CSCI 2270 Lecture Notes

2/6/2019

* Algorithms
  + Algorithm is a recipe. Given a certain input, what set of steps are needed to achieve the desired output
  + Pre-Condition
    - what has to be true about the input for the algorithm to behave correctly as advertised
  + Post-Condition
    - the expected output after algorithm finishes execution
  + Correctness
    - algorithm must return correct result according to the pre and post conditions
  + Cost
    - memory use and runtime
    - runtime = number of cpu cycles being used
  + Complexity
    - How does the algorithm scale as a function of N, the input size?
    - Big O notation – drop overhead and focus how the algorithm scales
      * O(n), O(n^2), O(nlog(n)), O(log(n))
    - Some data structure operations
      * Array
        + Access – O(1)
        + Search – O(n)
        + Insert – O(n)
        + Delete – O(n)
      * Linked List
        + Access – O(n)
        + Search – O(n)
        + Insert – O(1)
        + Delete – O(1)
      * Binary Search Tree (balanced)
        + Access, Search, Insert, Delete – O(log n)
      * Stack
        + A – O(n)
        + S – O(n)
        + I – O(1)
        + D – O(1)
* Stack Data Structure
  + allows a specific order in which operations on its data can be performed
  + can only add to the top (push)
  + can only remove from the top (pop)
    - kinda like a stack of plates
  + usage of stack
    - call stack during program execution
      * currently active subroutines