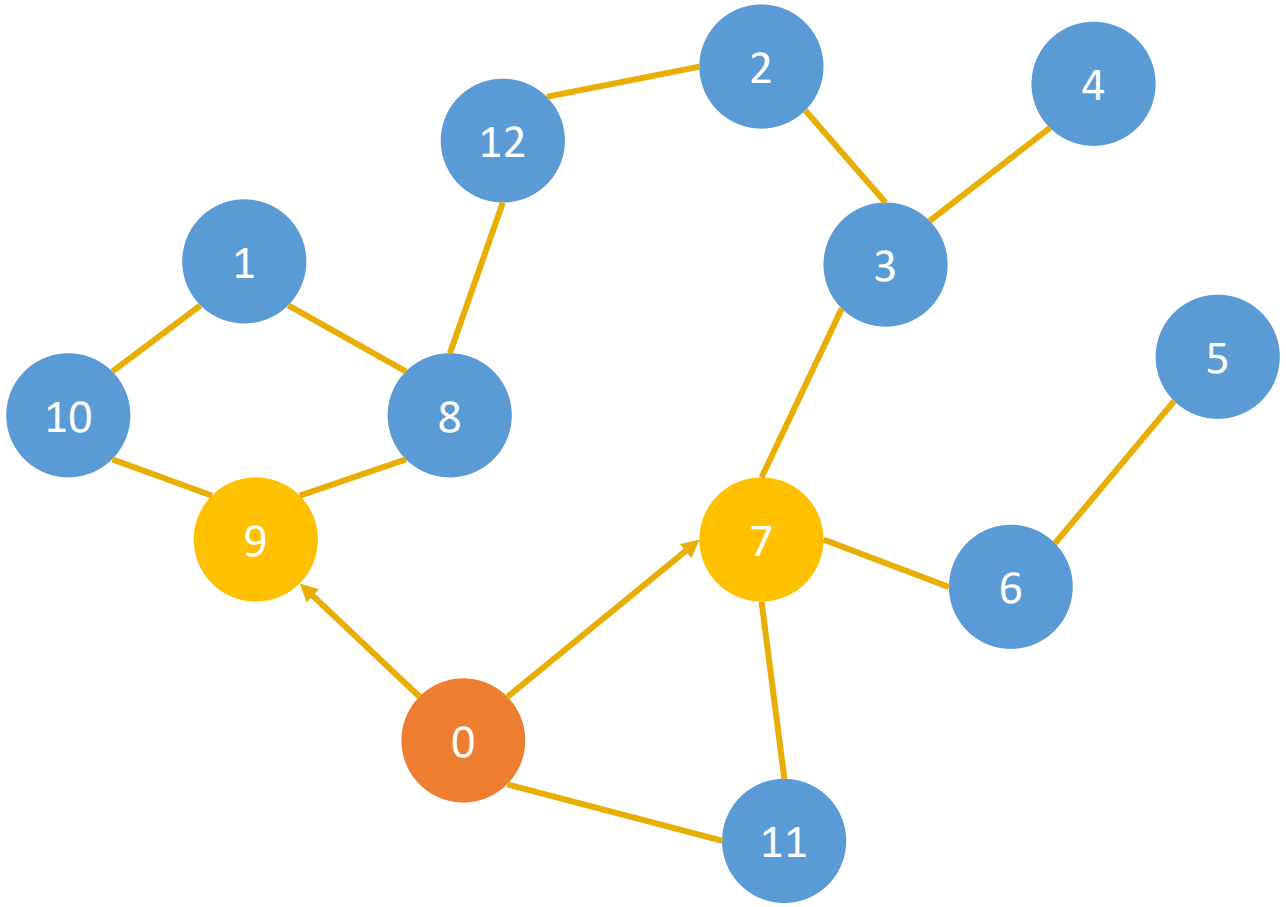

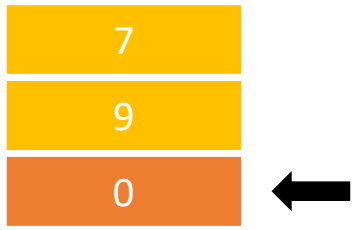

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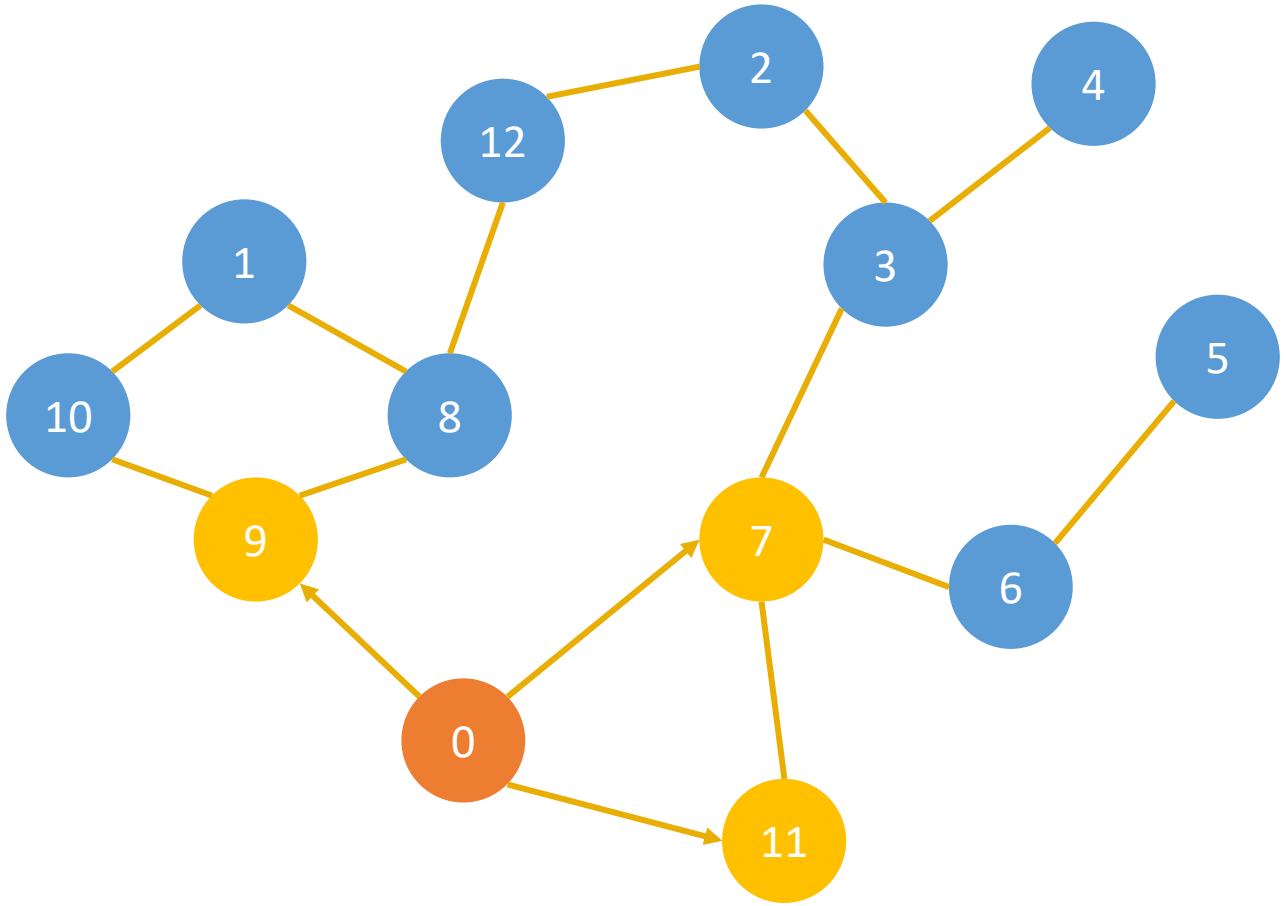

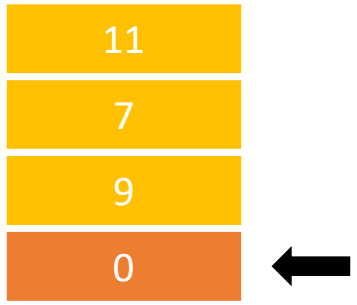

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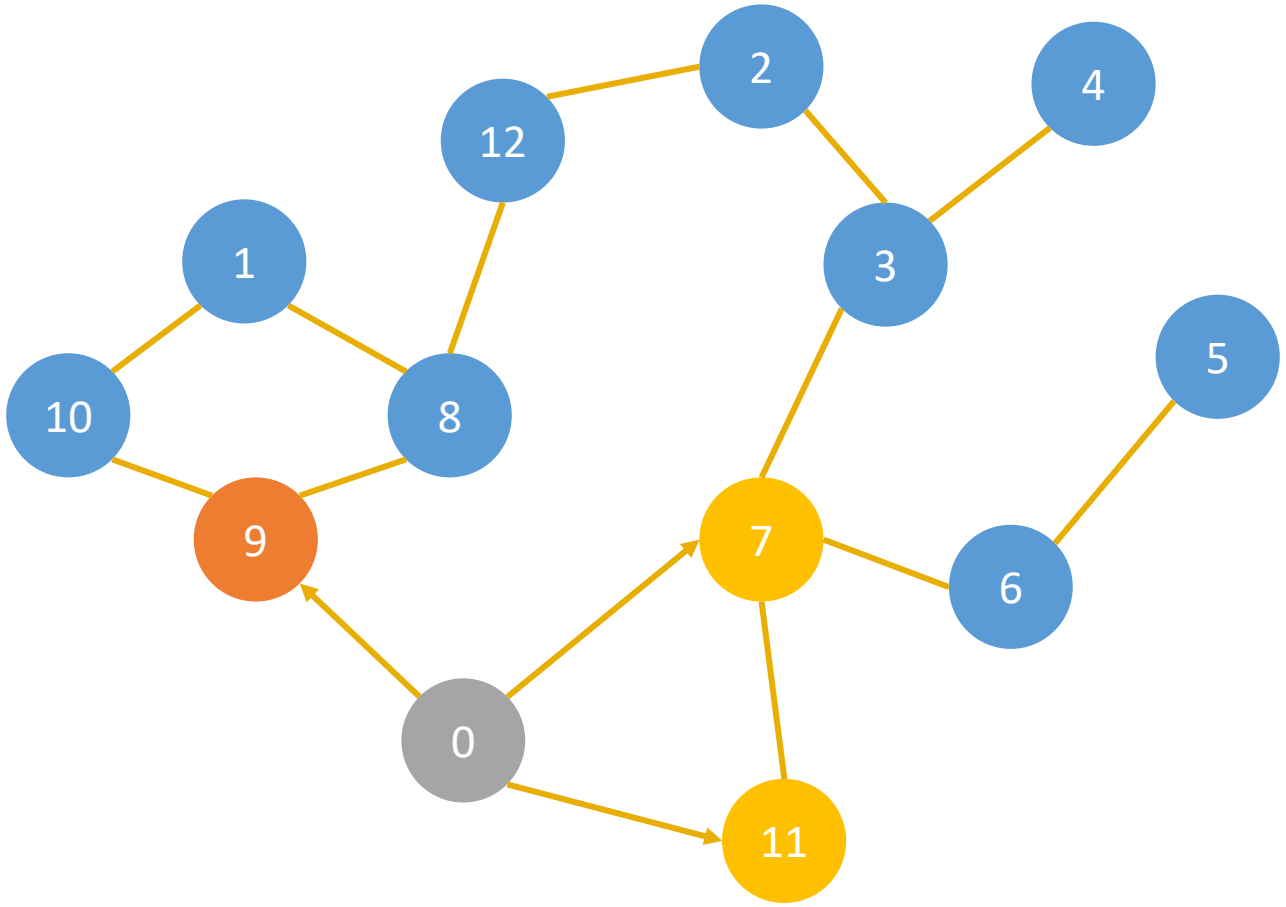

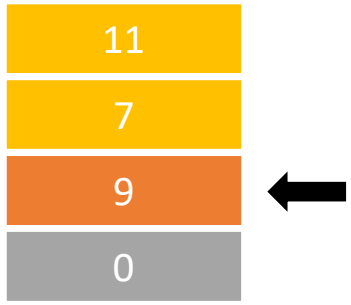

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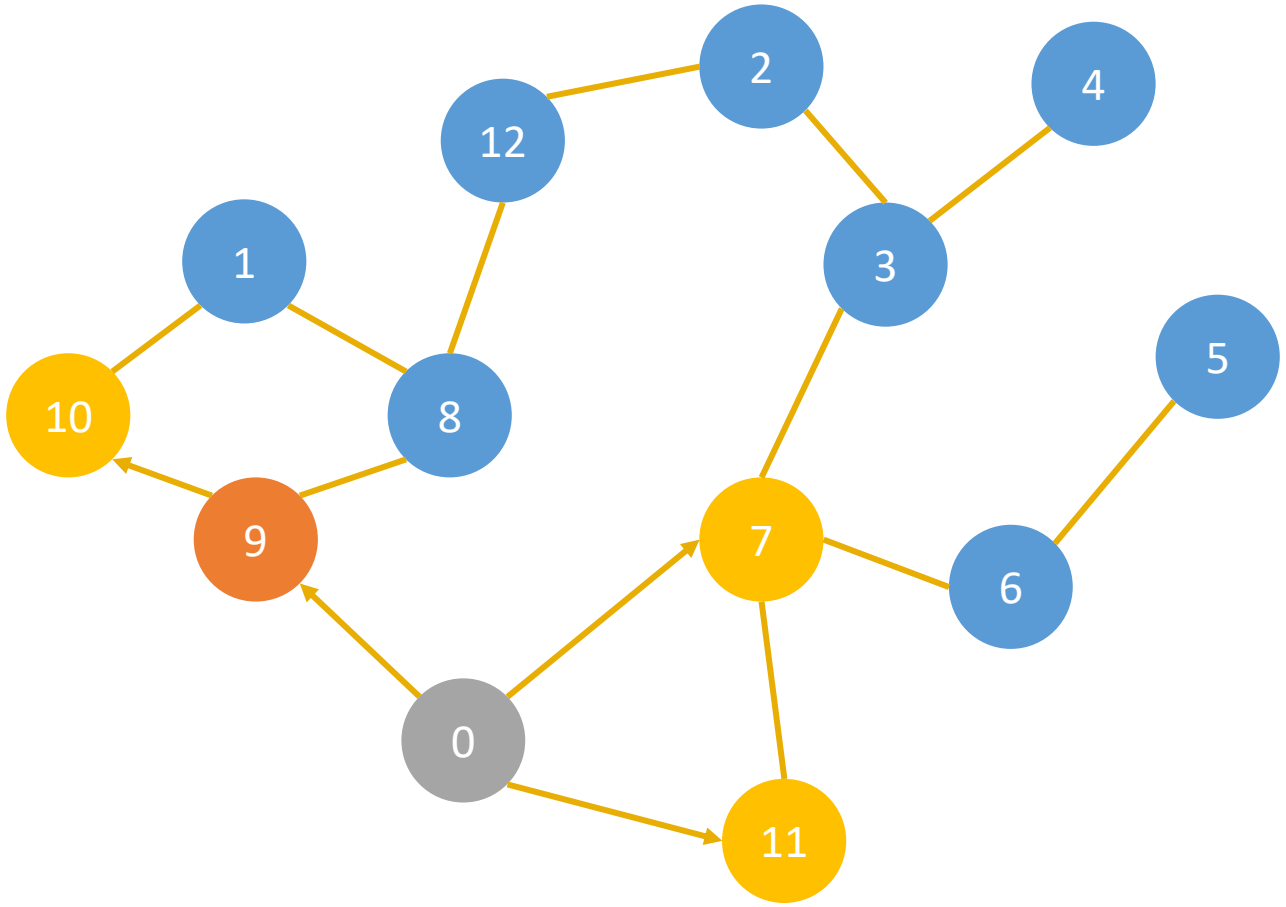

