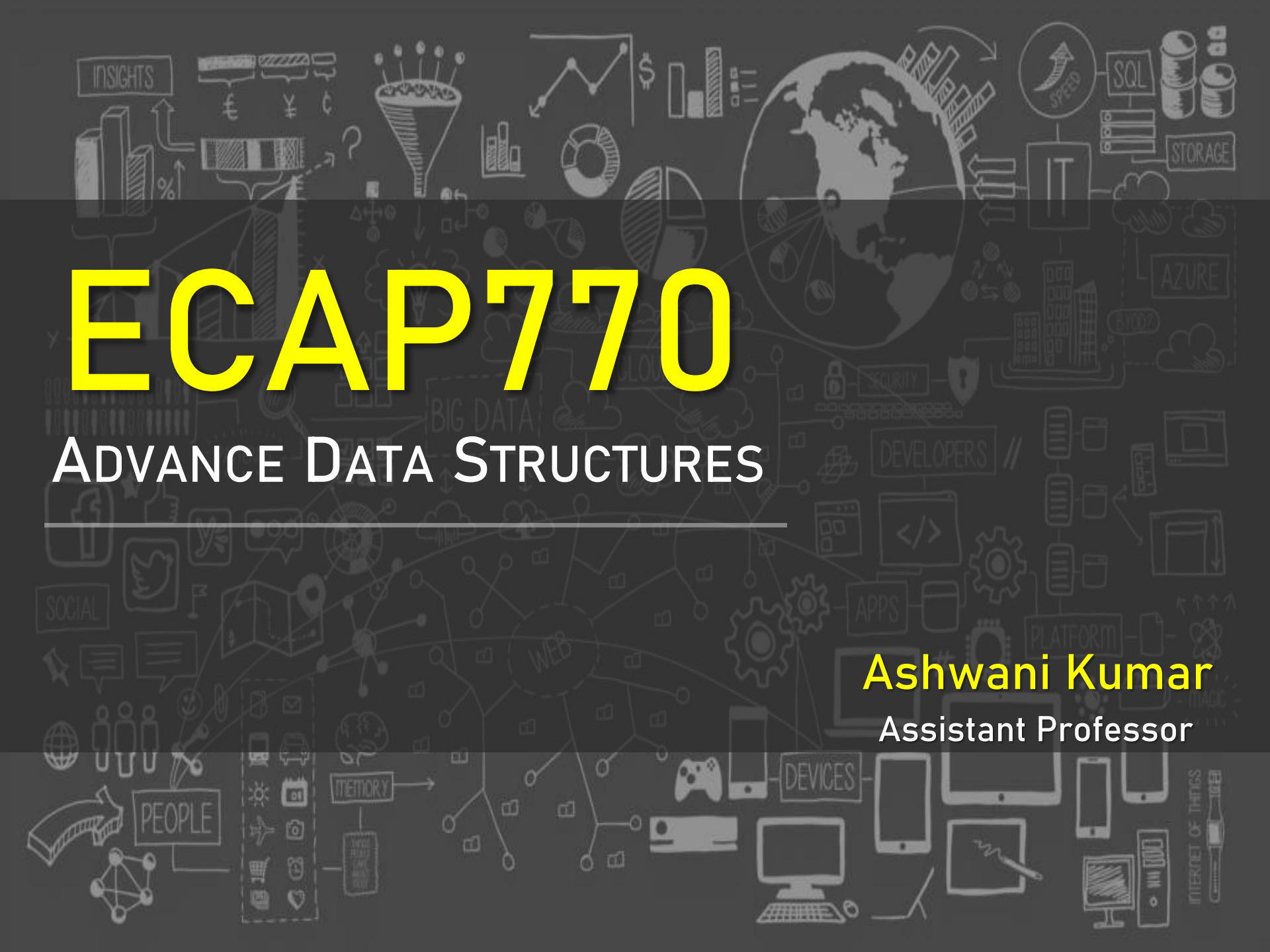

ECAP770

Advance Data Structures

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Learning Outcomes

After this lecture, you will be able to

- Understand Graphs
- Type of graphs

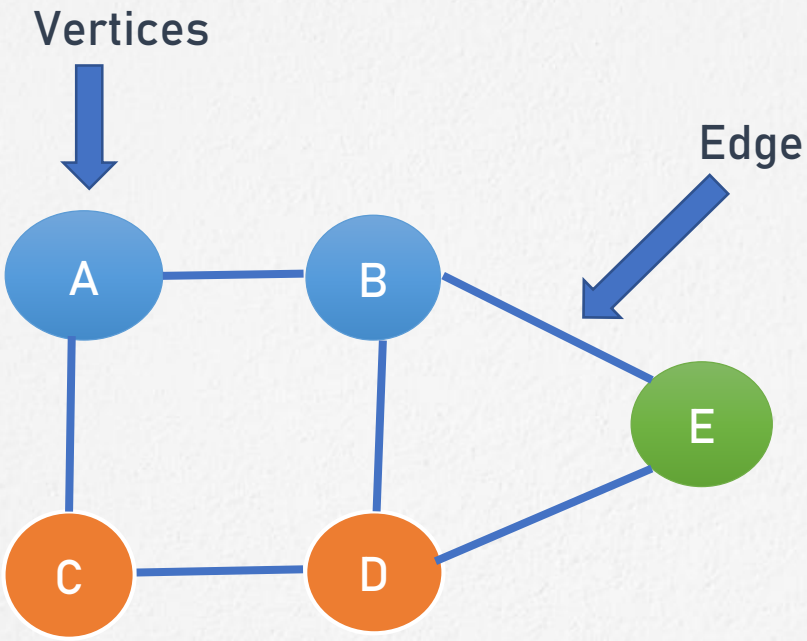
Graphs

- Graph is collection of vertices(nodes) (V) and edges(path) (E). It is non-linear data structure.

  G (V,E)

- It is a pictorial representation of a set of objects where objects are connected by links.

Graph



Vertices= (A, B, C, D, E)

Edges= (AB, AC, CD, DE, BE, BD)

Graph terminology

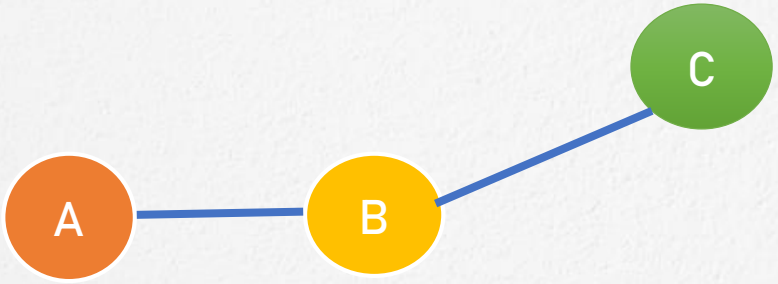
- Vertices
- Edges
- Path
- Closed path
- Degree of the Node
- Adjacent Nodes/ Adjacency

Graph terminology

- Vertices: Each node of the graph is represented as a vertex.
