BINARY SEARCH TREE OPERATIONS

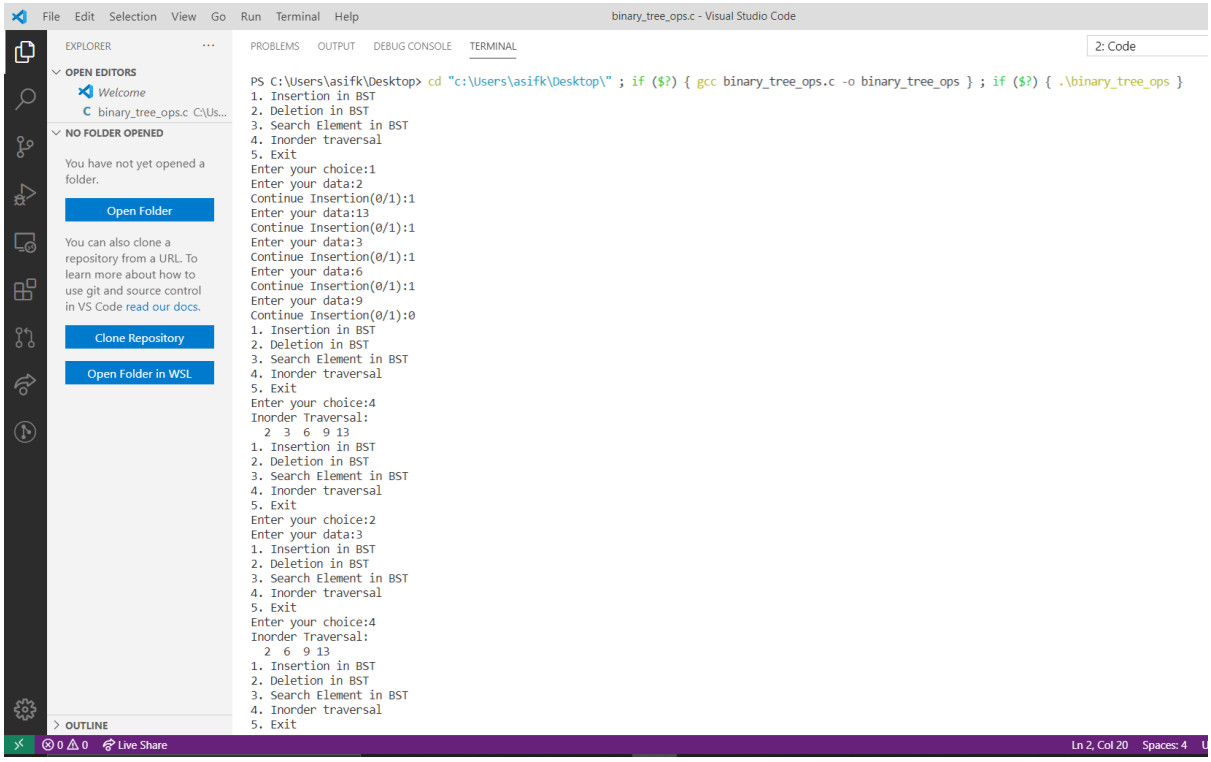
```
#include <stdio.h>
#include <stdlib.h>

struct treeNode
    {
    int data;
    struct treeNode *left, *right;
    };

struct treeNode *root = NULL;
struct treeNode* createNode(int data)
{
    struct treeNode *newNode;
    newNode = (struct treeNode *) malloc(sizeof (struct treeNode));
    newNode->data = data;
    newNode->left = NULL;
    newNode->right = NULL;
    return(newNode);
}
void insertion(struct treeNode **node, int data)
{
    if (*node == NULL)
    {
    *node = createNode(data);
    }
    else if (data < (*node)->data)
    {
    insertion(&(*node)->left, data);
    }
    else if (data > (*node)->data)
    {
    insertion(&(*node)->right, data);
    }
}
void deletion(struct treeNode **node, struct treeNode **parent, int data)
{
struct treeNode *tmpNode, *tmpParent;
if (*node == NULL)
return;
if ((*node)->data == data)
{
if (!(*node)->left && !(*node)->right)
{
if (parent)
{
if ((*parent)->left == *node)
```

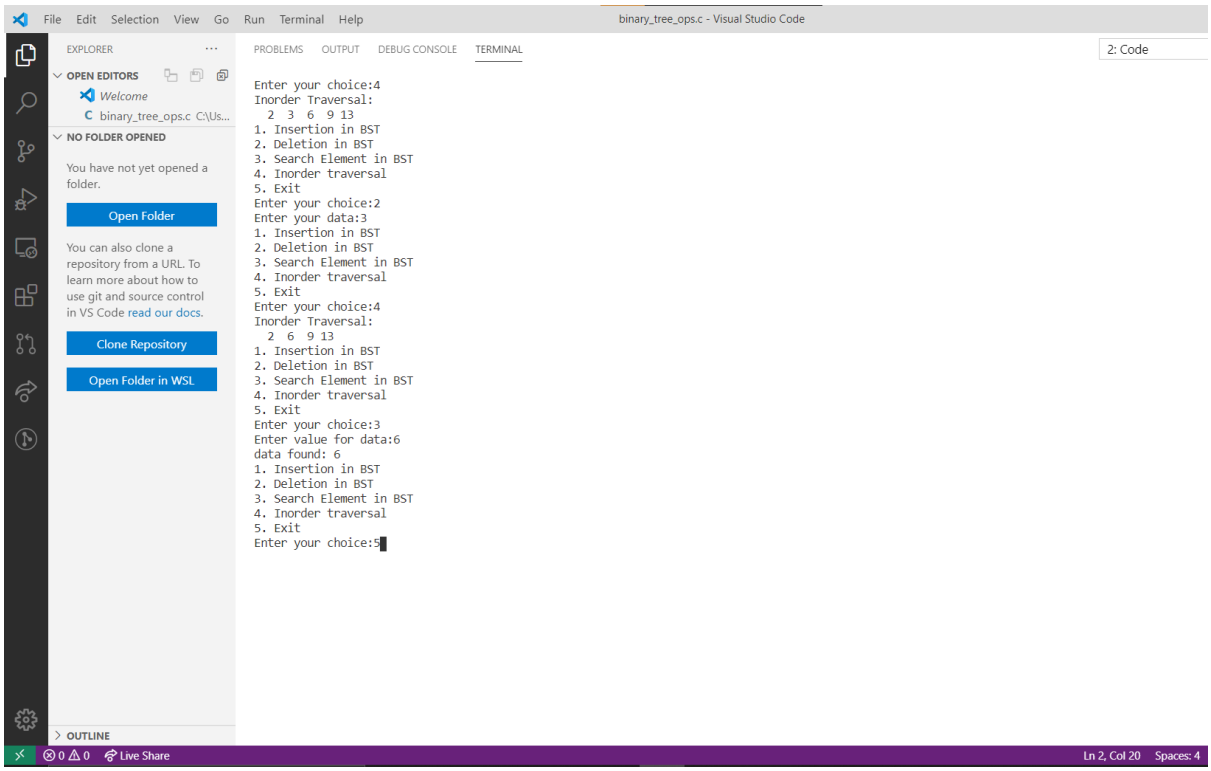
```
(*parent)->left = NULL;
else
(*parent)->right = NULL;
free(*node);
}
else
{
free(*node);
}
}
else if (!(*node)->right && (*node)->left)
{
tmpNode = *node;
(*parent)->right = (*node)->left;
free(tmpNode);
*node = (*parent)->right;
}
else if ((*node)->right && !(*node)->left)
{
tmpNode = *node;
(*parent)->left = (*node)->right;
free(tmpNode);
(*node) = (*parent)->left;
}
else if (!(*node)->right->left)
{

tmpNode = *node;
(*node)->right->left = (*node)->left;
(*parent)->left = (*node)->right;
free(tmpNode);
*node = (*parent)->left;
}
else
{
tmpNode = (*node)->right;
while (tmpNode->left)
{
tmpParent = tmpNode;
tmpNode = tmpNode->left;
}
tmpParent->left = tmpNode->right;
tmpNode->left = (*node)->left;
