Sri SAI RAM ENGINEERING COLLEGE
INSTITUTE OF TECHNOLOGY
West Tambaram, Chennai - 44

SAIRAM DIGITAL RESOURCES

YEAR II SEM III

CS8391

DATA STRUCTURES
(Common to CSE & IT)

UNIT NO 4

NON LINEAR DATA STRUCTURES - GRAPHS

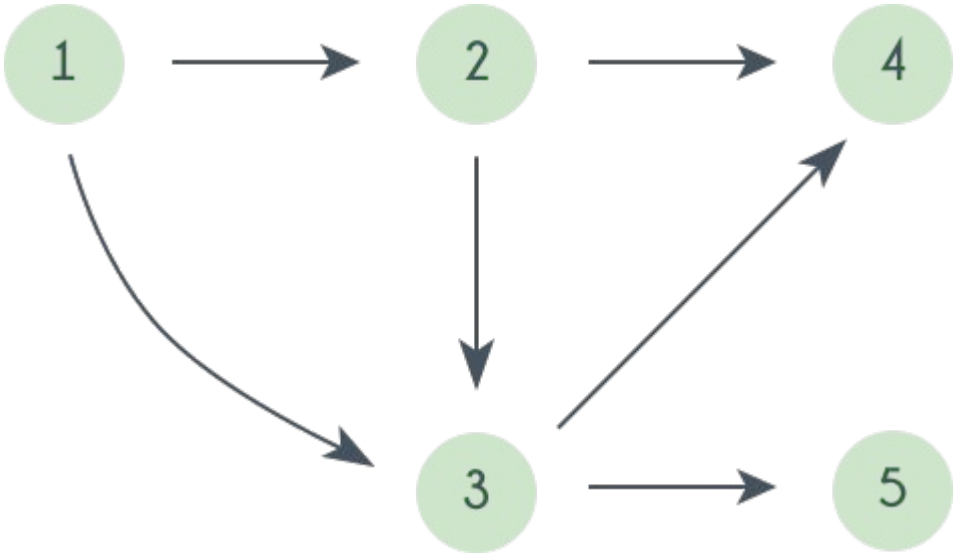
4.4 TOPOLOGICAL SORT

COMPUTER SCIENCE & ENGINEERING

TOPOLOGICAL SORT

Topological sorting of vertices of a Directed Acyclic Graph is an ordering of the vertices v1,v2,...vn in such a way, that if there is an edge directed towards vertex vj from vertex vi, then vi comes before vj.

EXAMPLE



A topological sorting of this graph is: 1 2 3 4 5

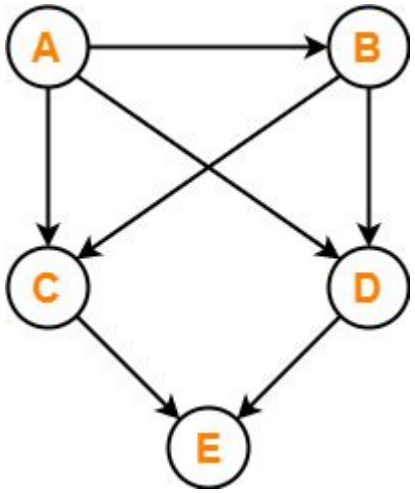
TOPOLOGICAL SORT ALGORITHM

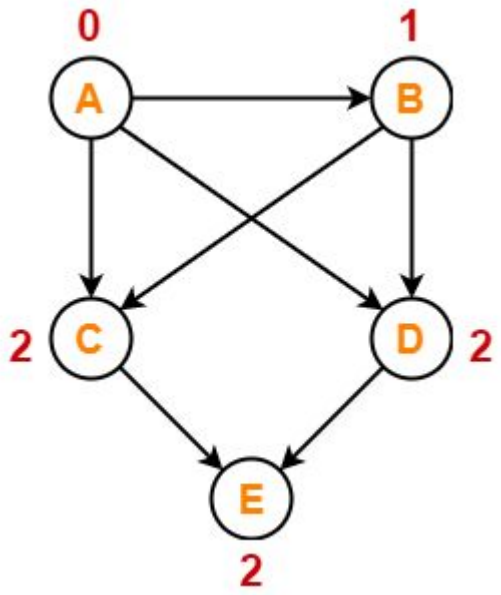
Algorithm *TSort*(G)
Input: a directed acyclic graph G
Output: a topological ordering of vertices

```
1.  initialize Q to be an empty queue;
2.  for each vertex v
3.      do if indegree(v) = 0
4.          then enqueue(Q, v);
5.  while Q is non-empty
6.      do v := dequeue(Q);
7.         output v;
8.         for each arc (v, w)
9.             do indegree(w) = indegree(w) − 1;
10.                if indegree(w) = 0
11.                   then enqueue(w)
```