- Edge: it is used to represent the relationships between various nodes in a graph. An edge between two nodes expresses a one-way or two-way relationship between the nodes.

Graph terminology

- Path: Path represents a sequence of edges between the two vertices. E.g. ABC

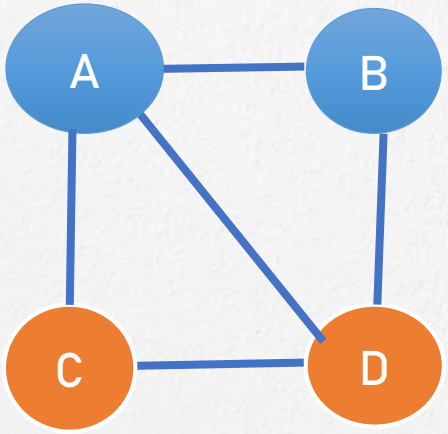


Graph terminology

- Closed Path: A path will be called as closed path if the initial node is same as terminal node.

Graph terminology

- Degree of the Node: A degree of a node is the number of edges that are connected with that node. Degree of A=3.



Graph terminology

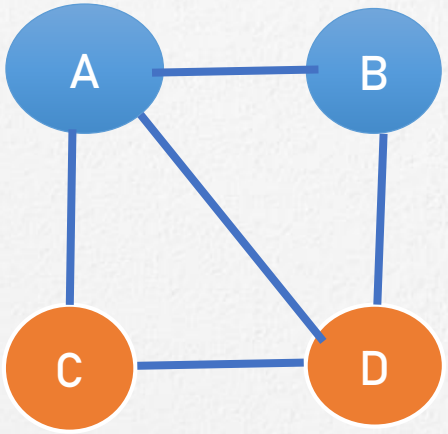
- Adjacent Nodes/ Adjacency: if two nodes are connected to each other through an edge are called as neighbours or adjacent nodes.

