11 Yashraj Deepak Devrat

```
#include<iostream>
 # include <cstdlib>
 using namespace std;
class node
{
          public:
int info;
struct node *left;
                    struct node *right;

}*root;
class BST
{
 public:
 node *root;
void insert(node *,node *);
void display(node *, int);
int min(node *);
int height(node *);
void mirror(node *);
void preorder(node *);
void inorder(node *);
void postorder(node *);
void search(node *,int);
BST()
{
root = NULL;
}
    };
int main()
{
int choice, num;
BST bst;
node *temp;
while (1)
{
```

```
cout<<"-----------------"<<endl;
cout<<"Operations on BST"<<endl;
cout<<"-----------------"<<endl;
cout<<"1.Insert Element "<<endl;
cout<<"2.Display"<<endl;
cout<<"3.Min value find"<<endl;
cout<<"4.Height"<<endl;
cout<<"5.Mirror of node"<<endl;
cout<<"6.Preorder"<<endl;
cout<<"7.Inorder"<<endl;
cout<<"8.Postorder"<<endl;
cout<<"9.No. of nodes in longest path"<<endl;
                    cout<<"10.Search an element"<<endl;
cout<<"11.Quit"<<endl;
cout<<"Enter your choice : ";
cin>>choice;
switch(choice)
{
case 1:
temp = new node();
cout<<"Enter the number to be inserted : ";
cin>>temp->info;
bst.insert(bst.root, temp);
             break;
case 2:
cout<<"Display BST:"<<endl;
bst.display(bst.root,1);
cout<<endl;
break;
                                        case 3:
                                        cout<<"Min value of tree"<<endl;
                                       cout<<temp->info;
                                       bst.min(bst.root);
                                       cout<<endl;
                                       break;
                                case 4:
                                        int h;
                                        h=bst.height(bst.root);
                                       cout<<"Height of tree="<<h;
                                        cout<<endl;
```

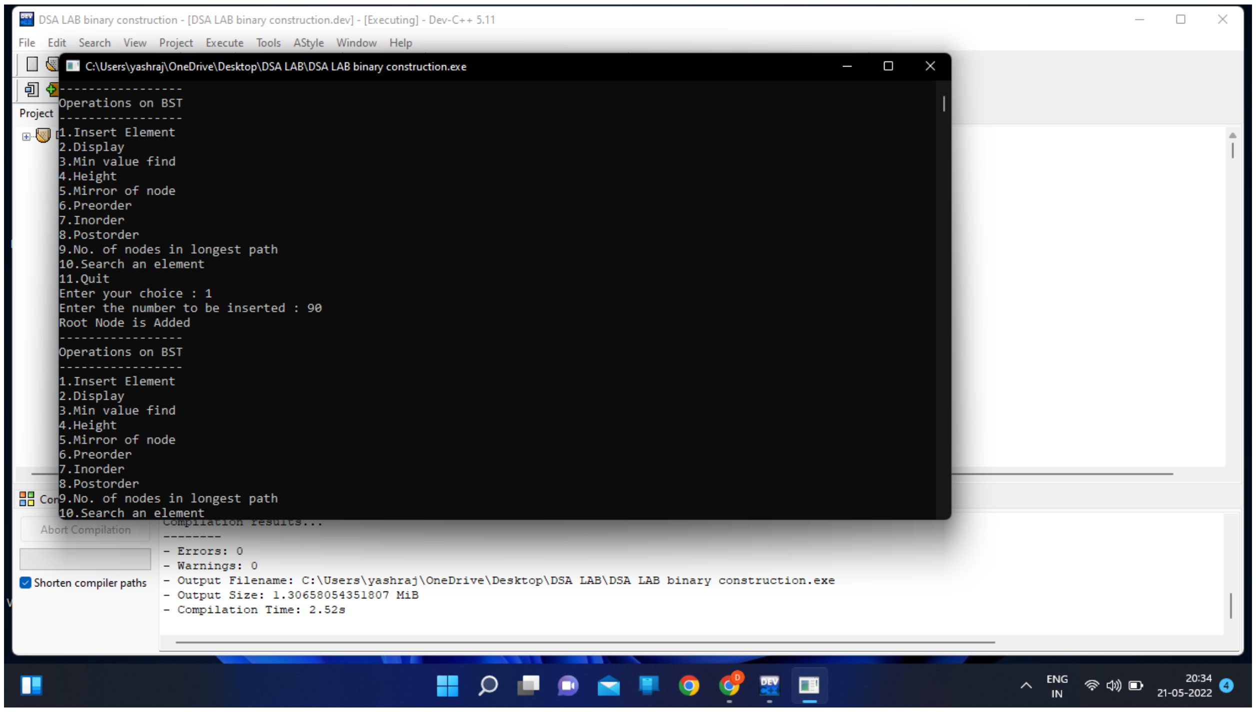
```
                                          break;
                                        case 5:
 cout<<"Mirror";
                                         bst.mirror(bst.root);
                                         bst.display(bst.root,1);
