DSA ASSIGNMENT – 4

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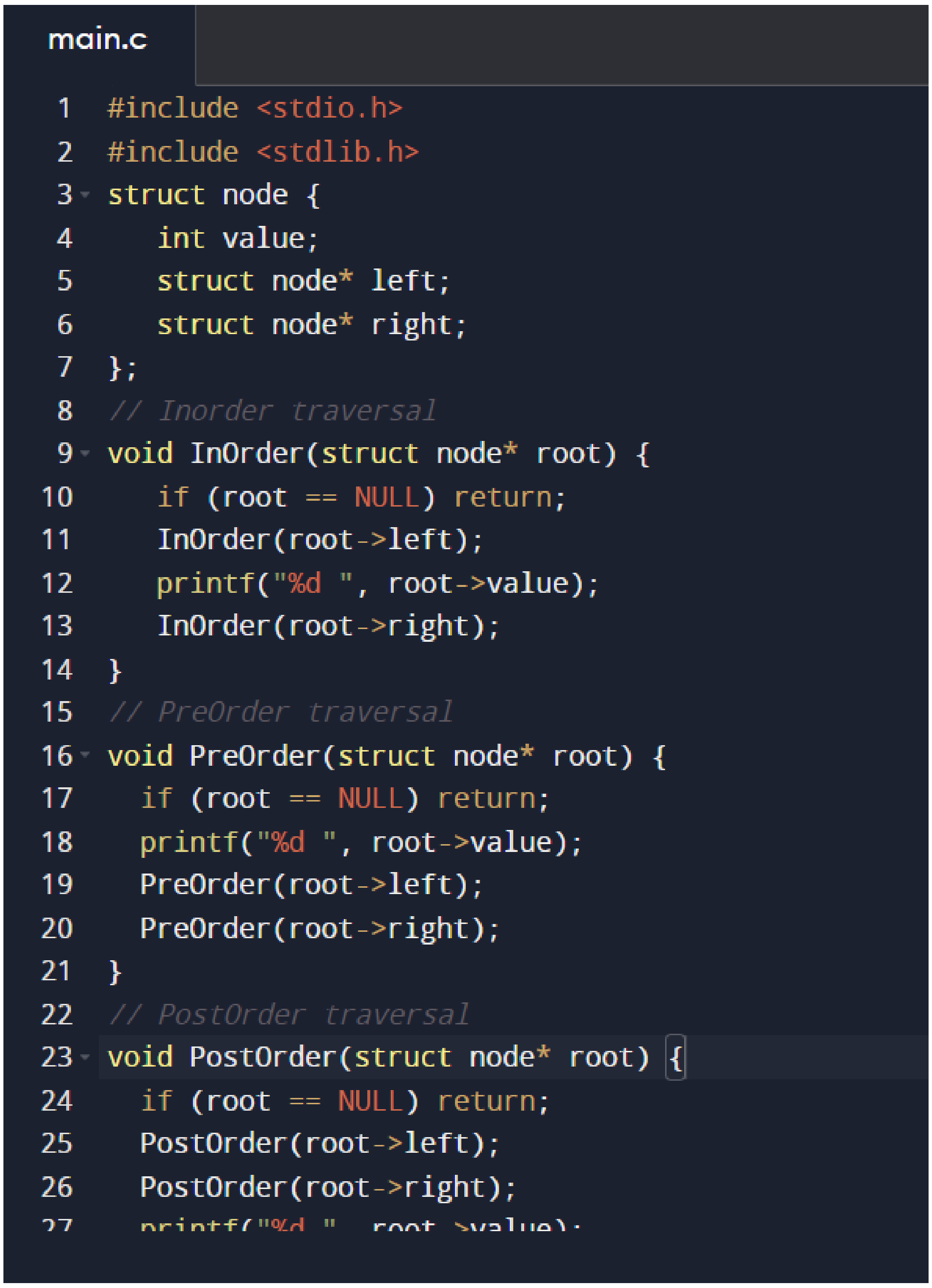
Implementation in C

INPUT

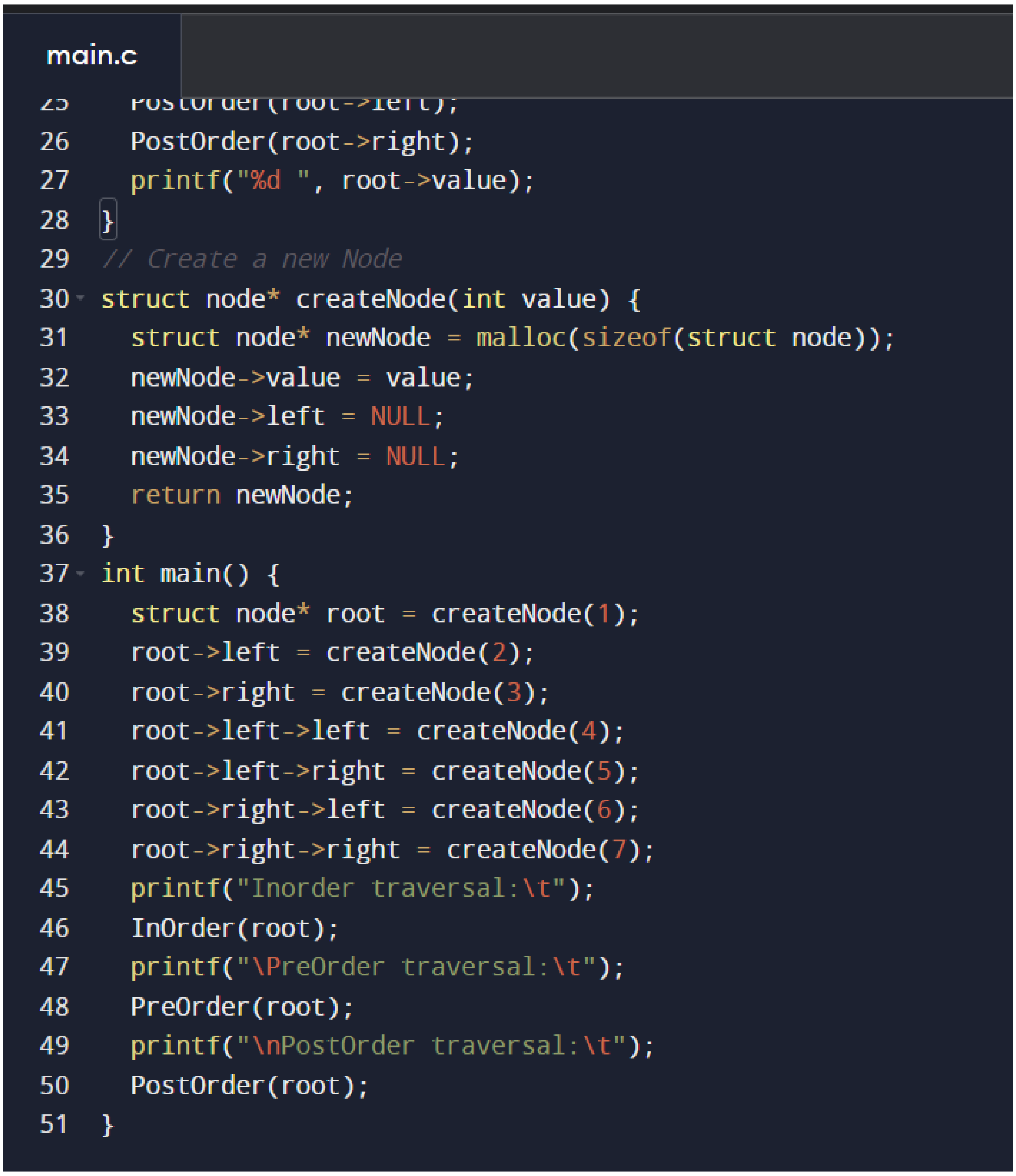
```
#include <stdio.h>

#include <stdlib.h>

struct node {

  int value;

  struct node* left;

  struct node* right;

};

// Inorder traversal

void InOrder(struct node* root) {

  if (root == NULL) return;

  InOrder(root->left);

  printf("%d ", root->value);

  InOrder(root->right);

}

// PreOrder traversal

void PreOrder(struct node* root) {

 if (root == NULL) return;

 printf("%d ", root->value);

 PreOrder(root->left);

 PreOrder(root->right);
```

```
}
// PostOrder traversal
void PostOrder(struct node* root) {
 if (root == NULL) return;
 PostOrder(root->left);
 PostOrder(root->right);
 printf("%d ", root->value);
}
// Create a new Node
struct node* createNode(int value) {
 struct node* newNode = malloc(sizeof(struct node));
 newNode->value = value;
 newNode->left = NULL;
 newNode->right = NULL;
 return newNode;
}
int main() {
 struct node* root = createNode(1);
 root->left = createNode(2);
 root->right = createNode(3);
 root->left->left = createNode(4);
 root->left->right = createNode(5);
 root->right->left = createNode(6);
 root->right->right = createNode(7);
 printf("Inorder traversal:\t");
 InOrder(root);
```

```
  printf("\PreOrder traversal:\t");
  PreOrder(root);
  printf("\nPostOrder traversal:\t");
  PostOrder(root);
}
```

