| S.No: 21 | Exp. Name: ***Write the code for traversing a binary tree in preorder, inorder and postorder*** | Date:2023-05-17 |
|---|---|---|

**Aim:**

Write a recursive C program for traversing a binary tree in preorder, inorder and postorder.

**Source Code:**

binaryTree.c

```
#include<stdio.h>
#include<stdlib.h>
struct node
{
   int data;
   struct node *left;
   struct node *right;
};
struct node *root=NULL;
   void inorder(struct node *temp)
   {
      if(temp)
      {
         inorder(temp->left);
         printf("%d->",temp->data);
         inorder(temp->right);
      }

   }
   void preorder(struct node *temp)
   {
      if(temp)
      {
         printf("%d->",temp->data);
         preorder(temp->left);
         preorder(temp->right);
      }
   }
   void postorder(struct node *temp)
   {
      if(temp)
      {
         postorder(temp->left);
         postorder(temp->right);
         printf("%d->",temp->data);
      }
   }
   void create()
   {
      root=NULL;
      insert();
   }
   struct node *createnode()
   {
      struct node *r;
```


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```
    r=(struct node*)malloc(sizeof(struct node));
    return r;
}
void insert()
{
    struct node *temp,*r;
    r=createnode();
    printf("Enter the data: ");
    scanf("%d",&r->data);
    r->left=NULL;
    r->right=NULL;
    if(root==NULL)
    {
        root=r;
    }
    else
    {
        temp=root;
        while(temp!=NULL)
        {
            if(temp->data>r->data)
            {
                if(temp->left==NULL)
                {
                    temp->left=r;
                    temp=temp->left;
                }
                temp=temp->left;
            }
            else
            {
                if(temp->right==NULL)
                {
                    temp->right=r;
                    temp=temp->right;
                }
                temp=temp->right;
            }
        }
    }
}
int main()
{
root=NULL;
int x,choice;
do{
    printf("0.create\n1.insert\n2.preorder\n3.postorder\n4.inorder\n5.exit\n");
    printf("Enter your choice: ");
    scanf("%d",&choice);
    switch (choice)
    {
        case 0:
        {
            create();
            break;
        }
```


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```
         case 1:
         {
            insert();
            break;
         }
         case 2:
         {
            printf("Display tree in Preorder ");
            preorder(root);
            printf("\n");
            break;
         }
         case 3:
         {
            printf("Display tree in Postorder ");
            postorder(root);
            printf("\n");
            break;
         }
         case 4:
         {
            printf("Display tree in Inorder ");
            inorder(root);
            printf("\n");
            break;
         }
         case 5:
         {
            exit(0);
         }
         default:printf("Enter valid input\n");
      }
   }while(choice!=5);
   return 0;
}
```

Execution Results - All test cases have succeeded!

| Test Case - 1 |
|---|
| User Output |
| 0.create 0 |
| 1.insert 0 |
| 2.preorder 0 |
| 3.postorder 0 |
| 4.inorder 0 |
| 5.exit 0 |
| Enter your choice: 0 |
| Enter the data: 25 |

```
0.create 1
1.insert 1
2.preorder 1
3.postorder 1
4.inorder 1
5.exit 1
Enter your choice:  1
Enter the data:  245
0.create 0
1.insert 0
2.preorder 0
3.postorder 0
4.inorder 0
5.exit 0
Enter your choice:  0
Enter the data:  345
0.create 1
1.insert 1
2.preorder 1
3.postorder 1
4.inorder 1
5.exit 1
Enter your choice:  1
Enter the data:  36
0.create 1
1.insert 1
2.preorder 1
3.postorder 1
4.inorder 1
5.exit 1
Enter your choice:  1
Enter the data:  589
0.create 2
1.insert 2
2.preorder 2
3.postorder 2
4.inorder 2
5.exit 2
Enter your choice:  2
Display tree in Preorder 345->36->589-> 3
0.create 3
1.insert 3
2.preorder 3
3.postorder 3
4.inorder 3
5.exit 3
Enter your choice:  3
Display tree in Postorder 36->589->345-> 4
0.create 4
1.insert 4
2.preorder 4
```