                                                   break;
                                        case 6:
cout<<" \n Display preorder Binary tree = ";
                                                  bst.preorder(bst.root);
                                                  cout<<endl;
                                                  break;
                                         case 7:
                                        cout<<" \n Display inorder Binary tree = ";
                                                  bst.inorder(bst.root);
                                                   cout<<endl;
                                                  break;
                                         case 8:
                                        cout<<" \n Display postorder Binary tree = ";
                                                  bst.postorder(bst.root);
                                                  cout<<endl;
                                                   break;
                              case 9:
                                                  int nodes;
                                                  nodes=bst.height(bst.root);
                                                  cout<<"No. of nodes in longest path from root is
"<<nodes;
                                                  cout<<endl;
                                                   break;
case 10:
                                         int searchdata;
                                        cout<<"Enter the element to ne searched:";
                                        cin>>searchdata;
                                        bst.search(bst.root, searchdata);
                                        cout<<endl;
                                        break;
case 11:
exit(1);
default:
cout<<"Wrong choice"<<endl;
}
```

```
  }
}




void BST::insert(node *tree, node *newnode)
{
if (root == NULL)
{
root = new node;
root->info = newnode->info;
root->left = NULL;
root->right = NULL;
cout<<"Root Node is Added"<<endl;
return;
}
          if (tree->info == newnode->info)
{
cout<<"Element already in the tree"<<endl;
return;
}
          if (tree->info > newnode->info)
