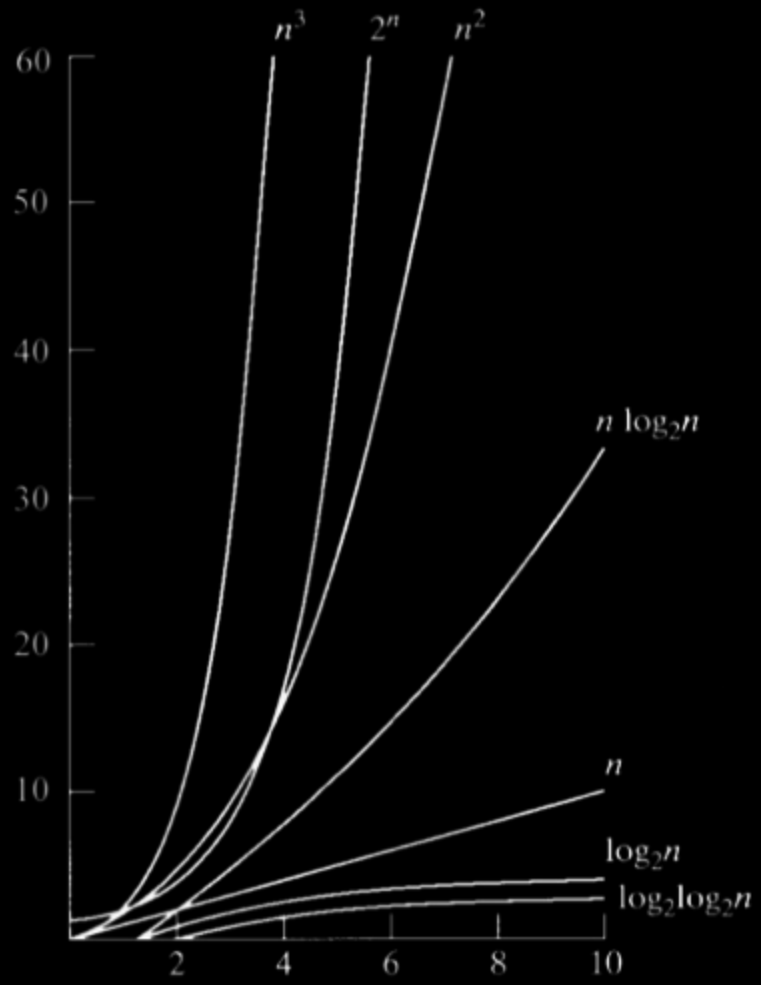

n^3
2^n
n^2
60
50
40
30
20
10
$n \log_2 n$
n
$\log_2 n$
$\log_2 \log_2 n$
2
4
6
8
10

