



DATA STRUCTURES

Final Assignment
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15453
Csc-201

Q1: SORT THE GIVEN LIST USING INSERTION SORT.

56, 59, 45, 40, 43, 55

GIVEN:

$$N = 6$$
$$\text{Steps} = N - 1 = 5$$

Step# 1: Element = 59

56, 59, 45, 40, 43, 55

56, 59, 45, 40, 43, 55

Step# 2: Element = 45

56, 59, 45, 40, 43, 55

56, 45, 59, 40, 43, 55

45, 56, 59, 40, 43, 55

Step# 3: Element = 40

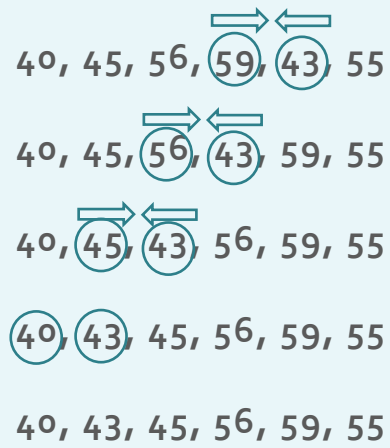
45, 56, 59, 40, 43, 55

45, 56, 40, 59, 43, 55

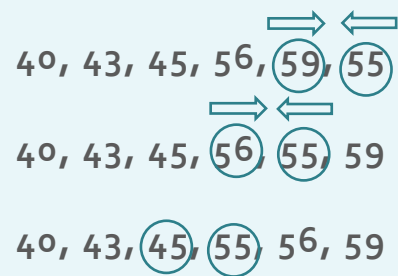
45, 40, 56, 59, 43, 55

40, 45, 56, 59, 43, 55

Step# 4: Element = 43



Step# 5: Element = 55

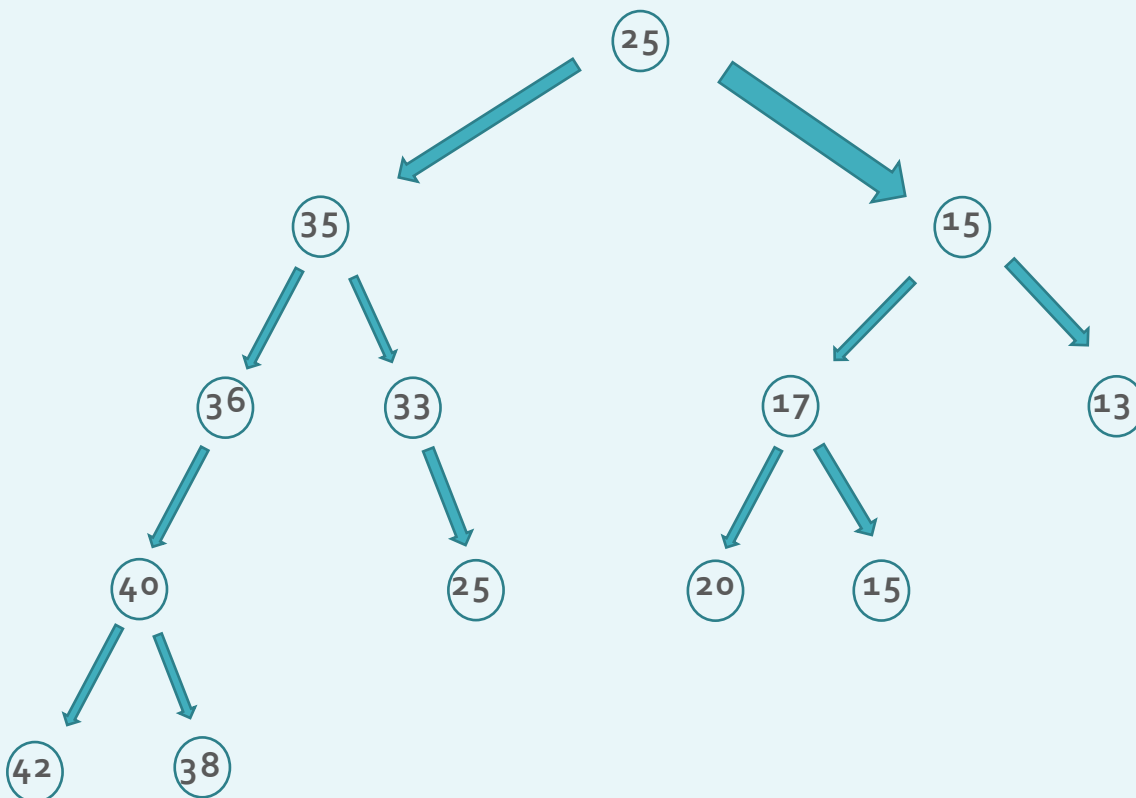


Hence 40, 43, 45, 55, 56, 59 is the sorted list.

