CMPT 225

Lecture 16 – Binary Trees and Binary Search Trees
Last Lecture

- We saw how to ...
  - Define some tree-related terms and concepts
Learning Outcomes

At the end of the next few lectures, a student will be able to:

- Define the following data structures:
  - Binary search tree
  - Balanced binary search tree (AVL)
  - Binary heap
  as well as demonstrate and trace their operations
- Implement the operations of binary search tree and binary heap
- Implement and analyze sorting algorithms: tree sort and heap sort
- Write recursive solutions to non-trivial problems, such as binary search tree traversals
Today’s menu

- Describe binary tree and its property
- Describe binary search tree
Binary Tree: N-ary Tree where N = 2

- We shall now focus on 2-ary tree i.e., binary tree
- Binary tree properties:
  1. Maximum height a binary tree with \( m \) nodes can have is:
  2. Minimum height a binary tree with \( m \) nodes can have is:
  3. If a binary tree \( T \) has height \( H \) then \( T \) has between ______ and ______ nodes
Binary tree: Position-oriented or value-oriented?

To answer this question, let’s create a tree of each type by inserting the following elements (in this order) D, E, B, G, A, C into each of them.
√ Learning Check

- We can now ...
  - Describe binary tree and its property
  - Describe binary search tree
Next Lectures

- Continue investigating Binary Search Trees