Graph

Graph is a non-linear data structure consisting of vertices and edges. The vertices are sometimes also referred to as nodes and the edges are lines or arcs that connect any two nodes in the graph. More formally a Graph is composed of a set of vertices(**V**) and a set of edges(**E**). The graph is denoted by **G(V, E)**

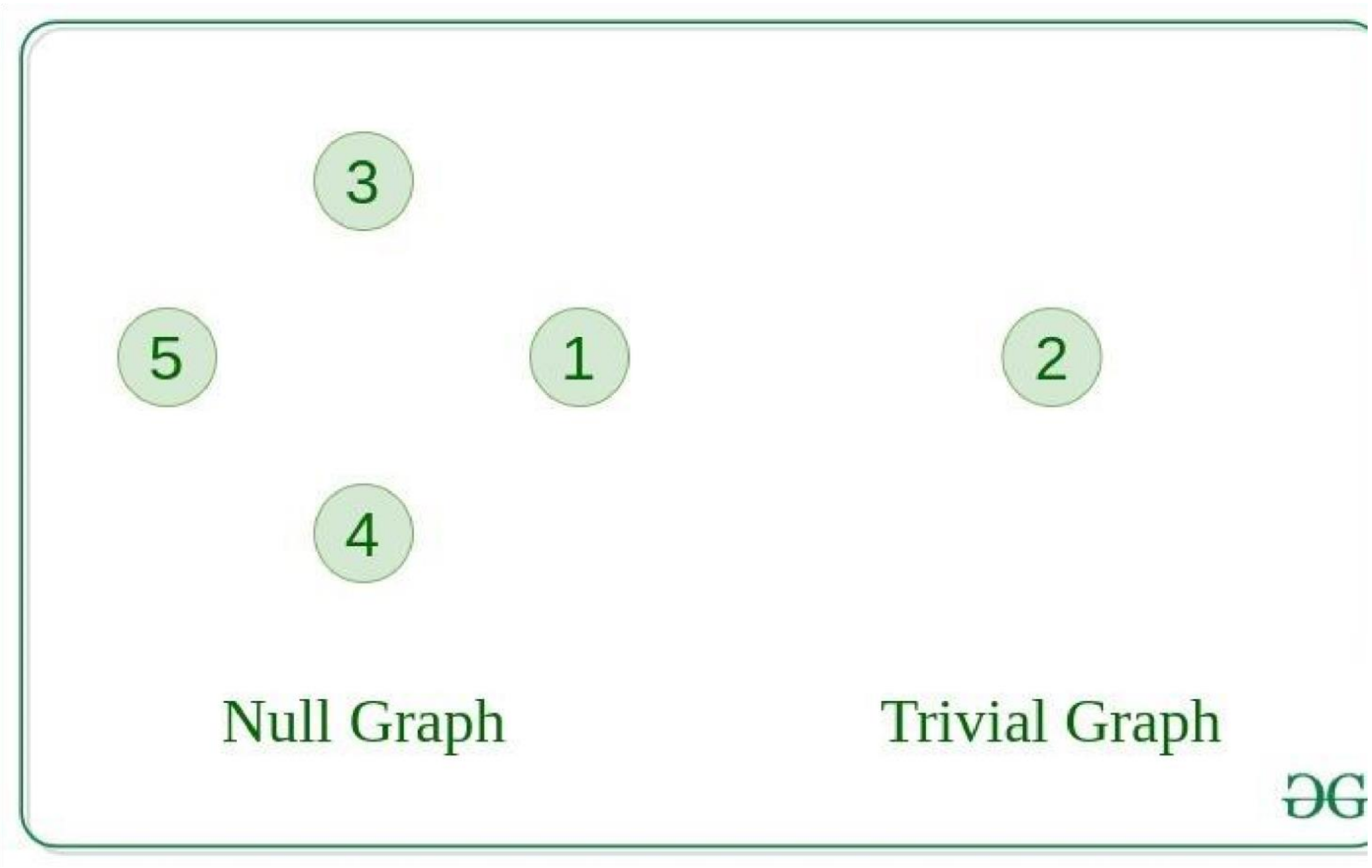
Types Of Graph Data Structure:

1. Null Graph

A graph is known as a null graph if there are no edges in the graph.

