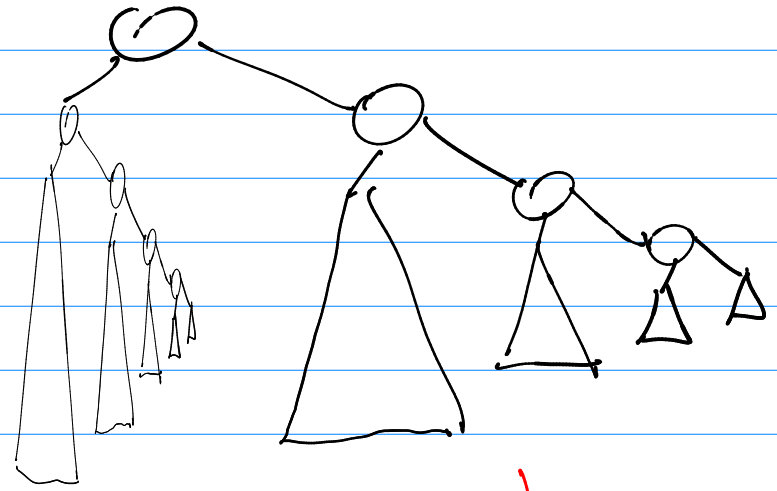
CC3001

Propiedades de bolas de Búsqueda

(1) Altura de AVL $\in O(\lg n)$

Cuál es la altura h de un árbol "AVL" de n elementos / nodos internos?



$\equiv$ Cuantos n nodos tiene un árbol AVL de altura h

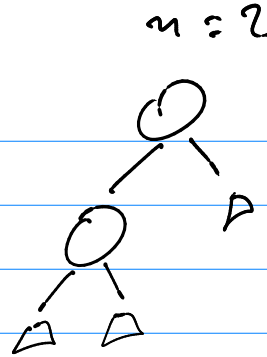
$h \in O(\log n)$ $\Leftarrow$ $\log_2 n < h \leq \log_c n = \frac{\log_2 n}{\log_2 c}$

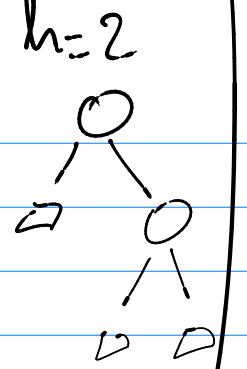
$c^h = n_h \leq n \leq 2^h - 1$

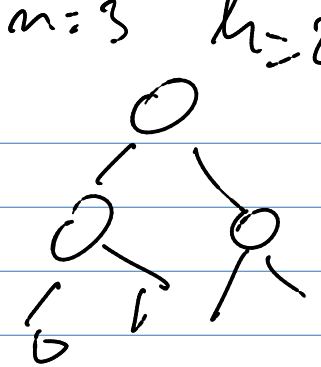
Inducción sobre n:

demasiado "lento"

