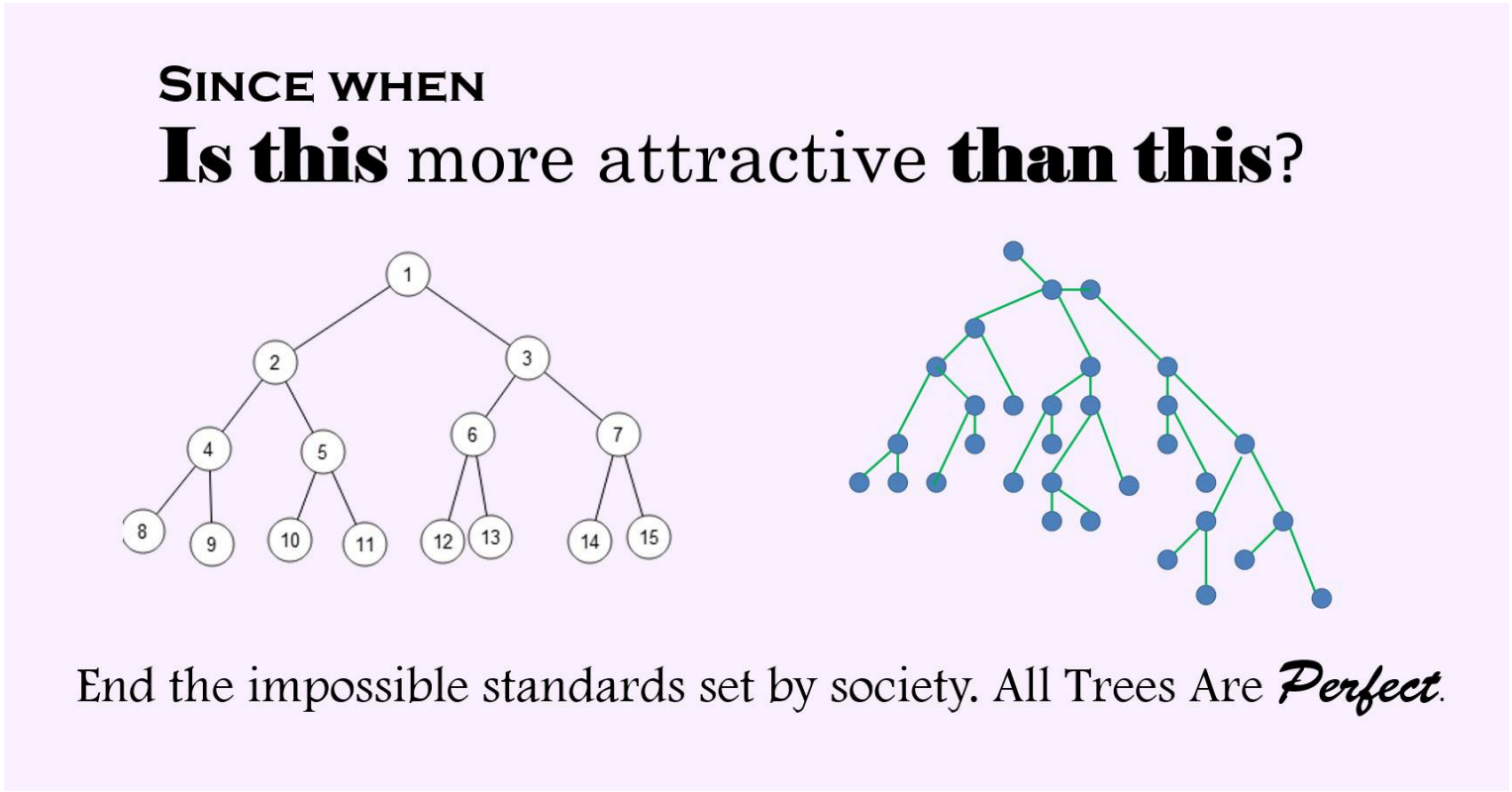
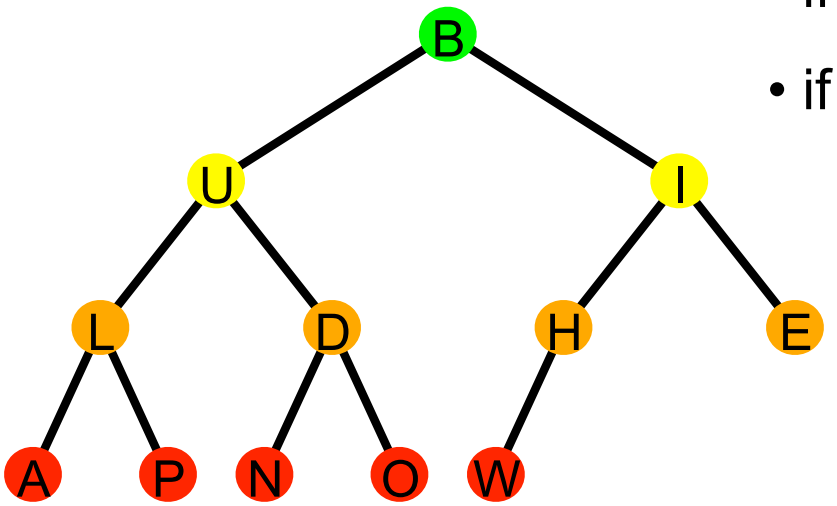
Announcements

