

CSc 352

Binary Tree with Structs

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Linked List

Previously build linked list with structs

```
typedef struct ListNode {  
    int value;  
    struct ListNode* next;  
} ListNode;
```

What would a Binary Tree node look like?

Binary Tree

Previously build linked list with structs

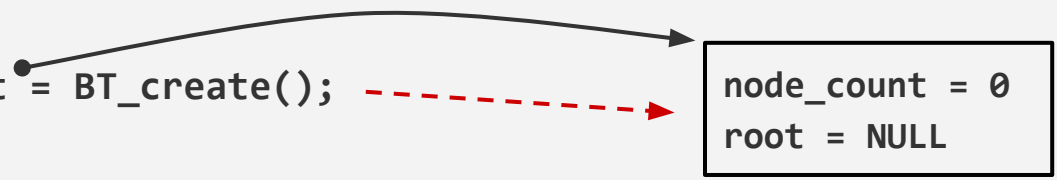
```
typedef struct BinaryTreeNode {  
    void* value;  
    struct BinaryTreeNode* left;  
    struct BinaryTreeNode* right;  
} BinaryTreeNode;
```

Generic value pointer

```
typedef struct BinaryTree {  
    int node_count;  
    struct BinaryTreeNode* root;  
} BinaryTree;
```

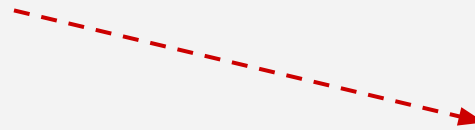
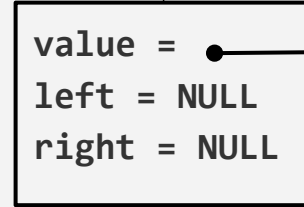
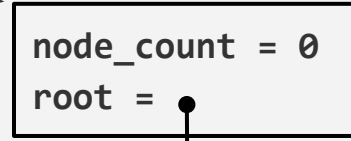
```
BinaryTree* bt = BT_create();
```

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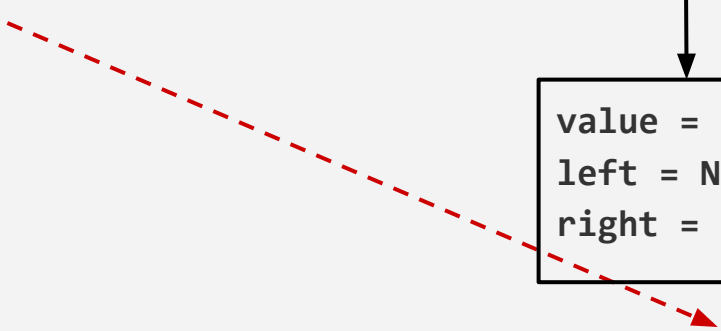
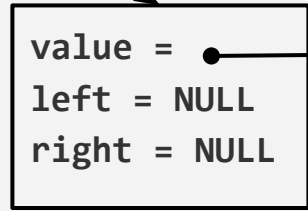
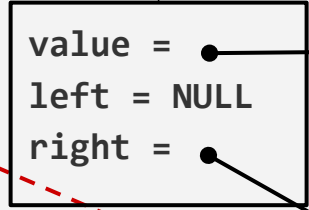
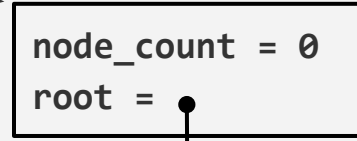


```
node_count = 0  
root = NULL
```