{
if (tree->left != NULL)
{
insert(tree->left, newnode);
}
else
{
tree->left = newnode;
                              (tree->left)->left = NULL;
 (tree->left)->right = NULL;
cout<<"Node Added To Left"<<endl;
return;
}
}
else
{
if (tree->right != NULL)
```

```
{
insert(tree->right, newnode);
}
else
{
tree->right = newnode;
 (tree->right)->left = NULL;
 (tree->right)->right = NULL;
cout<<"Node Added To Right"<<endl;
return;
                              }
           }
}




void BST::display(node *ptr, int level)
{
int i;

           if (ptr != NULL)
{
display(ptr->right, level+1);
cout<<endl;
if (ptr == root)
cout<<"Root->:  ";
else
{
for (i = 0;i < level;i++)
cout<<"       ";
}
cout<<ptr->info;
display(ptr->left, level+1);
}
}
int BST::min(node *root)
{
node *temp;
if(root==NULL)
```

```
  {
   cout<<"Tree is empty";
  }
  else
  {
                       temp=root;
                                  while(temp->left!=NULL)
                               {
                               temp=temp->left;
                      }
                               return(temp->info);
           }
}
int BST::height(node *root)
{
           int htleft,htright;
           if(root==NULL)
            {
                               //cout<<"Tree is empty"<<endl;
                                return(0);
                     }
           else if(root->left==NULL && root->right==NULL)
            {
                                return(1);
            }
           htleft=height(root->left);
           htright=height(root->right);
            if(htright>=htleft)
            {
                               return(htright+1);
           }
            else
           {
                               return(htleft+1);
            }
}
void BST::mirror(node *root)
{
           node *temp;
            if(root!=NULL)
            {
                        temp=root->left;
                                  root->left=root->right;
                                  root->right=temp;
                                 mirror(root->left);
                                 mirror(root->right);
            }
}
void BST::preorder(node *ptr)
{
