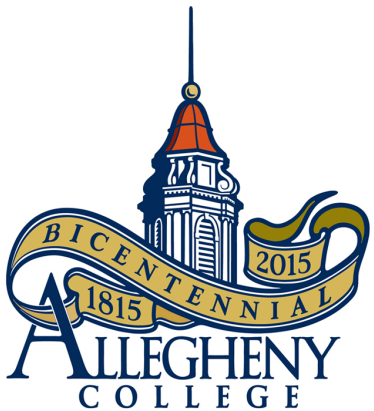
CS202 - Algorithm Analysis

Graph Algorithms Module-2

Aravind Mohan

Allegheny College

May 10, 2021



Discussion Based On ...

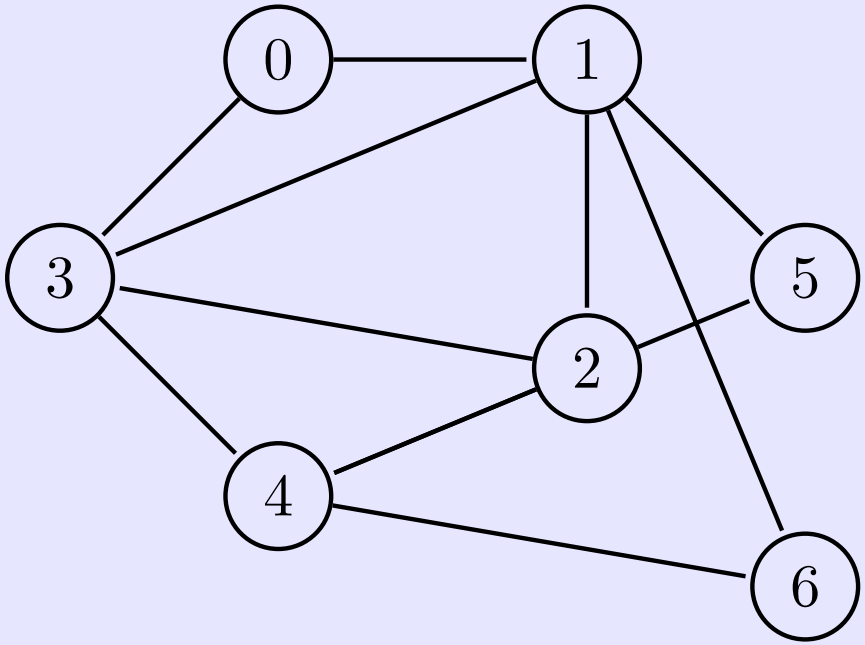
Sedgewick 4.1, 4.2

Graph Traversals

- **Graph traversal** is a process used to visit each node or vertex in a connected graph.
- Two popular algorithms are generally used for the traversal of a graph, namely, Depth First Search (DFS) and Breadth First Search (BFS).

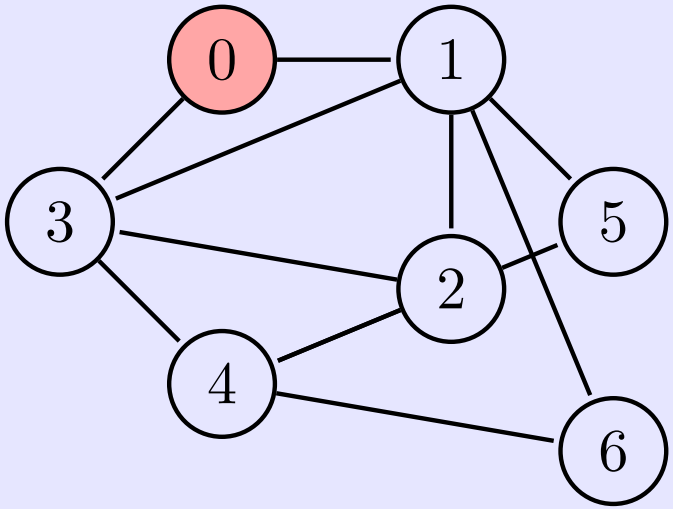
An important: application of graph traversal is to detect cycles in a Graph.