Q2: CONSTRUCT BINARY TREES FROM GIVEN LIST OF NUMBERS AND THEN VERIFY THE TREE

25, 15, 35, 17, 33, 36, 25, 13, 15, 40, 38, 42, 20

SOLUTION:



VERIFYING USING IN-ORDER TRAVERSAL METHOD:

42, 40, 38, 36, 35, 33, 25, 25, 20, 17, 15, 15, 13

Hence 42, 40, 38, 36, 35, 33, 25, 25, 20, 17, 15, 15, 13 is the sorted list.

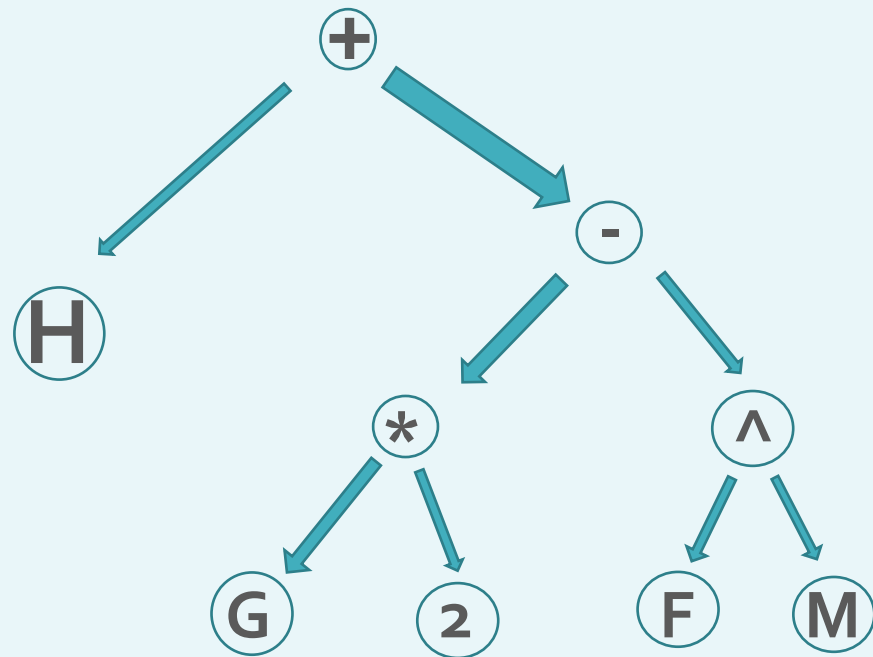
Q3: CONSTRUCT BINARY TREES FROM GIVEN MATHEMATICAL EXPRESSIONS

I. $H + G * 2 - (F \wedge M)$

II. $A * D + T \wedge B - R$

SOLUTION I:

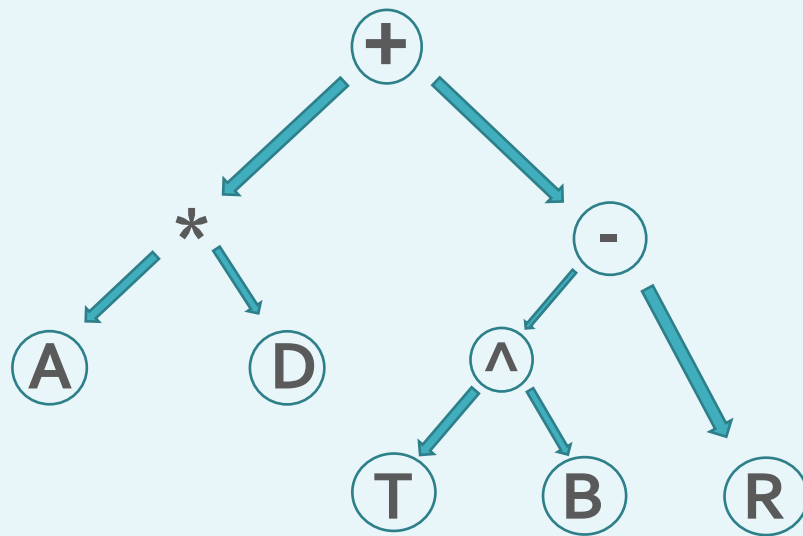
$H + G * 2 - (F \wedge M)$
— — — — —
— — — — —
— — — — —



Hence $H + G * 2 - (F \wedge M)$ is Converted into a binary tree.

