# Lecture 11.1

## Topics:

1. Tree Terminology – Continued

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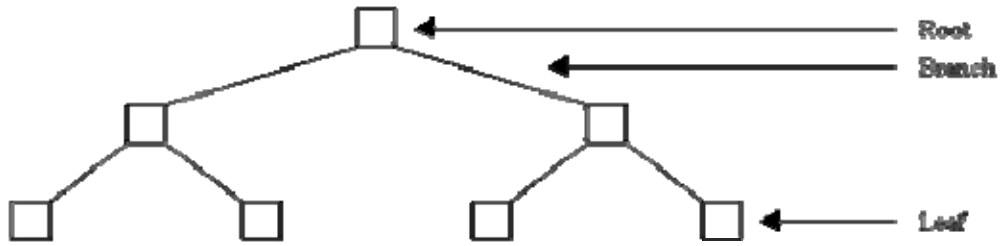
## 1. Tree Terminology – Continued

Consider the following description.

- All non-empty trees are headed by a single node called the *root* node, from which all other nodes in a tree stem. Nodes are connected to one another via *branches*. Nodes from which no branches stem are called *leaf* nodes.

**Listing 1**

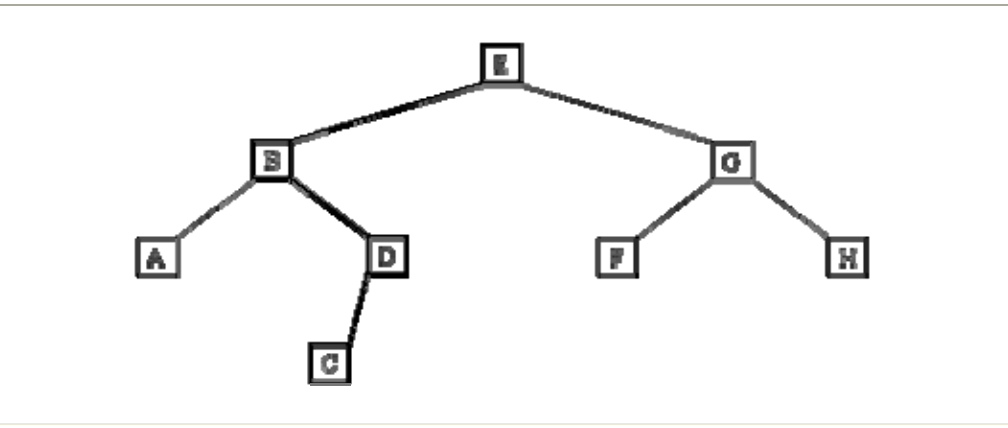



- At the top of the tree are the *ancestor* nodes; the nodes of which all other nodes are *descendants*. **When 2 or more nodes share the same *parent* that are called the *children* of that node**, and are considered *siblings* of one another.

Among the important characteristics of trees are:

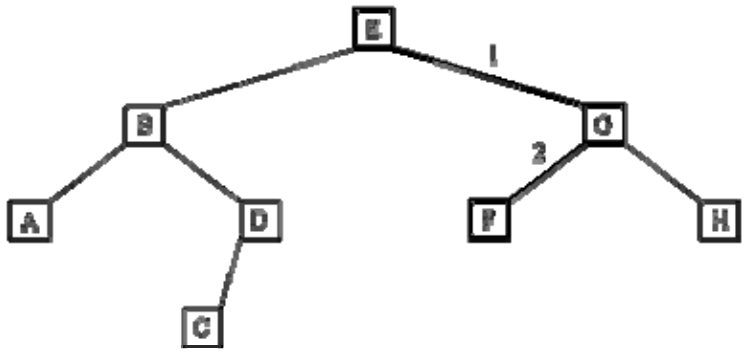
- There is only 1 path from the root node to any other node in the tree. For instance, in **Listing 2**, there is only 1 path from the root node *E* to the leaf node *C*; from *E* to *B* to *D* to *C*.

**Listing 2**



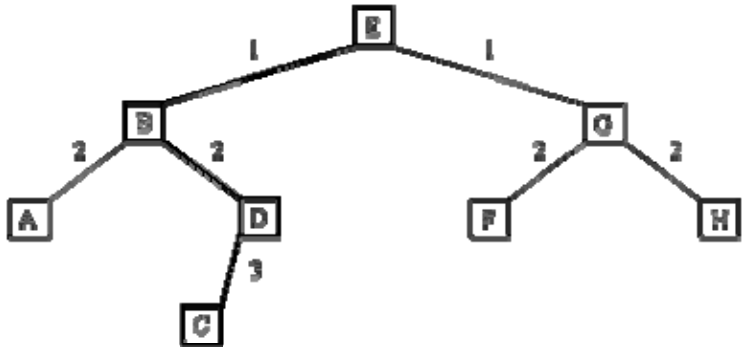

- The height of any path from the root node to any other node in the tree is the number of branches between them. For example, in **Listing 3**, the height of the path from *E* to *F* is 2.

**Listing 3**




- The depth of a tree is the height of the longest path in the tree PLUS 1. Thus, the depth of the tree illustrated in **Listing 4** is 4.

**Listing 4**




If it has not been apparent from the above description then it should be recognized that there is a recursive quality to trees – **Any node in a tree is itself a tree**. This recursive structure lends itself to very powerful and elegant algorithms for processing trees.

A final distinction worthy of note is the distinction between a **binary tree** and a **general tree**.

- A general tree is a tree, any of whose nodes may contain 0 or more subtrees.
- A binary tree is a special form of general tree, each of whose nodes may contain 0, 1 or 2 subtrees.
- While binary trees can be manipulated using the same principles and algorithms used to manipulate general trees, their simpler structure and more specialized applications make them somewhat easier to learn than their more general counterpart.