$O(n^2)$

$O(n \log n)$

$O(n)$

$O(\log n)$

$O(1)$

Sorting Algorithms

Bubble Sort

Insertion Sort

Shell Sort

Merge Sort

Quick Sort

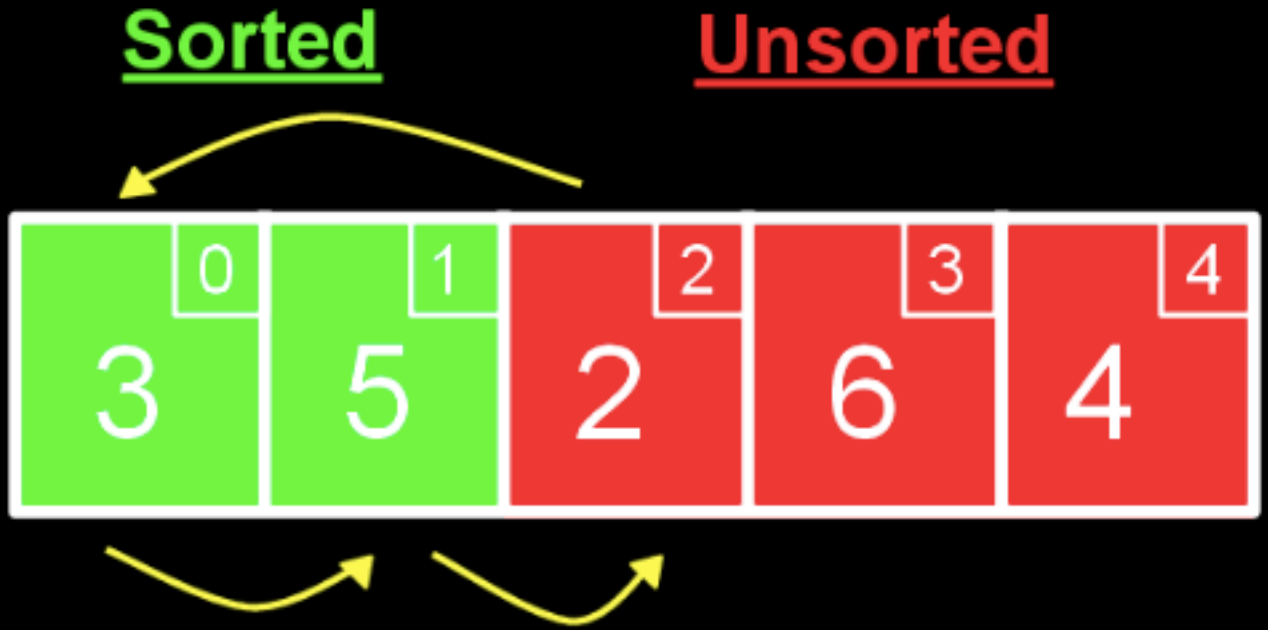
Heap Sort

Selection Sort

Insertion sort

The idea of insertion sort is to build your sorted array in place, shifting elements out of the way if necessary, to make room as you go.

