

CS 112 - Fall 2012, Lab 11

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Hashing

- Space & Time Tradeoff
 - $O(n/m)$ for searching
- Design Hashing Function
 - Key
 - Hash Code \Rightarrow Table Index
- Deal with Collisions:
 - Separate Chaining
 - Linear Probing

Hashing in Java

- Hash Code
- hashCode() is a method in Java
 - String: $s[0]*31^{(n-1)} + s[1]*31^{(n-2)} + \dots + s[n-1]$
 - Integer: equal to the primitive int value
 - Double: $(int)(v^{(v>>>32)})$
- Always an int value

R-B Tree and Hash Table in Java

- Red-Black Tree:
 - `TreeMap<K,V>`
 - <http://docs.oracle.com/javase/7/docs/api/java/util/TreeMap.html>
- Hash Table:
 - `HashMap<K,V>`
 - <http://docs.oracle.com/javase/7/docs/api/java/util/HashMap.html>

Graph

- Vertices: V
- Edges: E

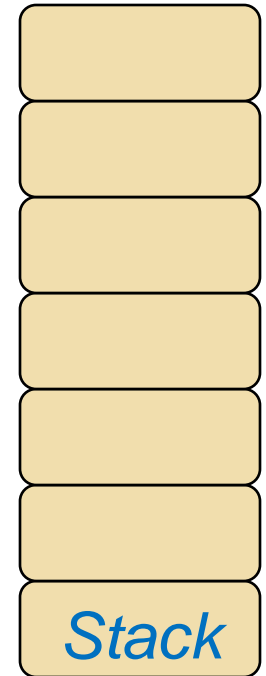
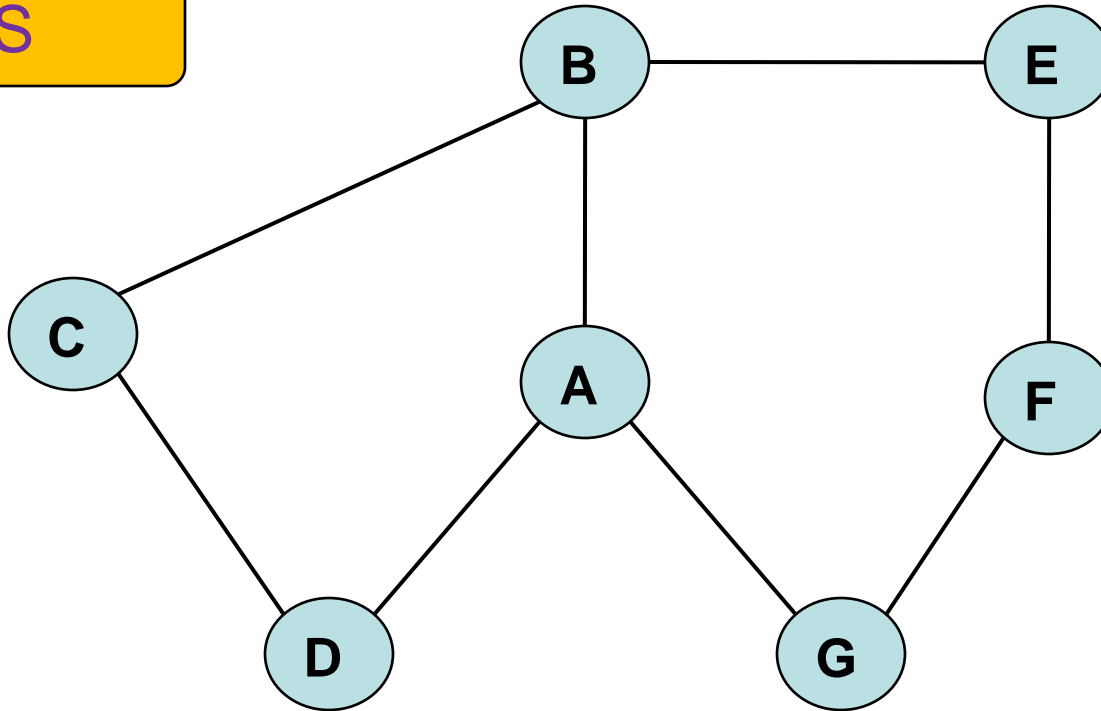
- Representation
 - **Adjacency list**
 - Adjacency matrix
 - Adjacency sets

Graph Traversal

- Depth-first traversal
 - Stack
- Breadth-first traversal
 - Queue

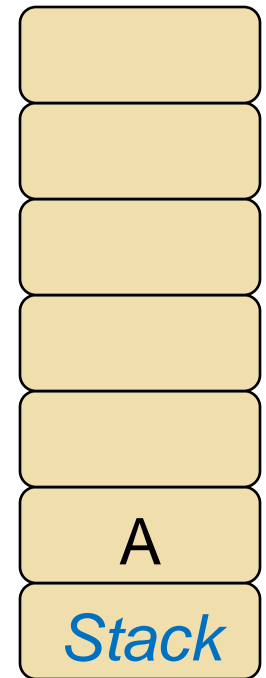
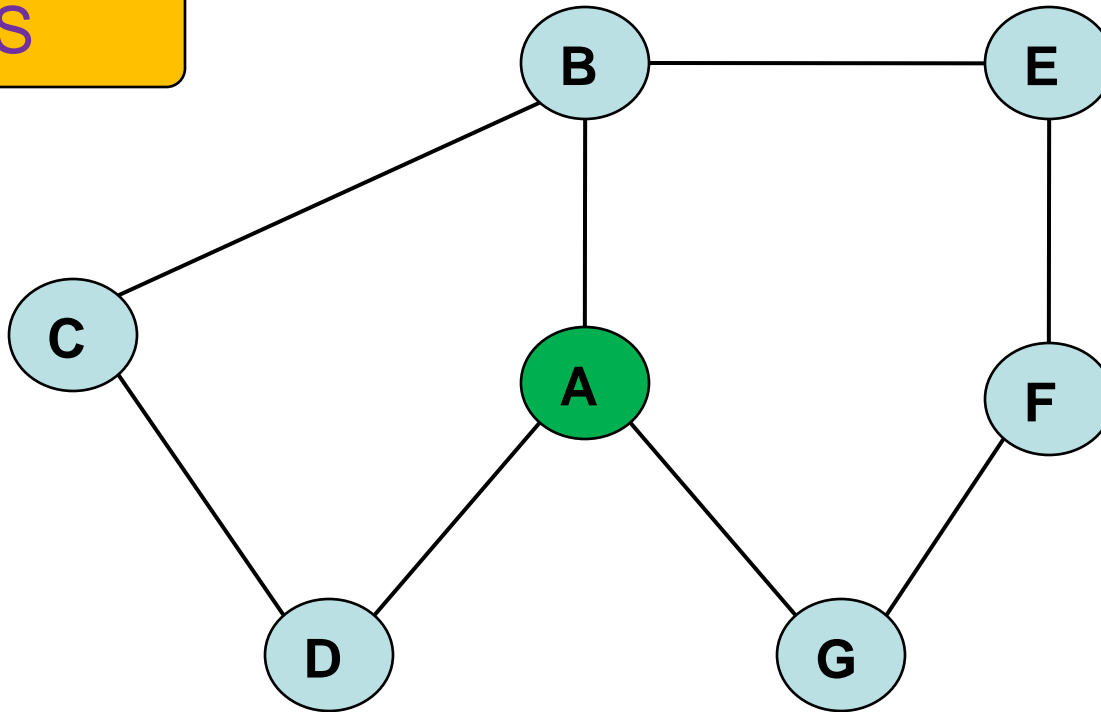
Graph Traversal

