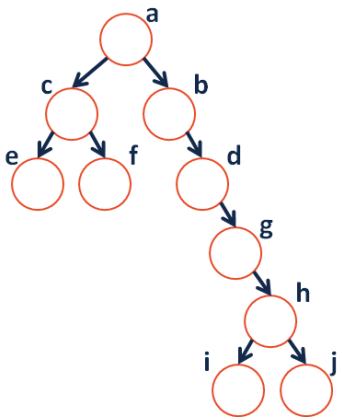
CS 225

#14: Trees and our First Tree Proof

February 26, 2021 · *G Carl Evans*

We will primarily talk about **binary trees:**

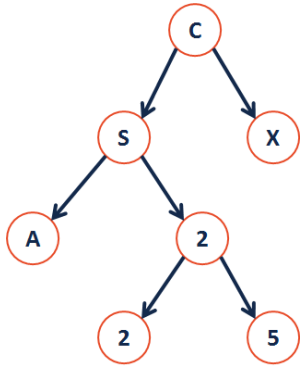
- How many parents does each vertex have?
- Which vertex has the fewest **children**?
- Which vertex has the most **ancestors**?
- Which vertex has the most **descendants**?
- List all the vertices is b's left **subtree**.
- List all the **leaves** in the tree.



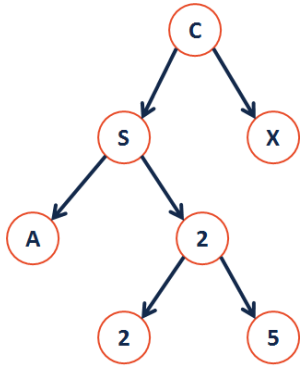
Definition: Binary Tree

A *binary tree* **T** is:

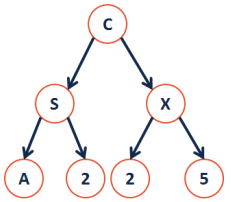
The height of a tree **T** is:



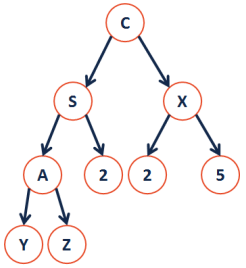
Tree Property: Full



Tree Property: Perfect



Tree Property: Complete



Towards a Tree Implementation – Tree ADT:

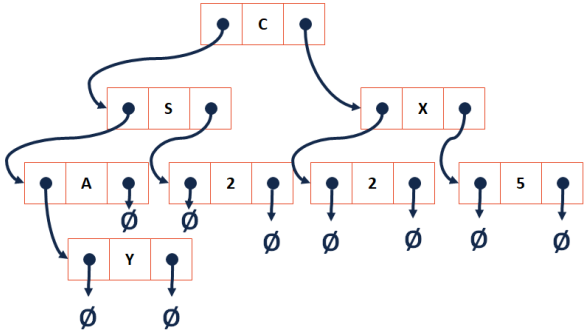
ADT Functionality (English Description)	Function Call

Tree Class

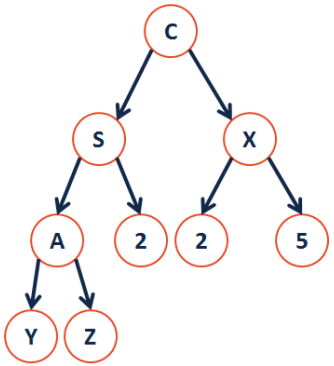
BinaryTree.h

```
1  #pragma once
2
3  template <typename T>
4  class BinaryTree {
5    public:
6      /* ... */
7    private:
8
9
10
11
12 };
```

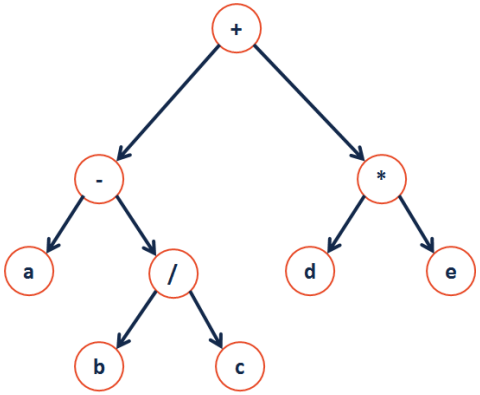
Trees are nothing new – they're fancy linked lists:



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. mp_lists extra credit deadline Monday **2.** Practice for Exam 1 released today. **3.** Daily POTDs