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VIDYAVIHAR

K J Somaiya Institute of Technology

An Autonomous Institute Permanently Affiliated to the University of Mumbai

DEPARTMENT OF INFORMATION TECHNOLOGY

Course Name and Code: Data Structures Lab (ITL302)

Semester: III (SYIT)

Academic Year: 2024-25 (Odd Semester)

Experiment No. 06

Aim: Implementation of Binary Tree and its Traversal for real-world application.

Code:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <malloc.h>
4 struct node{
5     int data;
6     struct node *left;
7     struct node *right;
8 };
9
10 struct node *tree;
11 void create(struct node *);
12 struct node *insert(struct node *, int);
13 void inorder(struct node *);
14 void preorder(struct node *);
15 void postorder(struct node *);
16
17 int main(){
18     printf("\n --- Welcome To Implementation Of Binary Tree Traversals --- \n");
19     int choice, x;
20     struct node *ptr;
21     create(tree);
22     do{
23         printf("\n 1. Insert a Node");
24         printf("\n 2. Display Inorder Traversal");
25         printf("\n 3. Display Preorder Traversal");
26         printf("\n 4. Display Postorder Traversal");
27         printf("\n *** --- Operations Available --- *** ");
28         printf("\n 5. Exit \n");
29         printf(" Please enter your choice: ");
30         scanf("%d", &choice);
31         switch (choice){
32             case 1: printf("\n Enter the data to be inserted: "); scanf("%d", &x);
33                     tree = insert(tree, x);
34                     break;
35             case 2: printf("\n Elements in the inorder traversals are: "); inorder(tree);
36                     printf("\n");
37                     break;
38             case 3: printf("\n Elements in the preorder traversals are: "); preorder(tree);
39                     printf("\n");
40                     break;
41             case 4: printf("\n Elements in the postorder traversals are : "); postorder(tree);
42                     printf("\n");
43                     break;
44         }
```



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```
44
45     case 5: printf("Exit: Program Finished !!");
46             break;
47     default: printf("\n Please enter a valid option 1, 2, 3, 4, 5.");
48             break;
49 }
50 }while (choice != 5);
51 }
52
53 void create(struct node *tree){
54     tree = NULL;
55 }
56
57 struct node *insert(struct node *tree, int x){
58     struct node *p, *temp, *root;
59     p = (struct node *)malloc(sizeof(struct node));
60     p->data = x;
61     p->left = NULL;
62     p->right = NULL;
63     if (tree== NULL){
64         tree = p;
65         tree->left = NULL;
66         tree->right = NULL;
67     }
68     else{
69         root = NULL;
70         temp = tree;
71         while (temp != NULL){
72             root = temp;
73             if (x < temp->data)
74                 temp = temp->left;
75             else
76                 temp = temp->right;
77         }
78         if (x < root->data)
79             root->left = p;
80         else
81             root->right = p;
82     }
83     return tree;
84 }
85
86 void inorder(struct node *tree){
87     if (tree != NULL){
88         inorder (tree->left);
89         printf("%d \t", tree->data);
90         inorder(tree->right);
91     }
92 }
93
94 void preorder(struct node *tree){
95     if (tree != NULL){
96         printf("%d \t", tree->data);
97         preorder(tree->left);
98         preorder(tree->right);
99     }
100 }
101
102 void postorder (struct node *tree){
103     if (tree != NULL){
104         postorder(tree->left);
105         postorder(tree->right);
106         printf("%d \t", tree->data);
107     }
108 }
```



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Output:

```
oem@master-node:~$ gcc abhidsaexp6.C
oem@master-node:~$ ./a.out

--- Welcome To Implementation Of Binary Tree Traversals ---

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Opertaions Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 42

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Opertaions Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 37

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Opertaions Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 35

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Opertaions Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 16
```



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```
1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Operations Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 24

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Operations Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 52

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Operations Available --- ***
5. Exit
Please enter your choice: 1

Enter the data to be inserted: 85

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Operations Available --- ***
5. Exit
Please enter your choice: 2

Elements in the inorder traversals are: 16    24    35    37    42    52    85

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Operations Available --- ***
5. Exit
Please enter your choice: 3

Elements in the preorder traversals are: 42    37    35    16    24    52    85

1. Insert a Node
2. Display Inorder Traversal
3. Display Preorder Traversal
4. Display Postorder Traversal
*** --- Operations Available --- ***
5. Exit
Please enter your choice: 4

Elements in the postorder traversals are : 24    16    35    37    85    52    42
```

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