2. Trivial Graph

Graph having only a single vertex, it is also the smallest graph



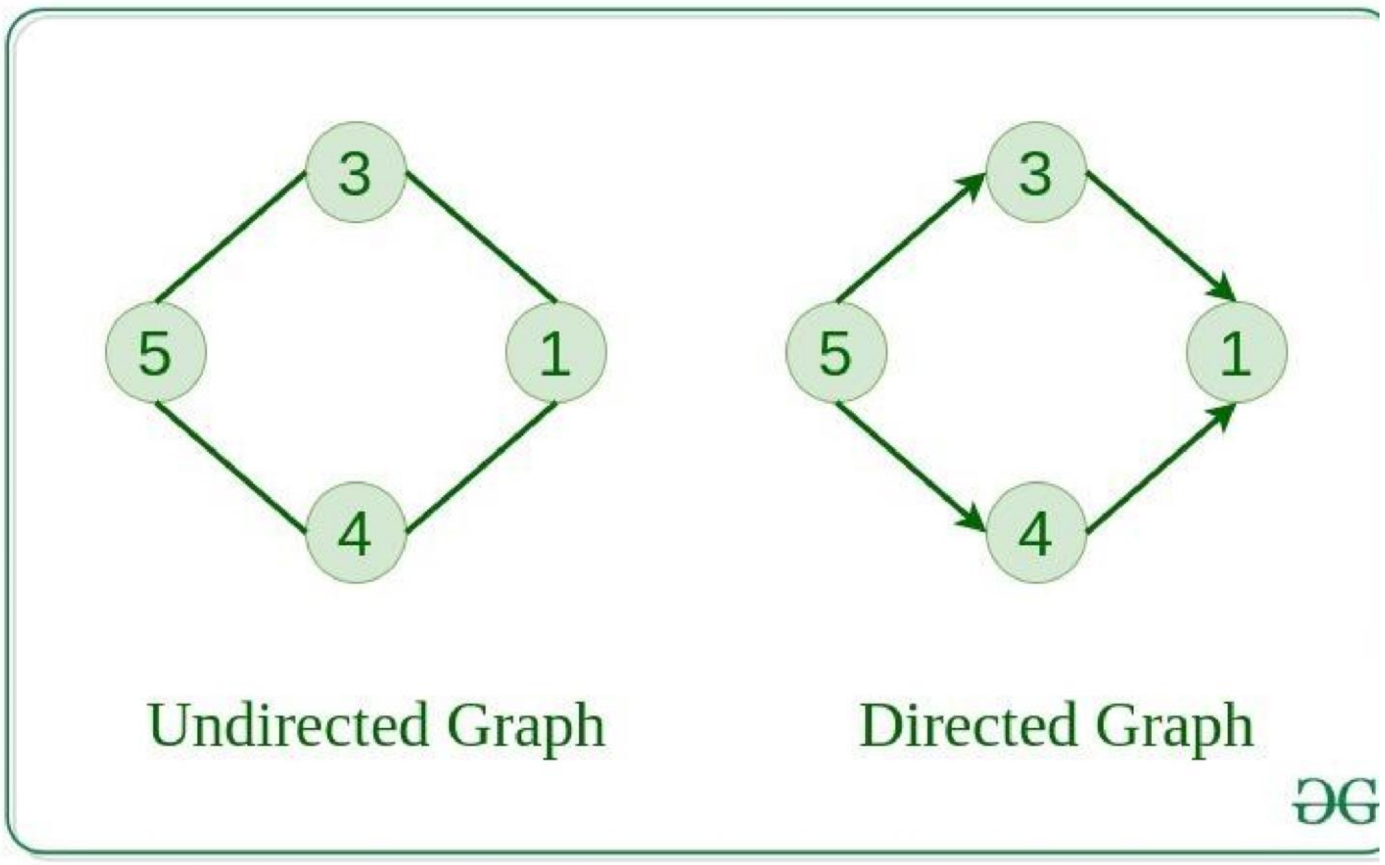
possible.

3. Undirected Graph

A graph in which edges do not have any direction. That is the nodes are unordered pairs in the definition of every edge.

4. Directed Graph

A graph in which edge has direction. That is the nodes are ordered pairs in the definition of every edge.

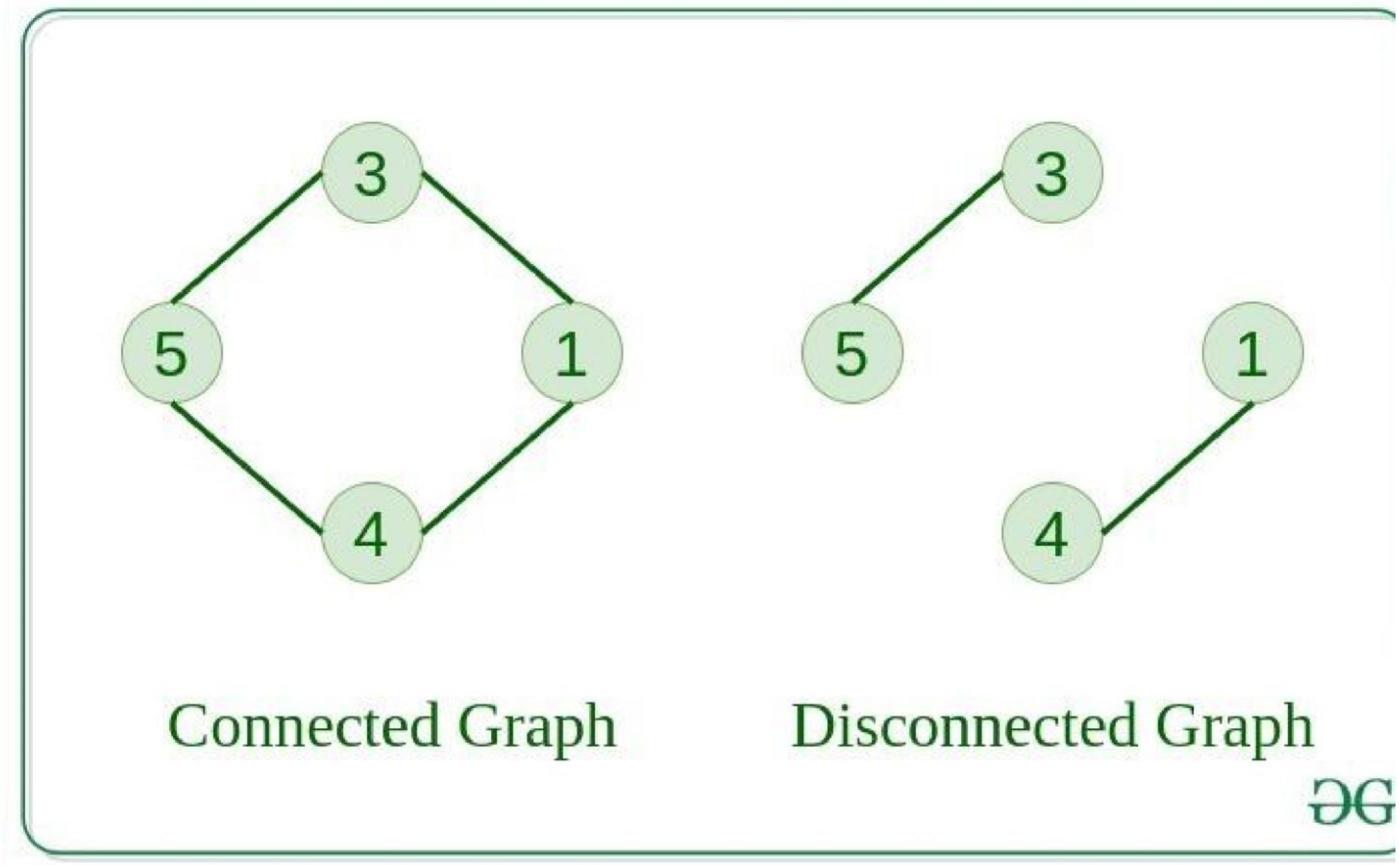


5. Connected Graph

The graph in which from one node we can visit any other node in the graph is known as a connected graph.

