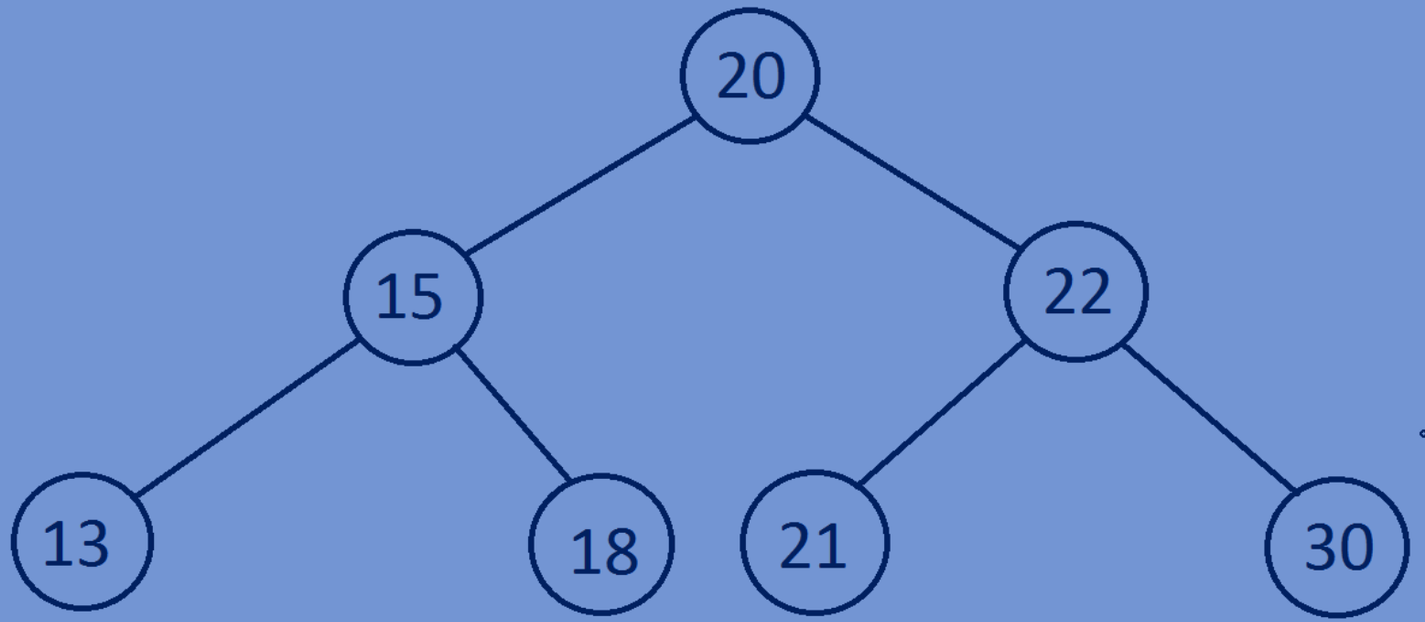
Data Structures

Implementation of Binary Search Tree

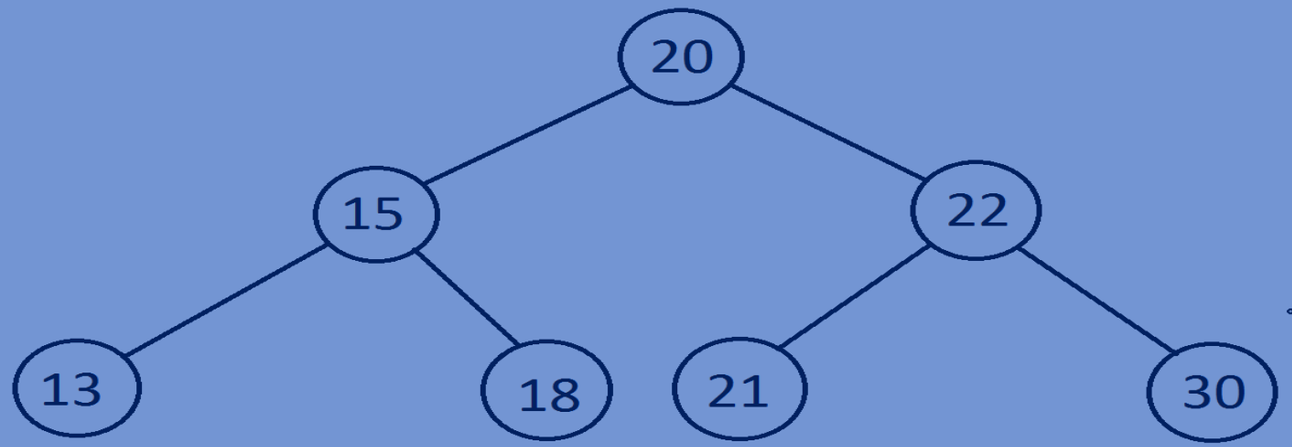
Binary Search Tree:

- A Binary Search tree is a binary tree in which value of left sub-tree node is Less than or equal to its parent nodes value and the value of right sub-tree Node is greater than its parent nodes value,here for each node,value of all the nodes in left subtree is lesser and value of all the nodes in right subtree is greater.



Implementation of Binary Search Tree:

- If root is equal to NULL we make the newly created node(newnode) as the root.
- If the data in the newnode is less than or equal to the data of the root node then We make a recursive call of the function to insert the newnode in the left Subtree and then set the new root of the left subtree in root->left.
  root->left=InsertNodeintoBStree(root->left,newnode).
- If the data in the newnode is greater than the data of the root node then We make a recursive call of the function to insert the newnode in the right Subtree and then set the new root of the right subtree in root->right.
  root->right=InsertNodeintoBStree(root->right,newnode).



Function for Creating of a Binary Search Tree:

```
BStree *InsertNodeintoBStree(BStree *root,BStree *newnode){
    if(root==NULL){
        root=newnode;
        return root;
    }
    if(newnode->data<=root->data){
        root->left=InsertNodeintoBStree(root->left,newnode);
    }
    else if(newnode->data>root->data){
        root->right=InsertNodeintoBStree(root->right,newnode);
    }
    return root;
}
