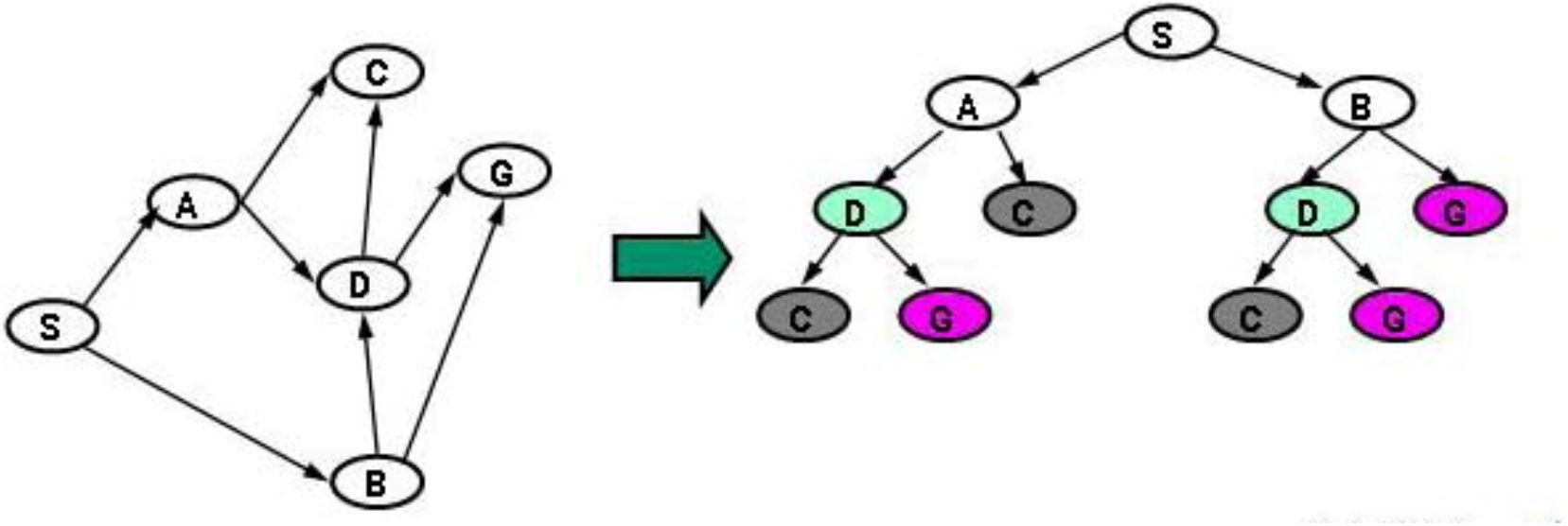
Review of BFS and DFS

305450 Lab01

Graph search as Tree search

- Trees are directed graphs without cycles
- We can turn graph search problems into tree search problems by
  - Replacing undirected links by 2 directed links
  - Avoiding loops in paths (or keeping track of visited nodes)



Terminology

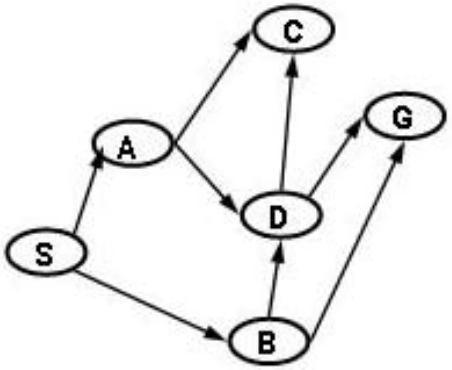
- Visited – a state N is first visited when a path to N first gets added to Q.
  - We visited a state when place it on Q, but we have not yet generated its descendants
- Expanded – a state N is expanded when it is the state of a node that is pulled of Q.
  - At this point, the descendants of N are visited and the path that led to M is extended to the descendants.
  - When a node M is expanded, we will not expand it again, hence we discard it from Q.

Depth First Search

Depth First Search

- Pick first element of Q; Add path extension to *front* of Q.

