

Interview Preparation



Lecture: 13 - Tries & Heaps

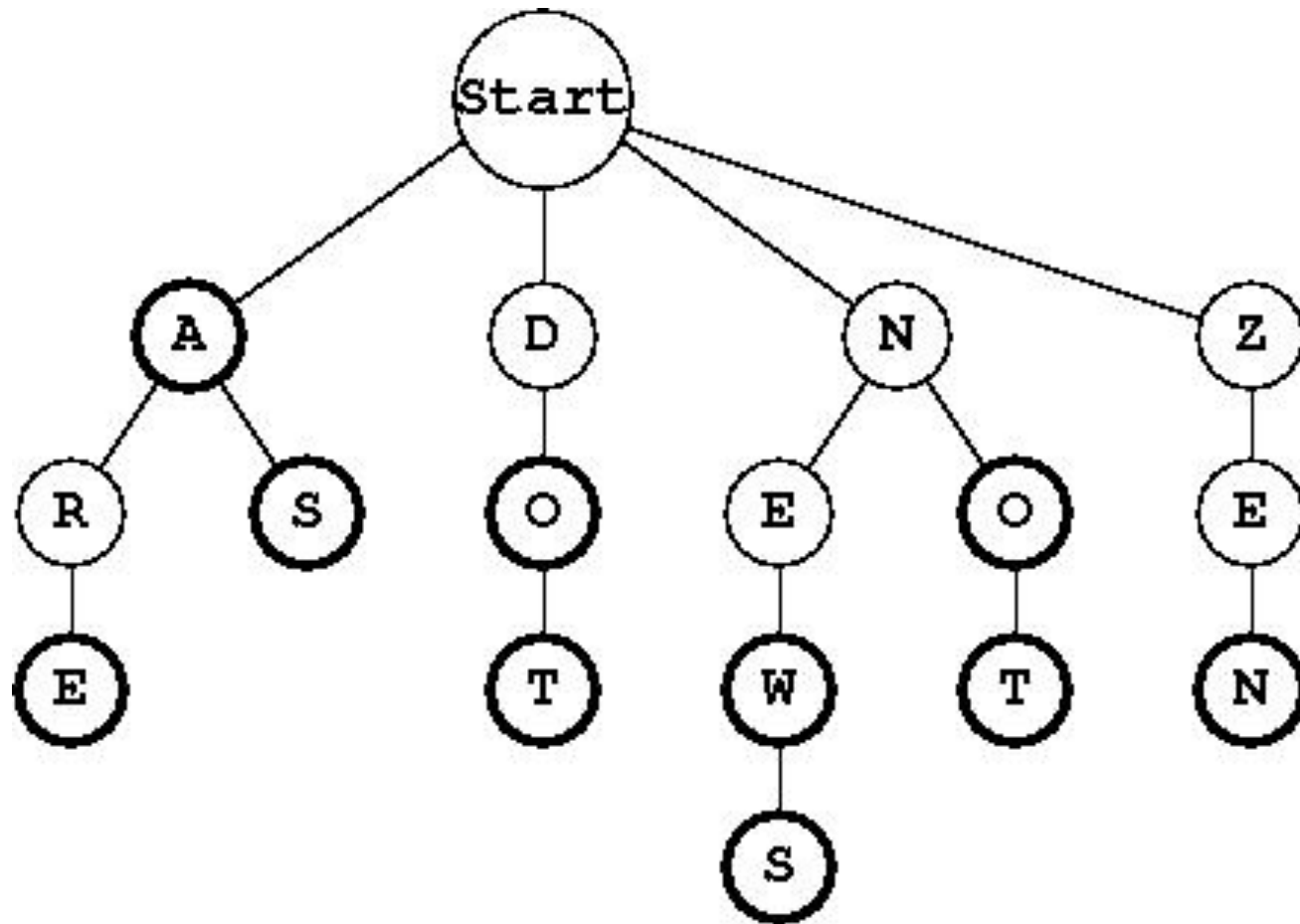
Doubts from last class?

