#14: Trees and our First Tree Proof

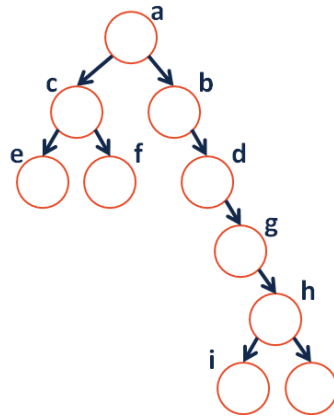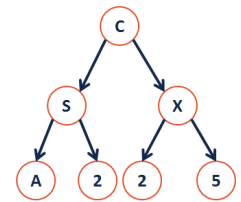*February 15, 2018 · Fagen-Ulmschneider, Zilles*

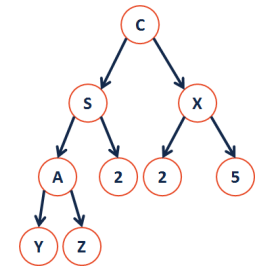We will primarily talk about **binary trees:**
- How many parents does each vertex have?
- Which vertex has the fewest **children**?
- Which vertex has the most **ancestors**?
- Which vertex has the most **descendants**?
- List all the vertices is b's left **subtree**.
- List all the **leaves** in the tree.

Definition: Binary Tree
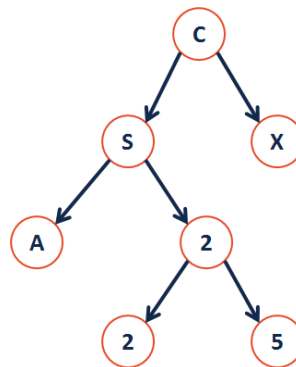
A *binary tree* **T** is:

The height of a tree **T** is:

Tree Property: Full

Tree Property: Perfect

Tree Property: Complete
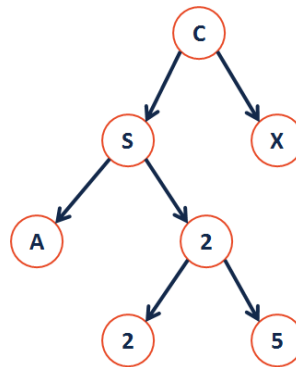
Towards a Tree Implementation – Tree ADT:

ADT Functionality (English Description)	Function Call

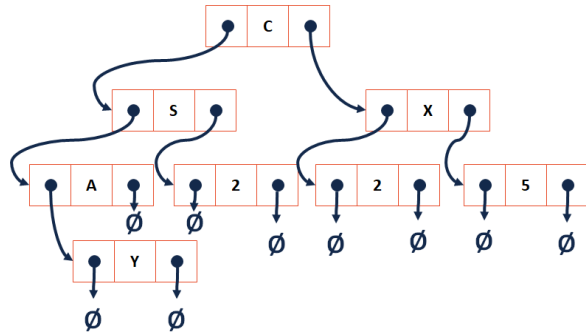## Tree Class

```
                    BinaryTree.h
1   #pragma once
2
3   template <typename T>
4   class BinaryTree {
5     public:
6       /* ... */
7     private:
8
9
10
11
12   };
```
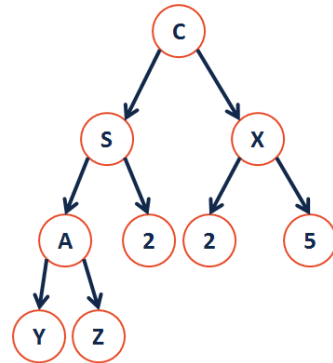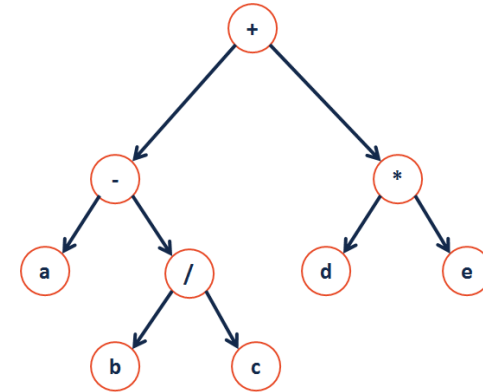
Trees are nothing new – they're fancy linked lists:

Theorem: If there are n data items in our representation of a binary tree, then there are _____ NULL pointers.

Traversals:

CS 225 – Things To Be Doing:
1. Programming Exam A is on-going (ends on Sunday!)
2. MP3 extra credit deadline is Monday!
3. lab_quacks due Sunday
4. Daily POTDs