DATA STRUCTURES AND ITS APPLICATIONS

Graphs

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Graphs

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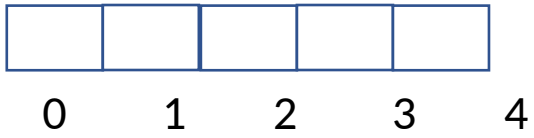
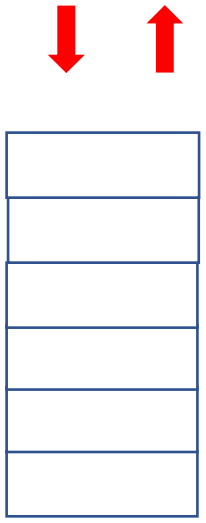
Linear data structures

Array

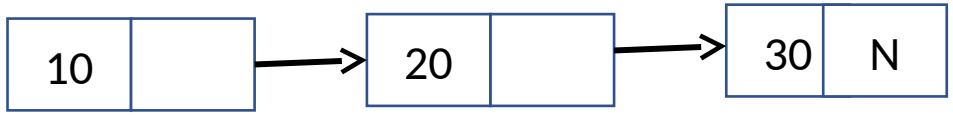


Stack



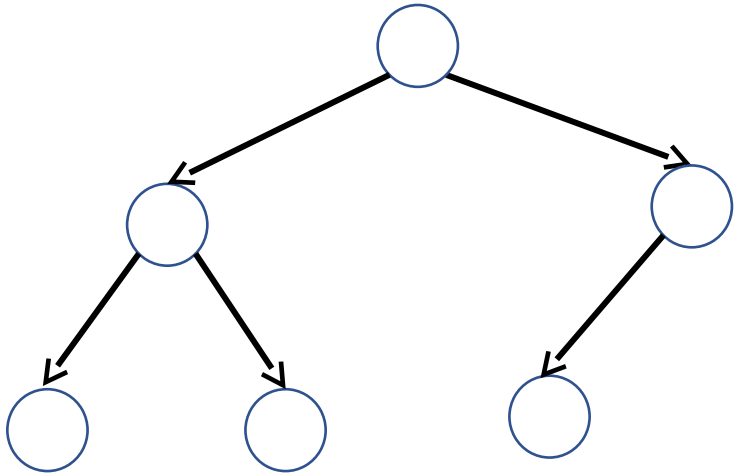
Queue

Linked List

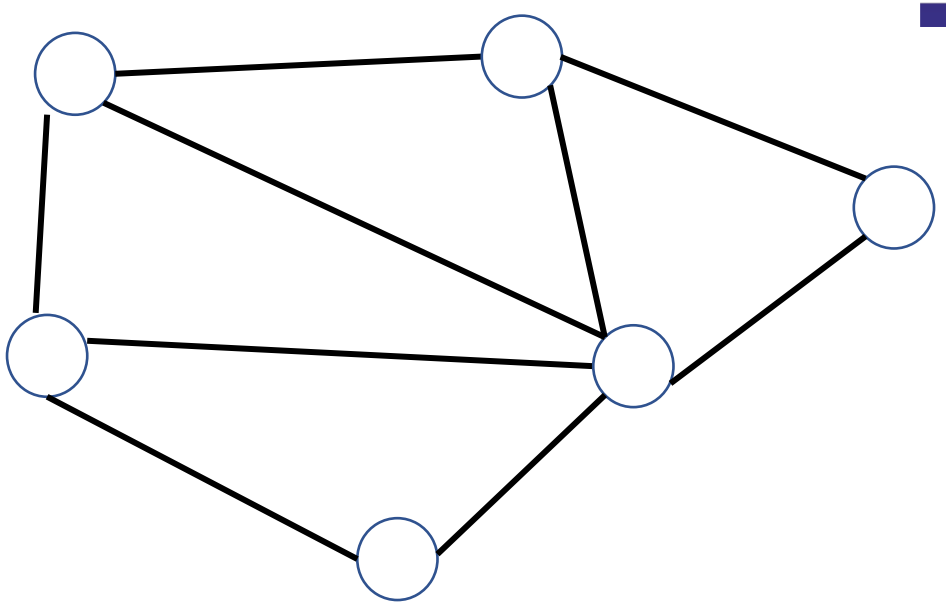


Introduction to Graphs

Non-Linear Data Structure



Tree



Graph

In a tree with N nodes there are N-1 edges

Introduction to graph

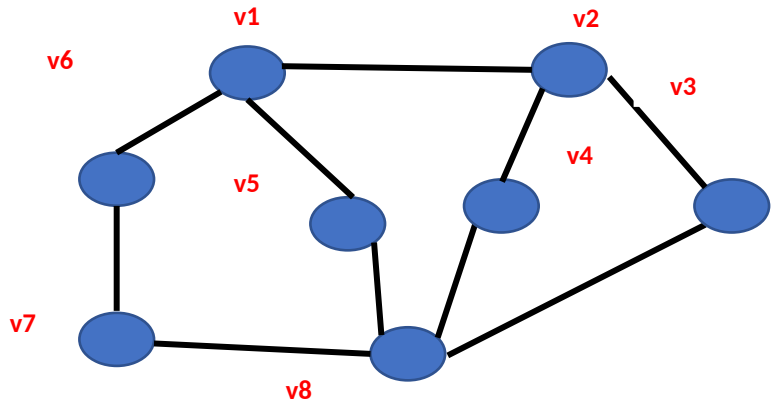
Graphs

- A Graph is a data structure that consists of set of vertices and a set of edges that relate the node to each other.
- The set of edges represents the relationship among the vertices.
- A graph G is defined as

G=(V,E)

V: finite nonempty set of vertices

E: a set of edges

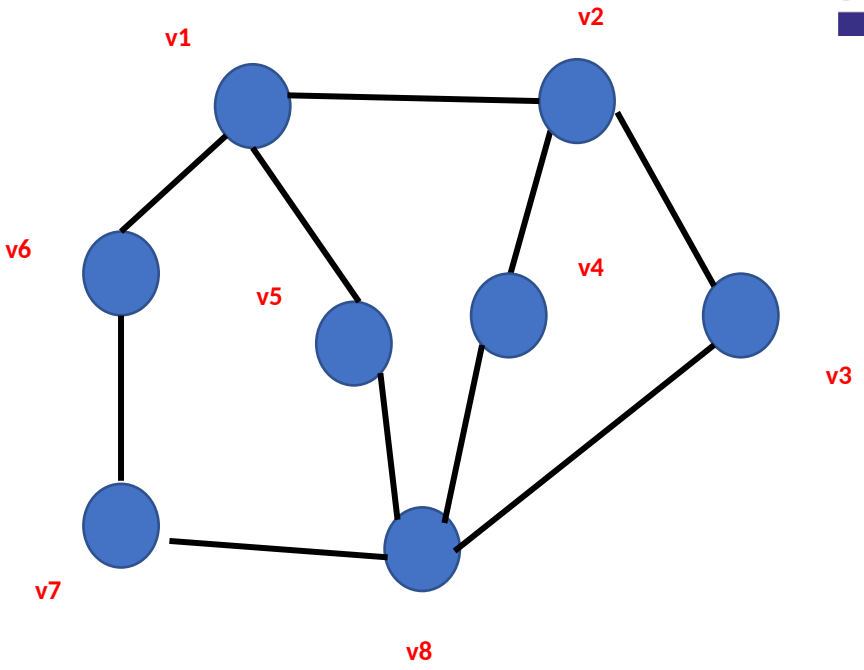


V = { v1,v2,v3,v4,v5,v6,v7,v8}

Representation of Edge

V = { v1,v2,v3,v4,v5,v6,v7,v8}

E={(v1,v2),(v2,v3),(v2,v4),(v4,v8),(v1,v5),(v1,v6),(v6,v7),(v5,v8)}



Types of Graphs

Undirected Graph:

- A graph is undirected, when the pair of vertices representing any edge is unordered.