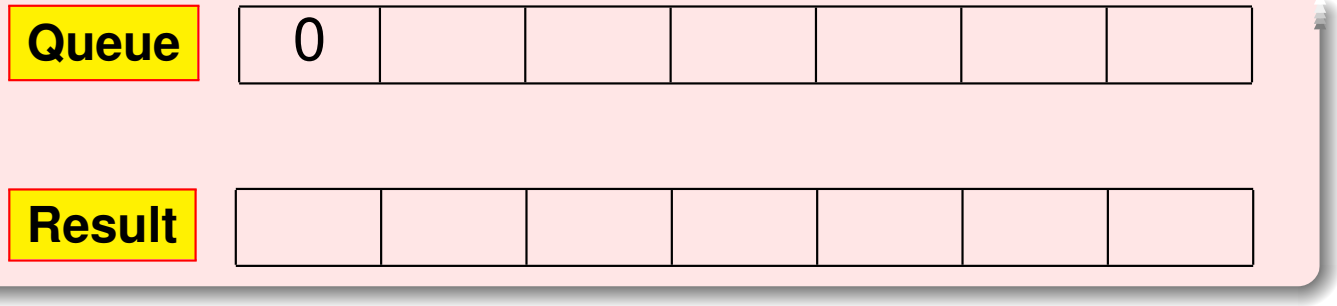
BFS example



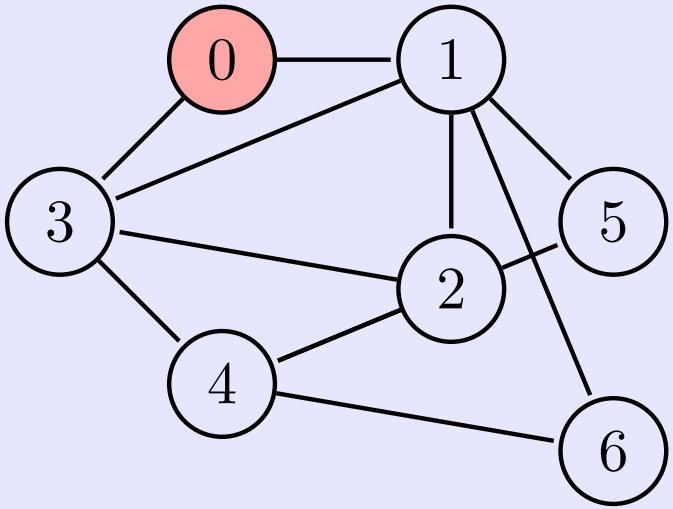
Traverse graph by starting from 0

BFS example (1)





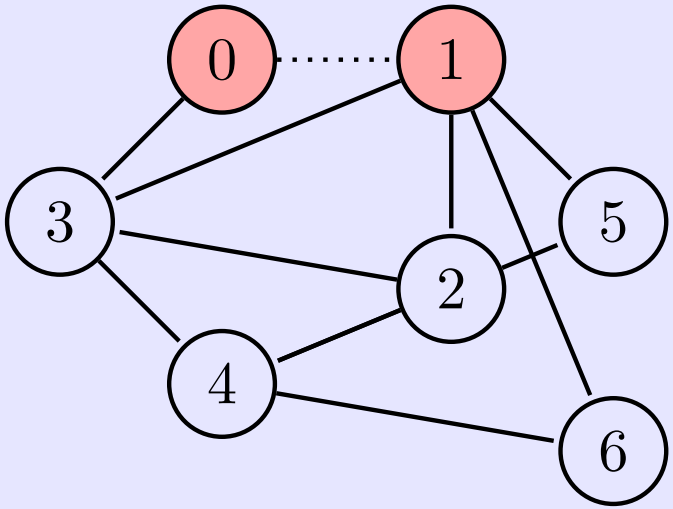
BFS example (1)



Queue	~~0~~	1	3				

Result	0						

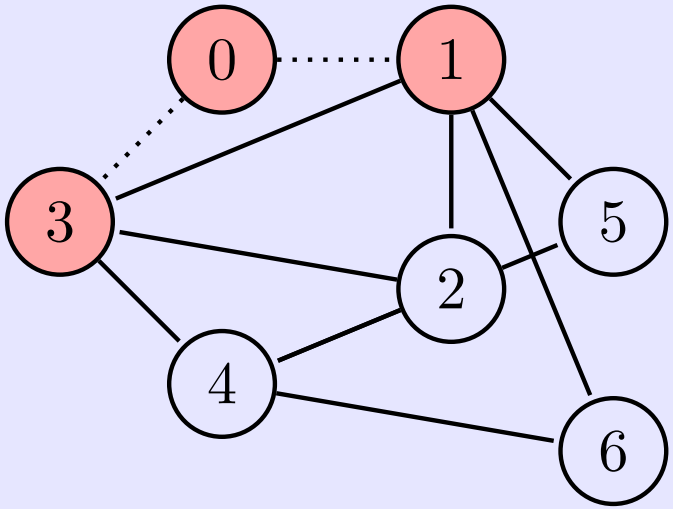
BFS example (1)