Types of Graph

- Undirected Graph
- Directed Graph
- Weighted Graph
- Un-weighted Graph
- Complete Graph
- Finite Graph
- Trivial Graph
- Multi Graph
- Pseudo Graph
- Connected Graph
- Labeled Graphs
- Disconnected Graph

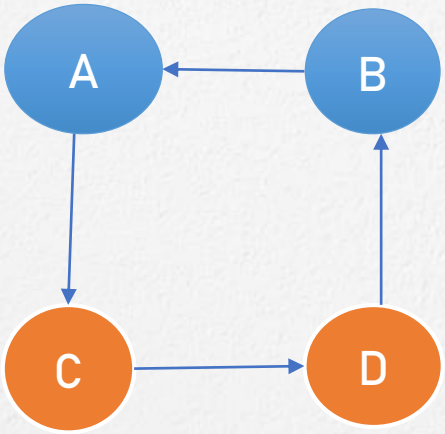
Undirected Graph

- An undirected graph nodes are connected and all the edges are bi-directional i.e. the edges do not point in any specific direction.



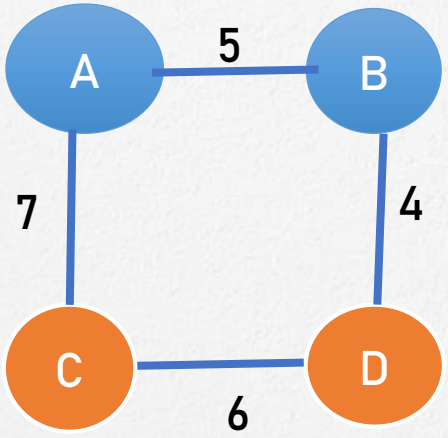
Directed Graph

- A directed graph is a graph in which all the edges are uni-directional i.e. the edges point in a single direction. It is also called a digraph.



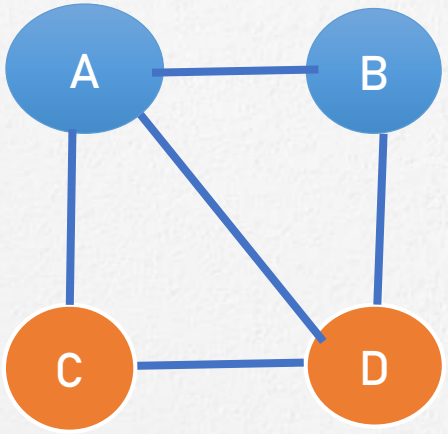
Weighted Graph

- In weighted graph edges or path have values or cost. All the values seen associated with the edges are called weights.



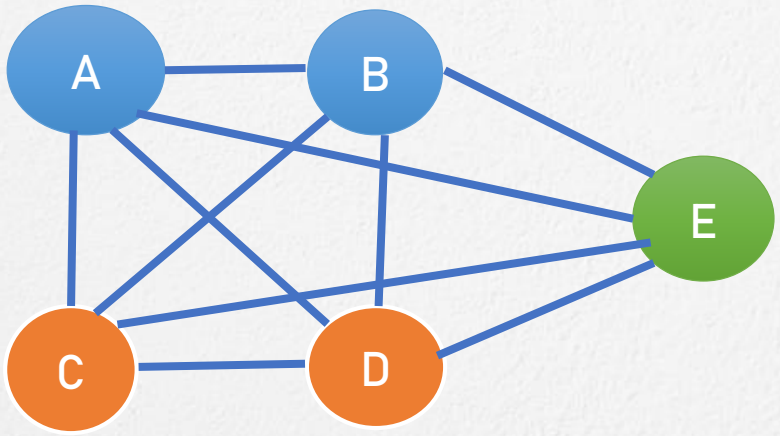
Un-weighted Graph

- In un-weighted graph there is no value or weight associated with the edge. By default, all the graphs are un-weighted



