

1.program to implement binary search tree in insertion,deletion,searching

```
#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

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:5

Continue Insertion(0/1):1

Enter your data:6

Continue Insertion(0/1):1

Enter your data:7

Continue Insertion(0/1):1

Enter your data:8

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:2

Enter your data:8

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:5

data found: 5

1. Insertion in BST

2. Deletion in BST

3. Search Element in BST

4. Inorder traversal

5. Exit

Enter your choice:4

Inorder Traversal:

7 6 5

1. Insertion in BST

2. Deletion in BST

3. Search Element in BST

4. Inorder traversal

5. Exit

Enter your choice: