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CLASS : SE

BATCH : A4

ROLL NO.: SEAD21168

B-19

Problem Statement

Convert given binary tree into threaded binary tree. Analyze time and space complexity of the algorithm.

CODE:

```
#include<iostream>
using namespace std;
class node {
        public :
                        int data;
                        int lth,rth;
                        node *right,*left;
        };
        class TBT {
                public :            node * root,* head;
        TBT() {
                        head = new node;
                        head->right = head;
                        head->left = head;
                        head->lth = 1;
                        head->rth = 0;
                        root = NULL;
                }
                        void create();
                        void preorder();
                        void inorder();
```

```
        node * inorderSucc(node *);
};
void TBT :: create() {
        node *temp,*curr;
        char ch;
        do {
                curr = new node;
                cout<<"\n Enter the data : ";
                cin>>curr->data;
                curr->right = NULL;
                curr->left = NULL;
                curr->lth = 1;
                curr->rth = 1;
if(root == NULL)
                {
                        root = curr;
                        root->right = head;
                        root->left = head;
                        head->left = root;
                        head->lth = 0;
} else
                {
                        temp = root;
while(1)
        {
                if(curr->data < temp->data)
                        {
                        if(temp->lth == 1)
                        {
                        curr->left = temp->left;
                        curr->right = temp;
```

```
            temp->lth = 0;
            temp->left = curr;
            break;
                        }
                        else
                        {
            temp = temp->left;
}
            }
            else
            {
            if(temp->rth == 1)
            {
            curr->right = temp->right;
            curr->left = temp;
            temp->rth = 0;
            temp->right = curr;
            break;
            }
            else
                                    {
                        temp = temp->right;
                                    }
                                    }
                                    }
cout<<"\n Do you want to continue (Y/N) :  ";
cin>>ch;
}while(ch == 'y' || ch == 'Y');
}
```

```
void TBT :: preorder() {
node * temp;
int flag = 0;
temp = root;
while(temp != head)
        {
        if(flag == 0)
                        cout<<temp->data<< "  ";
        if(temp->lth == 0 && flag == 0) {
                        temp = temp->left;
                }
        else if( temp->rth == 0){
                        temp = temp->right;
                        flag = 0;
        } else {
                temp = temp->right;
                flag = 1;
}
        }
}
void TBT :: inorder() {
        node* temp;
        temp = head;
        do{
                temp = inorderSucc(temp);
                if(temp!= head)
                        cout<<temp->data<<" ";
        }while(temp != head);
}
node * TBT :: inorderSucc(node * temp) {
node * p;
```

```
            p = temp->right;
            if(temp->rth == 0) {
                  while(p->lth == 0) {
                        p = p->left;
                  }     }
            return p;
            }
      int main()
      {
            TBT t;
            cout<<"\n Create a binary tree : ";
            t.create();
            cout<<"\n Preorder traversal is : ";
            t.preorder();
            cout<<"\n Inorder traversal is : ";
            t.inorder();
      return 0;
      }
```

OUTPUT:

```
PS C:\Users\tanis\OneDrive\Desktop\Tanishq_Gupta_21168> g++ .\b9.cpp
PS C:\Users\tanis\OneDrive\Desktop\Tanishq_Gupta_21168> .\a.exe

 Create a binary tree :
 Enter the data : 12

 Do you want to continue (Y/N) :  y

 Enter the data : 4

 Do you want to continue (Y/N) :  y

 Enter the data : 7

 Do you want to continue (Y/N) :  y

 Enter the data : 17

 Do you want to continue (Y/N) :  n

 Preorder traversal is : 12  4  7  17
 Inorder traversal is : 4 7 12 17
PS C:\Users\tanis\OneDrive\Desktop\Tanishq_Gupta_21168>
```