6. Disconnected Graph

The graph in which at least one node is not reachable from a node is known as a disconnected graph.

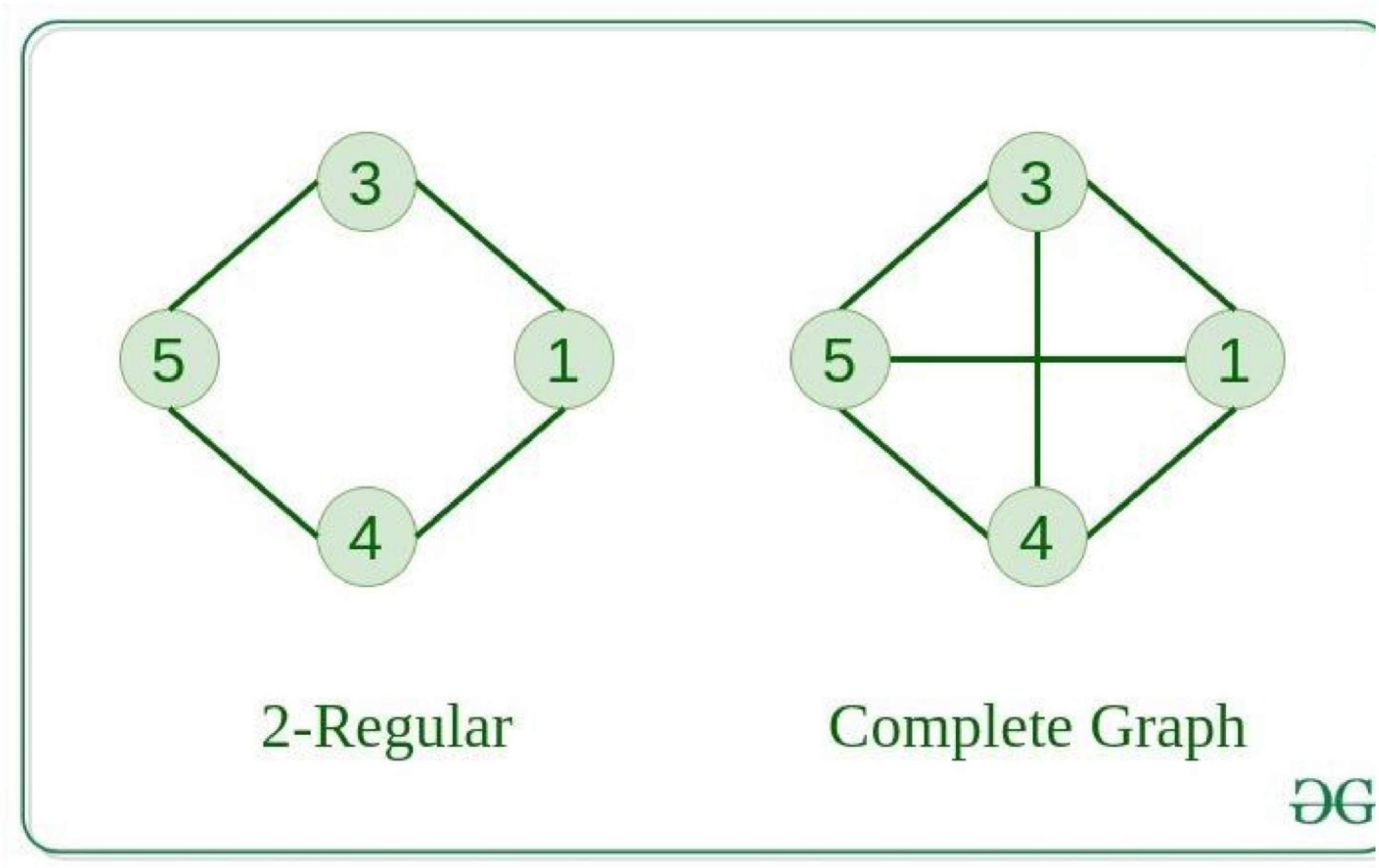


7. Regular Graph

The graph in which the degree of every vertex is equal to K is called K regular graph.

8. Complete Graph

The graph in which from each node there is an edge to each



other node.