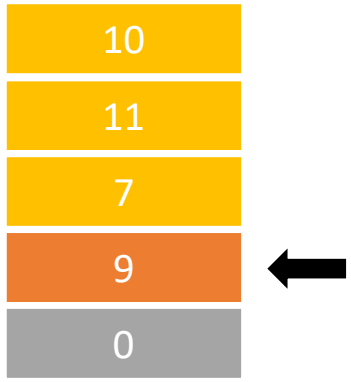

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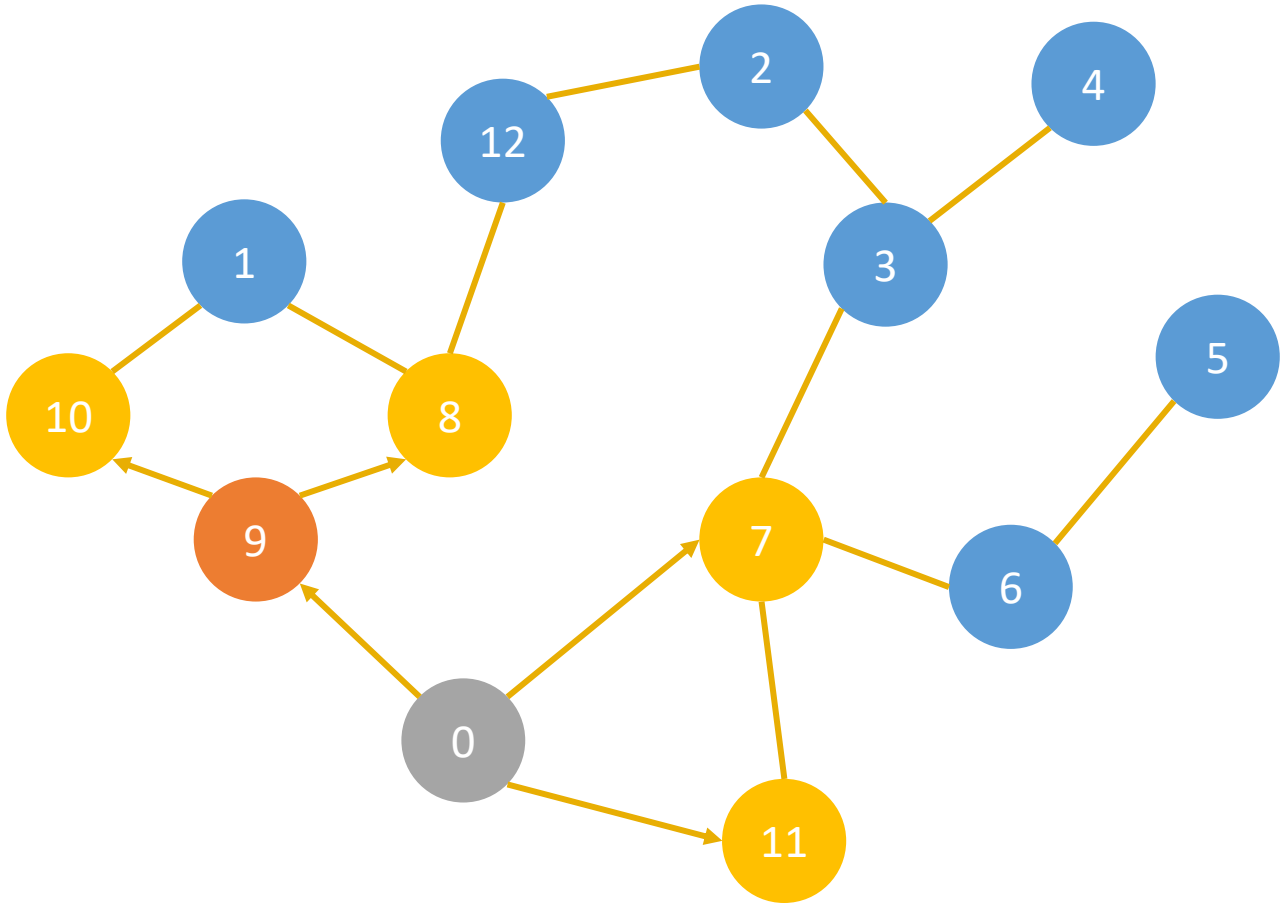

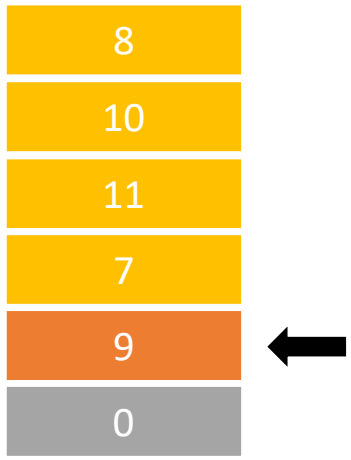

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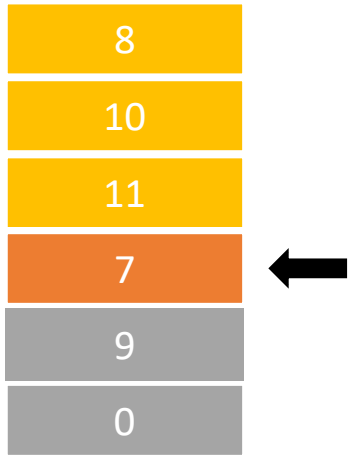

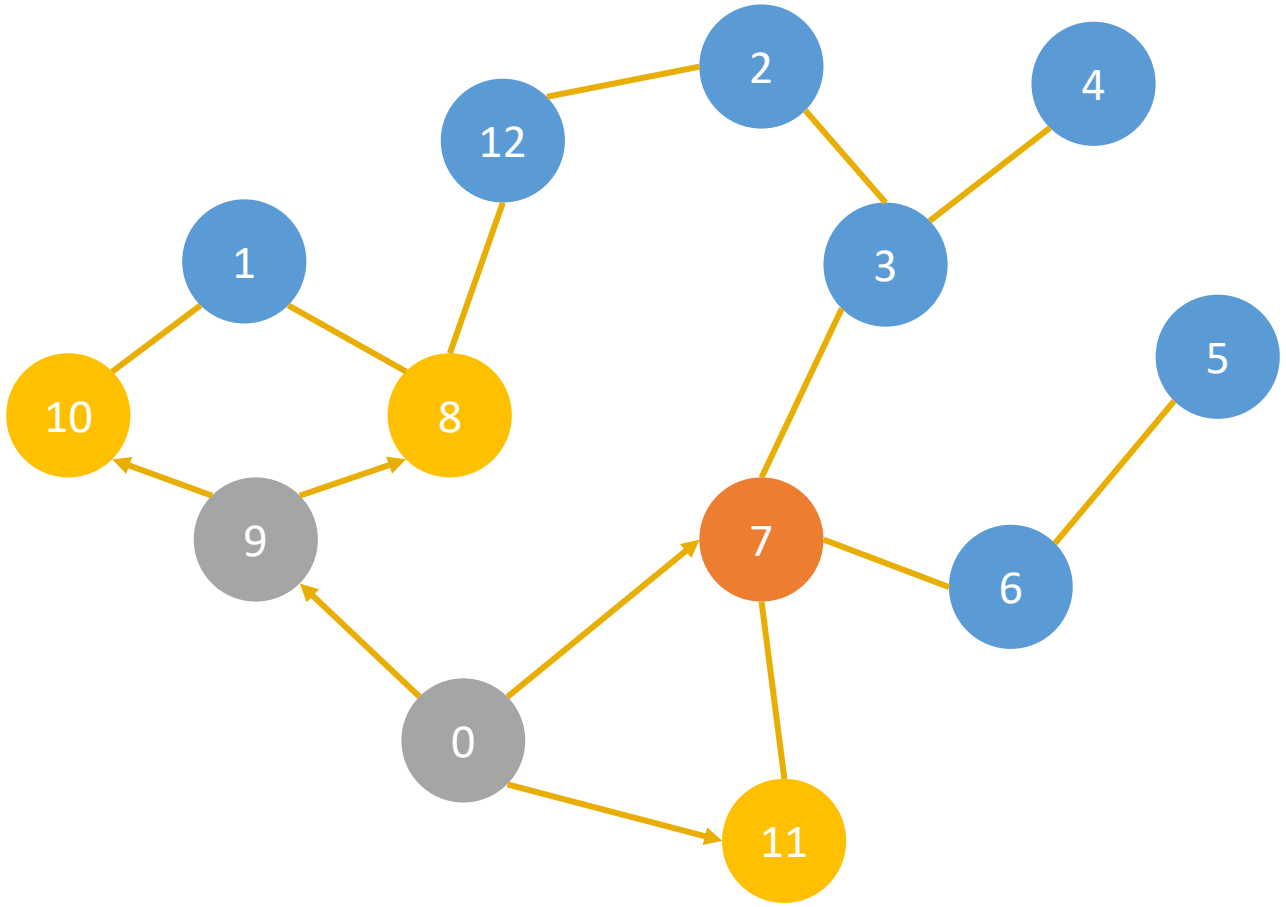

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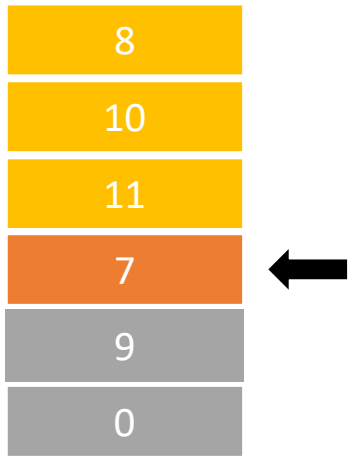

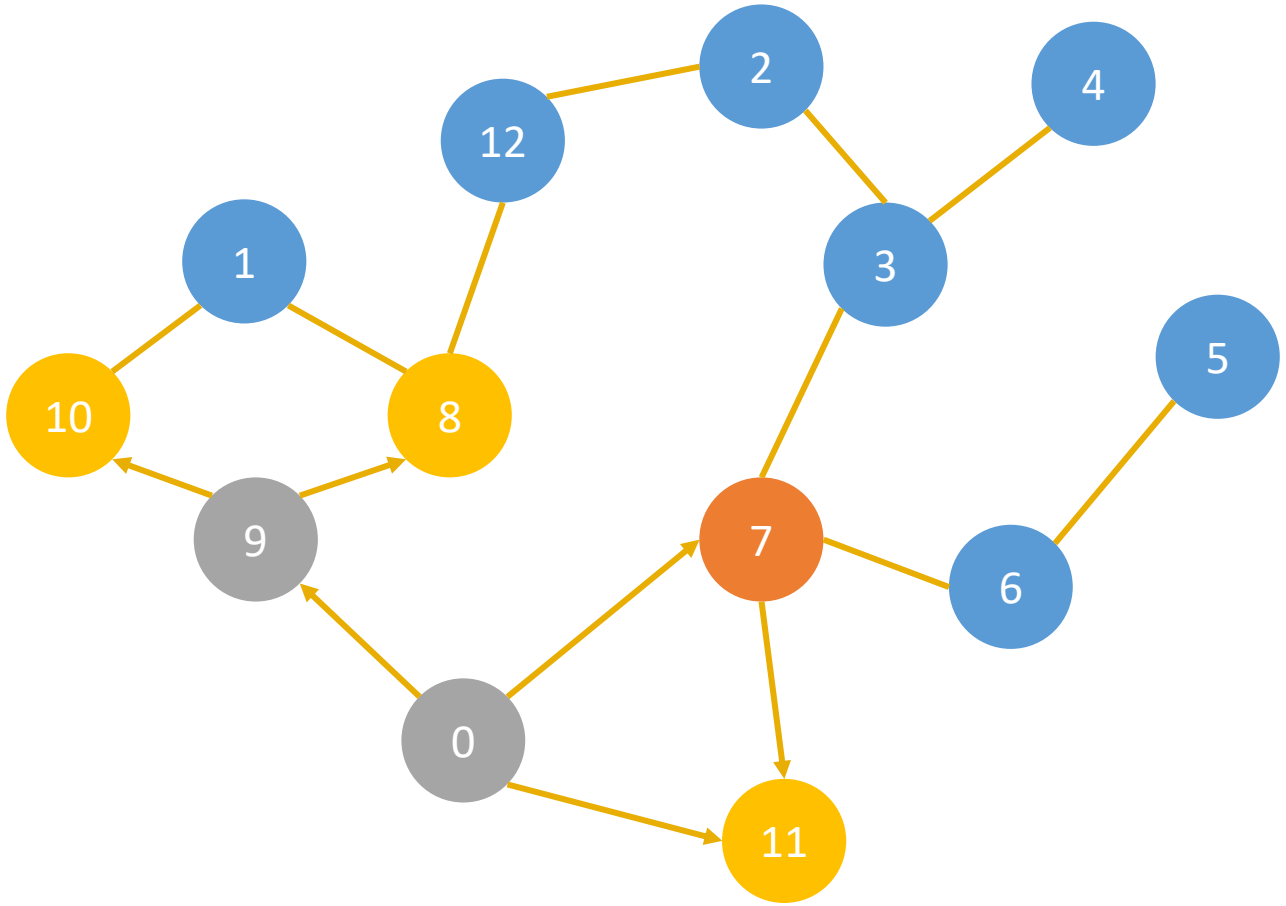

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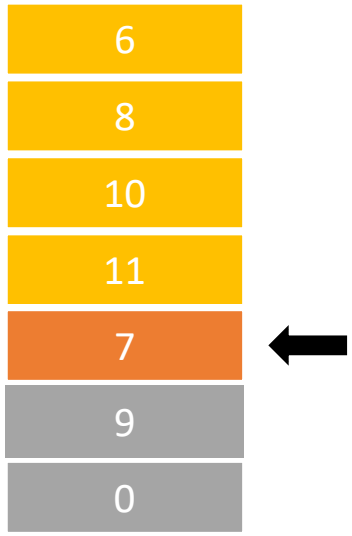

