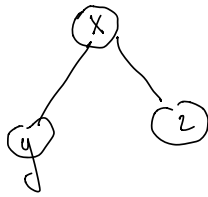


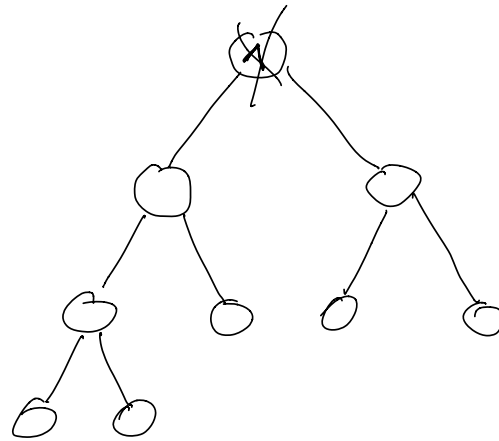
$O(n \log n) \leftarrow \text{heapsort}$

$O(n^2) \leftarrow \text{bubblesort, selectionsort}$

Heap property



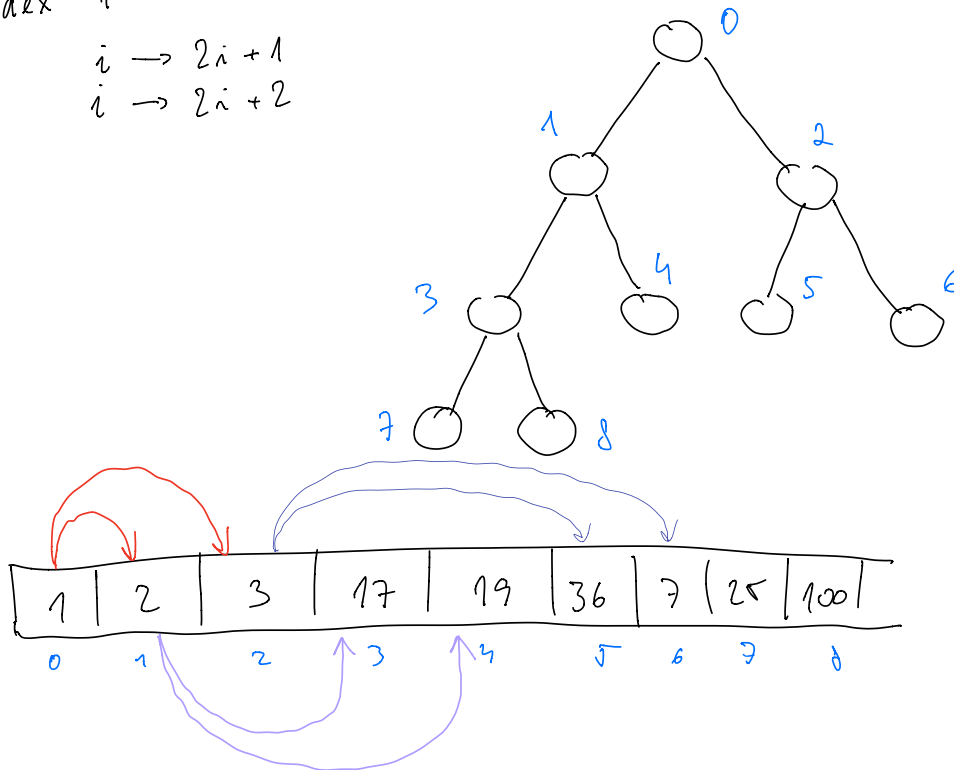
$$x \leq y, x \leq z$$



2. index i

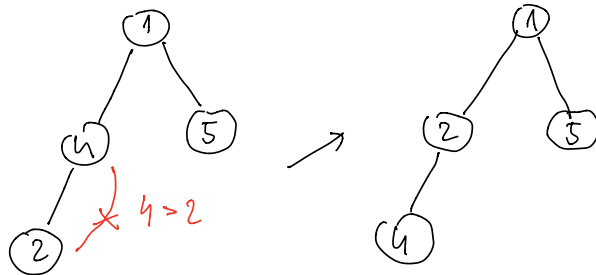
$$i \rightarrow 2i + 1$$

$$i \rightarrow 2i + 2$$



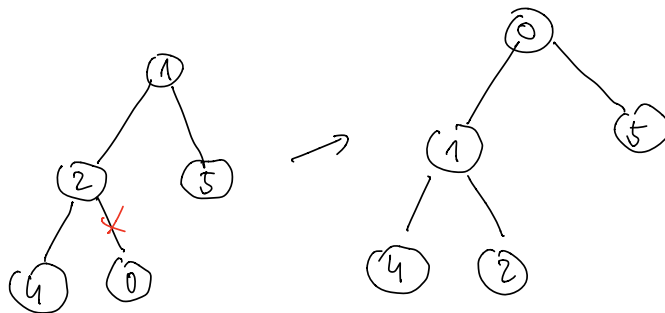
3.

INSERT (2)

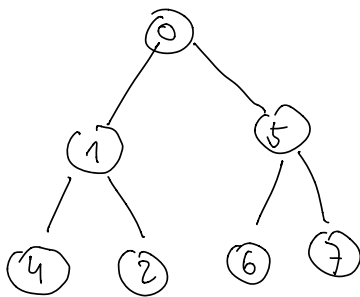


$\log(n)$ výměn
 $O(n \log(n))$

INSERT (0)