Queue	~~1~~	3	2	5	6		

Result	0	1					

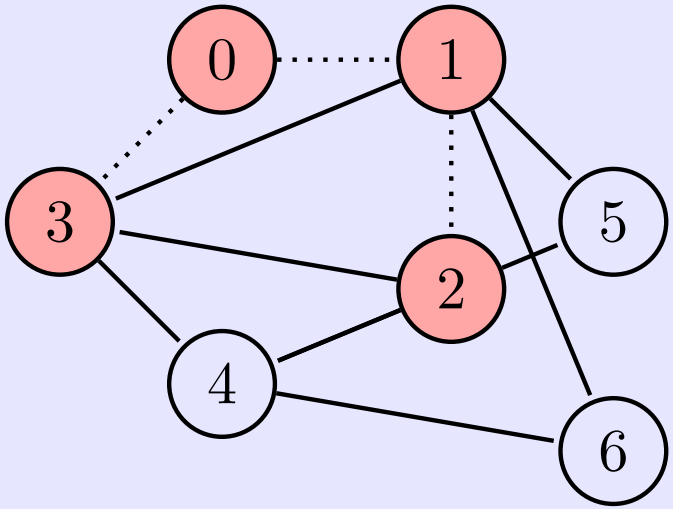
BFS example (1)



Queue	~~3~~	2	5	6	4		

Result	0	1	3				

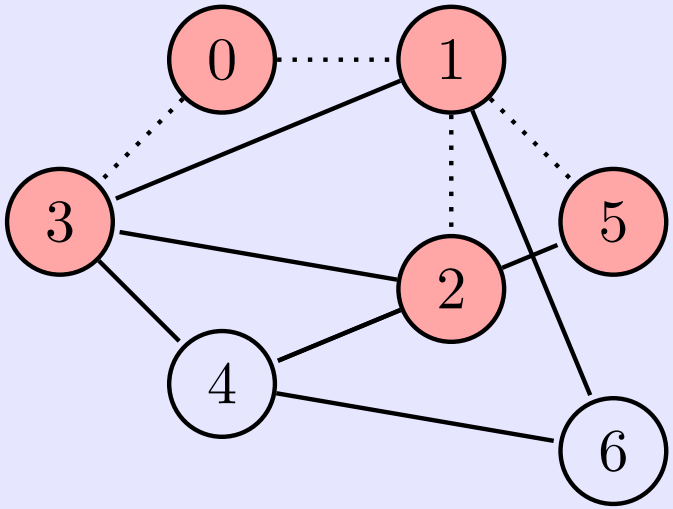
BFS example (1)



Queue	~~2~~	5	6	4			

Result	0	1	3	2			

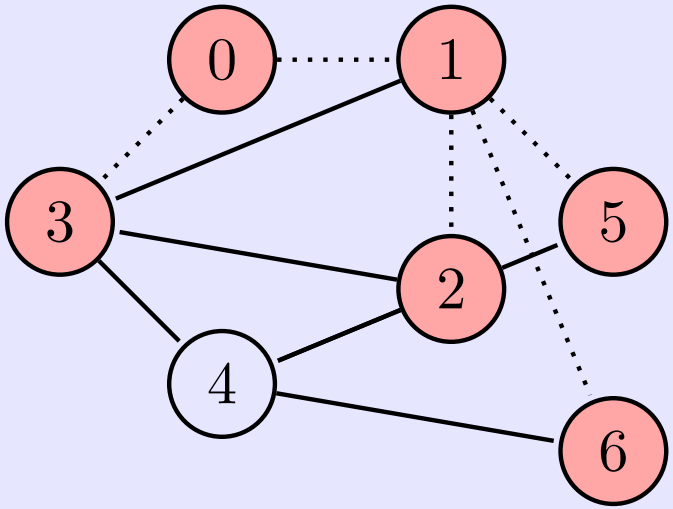
BFS example (1)



Queue	~~5~~	6	4				

Result	0	1	3	2	5		

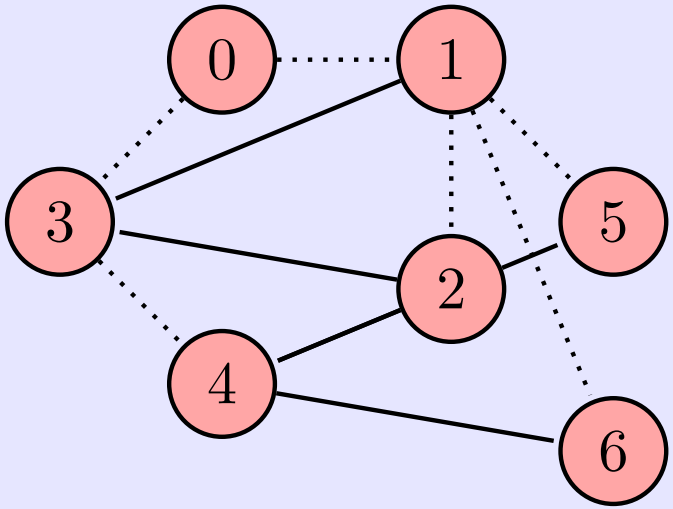
BFS example (1)



