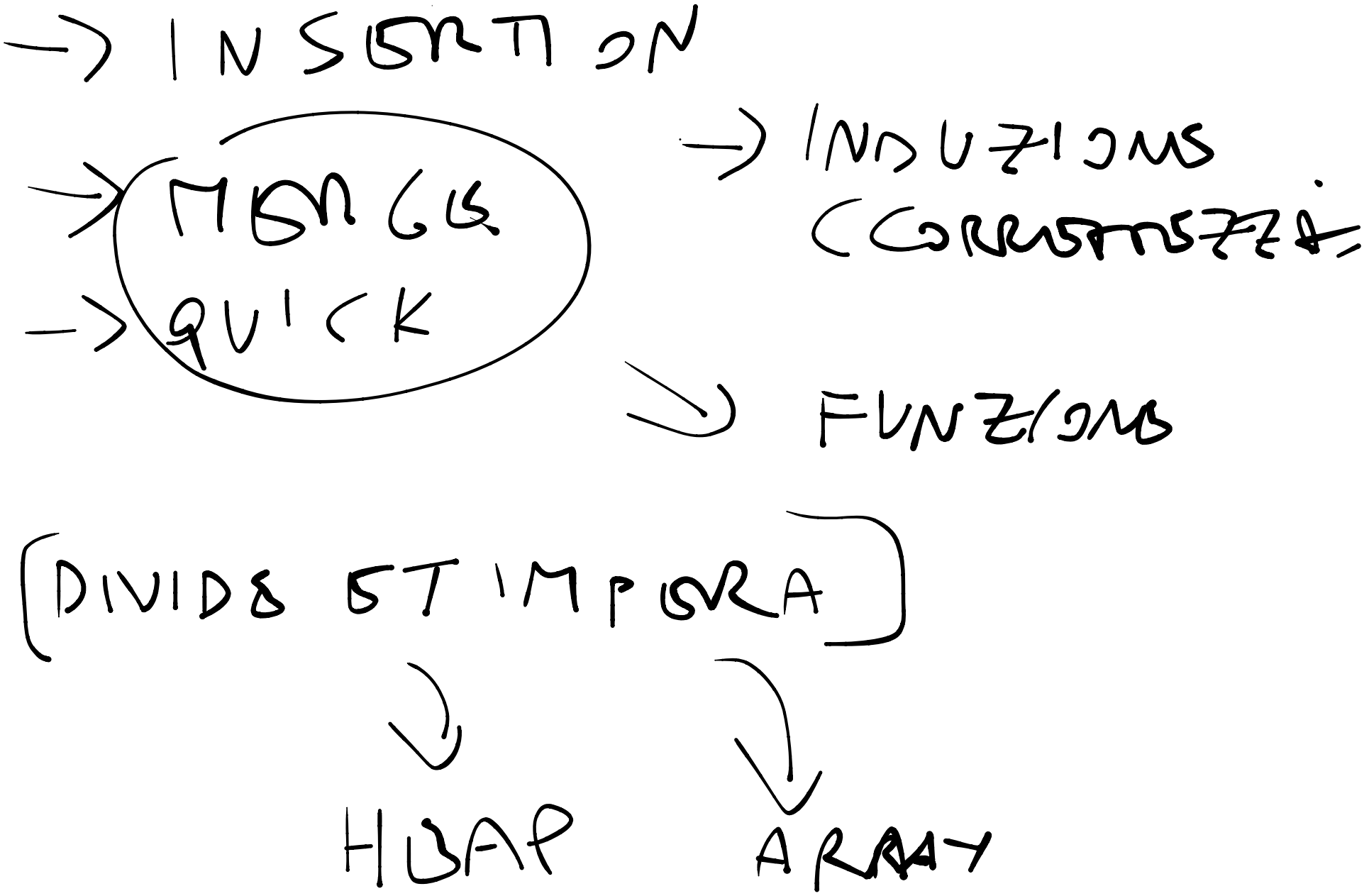
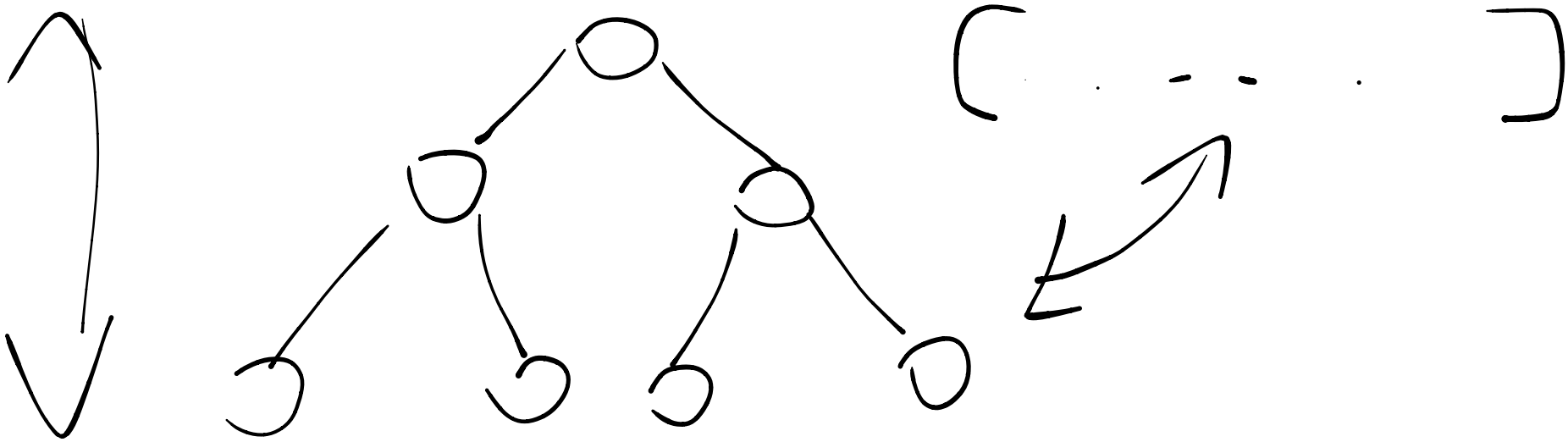
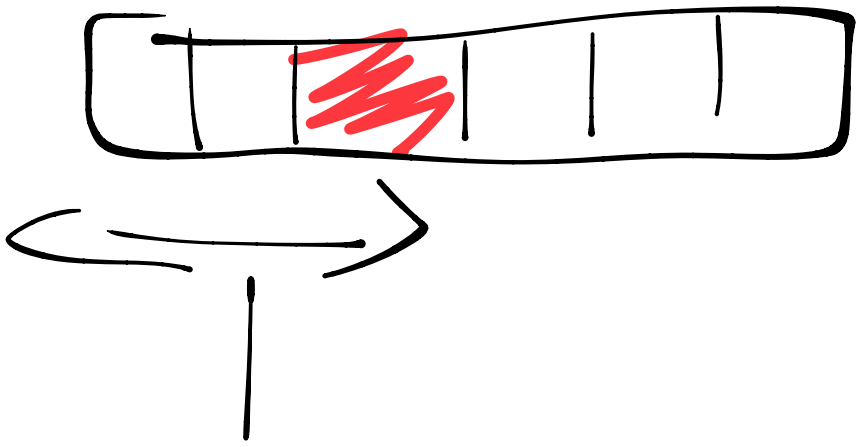