DFS



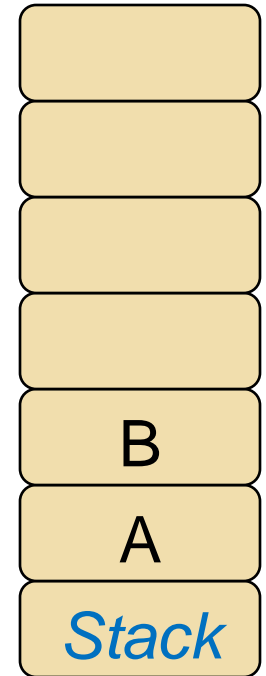
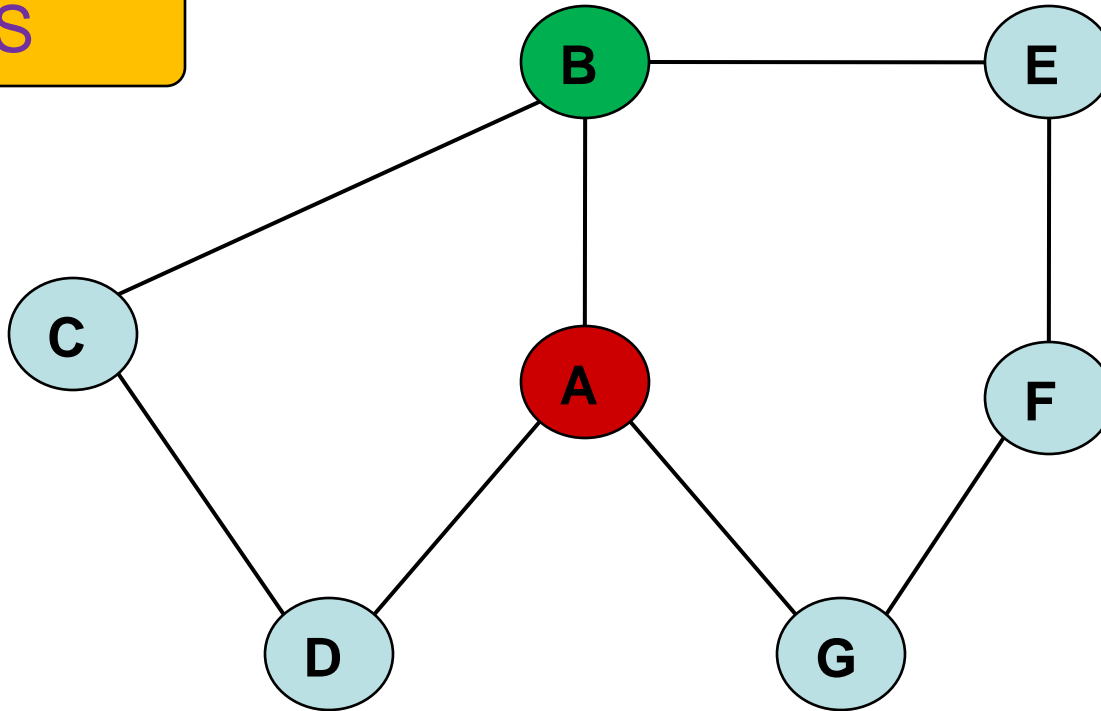
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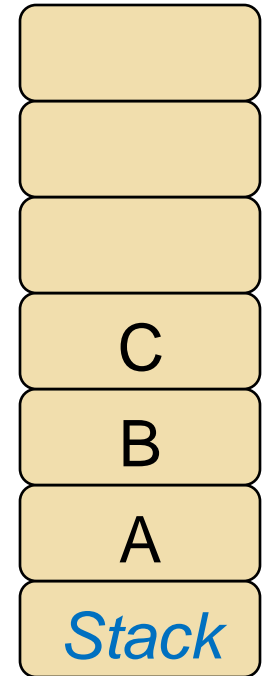
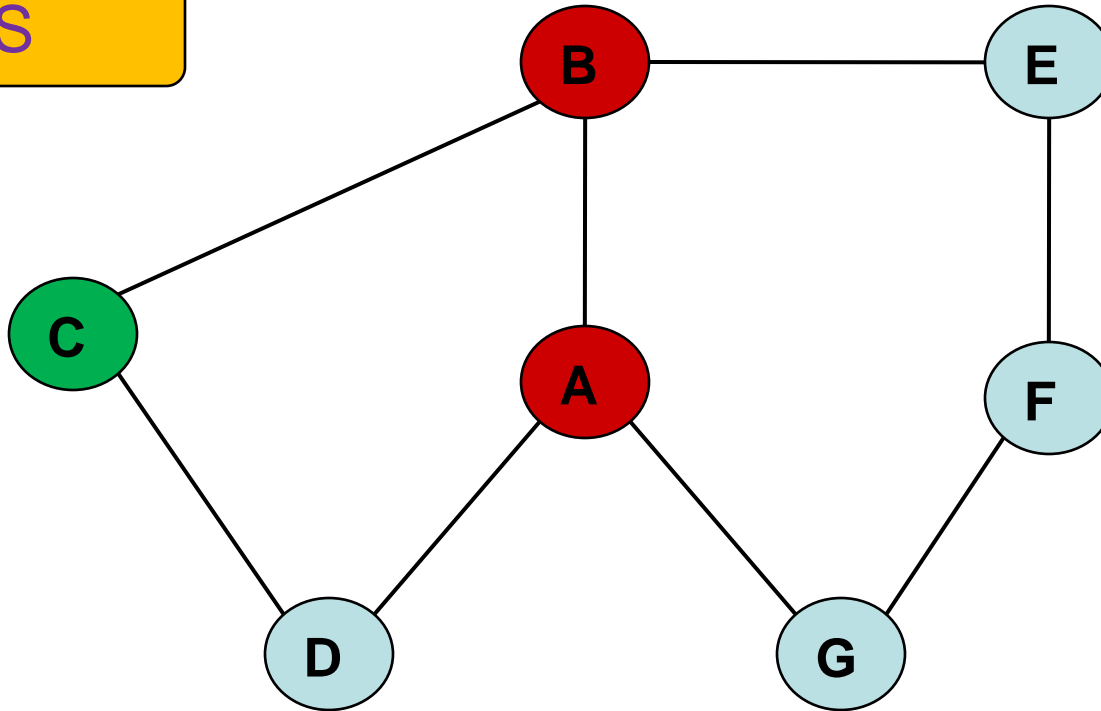
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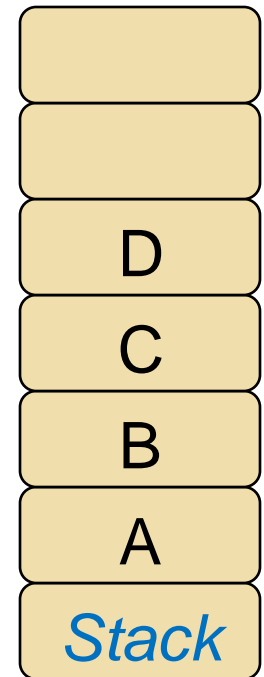
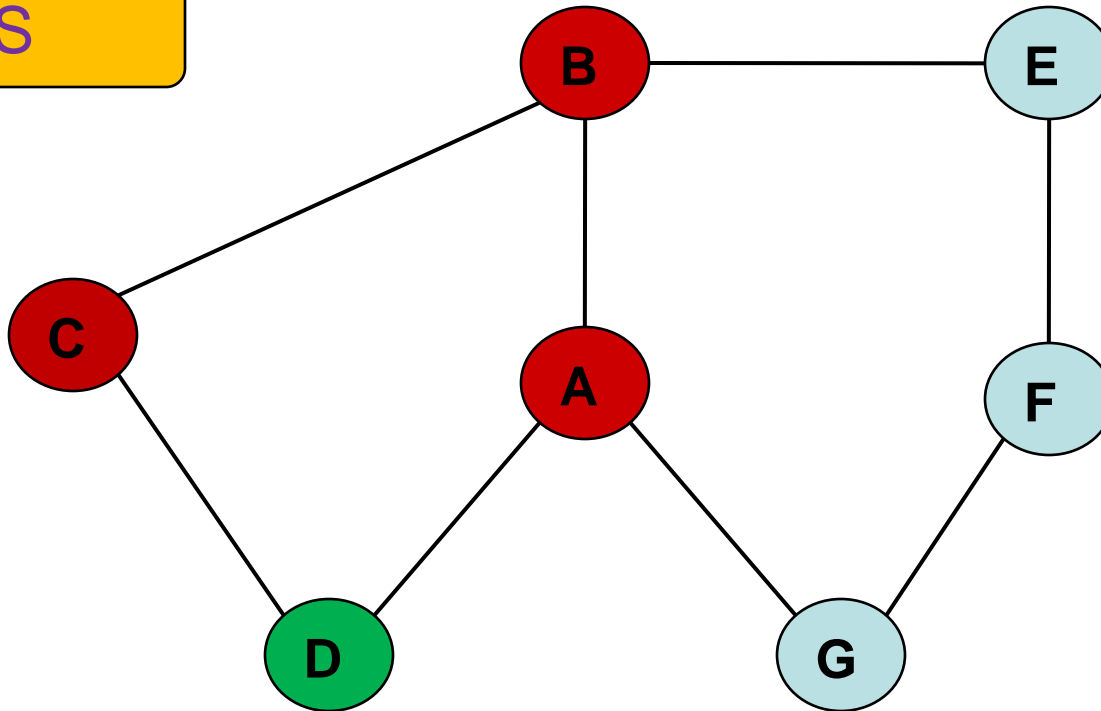
Graph Traversal

