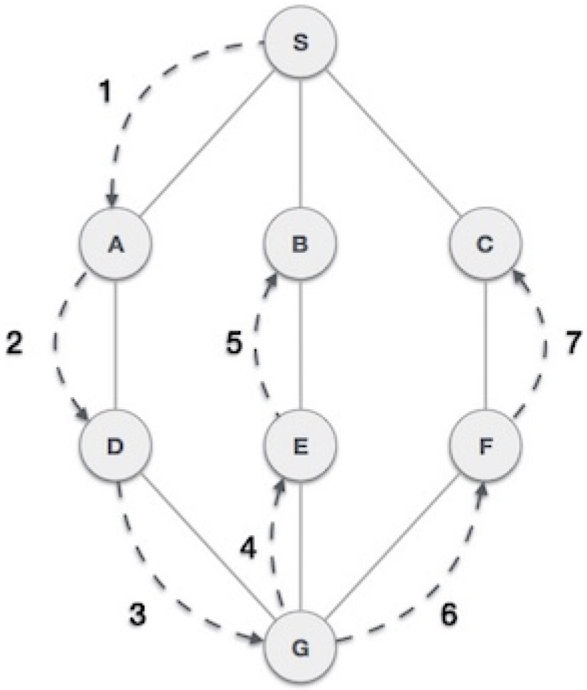
DATA STRUCTURE - DEPTH FIRST TRAVERSAL

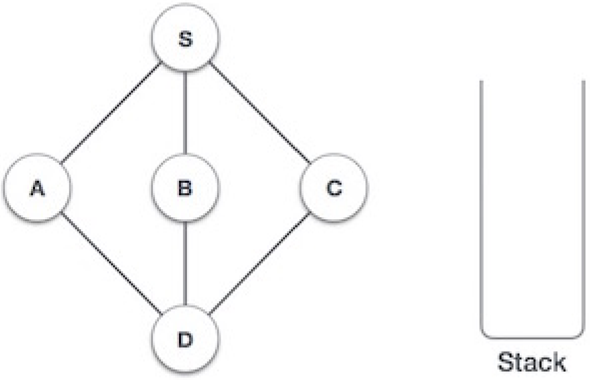
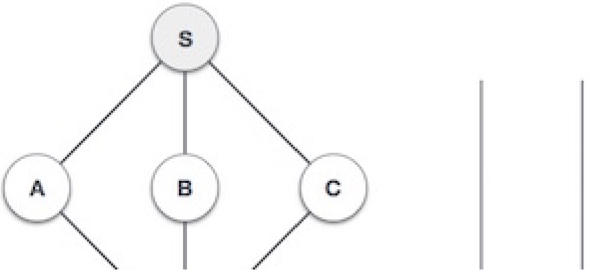
http://www.tutorialspoint.com/data_structures_algorithms/depth_first_traversal.htm

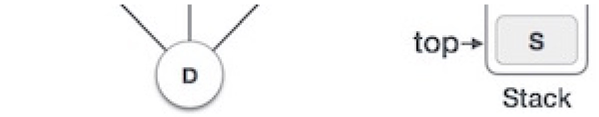
Depth First Search algorithm*DFS* traverses a graph in a depthward motion and uses a stack to remember to get the next vertex to start a search when a dead end occurs in any iteration.



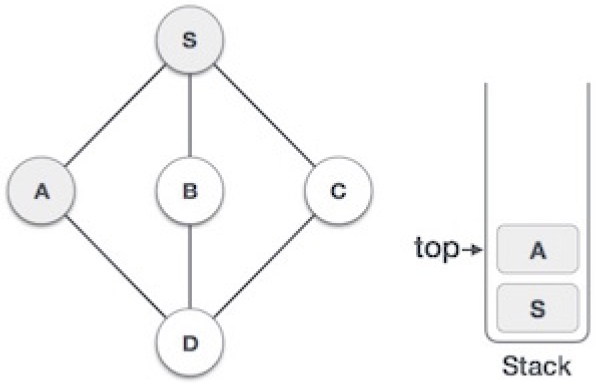
As in example given above, DFS algorithm traverses from A to B to C to D first then to E, then to F and lastly to G. It employs following rules.

