



Inplace/outplace sorting algorithm

extra space

Merge Sort

Stable/Not a stable algorithm

original array

0	1	2	3	4	5	6
2	7 ^a	6	5	7 ^b	8	12

Sorting algorithm

0	1	2	3	4	5	6
2	5	6	7 ^a	7 ^b	8	12

Bubble Sort

Relative order is maintained

↳ Stable algorithm

0	1	2	3	4	5	6
2	5	6	7 ^b	7 ^a	8	12



Relative order is not maintained

↳ Not a stable
algorithm



HeapSort

Bubble Sort

0 1 2 3 4 5
~~20~~, ~~50~~, ~~10~~, ~~40~~, ~~100~~, ~~90~~
 10 50 50 90 100
 40

$i = 0$

$J = 0 \text{ to } 4$
 0 1 2 3 4 5
~~20~~, ~~10~~, 40, 50, 90, 100
 10 20
 ↑

$a[j] > a[j+1]$

Swap($a[j]$,

$a[j+1]$)

$n = 6$

$i = 1$

$J = 0 \text{ to } 3$
 0 1 2 3 4 5
 10, 20, 40, 50, 90, 100

$i = 2$

$J = 0 \text{ to } 2$
 0 1 2 3 4 5
 10, 20, 40, 50, 90, 100

swapped = false

↳ break

Best case

Scenario

$i = 3, i = 4, i = 5$

comparison

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

$$\text{Sum of } n \text{ natural num} = \frac{n(n+1)}{2}$$

$$(n-1) \text{ --- } = \frac{(n-1)n}{2}$$

$$\Rightarrow \underline{O(n^2)}$$

