Tinker Academy

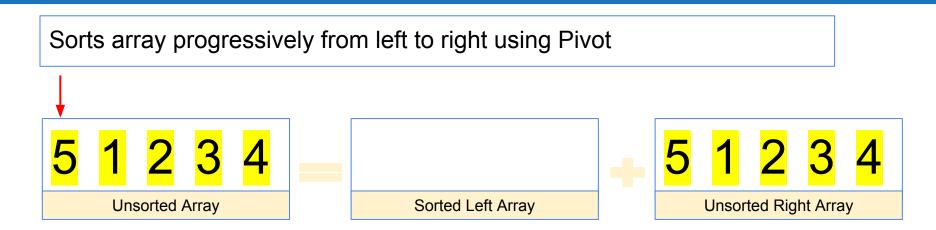
Programming Using Java (Analysis Bubble Sort)

Simple Sorting Algorithm



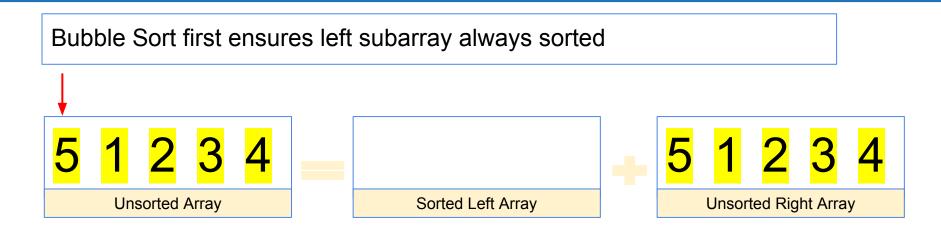


Sorting is "slow", which means it takes more cpu time to complete sort



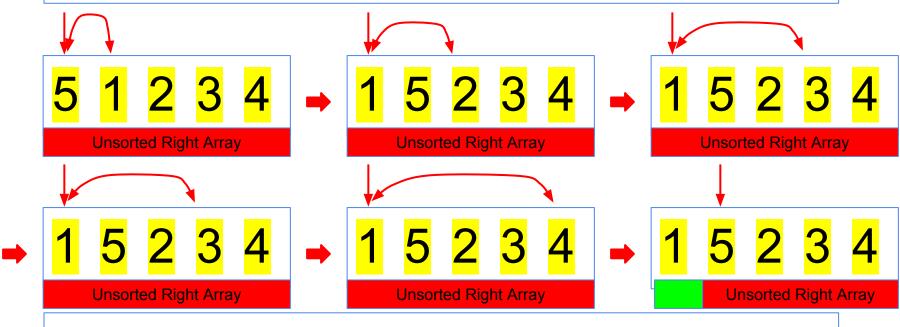
Pivot divides the array into 2, a sorted left subarray, unsorted right array

Pivot at index 0 divides array into empty left subarray, full right subarray

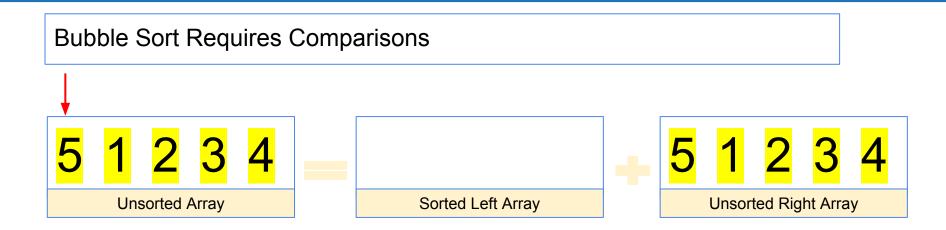


When Pivot at index 0, left subarray is empty and is sorted by definition

Bubble Sort next ensures item at pivot index is lowest in right subarray



Swaps item if item to right of Pivot < Pivot Item



For each Pivot, each item to right compared with pivot item

For 5 item array, when Pivot at index 0, 4 comparisons

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For 5 item array, when Pivot at index 1, 3 comparisons

For 5 item array, when Pivot at index 2, 2 comparisons

For 5 item array, when Pivot at index 3, 1 comparisons

For 5 item array, when Pivot at index 4, 0 comparisons

Total Comparisons =
$$(4) + (3) + (2) + (1) + (0)$$

1



In General, for array of size n

Total Comparisons =
$$(n-1) + (n-2) + (n-3) + ... + (0) = n(n-1)/2$$

For array of size n, # of calculations almost n²

As n is large, for example 1 Million, # Comparisons ~= 1 Trillion!

Array of size 1 Million, # Comparisons ~= 1 Trillion!

 5
 1
 2
 3
 4

 Unsorted Array
 Sorted Left Array
 Unsorted Right Array

Thats too many comparisons!

Better sorting algorithms will reduce the number to ~= 20 million

20 million << 1 Trillion!