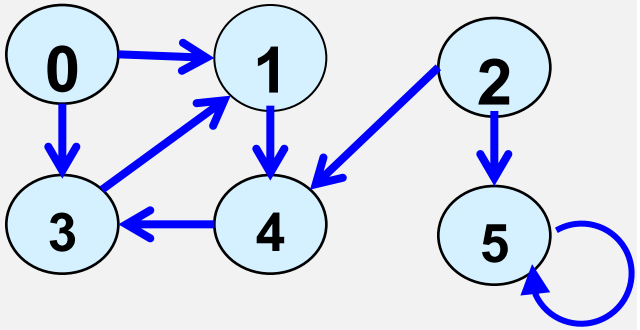
graph traversal

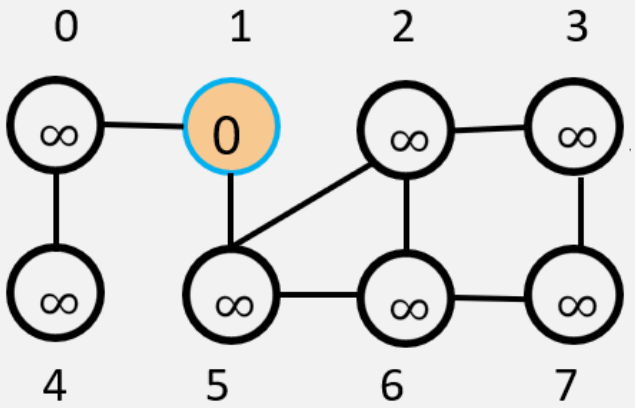


- กระบวนการเข้าไปเยือนโหนดในกราฟ
- แต่ละโหนดจะถูกเยือนเพียงครั้งเดียว

- ในกราฟระหว่างโหนดอาจจะมีหลายเส้นทาง ดังนั้นเพื่อป้องกันการท่องไปในเส้นทางที่ซ้ำเดิมจึงจำเป็นต้องทำเครื่องหมายบริเวณที่ได้เยือนเสร็จเรียบร้อยแล้วเพื่อไม่ให้เข้าไปเยือนอีก
- วิธีการท่องกราฟมี 2 แบบดังนี้
  - BFS
  - DFS

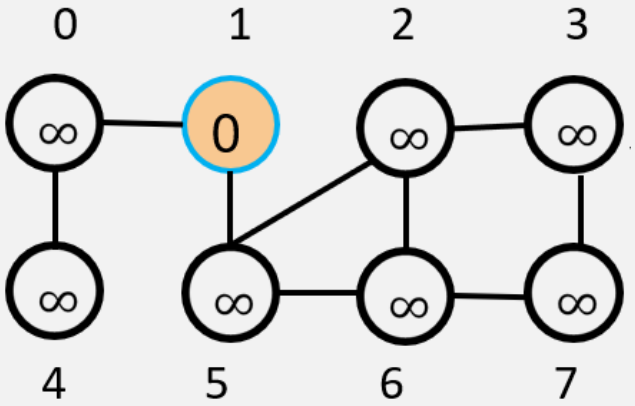
4.3 Breadth-first search (BFS) : Algorithm for searching a graph

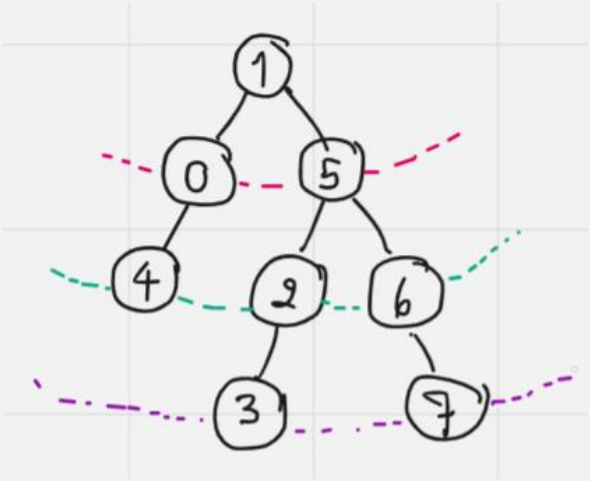
Definition : Given a graph G = (V,E) and distinguished source vertex s, bfs systematically explores the edges of G to discover every vertex that is reachable from s to all such reachable vertices.



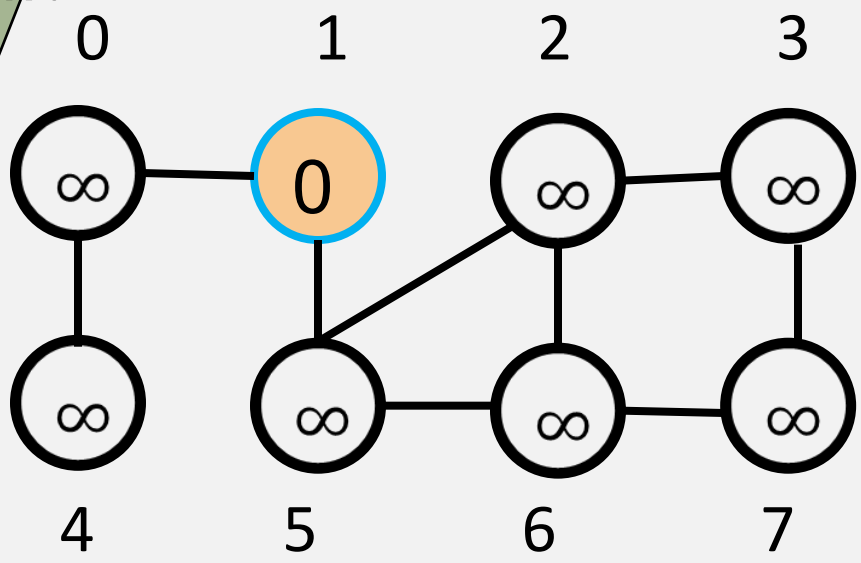
Output - Compute distance

- Produces a bfs tree.

