PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++ and JAVA: Lesson-7: Data Structures: Trees

Tree

- When the list becomes long traversing through it, insertions, deletion, and search of an element in-between the list becomes lengthier process.

Tree

- Suppose a list element instead of just pointing to the next element through LIST_NEXT, it points to two elements using LIST_NEXT_LEFT and LIST_NEXT _RIGHT or to more than two elements by LIST_NEXT1, LIST_NEXT2, …. Then instead of List, we form a Tree.

Tree

1) There is a root element.

2) Root has two or more branches each having a daughter element.

3) Each daughter element has two or more daughter elements.

4) Last one (leaf) does not have any daughter element and points to Null.

Tree

5) Only the root element is identifiable and it is done by the treetop pointer (Header). Each element points to TNodeNextLeft and TNodeNextRIGHT in a binary tree and or to more than two elements by TNodeNext1, TNodeNext2, … , TNodeNextN in tree with N-branches (maximum) at a node.

Tree

6) Since no other element is identifiable directly, by traversing the root element, then proceeding continuously through all the succeeding daughters, a tree element can be read or read and deleted, or can be added to another daughter or replaced by another element.

Tree

7) Last element in the node points to NULL like in a list.

8) A tree has data elements arranged as branches. The last daughter, called node has no further daughters. A binary tree is a tree with a maximum of two daughters (branches) in each element.

Application Examples of a Tree

1. A directory - Number of file-folders, Each file-folder having a number of other file folders and so on and a file is at the least node (leaf).

2. USB Devices nodes connected to hubs and nodes, and finally to a host controller at root

3. Files in a sub-directory and each sub-directory to parent directory, and finally to a root directory

4. A root has number of file-folders. Each file-folder has a number of other file folders and so on in the end there is a file each.

5. Network architecture in which a central server connects to multiple servers and clients

Summary

We learnt

- Tree is a data structure to organize a large set of data elements

End of Lesson 7 of Chapter 5