LANDON S. LORICA
BSCPE 2-2

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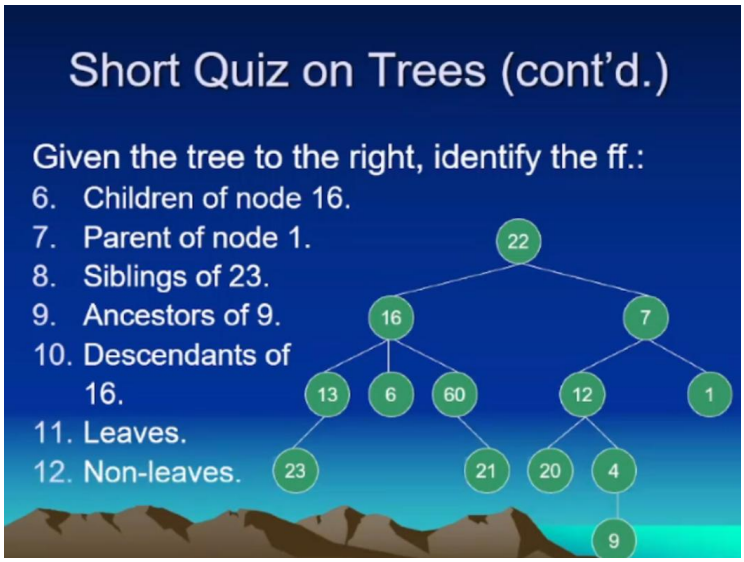
SHORT QUIZ IN DATA STRUCTURES AND ALGORITHMS



6. Children of node 16.
   Answer: 13, 6, 60
7. Parent of node 1.
   Answer: 7
8. Siblings of 23.
   Answer: No siblings
9. Ancestors of 9.
   Answer: 4, 12, 7, 22
10. Descendants of 16.
    Answer: 13, 6, 60, 23, 21
11. Leaves.
    Answer: 23, 6, 21, 20, 9, 1
12. Non-leaves.
    Answer: 22, 16, 7, 13, 60, 12, 4
13. Depth of node 4.
    Answer: 3
14. Degree of the tree.
    Answer: 3
15. Height of the tree.
    Answer: 4
16. Weight of the tree.
    Answer: 6
17. Is the tree a binary tree?
    Answer: No, due to the degree of the given tree is not equal to 2
18. Removing 6, is the tree a full binary tree?
    Answer: No, because some node exhibit a degree of 1
19. Removing 6, is the tree a complete binary tree?
    Answer: No, as stated above it will not be a complete binary tree due to some node have a degree of 1
20. Is a full binary tree complete?
    Answer: No, because sometimes the nodes have only 0 or 2 offspring (making it binary) but the left part of the tree is not fully filled
21. Is a complete binary tree full?

Answer: A complete binary tree is full because each node is either a leaf or a branch. or has a 2 degree. Moreover, the internal nodes in a complete binary tree is exactly equal to 2 as a result, a complete binary tree can also be a full binary tree.

22. How many leaves does a complete *n*-ary tree of height *h* have?

Answer: n^h

23. What is the height of a complete *n*-ary tree with *m* leaves?

Answer: $\log_n m$

24. What is the number of internal nodes of a complete *n*-ary tree of height *h*?

Answer:

$$1 + n + n^2 + \cdots + n^{h-1} = \sum_{i=0}^{h-1} n^i = \frac{n^h - 1}{n - 1}$$

25. What is the total number of nodes a complete *n*-ary tree of height *h* have?

Answer: $T = n^h + \frac{n^h - 1}{n-1}$; where T = total number of nodes in a complete *n-ary* trees