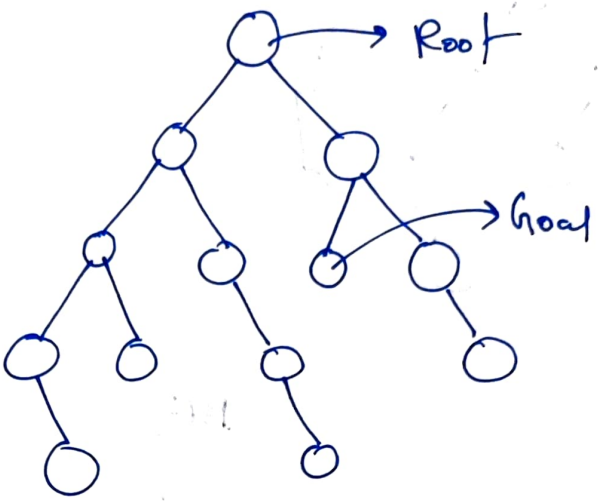
Assignment - 1
Graph Search

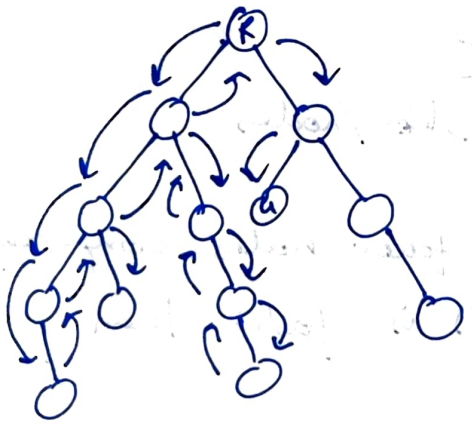
Shajith Hameed
CSE-B
205001097

① Given Tree:

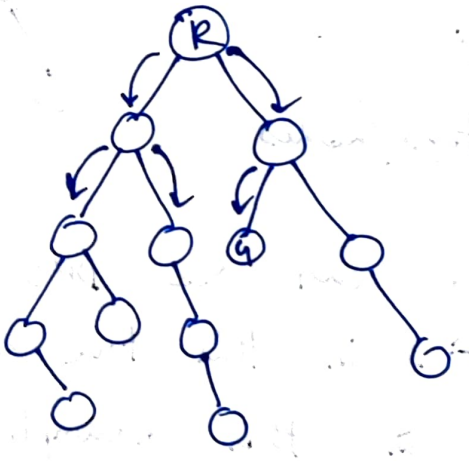


If DFS and BFS picks elements from left to right BFS will reach the goal node faster than DFS.

DFS

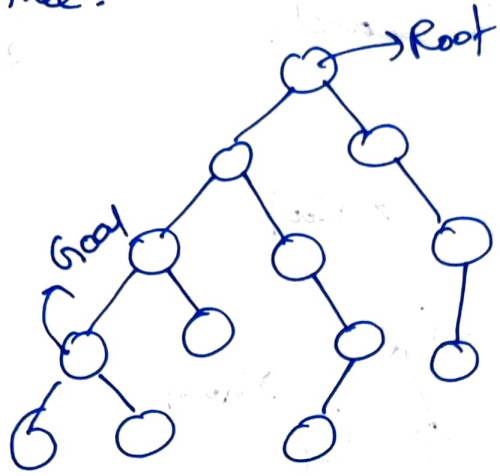


BFS

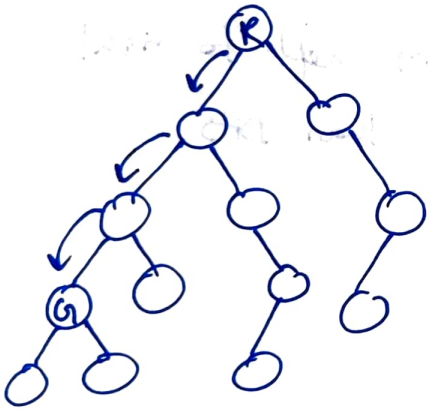


As we can DFS performs more steps compared to BFS in this example, BFS reaches the goal node faster.