h = 1







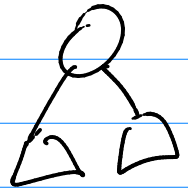
n = 4 n = 5 n = 6

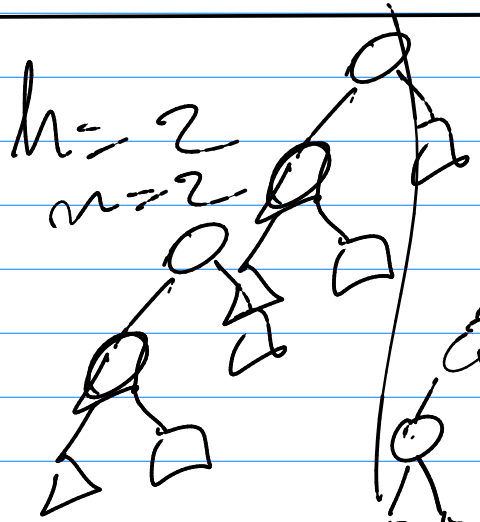
h = 3 h = 3 — — —

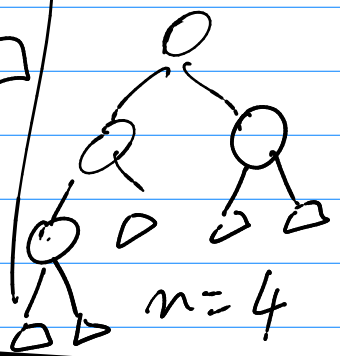
Inducción sobre h

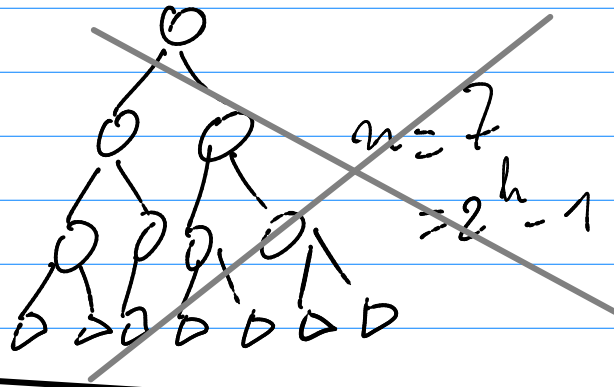
h = 1

n = 1









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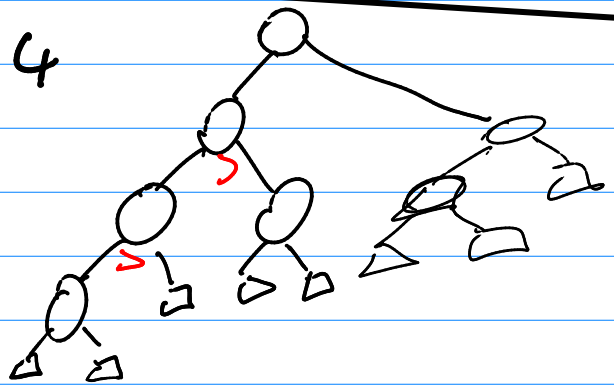
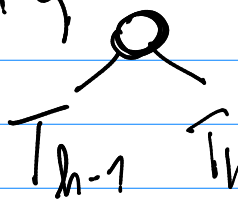
h = 4

n = 7



h Th que minimiza n_h



$n_h = 1 + n_{h-1} + n_{h-2}$

$n_1 = 1$

$n_2 = 2$

FIBONACCI

Fibonacci $\begin{cases} F_1 = F_2 = 1 \\ F_n = F_{n-1} + F_{n-2} \end{cases}$

-qui:

$$\begin{cases} n_1 = 1 \\ n_2 = 2 \\ n_h = n_{h-1} + n_{h-2} + 1 \end{cases}$$

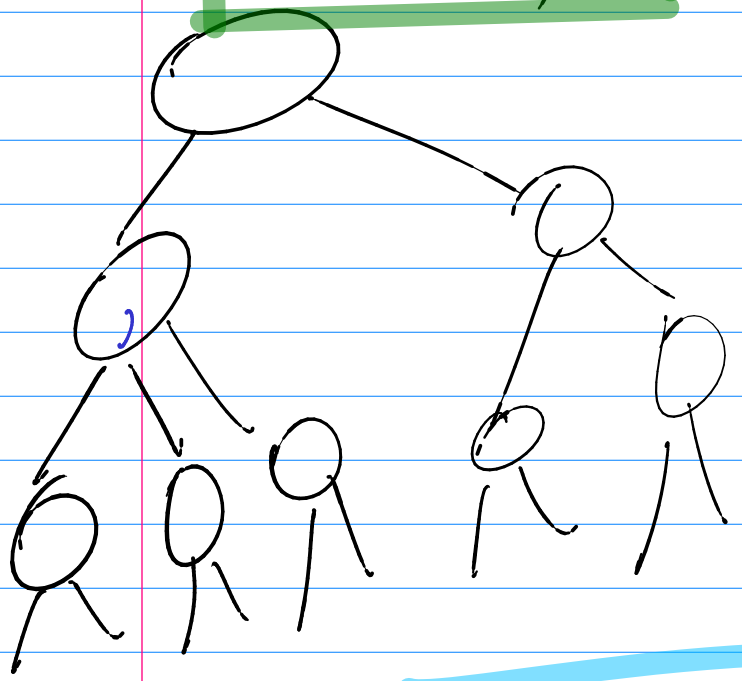
$$\begin{pmatrix} n_h \\ n_{h-1} \\ 1 \end{pmatrix} = \overbrace{\begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}}^{M} \begin{pmatrix} n_{h-1} \\ n_{h-2} \\ 1 \end{pmatrix} = M^{h-2} \overbrace{\begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix}}^{\begin{matrix} n_2 \\ n_1 \end{matrix}}$$

h

$M = P D P^{-1}$, $M^{h-2} = PDP^{-1}PDP^{-1}\dots PDP^{-1} = PD^{h-2}P^{-1} \rightarrow n_h = C$