MP4 available, due 3/10/17, 11:59p. EC due 3/3/17, 11:59p.



Complete Binary tree: for any level k in [0,h-1], level k has 2^k nodes, and on level h, all nodes are "pushed to the left."



Complete tree of height h, C_h:

- if h= -1, then C_h is {}
- if h > -1, then C_h is {r, T_L, T_R}, and either:

T_L is _____ and T_R is _____

OR

T_L is _____ and T_R is _____

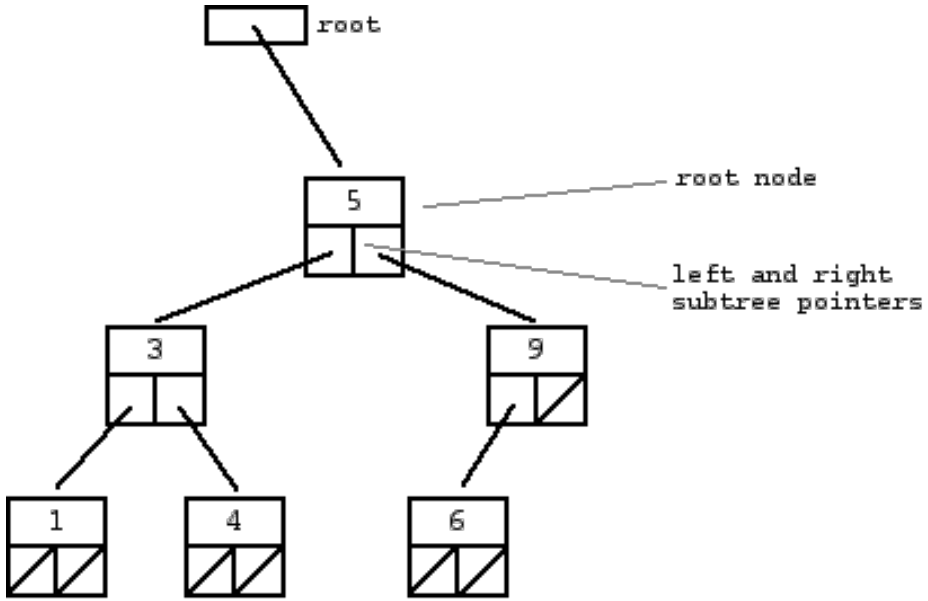
http://xlinux.nist.gov/dads//HTML/completeBinaryTree.html

Check for understanding:

Is every full tree complete?

Is every complete tree full?

Rooted, directed, ordered, binary trees

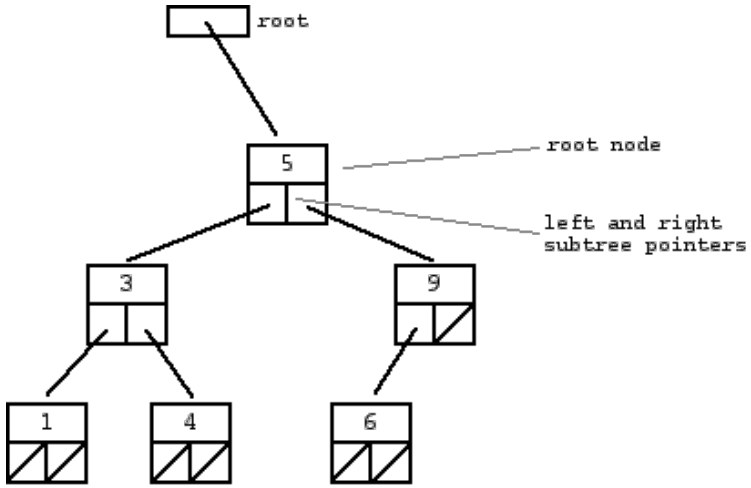


Tree ADT:

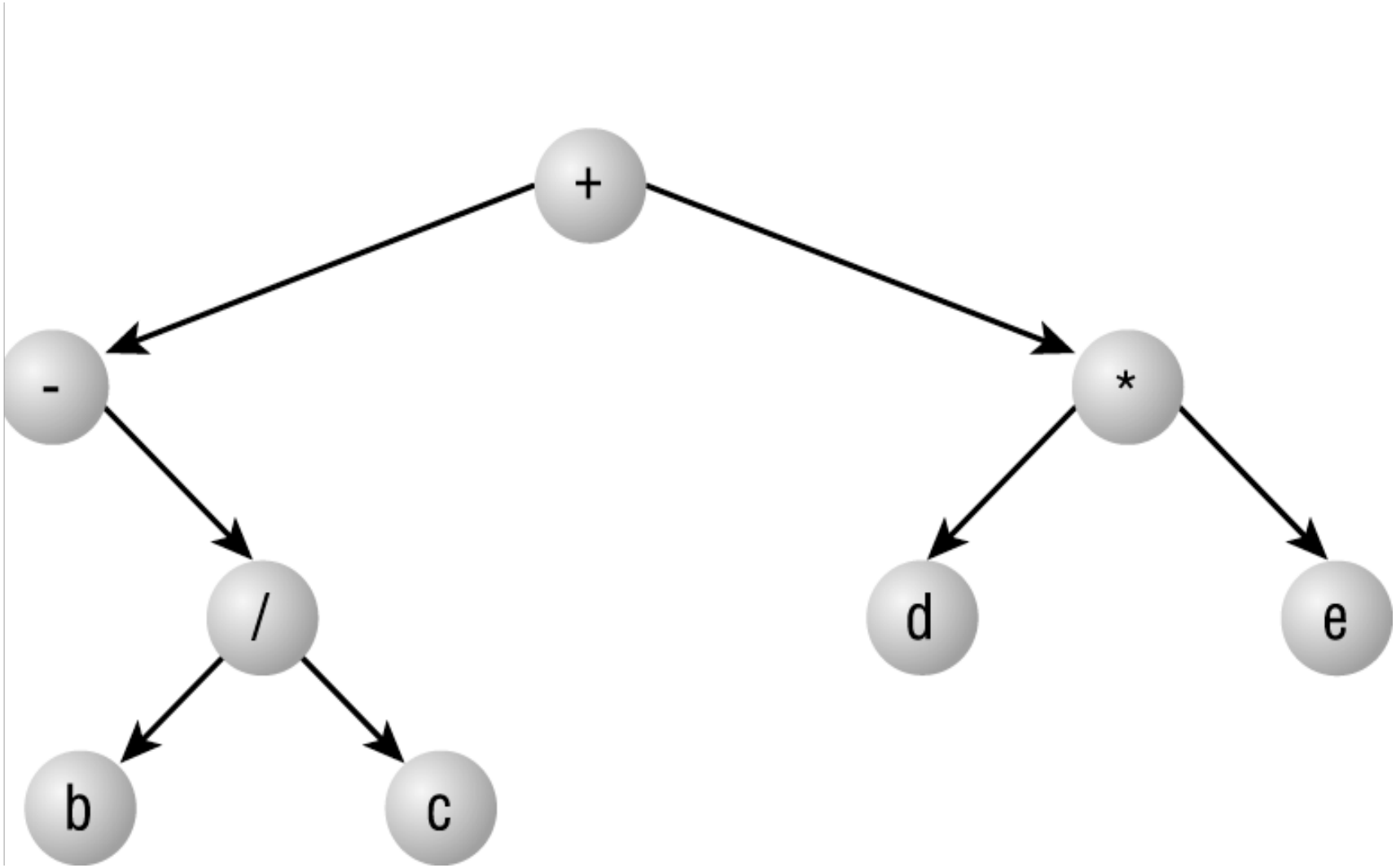
- insert
- remove
- traverse

```
template <class T>
class tree{
public:
…
private:
   struct treeNode{
      T data;
      treeNode * left;
      treeNode * right;
   };
   treeNode * root
…
};
```

