Thursday, 31 March 16

Crux
Lecture - 20

Data Structures

Priority Queues and Heaps

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CODING BLOCKS

Data Structures so far

- Linked Lists
- Stacks and Queues
- Dynamic Arrays
- Trees(Generic + Binary)
- BST
- Maps

How to find min/max out of some elements?

Priority Queues

Priority Queues

```
Class PriorityQueue{
    // accessor methods
    int size();
    boolean isEmpty();
    Object min();
    // update methods
    void insert(Object priority, Object value);
    void removeMin();
    }
```

Implement using unsorted List

- Min
- RemoveMin
- Insert

Selection Sort?

Implement using sorted List

- Min
- RemoveMin
- Insert

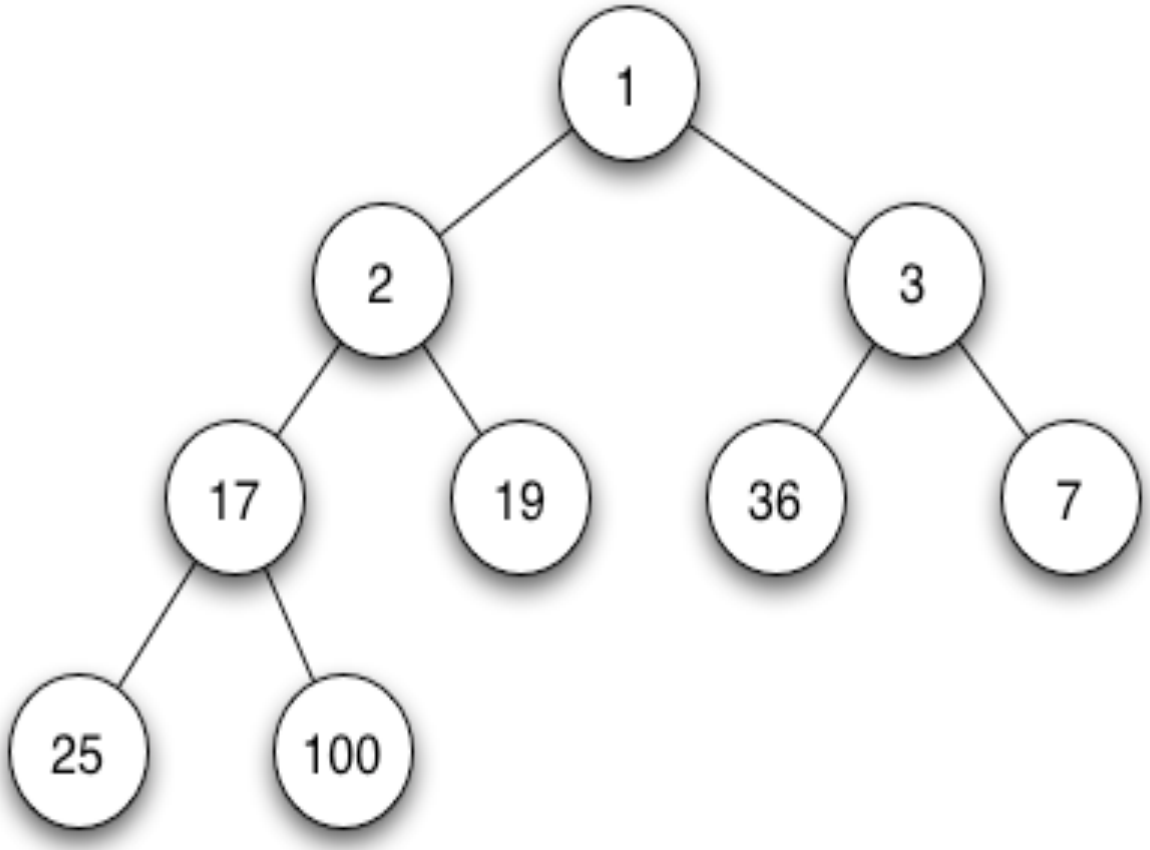
Insertion Sort?

Any other options?

Heaps

Heap Data Structure

- Binary Tree
- Complete Binary Tree Property
- Heap Order Property



CODING BLOCKS

What is the height of a complete binary tree?

Complete Binary Tree

- Add
- Remove

How to implement a complete binary tree

How to implement Heap using CBT?

- Min
- Insertion
- removeMin

Heap Sort

Inplace Heap Sort

Building a Heap in O(n)

Lets discuss few problems

- Sort an almost sorted given array in O(n).

Your Turn

- Given an unsorted array, find k smallest elements.

  Extra space – O(k) and time – O(nLogk)

Thank You !!☺

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