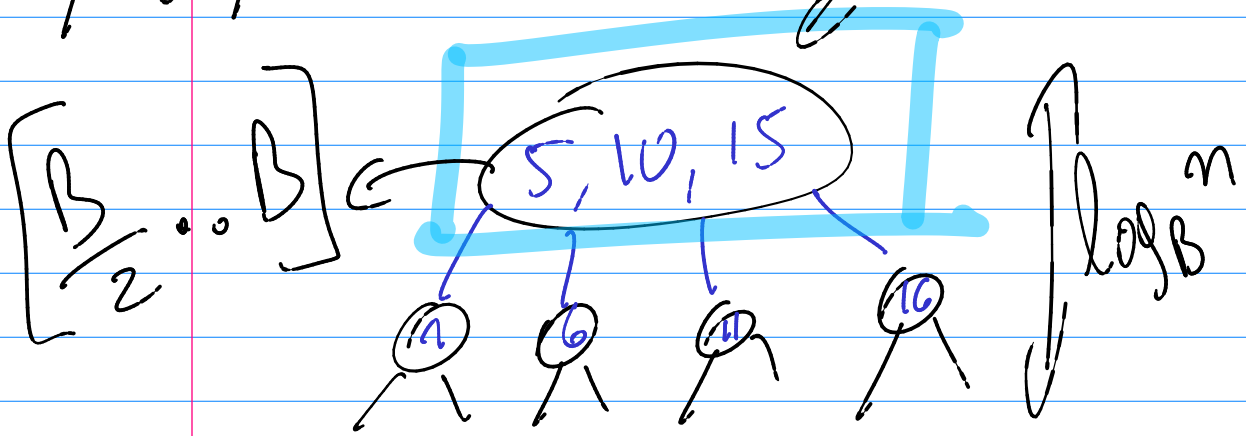
② Extensiones

Arbol 2,3



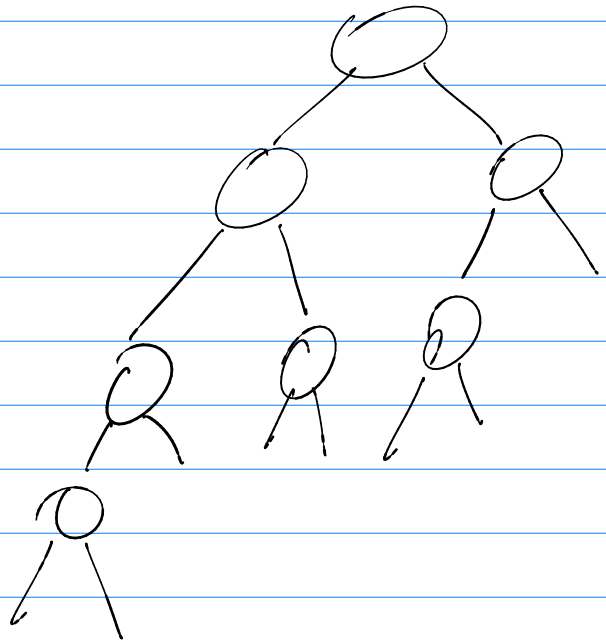
Barboles

"pagina de B elementos"



$\lceil \log_B n \rceil$

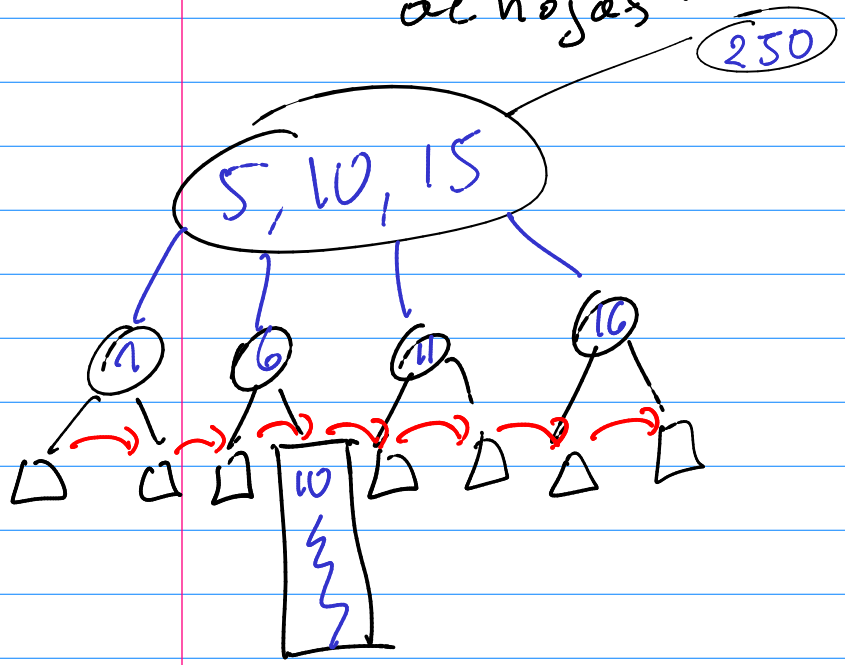
Arboles AVL



(Podriamos relajar mas aun el desequilibrio)

