

Problem 3: Find the Diameter of a Binary Tree. **Diameter** is the length of the longest path between any 2 nodes in the tree and this path may or may not pass from the root.

```
class Node:
```

```
    def __init__(self, data):
```

```
        self.data = data
```

```
        self.left = None
```

```
        self.right = None
```

```
def height(node):
```

```
    if node is None:
```

```
        return 0
```

```
    return max(height(node.left), height(node.right)) + 1
```

```
def diameter(node):
```

```
    if node is None:
```

```
        return 0
```

```
    left_height = height(node.left)
```

```
    right_height = height(node.right)
```

```
    left_diameter = diameter(node.left)
```

```
    right_diameter = diameter(node.right)
```

```
    return max(left_height + right_height + 1, max(left_diameter, right_diameter))
```

```
root = Node(1)
```

```
root.left = Node(2)
```

```
root.right = Node(3)
```

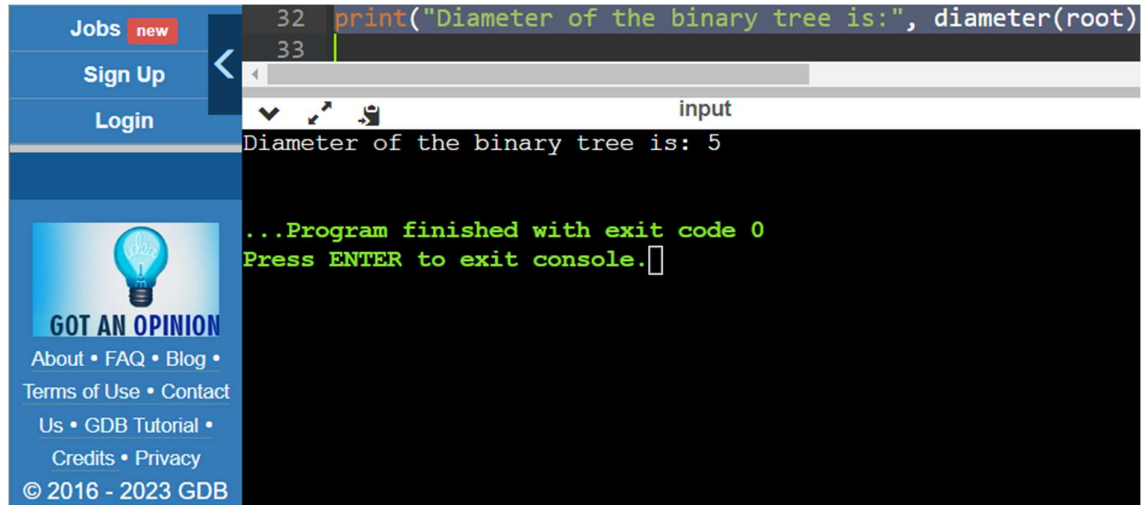
```
root.left.left = Node(4)
```

```
root.left.right = Node(5)
```

```
root.right.left = Node(6)
```

```
root.right.right = Node(7)
```

```
print("Diameter of the binary tree is:", diameter(root))
```



The screenshot shows a web browser with a blue sidebar on the left and a main content area on the right. The sidebar contains a 'Jobs' button with a 'new' tag, 'Sign Up', and 'Login' buttons. Below these is a section titled 'GOT AN OPINION' with a lightbulb icon, followed by links for 'About', 'FAQ', 'Blog', 'Terms of Use', 'Contact Us', 'GDB Tutorial', 'Credits', and 'Privacy'. At the bottom of the sidebar is the copyright notice '© 2016 - 2023 GDB'. The main content area displays a code editor with two lines of Python code: line 32 is `print("Diameter of the binary tree is:", diameter(root))` and line 33 is empty. Below the code editor is a terminal window with a black background and green text. The terminal shows the output 'Diameter of the binary tree is: 5' and then '...Program finished with exit code 0' followed by 'Press ENTER to exit console.' with a cursor.

```
32 print("Diameter of the binary tree is:", diameter(root))
33
```

input

Diameter of the binary tree is: 5

...Program finished with exit code 0
Press ENTER to exit console.