

Rajalakshmi Engineering College

Name: HARIHARAN S
Email: 240701166@rajalakshmi.edu.in
Roll no: 240701166
Phone: 8148674034
Branch: REC
Department: I CSE AG
Batch: 2028
Degree: B.E - CSE

Scan to verify results



NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 5_COD_Question 1

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

John is learning about Binary Search Trees (BST) in his computer science class. He wants to create a program that allows users to delete a node with a given value from a BST and print the remaining nodes using an in-order traversal.

Implement a function to help him delete a node with a given value from a BST.

Input Format

The first line of input consists of an integer N, representing the number of nodes in the BST.

The second line consists of N space-separated integers, representing the values of the BST nodes.

The third line consists of an integer V, which is the value to delete from the BST.

Output Format

The output prints the space-separated values in the BST in an in-order traversal, after the deletion of the specified value.

If the specified value is not available in the tree, print the given input values in-order traversal.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
10 5 15 2 7
15
Output: 2 5 7 10

Answer

```
#include <stdio.h>
#include <stdlib.h>
```

```
struct TreeNode {
    int data;
    struct TreeNode* left;
    struct TreeNode* right;
};
```

```
struct TreeNode* createNode(int key) {
    struct TreeNode* newNode = (struct TreeNode*)malloc(sizeof(struct
TreeNode));
    newNode->data = key;
    newNode->left = newNode->right = NULL;
    return newNode;
}
```

```
/*// You are using GCC
struct TreeNode* insert(struct TreeNode* root, int key) {
    //Type your code here
```

```
}
```

```
struct TreeNode* findMin(struct TreeNode* root) {  
    //Type your code here  
}
```

```
struct TreeNode* deleteNode(struct TreeNode* root, int key) {  
    //Type your code here  
}
```

```
void inorderTraversal(struct TreeNode* root) {  
    //Type your code here  
}*/
```

```
struct TreeNode* insert(struct TreeNode* root, int key) {  
    if (root == NULL)  
        return createNode(key);  
    if (key < root->data)  
        root->left = insert(root->left, key);  
    else if (key > root->data)  
        root->right = insert(root->right, key);  
    return root;  
}
```

```
// Find the node with minimum value in a subtree  
struct TreeNode* findMin(struct TreeNode* root) {  
    while (root && root->left != NULL)  
        root = root->left;  
    return root;  
}
```

```
// Delete a node from BST
```

```
struct TreeNode* deleteNode(struct TreeNode* root, int key) {  
    if (root == NULL)  
        return root;
```

```
    if (key < root->data)  
        root->left = deleteNode(root->left, key);  
    else if (key > root->data)  
        root->right = deleteNode(root->right, key);  
    else {  
        // Node with only one child or no child  
        if (root->left == NULL) {
```

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

```
// Node with two children
struct TreeNode* temp = findMin(root->right);
root->data = temp->data;
root->right = deleteNode(root->right, temp->data);
}
```

```
return root;
}
```

```
// In-order traversal
void inorderTraversal(struct TreeNode* root) {
    if (root == NULL)
        return;
    inorderTraversal(root->left);
    printf("%d ", root->data);
    inorderTraversal(root->right);
}
```

```
int main()
{
    int N, rootValue, V;
    scanf("%d", &N);
    struct TreeNode* root = NULL;
    for (int i = 0; i < N; i++) {
        int key;
        scanf("%d", &key);
        if (i == 0) rootValue = key;
        root = insert(root, key);
    }
    scanf("%d", &V);
    root = deleteNode(root, V);
    inorderTraversal(root);
    return 0;
}
```

Status : Correct

Marks : 10/10

Rajalakshmi Engineering College

Name: HARIHARAN S
Email: 240701166@rajalakshmi.edu.in
Roll no: 240701166
Phone: 8148674034
Branch: REC
Department: I CSE AG
Batch: 2028
Degree: B.E - CSE

Scan to verify results



NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 5_COD_Question 2

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Mike is learning about Binary Search Trees (BSTs) and wants to implement various operations on them. He wants to write a basic program for creating a BST, inserting nodes, and printing the tree in the pre-order traversal.

Write a program to help him solve this program.

Input Format

The first line of input consists of an integer N, representing the number of values to insert into the BST.

The second line consists of N space-separated integers, representing the values to insert into the BST.

Output Format

The output prints the space-separated values of the BST in the pre-order traversal.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5

3 1 5 2 4

Output: 3 1 2 5 4

Answer

```
#include <stdio.h>
#include <stdlib.h>
```

```
struct Node {
    int data;
    struct Node* left;
    struct Node* right;
};
```

```
struct Node* createNode(int value) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = value;
    newNode->left = newNode->right = NULL;
    return newNode;
}
```

```
struct Node* insert(struct Node* root, int value) {
    if (root == NULL) {
        return createNode(value);
    }
    if (value < root->data) {
        root->left = insert(root->left, value);
    } else if (value > root->data) {
        root->right = insert(root->right, value);
    }
    return root;
}
```

```
// Print BST in pre-order traversal
void printPreorder(struct Node* node) {
    if (node == NULL)
        return;

    printf("%d ", node->data);    // Visit root
    printPreorder(node->left);    // Traverse left
    printPreorder(node->right);   // Traverse right
}

int main() {
    struct Node* root = NULL;

    int n;
    scanf("%d", &n);

    for (int i = 0; i < n; i++) {
        int value;
        scanf("%d", &value);
        root = insert(root, value);
    }

    printPreorder(root);
    return 0;
}
```

Status : Correct

Marks : 10/10

Rajalakshmi Engineering College

Name: HARIHARAN S

Email: 240701166@rajalakshmi.edu.in

Roll no: 240701166

Phone: 8148674034

Branch: REC

Department: I CSE AG

Batch: 2028

Degree: B.E - CSE

Scan to verify results



NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 5_COD_Question 3

Attempt : 1

Total Mark : 10

Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

You are required to implement basic operations on a Binary Search Tree (BST), like insertion and searching.

