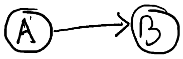
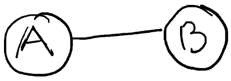
BFS DFS X section

26 February 2025 19:39

Graph Data Structure is a collection of **nodes**. Nodes are connected by **edges**. Edges represent connection between nodes.

Directed graph:  You can go from node A to B, but not B to A. Arrow will be present.

Undirected graph:  You can go from B to A and also from B to A. Arrow is absent.

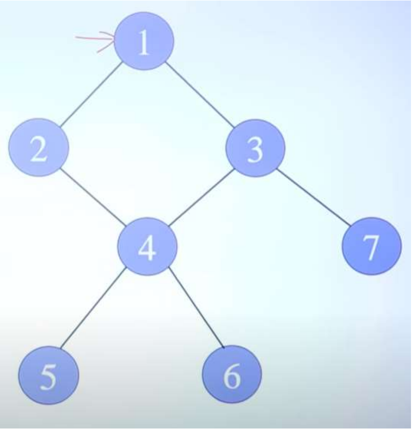
BFS is a graph traversal algorithm that explores all the neighbours of a node before moving on to their neighbours.

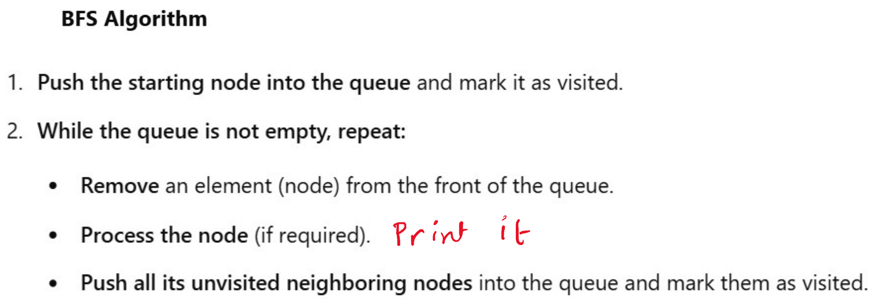
DFS is a graph traversal algorithm that explores as far as possible along each branch before backtracking.

Graphs Traversal

To traverse a Graph means to start in one vertex, and go along the edges to visit other vertices until all vertices, or as many as possible, have been visited.

2 techniques: BFS (Breadth first search), DFS (depth first search)



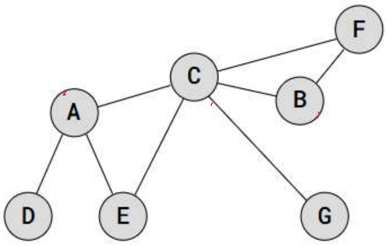


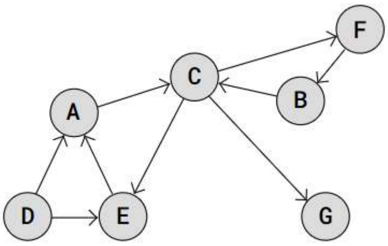
BFS Algorithm

1. **Push the starting node into the queue** and mark it as visited.
2. **While the queue is not empty, repeat:**
   - **Remove** an element (node) from the front of the queue.
   - **Process the node** (if required). Print it
   - **Push all its unvisited neighboring nodes** into the queue and mark them as visited.

Iterative DFS Algorithm (Using a Stack)

1. **Push start element in stack and print it.**
2. **Repeat till stack is not empty:**
   a. **See the top element in stack.**
   b. **If all its neighbours have been visited, remove the top item from stack.**
   c. **Else push one of its unvisited neighbours and continue the process.**

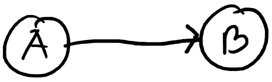


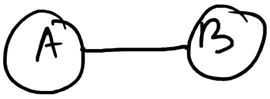


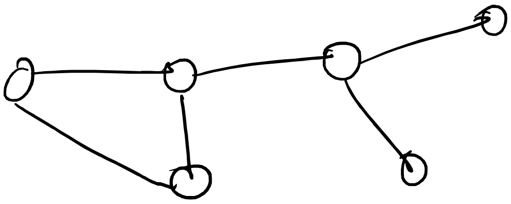
Graph- ① Non Linear Data Structure.

② finite number of nodes/vertices.

③ Nodes — Connections → Edges.

→ Directed 

→ Undirected 

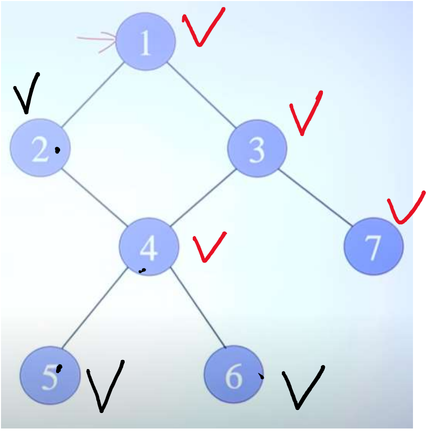
Graph Traversal - 

BFS (Breadth first search) DFS (Depth first Search).

↳ ① Queue DS.

Graph traversal begin from Node 3.

BFS



Queue ~~3~~ ~~7~~ ~~1~~ ~~4~~ ~~2~~ ~~5~~ ~~6~~ →

Result:- 3 7 1 4 2 5 6