	Q	Visited
1		
2		
3		
4		
5		



- Added path is in blue
- We show the paths in reversed order; the node's state is the first element

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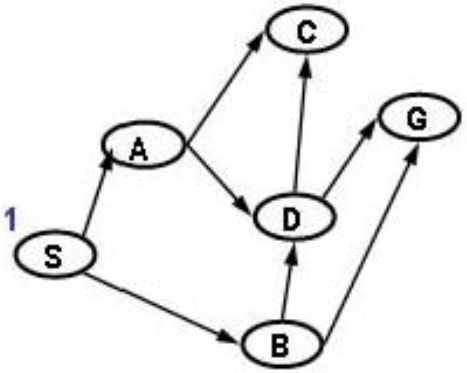

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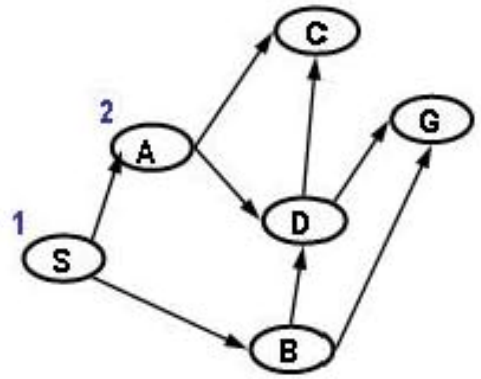

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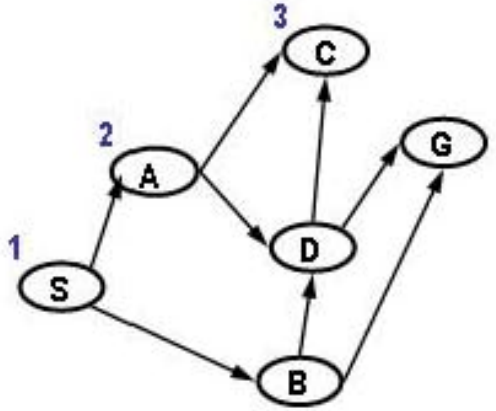

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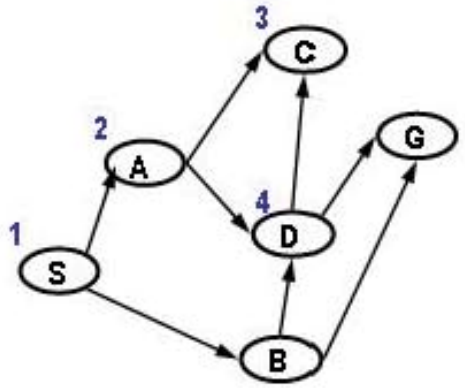

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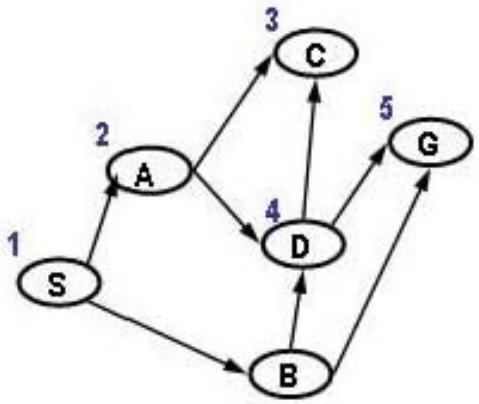

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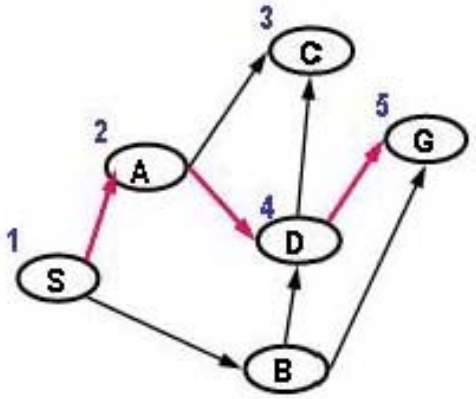

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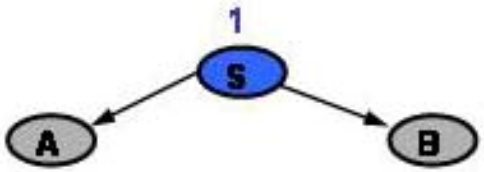
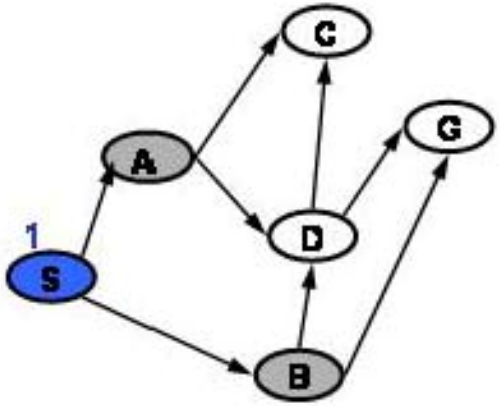
Depth First Search

