**MANASI:**

**Hello** Good Afternoon everyone!

My name is The Manasi Patil

Bhavin: And my name is Bhavin Patil

chaitanya: And my name is chaitanya Patil

Uma: And I’m Uma Thakur

**MANASI**

We are SEDA 1. Our topic for today’s group discussion is ‘Tree VS Graph’. So, without further ado let’s start with the discussion.

Before seeing the difference between the trees and graphs let us peep the trees and graphs terminologies.

**CHAITANYA:** Yeah so, I would like to start by talking about the tree data structures. A tree is a finite collection of data items which are termed as nodes. Tree is a non-linear data structure which arranges data items in sorted order.

BHAVIN: Yes! It is used to show a hierarchical structure between the various data elements and organizes the data into branches which relate the information.

MANASI Yeah, Also There are several types of trees which can be binary tree, BST (Binary Search Tree), AVL tree, B-tree, etc.

**UMA:**  right manasi. As “Bhavin” Mentioned tree arranges data in hierarchical structure. Also, there are various terminologies comes with trees such as terminal node, edge, level, degree, depth, forest, etc.

CHAITANYA yeah, so now let’s talk about these terminologies to understand it better.

BHAVIN

Yeah, I know about edges and level of tree.

so, what is Edge?

1. Edge is A line which connects two nodes.
2. Level – A tree is partitioned into levels such a way that the root node is at level 0. Then, its immediate children are at level 1, and its immediate children are at level 2 and so on up to the terminal or leaf node.

MANASI

Let me explain next terms which are degree and depth

1. Degree – It is the number of subtrees of a node in a given tree.
2. Depth – It is the maximum level of any node in a given tree and also known as height.

UMA

Guys don’t forget about terminal node

Which is the highest-level node while other nodes except terminal and root node are known as non-terminal nodes.

**CHAITANYA: yeah** guys, but do you know graphs are also non-linear data structure, and it can represent various kinds of physical structure.

BHAVIN: yes, also It consists of a group of vertices (or nodes) and set of edges that connect the two vertices.

**CHAITANYA** yes right Bhavin. Vertices on the graph is represented as point or circles and edges are shown as arcs or line segments.

**MANASI**: Guys do you know how edge is represented?

**// little bit!**

An edge is represented by the pairs of vertices. Removal of an edge from a circuit or connected graph creates a subgraph that is a tree.

Also, Data compression, file storage, manipulation of the arithmetic expression and game trees are some of the application of tree data structure.

BHAVIN: thanks, Manasi for telling us so important point about trees.

Now let me explain all of your basics of graph.

In graph we use various terms like adjacent vertices, path, cycle, degree, connected graph, complete graph, weighted graph, etc. Let’s understand some of these terms.

UMA: yeah, so first terminology is

Adjacent vertices If two vertices in a graph are connected by an edge, then we say the vertices are adjacent

Path – path in a graph is a finite or infinite sequence of edges which joins a sequence of vertices which, by most definitions, are all distinct

CHAITANYA Cycle – It is a path where the first and last vertices are the same.

Guys do you know about degree and connected graph?

BHAVIN: Yes, I know!

UMA: Can you explain Bhavin?

BHAVIN:

Yes, why not

Degree – It is a number of edges incident on a vertex.

Connected graph – If there exists a path from a random vertex to any other vertex, then that graph is known as a connected graph.

But can anyone tell us about properties of trees and graph?

UMA: Of course, Bhavin I can tell you about tree’s properties.

MANASI: And I can explain graph’s properties in detail

UMA: Oh great! But first Let me explain Properties of tree:

1. There is designated node at the top of the tree known as a root of the tree.
2. The remaining data items are divided into disjoint subsets refer to as subtree.

CHAITANYA: Yeah also

1. The tree is expanded in height towards the bottom.
2. A tree must be connected which means there must be a path from one root to all other nodes.

UMA: yes, right Chaitanya, also

1. It does not contain any loops.
2. We can count edges by using formula n-1.

MANASIohk now let me explain you all about Properties of a graph

**// YES**

Ohk!

1. A vertex in a graph can be connected to any number of other vertices using edges.
2. An edge can be indirected or directed.
3. An edge can be weighted.

BHAVIN: Ohk thanks Uma & Manasi for telling us about properties of both trees and graph.

Uma & Manasi: Welcome Bhavin / our pleasure

**CHAITANYA**

OHK guys I think this information is sufficient for the trees and graphs

Now let us talk about Key Differences Between Tree and Graph.

**//yeah, ohk, yes**

So, in a tree there exist only one path between any two vertices whereas a graph can have unidirectional and bidirectional paths between the nodes.

UMA

Tree is a hierarchical model because nodes are arranged in multiple level, and that creates a hierarchy. For example, any organization will have a hierarchical model.

It is a network model. For example, facebook is a social network that uses the graph data structure

CHAITANYA

Tree is a collection of edges and nodes. Whereas Graph is a collection of vertices and edges.

Also In the tree, there is exactly one root node, and every child can have only one parent. As against, in a graph, there is no concept of the root node.

MANASI

A tree cannot have loops and self-loops while graph can have loops and self-loops.

Also, Graphs are more complicated as it can have loops and self-loops. In contrast, trees are simple as compared to the graph.

Bhavin: The tree is traversed using pre-order, in-order and post-order techniques. On the other hand, for graph traversal, we use BFS (Breadth First Search) and DFS (Depth First Search).

UMA

in tree we can calculate the number of edges simply by subtracting number of nodes -1 for example if there are 10 number of nodes in my tree then there can be 10-1 i.e., 9 edges.

On the contrary, in the graph, there is no predefined number of edges, and it depends on the graph.

CHAITANYA

Okay guys let us see some applications of trees:

Trees are used in XML Parser uses tree algorithms.

MANASI

Decision-based algorithm is used in machine learning which works upon the algorithm of tree.

Bhavin

Databases also uses tree data structures for indexing.

Domain Name Server(DNS) also uses tree structures.

UMA

File explorer/my computer of mobile/any computer

BST used in computer Graphics

CHAITANYA

Posting questions on websites like Quora, the comments are child of questions

MANASI

Now let us see some of applications of graphs:

The best example of graph we can give is a Google maps

They use the graph data structure to display us the shortest or longest paths from one place to another

Bhavin

Also, Facebook’s Friend suggestion algorithm uses graph. Facebook is an example of undirected graph.

UMA:

In Computer science graphs are used to represent the flow of computation.

**So yes I think we have discussed almost every key points of trees vs graph, so we can conclude that,**

Graph and tree are the non-linear data structure which is used to solve various complex problems. A graph is a group of vertices and edges where an edge connects a pair of vertices whereas a tree is considered as a minimally connected graph which must be connected and free from loops.