- **Rule 1** − Visit adjacent unvisited vertex. Mark it visited. Display it. Push it in a stack.
- **Rule 2** − If no adjacent vertex found, pop up a vertex from stack. *Itwillpopupalltheverticesfromthestackwhichdonothaveadjacentvertices.*
- **Rule 3** − Repeat Rule 1 and Rule 2 until stack is empty.

Step	Traversal	Description
1.		Initialize the stack
2.		Mark **S** as visited and put it onto the stack. Explore any unvisited adjacent node from **S**. We have three nodes and we can pick any of them. For this example, we shall take the node in alphabetical order.

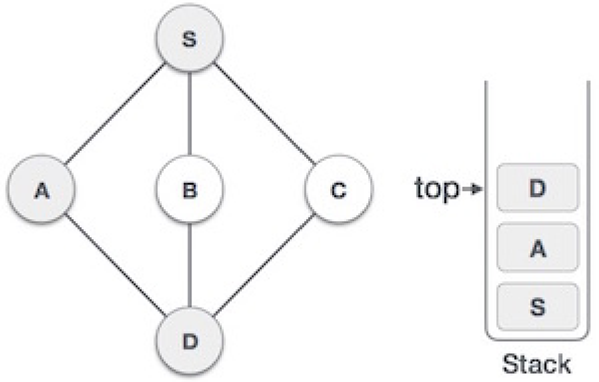


3.



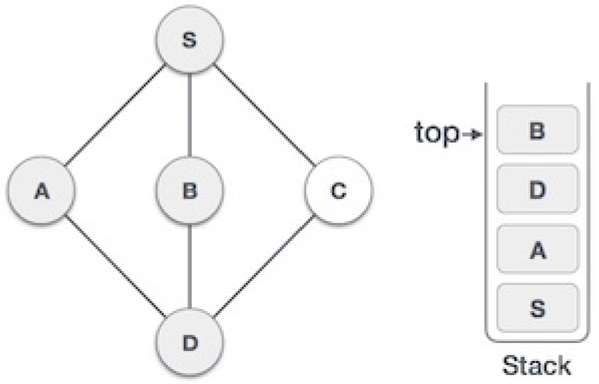
Mark **A** as visited and put it onto the stack. Explore any unvisited adjacent node from A. Both **S** and **D** are adjacent to **A** but we are concerned for unvisited nodes only.

4.



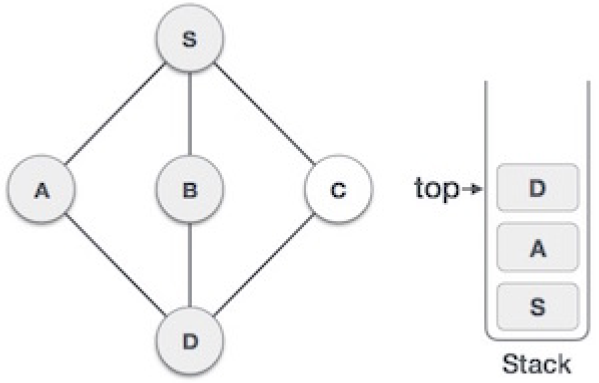
Visit **D** and mark it visited and put onto the stack. Here we have **B** and **C** nodes which are adjacent to **D** and both are unvisited. But we shall again choose in alphabetical order.

5.



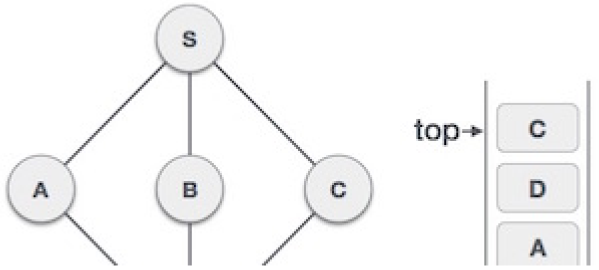
We choose **B**, mark it visited and put onto stack. Here **B** does not have any unvisited adjacent node. So we pop **B** from the stack.

6.



We check stack top for return to previous node and check if it has any unvisited nodes. Here, we find **D** to be on the top of stack.

7.



Only unvisited adjacent node is from **D** is **C** now. So we visit **C**, mark it visited and put it onto the stack.

As **C** does not have any unvisited adjacent node so we keep popping the stack until we find a node which has unvisited adjacent node. In this case, there's none and we keep popping until stack is empty.

To see the implementation of this algorithm in C programming language, click here.