

Instructions: Please read carefully

- Please rename this file as only your ID number (e.g. 18-*****-1.doc or 18-*****-1.pdf).

1. Write a C++ code to implement Binary Search Tree operations (insertion, traversal and searching)

Do the following to write program for a BST:

To construct a binary search tree of integers (**insert** one by one).

To **traverse** the tree using all the methods i.e., in order, preorder and post order.

To **search** an element on a given BST.

To **delete** a node

Your code here:

```
#include<iostream>
#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
using namespace std;

struct BstNode
{
    int data;
    BstNode* left;
    BstNode* right;
};

BstNode* root;

BstNode* GetNewNode(int data)
{
    BstNode* NewNode = new BstNode();
    NewNode->data = data;
    NewNode->left = NULL;
    NewNode->right = NULL;
    return NewNode;
}

void PreOrder(BstNode* root)
{
    if (root == NULL)
    {
        return;
    }
    cout << root->data << " ";
    PreOrder(root->left);
    PreOrder(root->right);
}
```

```

void PostOrder(BstNode* root)
{
    if (root == NULL)
    {
        return;
    }
    PostOrder(root->left);
    PostOrder(root->right);

    cout << root->data << " ";
}

void InOrder(BstNode* root)
{
    if (root == NULL)
    {
        return;
    }
    InOrder(root->left);
    cout << root->data << " ";

    InOrder(root->right);
}

BstNode* Insert(BstNode* root, int data)
{
    if (root == NULL)
    {
        root = GetNewNode(data);
    }
    else if (data <= root->data)
    {
        root->left = Insert(root->left, data);
    }
    else
    {
        root->right = Insert(root->right, data);
    }
    return root;
}

BstNode* minValue(BstNode* node){
    BstNode* current = node;
    while (current && current->left != NULL)
        current = current->left;
    return current;
}

```

```

bool Search(BstNode* root, int data)
{
    if (root == NULL)
    {
        return false;
    }
    else if (root->data == data)
    {
        return true;
    }
    else if (data <= root->data)
    {
        return Search(root->left, data);
    }
    else
    {
        return Search(root->right, data);
    }
}

BstNode* deleteNode(BstNode* root, int data)
{
    if (root == NULL) return root;
    if (data < root->data)
        root->left = deleteNode(root->left, data);
    else if (data > root->data)
        root->right = deleteNode(root->right, data);

    else
    {
        if (root->left == NULL)
        {
            BstNode* temp = root->right;
            free(root);
            return temp;
        }

        else if (root->right == NULL){
            BstNode* temp = root->left;
            free(root);
            return temp;
        }
        BstNode* temp = minValue(root->right);
        root->data = temp->data;
        root->right = deleteNode(root->right, temp->data);
    }

    return root;
}

```

```

int main()
{
    int n;

    root = NULL;
    cout<<"How Many Data you want to take? ";
    cin>>n;
    int a[n];
    cout<<"\n Enter The Data : ";
    for(int i=0;i<n;i++)
    {
        cin>>a[i];
        root = Insert(root, a[i]);
    }

    cout<<"\n PreOrder Traversal : ";
    PreOrder(root);
    cout<<"\n InOrder Traversal : ";
    InOrder(root);
    cout<<"\n PostOrder Traversal : ";
    PostOrder(root);

    cout << "\n\n Please enter your search item: ";
    int s;
    cin >> s;
    cout << endl;
    if (Search(root, s) == true)
    {
        cout << "found" << endl;
    }
    else
    {
        cout << "Not found" << endl;
    }

    cout<<"\n DELETE : ";
    int e;
    cin>>e;
    deleteNode(root,e);
    cout<<"\n PreOrder Traversal : ";
    PreOrder(root);
    cout<<"\n InOrder Traversal : ";
    InOrder(root);
    cout<<"\n PostOrder Traversal : ";
    PostOrder(root);

    getch();
}

