LAB 4 – IMPLEMENTATION OF DFS & BFS

AI LAB

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IMPLEMENTATION OF DFS

ALGORITHM:

The algorithm of the topological sort goes like this:

1. Identify the node that has no in-degree(no incoming edges) and select that node as the source node of the graph.
2. Delete the source node with zero in-degree and also delete all its outgoing edges from the graph. Insert the deleted vertex in the result array.
3. Update the in-degree of the adjacent nodes after deleting the outgoing edges.
4. Repeat step 1 to step 3 until the graph is empty.

CODE:

```
from collections import defaultdict

class Graph:


  def __init__(self,n):


    self.graph = defaultdict(list)


    self.N = n


  def addEdge(self,m,n):


    self.graph[m].append(n)
```

```
def sortUtil(self,n,visited,stack):

    visited[n] = True

    for element in self.graph[n]:

        if visited[element] == False:

            self.sortUtil(element,visited,stack)

    stack.insert(0,n)

def topologicalSort(self):

    visited = [False]*self.N

    stack =[]

    for element in range(self.N):

        if visited[element] == False:

            self.sortUtil(element,visited,stack)
```

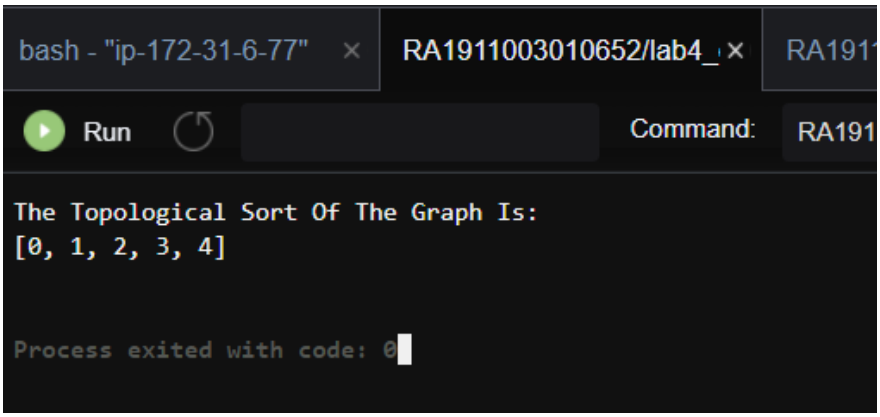
```
        print(stack)


graph = Graph(5)
graph.addEdge(0,1);
graph.addEdge(0,3);
graph.addEdge(1,2);
graph.addEdge(2,3);
graph.addEdge(2,4);
graph.addEdge(3,4);


print("The Topological Sort Of The Graph Is:  ")


graph.topologicalSort()
```

OUTPUT:



RESULT: Hence, the implementation of DFS was successfully implemented.

IMPLEMENTATION OF BFS

ALGORITHM:

CODE:

```
import collections
def visitPrint(i):
    print(i)

class Graph:
    def __init__(self):
        self.adjList = collections.defaultdict(set)
    def addEdge(self, node1, node2):
        self.adjList[node1].add(node2)
        self.adjList[node2].add(node1)

def bfs(start, graph, visitFunc=visitPrint):
    visited = collections.defaultdict(bool)
    queue = collections.deque()
    queue.append(start)
    while(len(queue) > 0):
        current = queue.popleft()
        if (not visited[current]):
            visited[current] = True
```

```
            visitFunc(current)
            for neighbor in graph.adjList[current]:
                queue.append(neighbor)
    # Testing the breadth first search implementation
    if __name__ == "__main__":
        # Testing on this tree
        #     1
        #    / \
        #   /   \
        #  2     3
        # / \   / \
        # 4  5 6  7
        g = Graph()
        g.addEdge(1, 2)
        g.addEdge(1, 3)
        g.addEdge(2, 4)
        g.addEdge(2, 5)
        g.addEdge(3, 6)
        g.addEdge(3, 7)
        print("Test 1:")
        bfs(1, g)
        print("\nTest2:")
        bfs(2, g)
```

OUTPUT:

RESULT: Hence, the implementation of BFS was successfully implemented.