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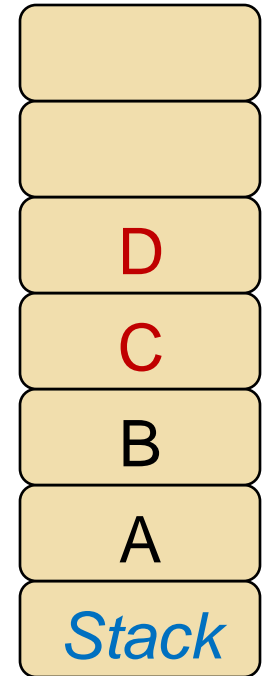
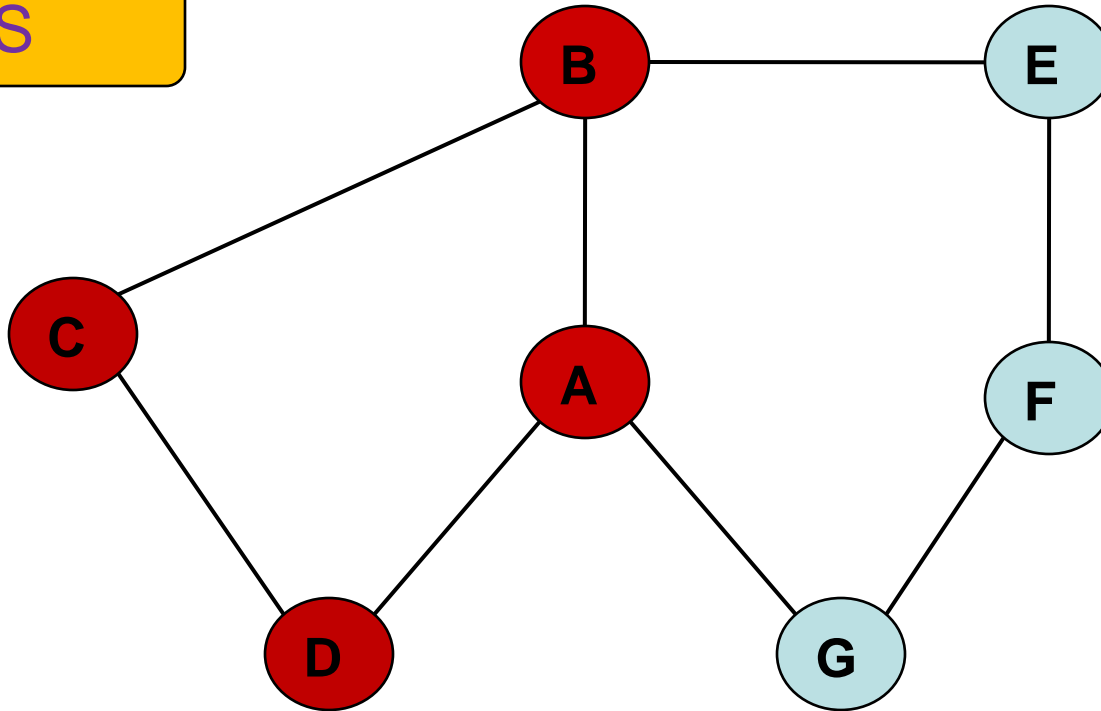
Graph Traversal