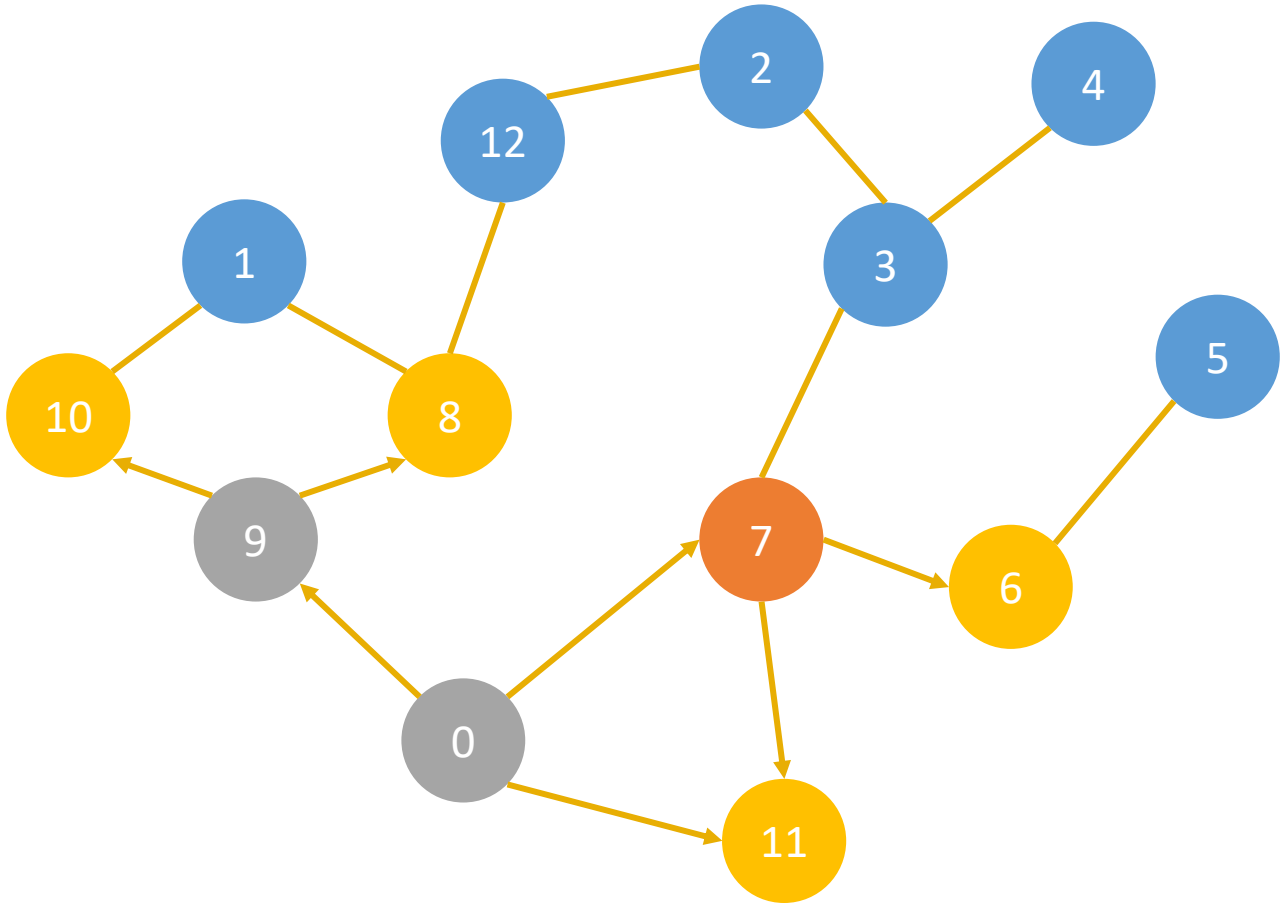

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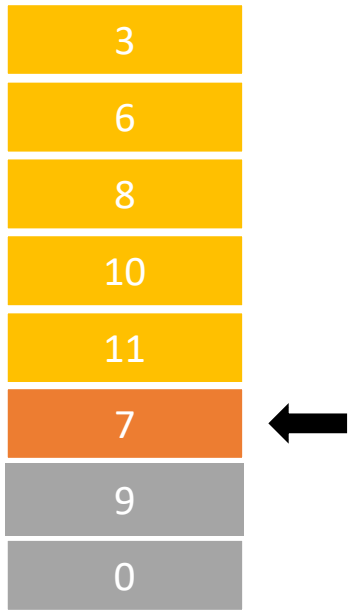

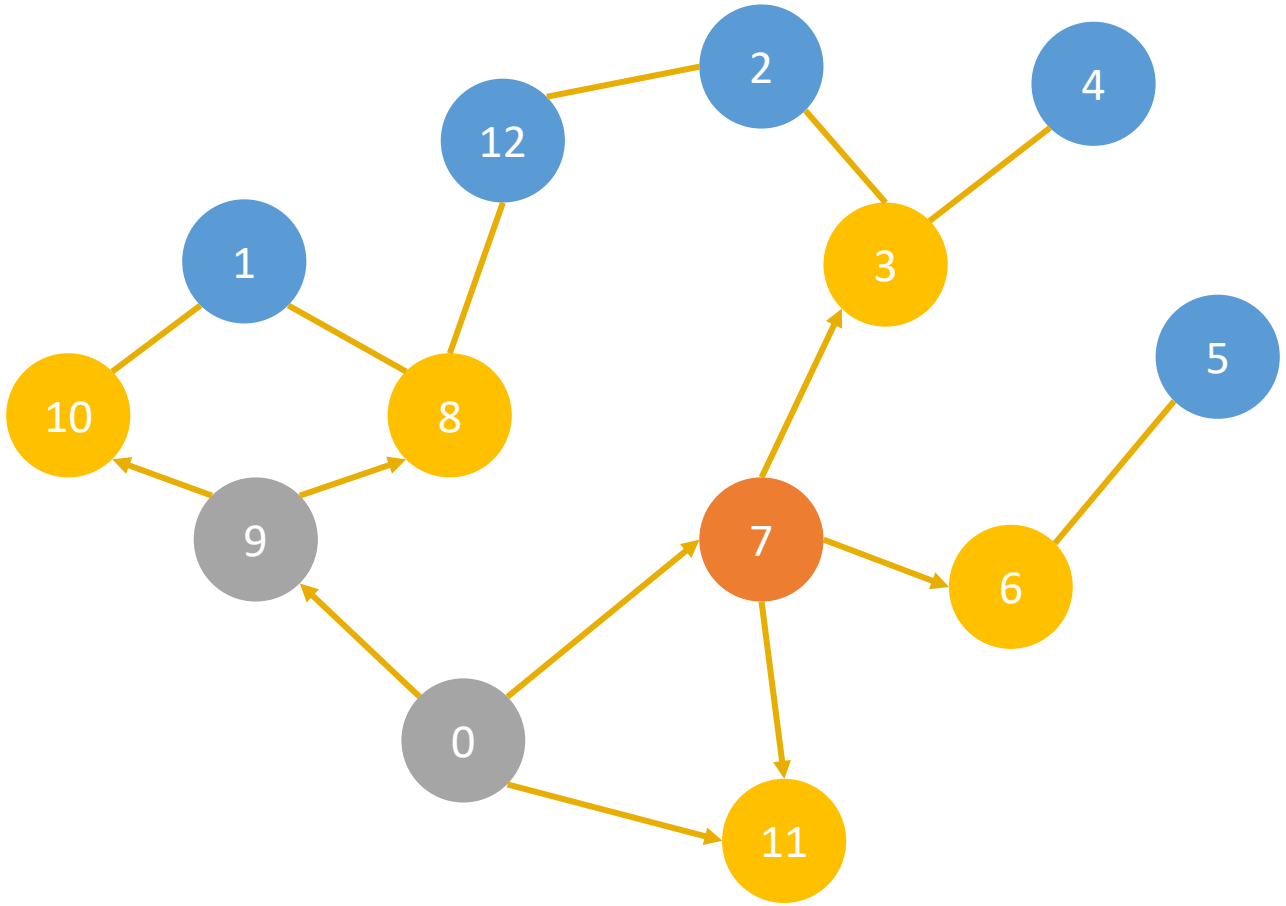

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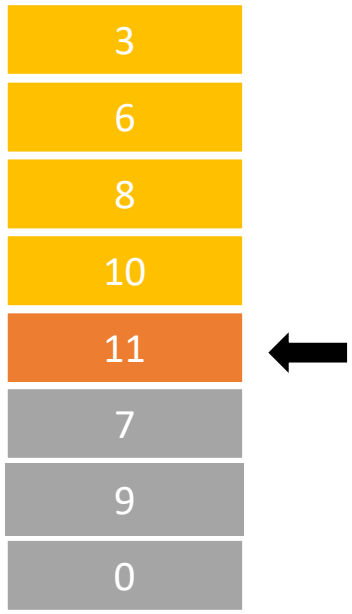

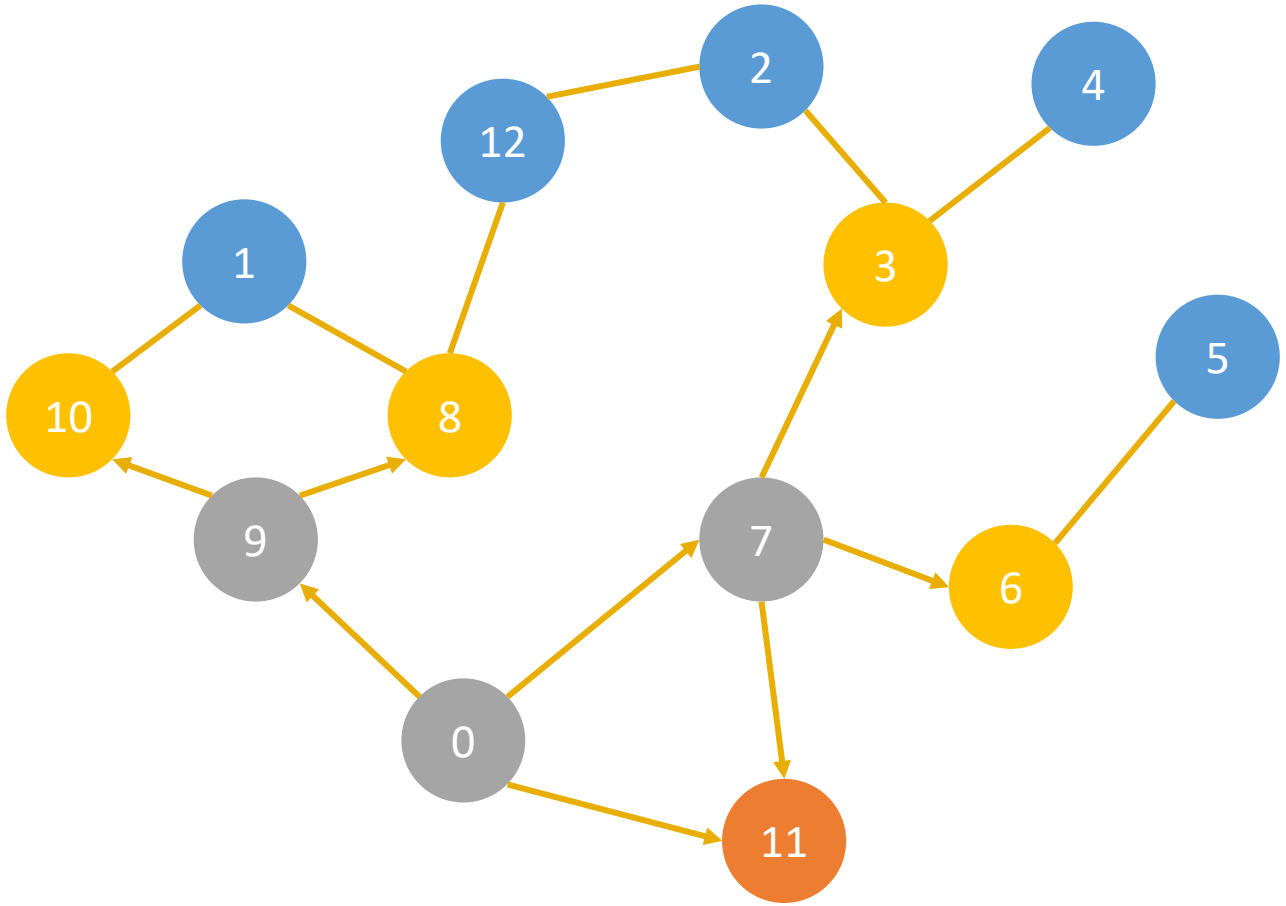

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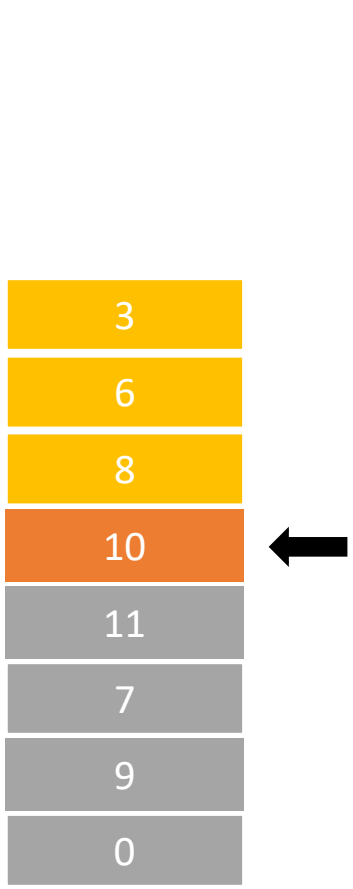

