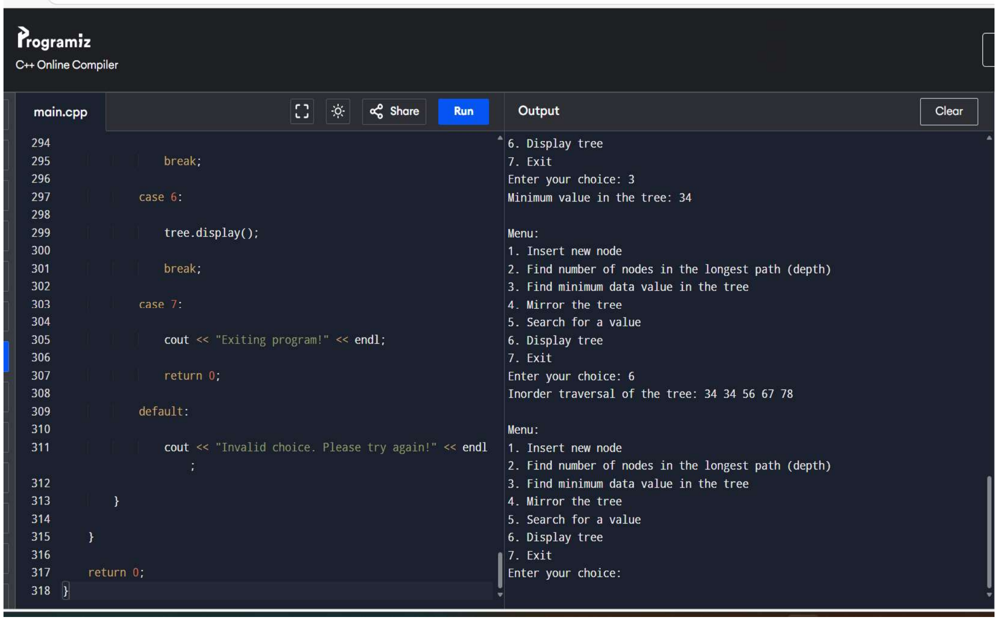
ASSINMENT NO 4

CONSTRUCT BINARY TREE WITH AN EMPTY BINARY SEARCH TREE BY INSERTING VALUES.

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

struct Bstnode {□
    int data;□
    Bstnode* left = NULL;□
    Bstnode* right = NULL;□
};□

class Btree {□
public:□
    Bstnode* root;□

    Btree() {□
        root = NULL;□
    }□

    // Function to create a new node□
    Bstnode* GetNewNode(int in_data) {□
        Bstnode* ptr = new Bstnode();□
        ptr->data = in_data;□
        return ptr;□
    }□

    // Insert a node into the tree□
    Bstnode* insert(Bstnode* temp, int in_data) {□
        if (temp == NULL) {□
            return GetNewNode(in_data);□
        }□
        if (in_data < temp->data) {□
            temp->left = insert(temp->left, in_data);□
        } else {□
            temp->right = insert(temp->right, in_data);□
        }□
        return temp;□
    }□

    void addNode() {□
        int value;□
        cout << "Enter value to insert into the tree: ";□
        cin >> value;□
        root = insert(root, value);□
        cout << "Node " << value << " inserted successfully!" << endl;□
    }□

    // Find the depth of the tree (longest path from root)□
    int findDepth(Bstnode* temp) {□
        if (temp == NULL)□
            return 0;□
        return max(findDepth(temp->left), findDepth(temp->right)) + 1;□
    }□

    // Find the minimum value in the tree□
    void findMinValue() {□
```

```
        if (root == NULL) {
            cout << "The tree is empty!" << endl;
            return;
        }
        Bstnode* temp = root;
        while (temp->left != NULL) {
            temp = temp->left;
        }
        cout << "Minimum value in the tree: " << temp->data << endl;
    }

    // Mirror the tree (swap left and right pointers)
    void mirrorTree(Bstnode* temp) {
        if (temp == NULL)
            return;
        swap(temp->left, temp->right);
        mirrorTree(temp->left);
        mirrorTree(temp->right);
    }

    void mirror() {
        if (root == NULL) {
            cout << "The tree is empty!" << endl;
            return;
        }
        mirrorTree(root);
        cout << "Tree mirrored successfully!" << endl;
    }

    // Search for a value in the tree
    bool search(Bstnode* temp, int in_data) {
        if (temp == NULL)
            return false;
        if (temp->data == in_data)
            return true;
        if (in_data < temp->data)
            return search(temp->left, in_data);
        return search(temp->right, in_data);
    }

    void searchValue() {
        int value;
        cout << "Enter value to search: ";
        cin >> value;
        if (search(root, value)) {
            cout << "Value " << value << " found in the tree." << endl;
        } else {
            cout << "Value " << value << " not found in the tree." <<
endl;
        }
    }

    // Inorder traversal
    void inorder(Bstnode* temp) {
        if (temp == NULL)
            return;
        inorder(temp->left);
        cout << temp->data << " ";
        inorder(temp->right);
    }

    void display() {
        if (root == NULL) {
            cout << "The tree is empty!" << endl;
            return;
        }
        cout << "Inorder traversal of the tree: ";
        inorder(root);
        cout << endl;
    }
};

int main() {
    Btree tree;
    int choice;

    while (true) {
        cout << "\nMenu:\n"
             << "1. Insert new node\n"
             << "2. Find number of nodes in the longest path (depth)\n"
             << "3. Find minimum data value in the tree\n"
             << "4. Mirror the tree\n"
             << "5. Search for a value\n"
             << "6. Display tree\n"
             << "7. Exit\n"
             << "Enter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1:
                tree.addNode();
                break;
            case 2:
                cout << "Number of nodes in the longest path (depth): "
<< tree.findDepth(tree.root) << endl;
                break;
            case 3:
                tree.findMinValue();
                break;
            case 4:
                tree.mirror();
                break;
            case 5:
                tree.searchValue();
                break;
            case 6:
                tree.display();
                break;
            case 7:
                cout << "Exiting program!" << endl;
                return 0;
            default:
                cout << "Invalid choice. Please try again!" << endl;
        }
    }
    return 0;
```



```

                break;

            case 6:

                tree.display();

                break;

            case 7:

                cout << "Exiting program!" << endl;

                return 0;

            default:

                cout << "Invalid choice. Please try again!" << endl
                    ;

        }

    }

    return 0;
}
```

```
6. Display tree
7. Exit
Enter your choice: 3
Minimum value in the tree: 34

Menu:
1. Insert new node
2. Find number of nodes in the longest path (depth)
3. Find minimum data value in the tree
4. Mirror the tree
5. Search for a value
6. Display tree
7. Exit
Enter your choice: 6
Inorder traversal of the tree: 34 34 56 67 78

Menu:
1. Insert new node
2. Find number of nodes in the longest path (depth)
3. Find minimum data value in the tree
4. Mirror the tree
5. Search for a value
6. Display tree
7. Exit
Enter your choice:
```