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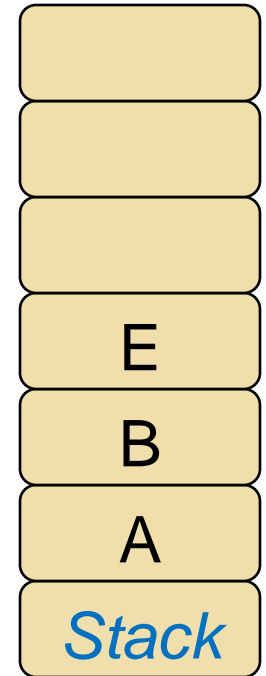
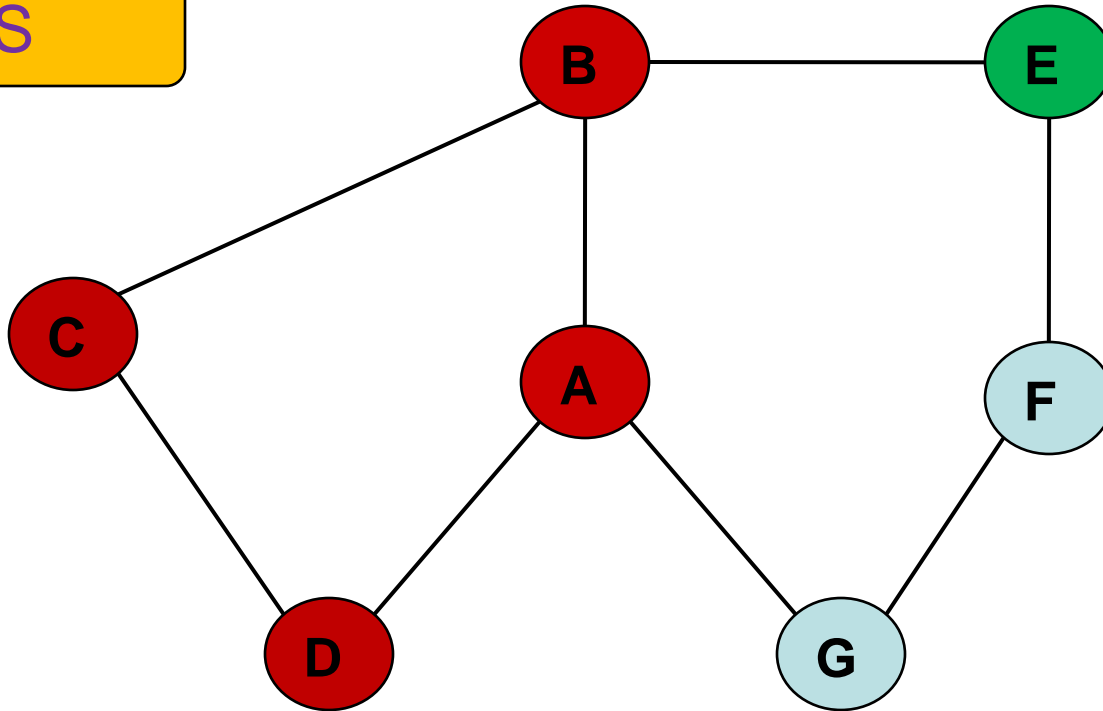
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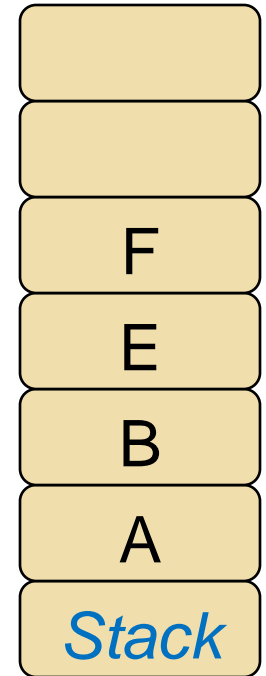
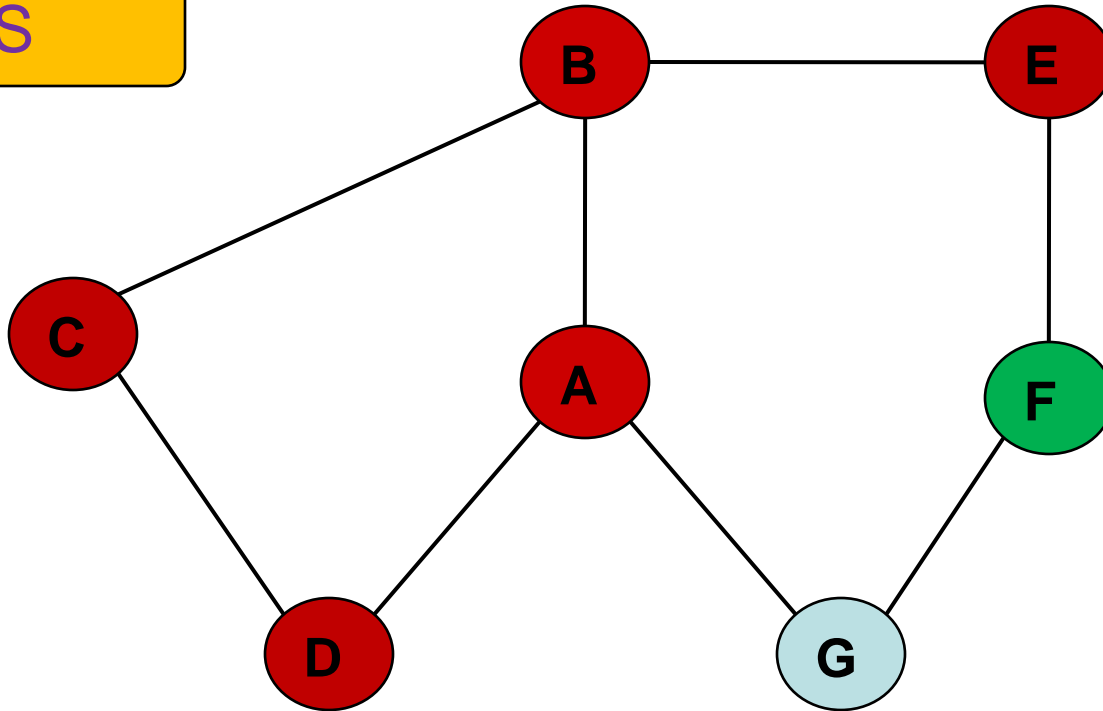
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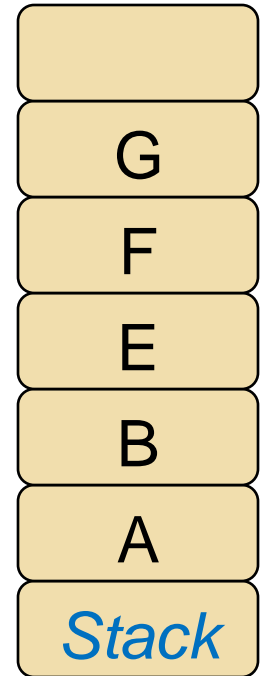
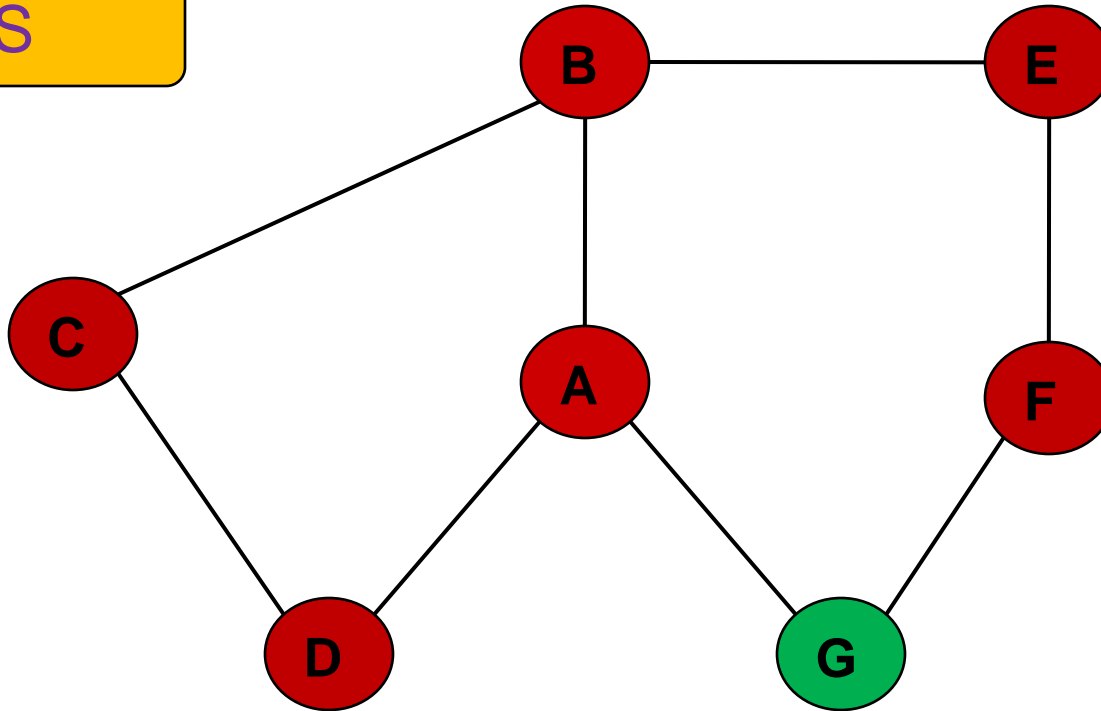
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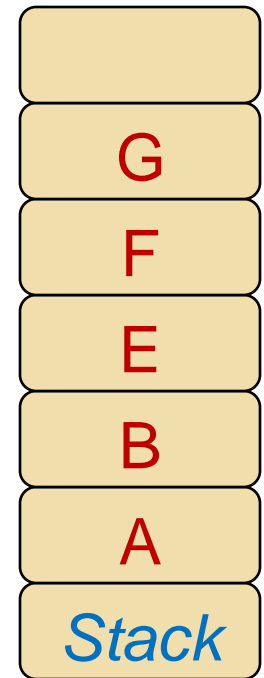
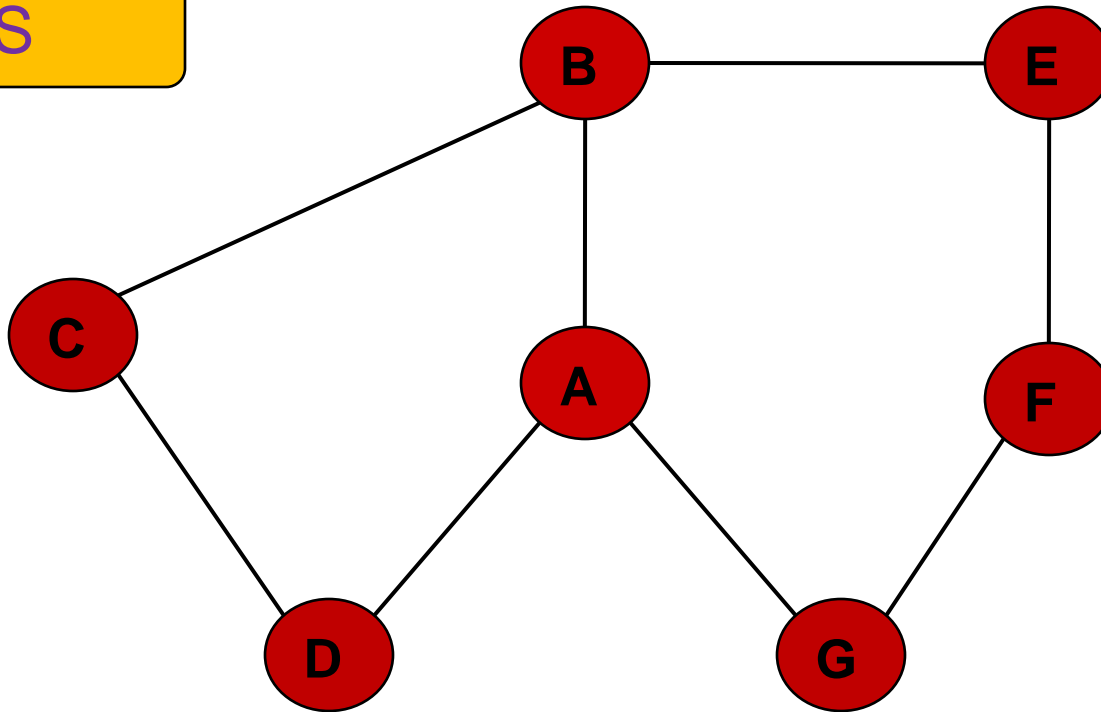
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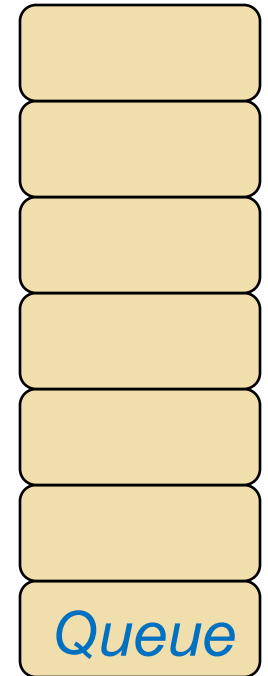
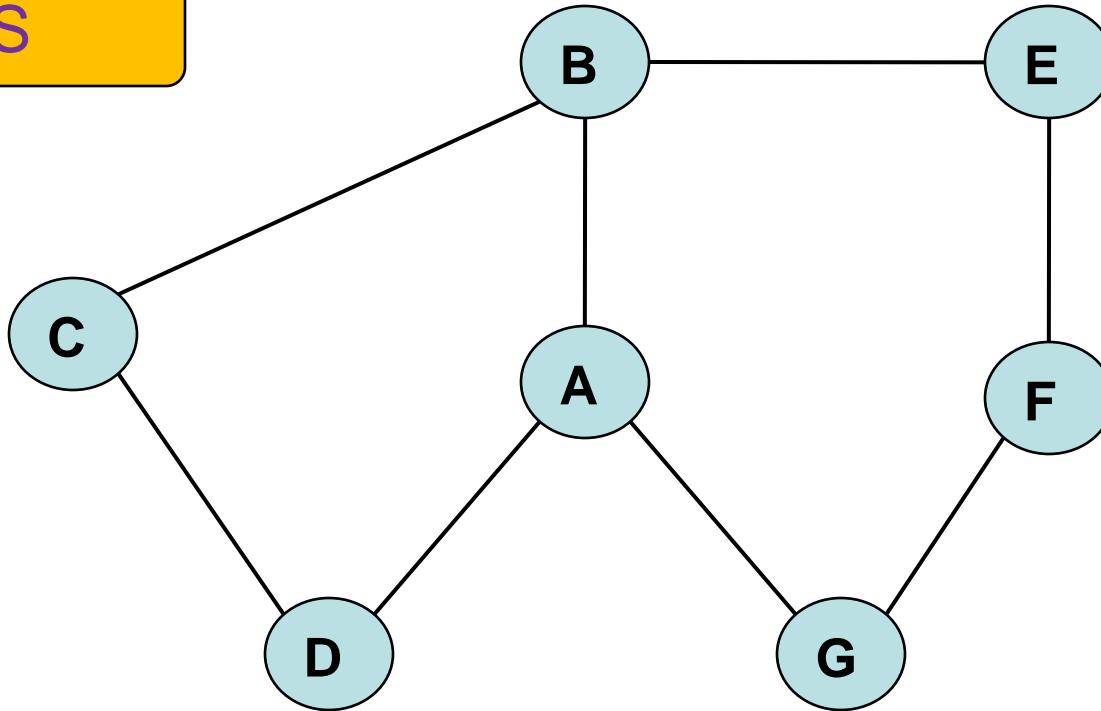
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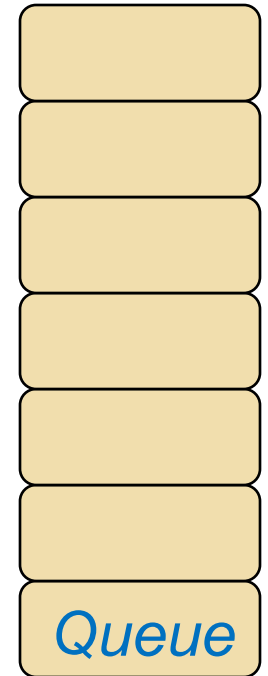
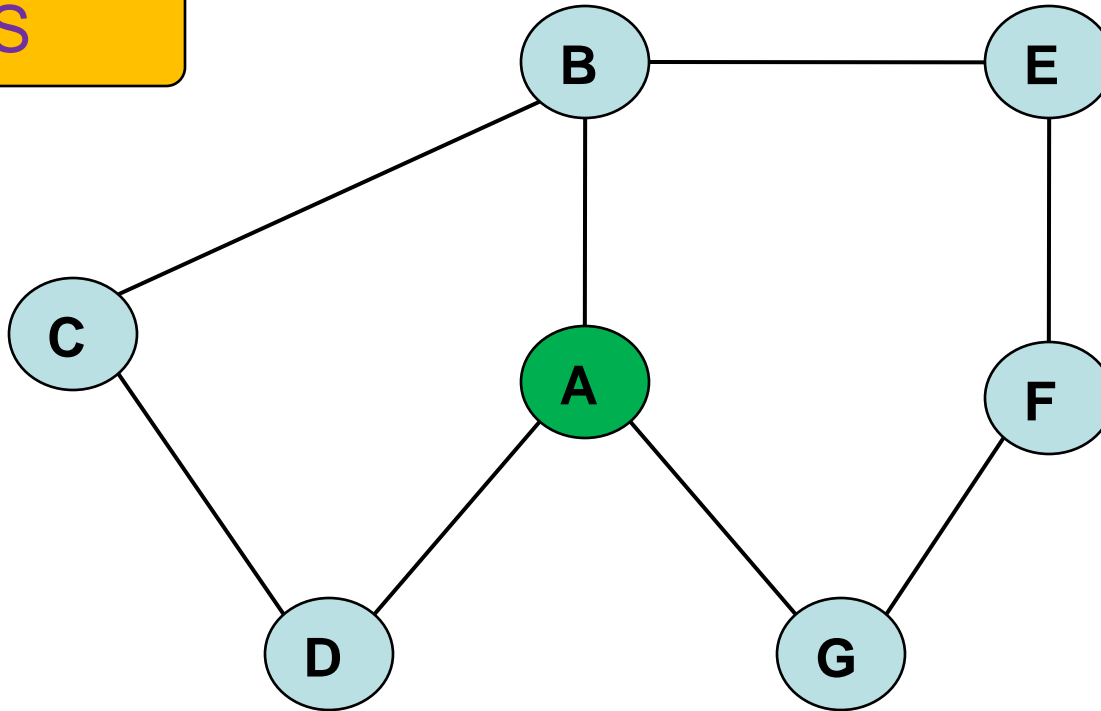
Graph Traversal

