CSA-0389

Datastructure for stackoverflow

Assignment-4

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Develop a C program to implement the Tree Traversals (Inorder, preorder, postorder)

```
#include <stdio.h>
#include <stdlib.h>
Struct Node {
    int data;
    struct Node * left;
    struct Node * right;
};
Struct Node * create Node (int data) {
        Struct Node * newNode = (struct Node *) malloc (size of
                                (struct Node));
    newNode -> data = data;
    newNode -> left = NULL;
    newNode -> right = NULL;
    return newNode;
}
void inorderTraversal (struct Node *root) {
    if (root = = NULL)
    return;
  inorderTraversal (root -> left);
  printf ("%d", root -> data);
  inorder Traversal (root -> right);
  void preorder Traversal (struct Node * root) {
      if (root = = NULL)
```

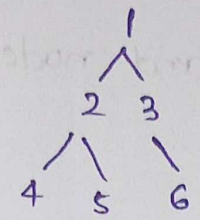
```
    return;
    printf("%d", root->data);
    preorderTraversal(root->left);
    preorderTraversal(root->right);
}

void postorderTraversal(struct Node* root){
    if(root == NULL)
        return;
    printf("%d", root->data);
    preorderTraversal(root->left);
    preorderTraversal(root->right);
    print("%d", root->data);
}

int main(){
struct Node* root = createNode(1);
root->left = createNode(2);
root->right = createNode(3);
root->left->left = createNode(4);
root->left->right = createNode(5);
root->right->right = createNode(6);
printf("Inorder Traversal:");
inorderTraversal(root);
print("\n");
print("preorder Traversal:");
```

```
preorderTraversal (root);
printf ("\n");
return 0;
}
```

Input :- creating the tree



Output :-

Inorder Traversal : 4 2 5 1 3 6

preorder Traversal : 1 2 4 5 3 6

postorder Traversal : 4 5 2 6 3 1

construct AVL tree for the following elements 3, 2, 1, 4, 5, 6, 7 followed by 10 to 16 in reverse order.

To construct an AVL tree for the given elements.

Elements to Insert

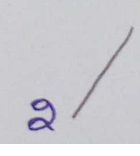
- First sequence : 3, 2, 1, 4, 5, 6, 7
- Second sequence (reverse order) : 16, 15, 14, 13, 12, 11, 10

Steps to construct the AVL Tree :

1. Insert 3 :

3

2. Insert 2 :

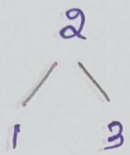


* Balance factor for node 3 is 1,

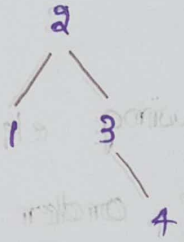
3. Insert 1

* Balance factor for node 3 is 2 and node 2 is 1, so we need a right rotation at node 3

* After rotation, the tree becomes :

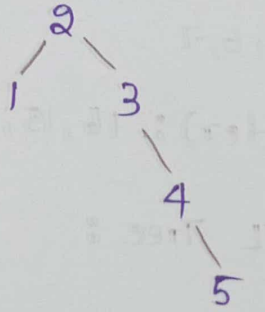


4. Insert 4 :



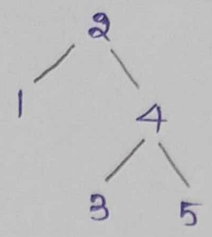
* Balance factor for node 2 is 0, so, no rotation needed

5. Insert 5 :

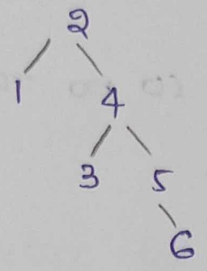


* Balancing factor for node 3 is -2, and node 4 is -1, so we need a left rotation at node 3

* After rotation :

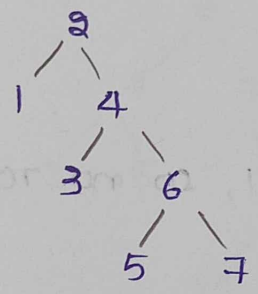


Insert 6 :



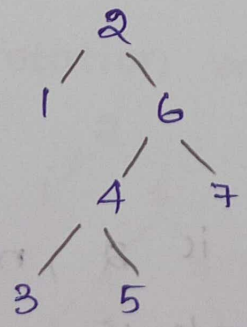
* Balance factor for node 4 is -1, so no rotation needed.

Insert 7 :



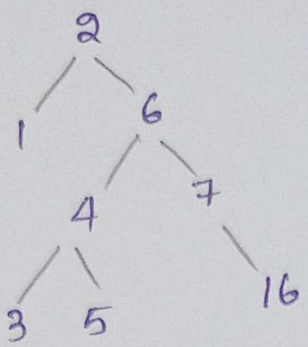
* Balance factor for node 4 is -2 and node 6 is -1, so we need left rotation at node 4.

