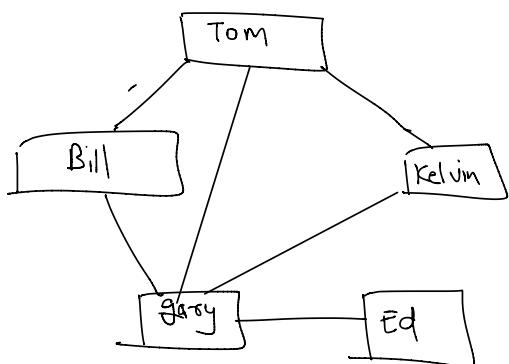
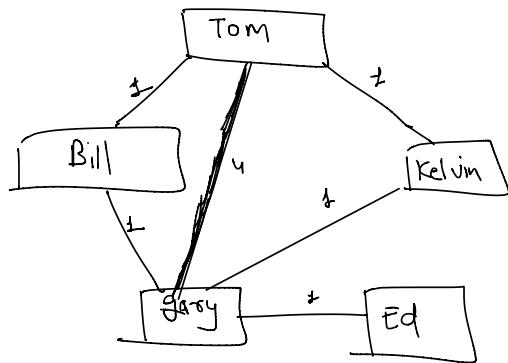


Module - 2 - Continue

Undirected graph

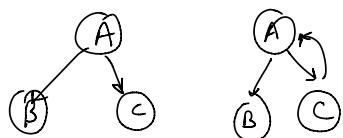


→ edge indicate at least 1 movie
that the actors have been in
together,



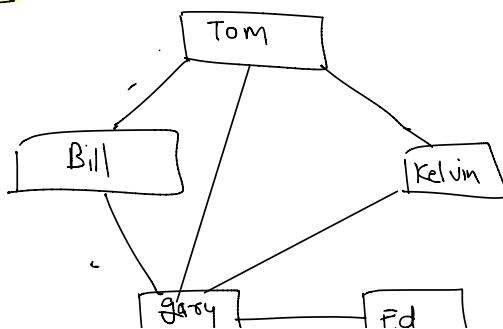
→ A weight graph where
weight are indicated both
as no. & by the thickness of
edges. In this graph
weight indicate how many
movies actor have been in
together

Directed graph



Representing N/W

Adjacency lists



Apollo 13

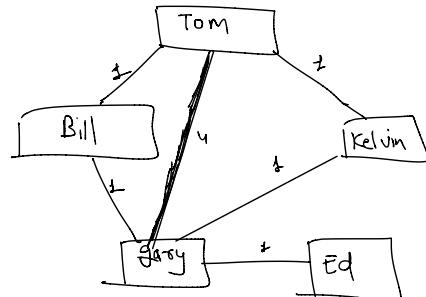
An adjacency list also called as **edge list**, each entry in the N/W is indicated by listing the pair of nodes that are connected.

for ex- adjacency list for Movie N/W

- Tom, Bill
- Tom, Kelvin
- Tom, Gary
- Gary, Kelvin
- Gary, Ed
- Gary, Bill

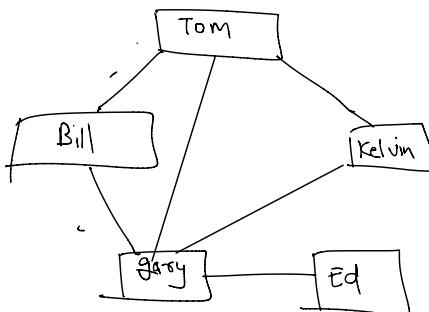
The adjacency lists can also include additional information about the edges.

- Tom, Bill, 1
- Tom, Kelvin, 1
- Tom, Gary, 1
- Gary, Kelvin, 1
- Gary, Ed, 1
- Gary, Bill, 1

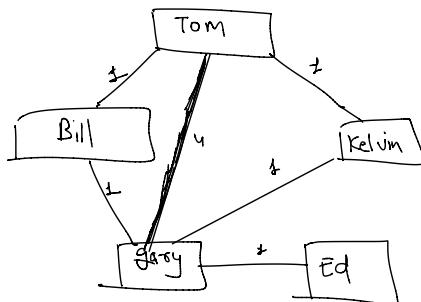


Adjacency Matrix

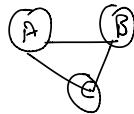
	Tom	Bill	Gary	Kelvin	ED
Tom	0	1	1	1	0
Bill	1	0	0	0	0
Gary	1	1	0	1	1
Kelvin	1	0	1	0	0
ED	0	0	1	0	0



	Tom	Bill	Gary	Kelvin	ED
Tom	0	1	1	1	0
Bill	1	0	1	0	0
Gary	1	1	0	1	1
Kelvin	1	0	1	0	0
ED	0	0	1	0	0



Clique :- All nodes in a group are connected to one another.
When this happens, it called as clique

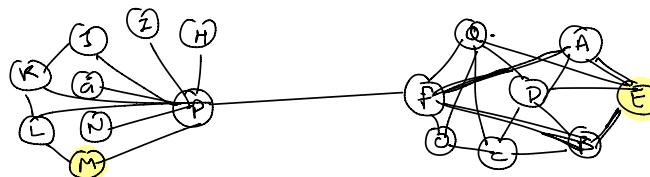


Ex - are held together by common interest, view or purpose

- one type of kids group

Path & connectedness:

- A Path is a series of nodes that can be traversed following edge betⁿ them
- To determine the length of path, we count the no. of edges in it.