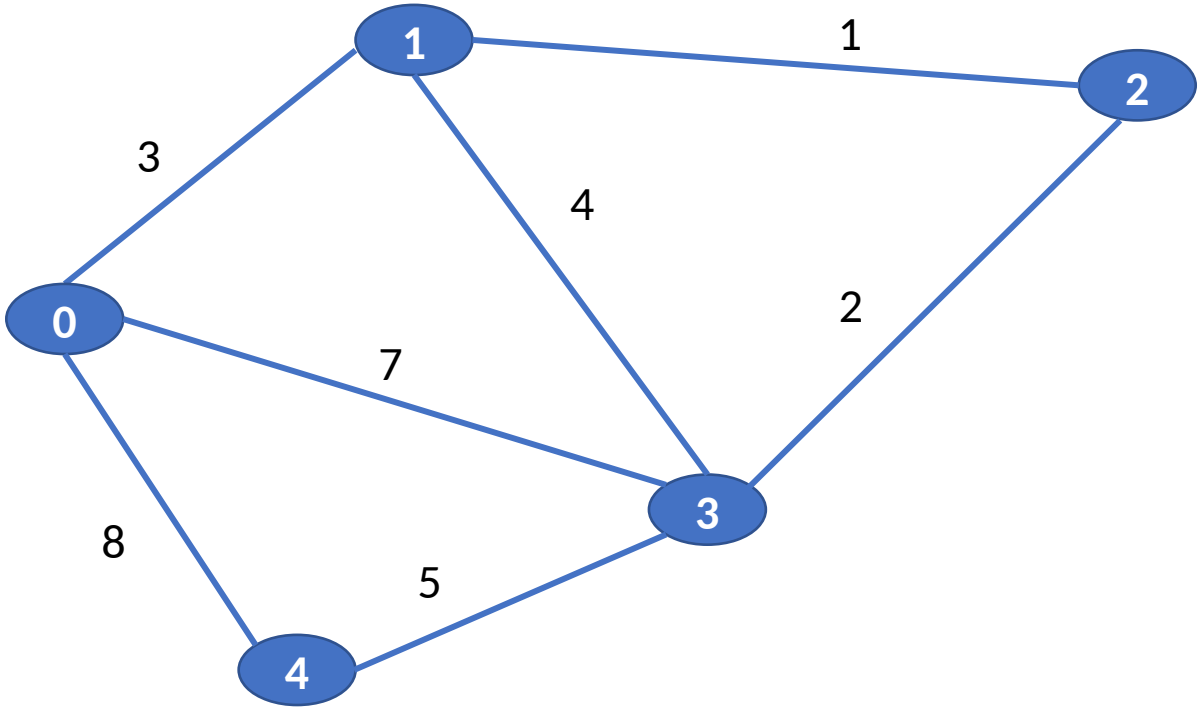
Directed Graph:

- A graph with all directed edges is called diagraph or directed graph.

Types of Graphs

Weighted Graph:

- A weighted graph is a graph where each edge has a numerical value called weight.



Graph terminologies

Adjacent Nodes :

- A node n is adjacent to node m if there is an edge from m to n.
- if n is adjacent to m, then n is called the **successor** of m and m is called the **predecessor** of n.

For example : a is adjacent to b

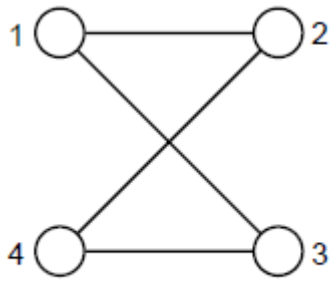
Path:

Path is a sequence of vertices that connect two nodes in a graph.

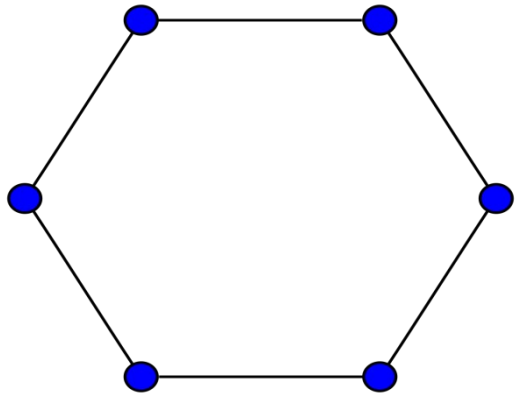
Graph terminologies

Cycle :

•A path from node to itself is called a cycle or cycle is path in which first and last vertices are same. A graph with at-least one cycle is called cyclic graph. For example the below graph are cyclic graphs



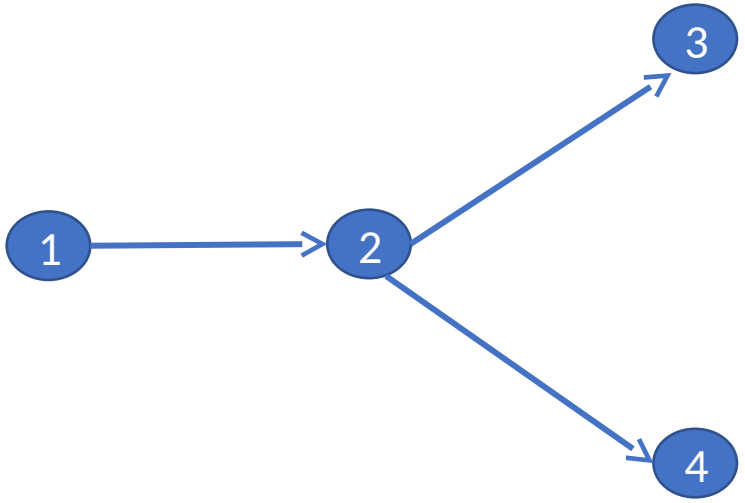
Cycle



Graph terminologies

Acylic :