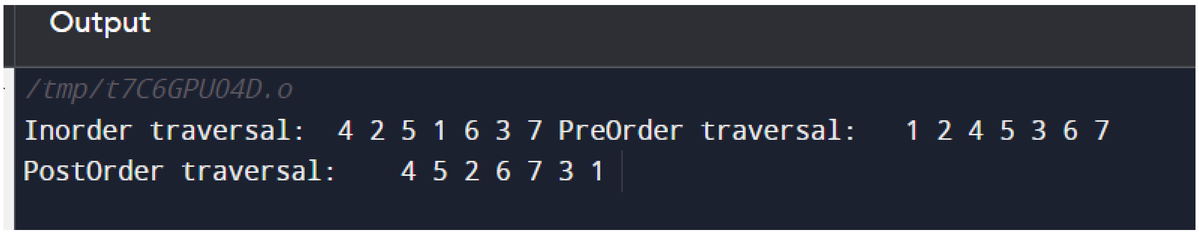


```c
#include <stdio.h>
#include <stdlib.h>
struct node {
    int value;
    struct node* left;
    struct node* right;
};
// Inorder traversal
void InOrder(struct node* root) {
    if (root == NULL) return;
    InOrder(root->left);
    printf("%d ", root->value);
    InOrder(root->right);
}
// PreOrder traversal
void PreOrder(struct node* root) {
  if (root == NULL) return;
  printf("%d ", root->value);
  PreOrder(root->left);
  PreOrder(root->right);
}
// PostOrder traversal
void PostOrder(struct node* root) {
  if (root == NULL) return;
  PostOrder(root->left);
  PostOrder(root->right);
  printf("%d ", root->value);
```



```c
  PostOrder(root->left);
  PostOrder(root->right);
  printf("%d ", root->value);
}
// Create a new Node
struct node* createNode(int value) {
  struct node* newNode = malloc(sizeof(struct node));
  newNode->value = value;
  newNode->left = NULL;
  newNode->right = NULL;
  return newNode;
}
int main() {
  struct node* root = createNode(1);
  root->left = createNode(2);
  root->right = createNode(3);
  root->left->left = createNode(4);
  root->left->right = createNode(5);
  root->right->left = createNode(6);
  root->right->right = createNode(7);
  printf("Inorder traversal:\t");
  InOrder(root);
  printf("\PreOrder traversal:\t");
  PreOrder(root);
  printf("\nPostOrder traversal:\t");
  PostOrder(root);
}
```

OUTPUT



```
/tmp/t7C6GPU04D.o
Inorder traversal:  4 2 5 1 6 3 7 PreOrder traversal:   1 2 4 5 3 6 7
PostOrder traversal:    4 5 2 6 7 3 1
```

