Practical no .4

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COB-249


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#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);
 }
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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);
```

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 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)
```
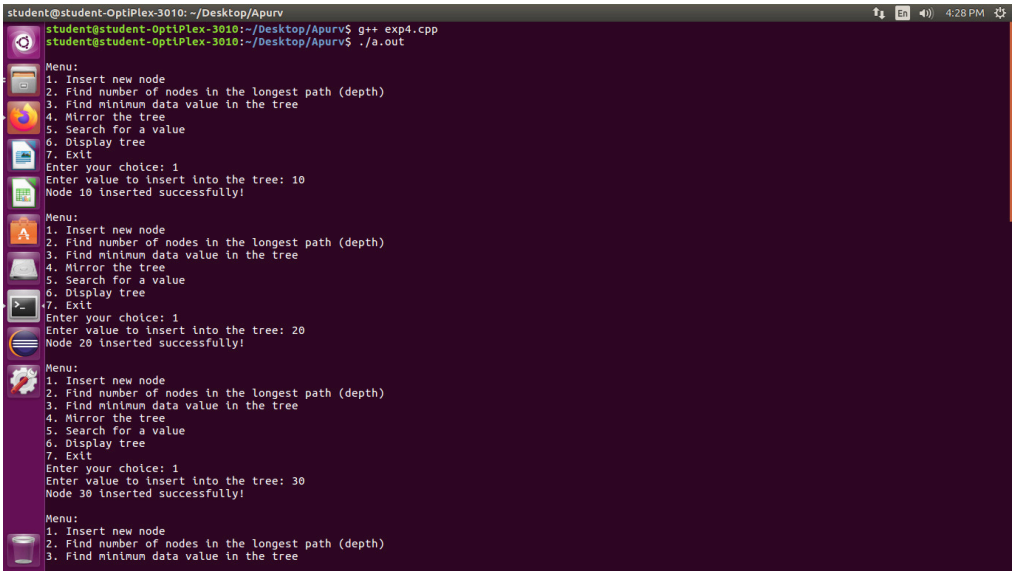
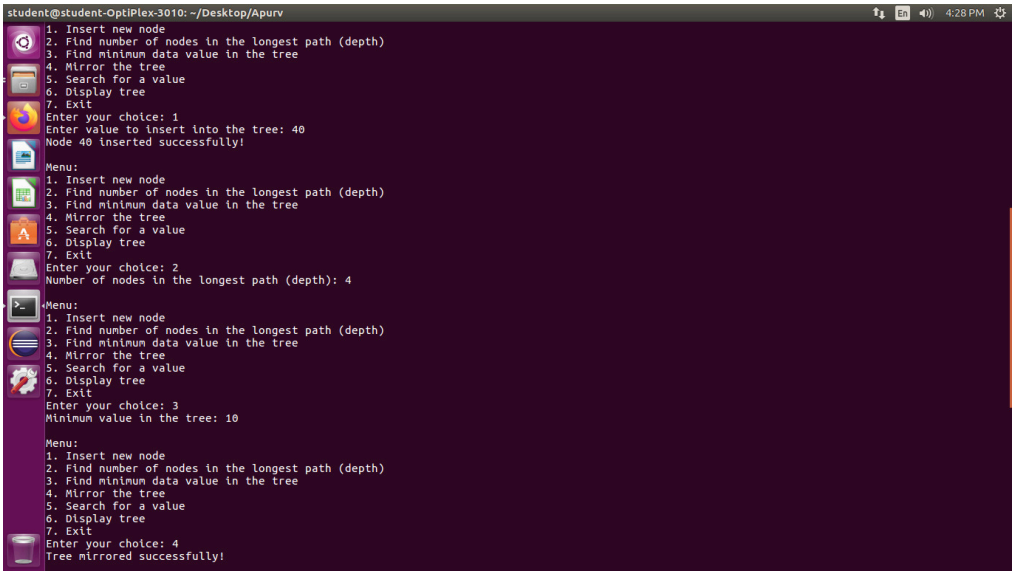
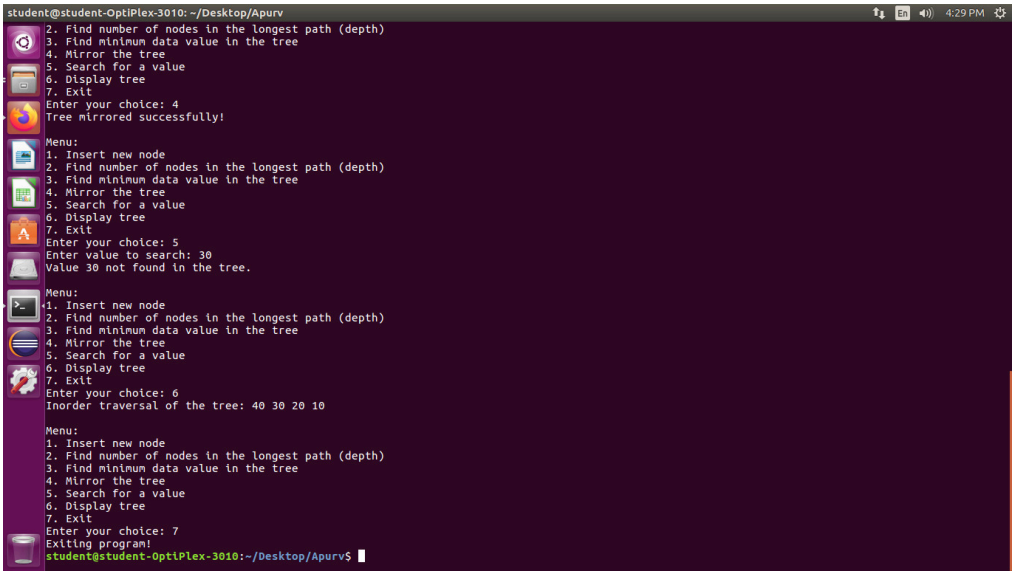

```
{  cout <<
"\nMenu:\n"
 << "1. Insert new node\n"
 << "2. Find number of nodes in the longest path (depth)\n"
 << "3. Find minimum data value in the tree\n"
 << "4. Mirror the tree\n"
 << "5. Search for a value\n"
 << "6. Display tree\n"
 << "7. Exit\n"  <<
"Enter your choice: ";
cin >> choice; switch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

Output:


student@student-OptiPlex-3010: ~/Desktop/Apurv
En
4:28 PM
student@student-OptiPlex-3010:~/Desktop/Apurv$ g++ exp4.cpp
student@student-OptiPlex-3010:~/Desktop/Apurv$ ./a.out
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: 1
Enter value to insert into the tree: 10
Node 10 inserted successfully!
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: 1
Enter value to insert into the tree: 20
Node 20 inserted successfully!
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: 1
Enter value to insert into the tree: 30
Node 30 inserted successfully!
Menu:
1. Insert new node
2. Find number of nodes in the longest path (depth)
3. Find minimum data value in the tree


student@student-OptiPlex-3010: ~/Desktop/Apurv
4:28 PM
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: 1
Enter value to insert into the tree: 40
Node 40 inserted successfully!
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: 2
Number of nodes in the longest path (depth): 4
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: 3
Minimum value in the tree: 10
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: 4
Tree mirrored successfully!


student@student-OptiPlex-3010: ~/Desktop/Apurv
4:29 PM
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: 4
Tree mirrored successfully!
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: 5
Enter value to search: 30
Value 30 not found in the tree.
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: 40 30 20 10
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: 7
Exiting program!
student@student-OptiPlex-3010:~/Desktop/Apurv$