

1
2
3

1
2
3

FIFO

EDEEDD

EEDD

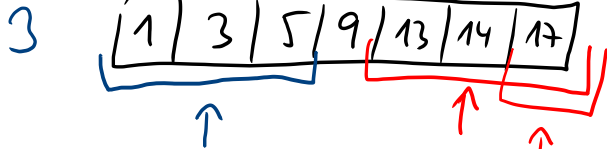
EDED

~~EEDD~~

ŘADICI ALGORITHMY

→ MIN / MAX

→ VYHLEDÁVÁNÍ PRVKU



SEŘAZENÉ
 $O(1)$
 $O(\log N)$

NESEŘAZENÉ
 $O(N)$
 $O(N)$



$\log_2 N$
 $\doteq 10$

N
 10^3

$\doteq 20$

10^6

$N = 10^3$

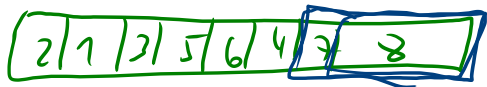
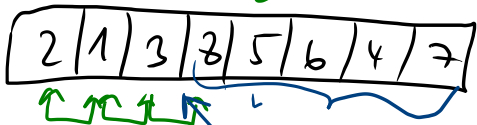
$N = 10^6$

16

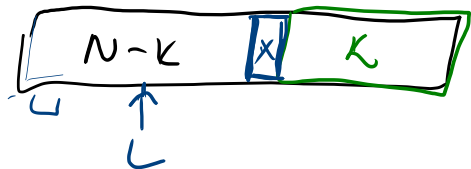
$$\log_2 10^3 = 3 \log_2 10$$

$$2^{10} = 1024 \doteq 1000$$

BUBBLE SORT $6 \ 8 \ 4 \ 2^7 \ 8$
 $5 \ 8$



N



```
def bubble_sort(A):
    for i in range(len(A)):
        for j in range(len(A) - i - 1):
            if A[j] > A[j + 1]:
                A[j], A[j + 1] = A[j + 1], A[j]
```

N iterations

?

N ITERATIONS

1 ITERATION

PO K. ITERACI?

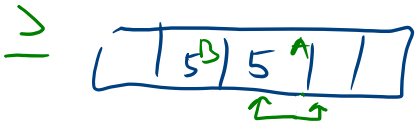
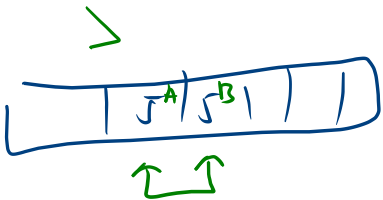
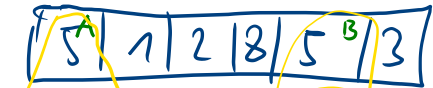
$$(N) + (N-1) + (N-2) + (N-3) + \dots + 1$$

$$1 + 2 + 3 + \dots + (N-1) + N = \frac{N \cdot (N+1)}{2} \in O(N^2)$$

STABILITA

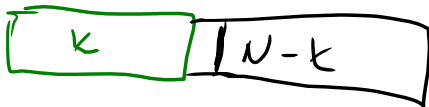
PAŤEŤ: $O(1)$

PŤIHOŤENOSŤ



SELECTION SORT

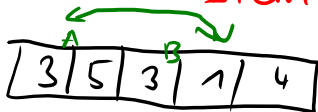
```
def selection_sort(A):  
    for i in range(len(A)):  
        min_idx = i  
        for j in range(i, len(A)):  
            if A[min_idx] > A[j]:  
                min_idx = j  
        A[min_idx], A[i] = A[i], A[min_idx]
```



ČAS: $O(N^2)$

PAŘEŤ: $O(1)$

NEVÍ STABILNÍ



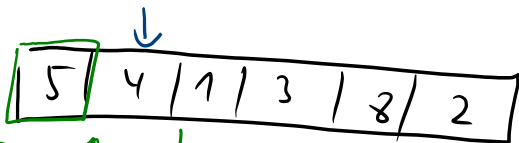
NEVÍ PŘEROZENÍ

INSERTION SORT

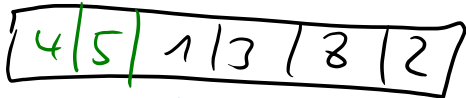
```
def insertion_sort(A):  
    for i in range(len(A)):  
        item = A[i]  
        j = i  
        while j > 0 and item < A[j - 1]:  
            A[j] = A[j - 1]  
            j -= 1  
        A[j] = item
```

CAS: $O(N^2)$

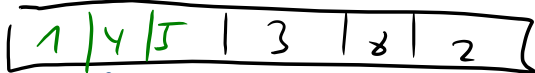
PATĚT: $O(1)$

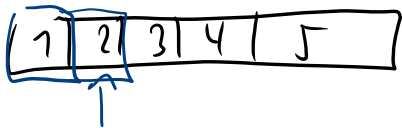


PO 2. ITERACI



PO 3. ITERACI





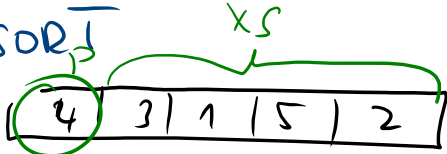
PŘIROZENÍ



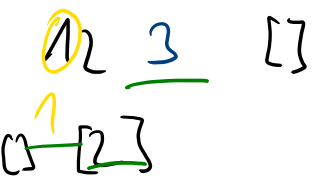
STABILNÍ



QUICKSORT



pivot



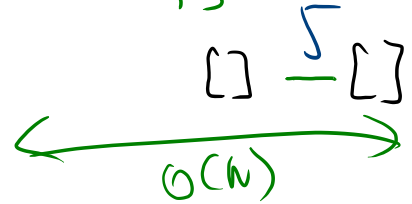
$$QS [] = []$$

$$QS (P:XS) =$$

$$QS [x \mid x \in XS, x < P] ++ [P] ++$$

$$QS [x \mid x \in XS, x \geq P]$$

kloubla



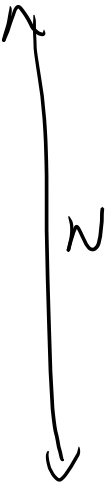
$$QS [] = []$$

$$QS (P:xs) = QS [x | x \leftarrow xs, x < P] ++ [P] ++$$

$$QS [x | x \leftarrow xs, x \geq P]$$

$[1 | 2 | 3 | 4]$ → PAMĚŤ $O(N)$

→ ČAS $O(N^2)$

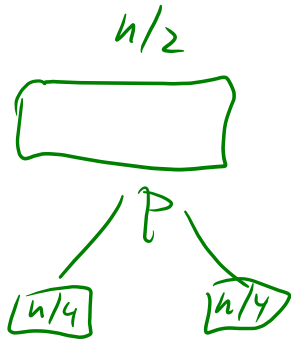
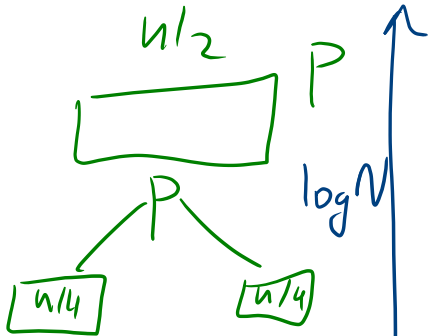


1
[] 2 3 4

2
[] 3 4

3
[] 4

4
[]



$O(N \cdot \log N)$