INSERTION
MERGE
QUICK
INDUZIONE
CORRETTEZZA
FUNZIONE
DIVIDE ET IMPERA
HEAP
ARRAY

$O(n \log n)$

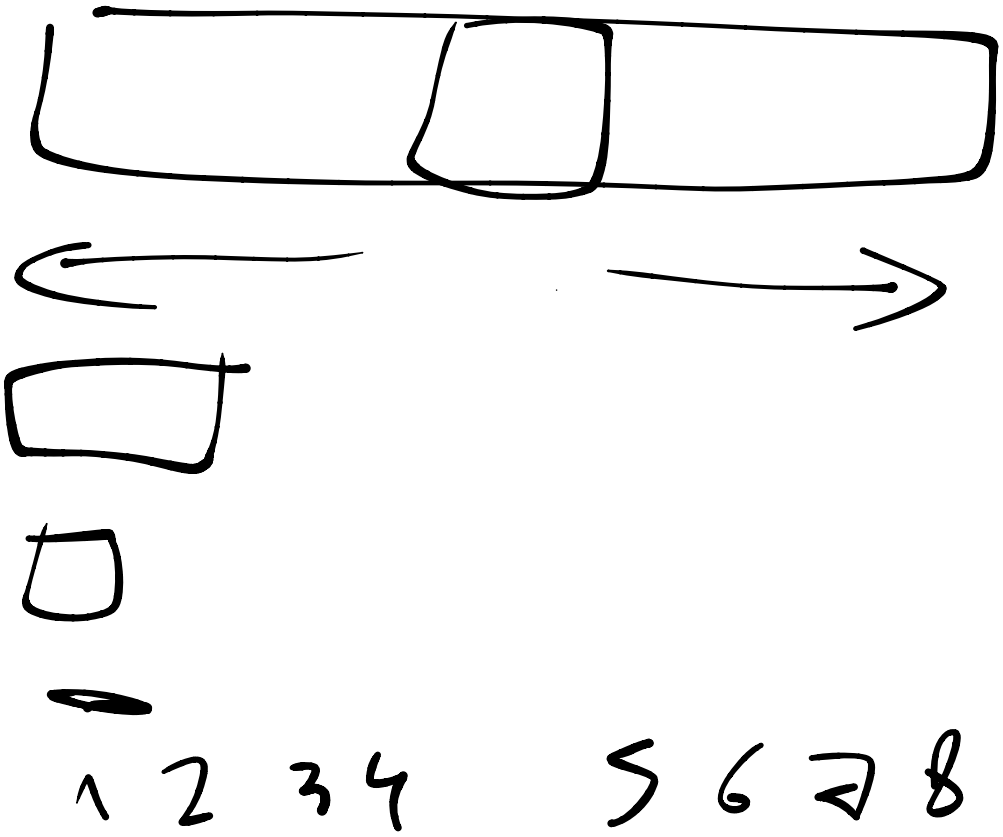


MERGE



QUICK

(PIVOT)



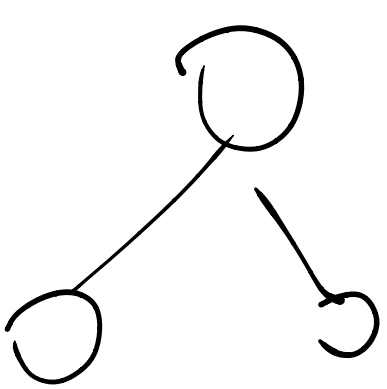
$n \log(n)$ → [ ] →

HEAP

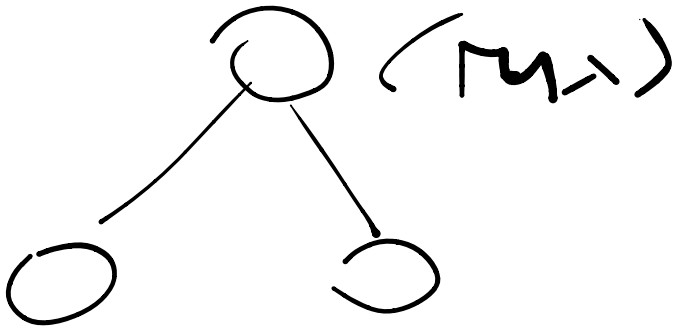
3, 7, 2, 1, 10, 8

MIN

MAX

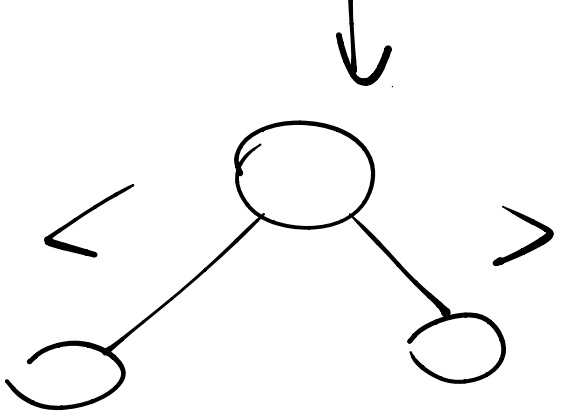


PARENT(MIN)