9. Cycle Graph

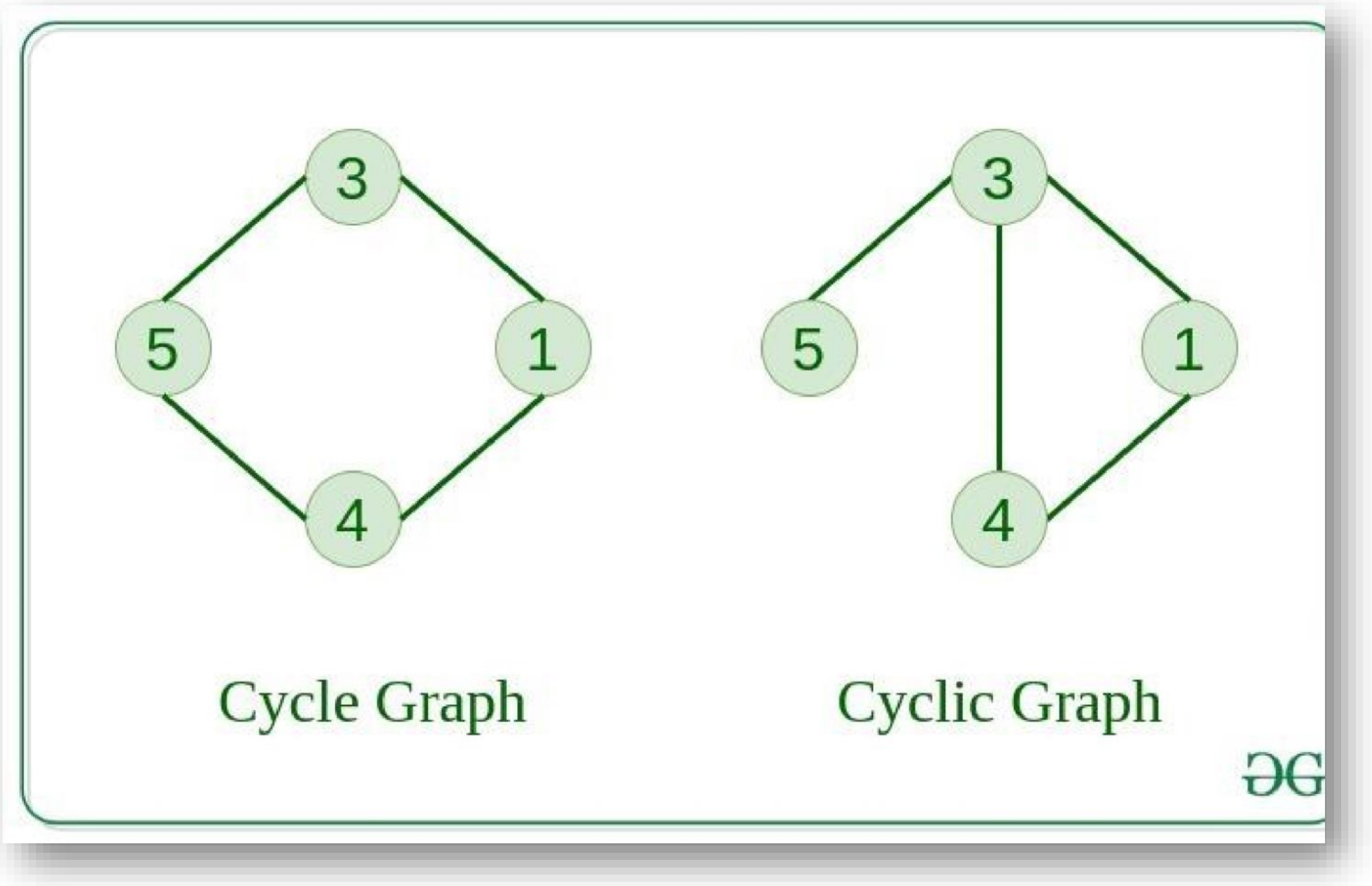
The graph in which the graph is a cycle in itself, the degree of each vertex is 2.

10. Cyclic Graph

A graph containing at least one cycle is known as a Cyclic graph.

11. Directed Acyclic Graph

A Directed Graph that does not contain any cycle.

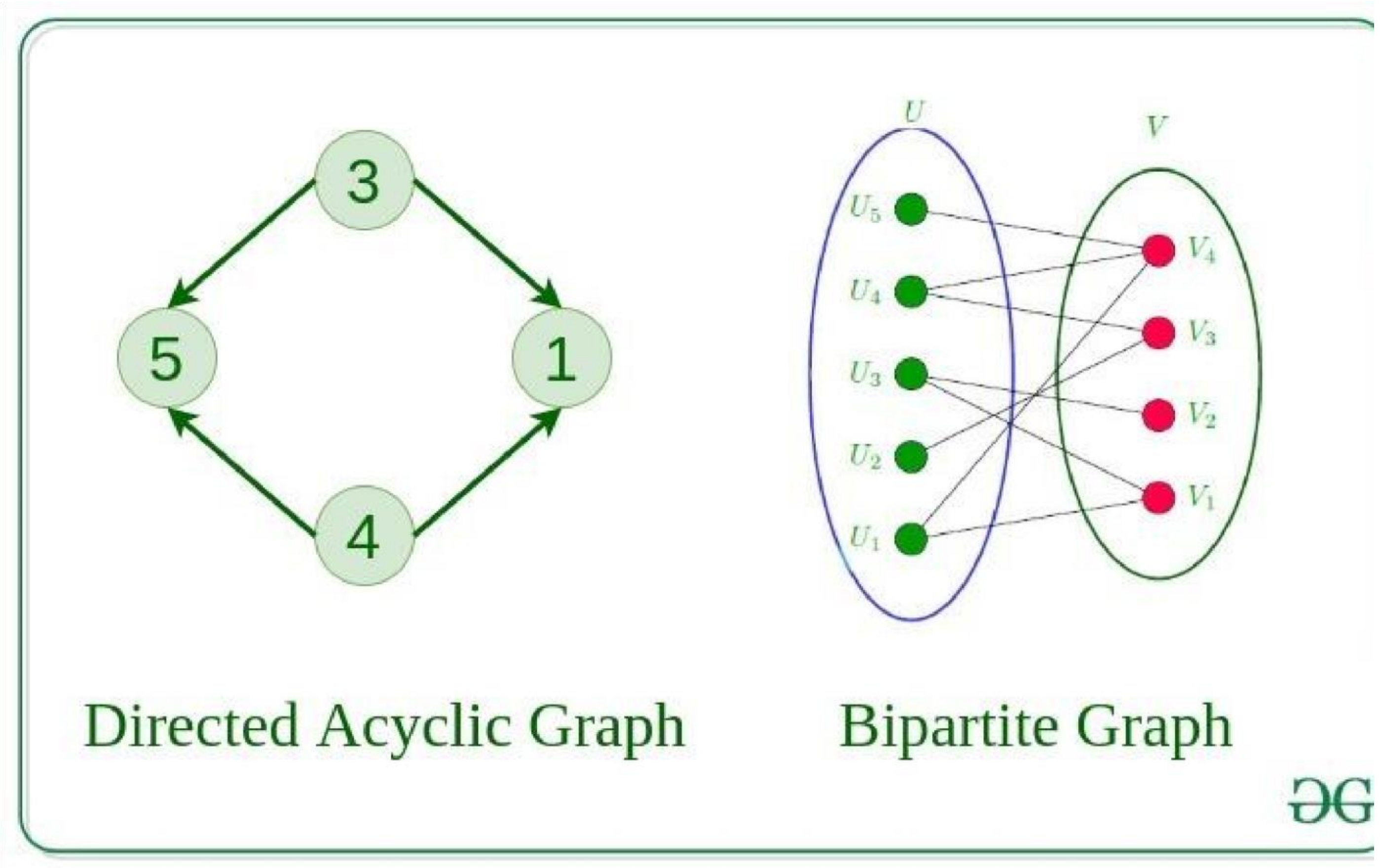


12. Bipartite Graph

A graph in which vertex can be divided into two sets such that vertex in each set does not contain any edge between them.