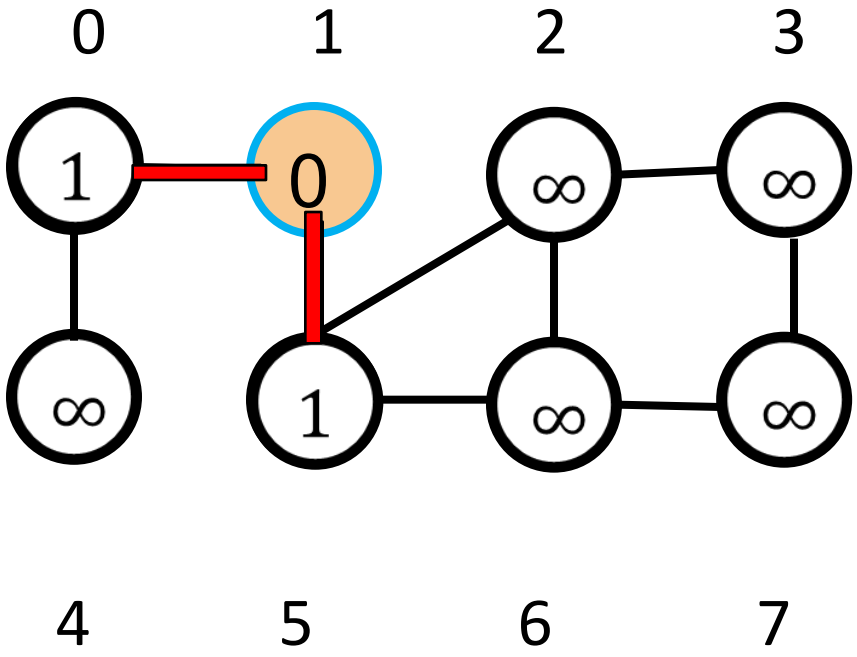




ทุกเส้นทางมีระยะเท่ากัน

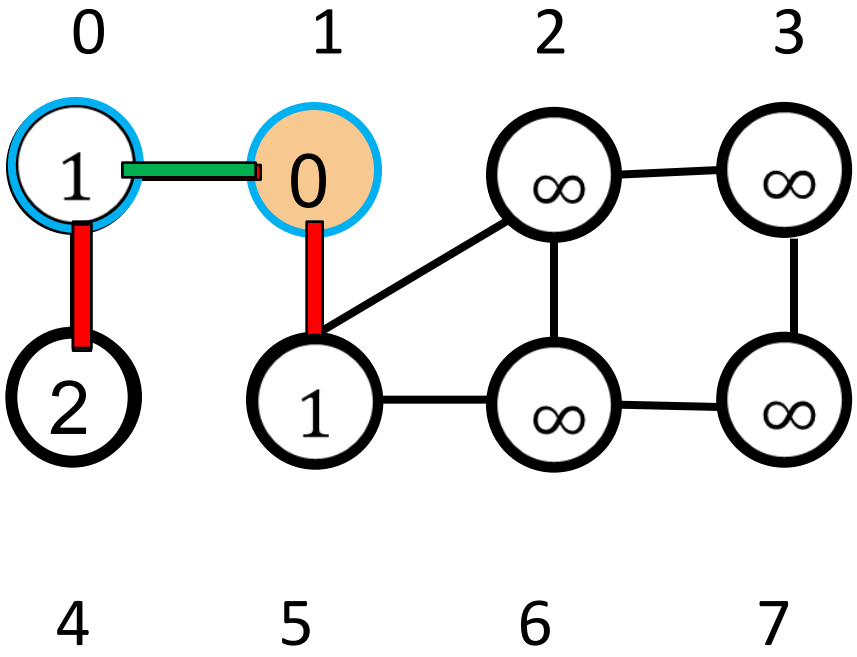


Q 1



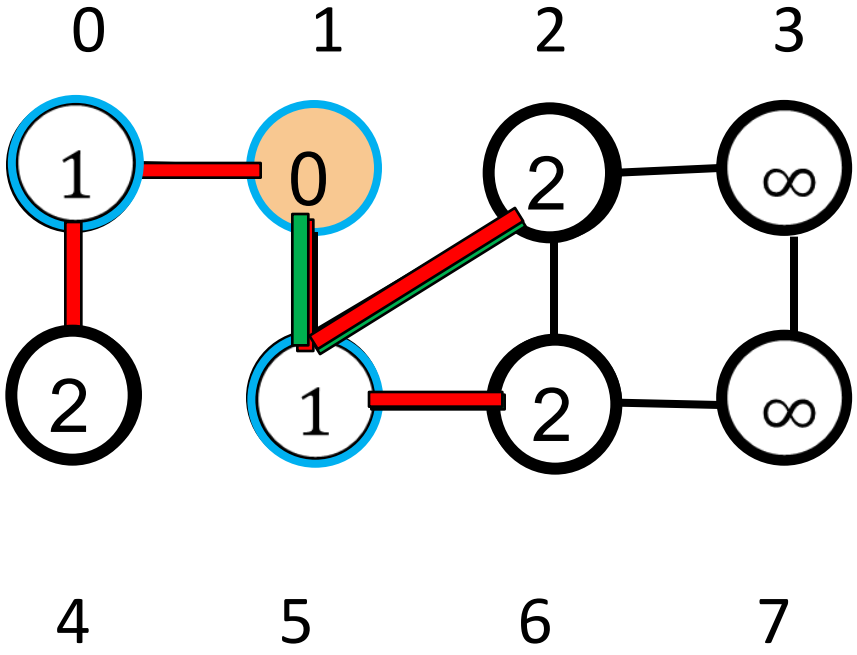
Q

1	0	5



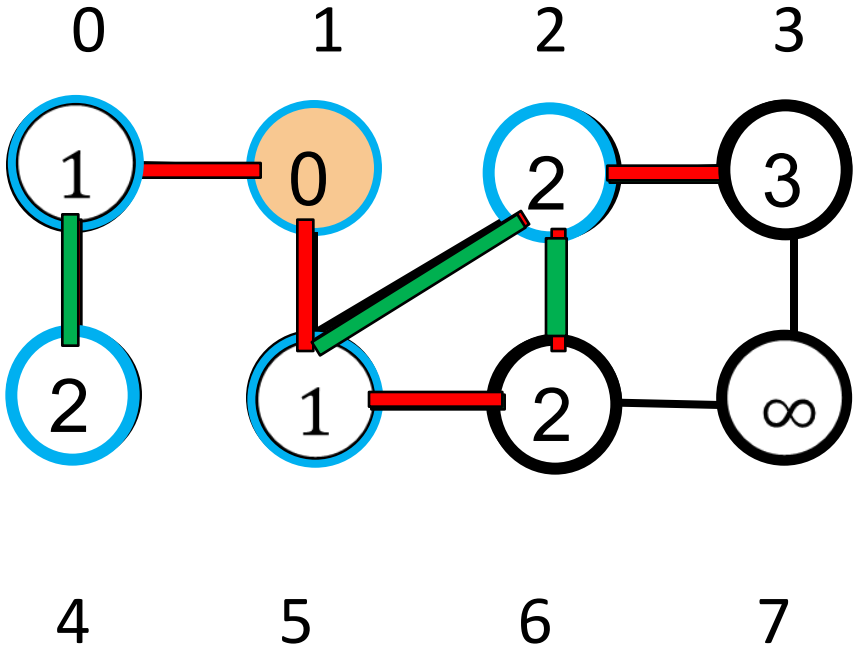
Q

0	5	4