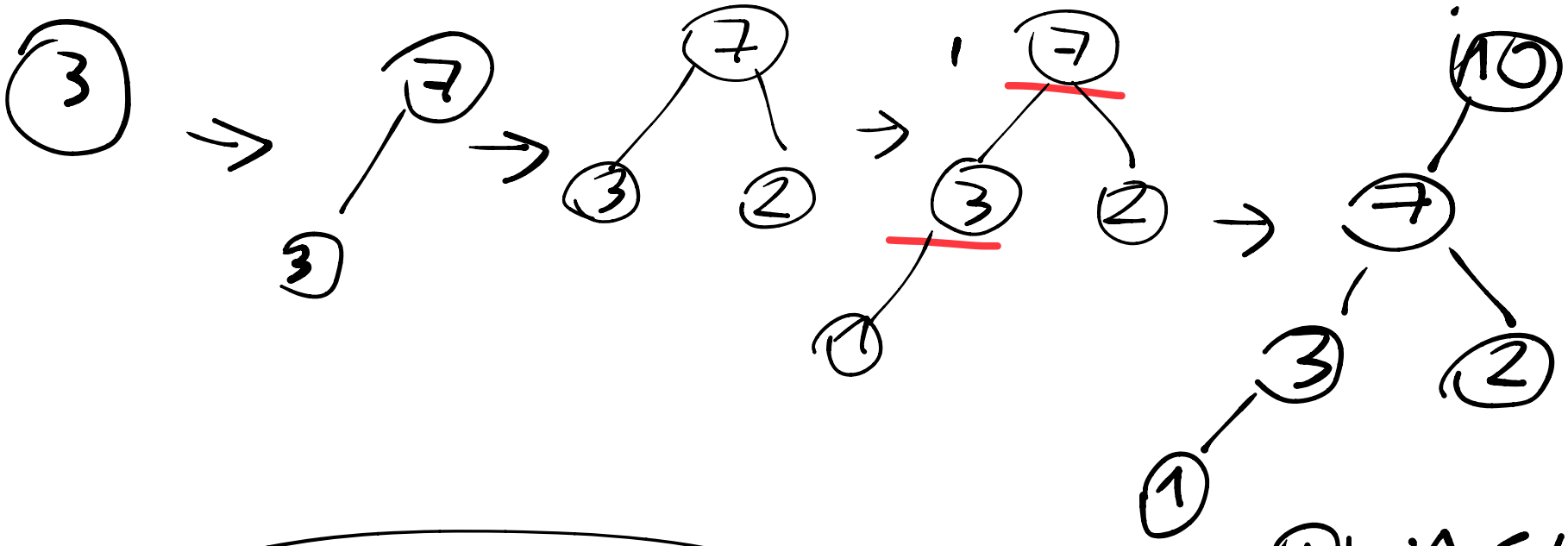


(MAX)