SOLUTION II:

$$\underline{\underline{A * D + T \wedge B - R}}$$

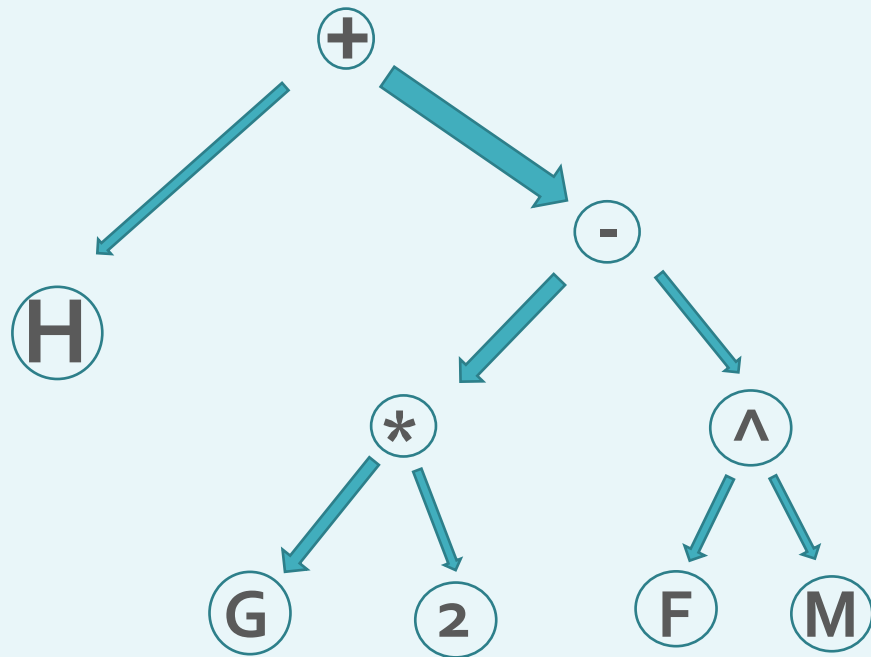


Hence $A * D + T \wedge B - R$ is Converted into a binary tree.

Q4: APPLY ALL THE THREE BINARY TREE TRAVERSAL TECHNIQUES ON EACH OF THE TREE CONSTRUCTED IN Q#3

GIVEN TREE:

$H + G * 2 - (F \wedge M)$



In-Order Traversal:

$H, +, G, *, 2, -, F, \wedge, M$

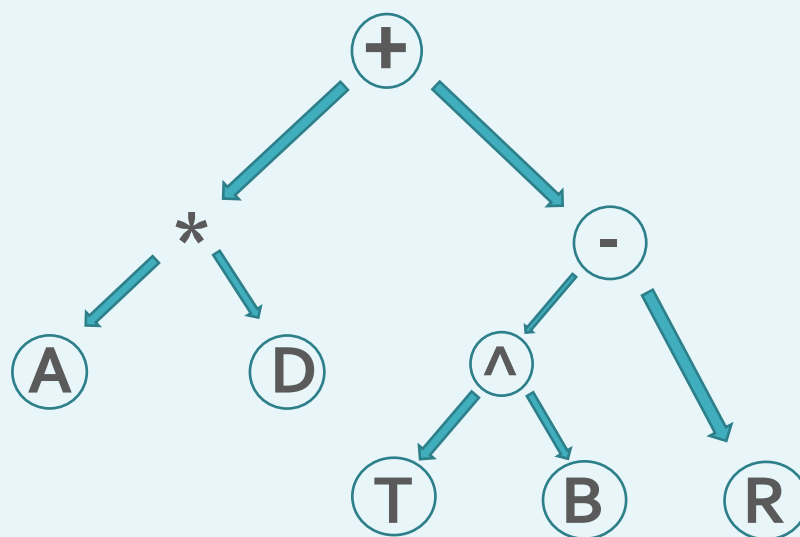
Pre-Order Traversal:

$+, H, -, *, G, 2, \wedge, F, M$

Post-Order Traversal:

$H, G, 2, *, F, M, \wedge, -, +$

GIVEN TREE:
 $A * D + T ^ B - R$



In-Order Traversal:

$A, *, D, +, T, ^, B, -, R$

Pre-Order Traversal:

$+, *, A, D, -, ^, T, B, R$

Post-Order Traversal:

$A, D, *, T, B, ^, R, -, +$

Q5: FILL IN THE BLANKS

- I. Elements of a Tree are called NODES.
- II. The graphical line drawn between Nodes of a Tree is called EDGE.
- III. Level Number of a Root is ZERO (0).
- IV. All the nodes with same Level Number belong to SAME GENERATION.
- V. The Left-Most Child Node is OLDEST BROTHER Node.
- VI. The Right-Most Child Node is YOUNGEST BROTHER Node.
- VII. A Tree is a NON-LINEAR Data Structure.
- VIII. An Ordered Set of Ordered Trees is called a FOREST.