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Construction of a tree from a given single order traversal and also find the other order traversal of a tree

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Abstract- As we know that tree traversal means to visit every node of a tree exactly once [1]. We can traverse a tree in three way these are Inorder, Preorder and Postorder. We can easily construct a tree from given two order these order can be Inorder and Preorder, Inorder and Postorder etc. Here we will be construct the tree from given one order and after constructing the tree we will find the other order traversal of a tree.

Keywords— Preorder to Postorder, Inorder to Preorder,Postorder to Preorder, Preorder to Inorder, One order traversal.

I. INTRODUCTION

Traversal of tree is most common operation performed on tree data structure. Traversal of tree means visit each node of tree exactly once [1].
A tree can be traverse in three ways-
1.Inorder-In this traversal firstly we will traverse the left subtree in Inorder(L) after that visit the root node(N) and finally traverse the right subtree in Inorder(R)[2].

2.Preorder-In this traversal firstly visit the root node(N)after that traverse the left subtree in Preorder(L)and finally traverse the right subtree in Preorder(R)[3].

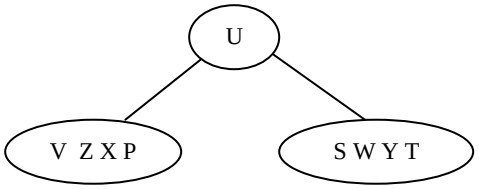
3. Postorder- In this traversal firstly traverse the left subtree in Preorder(L)after traverse the right subtree in Preorder(R)and finally visit the root node (N)[4].
Now in this paper we will be construct a tree from one given order

II. RESULTS AND DISCUSSION

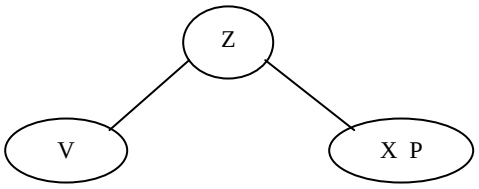
CASE -1

For Example-we have Inorder and we want to find the preorder
EX-
Inorder- V Z X P U S W Y T.

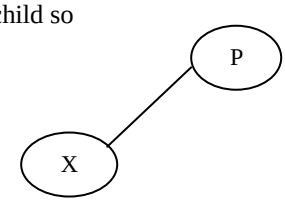
Step1: In case of Inorder middle element (i. e U) will be the root node so the element V Z X P will be at the left side of U and S W Y T will be the right side of U so



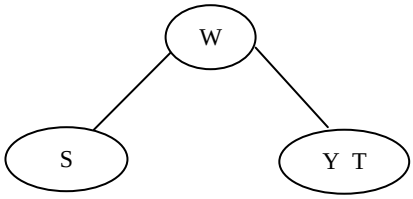
Step2: Now consider the left side V Z X P here Z is the middle element so it is the root



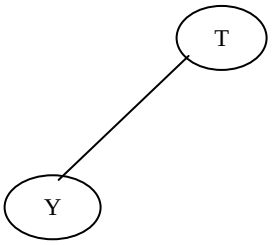
Step 3: Now we consider X P here P will be the root and X will be the left child so



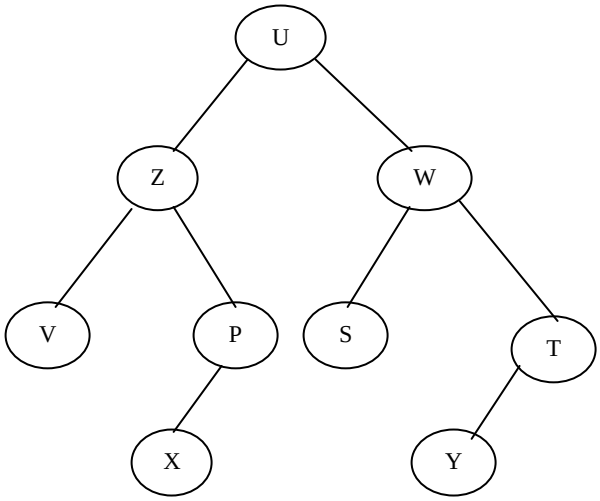
Step 4: Now consider the left side S W Y T here W is the middle element so it is the root



Step 5: Now we consider Y T, here T will be the root and Y will be the left child so



Step 6: Now combine all the steps now the tree will be as:



Now we can traverse this tree in pre and post order.