Arboles B^+

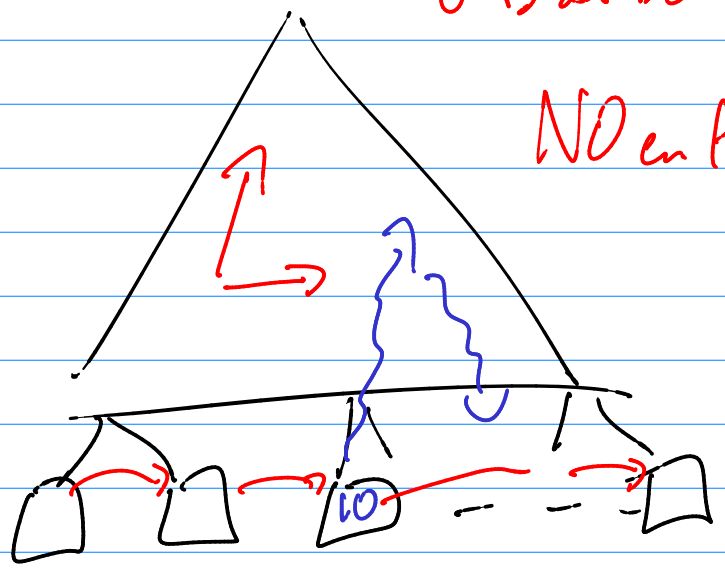
↳ Lista enlazada de hojas



y

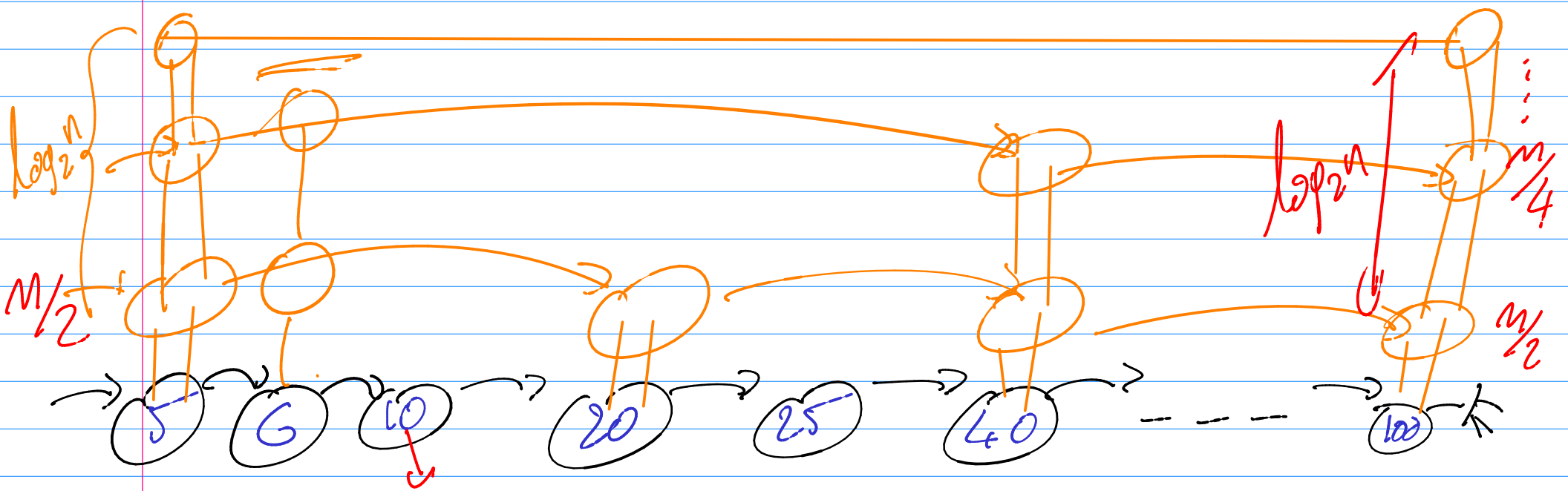
Finger Search Tree

(en Arboles 2-3 o Barbolas, NO en AVL)



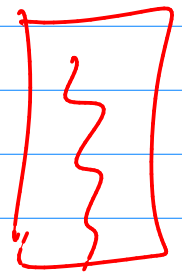
Se puede ver como
- una lista enlazada
- un arbol indexando la lista

③ SkipLists



$A = +1$

$B = Pare$



Busqueda $O(\lg n)$

Insercion ——

Deleción ——

} En Promedio!