

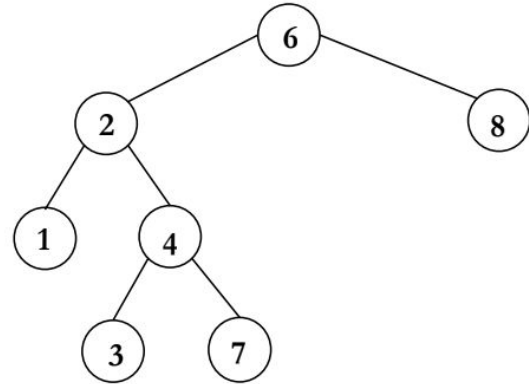
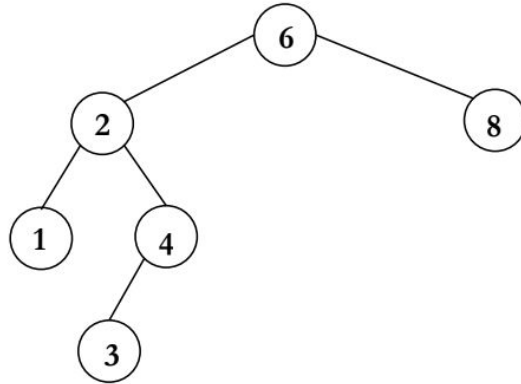
The background of the slide features a large, light blue watermark of the Hanyang University logo. The logo is circular, with the words "HANYANG UNIVERSITY" around the top edge and "한양" (Hanyang) in the center. Below the center, the year "1939" is visible. The logo is partially obscured by the title text.

Lab 05: Binary Search Tree

Data Structure 2023

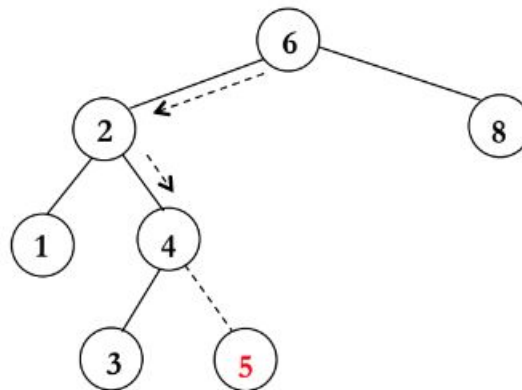
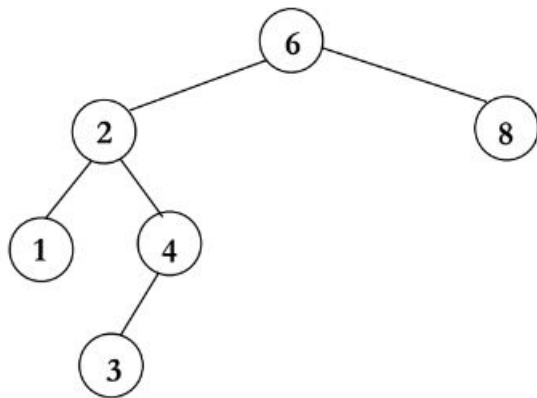
Binary Search Tree

- Which one can be the Binary Search Tree?



Binary Search Tree

- **For every node X in the tree,**
 - The values of all the keys in its left subtree are smaller than the key value in X.
 - The values of all the keys in its right subtree are larger than the key value in X.



Binary Search Tree ADT

- **insertNode** Insert a new node with the key value into the tree. If the key already exists in the tree, print an error message.
- **deleteNode** Delete a node with the given key value from the tree. Reform tree using right subtree. If the key does not exist in the tree, print an error message.
- **findNode** Find the key value in the binary search tree. If the key does not exist, print an error message.
- **printInorder** Print the tree by inorder traversal.
- **deleteTree** Delete the tree.