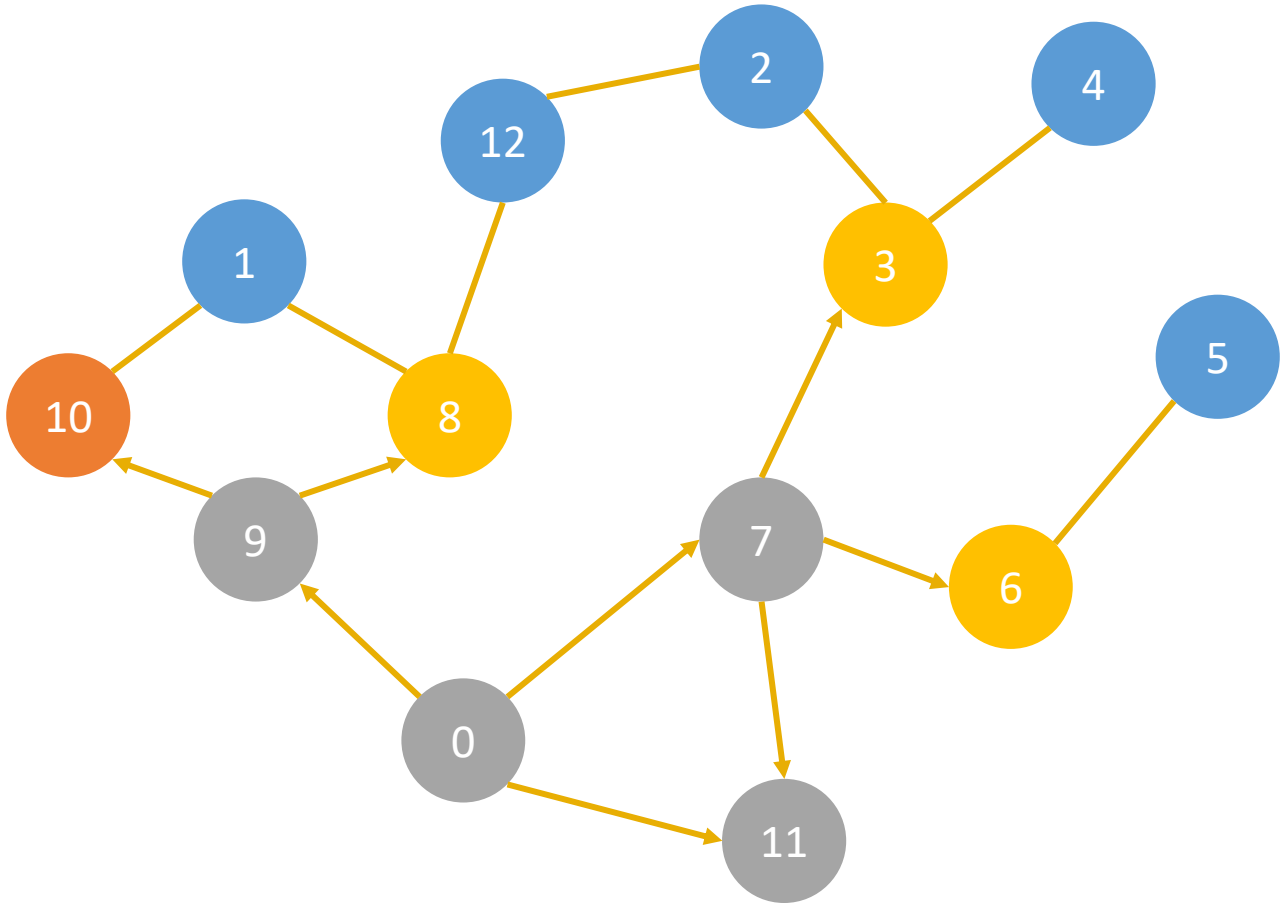

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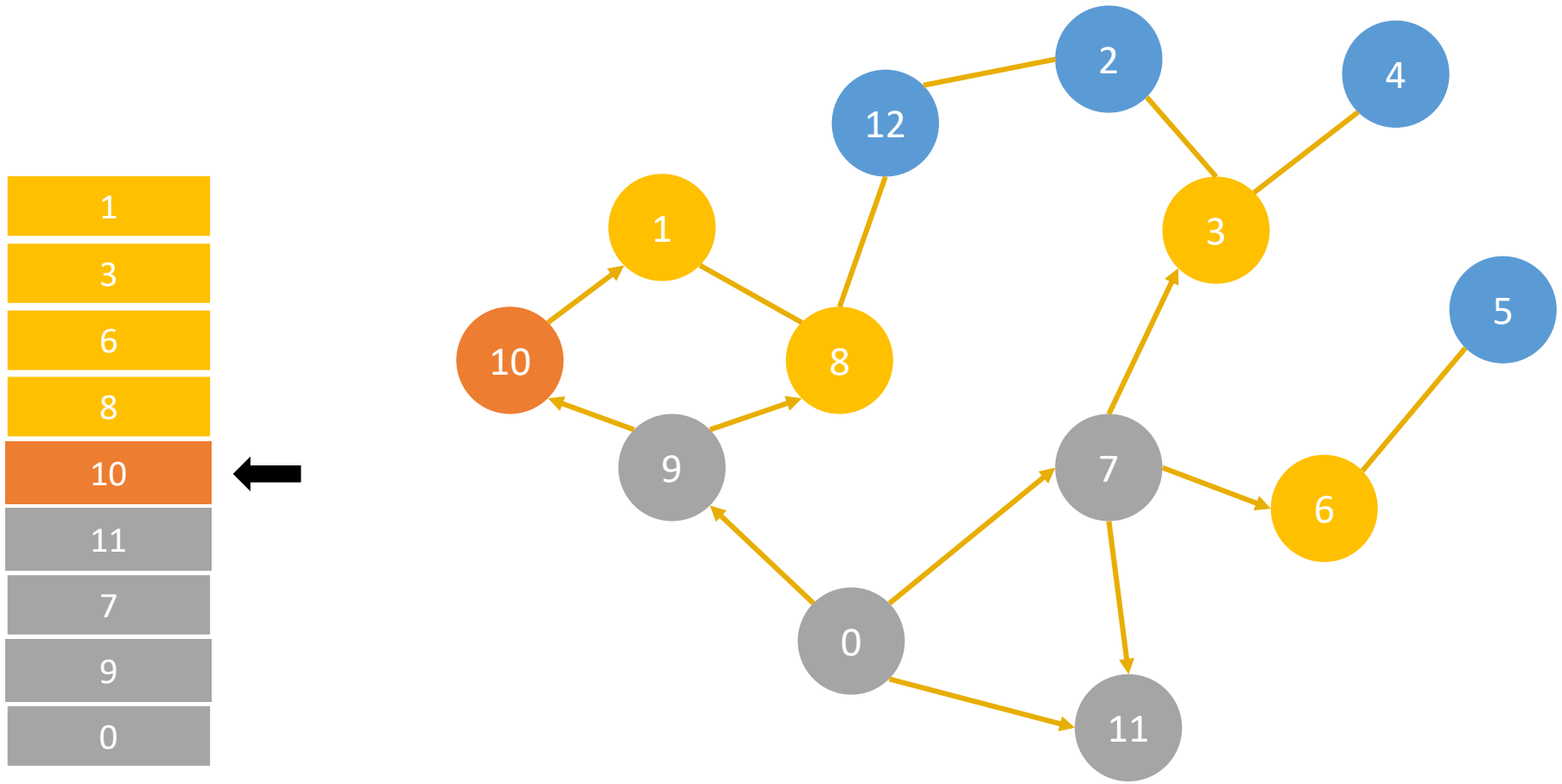

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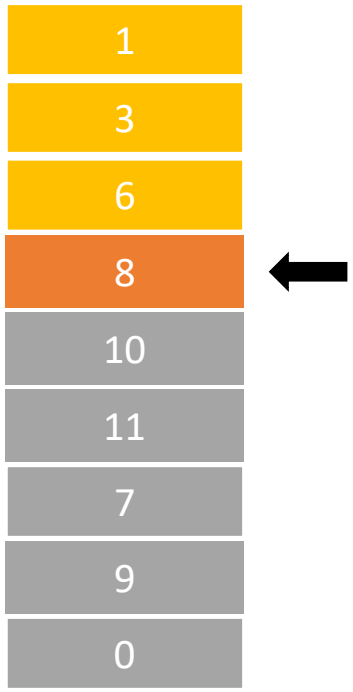

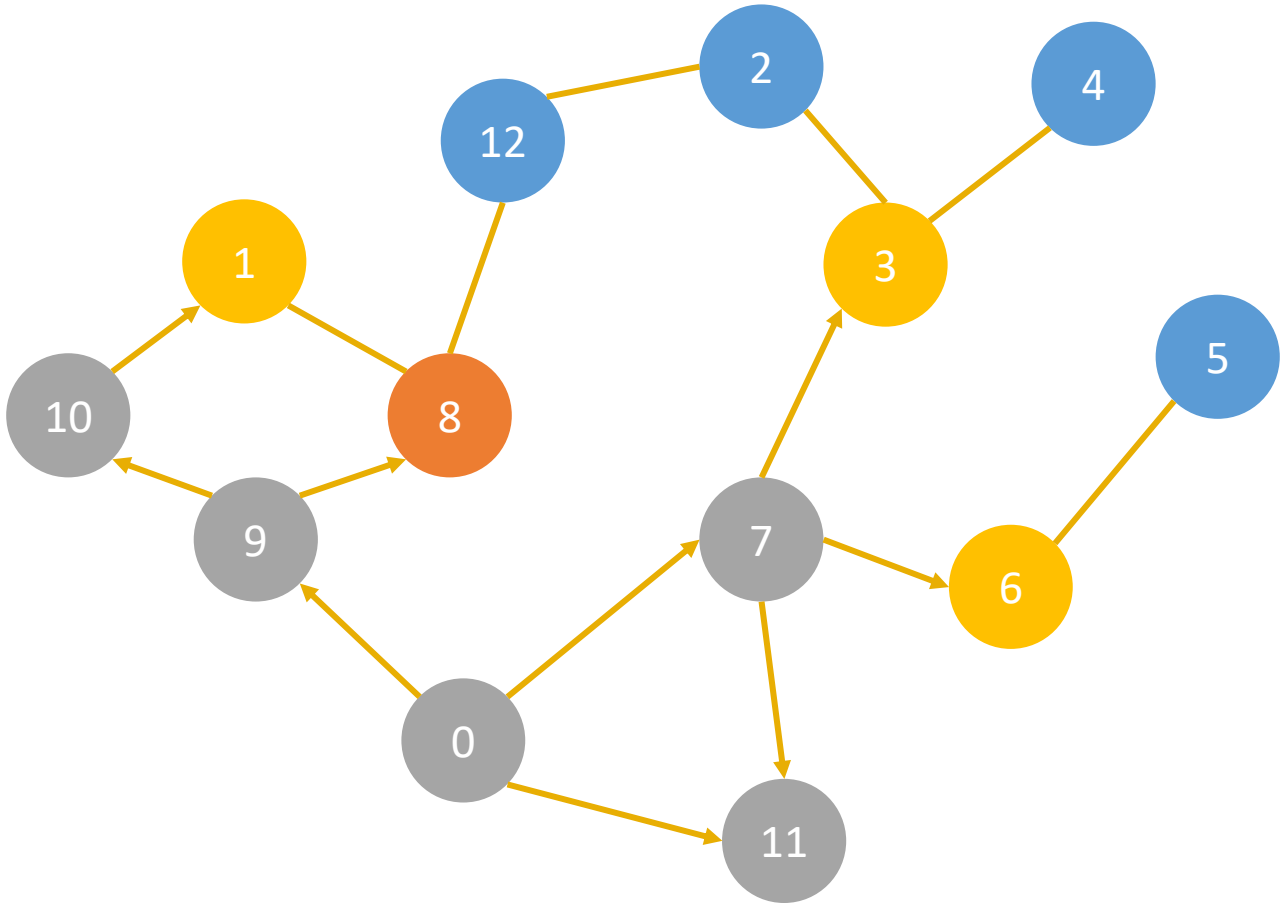

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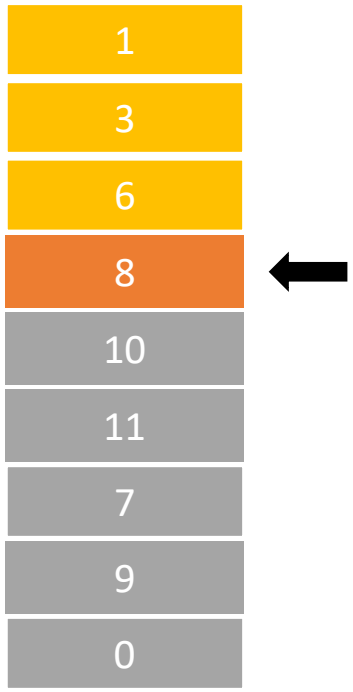

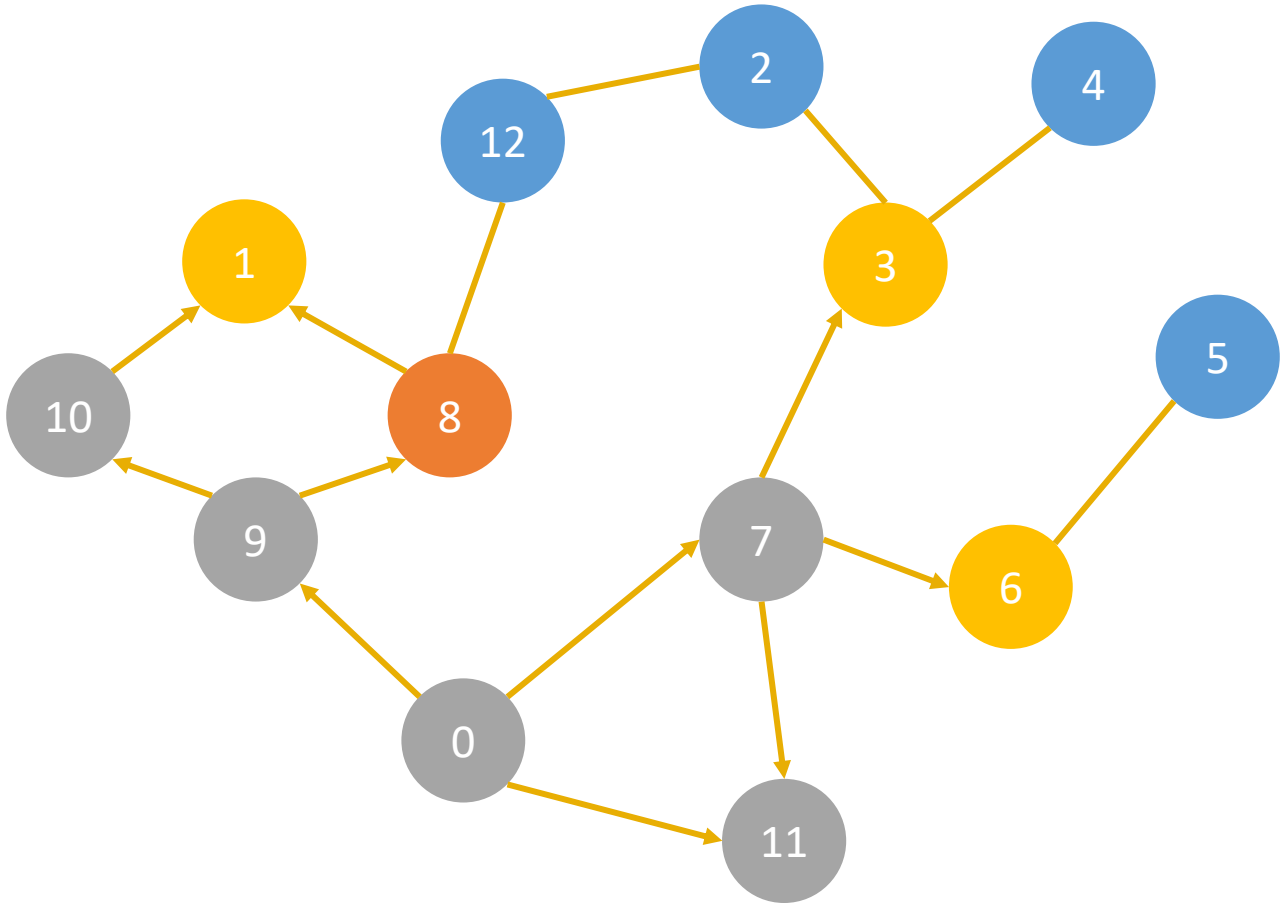

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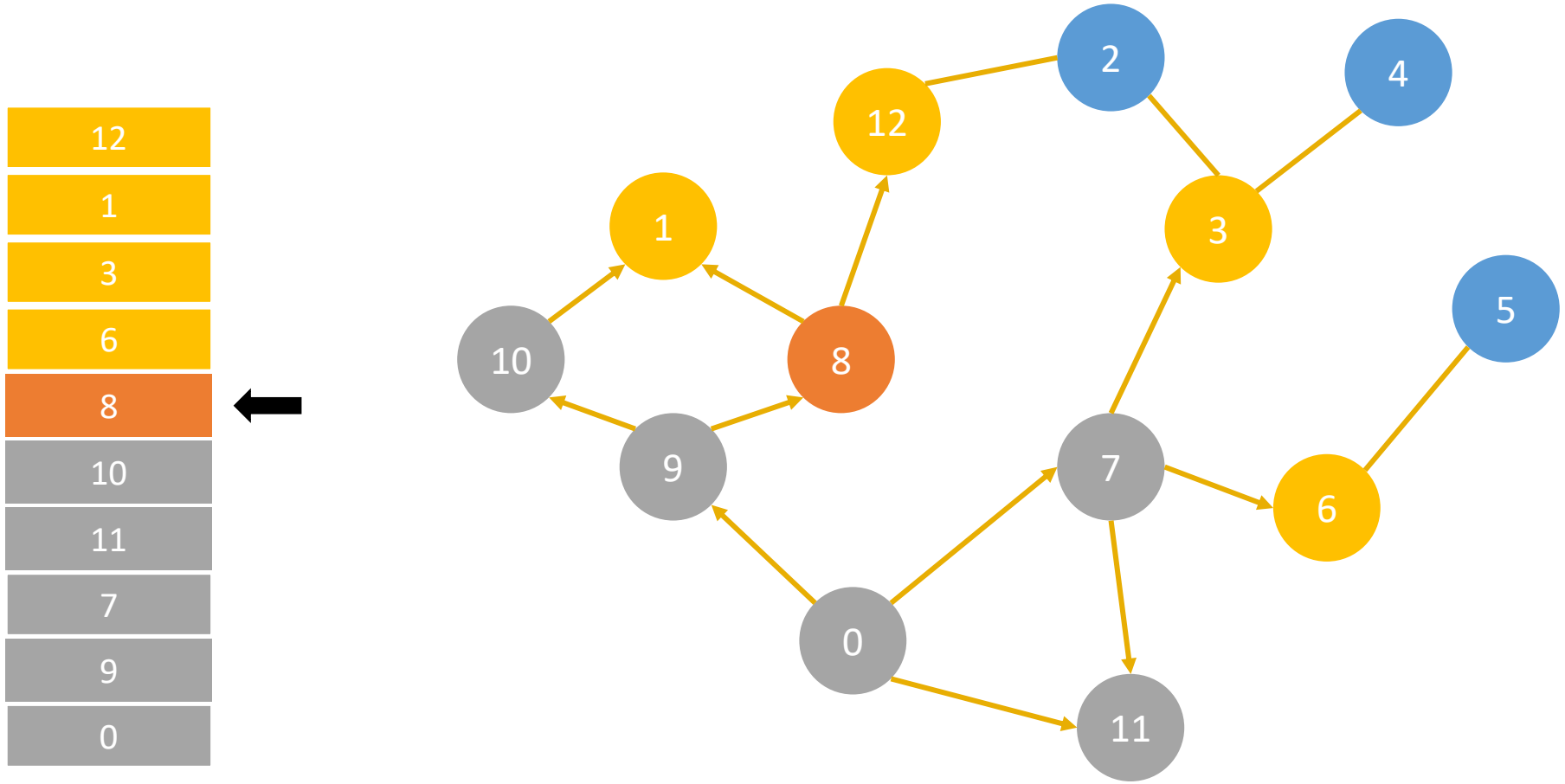