```

Your whole Screenshot here: (Console Output):

```
"F:\SEMESTER 4\DS LAB\TASK\BST.exe"
How Many Data you want to take? 5

Enter The Data : 10 8 6 4 3

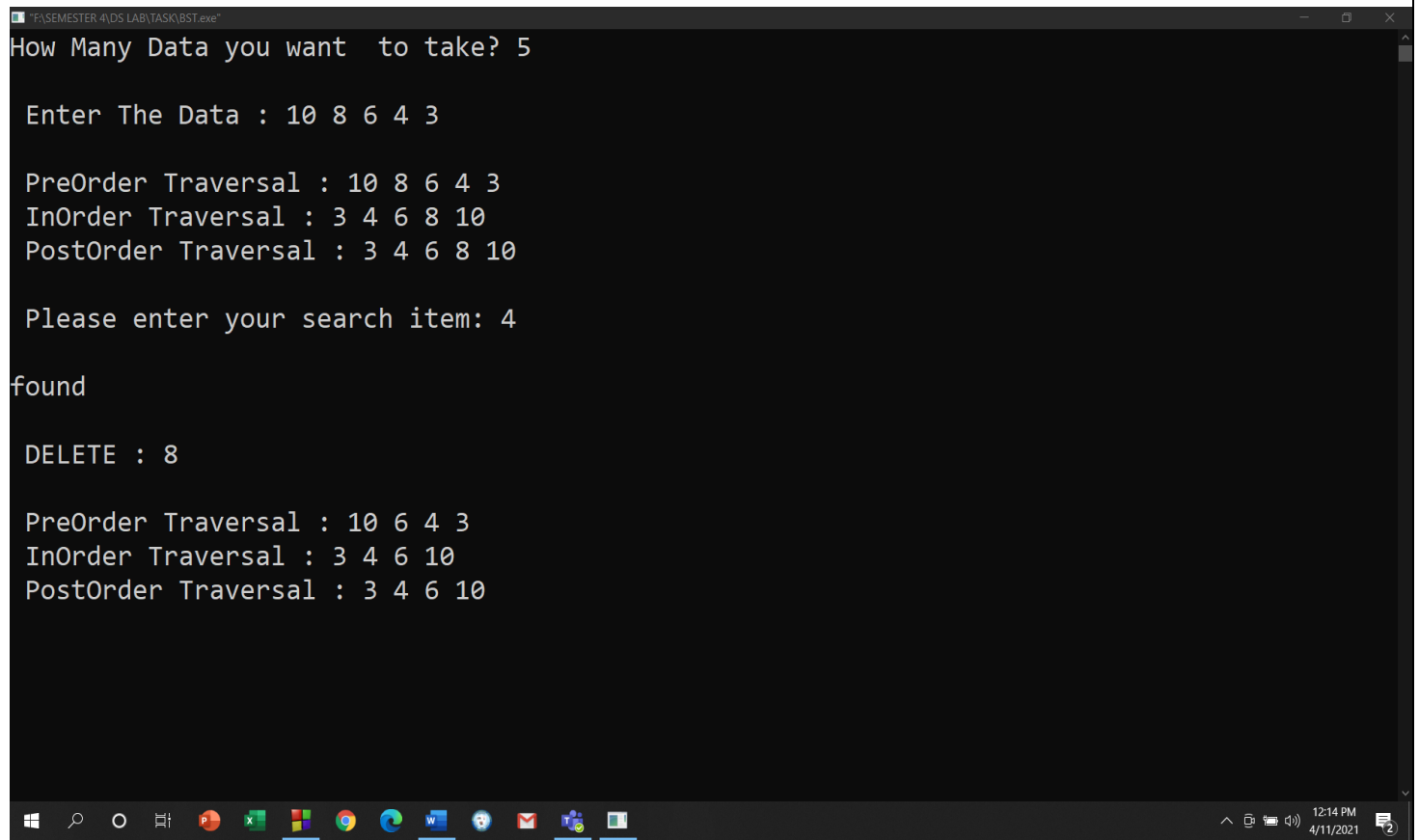
PreOrder Traversal : 10 8 6 4 3
InOrder Traversal : 3 4 6 8 10
PostOrder Traversal : 3 4 6 8 10

Please enter your search item: 4

found

DELETE : 8

PreOrder Traversal : 10 6 4 3
InOrder Traversal : 3 4 6 10
PostOrder Traversal : 3 4 6 10
```

A screenshot of a Windows console window titled "F:\SEMESTER 4\DS LAB\TASK\BST.exe". The window has a black background with white text. The user has entered 5 for the number of data points, followed by the values 10, 8, 6, 4, and 3. The program has output the PreOrder, InOrder, and PostOrder traversals for this input. Then, the user entered 4 as the search item, and the program output "found". Finally, the user entered 8 for deletion, and the program output the updated traversals. The Windows taskbar is visible at the bottom, showing various application icons and the system clock indicating 12:14 PM on 4/11/2021.