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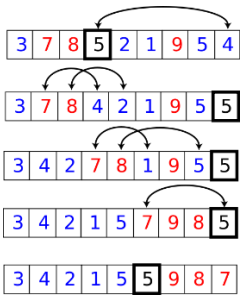
Quick Sort Information Handout

Visual Exemplar



Method

- Select pivot value
- Compare all elements of the array until all elements greater than the pivot are on the left and all elements smaller than the pivot are on the right
- Place the pivot on the wall, partitioning the array into two subarrays
- Apply quick sort recursively to the sub arrays until all elements are sorted

NEW TERMINOLOGY	**Pivot:** An element of the array that is compared with all the other elements **Wall:** A divider used to partition an array or subarray in the quick sorting method **Current Element:** The element that is being compared to the pivot **Partition:** Dividing an array into different parts **Subarray:** A subsection of an array
EFFICIENCY	Picking the Pivot: • Last/First Element (highest chance of worst case) • Randomly (lower chance of worst case) • Median of the first, last, & middle elements (minimizes worst case) Big O • Worst Case: $O(n^2)$ • Best Case: O(nlogn)

WHY	WHEN	WHERE
• Cache efficient & usually fast • High chance to pick a number that can partition the array into 2 parts	• No need for stable sort • Average performance is more important	• Used to sort arrays • Used for randomized arrays

PROS	CONS
• Recursive method is easy to implement • On paper, more efficient than all other sorting methods • More memory efficient than merge sort • Best case sorting is O(nlogn) • Extremely efficient if right pivot is chosen • Able to deal with large array sizes	• In the worst case, can be as slow as bubble sort (n^2) • Iterative implementation is difficult to implement (faster than recursive) • Is an unstable sorting method (Does not keep things in relative order)