

EX.NO:2

DATE:4/9/2024

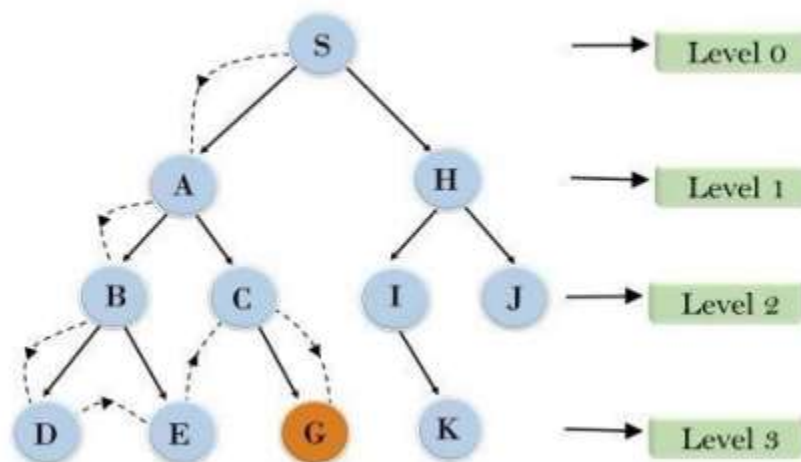
Reg.no:220701003

DEPTH-FIRST SEARCH

AIM: To implement a depth-first search problem using Python

- Depth-first search (DFS) algorithm or searching technique starts with the root node of graph G, and then travel deeper and deeper until we find the goal node or the node which has no children by visiting different node of the tree.
- The algorithm, then backtracks or returns back from the dead end or last node towards the most recent node that is yet to be completely unexplored.
- The data structure (DS) which is being used in DFS Depth-first search is stack. The process is quite similar to the BFS algorithm.
- In DFS, the edges that go to an unvisited node are called discovery edges while the edges that go to an already visited node are called block edges

Depth First Search



CODE:

```
def dfs_recursive(graph, start, visited=None):

    if visited is None:
        visited = set()
    visited.add(start)
    print(start)

    for neighbor in graph[start]:
        if neighbor not in visited:
            dfs_recursive(graph, neighbor, visited)

graph = {
    'A': ['B', 'C'],
    'B': ['A', 'D', 'E'],
    'C': ['A', 'F'],
    'D': ['B'],
    'E': ['B', 'F'],
    'F': ['C', 'E']
}

print("DFS Recursive:")
dfs_recursive(graph, 'A')

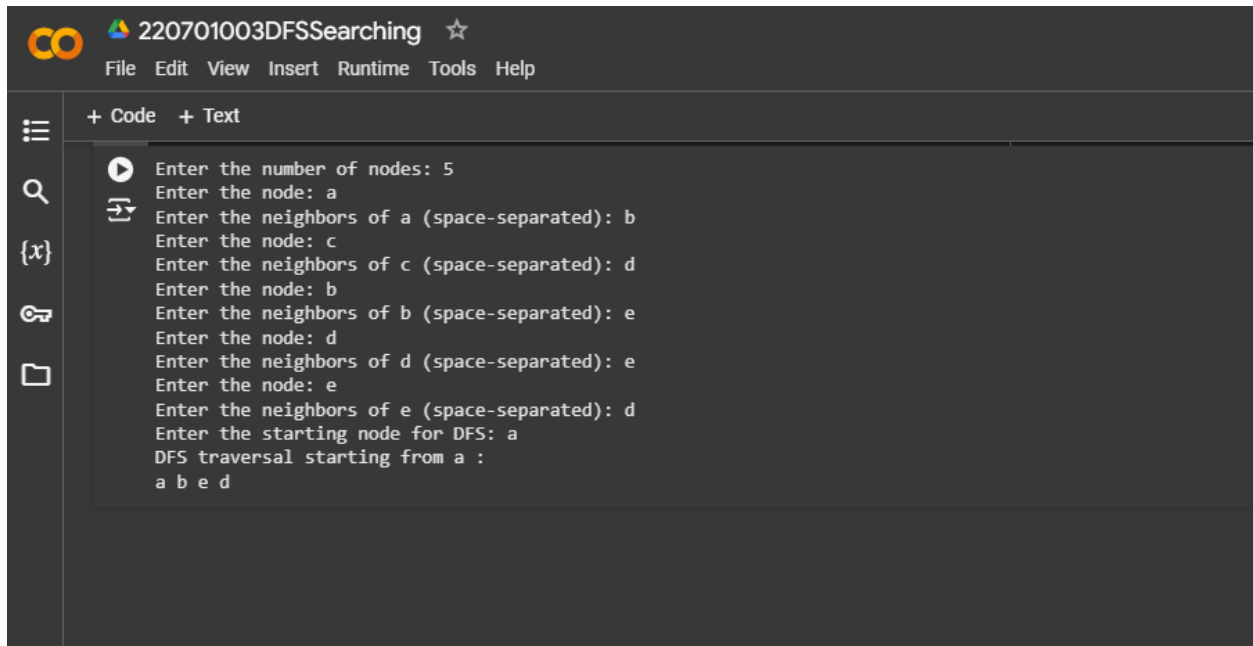
def dfs_iterative(graph, start):
    visited = set()
    stack = [start]

    while stack:
        vertex = stack.pop()
        if vertex not in visited:
            print(vertex)
            visited.add(vertex)
            stack.extend(neighbor for neighbor in graph[vertex] if
neighbor not in visited)

graph = {
    'A': ['B', 'C'],
    'B': ['A', 'D', 'E'],
    'C': ['A', 'F'],
    'D': ['B'],
    'E': ['B', 'F'],
    'F': ['C', 'E']
}

print("DFS Iterative:")
dfs_iterative(graph, 'A')
```

OUTPUT:



The screenshot shows a code editor window titled "220701003DFSSearching" with a star icon. The menu bar includes File, Edit, View, Insert, Runtime, Tools, and Help. The editor has tabs for "+ Code" and "+ Text". The code area contains the following text:

```
Enter the number of nodes: 5
Enter the node: a
Enter the neighbors of a (space-separated): b
Enter the node: c
Enter the neighbors of c (space-separated): d
Enter the node: b
Enter the neighbors of b (space-separated): e
Enter the node: d
Enter the neighbors of d (space-separated): e
Enter the node: e
Enter the neighbors of e (space-separated): d
Enter the starting node for DFS: a
DFS traversal starting from a :
a b e d
```

A large, light gray watermark "220701003" is visible diagonally across the lower half of the page.

Result:

Thus the above exercise has been executed successfully