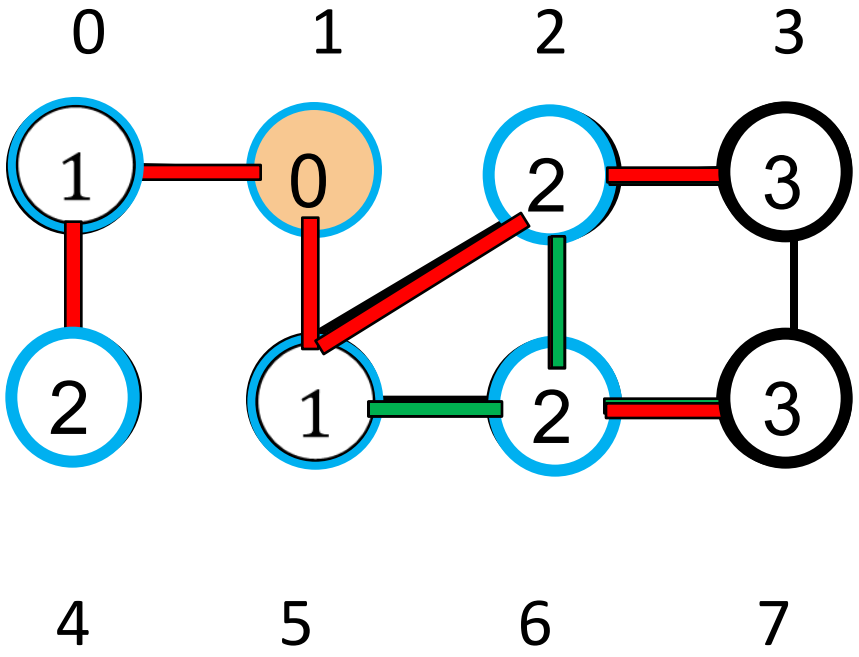
Q

5	4	2	6



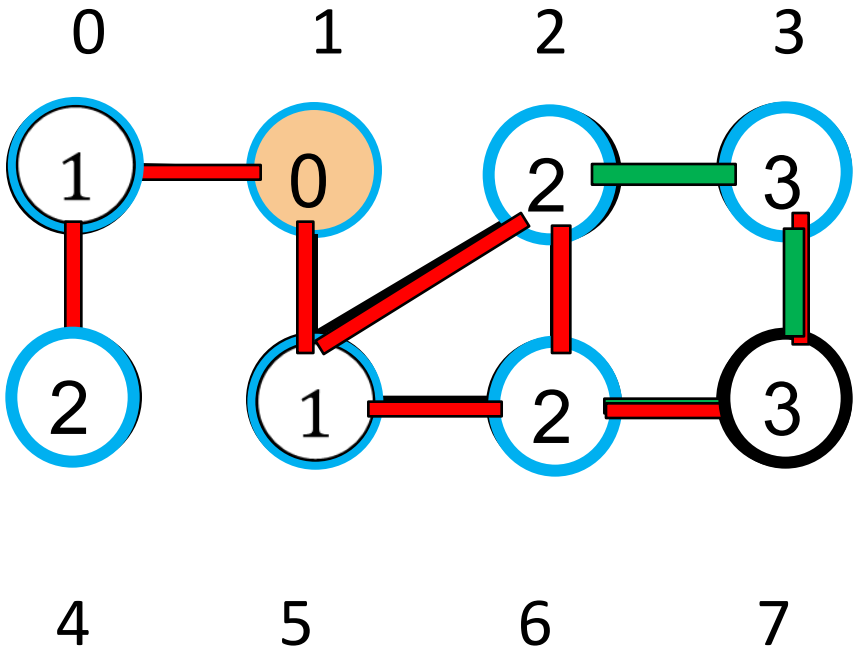
Q

4	2	6	3



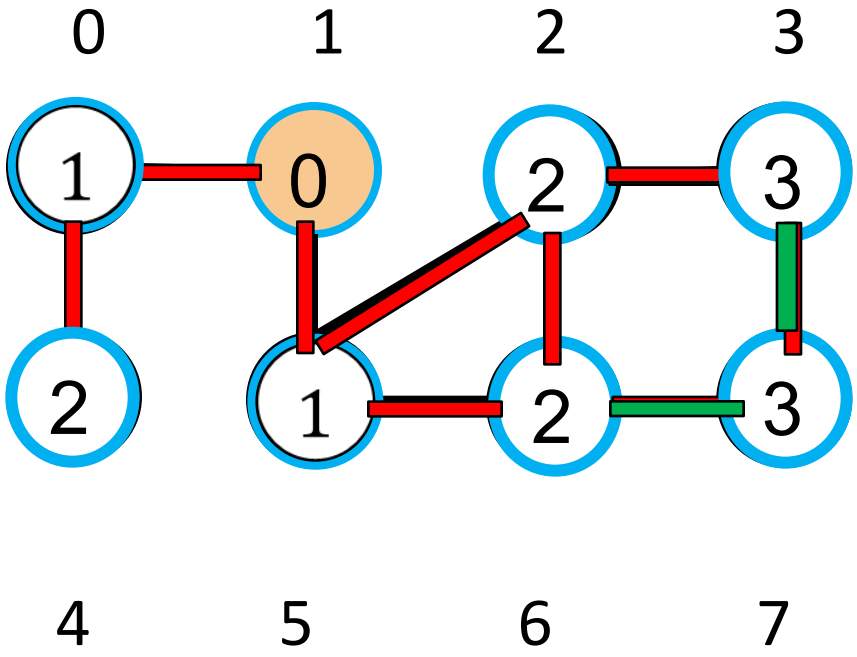
Q

6	3	7



Q

3	7



Q

7

4.3.1 BFS Algorithm

```
BFS(G,s)
for each vertex u E V[G] – {s}
do          pass[u]     = 0
