Date 06/03/15

(Lecture 25, 26) Chapter no 9: Trees

A tree is connected undirected graph with no simple circuit.

Types of Trees:-

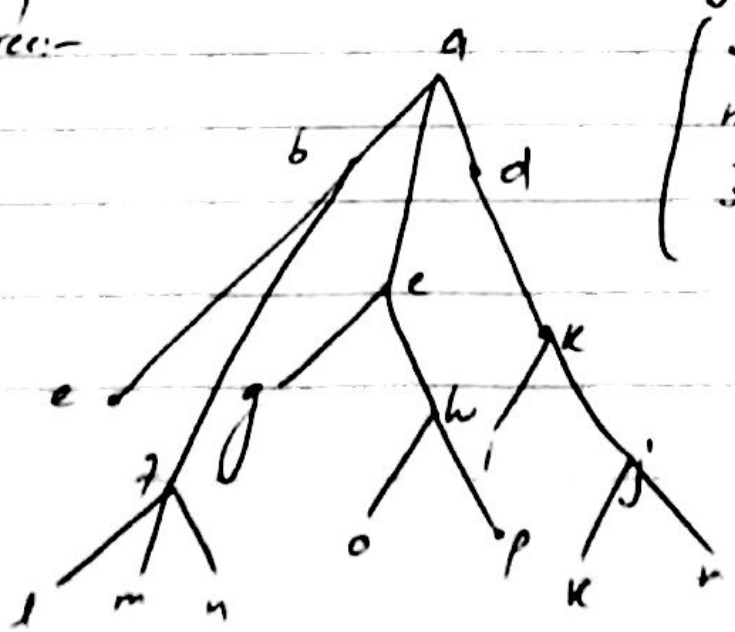
Rooted Tree:-

A rooted tree is a tree in which one vertex is designated as root and all edges are directed away from root.

M-ARY Tree:-

A rooted tree is called m-ARY Tree if every internal vertex has no more than m-children. The tree is called full-m-Ary tree if every internal vertex has exactly m-children. A m-ary tree with $m = 2$ is called binary tree.

Example Tree:-



[3-ARY Tree means it has 3 children]

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—: Terms use in Trees :—

Children :—
children points under one point.

Sibling :—
All points at same level.

Ancestors :—
All parent points or above points of one point.

Decendents :—
All points that are below that one point.

Internal Vertices :—
Vertices who have children are called internal vertices.

Leaves :—
Vertices who have no further children are called Leaves.

Parent :—
Parent point or point of generation above any point.

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:- Huffman Codes :-

Alphabets	A	B	C	D	E	F
Frequency	8	10	12	15	20	35

Suppose that we have two store these alphabets.

According to 8 bits, an ASCII codes, it requires 800 bits to store alphabets of frequency 100.

According to 3 bits, space required for these alphabets is 300 bits only.

Now, by using Huffman code, we will reduce the size more than 300 bits.

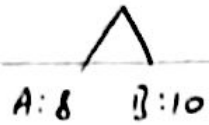
Arrange alphabets according to ascending order of their frequencies.

A	B	C	D	E	F
8	10	12	15	20	35

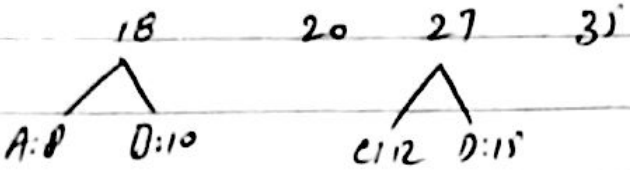
On every step, Add the first two smallest values and write them at next possible position.