Queue	~~6~~	4					

Result	0	1	3	2	5	6	

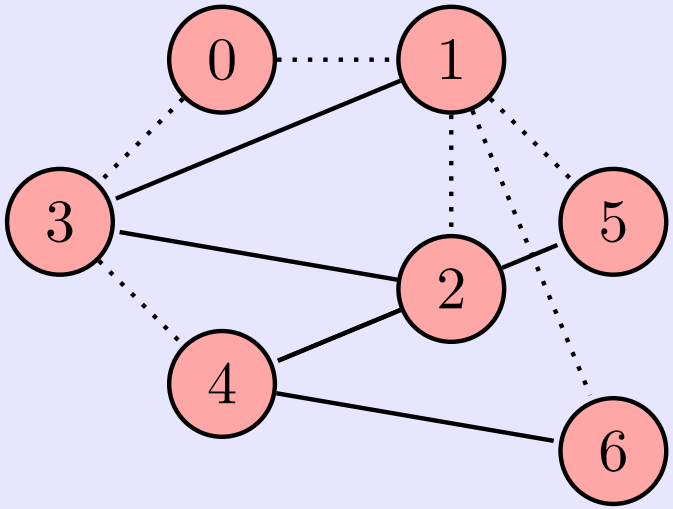
BFS example (1)



Queue	4						

Result	0	1	3	2	5	6	4

BFS example (1)



Queue

Result

0	1	3	2	5	6	4

Breadth First Search (BFS) Algorithm

BFS(G, u)

Input: Graph G = (V, E) directed or undirected, vertex u (element of) V

Output: BFS traversal order from node u

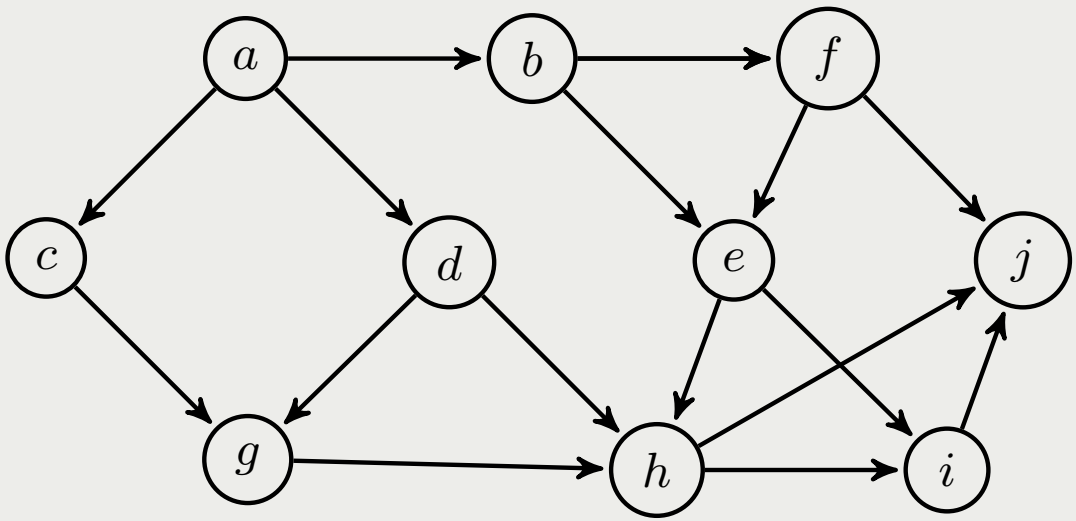
```
create a Queue Q
enqueue(Q, u)
while(Q is not empty)
  s = Dequeue(Q)
  if (visited of vertex s == false)
    result.add(s)
    visited of vertex s = true
  end if
  for all m (element of) neighbours of s
    if (visited of vertex m == false)
      enqueue(Q, m)
    end if
  end for
end while
return result
```

Complexity Analysis

Time Complexity - O(V + E)

Try out 1

- **Compute** the BFS traversal order in the Graph provided below, starting from vertex **a**. Show the Queue and Result array in your solution.



Reading Assignment

Sedgewick 4.1, 4.2

Questions?

Please ask if there are any Questions!