Binary Search Tree ADT

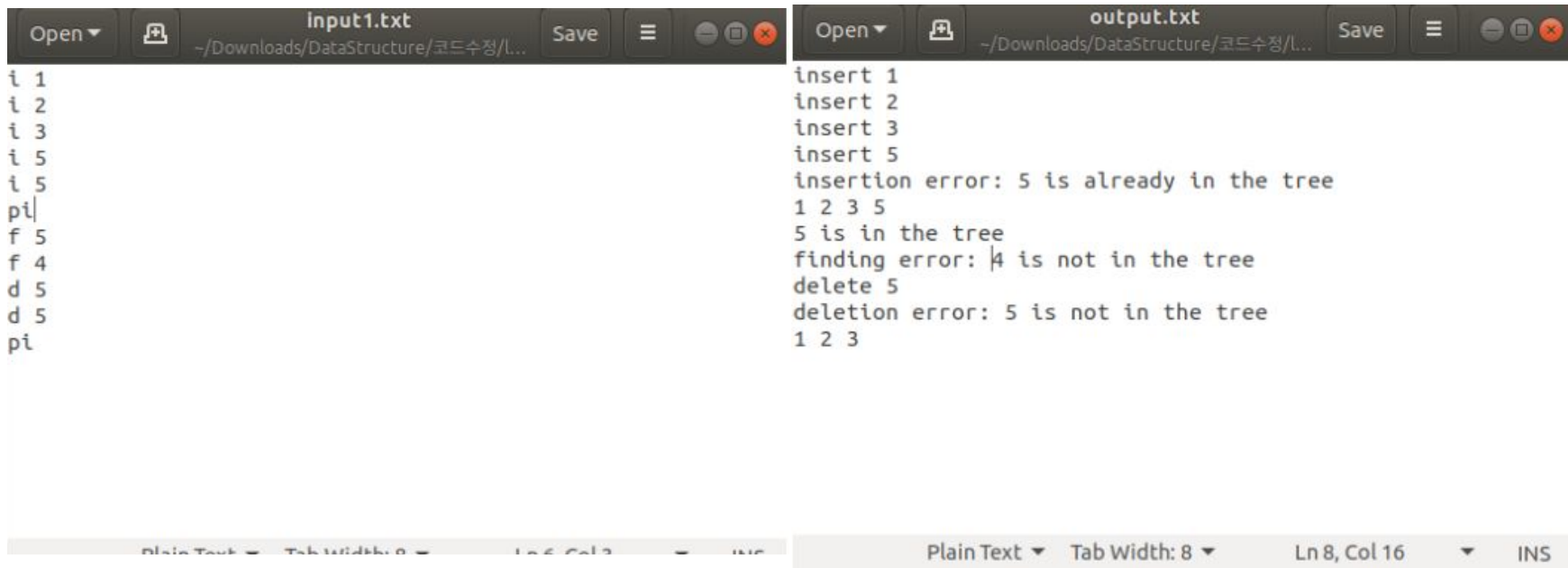
Structure

```
Typedef struct BST* Tree;  
typedef struct BST{  
    int value;  
    struct BST* left;  
    struct BST* right;  
}BST;
```

Function

```
Tree insertNode(Tree root, int key);  
Tree deleteNode(Tree root, int key);  
int findNode(Tree root, int key);  
void printInorder(Tree root);  
void deleteTree(Tree root);
```

Input & Output Example



The image shows two side-by-side text editor windows. The left window, titled 'Input1.txt', contains a list of commands: 'i 1', 'i 2', 'i 3', 'i 5', 'i 5', 'pi|', 'f 5', 'f 4', 'd 5', 'd 5', and 'pi'. The right window, titled 'output.txt', shows the corresponding program output: 'insert 1', 'insert 2', 'insert 3', 'insert 5', 'insertion error: 5 is already in the tree', '1 2 3 5', '5 is in the tree', 'finding error: 4 is not in the tree', 'delete 5', 'deletion error: 5 is not in the tree', and '1 2 3'. Both windows have a status bar at the bottom indicating 'Plain Text', 'Tab Width: 8', and the current cursor position 'Ln 8, Col 16'.

```
Input1.txt
i 1
i 2
i 3
i 5
i 5
pi|
f 5
f 4
d 5
d 5
pi

output.txt
insert 1
insert 2
insert 3
insert 5
insertion error: 5 is already in the tree
1 2 3 5
5 is in the tree
finding error: 4 is not in the tree
delete 5
deletion error: 5 is not in the tree
1 2 3
```

Assignment

- Due
 - ~ **2022.04.12(수) 23:59**
 - Last Commit 기준

- 자세한 내용은 과제 명세 PDF 파일 참고