! = BST

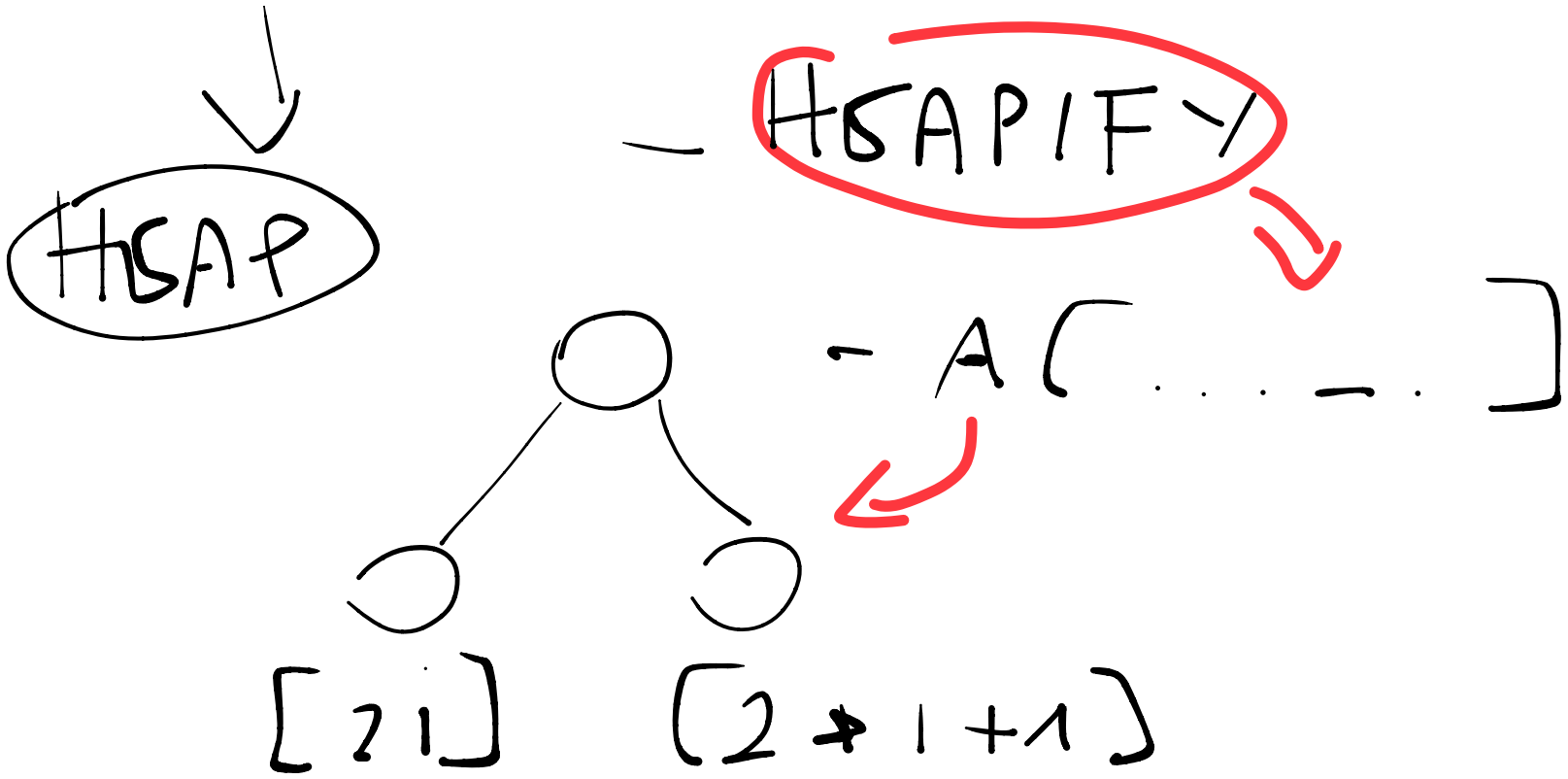


(3, 7, 2, 1, 10, 8) → MAX-HEAP



HUFFMAN → QUASI COMPLETO

VISUALGO.NET



$n \log n \rightarrow$ HSAP $\rightarrow O(n \log(n))$

$\rightarrow \Lambda \quad \cdot \searrow \rightarrow O(n)$

ISMAXHEAP(A)

→ N = A.LENGTH / HEAPSIZE(A)

WHILE (I ≤ N → (OR)

FIGLIO ≤ PADRE

A[I] ≤ A[I/2]