| |
|---|
| 3.postorder 4 |
| 4.inorder 4 |
| 5.exit 4 |
| Enter your choice: 4 |
| Display tree in Inorder 36->345->589-> 5 |
| 0.create 5 |
| 1.insert 5 |
| 2.preorder 5 |
| 3.postorder 5 |
| 4.inorder 5 |
| 5.exit 5 |
| Enter your choice: 5 |

| Test Case - 2 |
|---|
| User Output |
| 0.create 0 |
| 1.insert 0 |
| 2.preorder 0 |
| 3.postorder 0 |
| 4.inorder 0 |
| 5.exit 0 |
| Enter your choice: 0 |
| Enter the data: 21 |
| 0.create 0 |
| 1.insert 0 |
| 2.preorder 0 |
| 3.postorder 0 |
| 4.inorder 0 |
| 5.exit 0 |
| Enter your choice: 0 |
| Enter the data: 325 |
| 0.create 1 |
| 1.insert 1 |
| 2.preorder 1 |
| 3.postorder 1 |
| 4.inorder 1 |
| 5.exit 1 |
| Enter your choice: 1 |
| Enter the data: 586 |
| 0.create 0 |
| 1.insert 0 |
| 2.preorder 0 |
| 3.postorder 0 |
| 4.inorder 0 |
| 5.exit 0 |
| Enter your choice: 0 |
| Enter the data: 26 |
| 0.create 1 |
| 1.insert 1 |
| 2.preorder 1 |

| |
|---|
| 3.postorder 1 |
| 4.inorder 1 |
| 5.exit 1 |
| Enter your choice: 1 |
| Enter the data: 478 |
| 0.create 1 |
| 1.insert 1 |
| 2.preorder 1 |
| 3.postorder 1 |
| 4.inorder 1 |
| 5.exit 1 |
| Enter your choice: 1 |
| Enter the data: 213 |
| 0.create 1 |
| 1.insert 1 |
| 2.preorder 1 |
| 3.postorder 1 |
| 4.inorder 1 |
| 5.exit 1 |
| Enter your choice: 1 |
| Enter the data: 36 |
| 0.create 1 |
| 1.insert 1 |
| 2.preorder 1 |
| 3.postorder 1 |
| 4.inorder 1 |
| 5.exit 1 |
| Enter your choice: 1 |
| Enter the data: 21 |
| 0.create 1 |
| 1.insert 1 |
| 2.preorder 1 |
| 3.postorder 1 |
| 4.inorder 1 |
| 5.exit 1 |
| Enter your choice: 1 |
| Enter the data: 2245 |
| 0.create 2 |
| 1.insert 2 |
| 2.preorder 2 |
| 3.postorder 2 |
| 4.inorder 2 |
| 5.exit 2 |
| Enter your choice: 2 |
| Display tree in Preorder 26->21->478->213->36->2245-> 3 |
| 0.create 3 |
| 1.insert 3 |
| 2.preorder 3 |
| 3.postorder 3 |
| 4.inorder 3 |
| 5.exit 3 |

| |
|---|
| Enter your choice: 3 |
| Display tree in Postorder 21->36->213->2245->478->26-> 4 |
| 0.create 4 |
| 1.insert 4 |
| 2.preorder 4 |
| 3.postorder 4 |
| 4.inorder 4 |
| 5.exit 4 |
| Enter your choice: 4 |
| Display tree in Inorder 21->26->36->213->478->2245-> 5 |
| 0.create 5 |
| 1.insert 5 |
| 2.preorder 5 |
| 3.postorder 5 |
| 4.inorder 5 |
| 5.exit 5 |
| Enter your choice: 5 |