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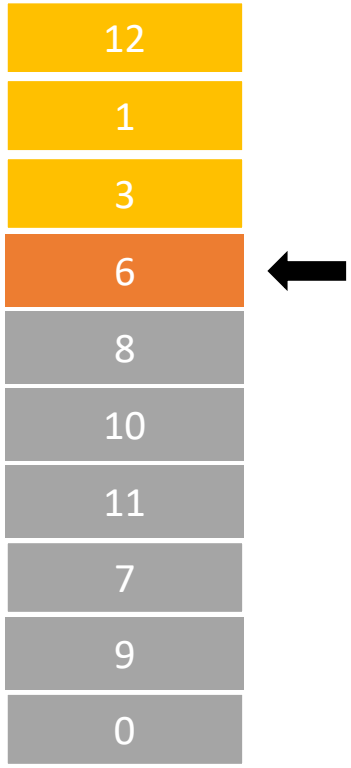

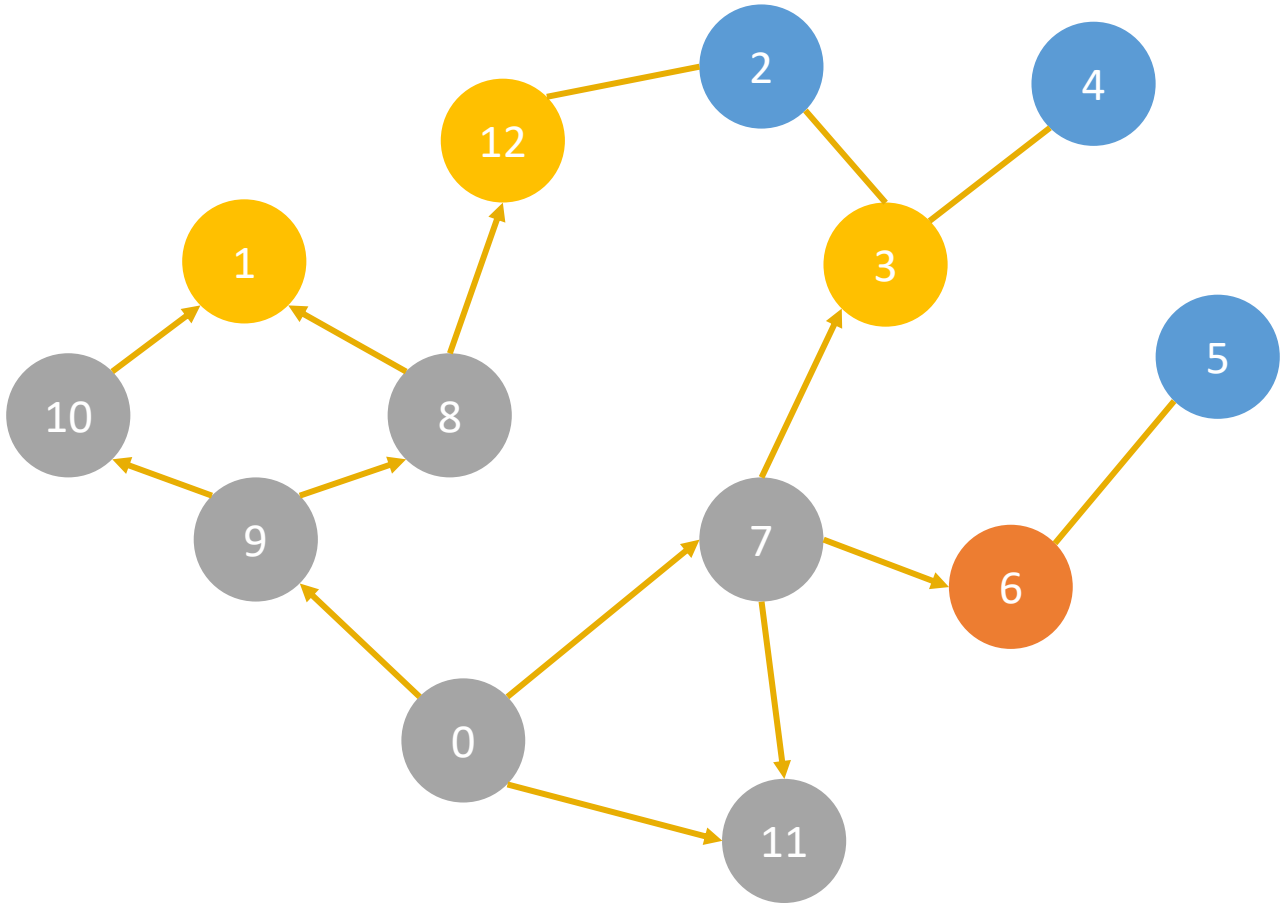

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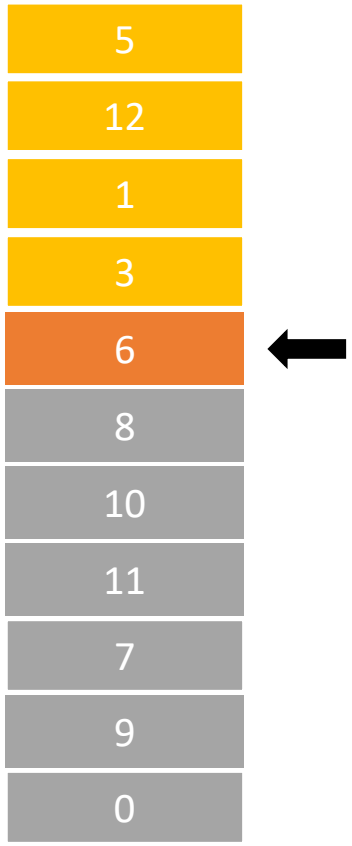

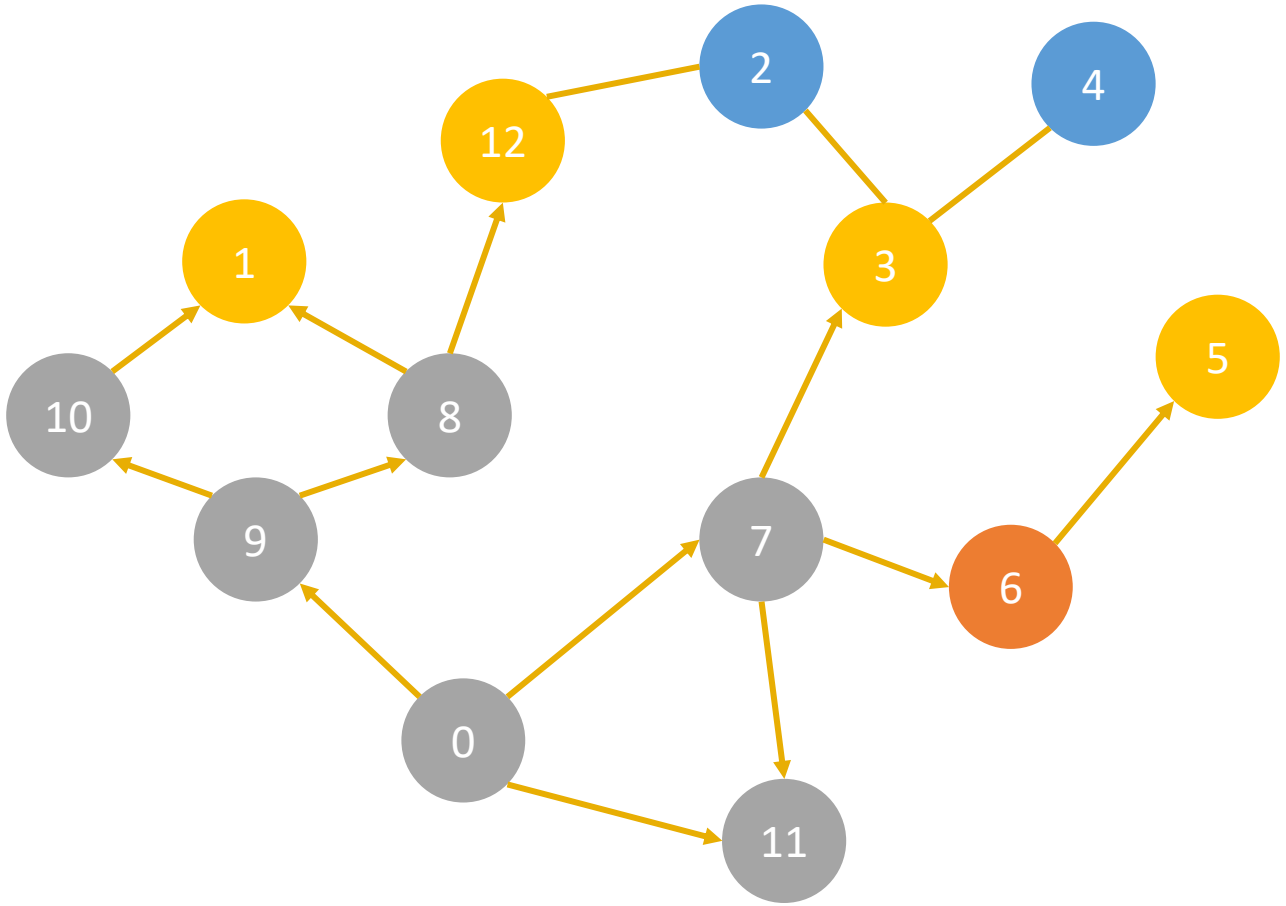

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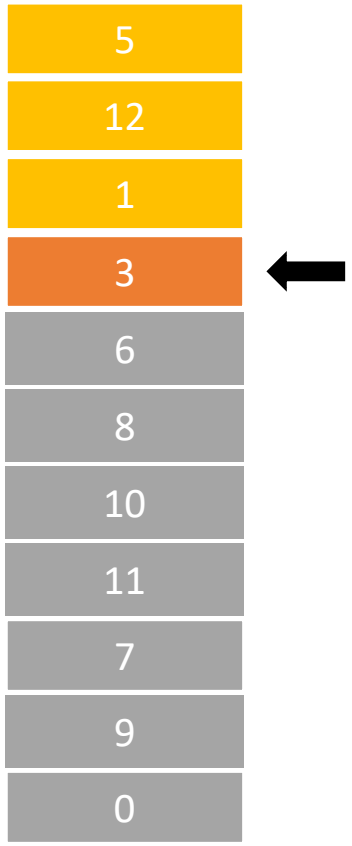

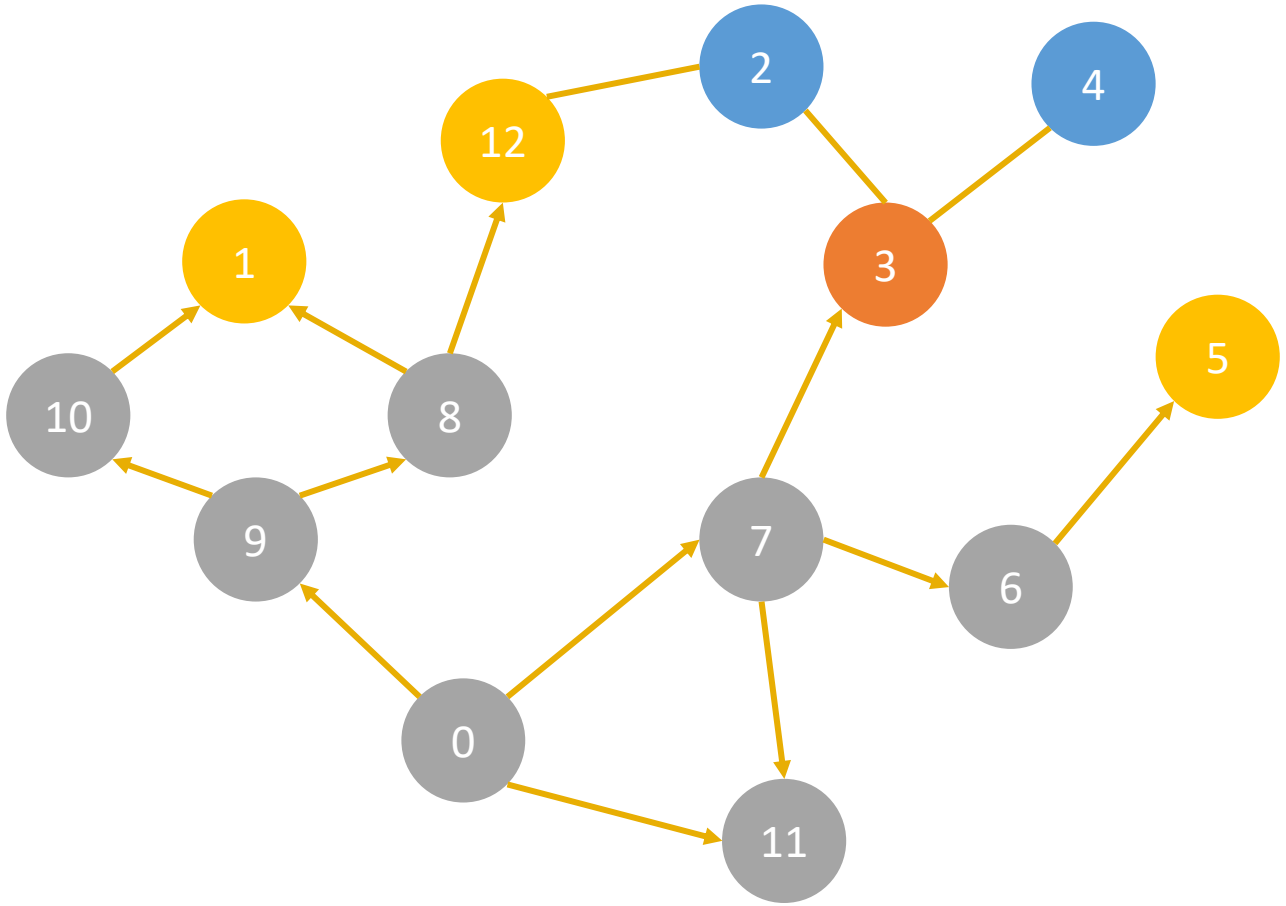

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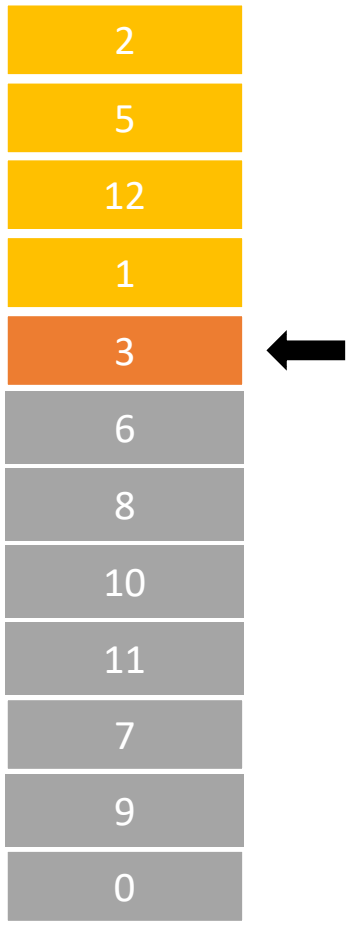