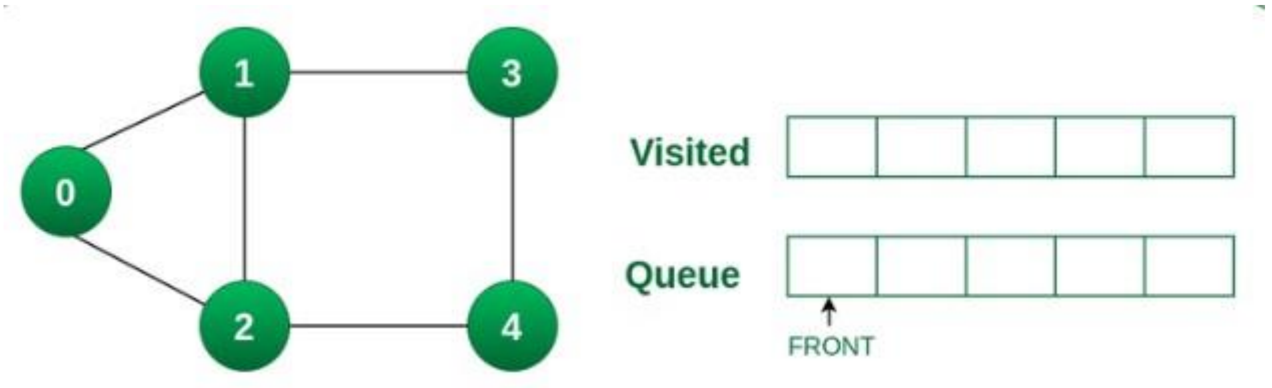
13. Weighted Graph

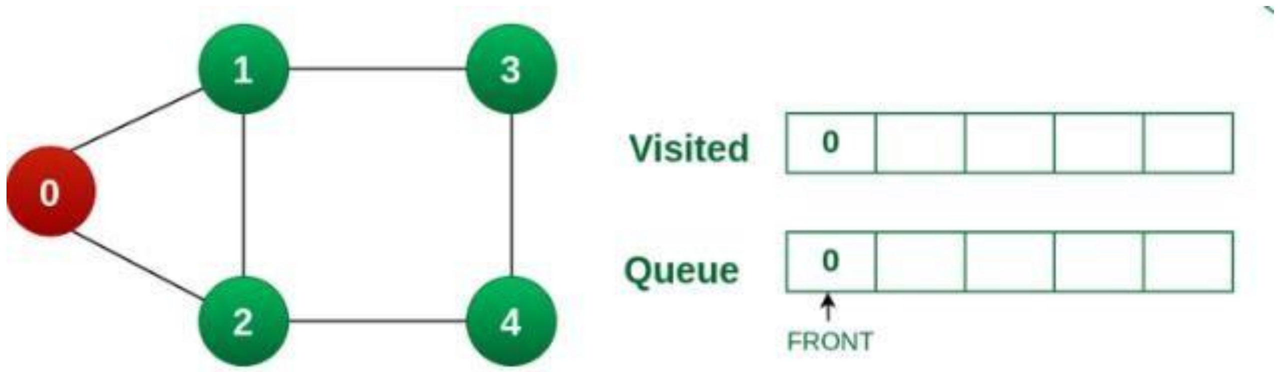
- A graph in which the edges are already specified with suitable weight is known as a weighted graph.
- Weighted graphs can be further classified as directed weighted graphs and undirected weighted graphs.



Breadth First Search (BFS) for a Graph:

Breadth First Search (BFS) is a graph traversal algorithm that explores all the vertices in a graph at the current depth before moving on to the vertices at the next depth level. It starts at a specified vertex and visits all its neighbors before moving on to the next level of neighbors.