- The path from M to E has length 4 (i.e. MP, PF, FA, AE)

Shortest path :- There are 2 shortest path from F to E, i.e. FAE & FBE

The shortest path will be an important measure in the n/w analysis also called geodesic distance.

Connectedness :- Path are used to determine a graph property called Connectedness. Two nodes in a graph are called connected, if there is a path between them in n/w. An entire graph is called as connected if all pair of nodes are connected.

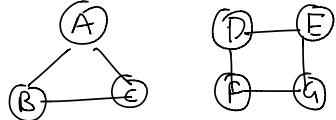
1) Strongly connected graph :- Every vertex is reachable from every other vertex.

2) Weakly connected graph :- If a path cannot be found betⁿ all pairs of nodes using direction of edge but path can be found if the directed edge are treated as undirected. Then graph are treated as undirected.

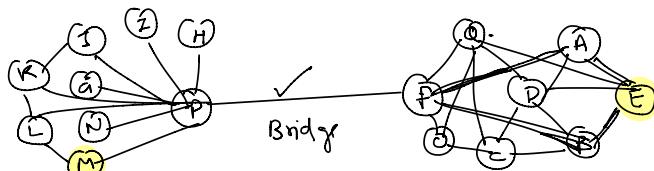
is called weakly Connected.

Bridge & Hubs :-

- Connected Component :- If a graph is not connected, it may have subgraph that are connected. Then are called Connected component.



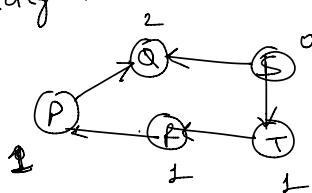
- Bridge : It is an edge that connects two otherwise separate group of nodes in the N/w. formally a Bridge is a edge that, if removed will increase the no of connected component in a graph



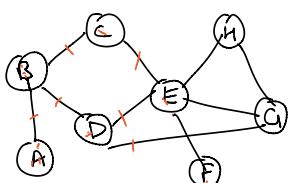
→ Hub - It is used to refer to most connected node in N/w
eg. Node P would be a Hub bcz it has many connected to other node

→ Indegree → In the directed graph, incoming edge to a vertex is called Indegree

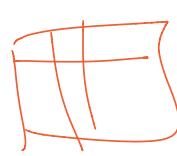
→ Outdegree → In the directed graph, outgoing edge to a vertex is called Indegree



Exercise :-

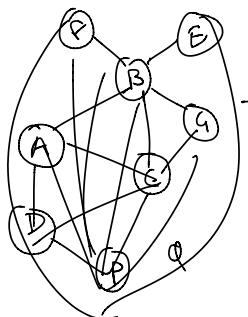


- How many nodes are in N/W - 8
- How many edges are in N/W - 10
- Is this graph directed or Undirected ✓
- Create adjacency Matrix & List ✓
- What is length of shortest path from A to F - ABCEF, ABCDEF
- How many connected components - 1
- Hub node? - E



→ Degree distribution: Degree is used to describe individual nodes. To get an idea of the degree for all the nodes in the N/W. we can build degree distribution

① To create a dd, calculate the degree for each node in the N/W.



Step-1

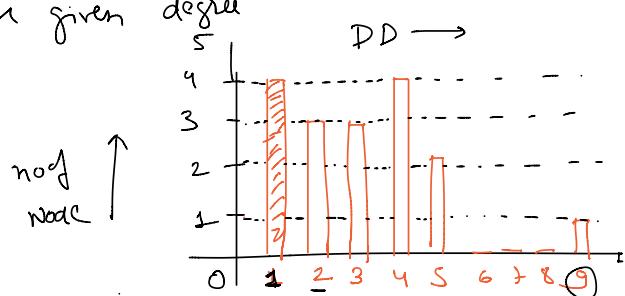
Node	degree
A	5 ✓
B	4 ✓
C	4 ✓
D	3 ✓
E	3 ✓
F	2 ✓
G	2 ✓
H	1 ✓
I	1 ✓
J	1 ✓
K	1 ✓
L	1 ✓
M	1 ✓
N	1 ✓
O	1 ✓
P	1 ✓
Q	1 ✓

graph	Node
degree	Count
1	1
2	3
3	3
4	4
5	2
6	0
7	0
8	0
9	1

Step-2

② It is count how many nodes have each degree. This is total for each degree including those for which there are no node with that count

③ Most common way to show a degree distribution is in bar graph. The x-axis has the degree in ascending order & y-axis indicate how many nodes have given degree



Degree

- Strong ties → you know very well. they have close ties with people.
Ex- Best friend, family
- weak ties → People you know but not very well. ex SM friend