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IMPLEMENTATION OF DFS & BFS

DFS

ALGORITHM :-

1. Identify the node that has no in-degree and select that node as the source node of the graph.
2. Delete the source node with zero in-degree and also delete all its outgoing edges from the graph. Insert the deleted vertex in the result array.
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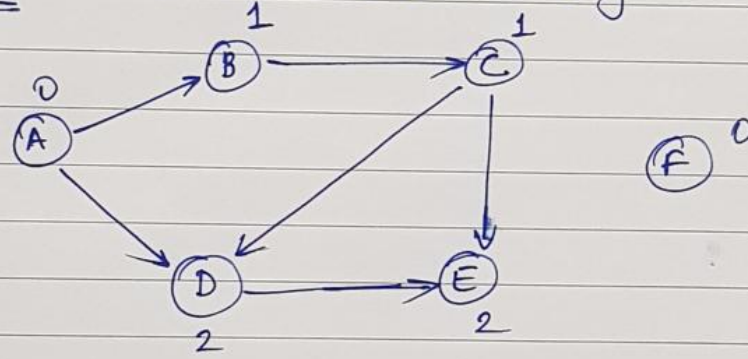
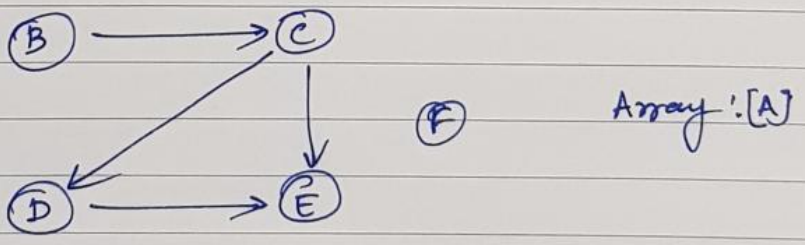
4. Repeat the step 1 to step 3 until the graph is empty.

for ex→ Consider a Directed Acyclic Graph. (DAG).

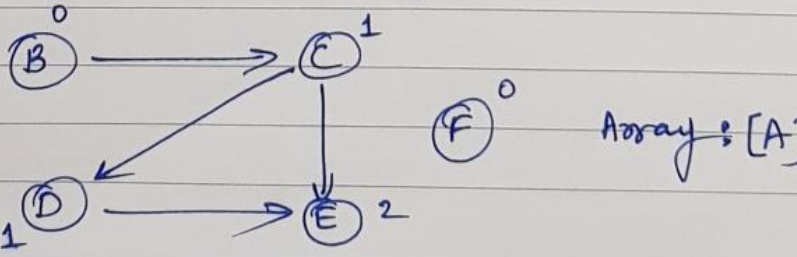
Initial state



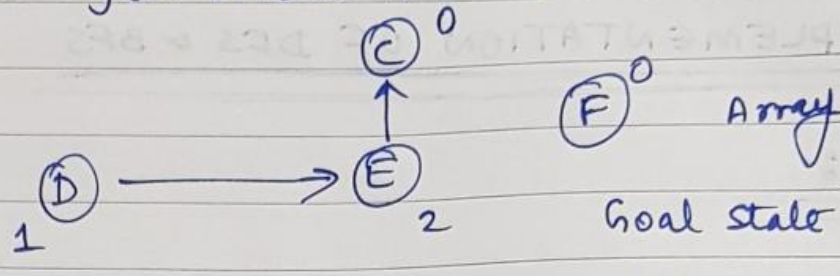
we will choose node A as the source node and delete this node.



Update the in-degree of the adjacent nodes.



Now again delete the node with in-degree 0.



Output of the following example

Array : [A, B, C, D, E, F]