BFS



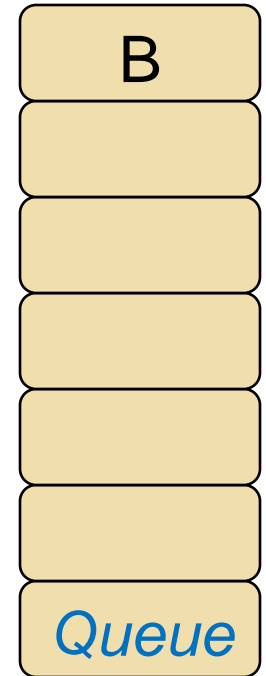
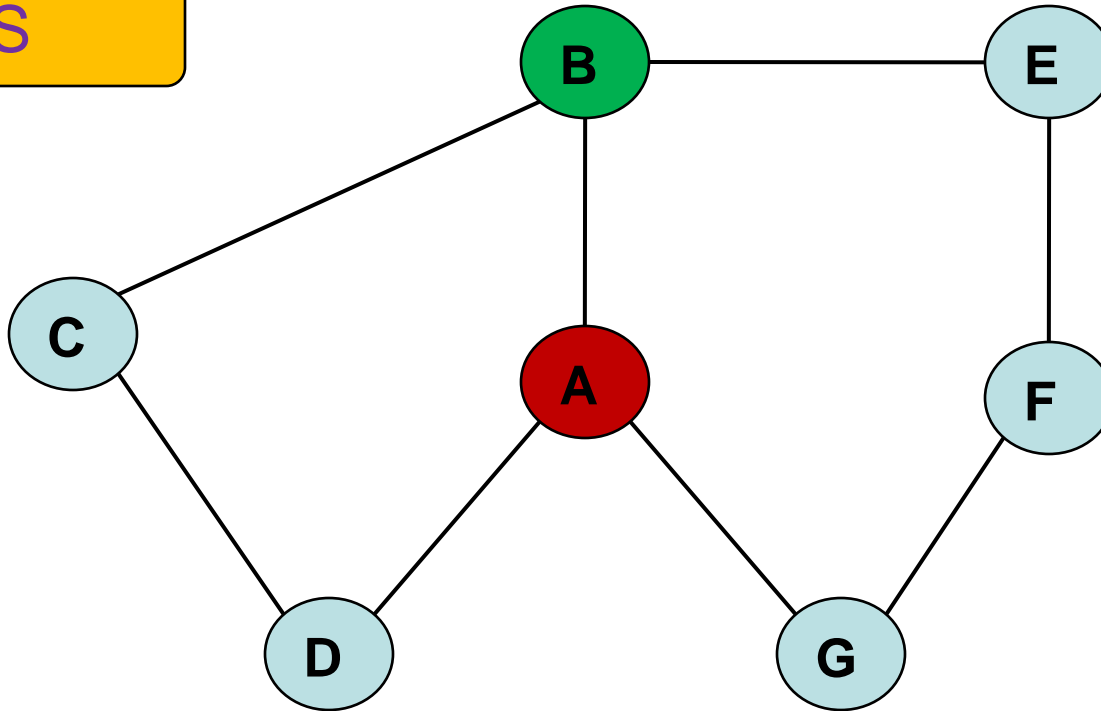
Graph Traversal