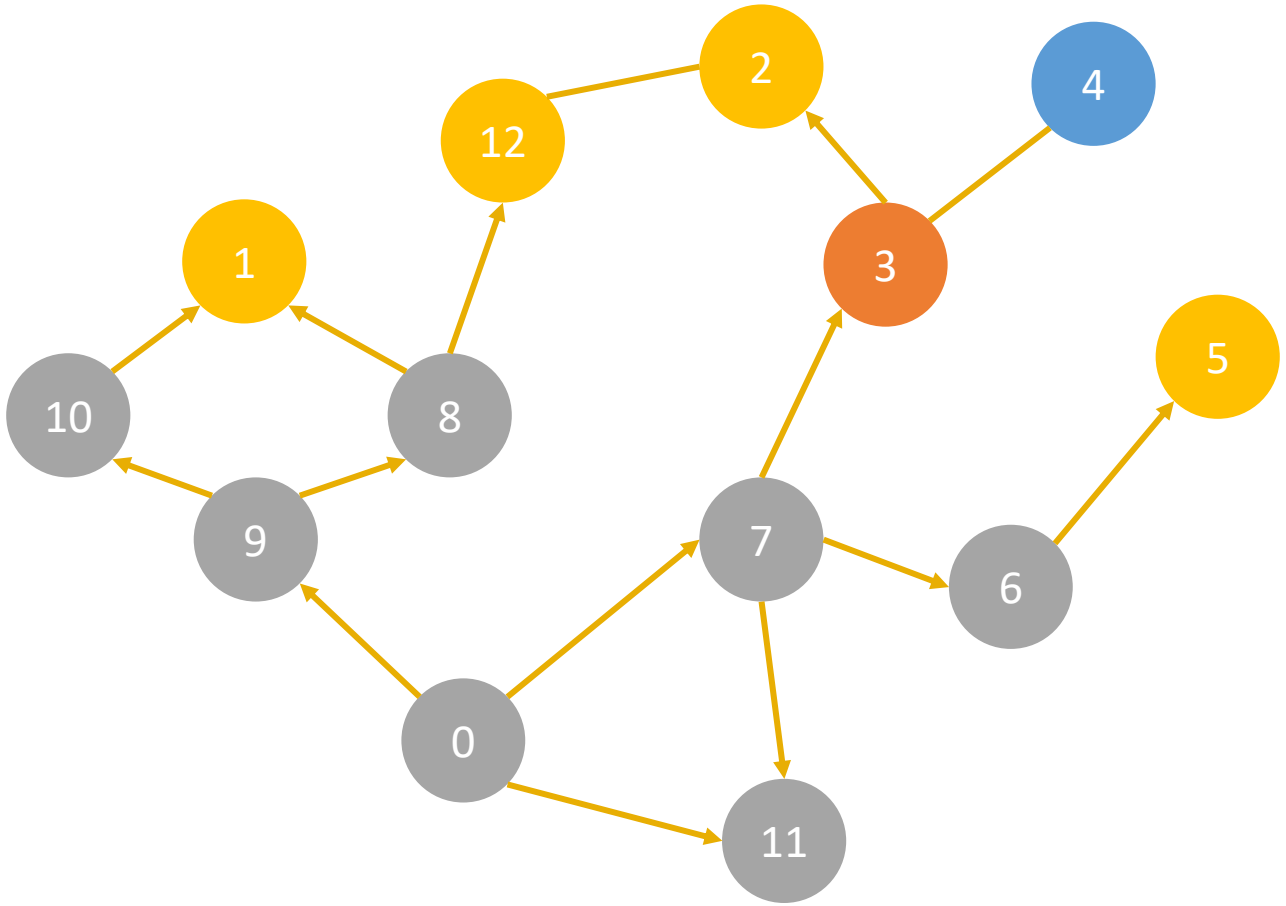

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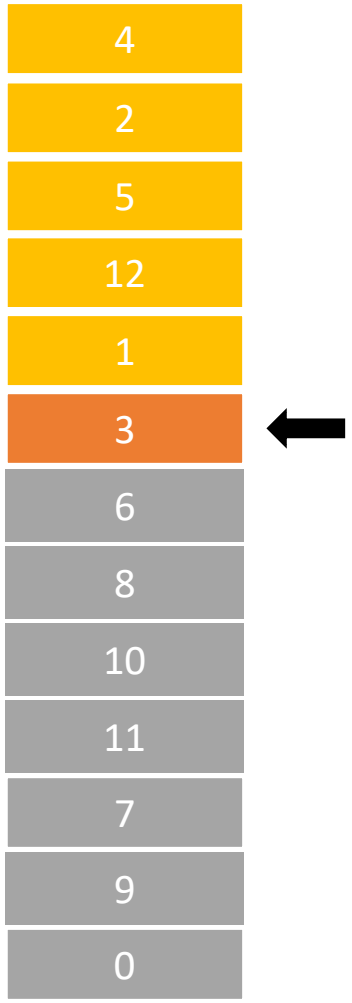
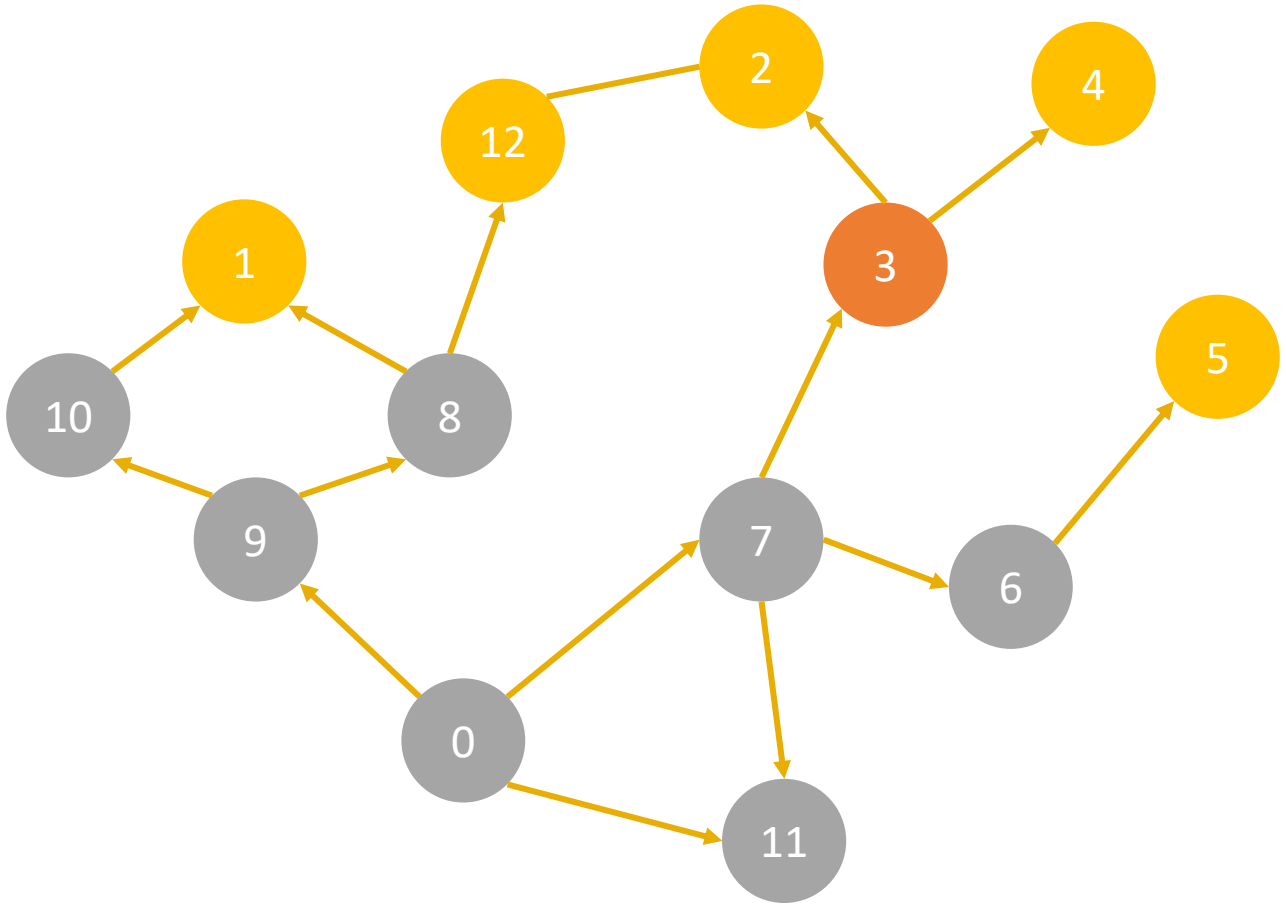
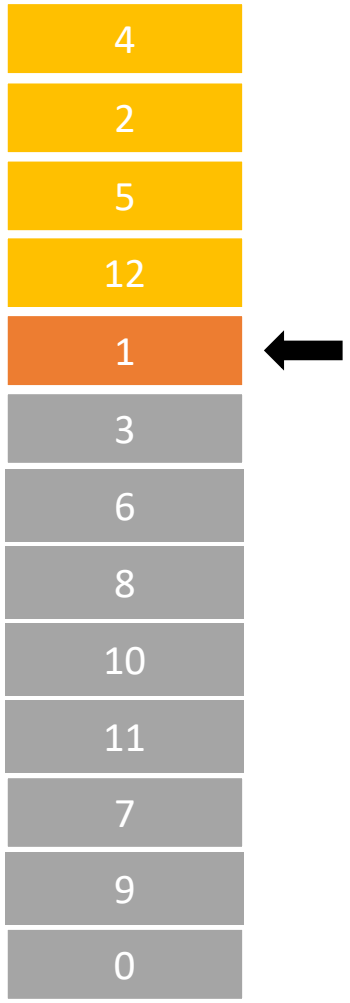


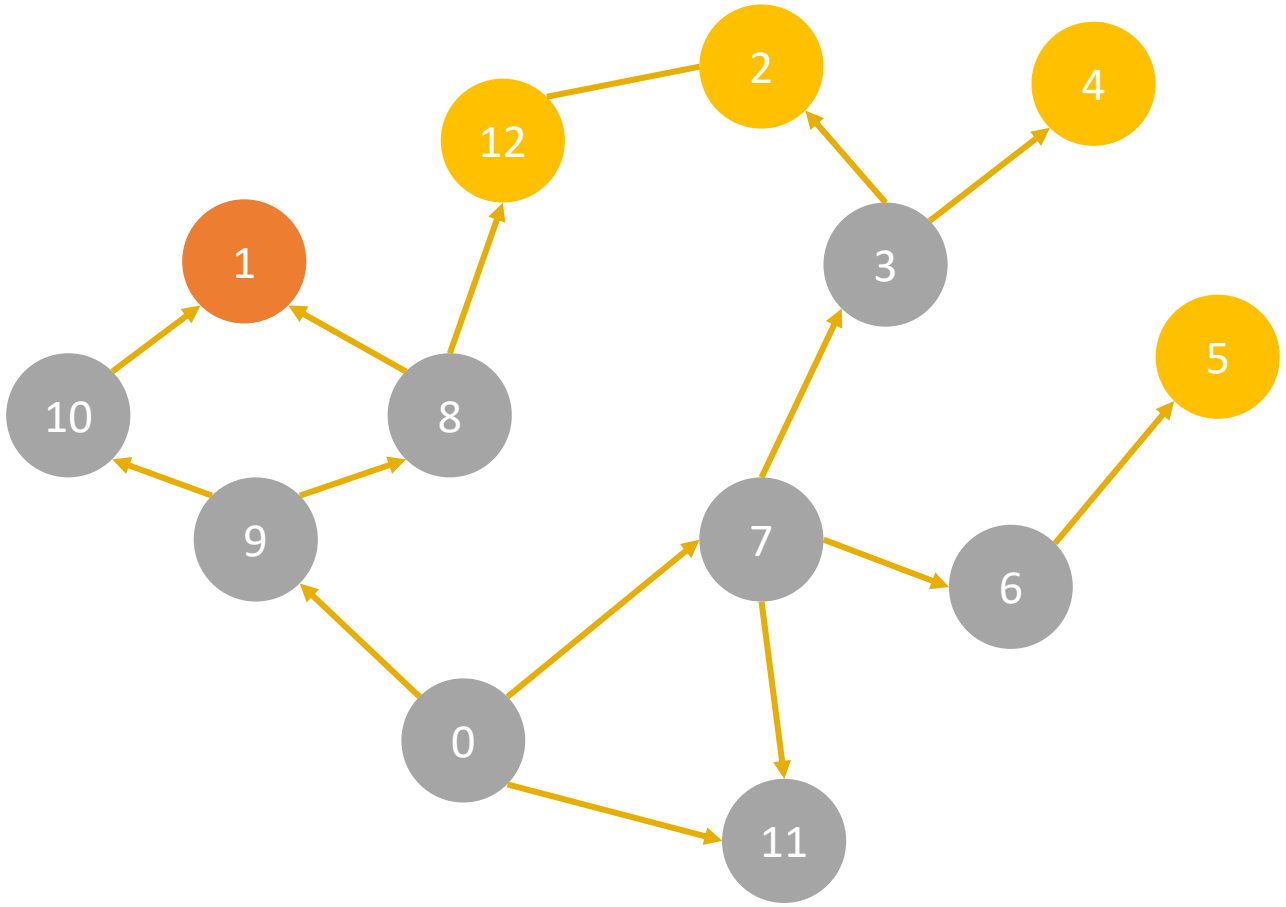


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.