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0
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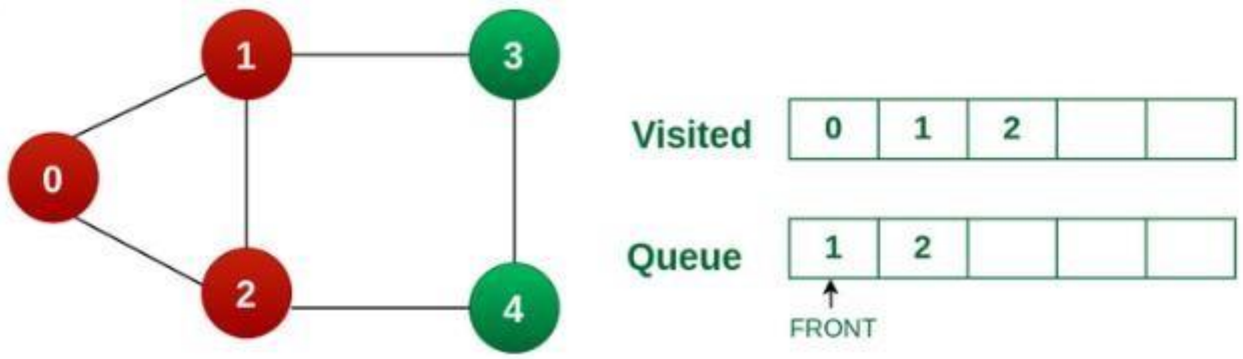
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0 1 2
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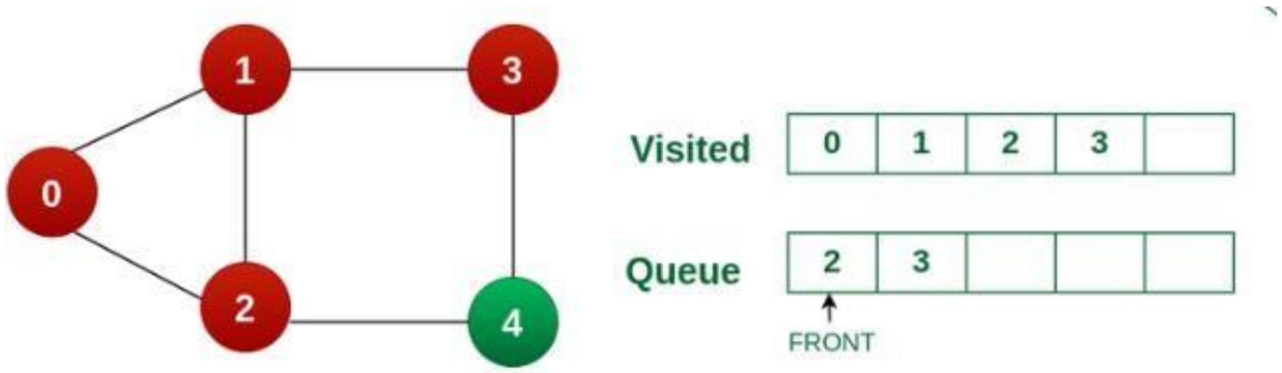
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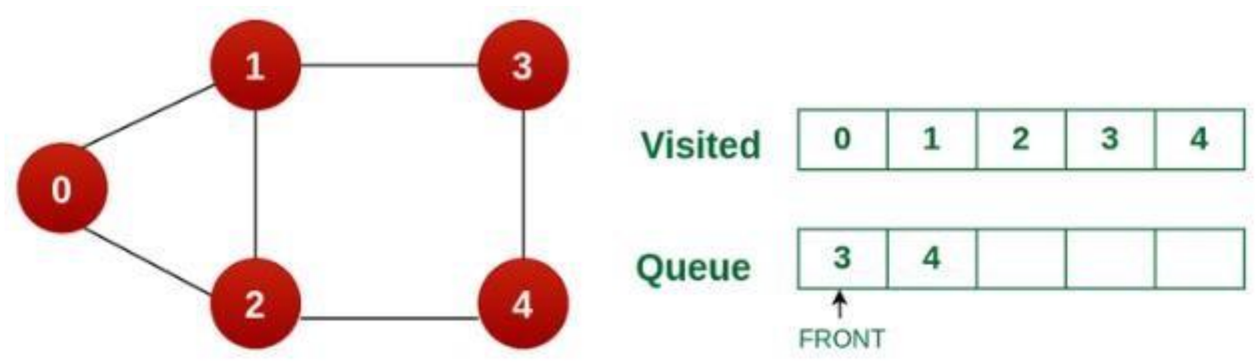
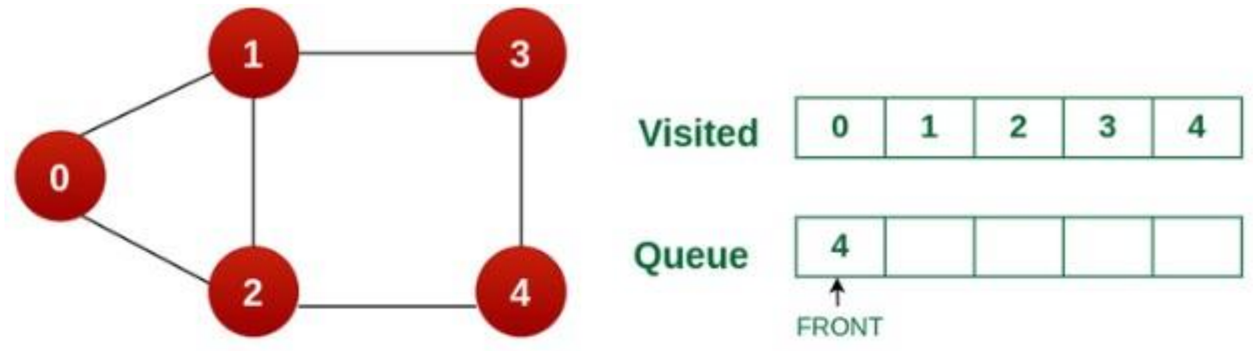
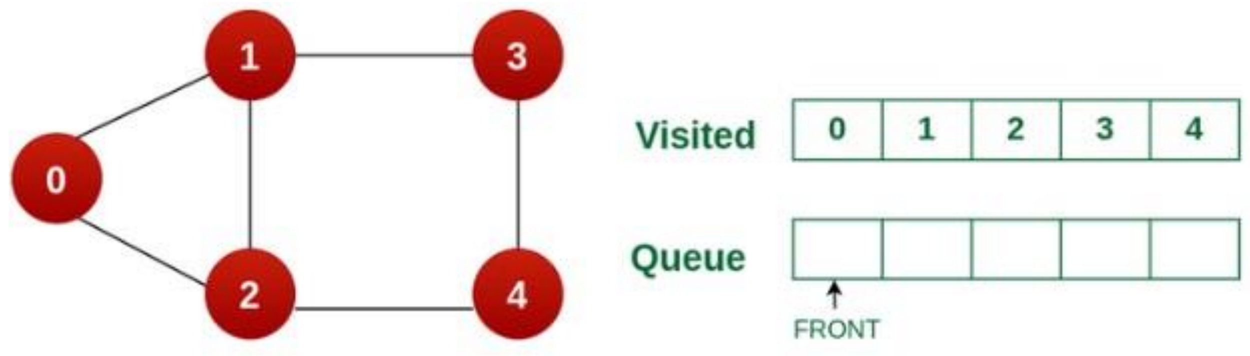