(2) Given Tree:

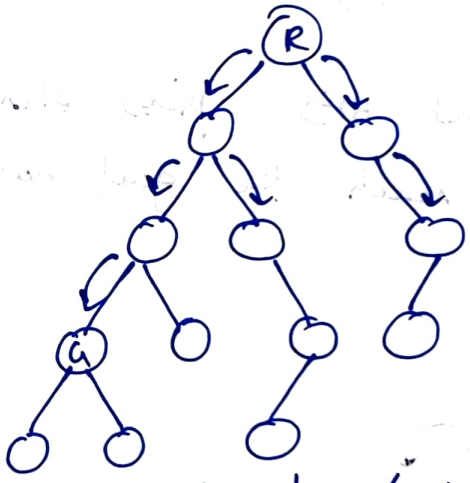


DFS



3 steps/nodes

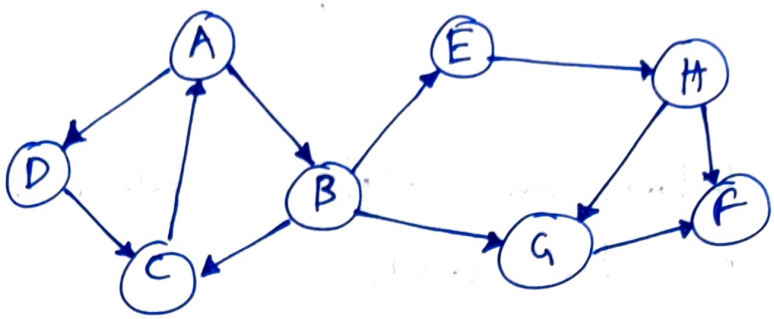
BFS



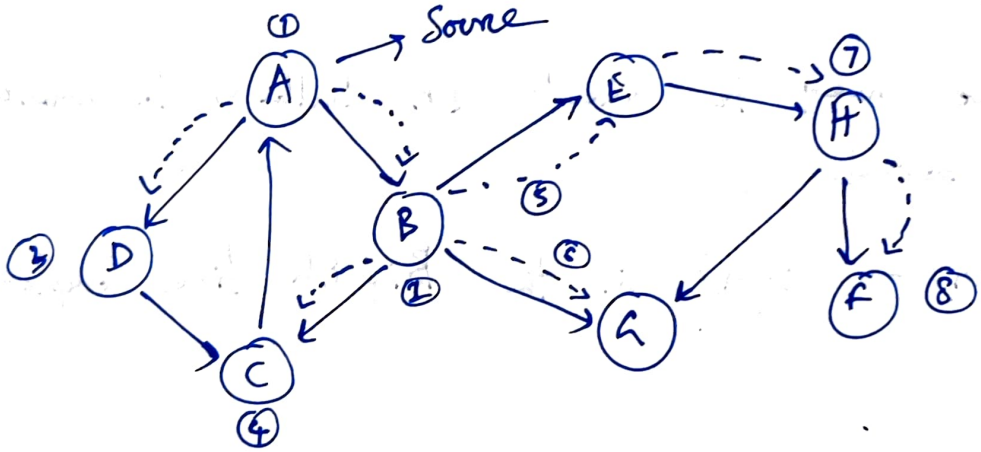
6 steps/nodes

As we can see DFS visited fewer nodes compared to BFS in this tree, so, DFS is faster than BFS in this example.

(3) Given Graph:

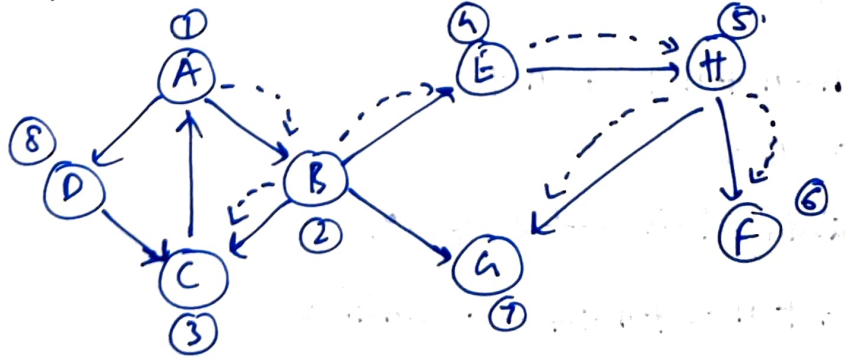


i) Breadth First Search (BFS):



BFS order: A → B → D → C → E → G → H → F

2) Depth First Search (DFS):



DFS order: A → B → C → E → H → F → G → D

(4) a)

let 'n' be the number of balloons on the board

if 2 balloons are shot one balloon is replaced on the board.

$\Rightarrow n-2+1 \Rightarrow n-1$

So, One balloon is removed for every for 2 balloons shot

So we need to shoot $2n$ balloons to empty the board.

$O(2n) \rightarrow O(n)$ is the Big Oh time Complexity.

b) let 'n' be the no. balloons on the board.

for every n balloons shot $n-1$ balloons are replaced in the board.

$\Rightarrow n = n - n + n - 1 = n - 1$

$n - 1 = n - 2$

$\Rightarrow$ Similarly, this adds up to,

$\Rightarrow n + n-1 + n-2 + n-3 + \ldots$ until 0

So $\Rightarrow \frac{n(n+1)}{2}$ balloons need to be shot

$O\left(\frac{n^2+n}{2}\right) = O(n^2)$. Big Oh (n^2) time Complexity.