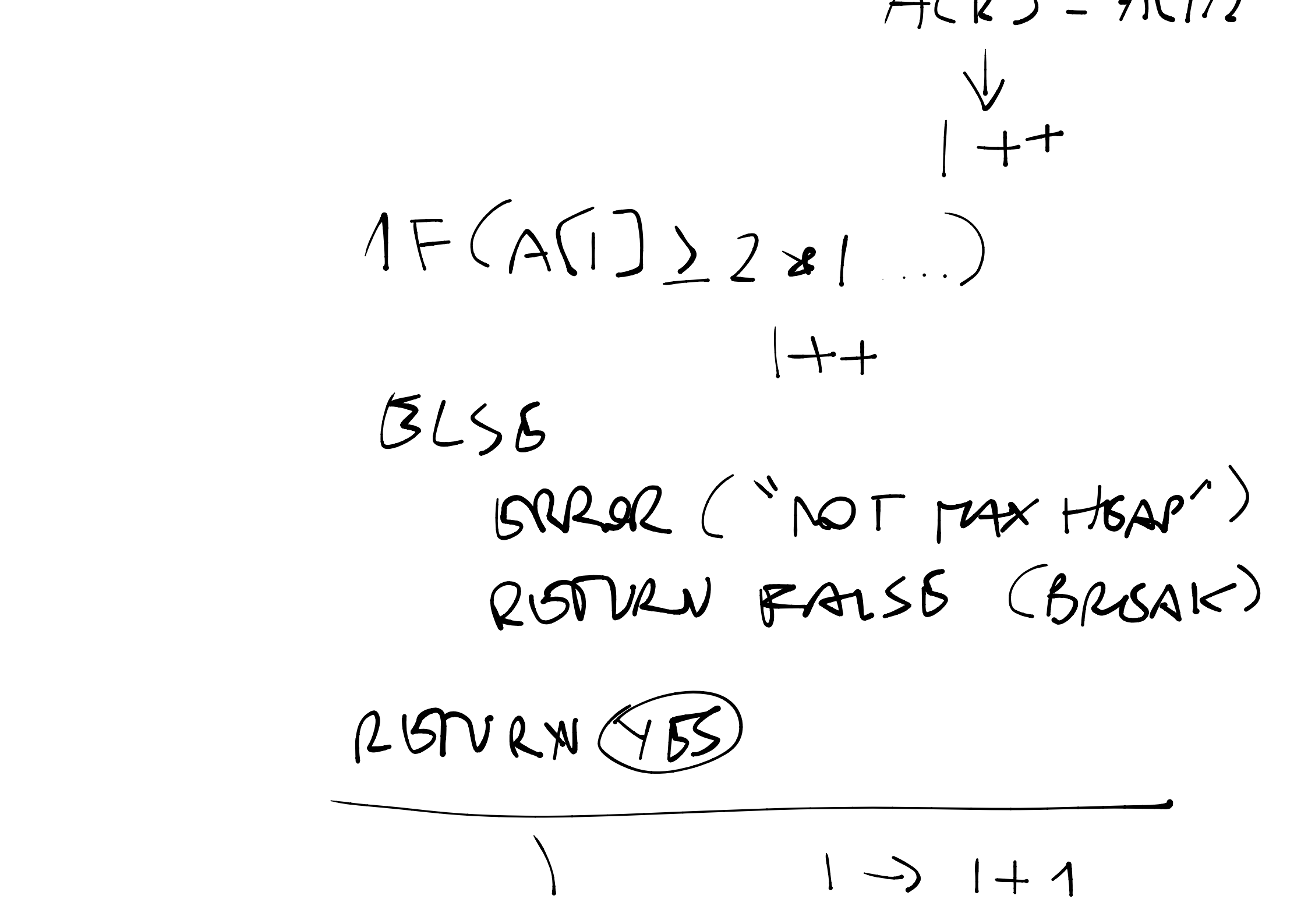
L = A[2I]

→ IF(A[L]

R = A[2I] + 1 ≤ A[I/2]

AND

A[R] ≤ A[I/2]



$A[k] = A[1/2$

$\downarrow$

$1++$

IF ($A[1] \geq 2 * 1$ ....)

$1++$

ELSE

ERROR ("NOT MAX HEAP")

RETURN FALSE (BREAK)

RETURN YES

$1 \rightarrow 1+1$

(CORRETT,) $L \leq P \quad \forall i$

2 PAROLE

P = PARENT $\quad 1 \to 1+1$

A[1/2] $\quad R \leq P \quad \forall i$

→ COMPLESSITÀ

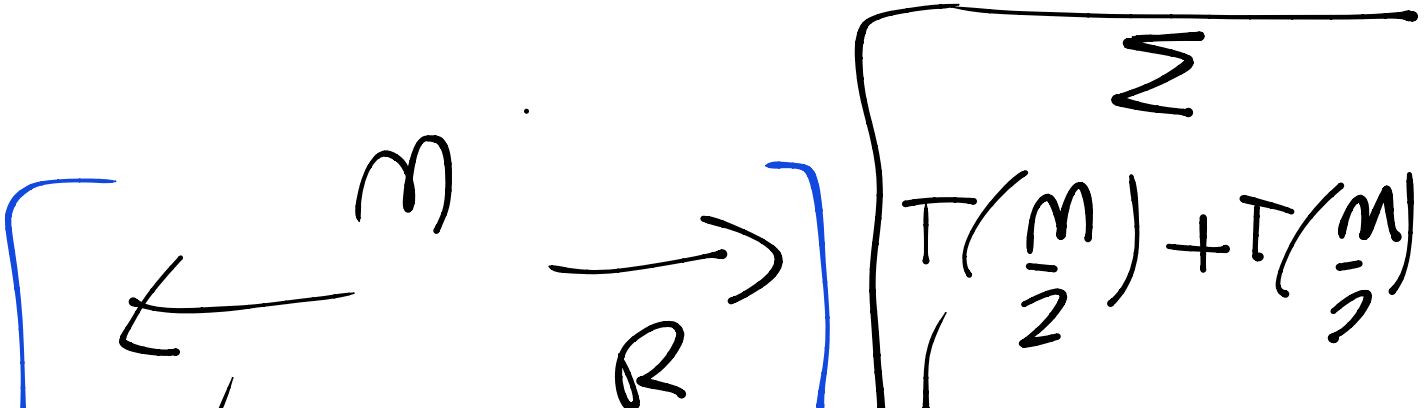
$$\to T(n) = 2T\left(\frac{n}{2}\right) + c \quad \to O(n)$$