Insertion: Given a list of integers, construct a Binary Search Tree by repeatedly inserting each integer into the tree according to the rules of a BST.

Searching: Given an integer, search for its presence in the constructed Binary Search Tree. Print whether the integer is found or not.

Write a program to calculate this efficiently.

Input Format

The first line of input consists of an integer n, representing the number of nodes

in the binary search tree.

The second line consists of the values of the nodes, separated by space as integers.

The third line consists of an integer representing, the value that is to be searched.

Output Format

The output prints, "Value <value> is found in the tree." if the given value is present, otherwise it prints: "Value <value> is not found in the tree."

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 7

8 3 10 1 6 14 23

6

Output: Value 6 is found in the tree.

Answer

```
struct Node* insertNode(struct Node* root, int value) {
    if (root == NULL) {
        return createNode(value);
    }

    if (value < root->data) {
        root->left = insertNode(root->left, value);
    } else {
        root->right = insertNode(root->right, value);
    }

    return root;
}
```

// Search for a node in BST

```
struct Node* searchNode(struct Node* root, int value) {
    if (root == NULL || root->data == value)
        return root;
}
```

```
if (value < root->data)
    return searchNode(root->left, value);
else
    return searchNode(root->right, value);
}
```

Status : Correct

Marks : 10/10

Rajalakshmi Engineering College

Name: HARIHARAN S
Email: 240701166@rajalakshmi.edu.in
Roll no: 240701166
Phone: 8148674034
Branch: REC
Department: I CSE AG
Batch: 2028
Degree: B.E - CSE

Scan to verify results



NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 5_COD_Question 4

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

John, a computer science student, is learning about binary search trees (BST) and their properties. He decides to write a program to create a BST, display it in post-order traversal, and find the minimum value present in the tree.

Help him by implementing the program.

Input Format

The first line of input consists of an integer N, representing the number of elements to insert into the BST.

The second line consists of N space-separated integers data, which is the data to be inserted into the BST.

Output Format

The first line of output prints the space-separated elements of the BST in post-order traversal.

The second line prints the minimum value found in the BST.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 3

5 10 15

Output: 15 10 5

The minimum value in the BST is: 5

Answer

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
struct Node {  
    int data;  
    struct Node* left;  
    struct Node* right;  
};
```

```
struct Node* createNode(int data) {  
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));  
    newNode->data = data;  
    newNode->left = newNode->right = NULL;  
    return newNode;  
}
```

```
struct Node* insert(struct Node* root, int data) {  
    if (root == NULL) {  
        return createNode(data);  
    }  
    if (data < root->data) {  
        root->left = insert(root->left, data);  
    } else if (data > root->data) {  
        root->right = insert(root->right, data);  
    }
```

```

    }
    return root;
}

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

int findMinValue(struct Node* root) {
    if (root == NULL) {
        return -1;
    }
    struct Node* current = root;
    while (current->left != NULL) {
        current = current->left;
    }
    return current->data;
}

int main() {
    struct Node* root = NULL;
    int n, data;
    scanf("%d", &n);
    for (int i = 0; i < n; i++) {
        scanf("%d", &data);
        root = insert(root, data);
    }

    displayTreePostOrder(root);
    printf("\n");

    int minValue = findMinValue(root);
    printf("The minimum value in the BST is: %d", minValue);

    return 0;
}

```

Status : Correct

Marks : 10/10

Rajalakshmi Engineering College

Name: HARIHARAN S

Email: 240701166@rajalakshmi.edu.in

Roll no: 240701166

Phone: 8148674034

Branch: REC

Department: I CSE AG

Batch: 2028

Degree: B.E - CSE

Scan to verify results



NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 5_COD_Question 5

Attempt : 1

Total Mark : 10

Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

In his computer science class, John is learning about Binary Search Trees (BST). He wants to build a BST and find the maximum value in the tree.

Help him by writing a program to insert nodes into a BST and find the maximum value in the tree.

Input Format

The first line of input consists of an integer N, representing the number of nodes in the BST.

The second line consists of N space-separated integers, representing the values of the nodes to insert into the BST.

Output Format

The output prints the maximum value in the BST.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5

10 5 15 2 7

Output: 15

Answer

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
struct TreeNode {  
    int data;  
    struct TreeNode* left;  
    struct TreeNode* right;  
};
```

```
struct TreeNode* createNode(int key) {  
    struct TreeNode* newNode = (struct TreeNode*)malloc(sizeof(struct  
TreeNode));  
    newNode->data = key;  
    newNode->left = newNode->right = NULL;  
    return newNode;  
}
```

```
struct TreeNode* insert(struct TreeNode* root, int key) {  
    if (root == NULL) {  
        return createNode(key);  
    }  
    if (key < root->data) {  
        root->left = insert(root->left, key);  
    } else if (key > root->data) {  
        root->right = insert(root->right, key);  
    }  
    return root;  
}
```

```
int findMax(struct TreeNode* root) {
```



```

    if (root == NULL) return -1;
    while (root->right != NULL) {
        root = root->right;
    }
    return root->data;
}

int main() {
    int N, rootValue;
    scanf("%d", &N);

    struct TreeNode* root = NULL;

    for (int i = 0; i < N; i++) {
        int key;
        scanf("%d", &key);
        if (i == 0) rootValue = key;
        root = insert(root, key);
    }

    int maxVal = findMax(root);
    if (maxVal != -1) {
        printf("%d", maxVal);
    }

    return 0;
}

```

Status : Correct

Marks : 10/10