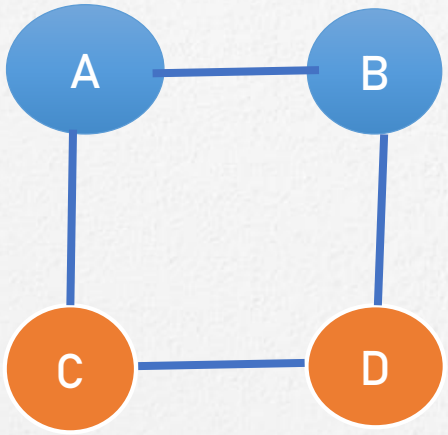
Complete Graph

- A complete graph is the one in which every node is connected with all other nodes. A complete graph contain n(n-1)/2 edges where n is the number of nodes in the graph.



Finite Graph

- The graph G=(V, E) is called a finite graph if the number of vertices and edges in the graph is limited in number

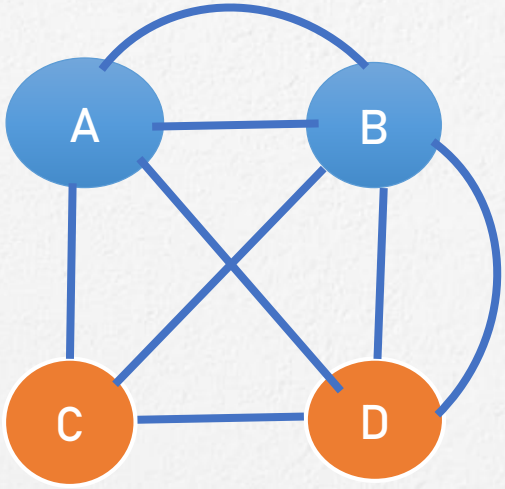


Trivial Graph

- A graph G= (V, E) is trivial if it contains only a single vertex and no edges.

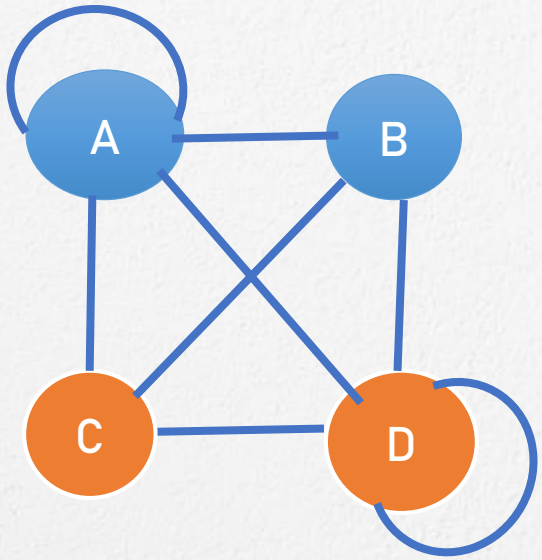
Multi Graph

- If there are numerous edges between a pair of vertices in a graph G= (V, E), the graph is referred to as a multi graph. There are no self-loops in a Multi graph.



Pseudo Graph

- If a graph G= (V, E) contains a self-loop besides other edges, it is a pseudo graph.

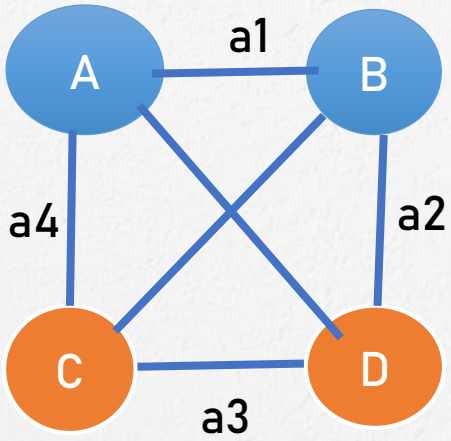


Connected Graph

- A connected graph is the one in which some path exists between every two vertices (u, v) in V. There are no isolated nodes in connected graph.

Labeled Graphs

- A graph G=(V, E) is called a labeled graph if its edges are labeled with some name or data



Disconnected Graph

- A graph is called disconnected if there is no path between any two of its vertices

Advantages of Graphs

- Easy to understand complex problem.
- Graphs are also used to draw activity network diagrams.
- In transport networks to find shortest path.
- In telecommunication (circuit networks).
- In program flow analysis.

That's all for now...