3.3 GRAPHS TRAVERSALS – DFS

DEPTH-FIRST SEARCH ALGORITHM

Depth first Search or Depth first traversal is a recursive algorithm for searching all the vertices of a graph or tree data structure.

- Depth-first search begins at a starting node A which becomes the current node.
- Process a neighbour of A, then a neighbour of neighbour of A, and so on.
- During the execution of the algorithm, if we reach a path that has a node N that has already been processed, then we backtrack to the current node.
- Otherwise, the unvisited (unprocessed) node becomes the current node.

Algorithm

To implement the Depth First Search, perform the following

Steps:

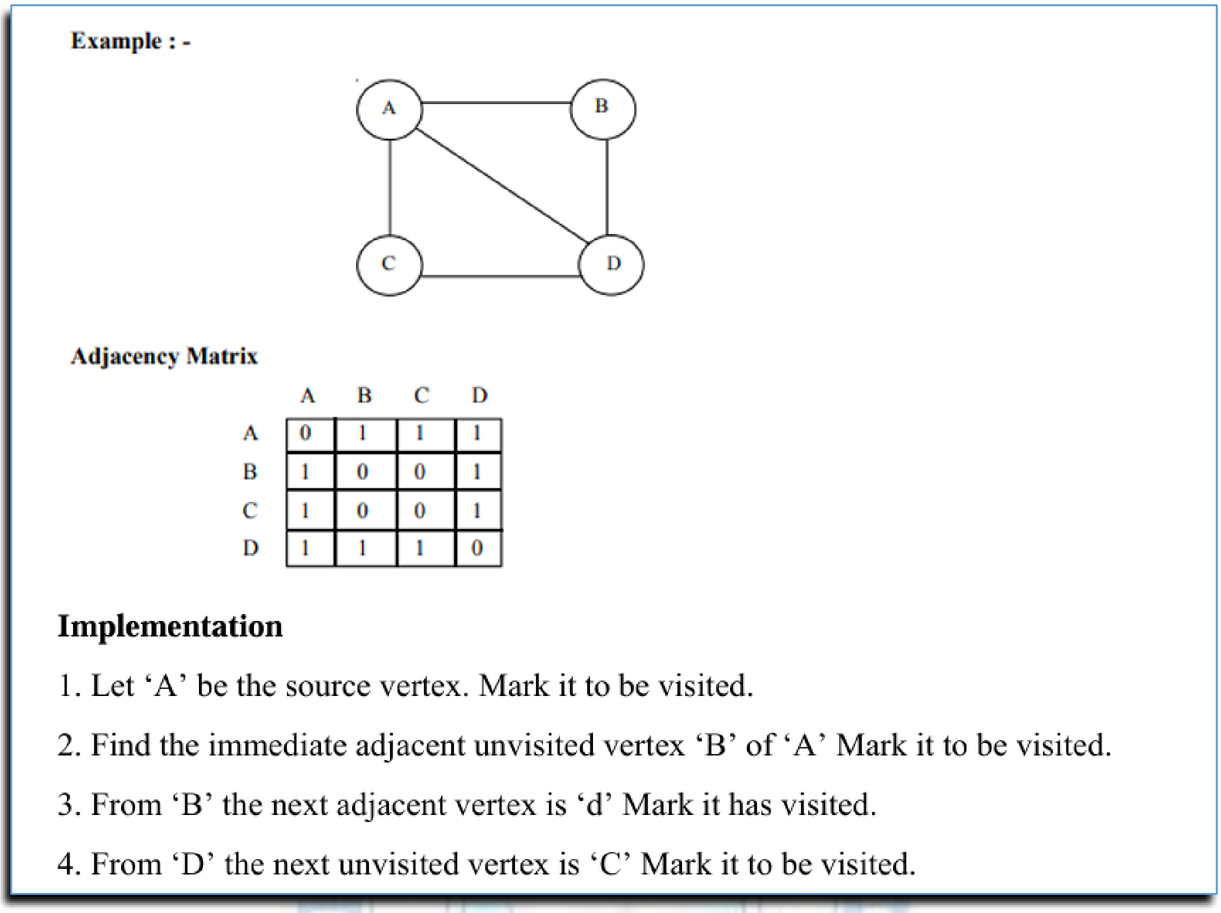
Step 1: Choose any node in the graph. Designate it as the search node and mark it as visited.

Step 2: Using the adjacency matrix of the graph, find a node adjacent to the search node that has not been visited yet. Designate this as the new search node and mark it as visited.

Step 3: Repeat step 2 using the new search node. If no nodes satisfying (2) can be found, return to the previous search node and continue from there.

Step 4: When a return to the previous search node in (3) is impossible, the search from the originally chosen search node is complete.

Step 5: If the graph still contains unvisited nodes, choose any node that has not been visited and repeat step (1) through (4).



Example : -

Adjacency Matrix

	A	B	C	D
A	0	1	1	1
B	1	0	0	1
C	1	0	0	1
D	1	1	1	0

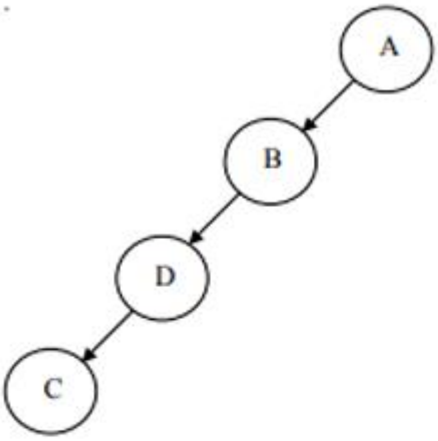
Implementation

1. Let ‘A’ be the source vertex. Mark it to be visited.

2. Find the immediate adjacent unvisited vertex ‘B’ of ‘A’ Mark it to be visited.

3. From ‘B’ the next adjacent vertex is ‘d’ Mark it has visited.

4. From ‘D’ the next unvisited vertex is ‘C’ Mark it to be visited.



Depth First Spanning Tree

Applications of Depth First Search

1. To check whether the undirected graph is connected or not.

2. To check whether the connected undirected graph is Bi-connected or not.

3. To check the a Acyclicity of the directed graph