- Another way to see it (as tree)





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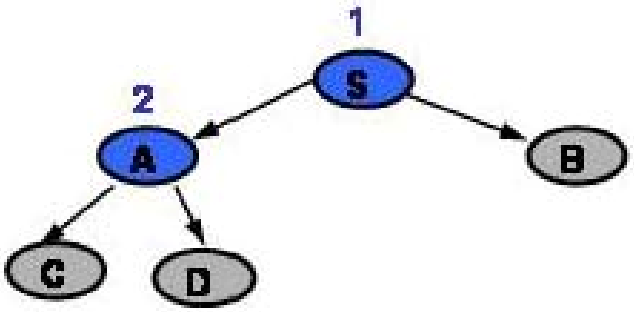

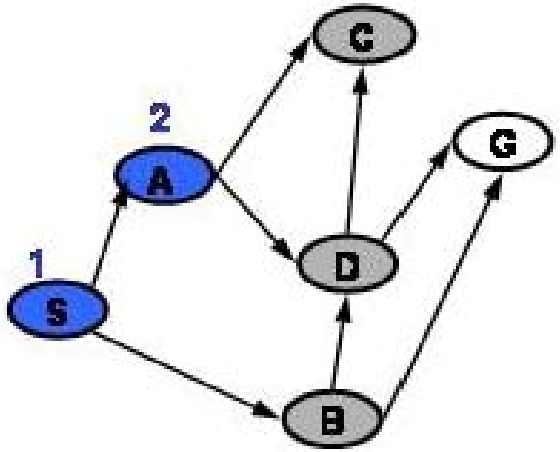

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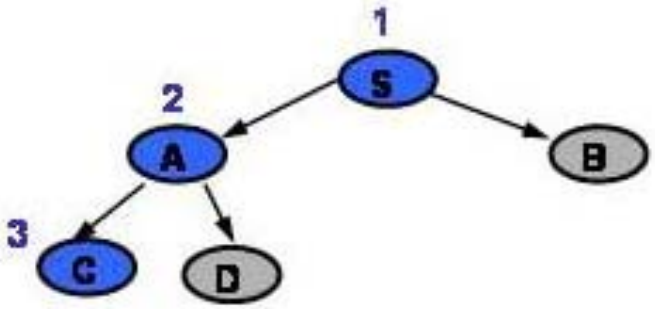