BFS



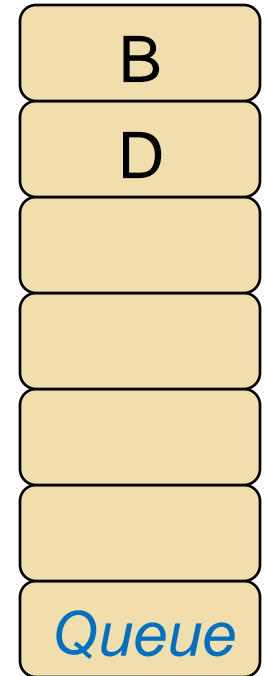
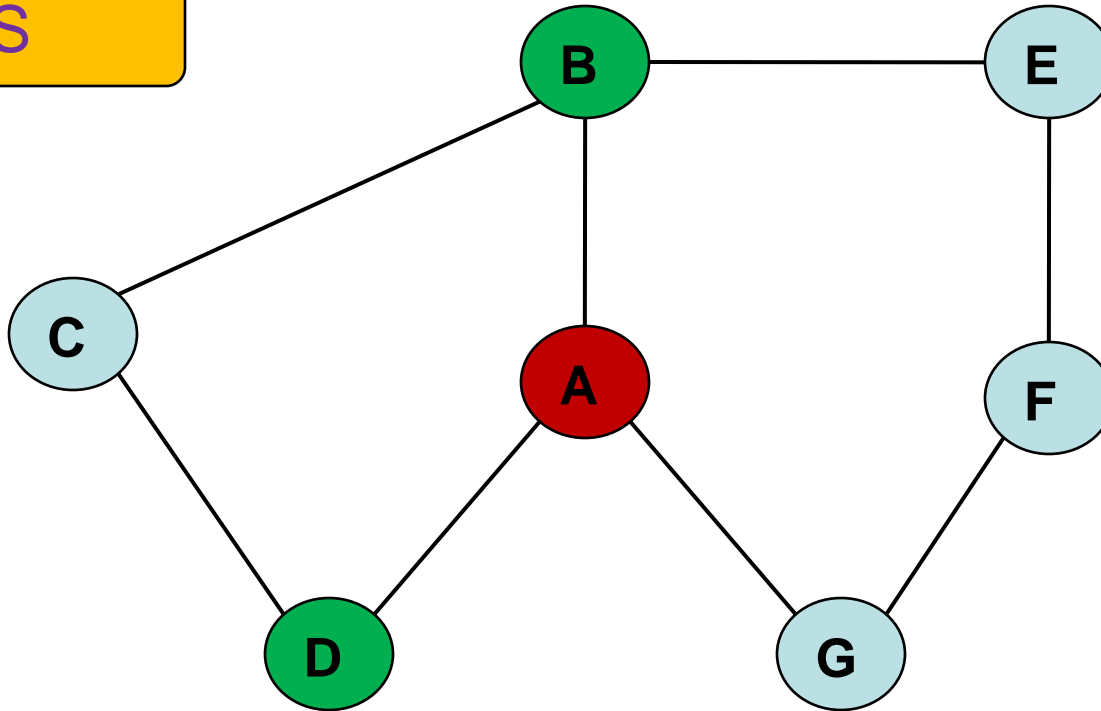
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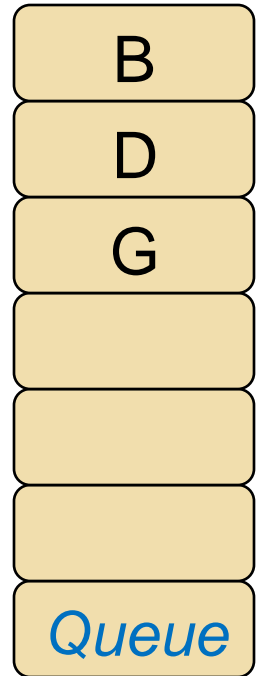
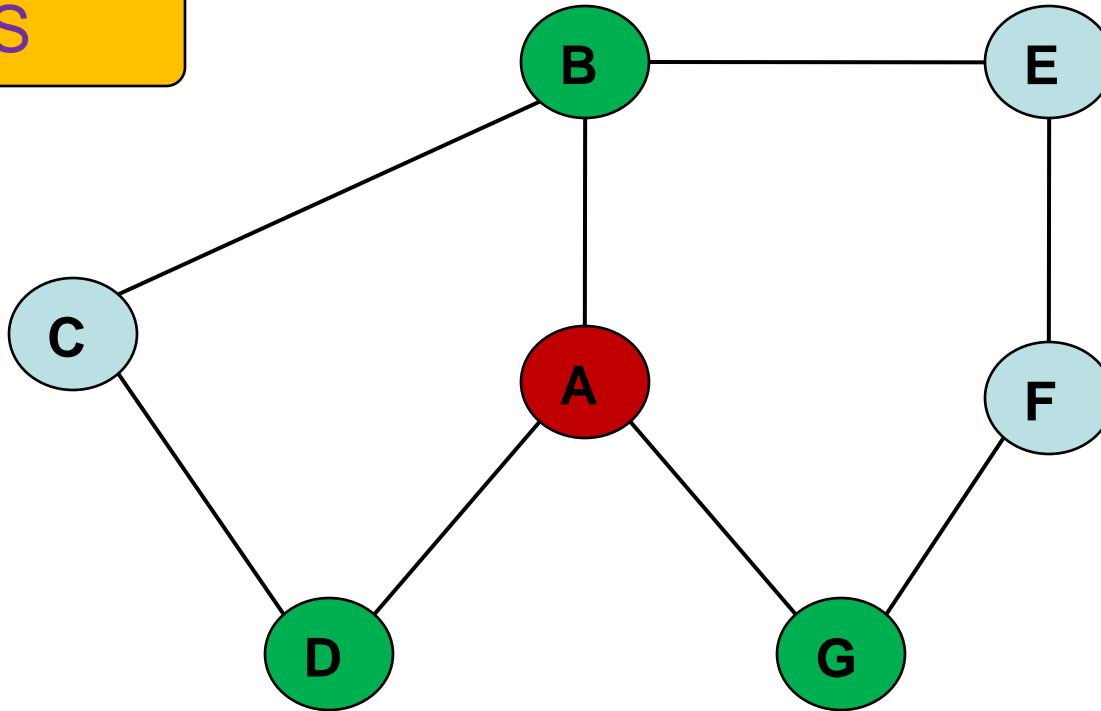
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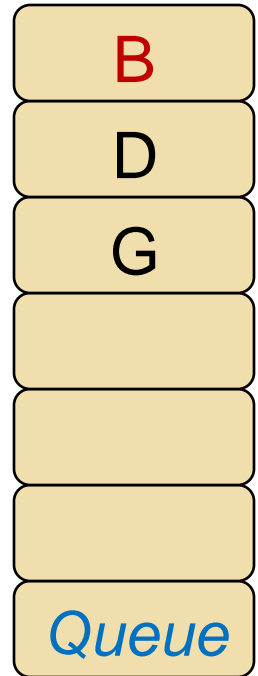
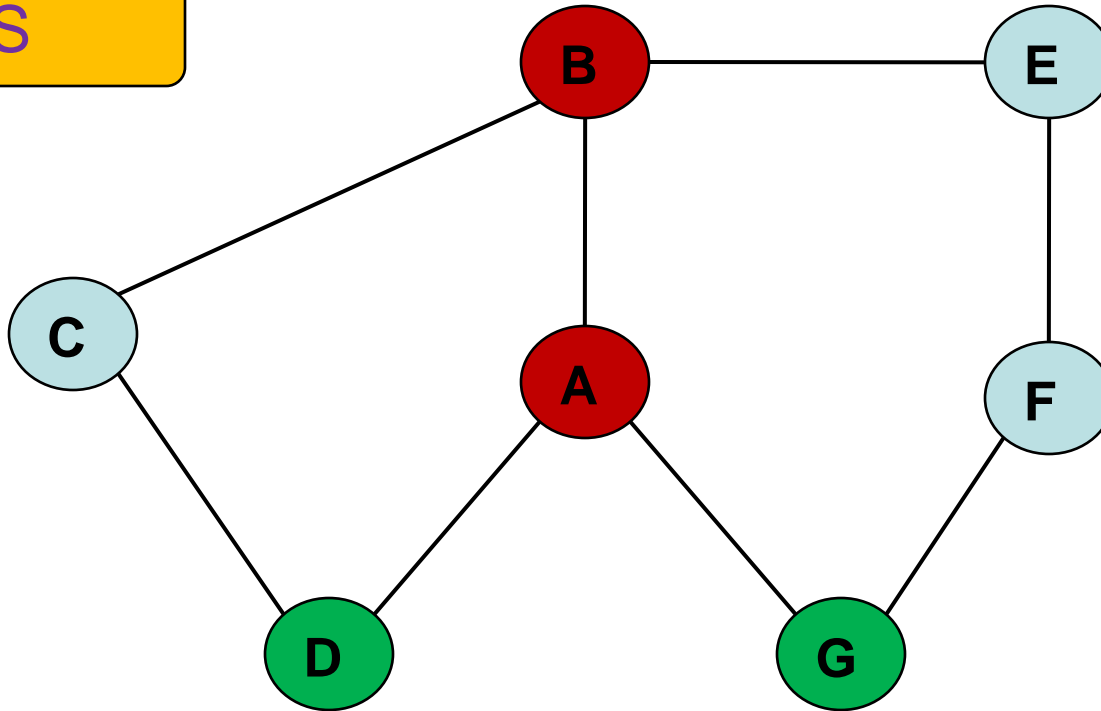
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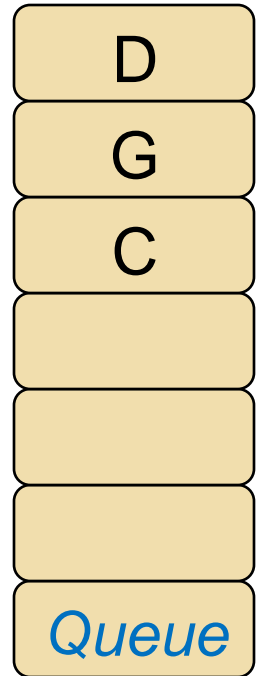
