Deletion in BST in C++

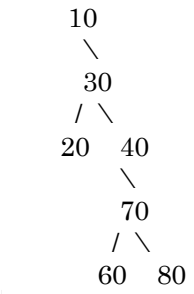
```
#include <iostream>
using namespace std;

class Node {
public:
    int key;
    Node *left, *right;

    Node(int item) {
        key = item;
        left = right = nullptr;
    }
};

class BST {
public:
    Node* root;

    BST() {
        root = nullptr;
    }

    Node* insert(Node* root, int x) {
        if (root == nullptr) {
            return new Node(x);
        }

        if (x < root->key) {
            root->left = insert(root->left, x);
        } else if (x > root->key) {
            root->right = insert(root->right,
x);
        }

        return root;
    }

    void inorder(Node* root) {
        if (root != nullptr) {
            inorder(root->left);
            cout << root->key << " ";
            inorder(root->right);
        }
    }

    Node* deleteNode(Node* root, int x) {
        if (root == nullptr) {
            return root;
        }

        if (x < root->key) {
            root->left = deleteNode(root->left,
x);
        } else if (x > root->key) {
            root->right = deleteNode(root-
>right, x);
        } else {
            if (root->left == nullptr) {
                Node* temp = root->right;
                delete root;
                return temp;
```

Initial Tree Structure

You inserted values in this order:

10, 30, 20, 40, 70, 60, 80

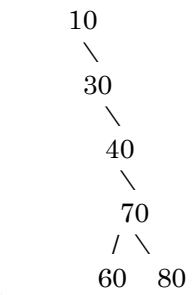
Resulting BST:



🔁 Dry Run of deleteNode(root, 20)

Step	Function Call	Current Node	Comparison	Action Taken
1	deleteNode(root, 20)	10	20 > 10	Go right → call deleteNode(30, 20)
2	deleteNode(30, 20)	30	20 < 30	Go left → call deleteNode(20, 20)
3	deleteNode(20, 20)	20	Match found	Node with no children, return nullptr
4	Return to Step 2	30	Set left = nullptr	20 is deleted from left of 30
5	Return to Step 1	10	Set right = result	Subtree rooted at 30 is updated after deletion

✅ Final Tree Structure (After Deletion)



📤 Inorder Traversals

State	Inorder Output
Before Deletion	10 20 30 40 60 70 80

```
        } else if (root->right == nullptr) {
            Node* temp = root->left;
            delete root;
            return temp;
        }

        Node* succ = getSuccessor(root->right);
        root->key = succ->key;
        root->right = deleteNode(root->right, succ->key);
    }

    return root;
  }

  Node* getSuccessor(Node* root) {
    Node* curr = root;
    while (curr != nullptr && curr->left != nullptr) {
        curr = curr->left;
    }
    return curr;
  }
};

int main() {
  BST tree;
  tree.root = tree.insert(tree.root, 10);
  tree.insert(tree.root, 30);
  tree.insert(tree.root, 20);
  tree.insert(tree.root, 40);
  tree.insert(tree.root, 70);
  tree.insert(tree.root, 60);
  tree.insert(tree.root, 80);

  cout << "Inorder traversal before deletion: ";
  tree.inorder(tree.root);
  cout << endl;

  tree.deleteNode(tree.root, 20);
  cout << "Inorder traversal after deletion: ";
  tree.inorder(tree.root);
  cout << endl;

  return 0;
}
```

State	Inorder Output
After Deletion	10 30 40 60 70 80

```
Inorder traversal before deletion: 10 20 30 40 60 70 80
Inorder traversal after deletion: 10 30 40 60 70 80
```