            d[u]        = -1
            pred[u]     = -1
pass[s]  =1
d[s]     =0
pred[s]  =s
```

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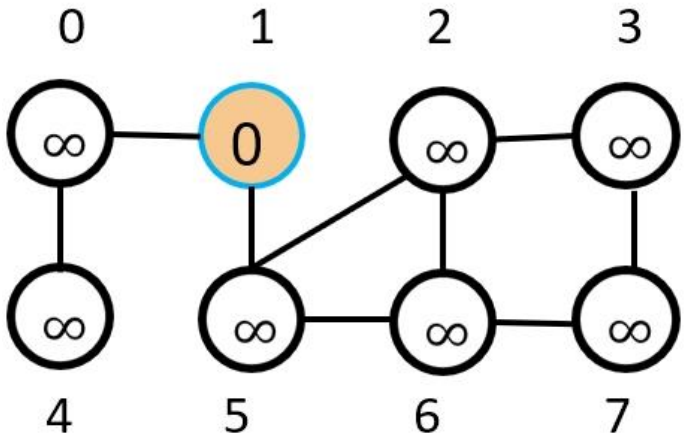
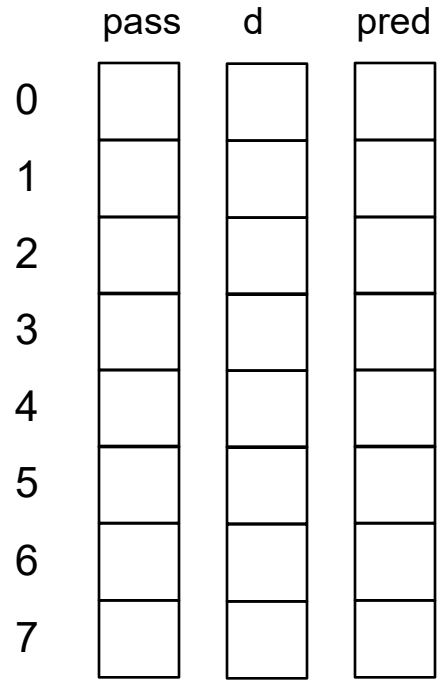
```