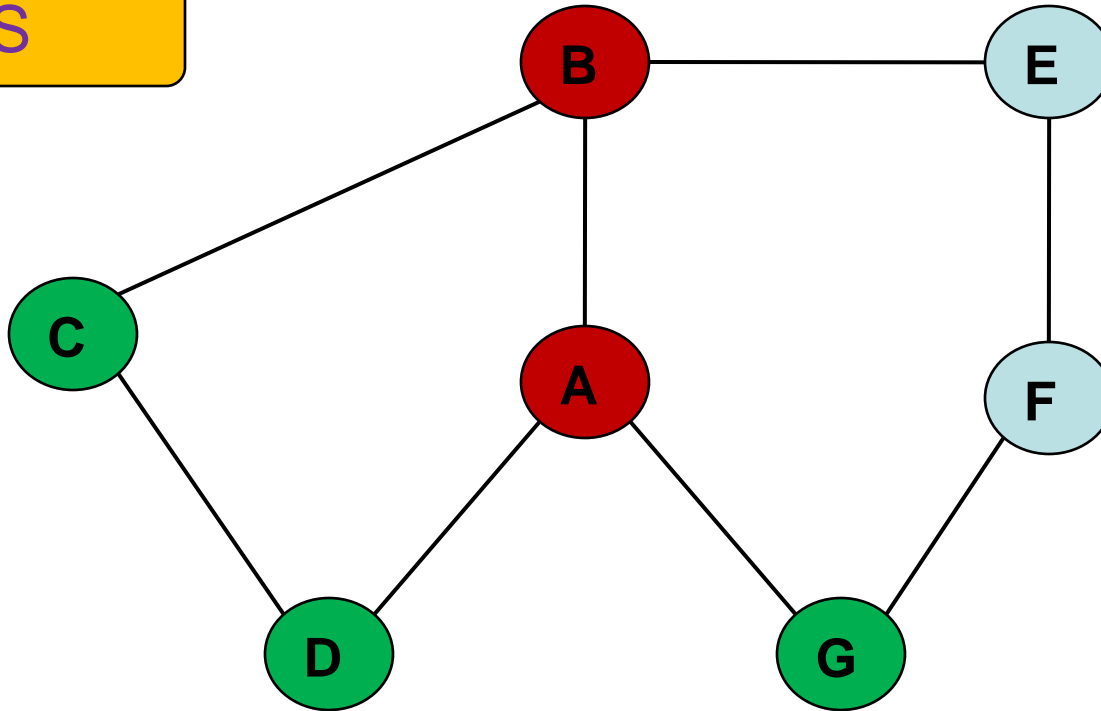
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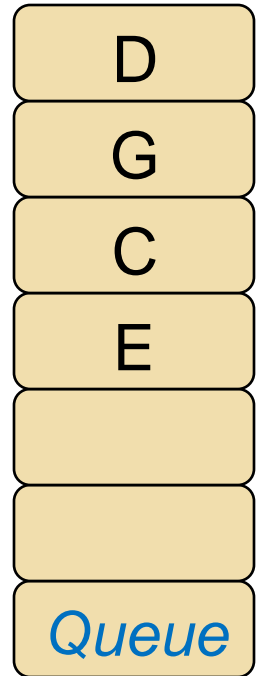
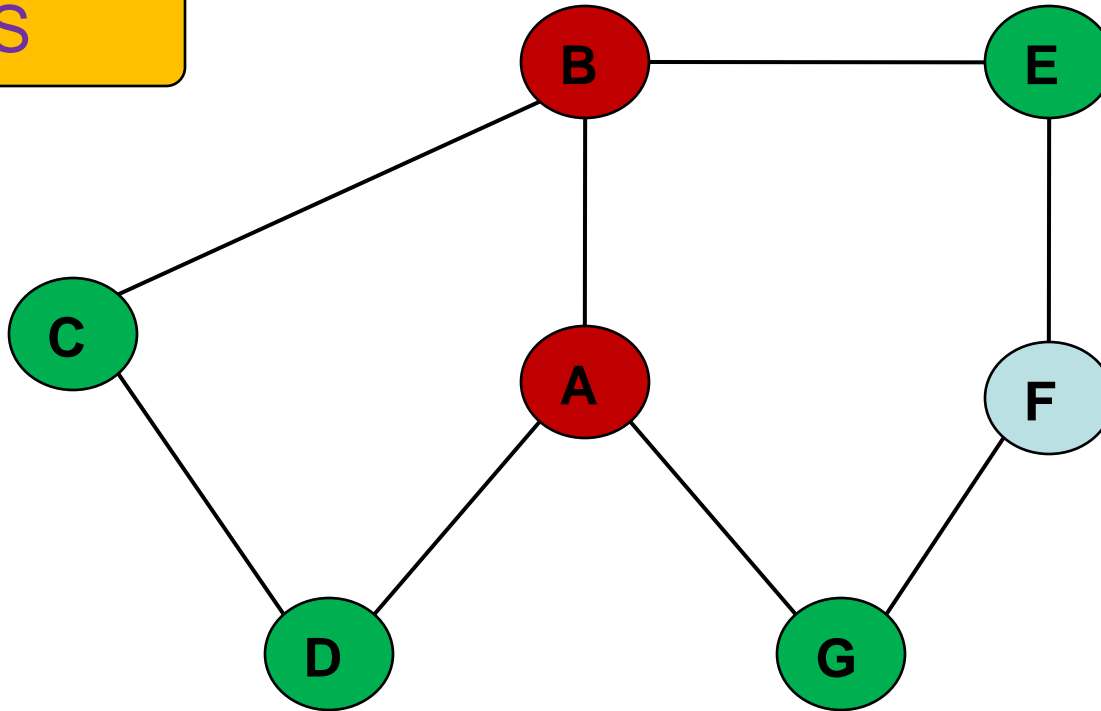
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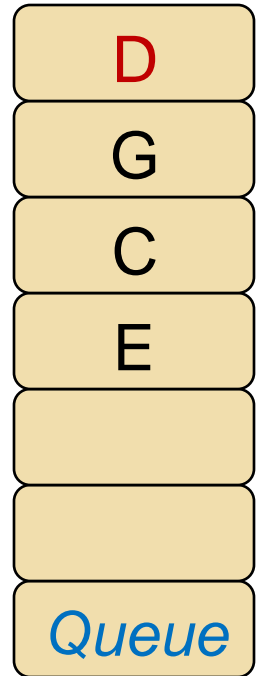
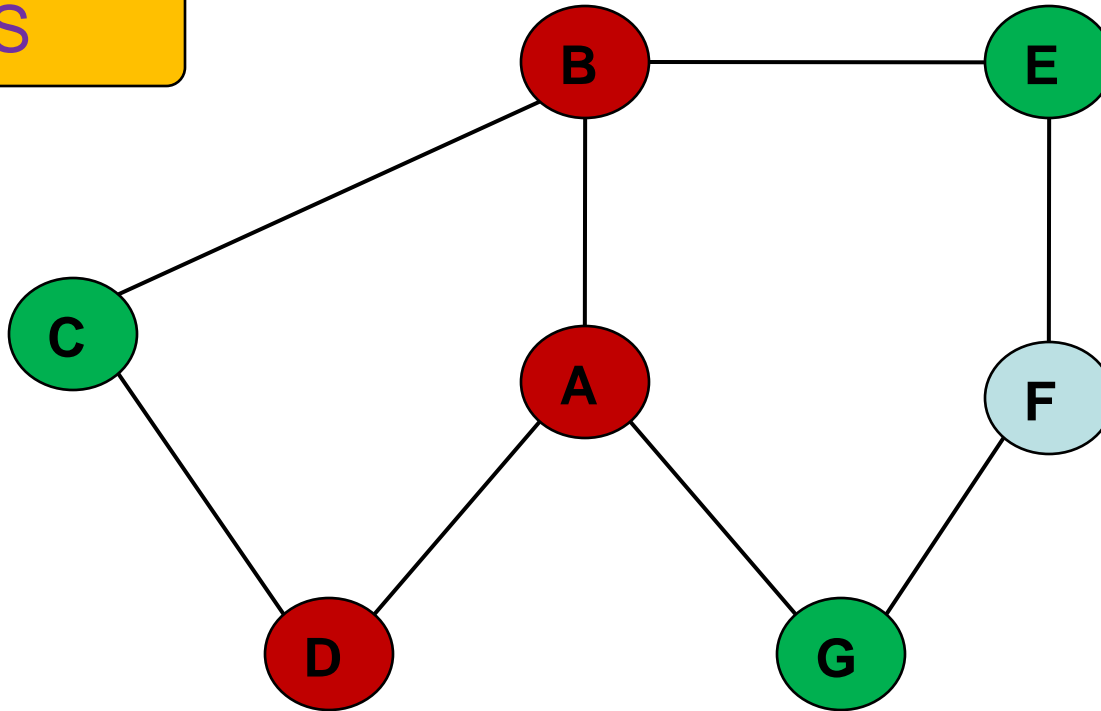
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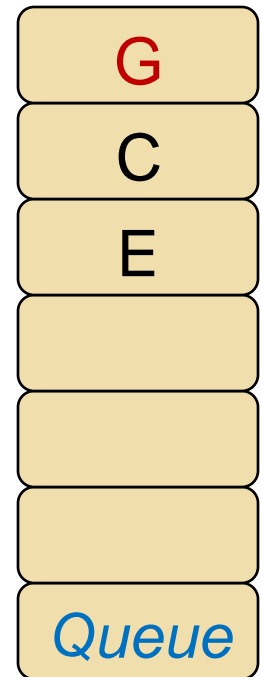
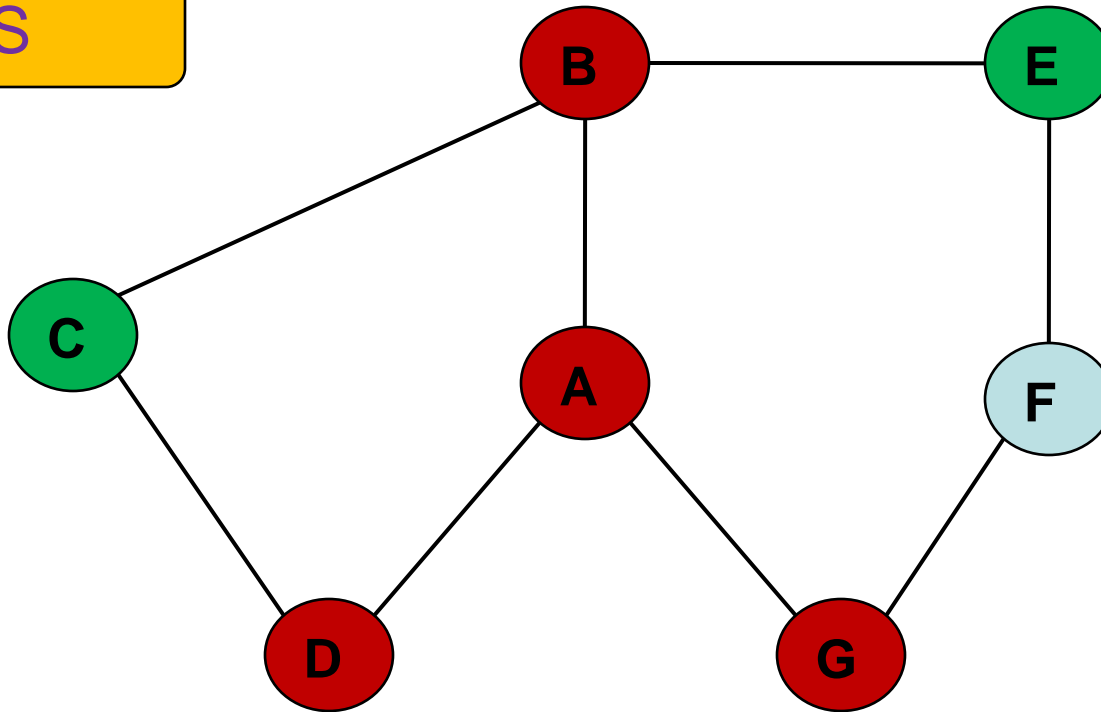
