

# Sortări Avansate

Shell sort  $\rightarrow$  Div. et Impera pt.  
Insertion

$\rightarrow$  împarte tabloul  $a$  în  $h$  subtablouri  
pentru  $i$  de la 1 la  $h$   
sort. subtabloul  $a_i$

sort. Integru tabloul

$h$  prea mic  $\rightarrow$  subtabl. prea mari  
 $h$  prea mare  $\rightarrow$  prea multe subtabl.

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27   15   83   5   40   13   78   99   18   20   16  
└──────────┘   └──────────┘   ↓

$\begin{pmatrix} 27 \\ 13 \\ 16 \end{pmatrix}$    15   83   5   40  
78   99   18   20

(5)

13   15   83   5   20

16   78   99   18   40

27

$\rightarrow$  13   15   83   5   20   -   -   -

(13) 15 83 (5) 20 16 (78) 99 18 (40) 27

5 20 16

78 99 18

40 27

(3)

H → 5 3 1

subtabela

5 15 16

13 20 18

40 27 83

78 99

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5 15 16 13 20 18 40 27 83 78 99

5 13 15 16 18 20 27 40 78 83 99

(1)

✓

H → descrescător

(ultimul  
obligatoriu 1)

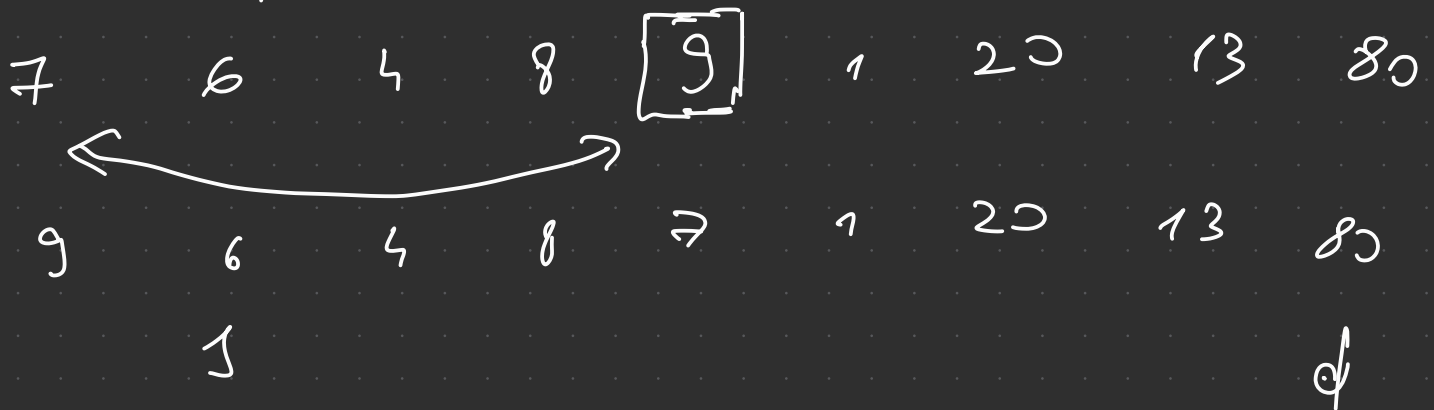
$$\rightarrow O\left(n^{\frac{5}{3}}\right) < O(n^2)$$

# Quicksort

$O(n^2)$  când aleg pivotul cel mai mic / mare

$O(n \log n)$  în general

I pivot median



$6^2$     $\boxed{8^3}$     $7^4$   
 $\downarrow$     $\downarrow$

$$(2+4)/2 = 3$$

$8$  |    $6$     $7$   
 $\downarrow$     $\downarrow$   
 $\downarrow$

$7$     $6$     $\boxed{8}$   
 $\sim$

$\boxed{7}$     $6$   
 $\downarrow$   
 $\downarrow$   
 $6$     $7$

$20^6$     $\boxed{13^7}$     $8^8$

$\downarrow \rightarrow \text{cant} >$

$\boxed{13}$     $20$     $80$

$\downarrow \rightarrow \text{cant} <$

$\downarrow$     $\downarrow$   
 $7$     $8$

$\boxed{20}$     $80$   
 $\downarrow$     $\downarrow$   
 $\swarrow$

- eleg pivot  $(s+d)/2$  (determine pivot element in subtable)



$$C_{\min} = M_{\min}$$

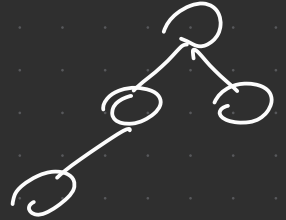
$$O(n) + 2T\left(\frac{n}{2}\right) + 4T\left(\frac{n}{4}\right) + \dots = O(n \log n)$$