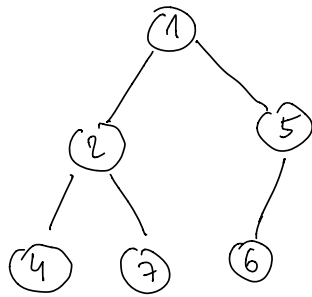
INSERT (6), INSERT (7)



1. EXTRACT

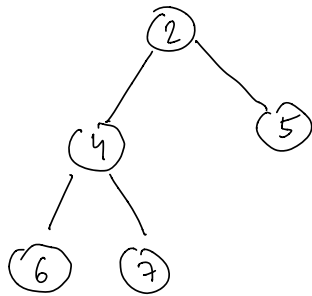
$[0, 1]$

$O(n \log(n))$



$[0, 1, 1]$

2. EXTRACT



$(n-1)$. EXTRACT

(7)

$[0, 1, 2, \dots, 7]$

slučajnost :

$$O(n \log n) + O(n \log n) = O(n \log n) \\ = O(n \log n)$$

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 1 | 5 | 2 | 0 | 6 | 7 |
|---|---|---|---|---|---|---|

INS(1)

—

INS(2)

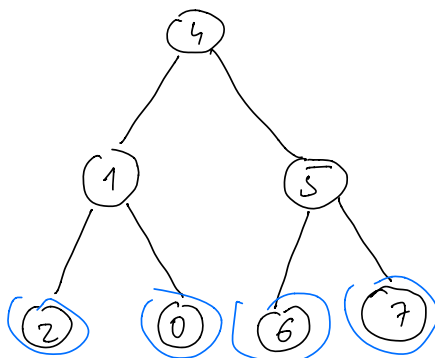
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—

