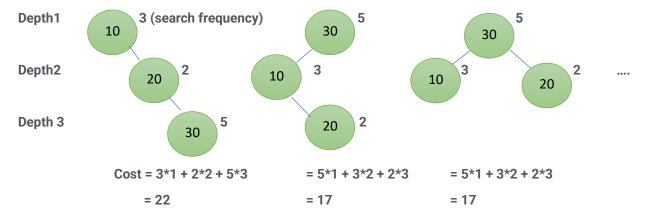
Optimal BST

Every key has a different probability to be searched for.



Brute force solution: build all tree configurations that contain the keys and see which is best.

Efficient solution: Dynamic Programming

B-Tree

How can we store a tree into a file?

There are two definitions of a B-tree:

Knuth Order (Order) is used by Knuth's definition. The Knuth order m is the maximum number of children. A Knuth order of m means every node must have a max = m, and a min = ceil(m/2) children.

<u>CLRS Degree (Degree)</u> is used in the definition in Cormen et al in Introduction to Algorithms (CLRS). The CLRS degree t is the minimum number of children. A CLRS degree of t means every node must have a min = t and a max = 2t children. Link to the book: https://edutechlearners.com/download/Introduction_to_algorithms-3rd%20Edition.pdf

The number of keys in both cases is equal to the number of children minus one.

!!! Attention: You will find a lot of examples with 'order' of B-Tree, order! = degree

Example:

B-tree of order 5 OR m=5

max children = m = 5

min children = ceil(m/2) = 3

max keys = m-1 = 4

min keys = ceil(m/2)-1 = 2

B-tree of degree 5 OR t=5

max children = 2t = 10

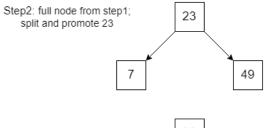
min children = t = 5

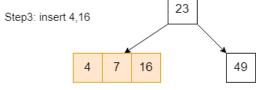
max keys = 2t-1 = 9

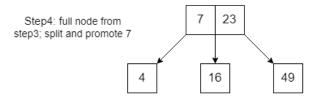
min keys = t-1 = 4

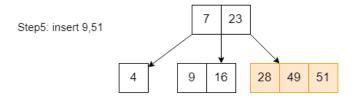
Step1: insert 49, 7,23

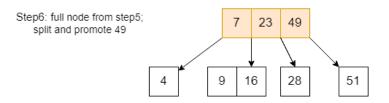


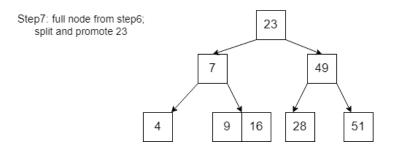










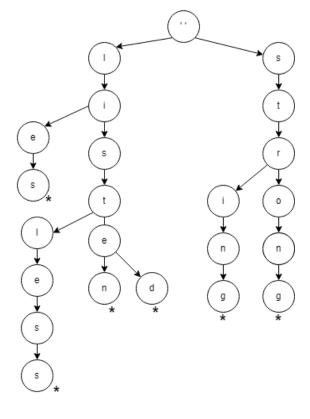


Trie tree

Trie tree insert:

- -listen
- -listless
- -lies
- -lists
- -listed
- -strong
- -string

Find listening?



Homework:

- 1. Build a B-Tree with min degree t=2 (each node can contain 1-3 keys) by inserting in order following keys: 35, 2, 1, 89, 4, 33, 24, 6, 7, 88, 14, 23, 22
- 2. Build a B-Tree with min degree t=3 (each node can contain 2-5 keys) by inserting in order following keys: 35, 2, 1, 89, 4, 33, 24, 6, 7, 88, 14, 23, 22,19
- 3. Implement a trie tree data structure and add operations to:
 - add a new word to the trie tree
 - print (in alphabetical order) all the words contained in the trie tree

TEST!!!