if(ptr!=NULL)
            {
                                 cout<<ptr->info<<"\t";
                                preorder(ptr->left);
                                preorder(ptr->right);
                                cout<<endl;
             }
}

void BST::inorder(node *ptr)
{
 if(ptr!=NULL)
           {
                                 inorder(ptr->left);
                                cout<<ptr->info<<"\t";
                                inorder(ptr->right);
                                cout<<endl;
            }
}
void BST::postorder(node *ptr)
{
            if(ptr!=NULL)
            {
postorder(ptr->left);
                                 postorder(ptr->right);
                                cout<<ptr->info<<"\t";
                                cout<<endl;
           }
}
```

```
void BST::search(node *ptr, int searchdata)
{
if (ptr->info==searchdata)
        {
                cout<<"Element Found..."<<endl;
         }
         else if (ptr->info<searchdata && ptr->right!=NULL)
          {
                search(ptr->right, searchdata);
         }
         else if (ptr->info>searchdata && ptr->left!=NULL)
        {
                search(ptr->left, searchdata);
         }
        else
        {
                cout<<"Element not found..."<<endl;
        }
}
```

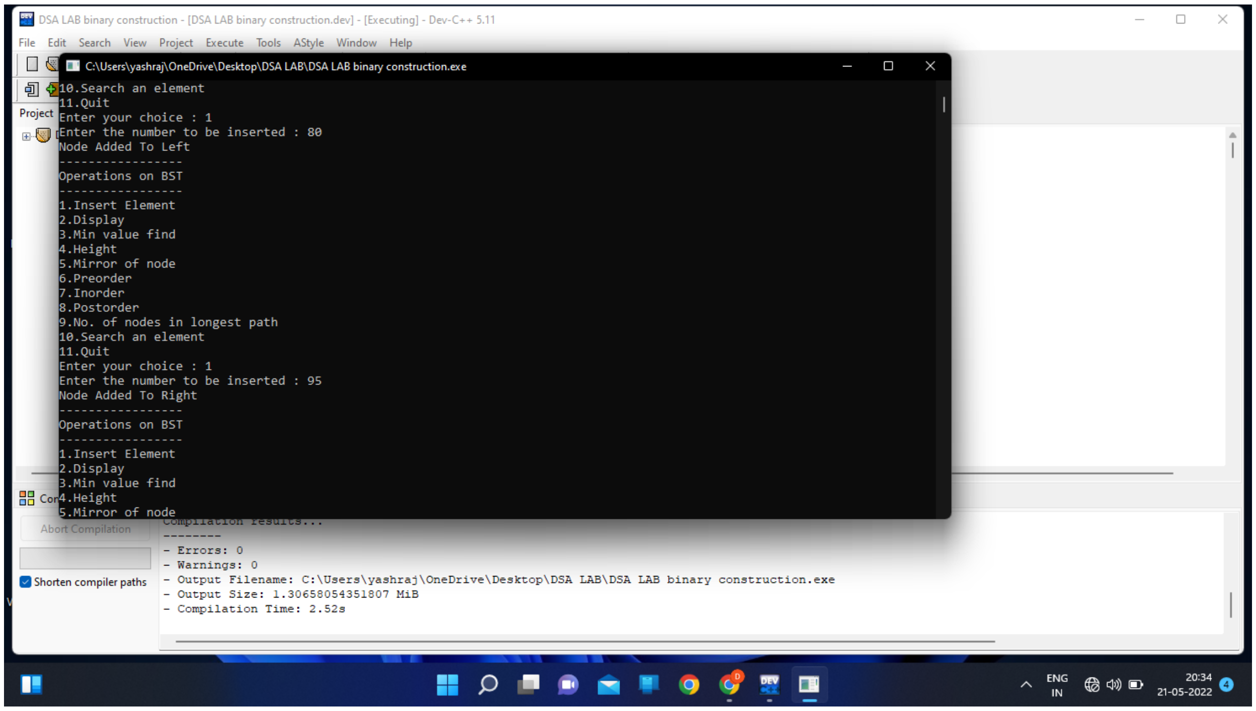


DSA LAB binary construction - [DSA LAB binary construction.dev] - [Executing] - Dev-C++ 5.11

C:\Users\yashraj\OneDrive\Desktop\DSA LAB\DSA LAB binary construction.exe

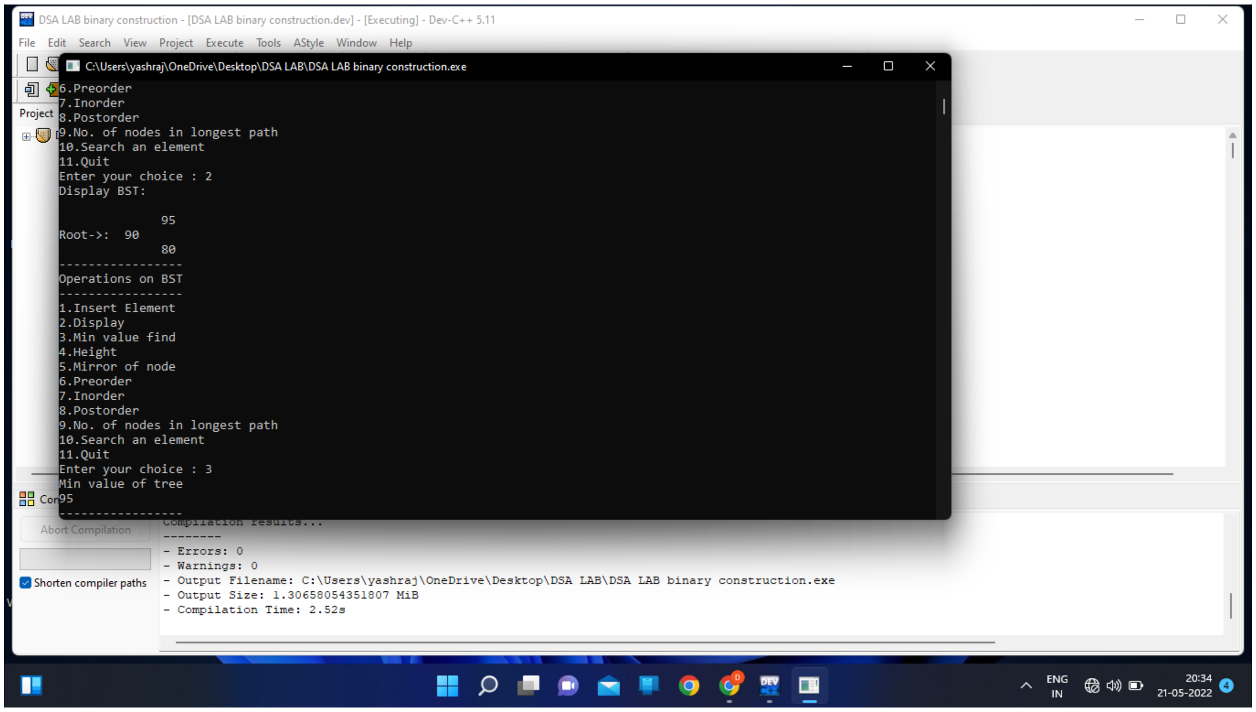
```
----------------
Operations on BST
----------------
1.Insert Element
2.Display
3.Min value find
4.Height
5.Mirror of node
6.Preorder
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
11.Quit
Enter your choice : 1
Enter the number to be inserted : 90
Root Node is Added
----------------
Operations on BST
----------------
1.Insert Element
2.Display
3.Min value find
4.Height
5.Mirror of node
6.Preorder
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\yashraj\OneDrive\Desktop\DSA LAB\DSA LAB binary construction.exe
- Output Size: 1.30658054351807 MiB
- Compilation Time: 2.52s
```



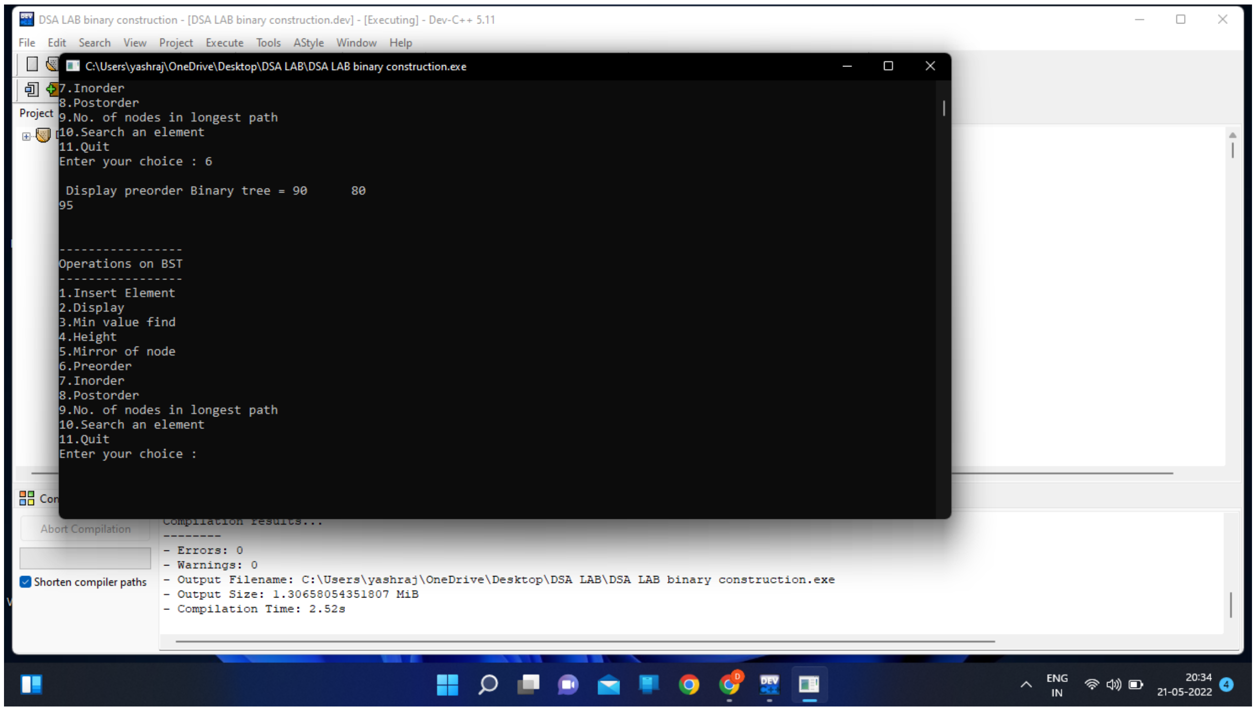