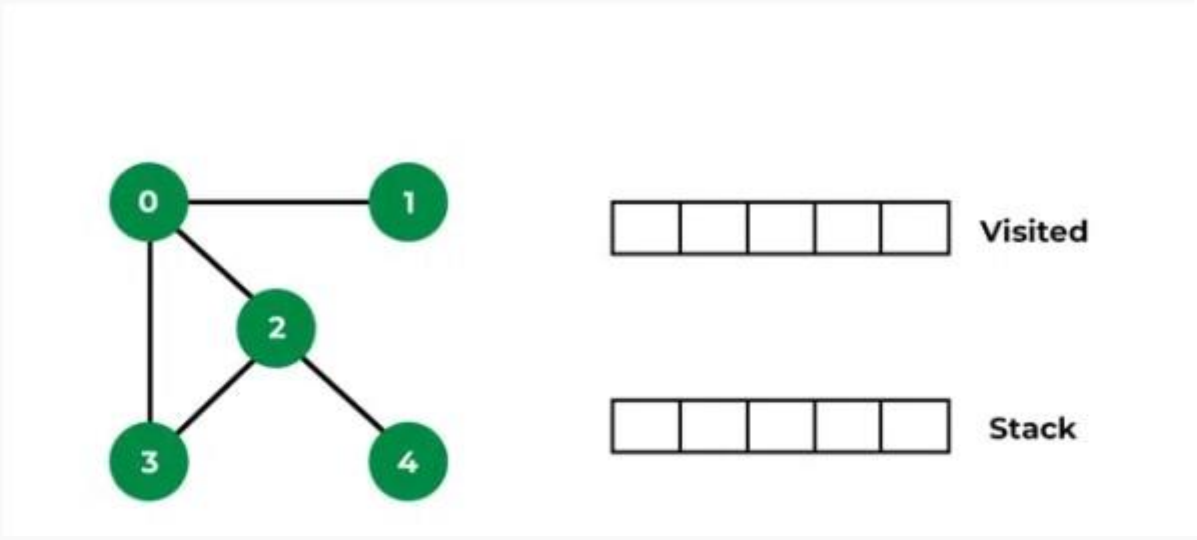




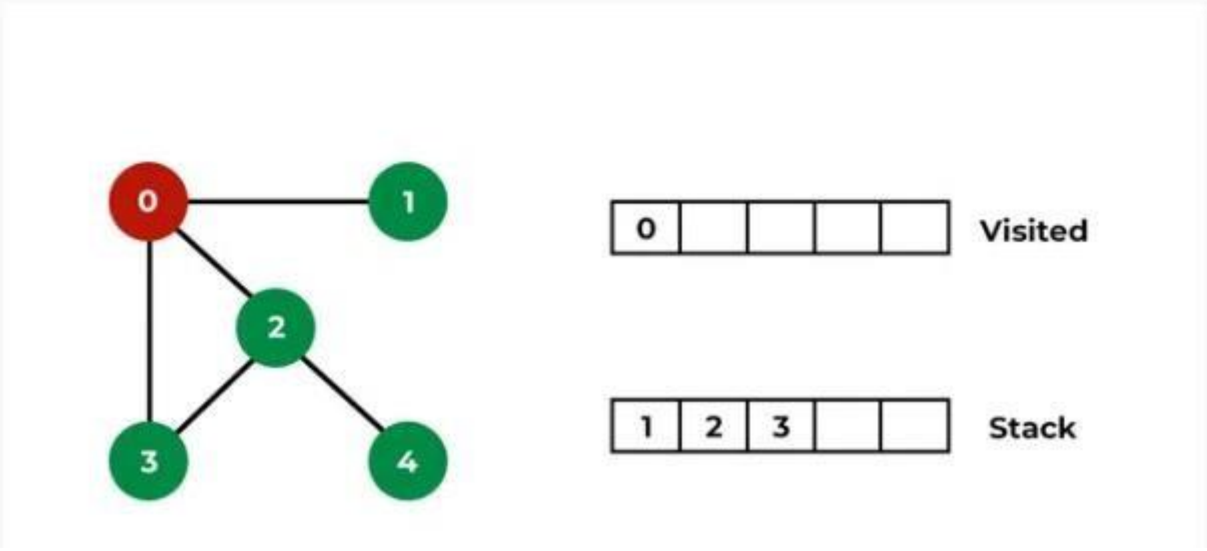
DFS(Depth-first search):

Depth-first search is an algorithm for traversing or searching tree or graph data structures. The algorithm starts at the root node (selecting some arbitrary node as the root node in the case of a graph) and explores as far as possible along each branch before backtracking.

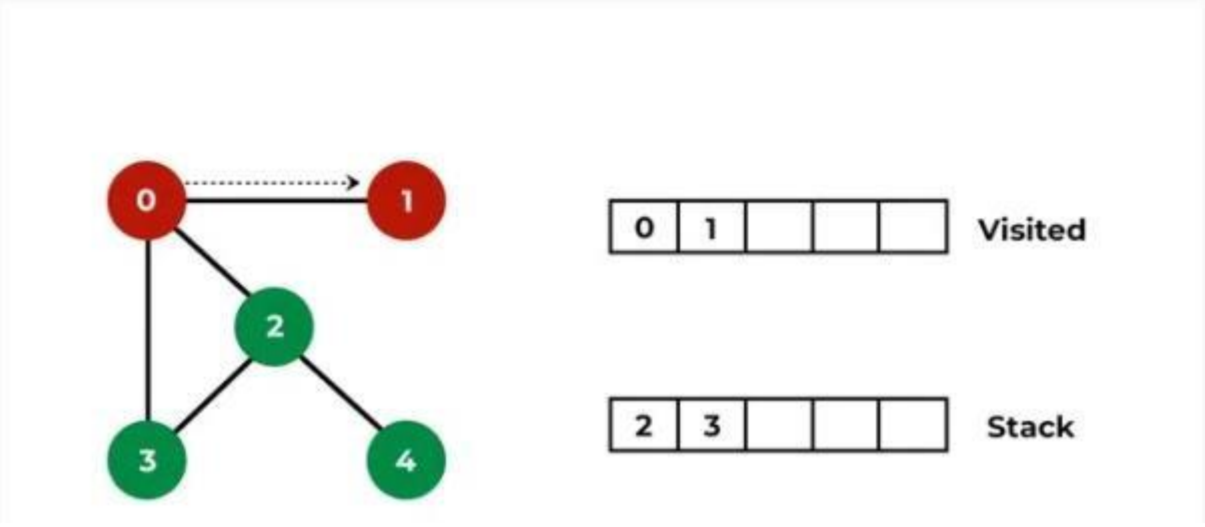
Step1: *Initially stack and visited arrays are empty.*



