



# HABIB UNIVERSITY

## Data Structures & Algorithms

CS/CE 102/171 Spring 2023

Instructor: Maria Samad

### Reconstructing Binary Search Trees – Using Postorder Traversal

Student Name: \_\_\_\_\_

1. Reconstruct Binary Search Trees from the given Postorder traversal sequence:

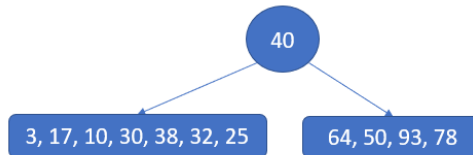
Postorder Sequence = [3, 17, 10, 30, 38, 32, 25, 64, 50, 93, 78, 40]

#### Answer:

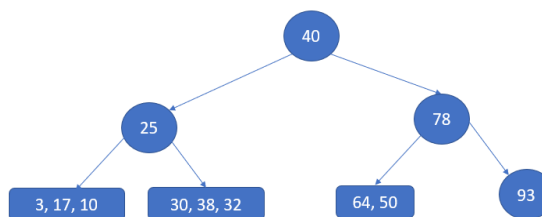
- Postorder Sequence, so the Node at index = len - 1, is always the Root
- Start constructing the BST by adding a new node, i.e. Root first

40

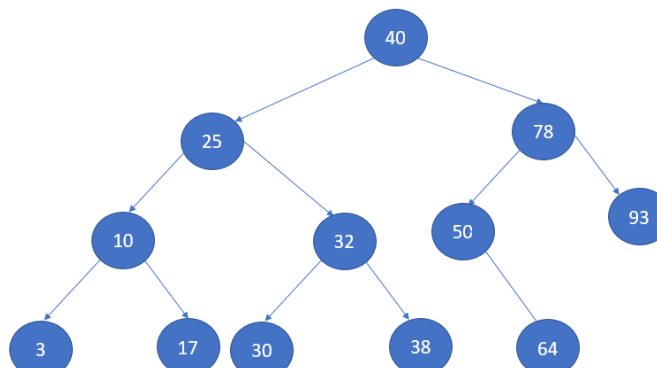
- Search for the next immediately lower value than the root, which is 25, so all the nodes before 25 (inclusive) will be a part of left subtree, and all the nodes after 25 and right before 40, will be a part of the right subtree
- Extend the BST by adding these subtree representations



- Apply the same logic on Left and Right Subtree
- For the left subtree, applying Postorder gives us Root from index = len - 1, and everything smaller than Root in left and everything bigger than Root in the right
- Same for the Right Subtree



- Continue the same process for the sequences in next level to get the final BST:



2. Reconstruct Binary Search Trees from the given Postorder traversal sequence:

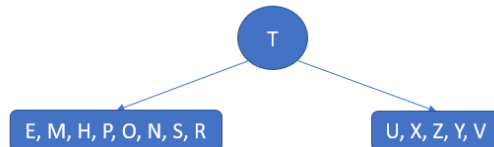
Postorder Sequence = [E, M, H, P, O, N, S, R, U, X, Z, Y, V, T]

**Answer:**

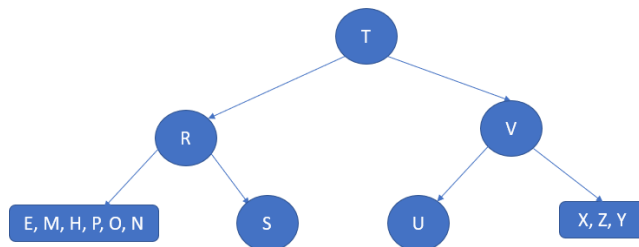
- Postorder Sequence, so the Node at index = len - 1, is always the Root
- Start constructing the BST by adding a new node, i.e. Root first



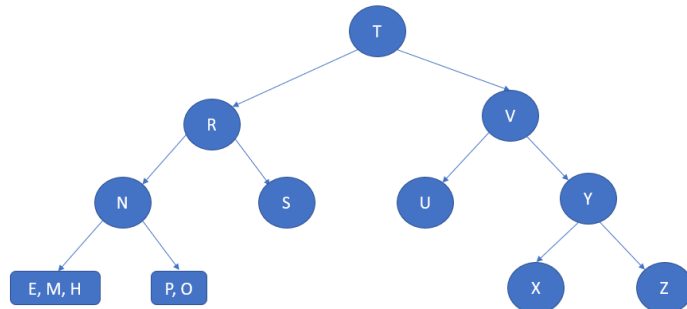
- Search for the next immediately lower value than the root, which is R, so all the nodes before R (inclusive) will be a part of left subtree, and all the nodes after R and right before T, will be a part of the right subtree
- Extend the BST by adding these subtree representations



- Apply the same logic on Left and Right Subtree
- For the left subtree, applying Postorder gives us Root from index = len - 1, and everything smaller than Root in left and everything bigger than Root in the right
- Same for the Right Subtree



- Continue the same process for the sequences in next level



- Continue the same process for the sequences in next level to get the final BST:

