

# LEGEND

TIME Complexity vs. SPACE Complexity

Good Fair Bad

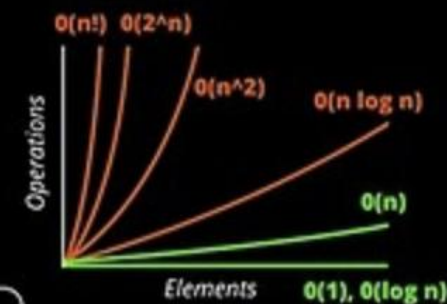
Good Fair Bad



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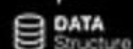


### DATA STRUCTURE

Operations

### ARRAY SORTING

Algorithms



DATA Structure



TIME Complexity



SPACE Complexity



ARRAY Algorithms



TIME Complexity



SPACE Complexity

Average

Worst

Best

Average

Worst

Worst

Access Search Insertion Deletion Access Search Insertion Deletion

Array		$O(1)$	$O(n)$	$O(n)$	$O(n)$	$O(1)$	$O(n)$	$O(n)$	$O(n)$	$O(n)$
Stack		$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$
Queue		$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$
Singly-Linked List		$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$
Doubly-Linked List		$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$	$O(n)$	$O(1)$	$O(1)$	$O(n)$
Skip List		$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$	$O(n)$	$O(n)$	$O(n)$	$O(n \log(n))$
Hash Table		N/A	$O(1)$	$O(1)$	$O(1)$	N/A	$O(n)$	$O(n)$	$O(n)$	$O(n)$
Binary Search Tree		$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$	$O(n)$	$O(n)$	$O(n)$	$O(n)$
Cartesian Tree		N/A	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	N/A	$O(n)$	$O(n)$	$O(n)$	$O(n)$
B-Tree		$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$
Red-Black Tree		$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$
Splay Tree		N/A	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	N/A	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$
AVL Tree		$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$
KD Tree		$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$	$O(n)$	$O(n)$	$O(n)$	$O(n)$	$O(n)$

Quicksort		$O(n \log(n))$	$O(n \log(n))$	$O(n^2)$	$O(\log(n))$
Mergesort		$O(n \log(n))$	$O(n \log(n))$	$O(n \log(n))$	$O(n)$
Timsort		$O(n)$	$O(n \log(n))$	$O(n \log(n))$	$O(1)$
Heapsort		$O(n \log(n))$	$O(n \log(n))$	$O(n \log(n))$	$O(1)$
Bubble Sort		$O(n)$	$O(n^2)$	$O(n^2)$	$O(1)$
Insertion Sort		$O(n)$	$O(n^2)$	$O(n^2)$	$O(1)$
Selection Sort		$O(n^2)$	$O(n^2)$	$O(n^2)$	$O(1)$
Tree Sort		$O(n \log(n))$	$O(n \log(n))$	$O(n^2)$	$O(n)$
Shell Sort		$O(n \log(n))$	$O(n(\log(n))^2)$	$O(n(\log(n))^2)$	$O(1)$
Bucket Sort		$O(n+k)$	$O(n+k)$	$O(n^2)$	$O(n)$
Radix Sort		$O(nk)$	$O(nk)$	$O(nk)$	$O(n+k)$
Counting Sort		$O(n+k)$	$O(n+k)$	$O(n+k)$	$O(k)$
Cubesort		$O(n)$	$O(n \log(n))$	$O(n \log(n))$	$O(n)$