•A graph with no cycles is called acyclic graph. A directed acyclic graph is called dag. For example below graph is a directed acylic graph



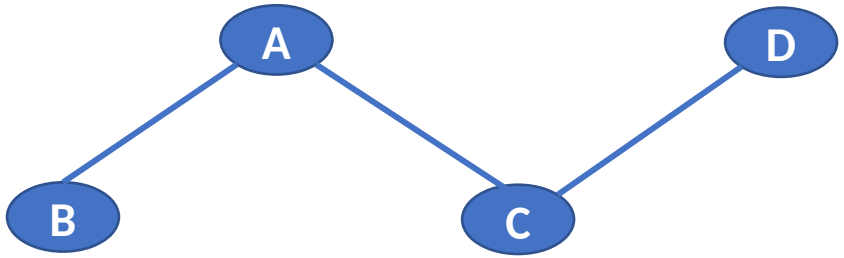
Graph terminologies

Incident:

A node n is incident to an edge x, if node is one of the two nodes the edge connects.

Degree:

The degree of vertex i is the number of edges incident on vertex i.



degree(A)=2,degree of(D)=1

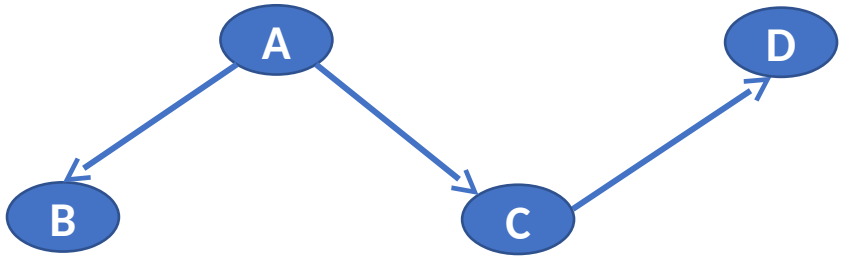
Graph terminologies

In-degree:

- In-degree of vertex i is the number of edges incident to i.

Out-degree:

- Out-degree of vertex i is the number of edges incident from i.



Out-degree(A)=2,in-degree of(A)=0

Out-degree(c)=1,in-degree of (c)=1

Properties of Graph

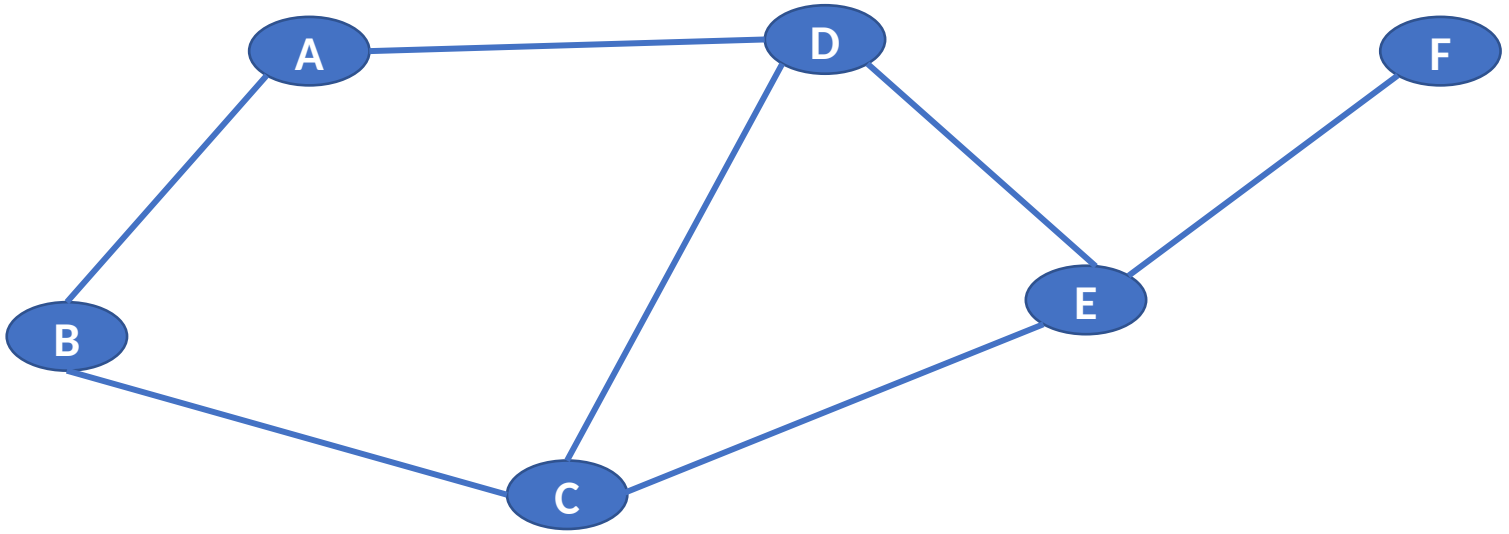
Directed graph:

- The number of possible pairs in an m vertex graph is m*(m-1)
- The number of edges in an directed graph is m*(m-1) since the edge(u, v) is not the same as the edge(v, u)
- The number of edges in an directed graph is<=m*(m-1)

Properties of Graph

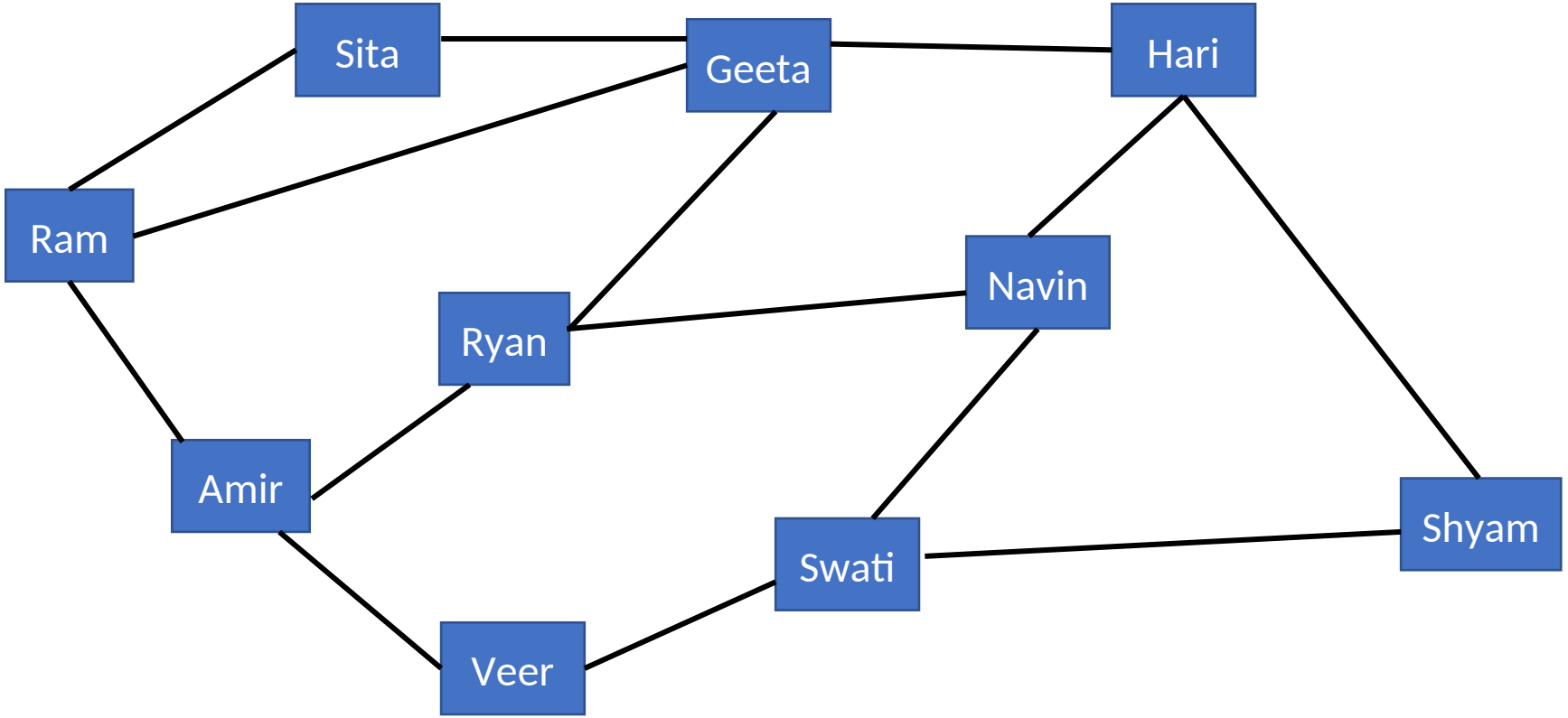
Undirected graph:

- The number of possible pairs in an m vertex graph is m*(m-1)
- The number of edges in an undirected graph is m*(m-1)/2 since the edge(u, v) is same as the edge(v, u)



Applications of graph

Social Networking sites



THANK YOU

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