Pattern Matching Algorithms

Brute Force

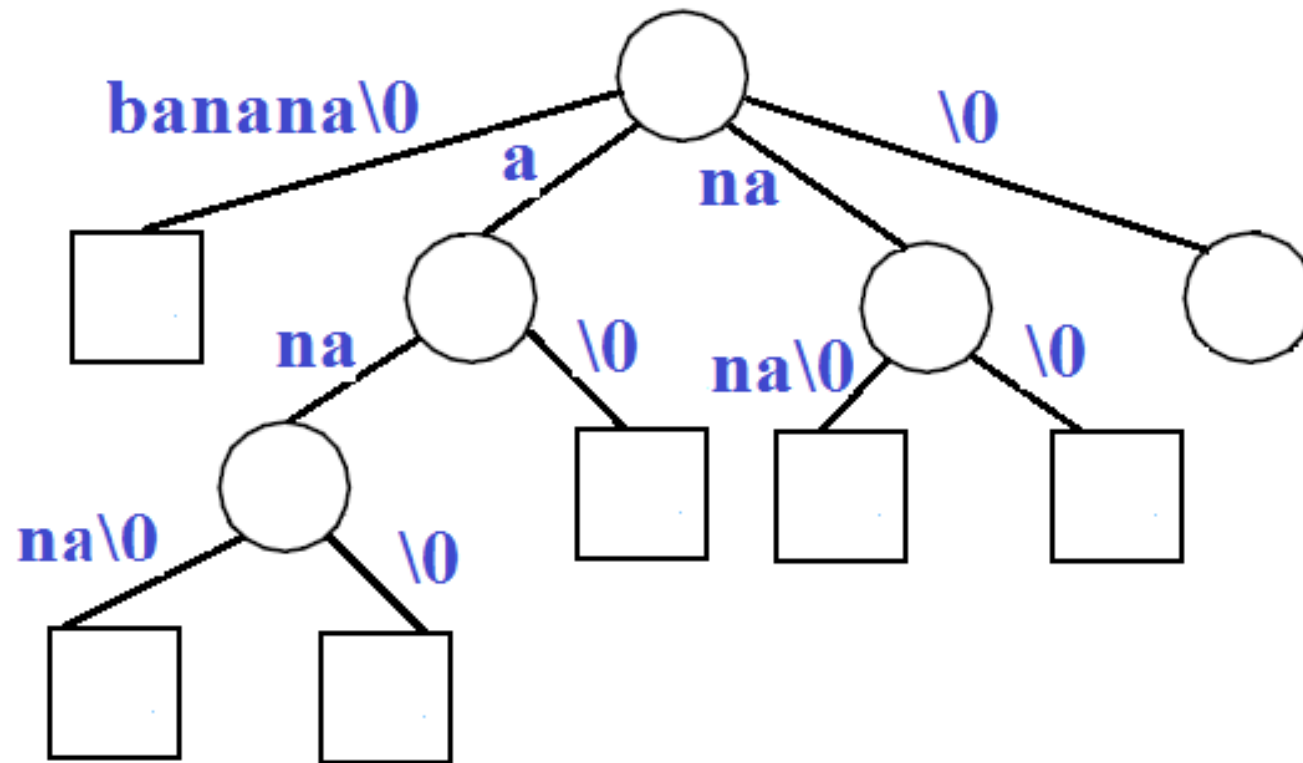
What if we get multiple queries for
a fixed String?

Trie



Lets Implement Trie Class

Suffix Tries



Brain Teasers and Probability

1. I roll two dice. What is the probability that the 2nd number is greater than the 1st?
2. Having an infinite stream of numbers write a function to take an element with equal probability for each.
3. There are 16 coins on a table. There are two players A&B. Each player can take 1 or 2 coins at a time. The person who takes the last coin is the loser. Assuming both A & B are really smart who will win this game?
4. Given Random7(generates random number between 1 to 7) write code for Random5
5. Given Random5(generates random number between 1 to 5) write code for Random7

5. An evil king has 1000 bottles of wine, one of which has poison. The king decides he will get some of his prisoners in his vast dungeons to drink the wine. Poison shows its effects in 5 weeks. Rather than using 1000 prisoners each assigned to a particular bottle, this king knows that he needs to murder no more than 10 prisoners to figure out what bottle is poisoned, and will still be able to drink the rest of the wine in 5 weeks time. How does he pull this off?

5 Cards Puzzle

How to find min/max out of some elements?

Priority Queues

Priority Queues

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


Implement using unsorted List

1. Min
2. RemoveMin
3. Insert

Selection Sort?

Implement using sorted List

1. Min
2. RemoveMin
3. Insert

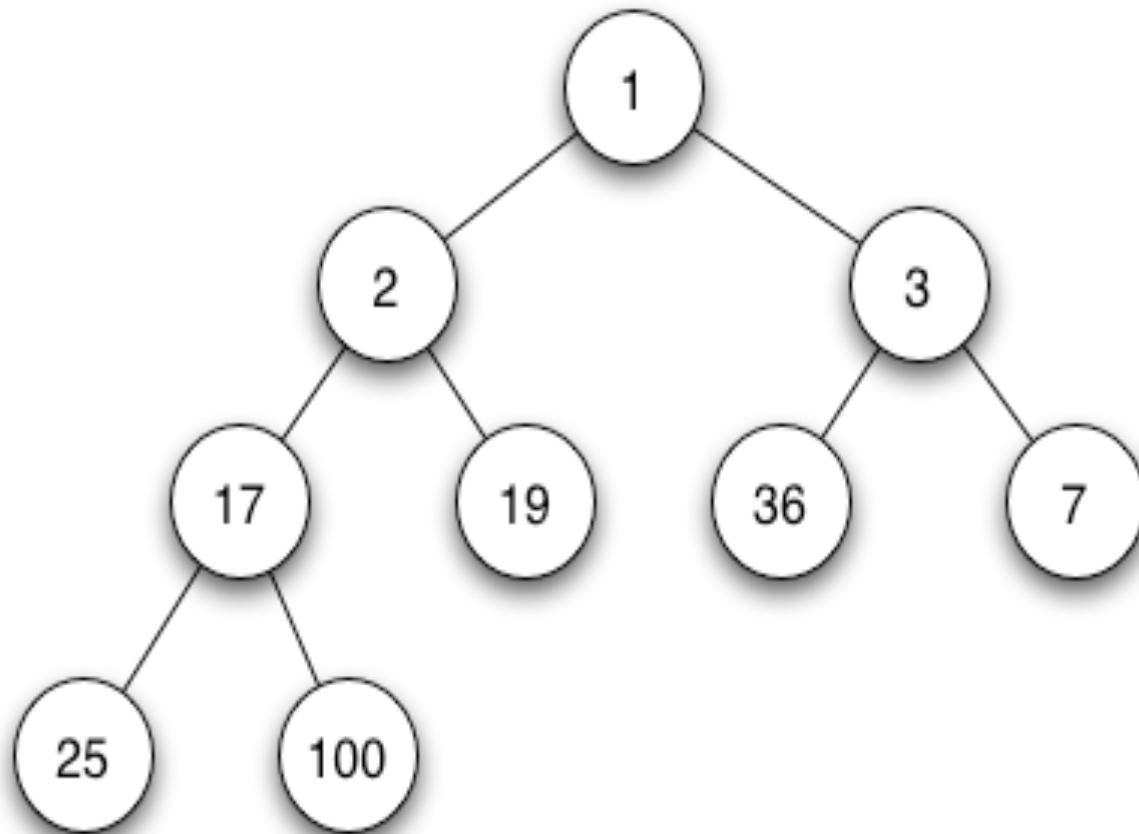
Insertion Sort?

Any other options?

Heaps

Heap Data Structure

1. Binary Tree
2. Heap Order Property
3. Complete Binary Tree Property



What is the height of a complete binary tree?

Complete Binary Tree

1. Add
2. Remove

How to implement a complete binary tree

How to implement Heap using CBT?

1. Min
2. Insertion
3. removeMin

Heap Sort

Inplace Heap Sort

Building a Heap in $O(n)$

Problems on Heaps



Thank you

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