Preorder is: the preorder traversal of tree process U, traverse left subtree and traverse right subtree However ,the preorder traversal of left subtree process the root Z then V then P and X. And the pre order traversal of right subtree process the root W then S then T and Y.

Hence U Z V P X W S T Y is the Pre order traversal.

If we want to find the Post order then from the constructed tree we can find

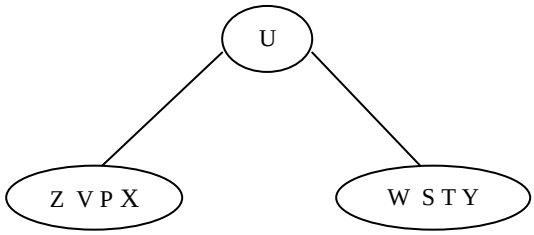
Postorder-The Postorder traversal of tree first traverse left subtree, traverse right subtree, and process U. The post order traversal of left subtree process V then right subtree of Z i. e process X then P and then Z. and the post order traversal of right subtree process S then right subtree of W ,process Y then T then W .at last process U.

Hence V X P Z S Y T W U is the Post order traversal

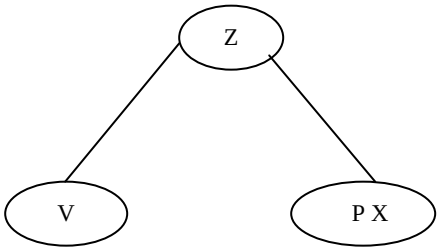
CASE-2

For Example- Let's assumes the Preorder is U Z V P X W S T Y then find Inorder of tree.

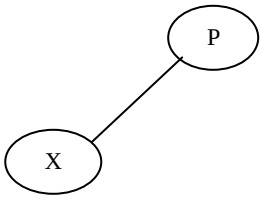
Step1: In case of preorder first element (i. e U) will be the root node so the element Z V P X will be at the left side of U and W S T Y will be the right side of U.so



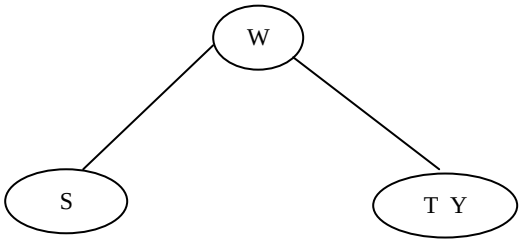
Step2: Now consider the left side Z V P X here Z is the first element so it is the root



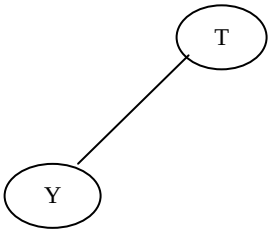
Step 3: Now we consider P X here P will be the root and X will be the left child so



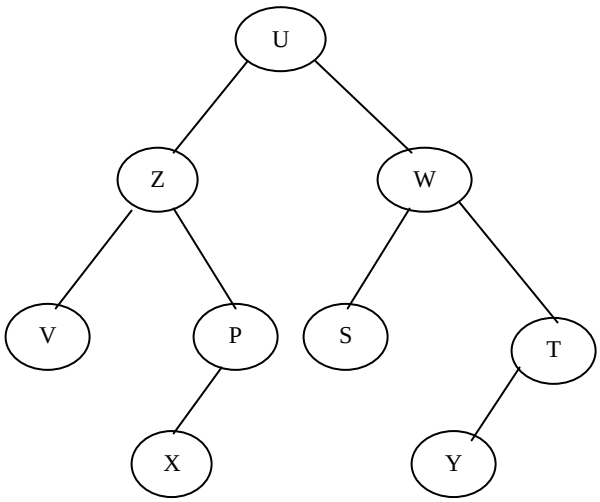
Step 4: Now consider the left side W S T Y here W is the first element so it is the root



Step 5: Now we consider T Y here T will be the root and Y will be the left child so



Step 6: Now combine all the steps now the tree will be as:



Now we can traverse this tree in Inorder and post order.
Inorder is: The Inorder traversal of tree , traverse left subtree ,process U and traverse right subtree However ,the Inorder traversal of left subtree process the root V then Z then X and P, process U,and the In order traversal of right subtree process S then W then Y and T.

