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Scribed Lecture 12 Notes:

Student ID :

202212056

202212057

202212058

202212059

202212060

Transitive Relation :-

Let R be relation on set S such that $a,b,c \in S$

If $\{ (a,b) \in R \} \wedge \{ (b,c) \in R \} \Rightarrow (a,c) \in R$ Then R is called a transitive relation.

Graph :-

Definition – A graph (denoted as $G=(V,E)$) consists of a non-empty set of vertices or nodes V and a set of edges E.

Example – Let us consider, a Graph is

$$G=(V,E)$$

$G=(V,E)$ where

$$V=\{a,b,c,d\}$$

$$V=\{a,b,c,d\} \text{ and}$$

$$E=\{\{a,b\}, \{a,c\}, \{b,c\}, \{c,d\}\}$$

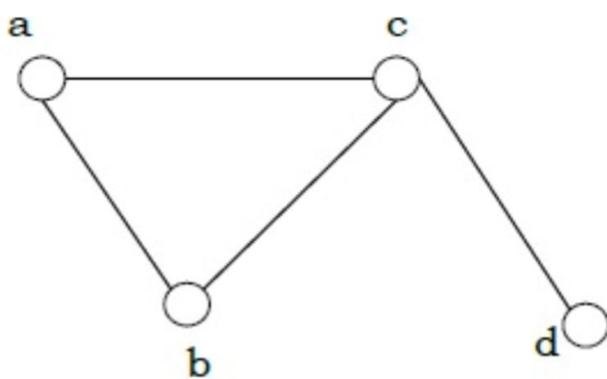


Diagram (1)

Undirected Graph:

A simple undirected graph consists of a finite set V of vertices & finite set E of edges , where E is a binary, irreflexive, symmetric relation over V .

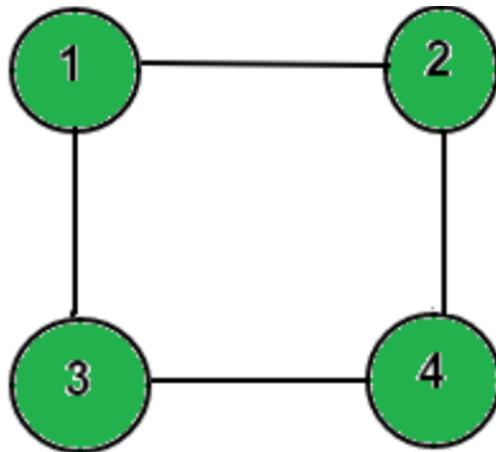
Explanation of above definition :-

As we can see from diagram (1)

1. a,b,c,d are vertices or nodes.
2. Finite set E is called edges which is a relation.
 - a) It connects two vertices. That's why it is called binary relation.
 - b) Vertice cannot connect to itself. That's why,it is called irreflexive.
 - c) There is no direction in the connection of nodes that's why it is called symmetric.
Because for example if node a & b are connected. That means aRb and bRa .

Reachability :-

A concept from graph theory concerned with whether there is a path between two vertices in a directed graph. Vertex V is said to be reachable from vertex U provided that there is a path from U to V. There may be several different paths from one vertex to another. The set of points that can be reached from a given vertex V is called the reachable set of V.



Here,

(i) Reflexive :-

Every node is reachable to itself, that's why it is called a reflexive relation.

(ii) Symmetric:-

If 1 is reachable to 2 that means 2 is reachable to 1. So, we can observe from this example that reachable relation is Symmetric.

(iii) Transitive:-

1 is connected with 2 and 2 is connected to 4 so, 1 is reachable to 4. So, we can observe from this example that reachable relation is transitive.

Equivalence Relation :-

When a relation is reflexive, symmetric and transitive, it is called Equivalence Relation. Here the reachable relation is an example of the Equivalence relation.