











Instructions

- Press the  button to sort the column in ascending or descending order
- Hover over any row to focus on it

Sorting Algorithms

Sorting Algorithms 	Space complexity		Time complexity	
	Worst case 	Best case 	Average case 	Worst case 
Insertion Sort	$O(1)$	$O(n)$	$O(n^2)$	$O(n^2)$
Selection Sort	$O(1)$	$O(n^2)$	$O(n^2)$	$O(n^2)$
Smooth Sort	$O(1)$	$O(n)$	$O(n \log n)$	$O(n \log n)$
Bubble Sort	$O(1)$	$O(n)$	$O(n^2)$	$O(n^2)$
Shell Sort	$O(1)$	$O(n)$	$O(n \log n^2)$	$O(n \log n^2)$
Mergesort	$O(n)$	$O(n \log n)$	$O(n \log n)$	$O(n \log n)$
Quicksort	$O(\log n)$	$O(n \log n)$	$O(n \log n)$	$O(n \log n)$
Heapsort	$O(1)$	$O(n \log n)$	$O(n \log n)$	$O(n \log n)$

Data Structures Comparison

Data Structures 	Average Case			Worst Case		
	Search 	Insert 	Delete 	Search 	Insert 	Delete 
Array	$O(n)$	N/A	N/A	$O(n)$	N/A	N/A
Sorted Array	$O(\log n)$	$O(n)$	$O(n)$	$O(\log n)$	$O(n)$	$O(n)$
Linked List	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(1)$	$O(1)$

Data Structures ⬆	Average Case			Worst Case		
	Search ⬆	Insert ⬆	Delete ⬆	Search ⬆	Insert ⬆	Delete ⬆
Doubly Linked List	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(1)$	$O(1)$
Stack	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(1)$	$O(1)$
Hash table	$O(1)$	$O(1)$	$O(1)$	$O(n)$	$O(n)$	$O(n)$
Binary Search Tree	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(n)$	$O(n)$	$O(n)$
B-Tree	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$
Red-Black tree	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$
AVL Tree	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$	$O(\log n)$

Growth Rates

n	$f(n)$	$\log n$	n	$n \log n$	n^2	2^n	$n!$
10		0.003ns	0.01ns	0.033ns	0.1ns	1ns	3.65ms
20		0.004ns	0.02ns	0.086ns	0.4ns	1ms	77years
30		0.005ns	0.03ns	0.147ns	0.9ns	1sec	8.4×10^{15} yrs
40		0.005ns	0.04ns	0.213ns	1.6ns	18.3min	--
50		0.006ns	0.05ns	0.282ns	2.5ns	13days	--
100		0.07	0.1ns	0.644ns	0.10ns	4×10^{13} yrs	--
1,000		0.010ns	1.00ns	9.966ns	1ms	--	--
10,000		0.013ns	10ns	130ns	100ms	--	--
100,000		0.017ns	0.10ms	1.67ms	10sec	--	--
1'000,000		0.020ns	1ms	19.93ms	16.7min	--	--
10'000,000		0.023ns	0.01sec	0.23ms	1.16days	--	--
100'000,000		0.027ns	0.10sec	2.66sec	115.7days	--	--
1,000'000,000		0.030ns	1sec	29.90sec	31.7 years	--	--

Comparison graph