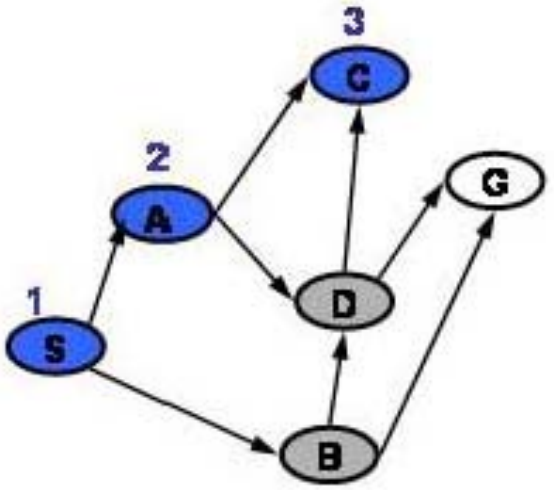

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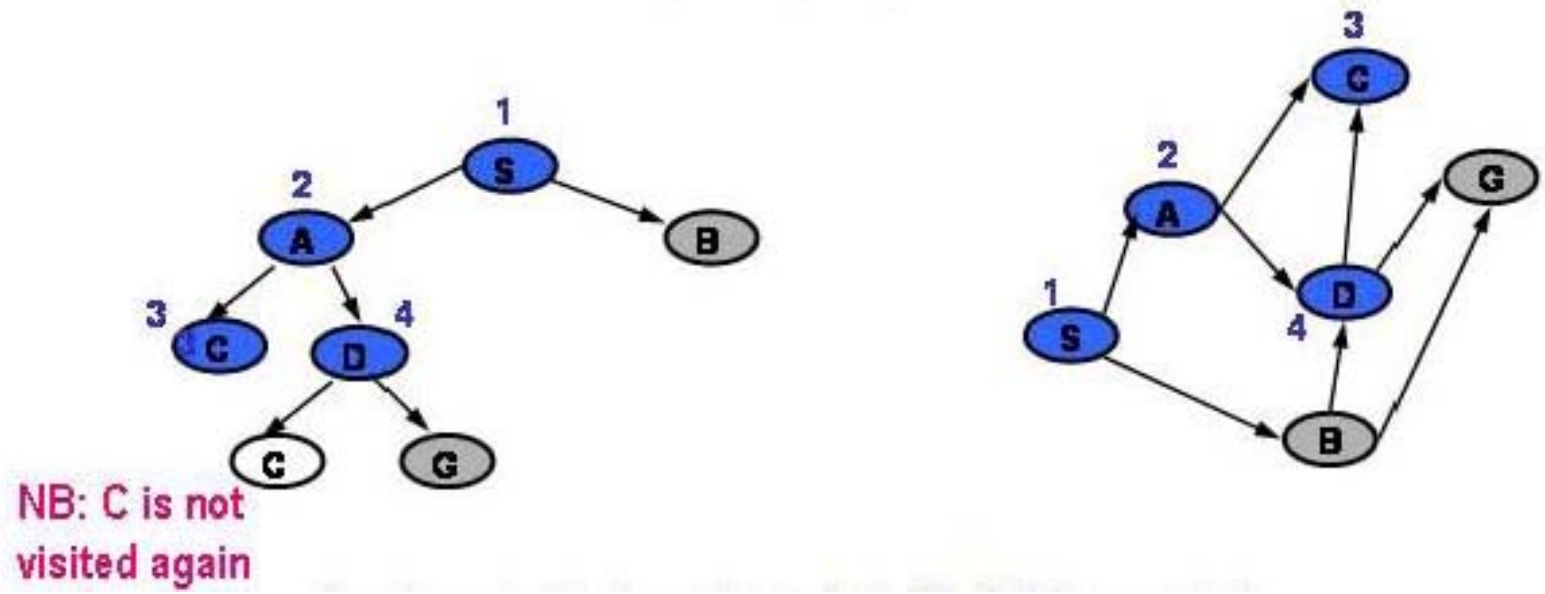

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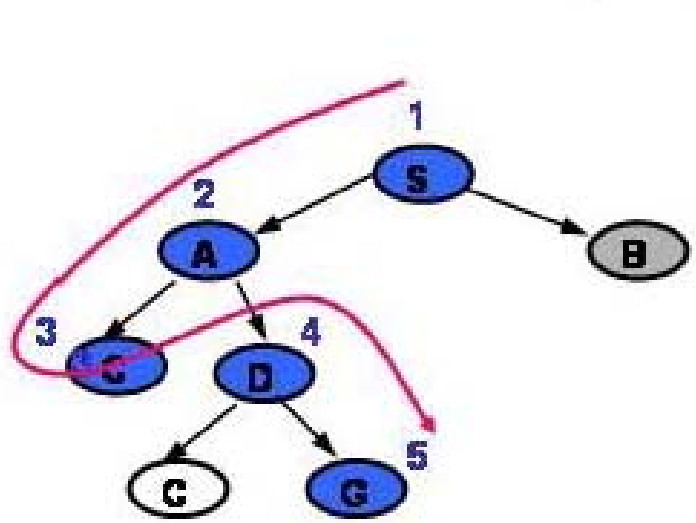

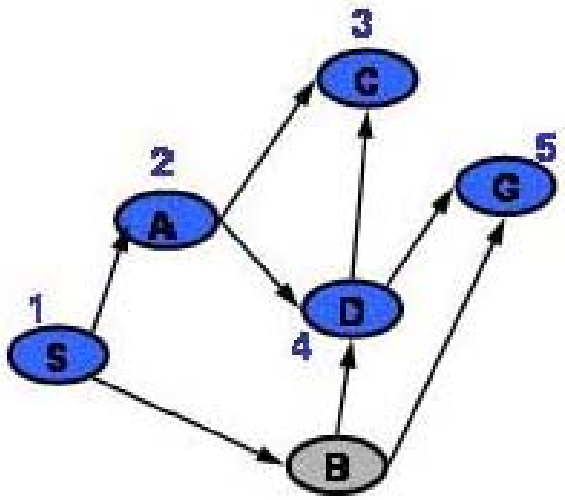

Depth First Search (without Visited list)