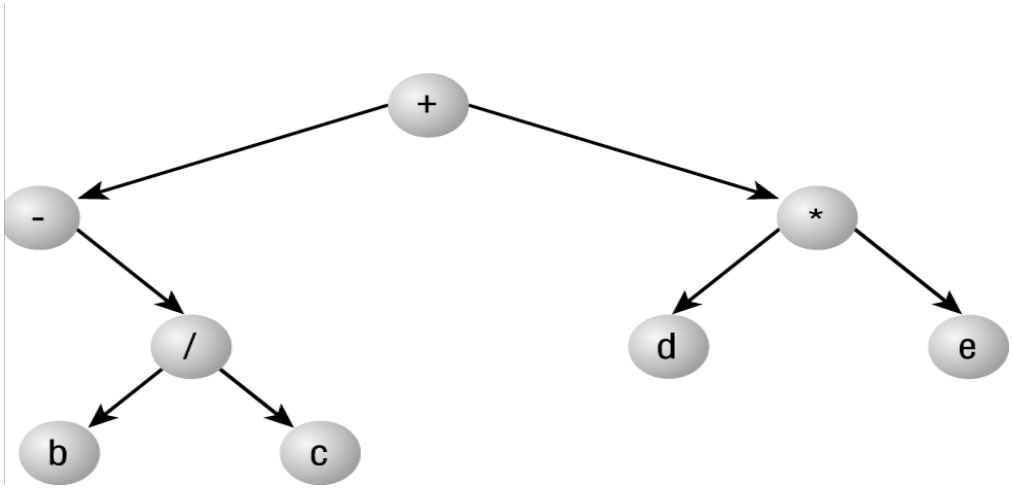
Theorem: if there are n data items in a binary tree, then there are _____ null pointers.



Traversals



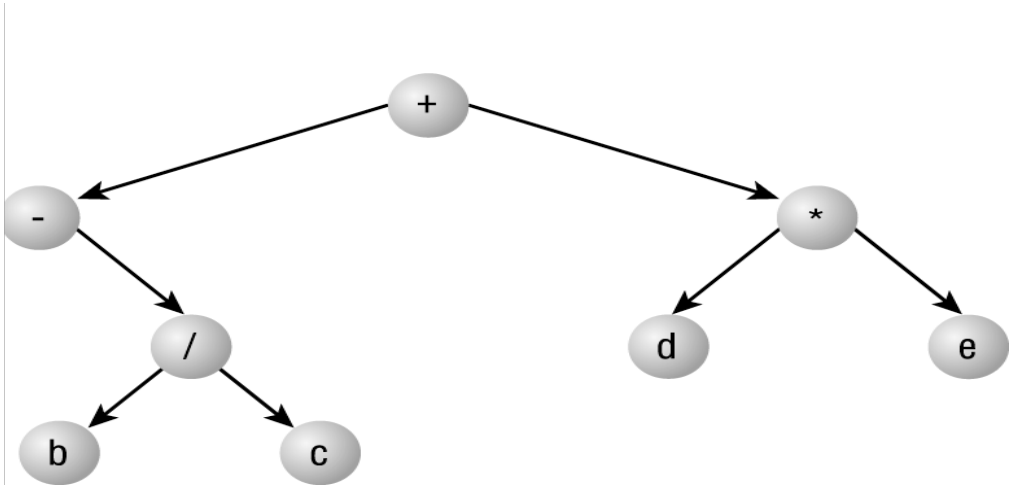
Traversals: A few discussion points…




```
template<class T>
void binaryTree<T>::_____Order(treeNode * croot){
     if (croot != null){
          ____________________________
          _____Order(croot->left);
          ____________________________
          _____Order(croot->right);
          ____________________________
     }
}
```

1. Where is the base case?

Traversals: A few discussion points…

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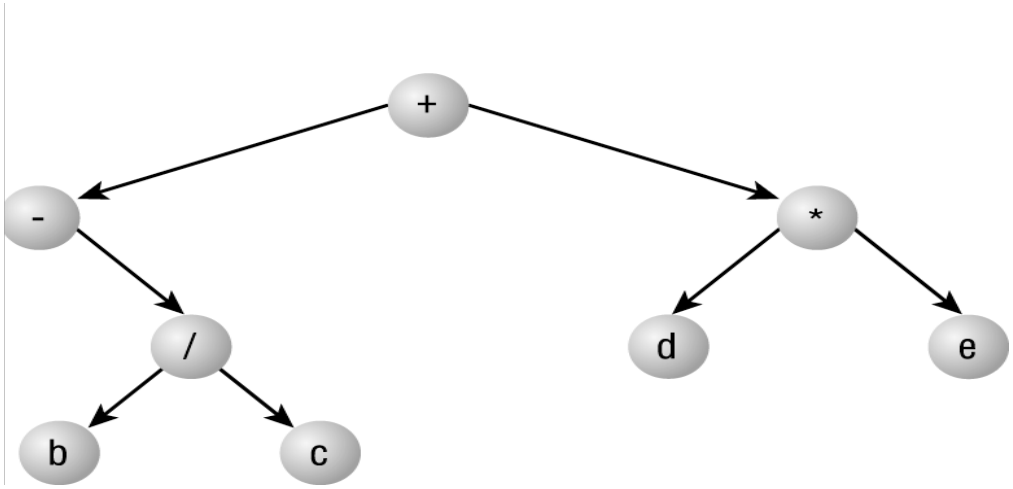
}
```

2. Running time?

Traversals: A few discussion points…

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     }
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```

3. Is this function public or private?