

Algorithms and Data Structures

Problem 5.4

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Time Complexities of Sorting Algorithms.

Sorted by average-case time complexity.

Name	Best-Case	Average-Case	Worst-Case	In-Place?
Counting Sort	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$	No
Radix Sort	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$	No
Bucket Sort	$\Theta(n)$	$\Theta(n)$	$\Theta(n^2)$	No
Cube Sort	$\Theta(n)$	$\Theta(n \log n)$	$\Theta(n \log n)$	No
Timsort	$\Theta(n)$	$\Theta(n \log n)$	$\Theta(n \log n)$	No (Almost)
Merge Sort	$\Theta(n \log n)$	$\Theta(n \log n)$	$\Theta(n \log n)$	Usually not
Heap Sort	$\Theta(n \log n)$	$\Theta(n \log n)$	$\Theta(n \log n)$	Yes
Quick Sort	$\Theta(n \log n)$	$\Theta(n \log n)$	$\Theta(n^2)$	Can be
Tree Sort	$\Theta(n \log n)$	$\Theta(n \log n)$	$\Theta(n^2)$	No
Shell Sort	$\Theta(n \log n)$	$\Theta(n(\log n)^2)$	$\Theta(n(\log n)^2)$	Yes
Bubble Sort	$\Theta(n)$	$\Theta(n^2)$	$\Theta(n^2)$	Yes
Insertion Sort	$\Theta(n)$	$\Theta(n^2)$	$\Theta(n^2)$	Yes
Selection Sort	$\Theta(n^2)$	$\Theta(n^2)$	$\Theta(n^2)$	Yes