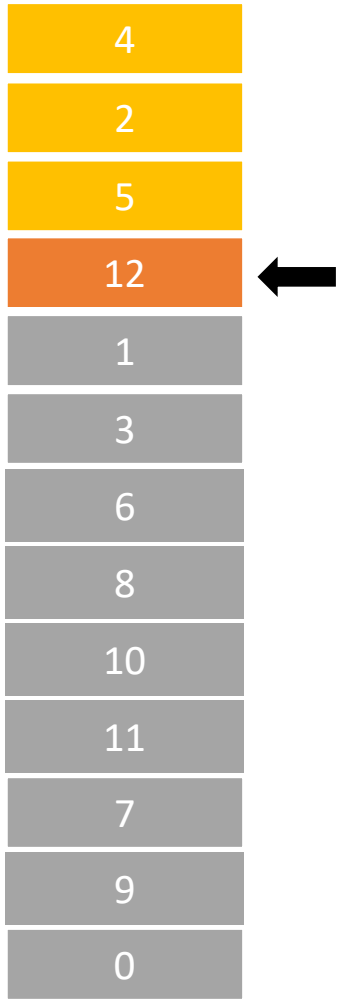


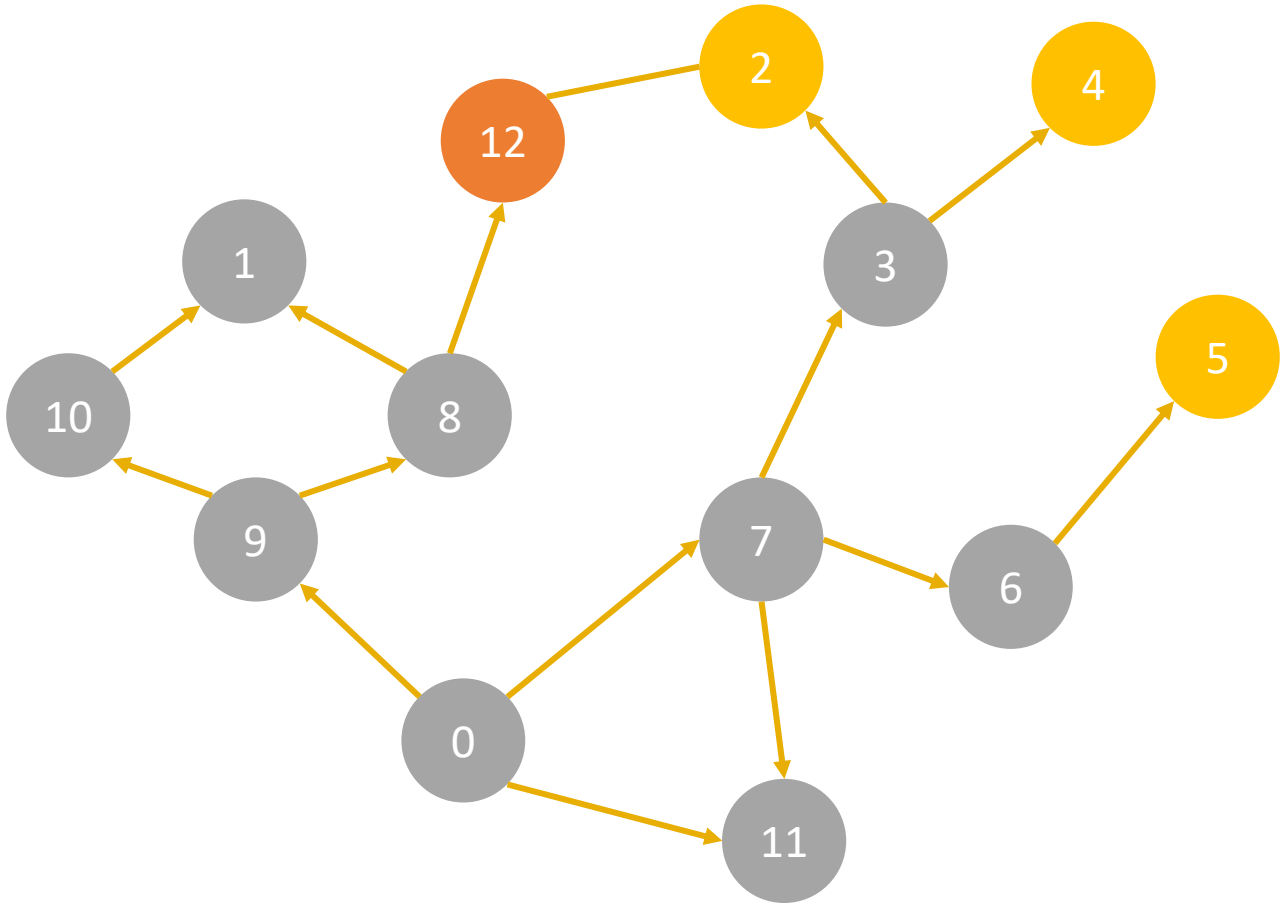


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.

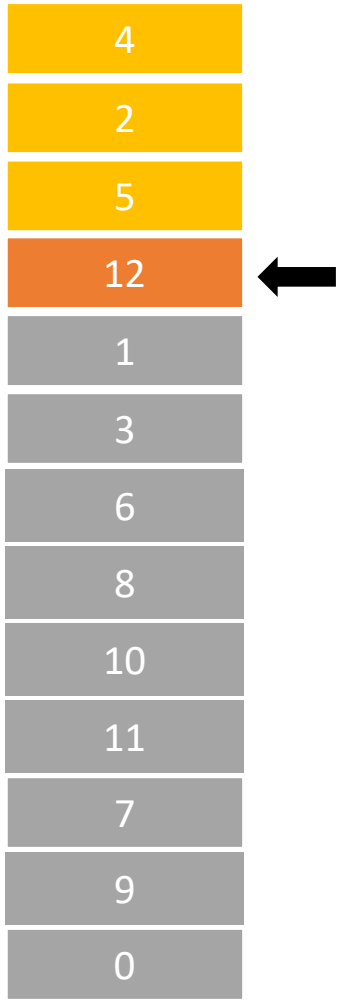


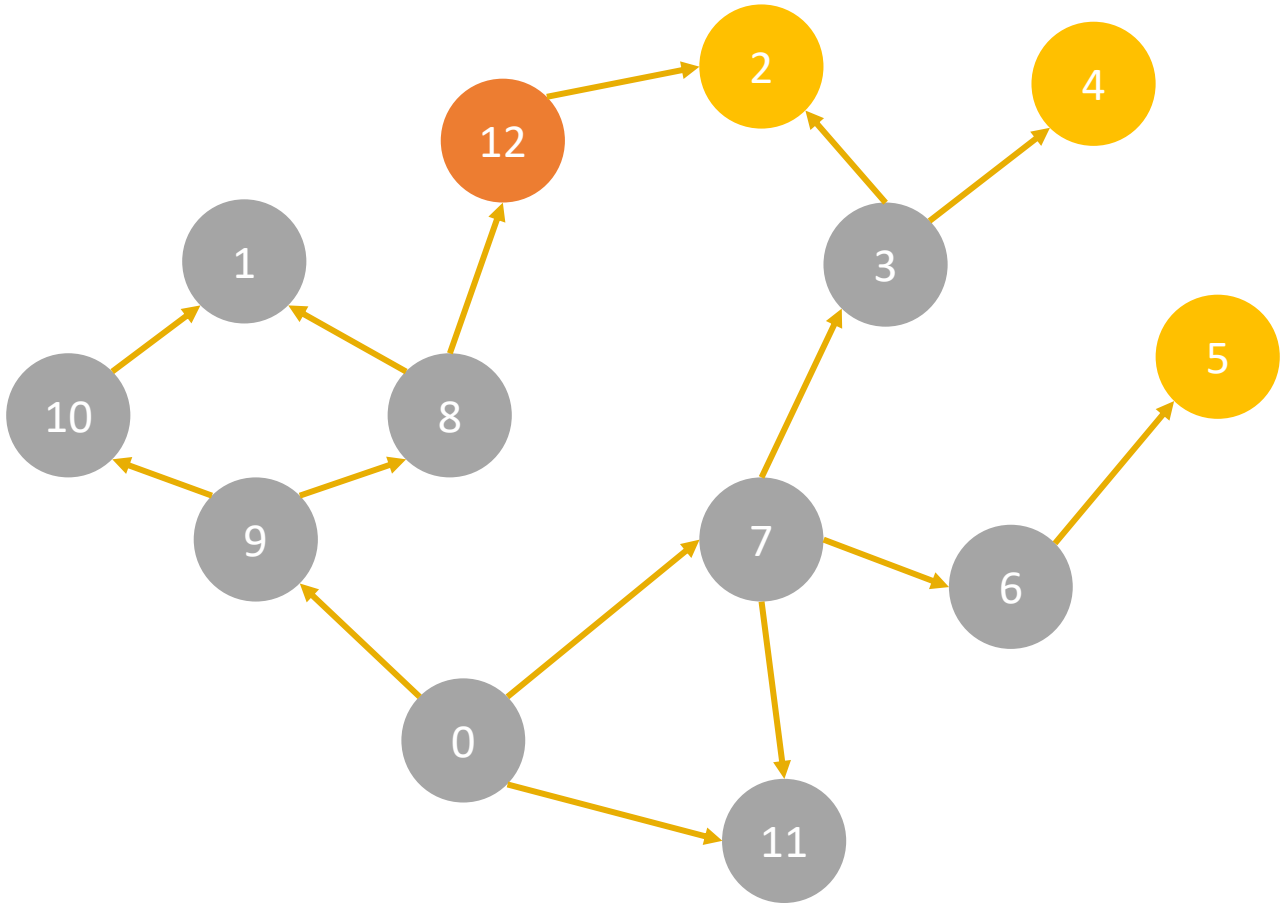


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.

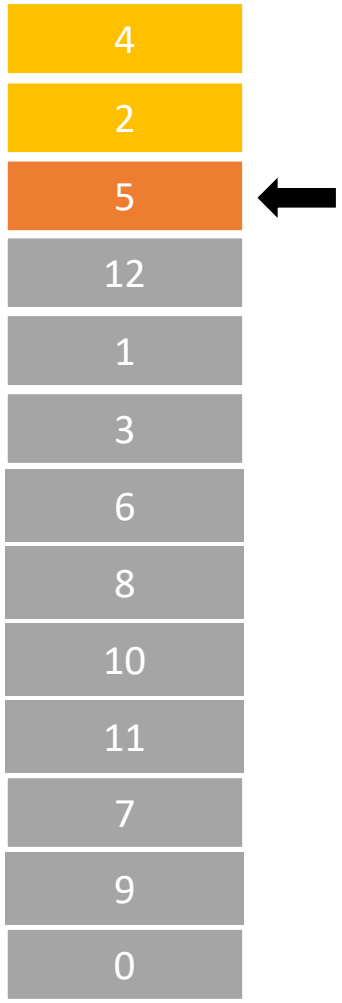


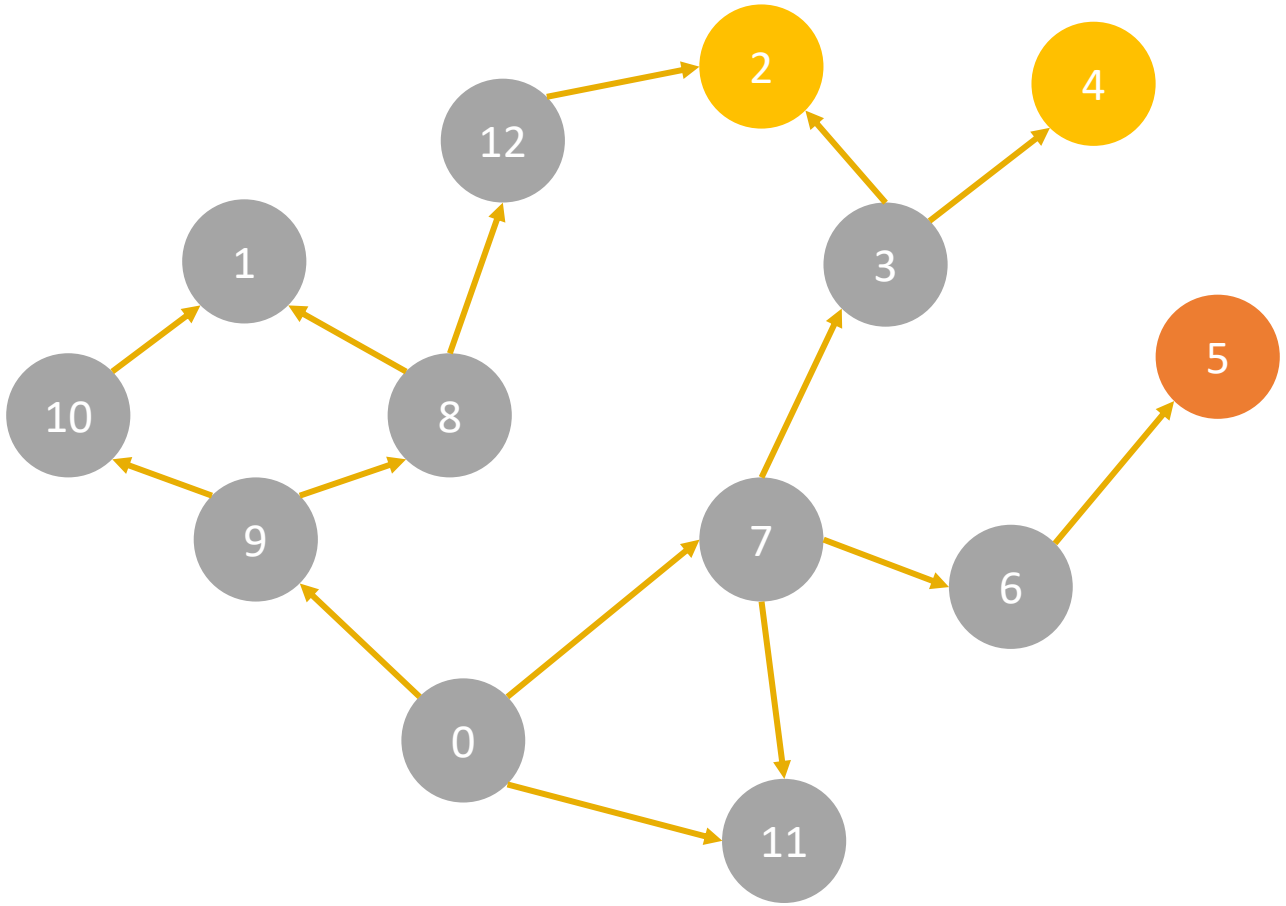


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.