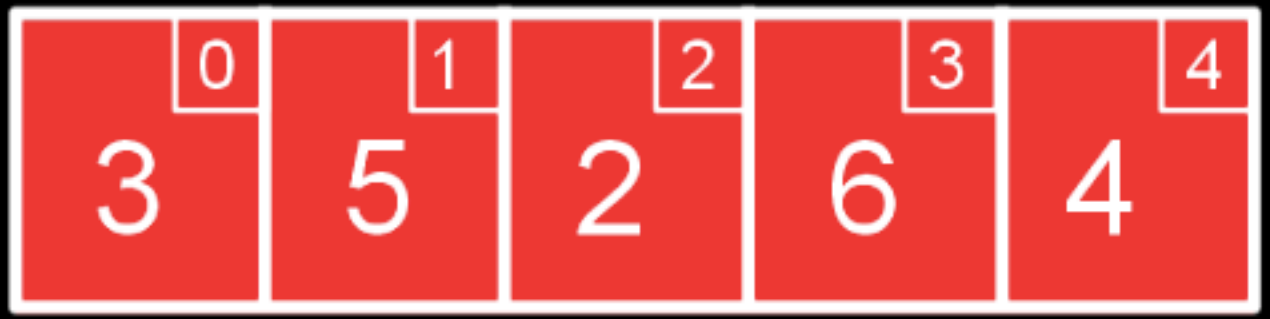
Insertion Sort



All values start as Unsorted

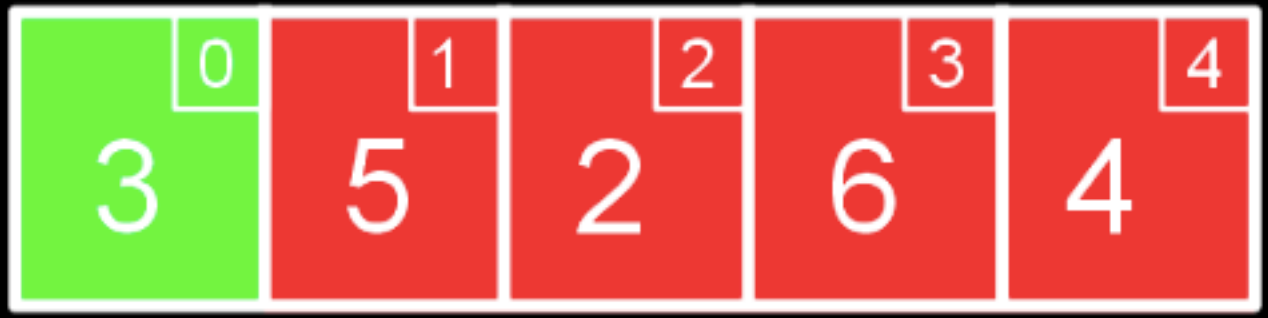
Sorted

Unsorted



Add first value to Sorted

Sorted Unsorted

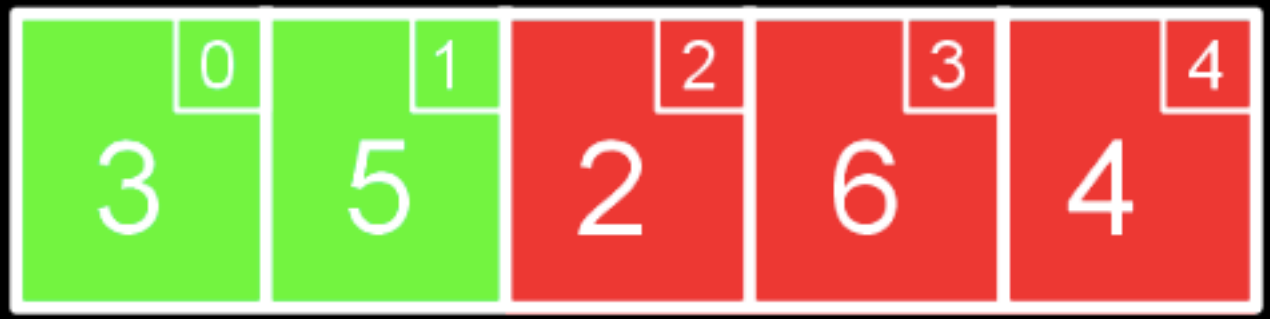


5 > 3

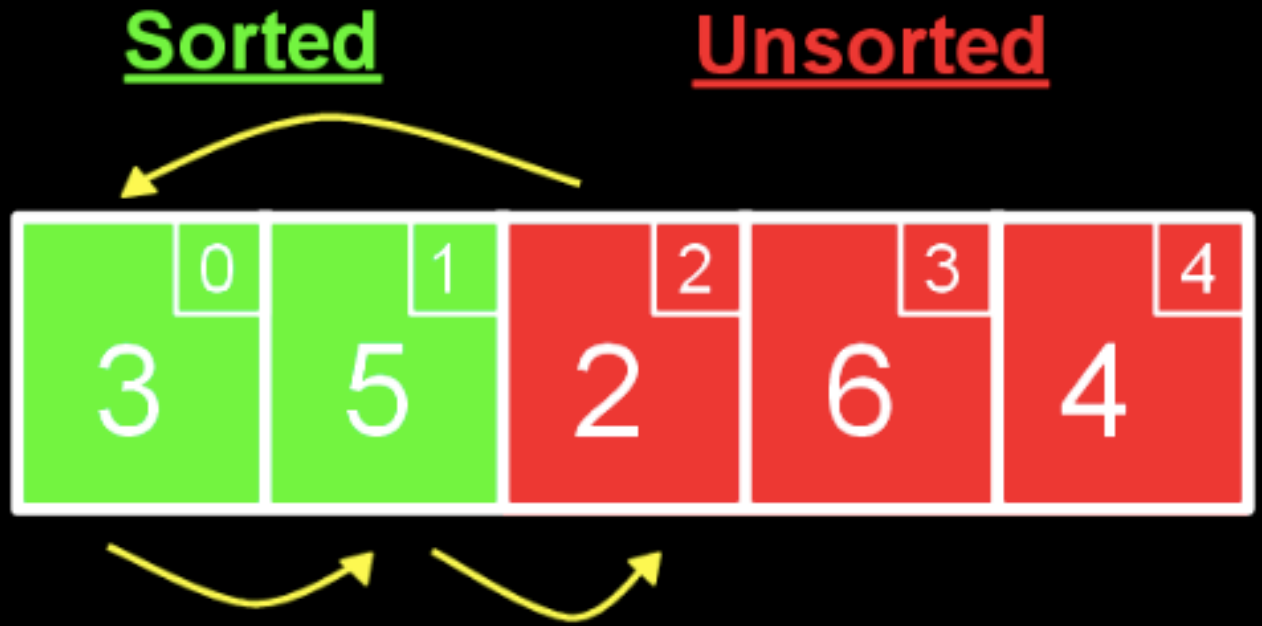
insert 5 to right of 3

Sorted

Unsorted



2 < 5 and 2 < 3
shift 3 and 5
insert 2 to left of 3

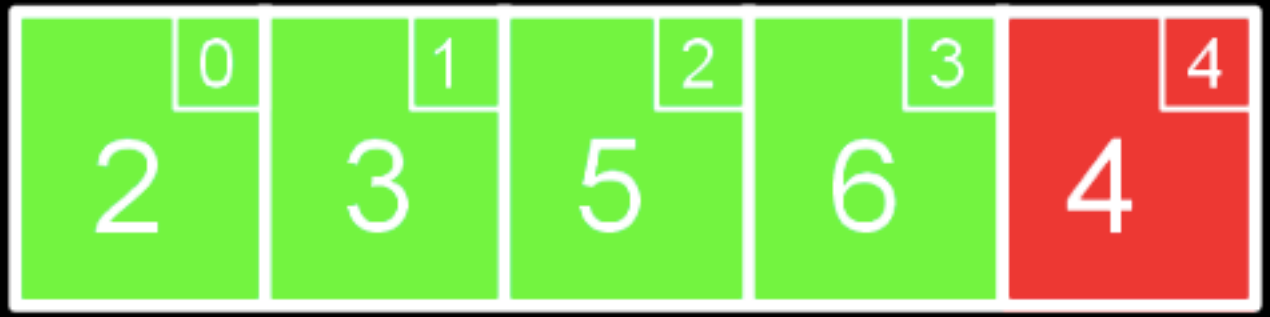


6 > 5

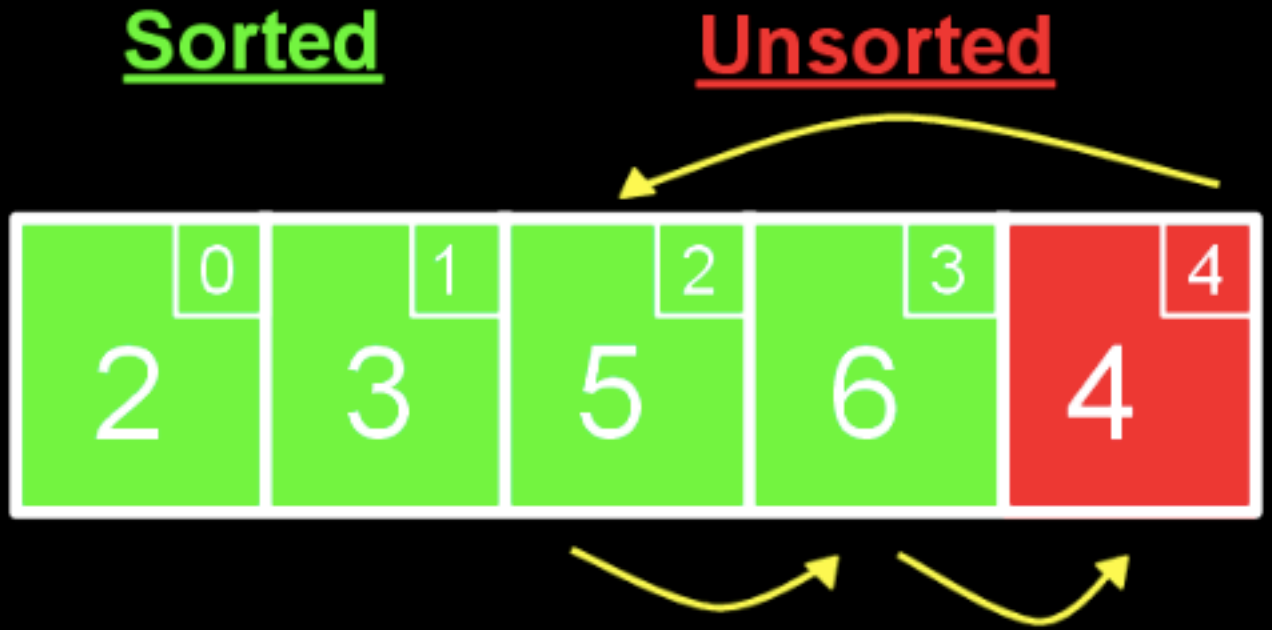
insert 6 to right of 5

Sorted

Unsorted



4 < 6, 4 < 5, and 4 > 3
shift 5 and 6
insert 4 to right of 3



Pseudocode:

- Call the first array of element sorted.
- Repeat until all elements are sorted:
  Look at the next unsorted element . Insert into sorted portion by shifting the requisite number of elements.

$O(n^2)$	selection sort, bubble sort, insertion sort
$O(n \log n)$	
$O(n)$	linear search
$O(\log n)$	binary search
$O(1)$	

$\Omega(n^2)$	selection sort
$\Omega(n \log n)$	
$\Omega(n)$	bubble sort, insertion sort
$\Omega(\log n)$	
$\Omega(1)$	linear search, binary search