	Q
1	(S)
2	(A S) (B S)
3	(C A S) (D A S) (B S)
4	(D A S) (B S)
5	(C D A S) (G D A S) (B S)
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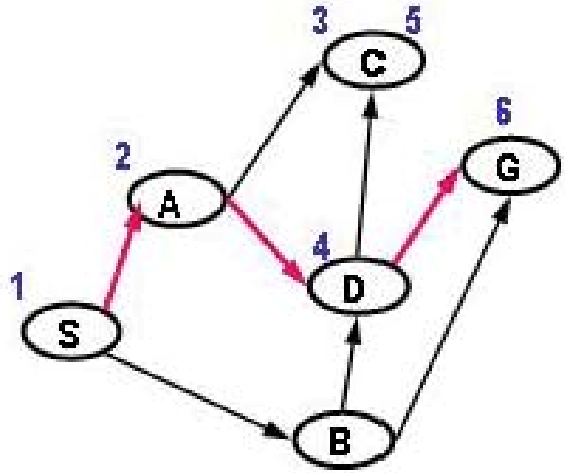

Breath First Search

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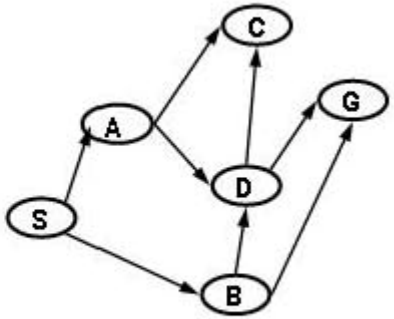

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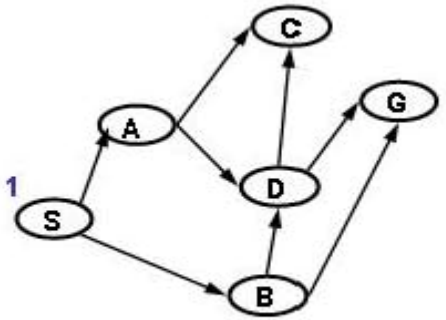

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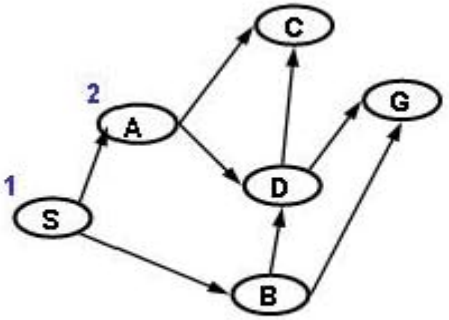

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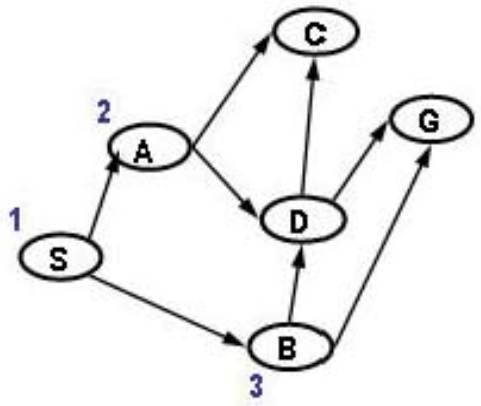

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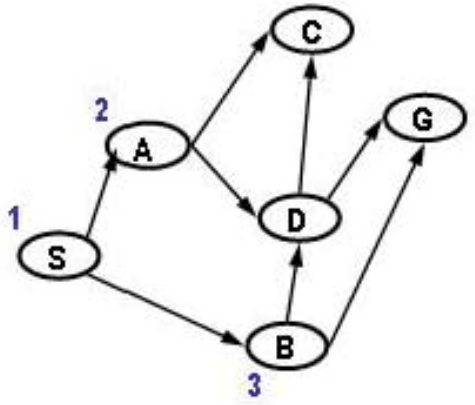

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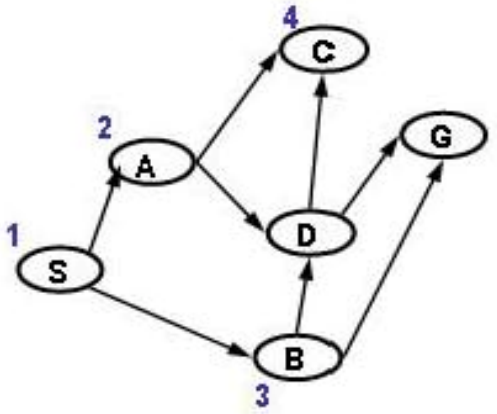

