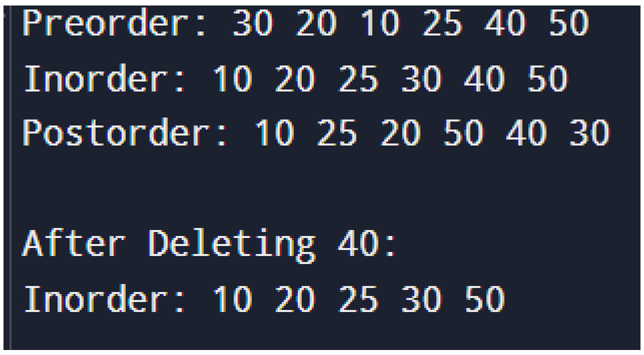
## Code

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

typedef struct Node {
    int key;
    struct Node *left, *right;
    int height;
} Node;

int height(Node *N) {
    if (N == NULL) return 0;
    return N->height;
}

int max(int a, int b) {
    return (a > b) ? a : b;
}

Node *newNode(int key) {
    Node *node = (Node *)malloc(sizeof(Node));
    node->key = key;
    node->left = node->right = NULL;
    node->height = 1;
    return node;
}

Node *rightRotate(Node *y) {
    Node *x = y->left;
    Node *T2 = x->right;
    x->right = y;
    y->left = T2;

    y->height = max(height(y->left), height(y->right)) + 1;
    x->height = max(height(x->left), height(x->right)) + 1;

    return x;
}

Node *leftRotate(Node *x) {
    Node *y = x->right;
    Node *T2 = y->left;

    y->left = x;
    x->right = T2;

    x->height = max(height(x->left), height(x->right)) + 1;
    y->height = max(height(y->left), height(y->right)) + 1;

    return y;
}

int getBalance(Node *N) {
    if (N == NULL) return 0;
    return height(N->left) - height(N->right);
}

Node *insert(Node *node, int key) {
    if (node == NULL) return newNode(key);
    if (key < node->key)
        node->left = insert(node->left, key);
    else if (key > node->key)
        node->right = insert(node->right, key);
    else
        return node;

    node->height = 1 + max(height(node->left), height(node->right));

    int balance = getBalance(node);

    if (balance > 1 && key < node->left->key)
        return rightRotate(node);

    if (balance < -1 && key > node->right->key)
        return leftRotate(node);

    if (balance > 1 && key > node->left->key) {
        node->left = leftRotate(node->left);
        return rightRotate(node);
    }

    if (balance < -1 && key < node->right->key) {
        node->right = rightRotate(node->right);
        return leftRotate(node);
    }

    return node;
}
```

```
Node *minValueNode(Node *node) {
    Node *current = node;
    while (current->left != NULL)
        current = current->left;
    return current;
}

Node *deleteNode(Node *root, int key) {
    if (root == NULL) return root;

    if (key < root->key)
        root->left = deleteNode(root->left, key);
    else if (key > root->key)
        root->right = deleteNode(root->right, key);
    else {

        if (root->left == NULL || root->right == NULL) {
            Node *temp = root->left ? root->left : root->right;

            if (temp == NULL) {
                temp = root;
                root = NULL;
            } else
                *root = *temp;

            free(temp);
        } else {
            Node *temp = minValueNode(root->right);
            root->key = temp->key;
            root->right = deleteNode(root->right, temp->key);
        }
    }

    if (root == NULL) return root;

    root->height = 1 + max(height(root->left), height(root->right));

    int balance = getBalance(root);

    if (balance > 1 && getBalance(root->left) >= 0)
        return rightRotate(root);

    if (balance > 1 && getBalance(root->left) < 0) {
        root->left = leftRotate(root->left);
        return rightRotate(root);
    }

    if (balance < -1 && getBalance(root->right) <= 0)
        return leftRotate(root);

    if (balance < -1 && getBalance(root->right) > 0) {
        root->right = rightRotate(root->right);
        return leftRotate(root);
    }

    return root;
}

void preorder(Node *root) {
    if (root != NULL) {
        printf("%d ", root->key);
        preorder(root->left);
        preorder(root->right);
    }
}

void inorder(Node *root) {
    if (root != NULL) {
        inorder(root->left);
        printf("%d ", root->key);
        inorder(root->right);
    }
}

void postorder(Node *root) {
    if (root != NULL) {
        postorder(root->left);
        postorder(root->right);
        printf("%d ", root->key);
    }
}

int main() {
    Node *root = NULL;

    root = insert(root, 10);
    root = insert(root, 20);
    root = insert(root, 30);
    root = insert(root, 40);
    root = insert(root, 50);
    root = insert(root, 25);

    printf("Preorder: ");
    preorder(root);

    printf("\nInorder: ");
    inorder(root);

    printf("\nPostorder: ");
    postorder(root);

    root = deleteNode(root, 40);

    printf("\n\nAfter Deleting 40:\n");
    printf("Inorder: ");
    inorder(root);

    return 0;
}
```

**Output**



```
Preorder: 30 20 10 25 40 50
Inorder: 10 20 25 30 40 50
Postorder: 10 25 20 50 40 30

After Deleting 40:
Inorder: 10 20 25 30 50
```