After rotation :-



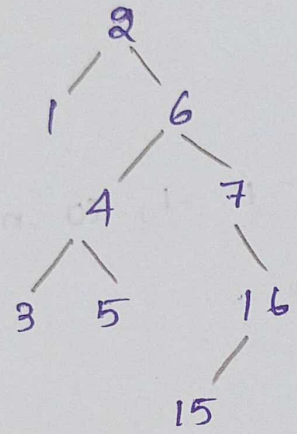
Next, we will insert the elements 16, 15, 14, 13, 12, 11, 10 in reverse order

8. Insert 16



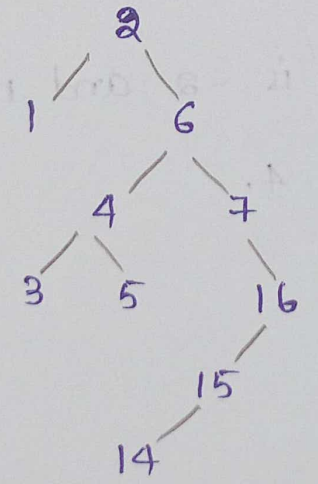
* Balance factor for node 7 is -1, so no rotation needed

9. Insert 15 :



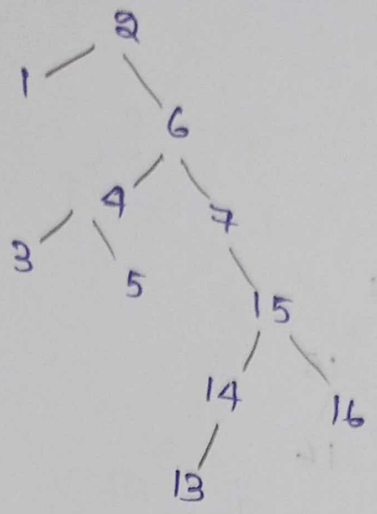
* Balance factor for node 16 is 1, so no rotation needed.

10. Insert 14 :



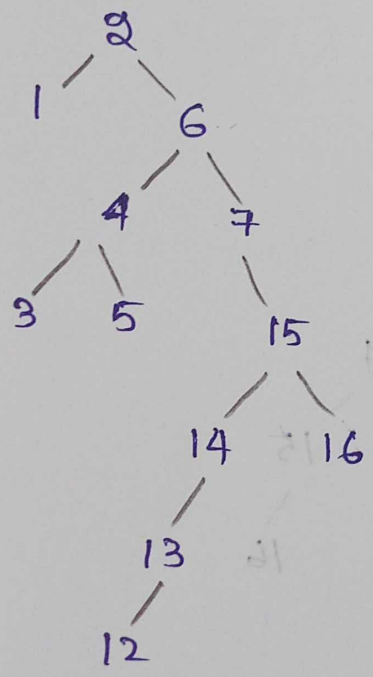
* Balance factor for node 16 is 2, node 15 is 1, so we need a right rotation at node 15

After rotation:

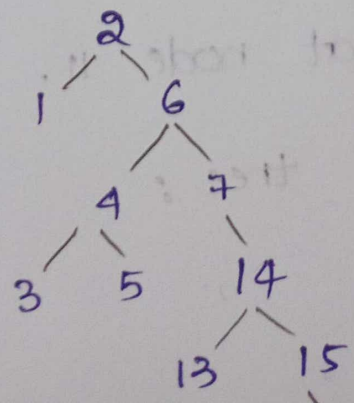


* Balance factor for node 15 is 1, so no rotation needed

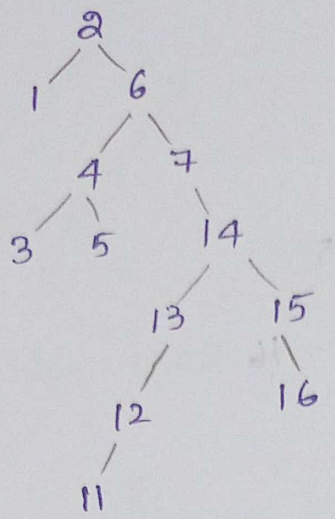
12. Insert 12



* Balance factor for node 15 is 2, node 14 is 1, so we need a right rotation at node 14

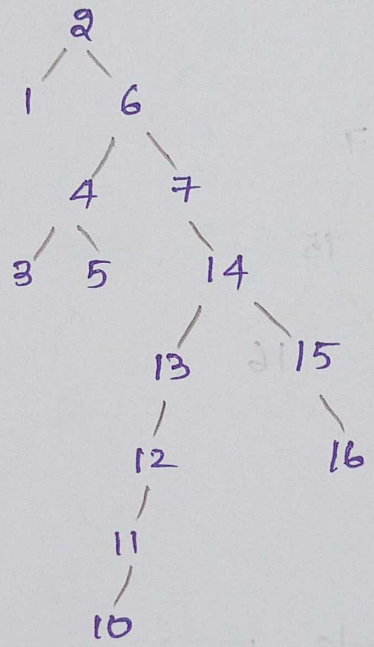


13. Insert 11



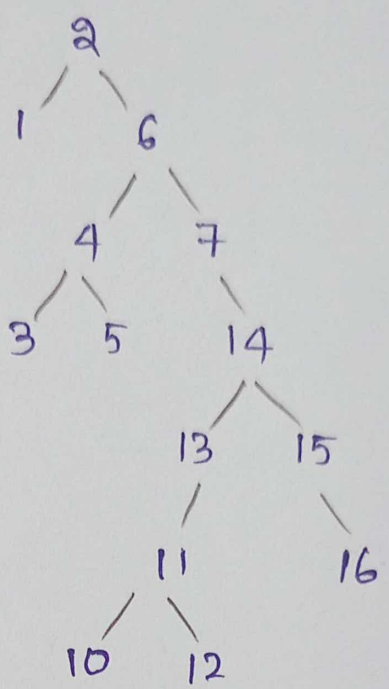
* Balance factor for node 14 is 1, so no rotation needed

14. Insert 10



* Balance factor for node 14 is 2, node 13 is 1, so we need a right rotation at node 11.

After rotation, the final tree:



This AVL tree is now balanced with given sequence insertions.