```
Enqueue(s);
while (queuesize() != 0)
 {    u = head(q)
      node=adj[u];
      while( node!= NULL)
     {    v= node->value;
           if  (pass[v]=0)
          {   pass[v] = 1
              d[v] = d[u]+1
              pred[v] = u
              enqueue(v)
           }
           node=node->next;
      }
      dequeue()
}
```





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           }
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      }
      dequeue()
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```

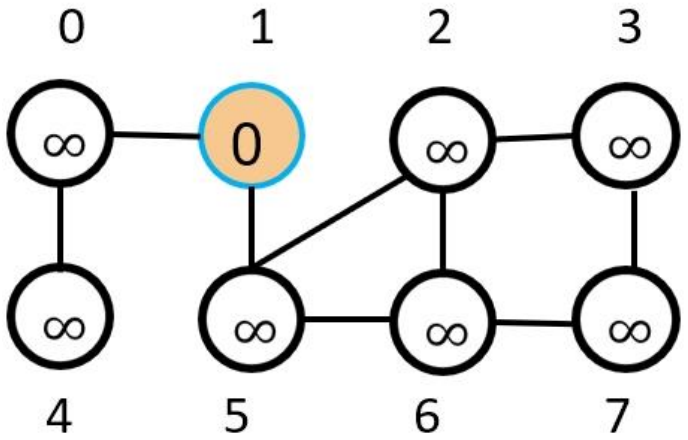

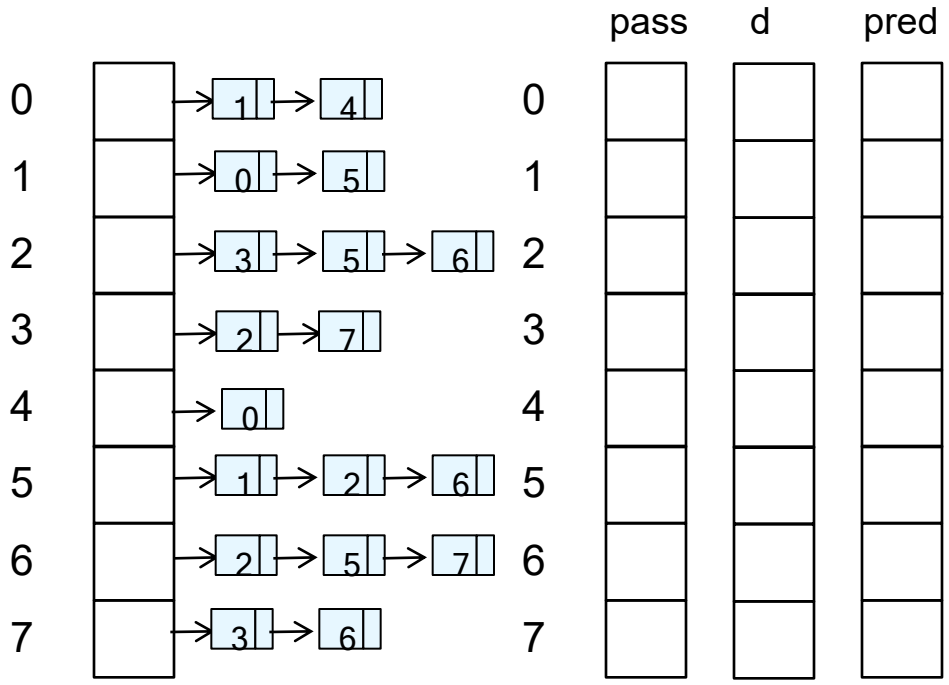

1. Edges are explored out of the most recently discovered vertex v that still has unexplored edge leaving it.

2. When all of v's edges have been explored, the search backtracks to explore edges leaving the vertex from which v has discovered. Until we have discovered all the vertices that are reachable from the original source vertex