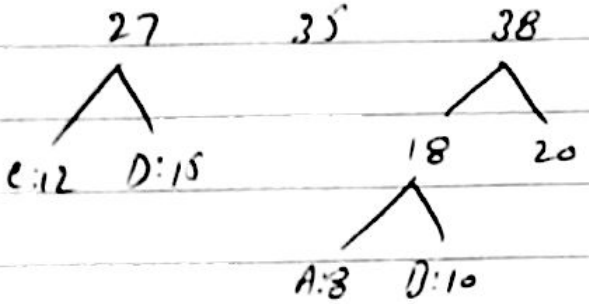
C D E F

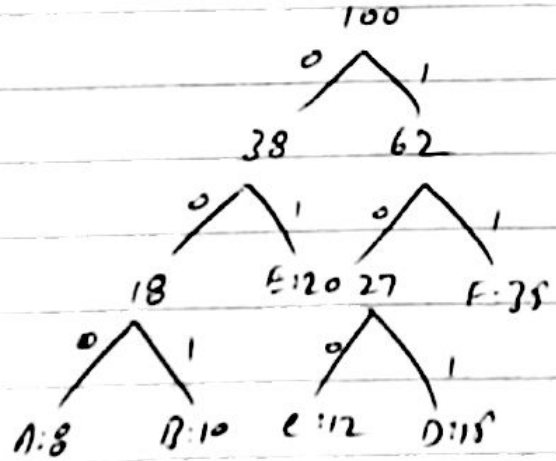
12 15 18 20 35



Again Add the Smallest Two







Now write code by following ~~left~~ zero on left sides and 1 on right

A: 000

B: 001

C: 100

D: 101

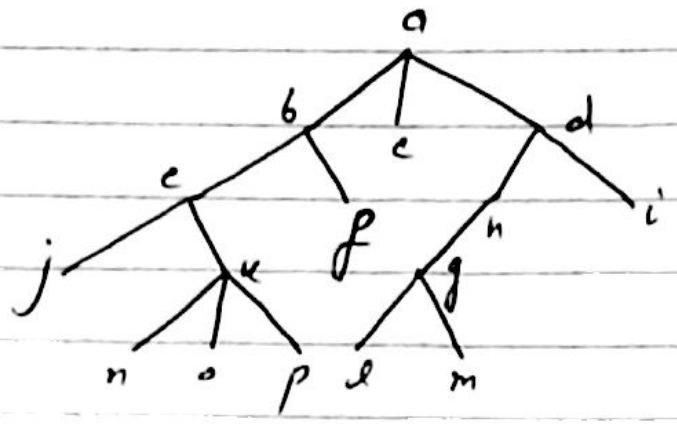
E: 01

F: 11

Space required: 3x8 + 3x10 + 3x12

+ 3x15 + 2x20 + 2x35

= 245 bits



How to find Pre-order (Prefix), In-order (Infix) and post-order (postfix) of above graph.

Pre-order (Prefix) = NLR = abejknopfcdglmhi
In-order (Infix) = LNR = jenkopbfacglgmdhi
Post-order (Postfix) = LRN = jnopkefbclmghida

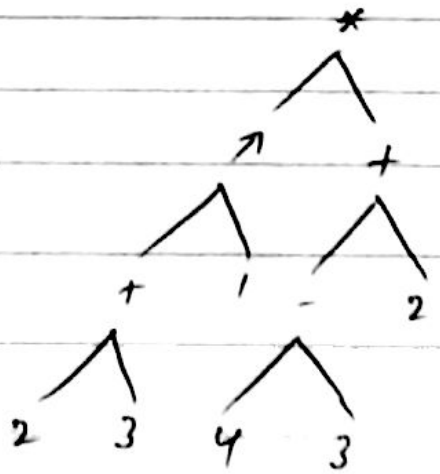
where L = left, R = Right and N = Node

Application of Prefix or Postfix

Question

$((2+3)\uparrow 1) * ((4-3)+2)$

Tree →



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According To Pre-order :-

= * ↑ + 2 3 1 4 - 4 3 2
= * ↑ + 2 3 1 + 1 2
= * ↑ + 2 3 1 3
= * ↑ 5 1 3
= * 5 3
= 15

[In Pre-order, start calculation from left side and combine every two values with a symbol.]

According To Post-order :-

= 2 3 + 1 ↑ 4 3 - 2 + *
= 5 1 ↑ 4 3 - 2 + *
= 5 4 3 - 2 + *
= 5 1 2 + *
= 5 3 *
= 15
