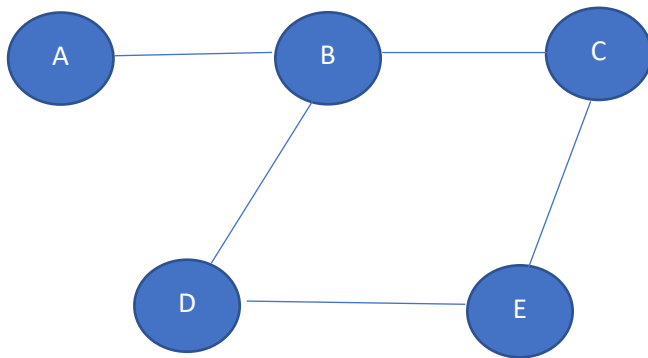


Playbook Notes: Introduction To Graphs

Example 1: Undirected Graph



The circles are called **Nodes** or **Vertexes**

This graph is **undirected** (Notice there are no arrows on the edges).

Nodes, or Vertexes may have data in them. In the above example I placed letters A-E.

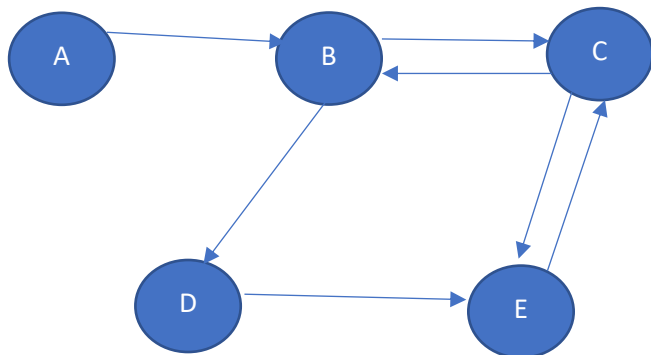
This may be an example of a social network (think Facebook, or some other social media).

Each Node is a person and each edge represents that someone is a friend between two nodes.

The lines between vertexes are called **edges**.

When two nodes are connected, the two nodes have what is called an **adjacency**.

Example 2: Directed Graph



Notice in this Graph there are arrows on the edges. This means data moves in one direction. Of course, some nodes have arrows going back to the original node so those nodes have data moving in two directions.

This could be a street map where single edges are one-way streets and double edges are two-way streets.

Adjacency Matrix

Using the directed graph above, we can create a matrix to show the flow of data.

		TO				
		A	B	C	D	E
FROM	A	0	1	0	0	0
	B	0	0	1	1	0
	C	0	1	0	0	1
	D	0	0	0	0	1
	E	0	0	1	0	0

Time Complexity: $O(1)$ and Space Complexity: $O(V^2)$
(Very fast to search, but takes up a lot of space)

Adjacency List

Below are two examples (Both examples represent the same data):

EXAMPLE 1	EXAMPLE 2		
A → B	A	B	
B → C → D	B	C, D	
C → B → E	C	B, E	
D → E	D	E	
E → C	E	C	

Each item in the list could be a link list of nodes to the other nodes.

Time Complexity: $O(V)$ and Space Complexity: $O(V+E)$

(More time to search, but uses less space)

Reference:

YouTube: Bro Code, "Learn Graphs in 5 minutes"

<https://www.youtube.com/watch?v=-VgHk7UMPP4>