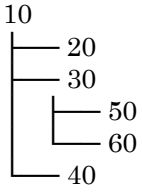
PrePostorder Traversal in C++

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

// Node structure definition
struct Node {
    int data;
    vector<Node*> children;
};

// Function to display the tree structure
void display(Node* node) {
    cout << node->data << " -> ";
    for (Node* child : node->children) {
        cout << child->data << ", ";
    }
    cout << "." << endl;

    for (Node* child : node->children) {
        display(child);
    }
}

// Function to construct the tree from an array
Node* construct(vector<int>& arr) {
    Node* root = nullptr;
    vector<Node*> st;

    for (int i = 0; i < arr.size(); ++i) {
        if (arr[i] == -1) {
            st.pop_back();
        } else {
            Node* t = new Node();
            t->data = arr[i];

            if (!st.empty()) {
                st.back()->children.push_back(t);
            } else {
                root = t;
            }

            st.push_back(t);
        }
    }

    return root;
}

// Function to perform pre-order, post-order, and edge printing traversals
void traversals(Node* node) {
    // Print Node Pre
    cout << "Node Pre " << node->data << endl;

    // Print Edge Pre
    for (Node* child : node->children) {
        cout << "Edge Pre " << node->data << "--" << child->data << endl;
        traversals(child);
        cout << "Edge Post " << node->data << "--" << child->data << endl;
    }

    // Print Node Post
    cout << "Node Post " << node->data << endl;
}

int main() {
    vector<int> arr = {10, 20, -1, 30, 50, -1, 60, -1, -1, 40, -1, -1};
    Node* root = construct(arr);

    display(root);
    traversals(root);

    return 0;
}
```

Input Array:

{10, 20, -1, 30, 50, -1, 60, -1, -1, 40, -1, -1}

✅ **Constructed Tree:**



🔁 Dry Run Table for traversals()

Step	Current Node	Action Type	Output
1	10	Node Pre	Node Pre 10
2	10 → 20	Edge Pre	Edge Pre 10--20
3	20	Node Pre	Node Pre 20
4	20	Node Post	Node Post 20
5	10 ← 20	Edge Post	Edge Post 10--20
6	10 → 30	Edge Pre	Edge Pre 10--30
7	30	Node Pre	Node Pre 30
8	30 → 50	Edge Pre	Edge Pre 30--50
9	50	Node Pre	Node Pre 50
10	50	Node Post	Node Post 50
11	30 ← 50	Edge Post	Edge Post 30--50
12	30 → 60	Edge Pre	Edge Pre 30--60
13	60	Node Pre	Node Pre 60
14	60	Node Post	Node Post 60
15	30 ← 60	Edge Post	Edge Post 30--60
16	30	Node Post	Node Post 30
17	10 ← 30	Edge Post	Edge Post 10--30
18	10 → 40	Edge Pre	Edge Pre 10--40
19	40	Node Pre	Node Pre 40
20	40	Node Post	Node Post 40
21	10 ← 40	Edge Post	Edge Post 10-

```
child->data << endl;
    }

    // Print Node Post
    cout << "Node Post " << node->data << endl;
}

int main() {
    vector<int> arr = {10, 20, -1, 30, 50, -1, 60, -1, -1,
40, -1, -1};

    Node* root = construct(arr);

    // Perform pre-order, post-order, and edge printing
traversals
    traversals(root);

    // Clean up memory (not necessary in this simple
example but good practice)
    // You would typically have a function to delete the
tree
    return 0;
}
```

			-40
22	10	Node Post	Node Post 10

Final Output (as it would appear on console):

```
Node Pre 10
Edge Pre 10--20
Node Pre 20
Node Post 20
Edge Post 10--20
Edge Pre 10--30
Node Pre 30
Edge Pre 30--50
Node Pre 50
Node Post 50
Edge Post 30--50
Edge Pre 30--60
Node Pre 60
Node Post 60
Edge Post 30--60
Node Post 30
Edge Post 10--30
Edge Pre 10--40
Node Pre 40
Node Post 40
Edge Post 10--40
Node Post 10
```


```
Node Pre 10
Edge Pre 10--20
Node Pre 20
Node Post 20
Edge Post 10--20
Edge Pre 10--30
Node Pre 30
Edge Pre 30--50
Node Pre 50
Node Post 50
Edge Post 30--50
Edge Pre 30--60
Node Pre 60
Node Post 60
Edge Post 30--60
Node Post 30
Edge Post 10--30
Edge Pre 10--40
Node Pre 40
Node Post 40
Edge Post 10--40
Node Post 10
```