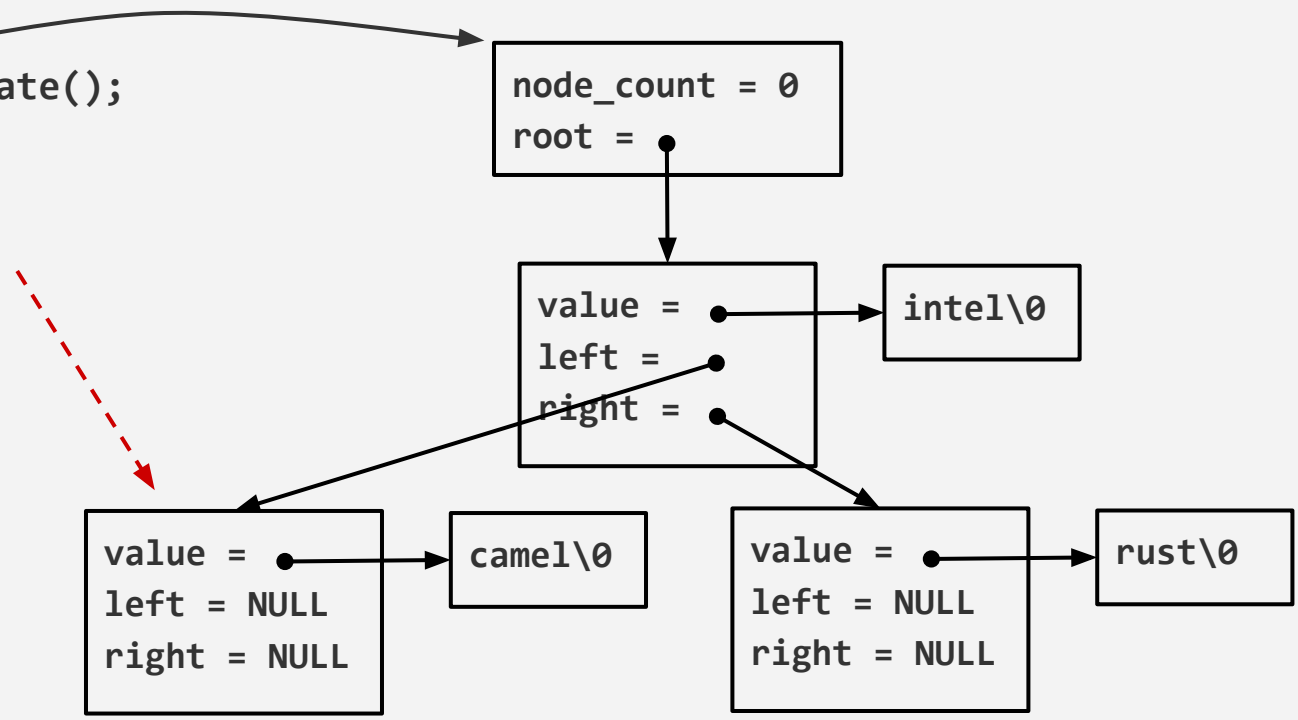
```
BinaryTree* bt = BT_create();  
BT_insert(bt, "intel");
```



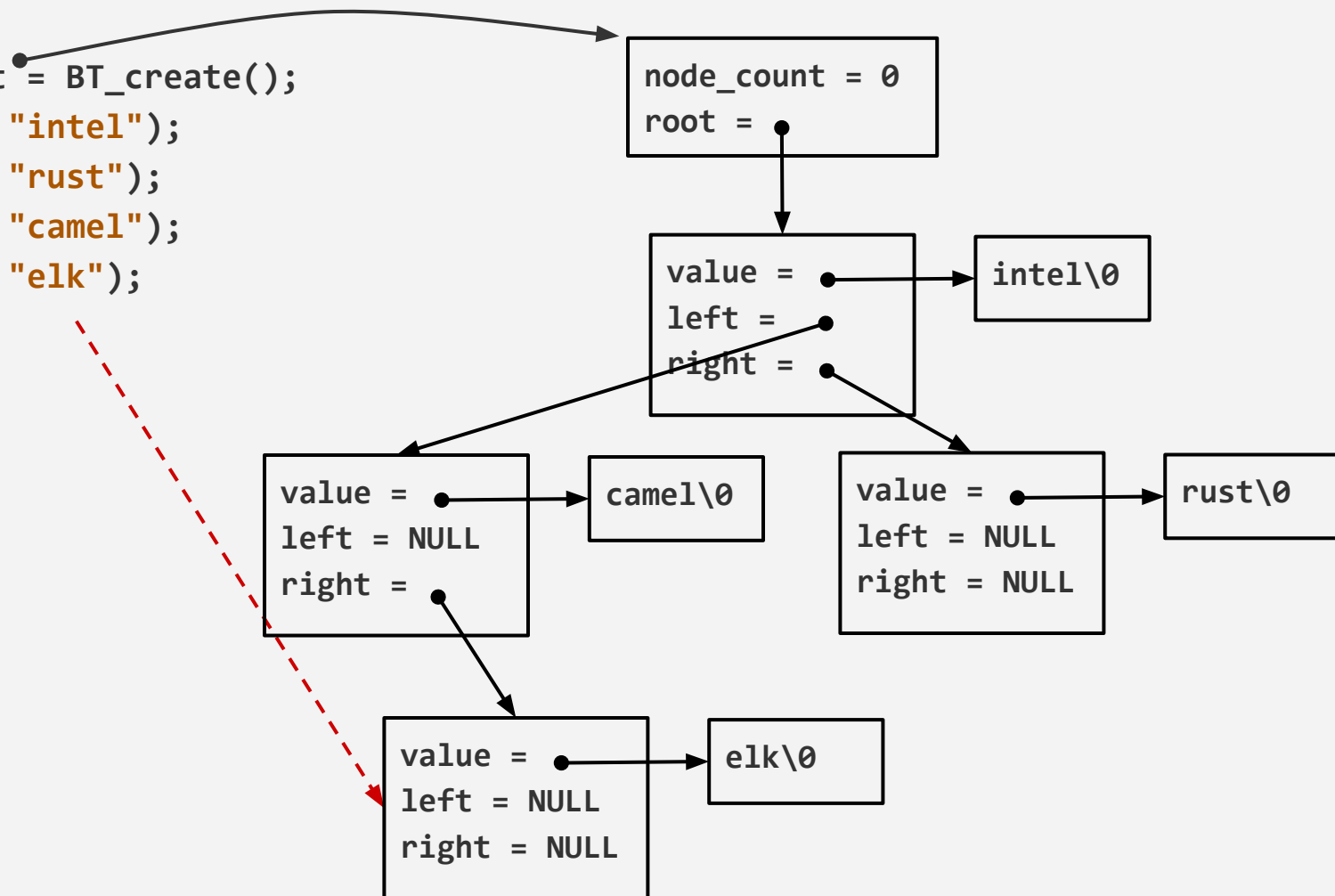
```
BinaryTree* bt = BT_create();  
BT_insert(bt, "intel");  
BT_insert(bt, "rust");
```



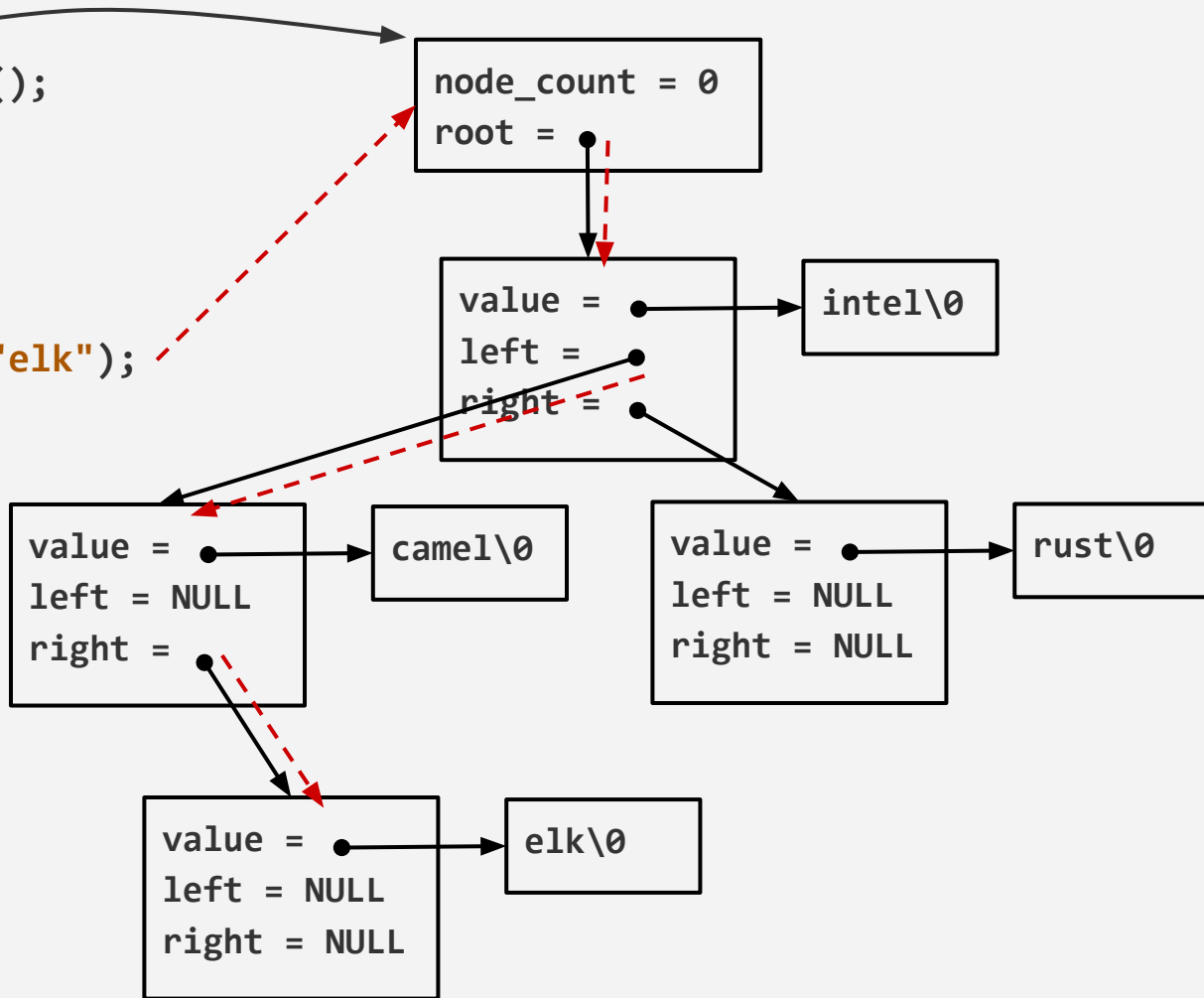
```
BinaryTree* bt = BT_create();  
BT_insert(bt, "intel");  
BT_insert(bt, "rust");  
BT_insert(bt, "camel");
```