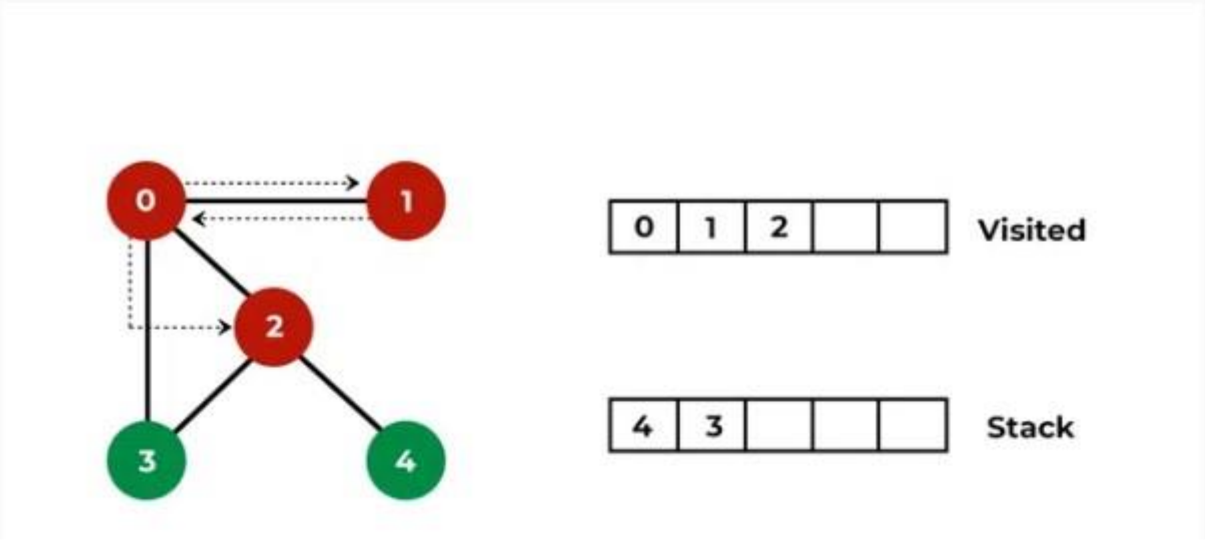
Step 2: *Visit 0 and put its adjacent nodes which are not visited yet into the stack.*



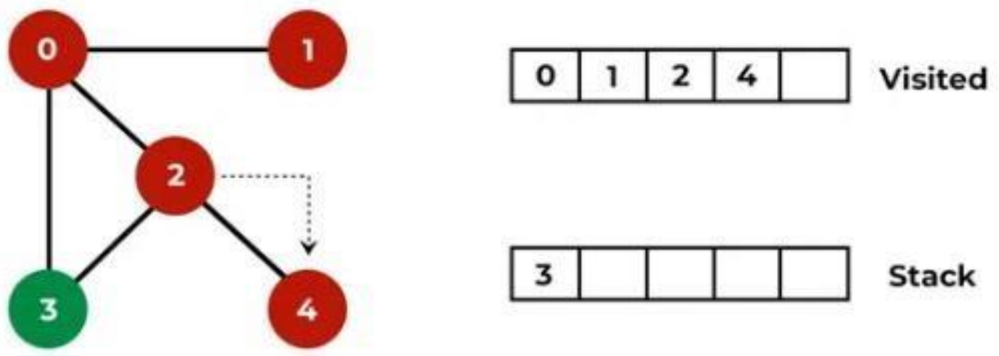
Step 3: *Now, Node 1 at the top of the stack, so visit node 1 and pop it from the stack and put all of its adjacent nodes which are not visited in the stack.*



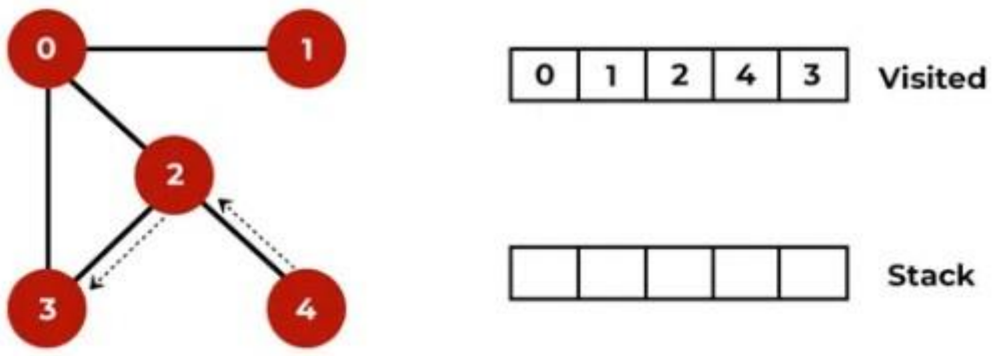
Step 4: *Now, Node 2 at the top of the stack, so visit node 2 and pop it from the stack and put all of its adjacent nodes which are not visited (i.e, 3, 4) in the stack.*



Step 5: *Now, Node 4 at the top of the stack, so visit node 4 and pop it from the stack and put all of its adjacent nodes which are not visited in the stack.*



Step 6: *Now, Node 3 at the top of the stack, so visit node 3 and pop it from the stack and put all of its adjacent nodes which are not visited in the stack.*


0
1
2
3
4
0 1 2 4 3
Visited
Stack