tmpNode->right =(*node)->right;
free(*node);
*node = tmpNode;
}
}
```

```
else if (data < (*node)->data)
{
deletion(&(*node)->left, node, data);
}
else if (data > (*node)->data)
{
deletion(&(*node)->right, node, data);
}
}

void findElement(struct treeNode *node, int data) {
if (!node)
return;
else if (data < node->data)
{
findElement(node->left, data);
}
else if (data > node->data)
{
findElement(node->right, data);
}
else
printf("data found: %d\n", node->data);
return;
}

void traverse(struct treeNode *node)
{
    if (node != NULL)
    {
    traverse(node->left);
    printf("%3d", node->data);
    traverse(node->right);
    }
    return;
}

int main()
{
    int data, ch;
    while (1)
    {
        printf("1. Insertion in BST\n");
        printf("2. Deletion in BST\n");
        printf("3. Search Element in BST\n");
        printf("4. Inorder traversal\n5. Exit\n");
        printf("Enter your choice:");
        scanf("%d", &ch);
```

```
    switch (ch)
    {
    case 1:
    while (1)
    {
        printf("Enter your data:");
        scanf("%d", &data);
        insertion(&root, data);
        printf("Continue Insertion(0/1):");
        scanf("%d", &ch);
        if (!ch)
        break;
    }
    break;
    case 2:
        printf("Enter your data:");
        scanf("%d", &data);
        deletion(&root, NULL, data);
    break;
    case 3:
        printf("Enter value for data:");
        scanf("%d", &data);
        findElement(root, data);
        break;
    case 4:
        printf("Inorder Traversal:\n");
        traverse(root);
        printf("\n");
        break;
    case 5:
        exit(0);
    default:
        printf("you entered wrong option\n");
        break;
    }
    }
    return 0;
}
```

OUTPUT