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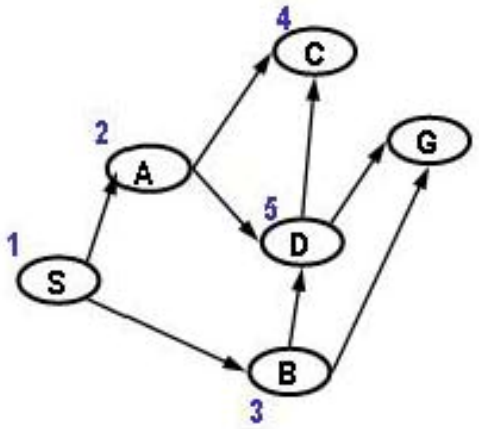

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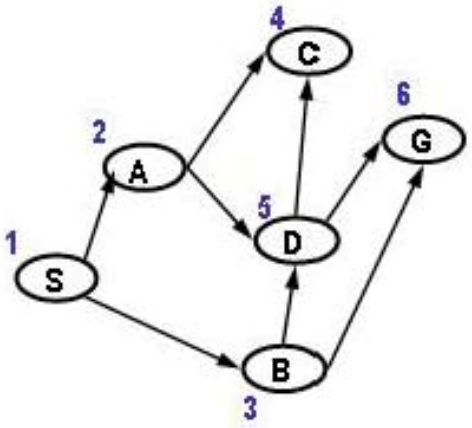

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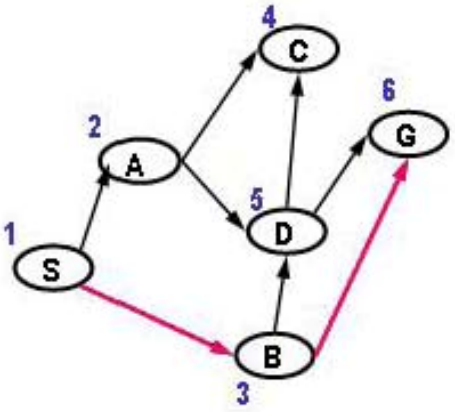

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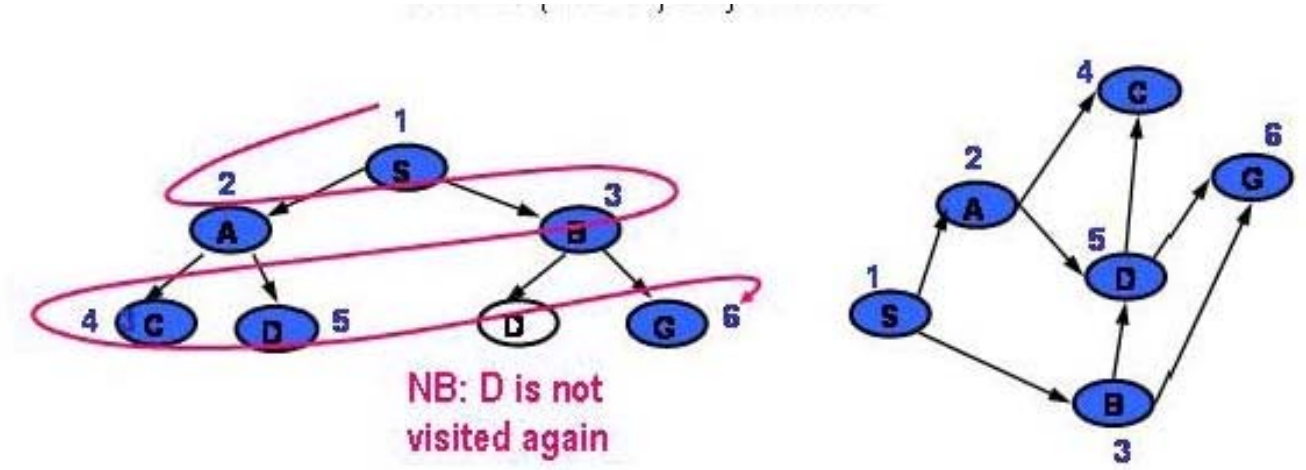

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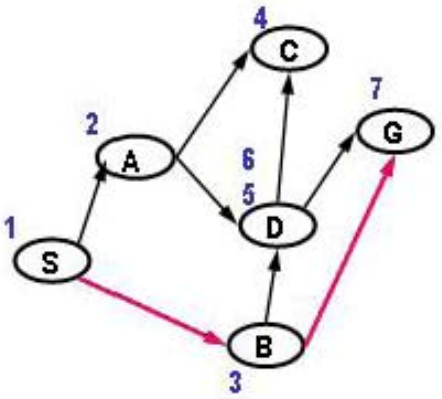

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- We could have stopped here, when the fist path to the goal was generated