```
10.Search an element
11.Quit
Enter your choice : 1
Enter the number to be inserted : 80
Node Added To Left
----------------
Operations on BST
----------------
1.Insert Element
2.Display
3.Min value find
4.Height
5.Mirror of node
6.Preorder
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
11.Quit
Enter your choice : 1
Enter the number to be inserted : 95
Node Added To Right
----------------
Operations on BST
----------------
1.Insert Element
2.Display
3.Min value find
4.Height
5.Mirror of node
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\yashraj\OneDrive\Desktop\DSA LAB\DSA LAB binary construction.exe
- Output Size: 1.30658054351807 MiB
- Compilation Time: 2.52s
```



```
6.Preorder
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
11.Quit
Enter your choice : 2
Display BST:

              95
Root->:  90
              80
----------------
Operations on BST
----------------
1.Insert Element
2.Display
3.Min value find
4.Height
5.Mirror of node
6.Preorder
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
11.Quit
Enter your choice : 3
Min value of tree
95
----------------
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\yashraj\OneDrive\Desktop\DSA LAB\DSA LAB binary construction.exe
- Output Size: 1.30658054351807 MiB
- Compilation Time: 2.52s
```


DSA LAB binary construction - [DSA LAB binary construction.dev] - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
C:\Users\yashraj\OneDrive\Desktop\DSA LAB\DSA LAB binary construction.exe
Abort Compilation
Shorten compiler paths
ENG
IN
20:34
21-05-2022

```
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
11.Quit
Enter your choice : 6

 Display preorder Binary tree = 90      80
95


----------------
Operations on BST
----------------
1.Insert Element
2.Display
3.Min value find
4.Height
5.Mirror of node
6.Preorder
7.Inorder
8.Postorder
9.No. of nodes in longest path
10.Search an element
11.Quit
Enter your choice :
```

```
Compilation results...
--------
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\yashraj\OneDrive\Desktop\DSA LAB\DSA LAB binary construction.exe
- Output Size: 1.30658054351807 MiB
- Compilation Time: 2.52s
```