Hence V Z X P U S W Y T is the Inorder traversal.
If we want to find the post order then from the constructed tree we can find

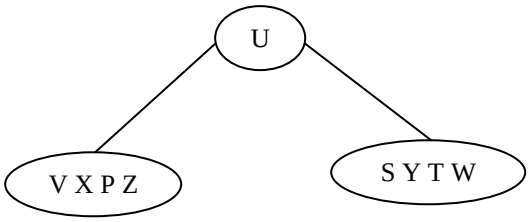
Postorder-The Postorder traversal of tree first traverse left subtree, traverse right subtree, and process U. The post order traversal of left subtree process V then right subtree of Z i.e. process X then P and then U and the post order traversal of right subtree process S then right subtree of W ,process Y then T then W .at last process U.

Hence V X P Z S Y T W U is the post order traversal

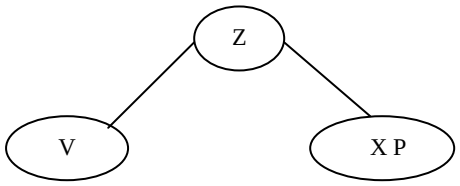
CASE-3

For Example- Let's assumes the Postorder is V X P Z S Y T W U then find Inorder of tree.

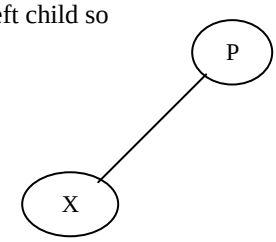
Step1: In case of Postorder last element (i. e U) will be the root node so the element V X P Z will be at the left side of U and S Y T W will be the right side of U.so



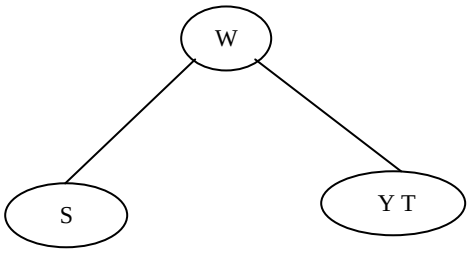
Step2: Now consider the left side V X P Z here Z is the last element so it is the root



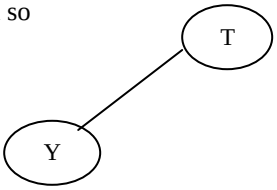
Step 3: Now we consider X P here P will be the root and X will be the left child so



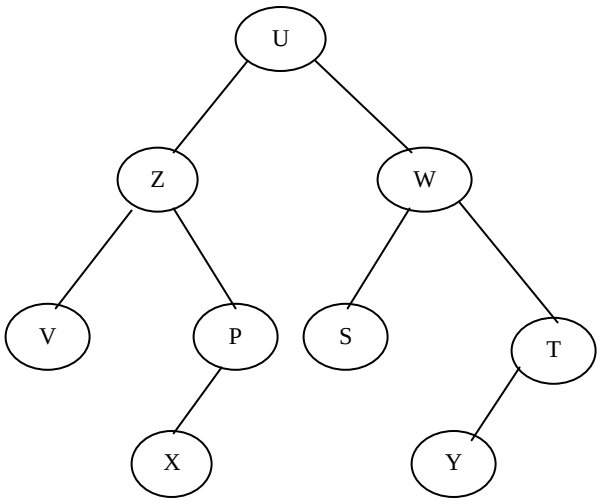
Step 4: Now consider the left side S Y T W here W is the last element so it is the root



Step 5: Now we consider Y T here T will be the root and Y will be the left child so



Step 6: Now combine all the steps now the tree will be as:



Now we can traverse this tree in preorder and Inorder.

Inorder is: The Inorder traversal of tree , traverse left subtree ,process U and traverse right subtree However, the Inorder traversal of left subtree process the root V then Z then X and P, process U.and the In order traversal of right subtree process S then W then Y and T.

Hence V Z X P U S W Y T is the Inorder traversal.
If we want to find the pre order then from the constructed tree we can find

Preorder is: The preorder traversal of tree process U, traverse left subtree and traverse right subtree However ,the preorder traversal of left subtree process the root Z then V then P and X. And the pre order traversal of right subtree process the root W then S then T and Y.

Hence U Z V P X W S T Y is the pre order traversal.

III. CONCLUSION

In this paper, we construct the tree from one order and find the other order traversal .In this paper firstly we take Inorder traversal and with this Inorder we construct the tree.
And find the pre and post order traversal. And secondly and finally we take pre and post order traversal and find the tree, in all the cases we seen that the tree is same.

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