Σ

$T\left(\frac{n}{2}\right) + T\left(\frac{n}{2}\right)$

n

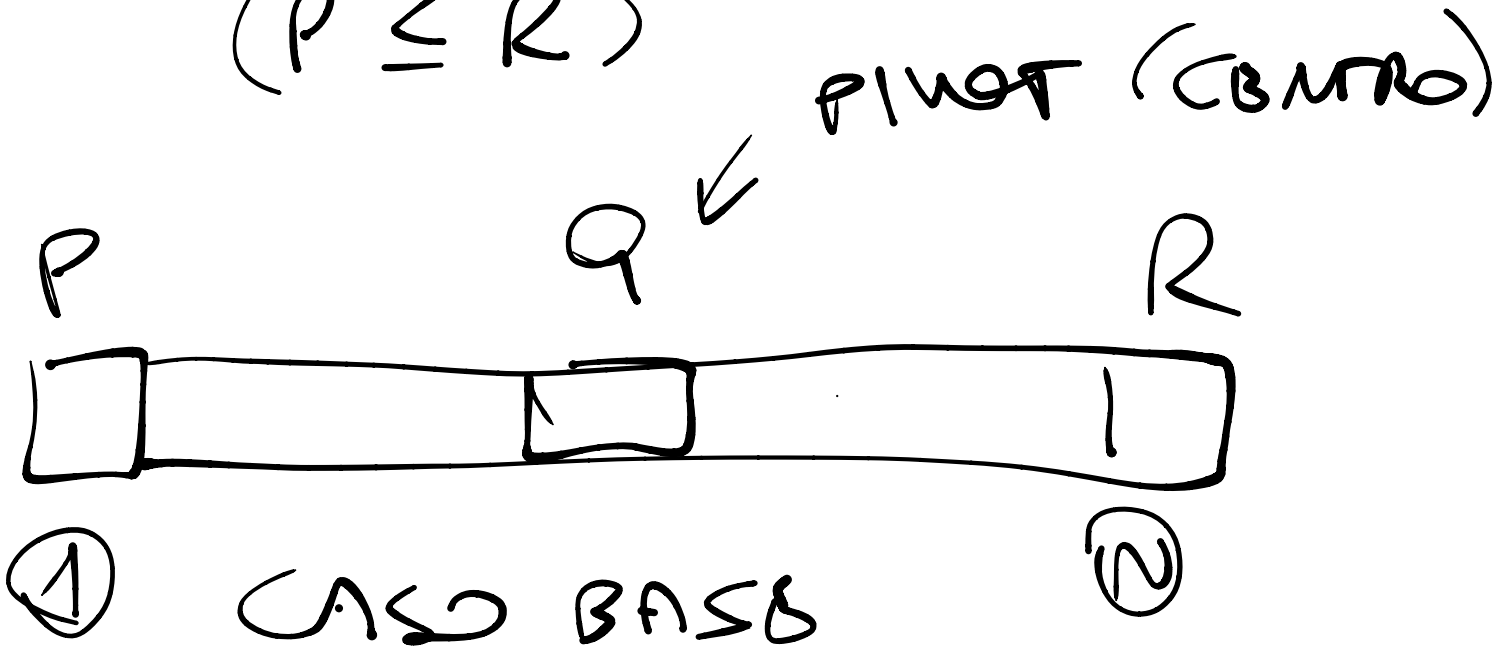
R



$T(n/2) \quad T(n/2) \quad 2T\left(\frac{n}{2}\right)$

DIVIDE ET IMPERA

$(p \leq r)$



CASO BASE

$\rightarrow p == r$ (NIENTE PIÙ)

2 CHIAMATE (SOLITO)

1° metà

→ PRIMA → FUN(A, P, q)

→ DOPO → FUN(A, q+1, R)

2° metà

A[1 ... n] → CROSCIATO

$\forall i \in \mathbb{N}$

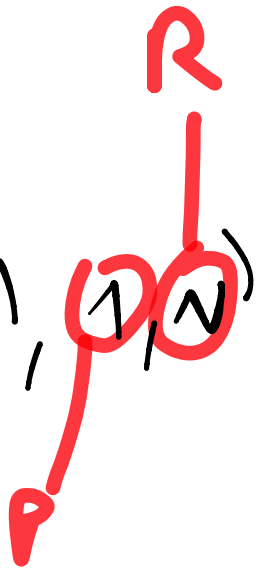
→ A[i] > i (CRESCENTE)

PIVOT

$A[J] > J \quad \forall J > i$

FIX(A)

RETURN FIX-REC(A, 1, N)

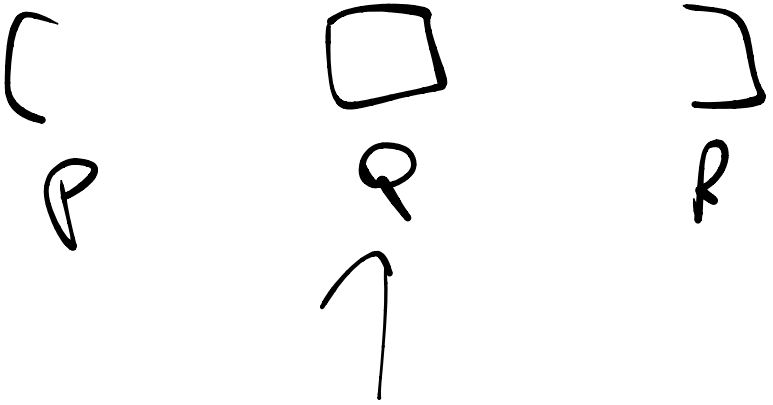


FIX(A, P, R)

REC

IF(P > R)

RETURN NIL



Q = P+R/2

↓

(CASO MIGLIORE)

$(A[q] = Q) \rightarrow$ PIVOT

$(A[q] < Q) \rightarrow$ MINORE

- $(Q+1, R)$

- $(P, Q-1)$

$$\overset{n/2}{\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \end{bmatrix}} \overset{n/2}{\begin{bmatrix} 6 & 7 & 8 & 9 & 10 \end{bmatrix}}$$

$O(n) < O(n \log n)$

$\{ T(n/2) + c \}$ COMPLESSITÀ

ARRAY1 -> SIZE(n)

$T\left(\frac{n}{2}\right) + T\left(\frac{n}{2}\right) = 2T\left(\frac{n}{2}\right)$

MASTER THEOREM = {RICORRENZA}

$$\log(n) \leftrightarrow 2T\left(\frac{n}{2}\right) + c$$

$c \geq 0$