—

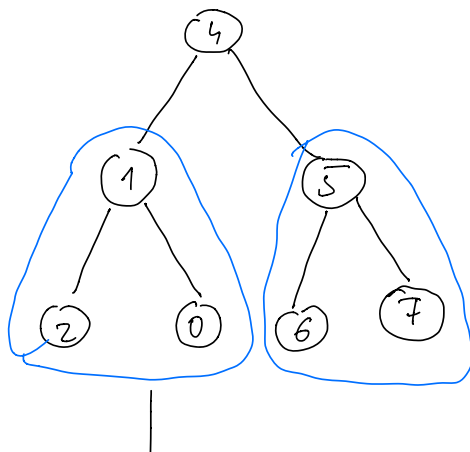
—

$i=0$

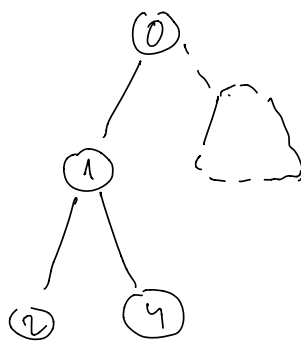
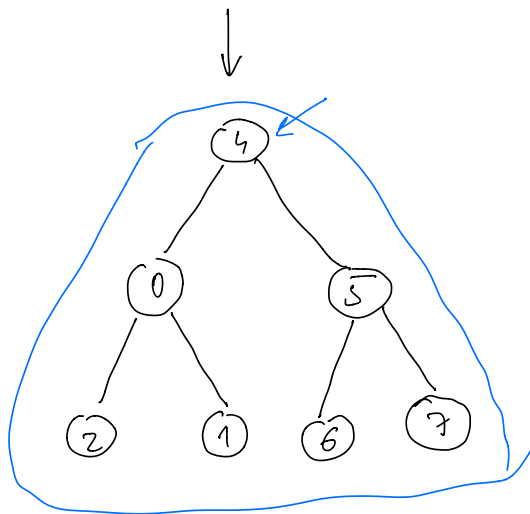
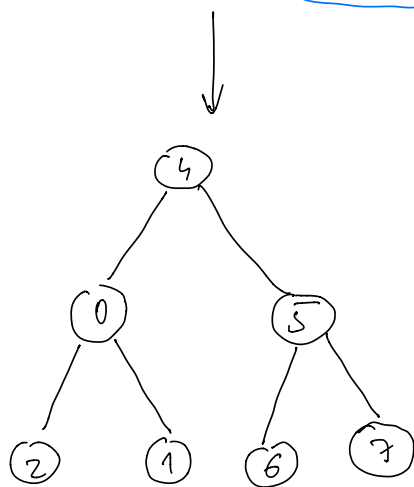
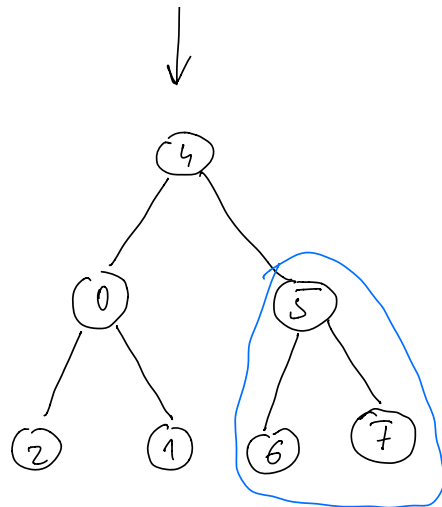


4 podstrony,
hłębka: 1

$i=1$



2 podstrony,
hłębka: 2



1 podstron
hloubka 3

$$f(n) = \sum_{i=0}^{\lfloor \log n \rfloor} \frac{n}{2^i} i = \sum_{i=0}^{\lfloor \log n \rfloor} \frac{in}{2^i} \leq n \sum_{i=0}^{\infty} \frac{i}{2^i} = n \left(\frac{0}{1} + \frac{1}{2} + \frac{2}{4} + \dots \right) = 2n \in O(n)$$