EXAMPLE

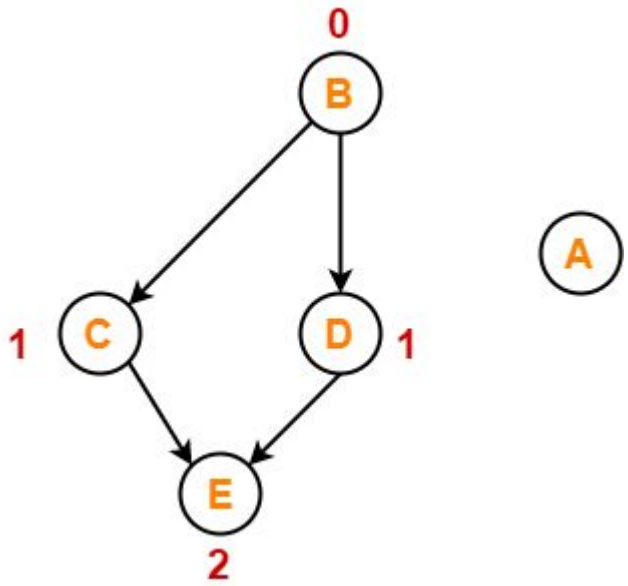
Step 1: Write in-degree of each vertex





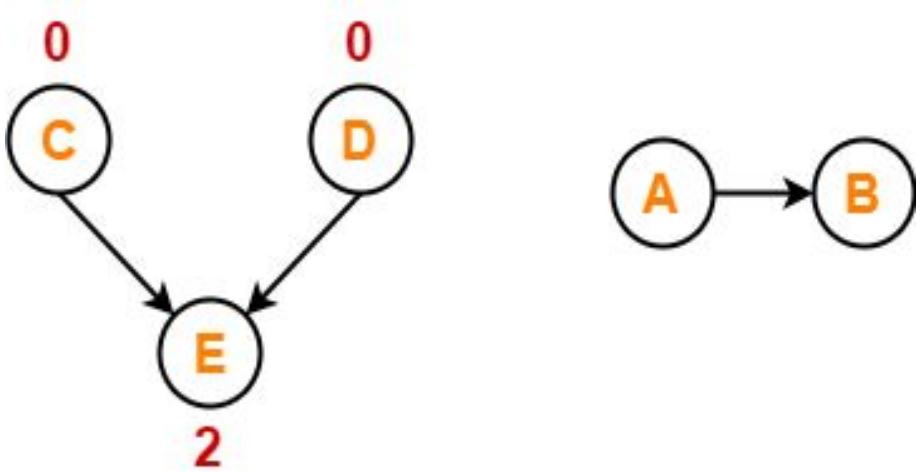
Step 2:

- Vertex-A has the least in-degree.
- So, remove vertex-A and its associated edges.
- Now, update the in-degree of other vertices.



Step 3:

- Vertex-B has the least in-degree.
- So, remove vertex-B and its associated edges.
- Now, update the in-degree of other vertices.



Step 4:

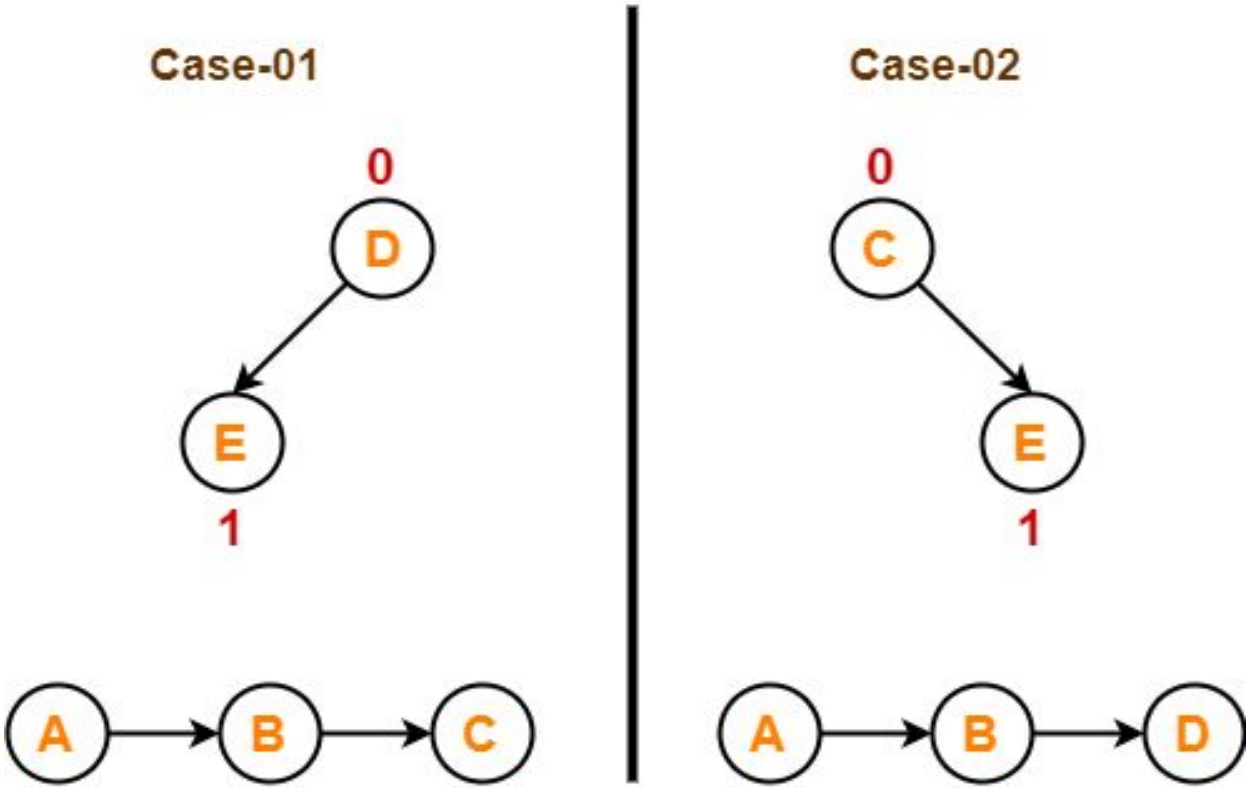
There are two vertices with the least in-degree.

In Case 1

- Remove vertex-C and its associated edges.
- Then, update the in-degree of other vertices

In Case 2

- Remove vertex-D and its associated edges.
- Then, update the in-degree of other vertices.


Case-01
0
D
E
1
A
B
C
Case-02
0
C
E
1
A
B
D

Step 5:

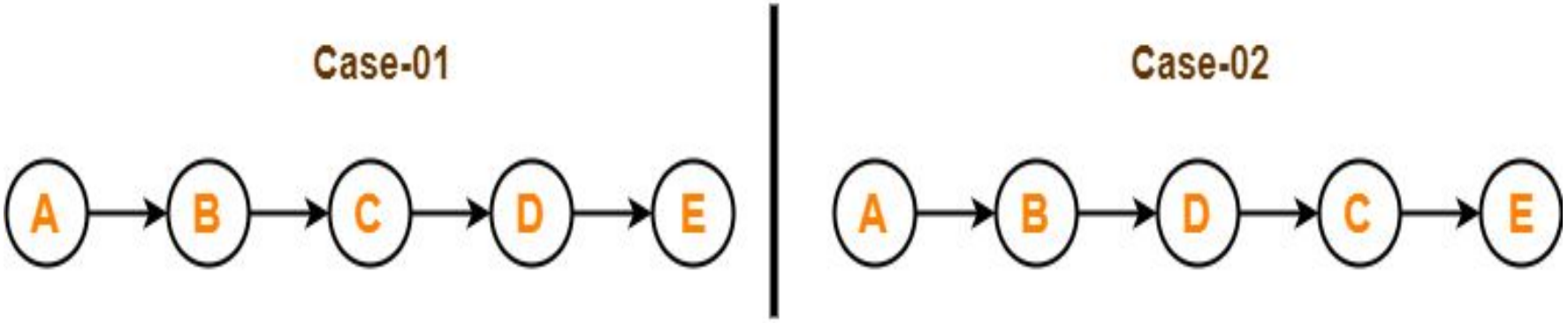
Now, the above two cases are continued separately in the similar manner.

In case 1

- Remove vertex-D since it has the least in-degree.
- Then, remove the remaining vertex-E.

In case 2

- Remove vertex-C since it has the least in-degree.
- Then, remove the remaining vertex-E.



For the given graph, following 2 different topological orderings are possible:

1. A B C D E

2. A B D C E

THANK YOU