↓  
rekursiver

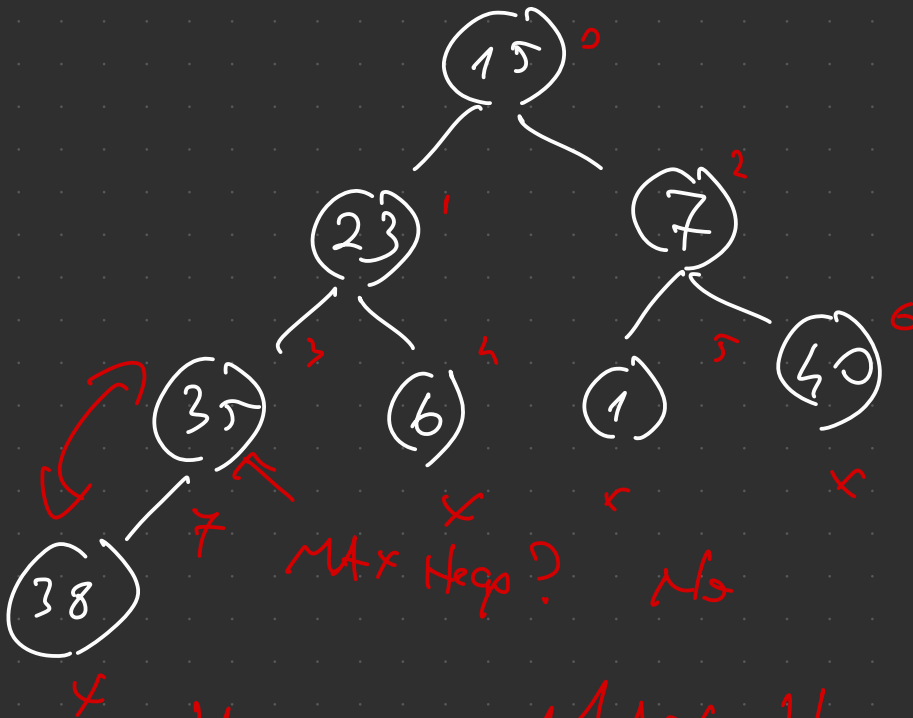
$$C_{\max} = M_{\max} = O(n^2) \quad \text{pivot-vel} \begin{cases} \text{max} \\ \text{min} \end{cases}$$

# Heap Sort

- nu folosește recursivitatea
- se bazează pe selection sort
- bazează pe un arbore binar



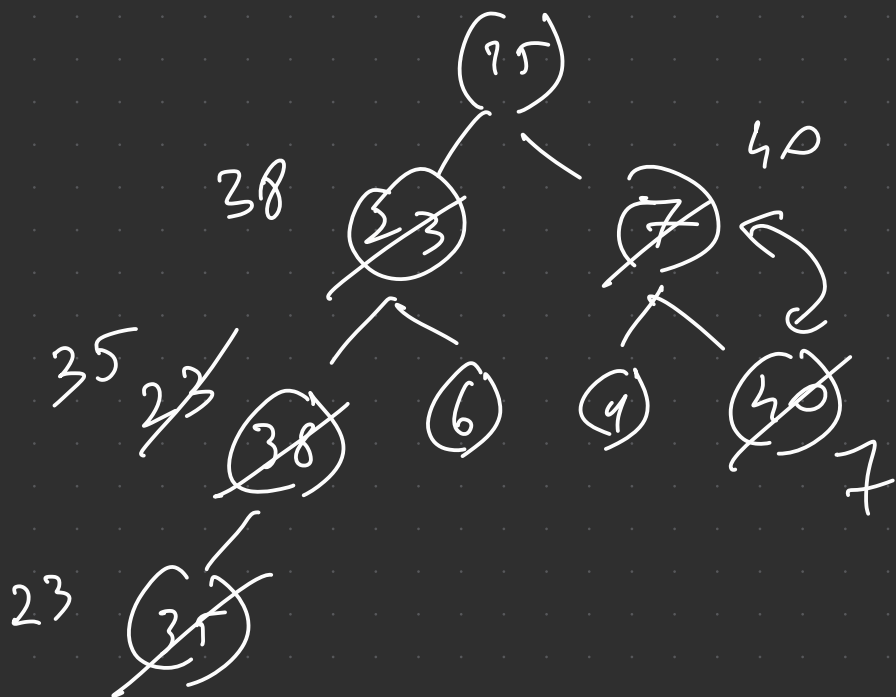
0 1 2 3 4 5 6 7  
15 23 7 35 6 1 40 38



Heap - MAX Heap

$$a[i] \geq a[2i+1]$$

$$a[i] \geq a[2i+2]$$



Nodul > fiu  $\rightarrow$  swap cu max  
dintre fiu