File Edit Selection View Go Run Terminal Help
binary_tree_ops.c - Visual Studio Code
EXPLORER
OPEN EDITORS
Welcome
binary_tree_ops.c C:\Us...
NO FOLDER OPENED
You have not yet opened a folder.
Open Folder
You can also clone a repository from a URL. To learn more about how to use git and source control in VS Code read our docs.
Clone Repository
Open Folder in WSL
OUTLINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
2: Code
PS C:\Users\asifk\Desktop> cd "c:\Users\asifk\Desktop\" ; if ($?) { gcc binary_tree_ops.c -o binary_tree_ops } ; if ($?) { .\binary_tree_ops }
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:1
Enter your data:2
Continue Insertion(0/1):1
Enter your data:13
Continue Insertion(0/1):1
Enter your data:3
Continue Insertion(0/1):1
Enter your data:6
Continue Insertion(0/1):1
Enter your data:9
Continue Insertion(0/1):0
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:4
Inorder Traversal:
2 3 6 9 13
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:2
Enter your data:3
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:4
Inorder Traversal:
2 6 9 13
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
0 0 Live Share
Ln 2, Col 20 Spaces: 4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OUTLINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
2: Code
Enter your choice:4
Inorder Traversal:
2 3 6 9 13
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:2
Enter your data:3
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:4
Inorder Traversal:
2 6 9 13
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:3
Enter value for data:6
data found: 6
1. Insertion in BST
2. Deletion in BST
3. Search Element in BST
4. Inorder traversal
5. Exit
Enter your choice:5
0 0 Live Share
Ln 2, Col 20 Spaces: 4