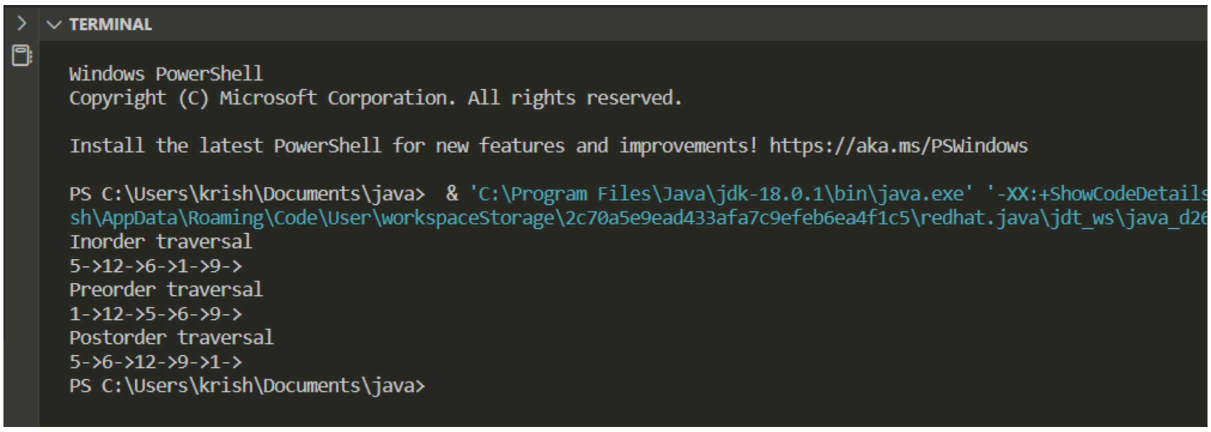
Implementation in Python

```python
from asyncio import Queue


class Node:
    def __init__(self, item):
     self.left = None
     self.right = None
     self.val = item
# creating a tree data structure
def inorder(root):
#checking if the root is null or not
   if root:
     inorder(root.left)
# recursively calling left subtree
     print(str(root.val) + " ", end = '')
     inorder(root.right)
# recursively calling right subtree
def postorder(root):
    if root:
     postorder(root.left)
     postorder(root.right)
     print(str(root.val) + " ", end = '')
def preorder(root):
    if root:
     print(str(root.val) + " ", end = '')
     preorder(root.left)
     preorder(root.right)
def levelOrder(root):
     queue = list()
     queue.append(root)
while len(Queue):
    current = Queue[0]
    Queue = Queue[1: ]

print(str(current.val) + " ", end = "")
if current.left:
 Queue.append(current.left)
if current.right:
   Queue.append(current.right)
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("\nLevelOrder traversal:\t", end = " ")
levelOrder(root)
print("\nInorder traversal:\t", end = " ")
inorder(root)
print("\nPreorder traversal:\t", end = " ")
preorder(root)
print("\nPostorder traversal:\t", end = " ")
postorder(root)
```

Implementation in JAVA

```
// Tree traversal in Java
class Node
{ int item;
Node left, right;
public Node(int key)
{ item = key;
left = right = null;
} }
class BinaryTree {
// Root of Binary Tree
Node root;
BinaryTree() {
root = null;
}
void postorder(Node node)
{ if (node == null)
return;
// Traverse left
postorder(node.left);
// Traverse right
postorder(node.right);
// Traverse root
System.out.print(node.item + "->");
}
void inorder(Node node)
{
if (node == null)
return;
// Traverse left
inorder(node.left);
// Traverse root
System.out.print(node.item + "->");
// Traverse right
inorder(node.right); }
void preorder(Node node)
{
if (node == null) return;
// Traverse root
System.out.print(node.item + "->");
// Traverse left
preorder(node.left);
// Traverse right
preorder(node.right); }
public static void main(String[] args) { BinaryTree tree = new BinaryTree();
     tree.root = new Node(1);
    tree.root.left = new Node(12);
    tree.root.right = new Node(9);

    tree.root.left.left = new Node(5);
    tree.root.left.right = new Node(6);
    System.out.println("Inorder traversal");
    tree.inorder(tree.root);
    System.out.println("\nPreorder traversal ");
    tree.preorder(tree.root);
    System.out.println("\nPostorder traversal");
    tree.postorder(tree.root);
} }
```

OUTPUT



```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\krish\Documents\java>  & 'C:\Program Files\Java\jdk-18.0.1\bin\java.exe' '-XX:+ShowCodeDetails
sh\AppData\Roaming\Code\User\workspaceStorage\2c70a5e9ead433afa7c9efeb6ea4f1c5\redhat.java\jdt_ws\java_d26
Inorder traversal
5->12->6->1->9->
Preorder traversal
1->12->5->6->9->
Postorder traversal
5->6->12->9->1->
PS C:\Users\krish\Documents\java>
```