BStree *implementBStree(BStree *root,int n){
    for(int i=1;i<=n;i++){
        BStree *newnode=(BStree*)malloc(sizeof(BStree));
        newnode->data=i*2;
        newnode->left=NULL;
        newnode->right=NULL;
        root=InsertNodeintoBStree(root,newnode);
    }
    return root;
}
```

Whole Program:

```c
#include<stdio.h>
#include<stdlib.h>
//creating a node
typedef  struct BStree{
    int data;
    struct BStree *left;
    struct BStree *right;
}BStree;
//Function for inserting nodes into a binary search tree.
BStree *InsertNodeintoBStree(BStree *root,BStree *newnode){
    if(root==NULL){
        root=newnode;
        return root;
    }
    if(newnode->data<=root->data){
        root->left=InsertNodeintoBStree(root->left,newnode);
    }
    else if(newnode->data>root->data){
```

```
        root->right=InsertNodeintoBStree(root->right,newnode);
    }
    return root;
}
//creating new nodes
BStree *implementBStree(BStree *root,int n){
    for(int i=1;i<=n;i++){
        BStree *newnode=(BStree*)malloc(sizeof(BStree));
        newnode->data=i*2;
        newnode->left=NULL;
        newnode->right=NULL;
        root=InsertNodeintoBStree(root,newnode);
    }
    return root;
}
//printing the data in ascending order(inorder traversal)
void printAscendingorder(BStree *root){
    if(root){
        printAscendingorder(root->left);
        printf("%d ",root->data);
        printAscendingorder(root->right);
    }
```

```
}
//main function
int main(){
    BStree *root=NULL;
    root=implementBStree(root,8);
    printAscendingorder(root);
    return 0;
}
```

Output:

2 4 6 8 10 12 14 16