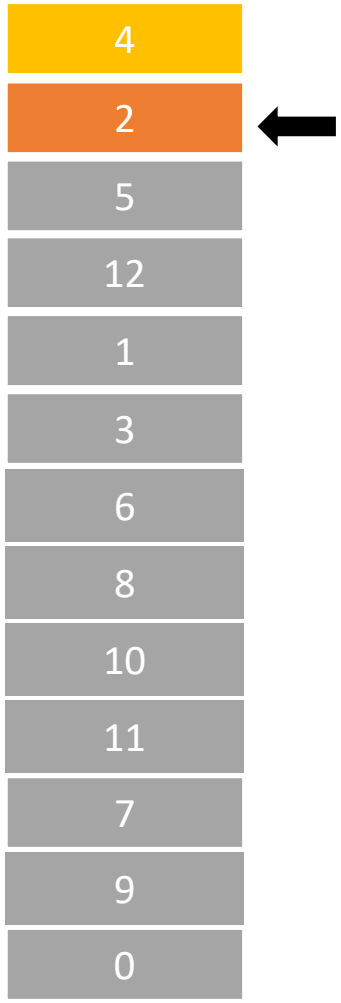


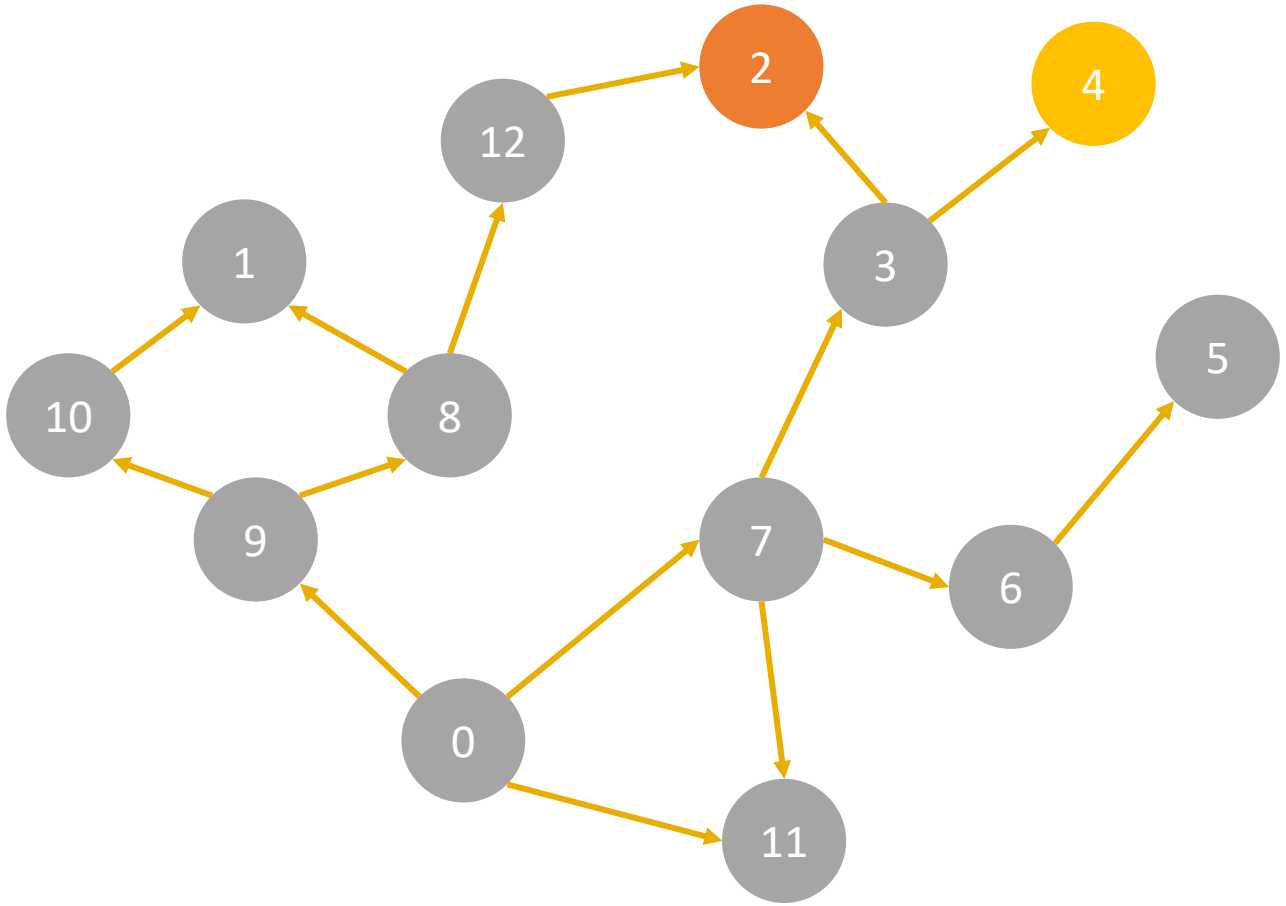


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.

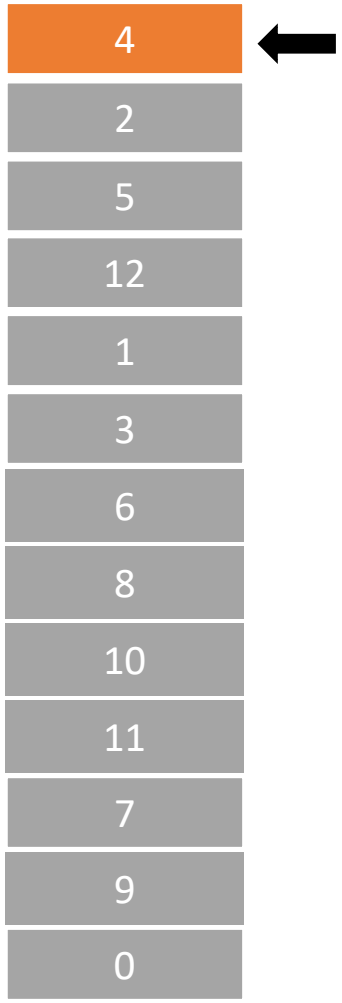


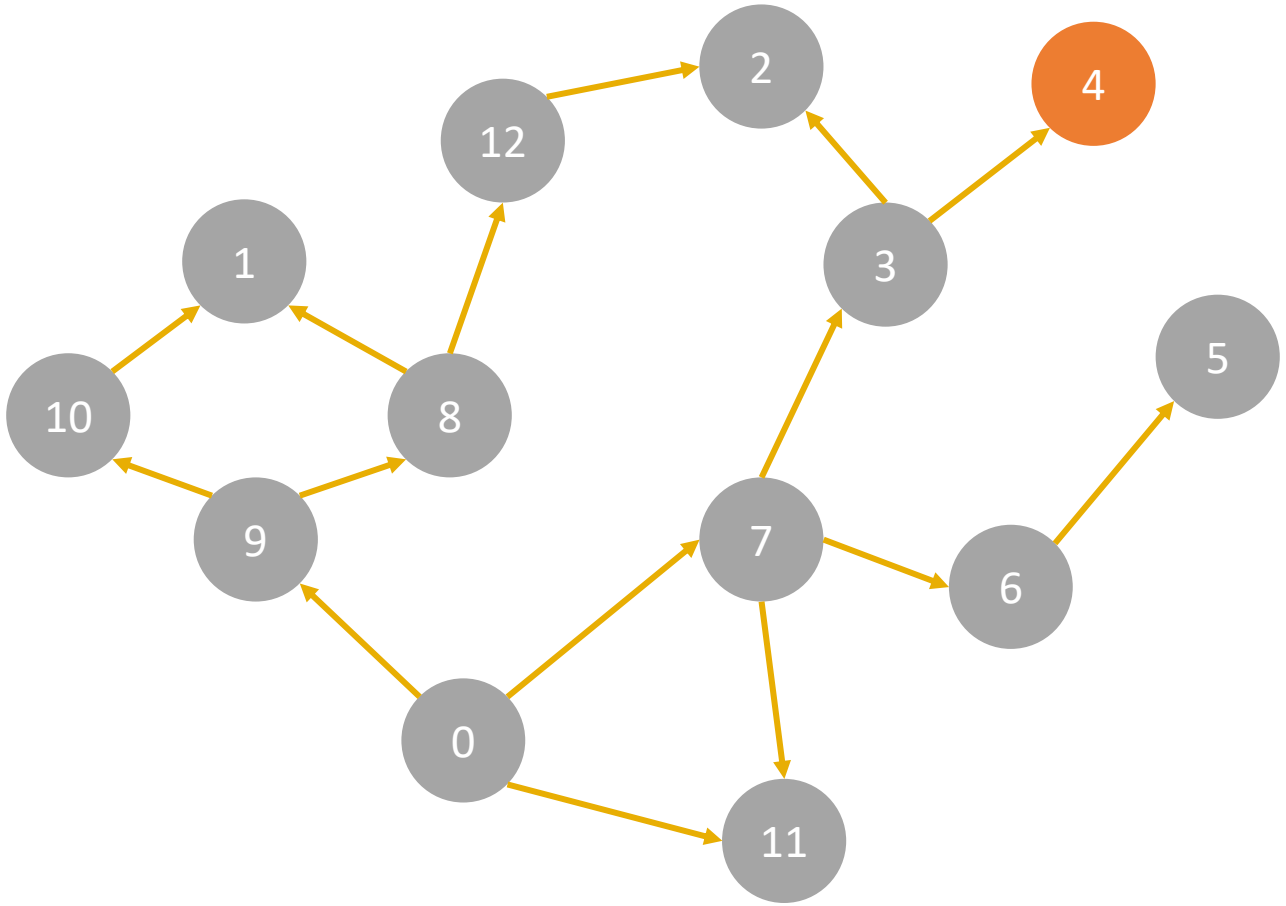


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.



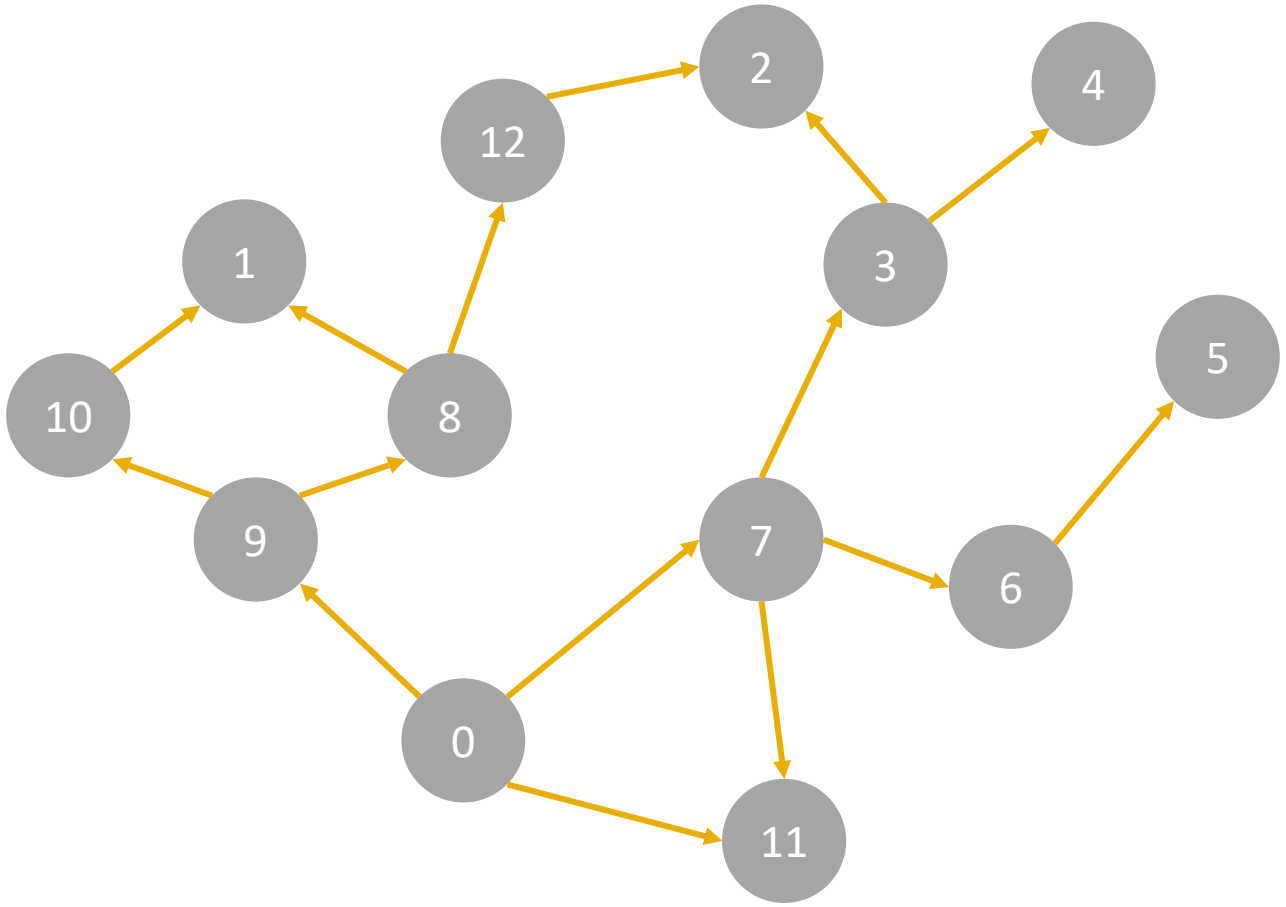


EXPLAIN

Breadth-First Search (**BFS**)

Traverses the graph level by level, initialize the queue starting from the source node.

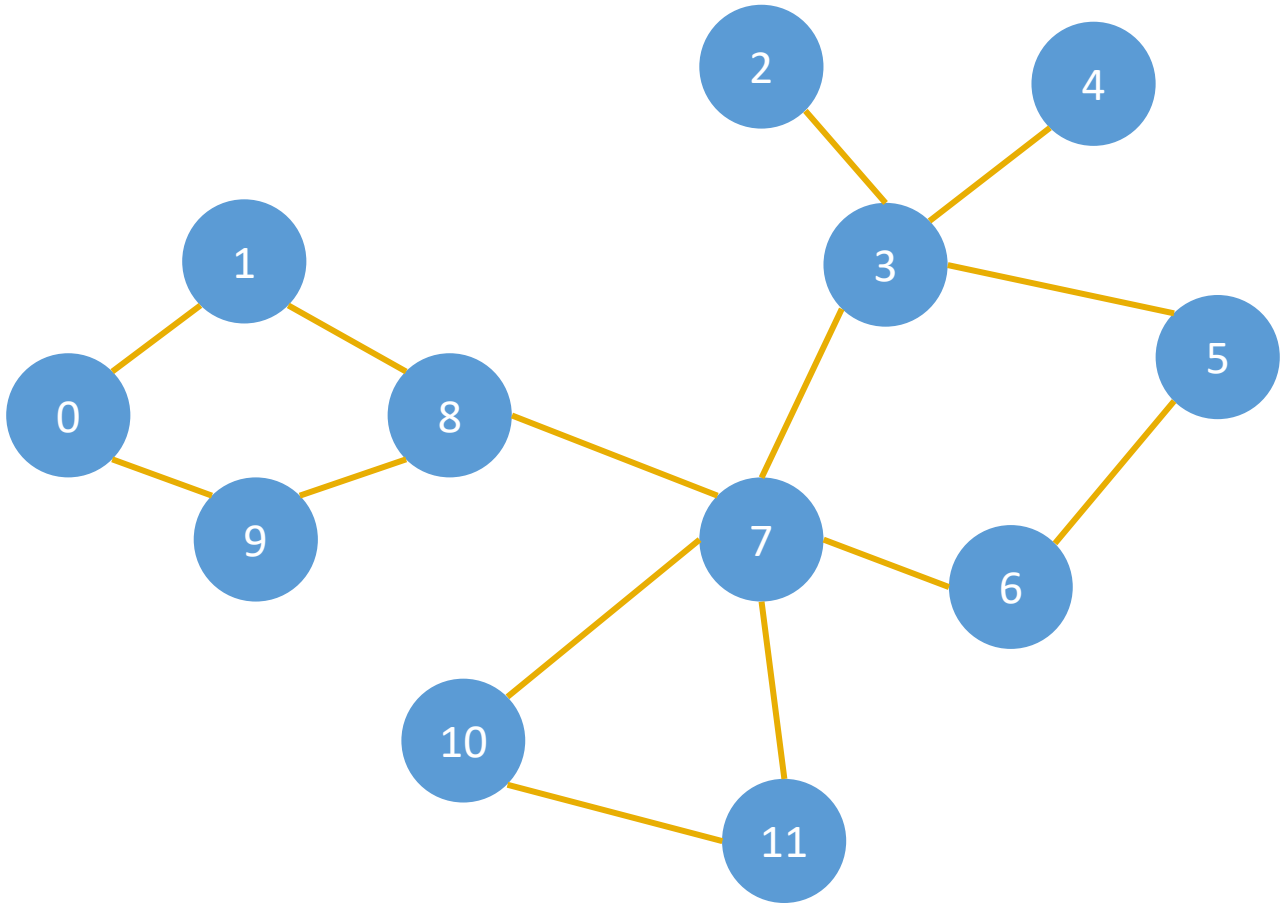
4
2
5
12
1
3
6
8
10
11
7
9
0



QUIZ

Breadth-First Search (**BFS**)

Traverse the graph below:



3-2-1 Challenge

- ✓ List three things you **learned** today.
- ✓ List two **questions** you still have.
- ✓ List one aspect of the lesson or topic you **enjoyed**.