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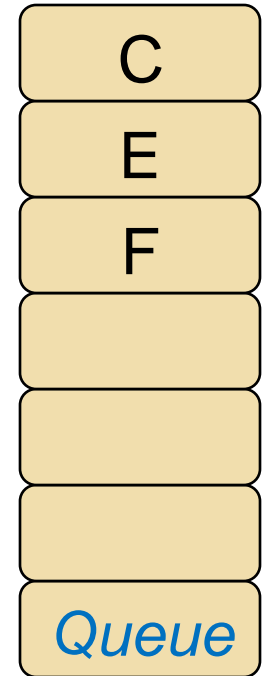
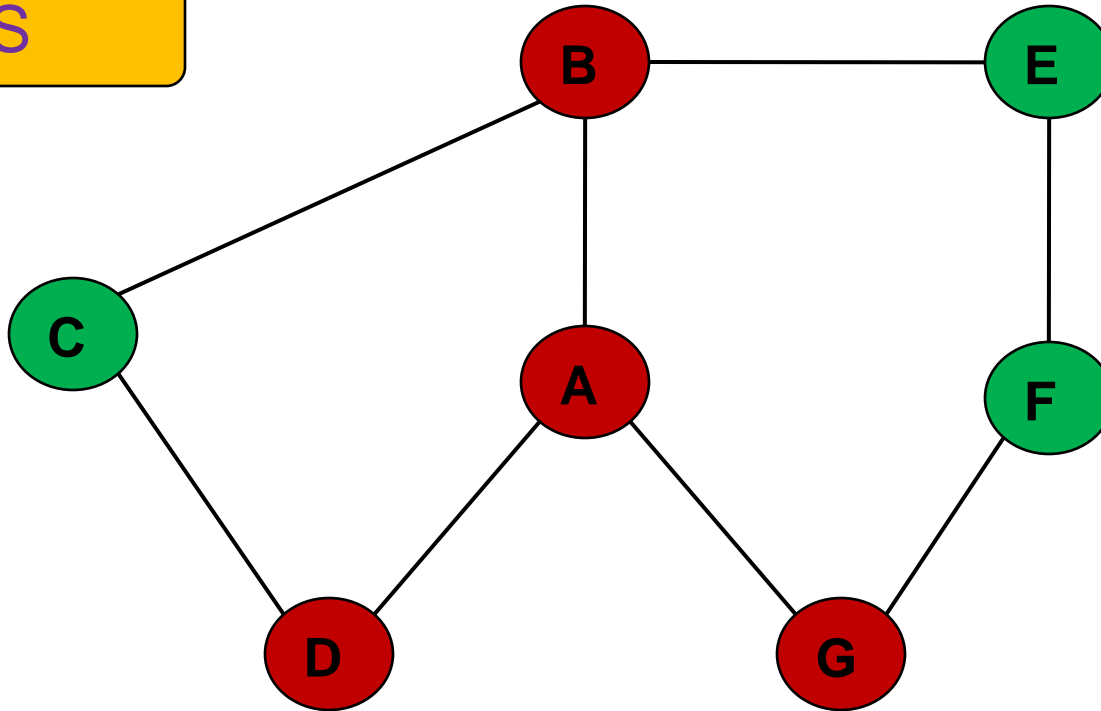
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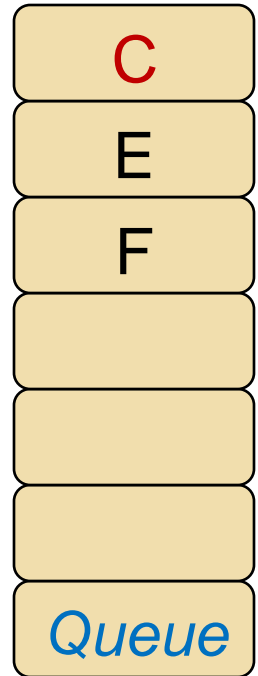
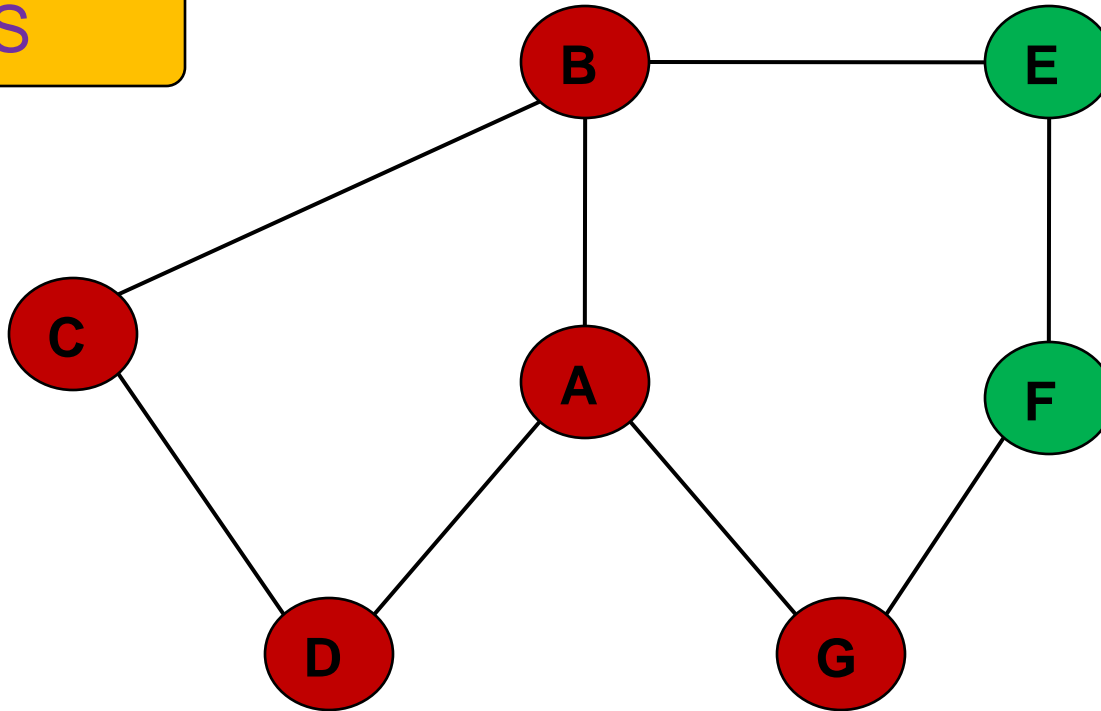
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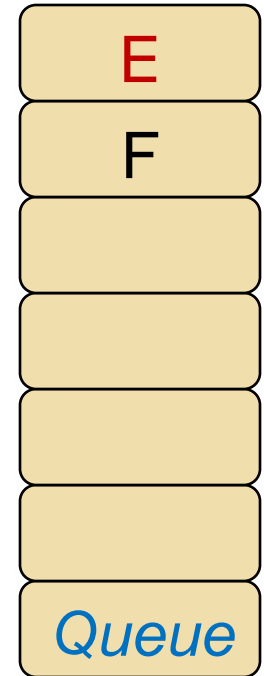
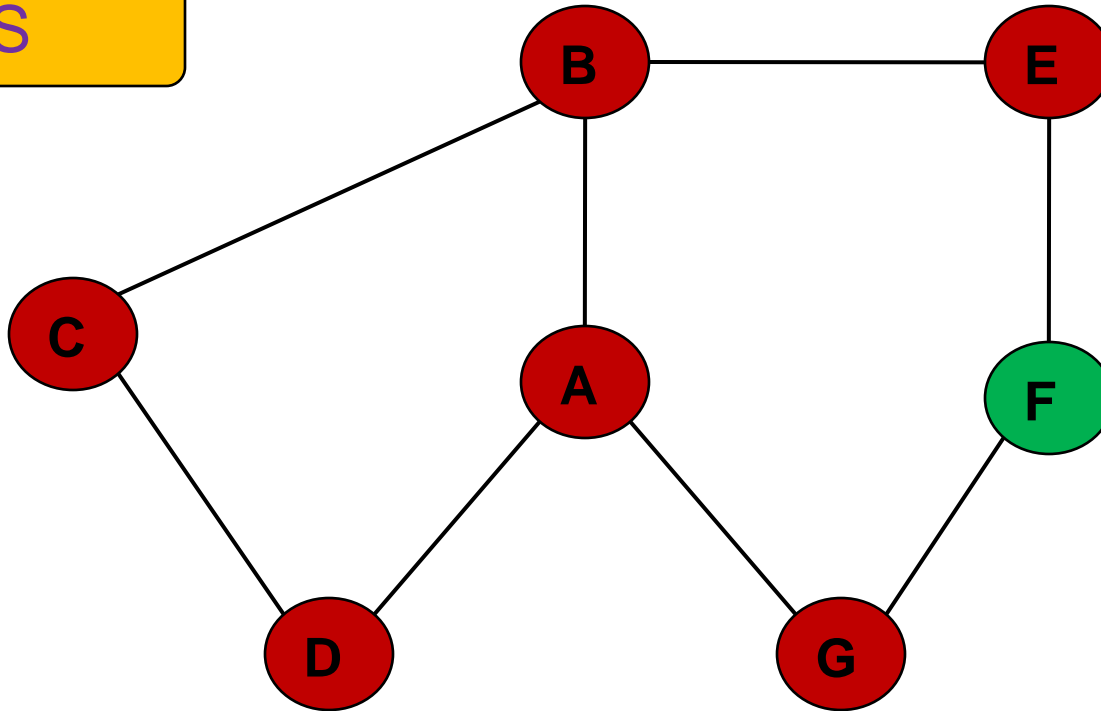
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