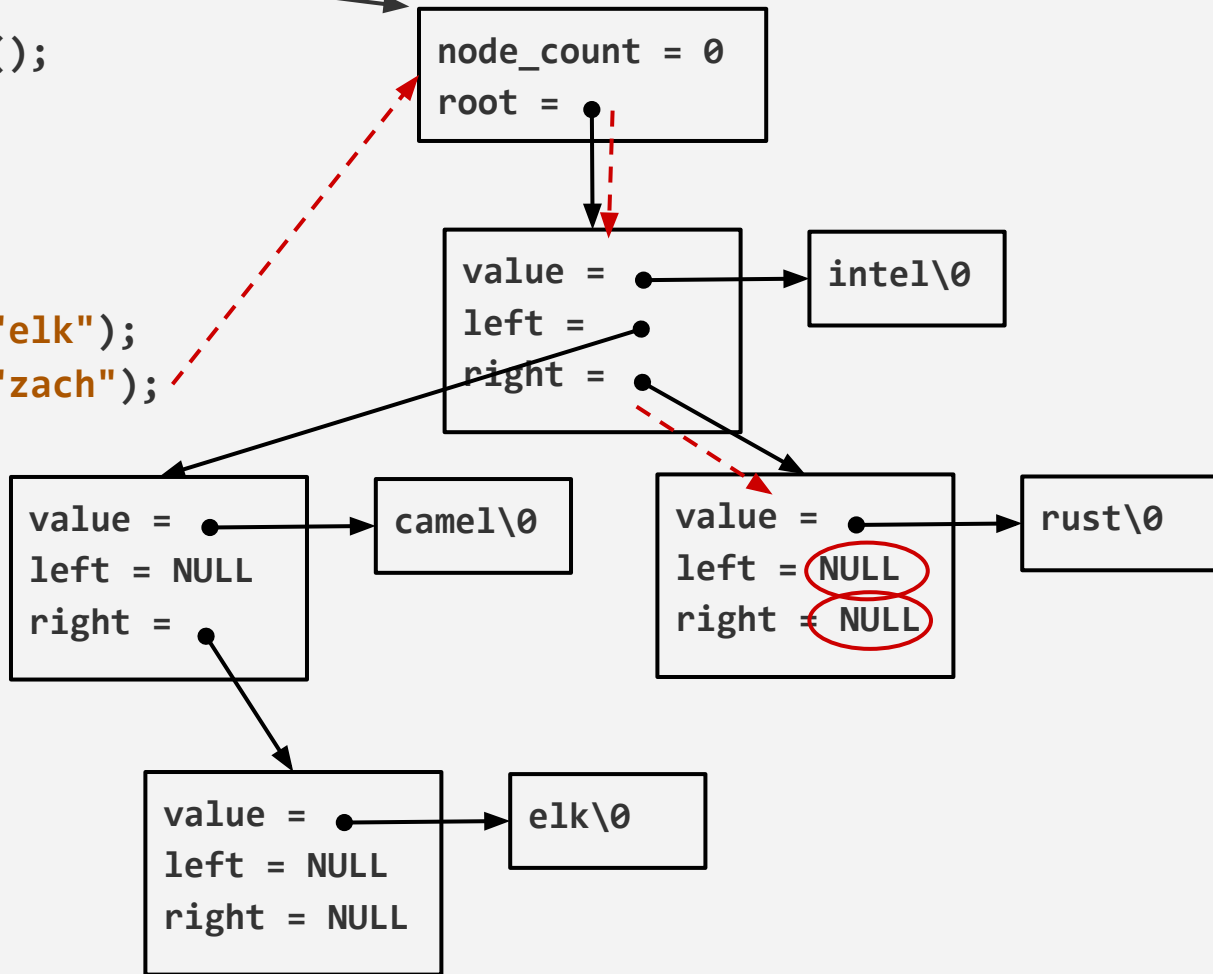

```
BinaryTree* bt = BT_create();  
BT_insert(bt, "intel");  
BT_insert(bt, "rust");  
BT_insert(bt, "camel");  
BT_insert(bt, "elk");
```



```
BinaryTree* bt = BT_create();  
BT_insert(bt, "intel");  
BT_insert(bt, "rust");  
BT_insert(bt, "camel");  
BT_insert(bt, "elk");  
bool c1 = BT_contains(bt, "elk");
```



```
BinaryTree* bt = BT_create();  
BT_insert(bt, "intel");  
BT_insert(bt, "rust");  
BT_insert(bt, "camel");  
BT_insert(bt, "elk");  
bool c1 = BT_contains(bt, "elk");  
bool c2 = BT_contains(bt, "zach");
```



Implement the Binary Tree

Implement:

```
BinaryTree* BT_create();  
void BT_insert(  
    BinaryTree* bt, char* val);  
bool BT_contains(  
    BinaryTree* bt, char* val);
```

Use these structs

```
typedef struct BinaryTreeNode {  
    void* value;  
    struct BinaryTreeNode* left;  
    struct BinaryTreeNode* right;  
} BinaryTreeNode;  
  
typedef struct BinaryTree {  
    int node_count;  
    struct BinaryTreeNode* root;  
} BinaryTree;
```