$$i=0 \quad n=8 \quad 2^0=1 \Rightarrow \frac{8}{1} = 8$$

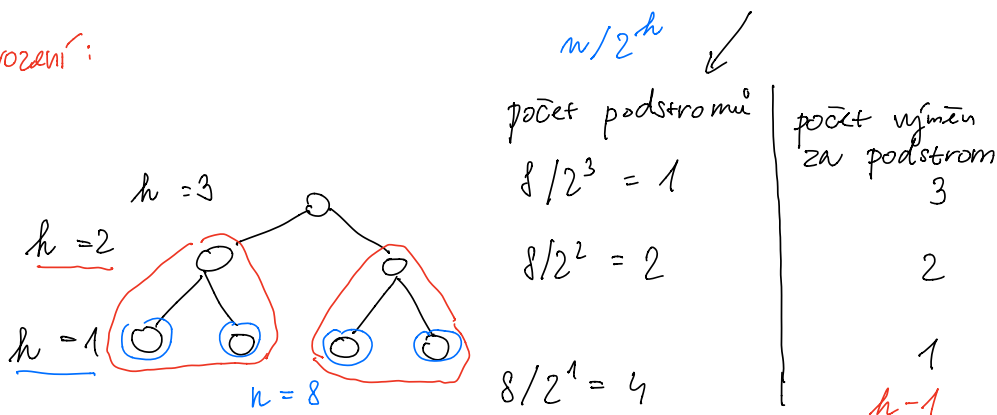
$$\underbrace{O(n)}_{\text{INSERT}} + \underbrace{O(n \log n)}_{\text{EXTRACT}} \quad f(n) = n + \underline{n \log n}$$

$$\downarrow$$

$$n \log n$$

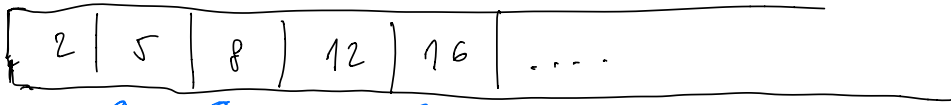
$$O(n \log n)$$

Odvození:



$$\sum_{h=1}^{\lfloor \log n \rfloor} \frac{n}{2^h} (h-1) \leq \sum_{h=0}^{\lfloor \log n \rfloor} \frac{n}{2^h} (h-1) \leq \sum_{h=0}^{\lfloor \log n \rfloor} \left(\frac{n}{2^h} h \right) = 2n$$

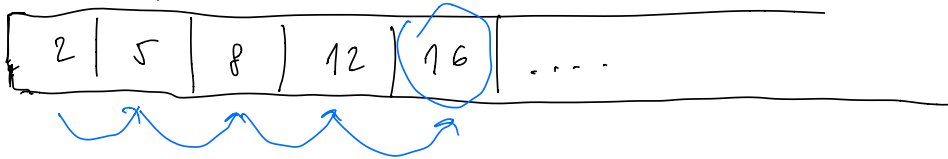
FIND(16)



neuspořádané pole $O(n)$

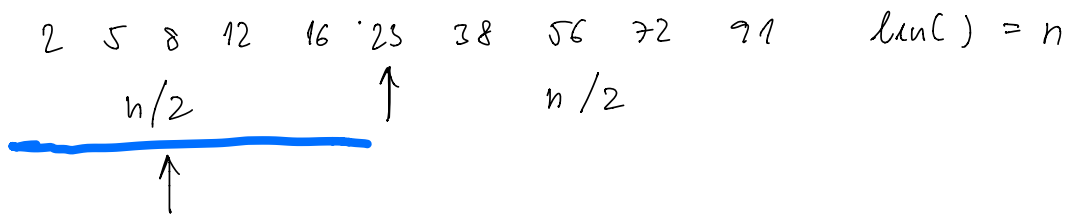
sekvencní vyhledávání

FIND(14)

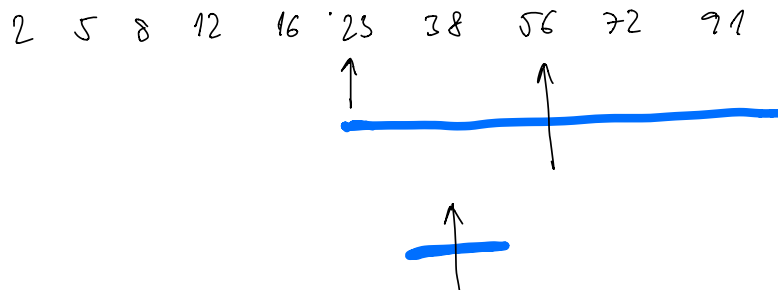


binární vyhledávání

FIND(8)



FIND(42)



$\left. \begin{array}{l} n/2 \\ n/4 \\ n/8 \end{array} \right\} \log(n)$