

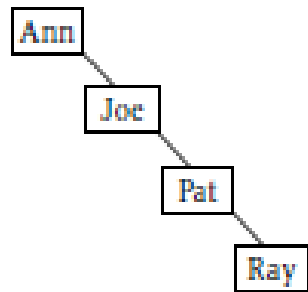
# Binary Search Trees (BST)

Textbook Reading:

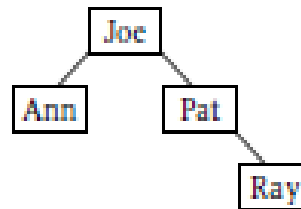
Chapter 4, Section 4.5, pp. 163-166.

# Binary Search Trees (BFT)

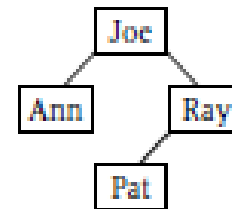
Examples for keys  $\text{Ann} < \text{Joe} < \text{Pat} < \text{Ray}$



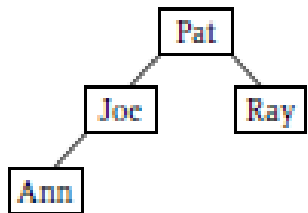
(a)



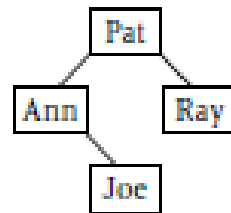
(b)



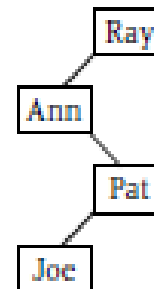
(c)



(d)



(e)



(f)

# Inorder Traversal

Performing an inorder traversal of a BST will output the keys in sorted order.

Conversely, given any binary tree and assigning a set of keys  $K_0 < K_1 < \dots < K_{n-1}$  to the nodes of a tree in inorder, i.e., scanning the keys and assigning them to the binary search tree using an in order traversal, results in a BST.

# PSN. Searching a BST

Write a recursive function SearchBST in C++ for search a binary tree for a Search Key. If found it returns pointer to node where found otherwise it returns NULL.

Assume the nodes of the tree are implemented using the structure:

```
typedef int KeyType;
```

```
struct Node {
```

```
    KeyType Key;
```

```
    Node *Left;
```

```
    Node *Right ;
```

```
}; //END TREENODE
```

```
typedef *Node ptrNode;
```

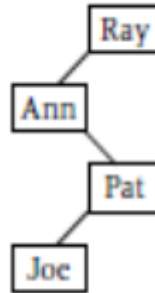
# PSN. Inserting into a BST

Write a C++ recursive function  
InsertBST for inserting into a BST.

# Preorder Traversal

Storing records of a BST in sequential file using a preorder traversal allows the BST to be recovered by reading records sequentially from file and inserting into BST, where initial BST is the null tree.

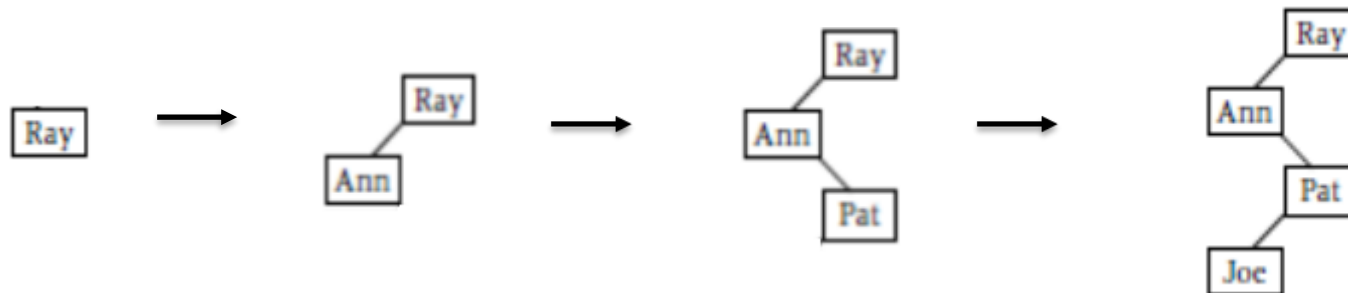
# Illustration



Storage in File using Preorder Traversal:

Ray, Ann, Pat, Joe

Reading File Sequentially and inserting



# Deleting from a BST

1. If a node to be deleted is a leaf, just delete it.
2. If a node to be deleted has just one child, replace it with that child.
3. If a node to be deleted has two children, replace the value of by its in-order successor's value then delete the in-order successor by applying either 1. or 2. (could also use in-order predecessor).



After years of searching, I finally found a great herb joke.

It's about thyme.

