

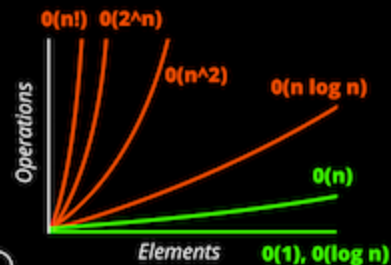
# LEGEND

TIME Complexity vs. SPACE Complexity

Good Fair Bad

Good Fair Bad

## <BIG-O-CHEATSHEET>



### DATA STRUCTURE Operations

[www.bigocheatsheet.com](http://www.bigocheatsheet.com)

### ARRAY SORTING Algorithms

DATA Structure		TIME Complexity				SPACE Complexity			
		Average		Worst		Worst			
		Access	Search	Insertion	Deletion	Access	Search	Insertion	Deletion
Array		$\Theta(1)$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$
Stack		$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$	$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$
Queue		$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$	$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$
Singly-Linked List		$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$	$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$
Doubly-Linked List		$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$	$\Theta(n)$	$\Theta(n)$	$\Theta(1)$	$\Theta(1)$
Skip List		$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$	$\Theta(n \log(n))$
Hash Table		N/A	$\Theta(1)$	$\Theta(1)$	$\Theta(1)$	N/A	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$
Binary Search Tree		$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$
Cartesian Tree		N/A	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	N/A	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$
B-Tree		$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$
Red-Black Tree		$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$
Splay Tree		N/A	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	N/A	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$
AVL Tree		$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$
KD Tree		$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(\log(n))$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$	$\Theta(n)$

ARRAY Algorithms		TIME Complexity				SPACE Complexity			
		Best	Average	Worst	Worst				
Quicksort		$\Omega(n \log(n))$	$\Theta(n \log(n))$	$\Theta(n^2)$	$\Theta(\log(n))$				
Mergesort		$\Omega(n \log(n))$	$\Theta(n \log(n))$	$\Theta(n \log(n))$	$\Theta(n)$				
Timsort		$\Omega(n)$	$\Theta(n \log(n))$	$\Theta(n \log(n))$	$\Theta(1)$				
Heapsort		$\Omega(n \log(n))$	$\Theta(n \log(n))$	$\Theta(n \log(n))$	$\Theta(1)$				
Bubble Sort		$\Omega(n)$	$\Theta(n^2)$	$\Theta(n^2)$	$\Theta(1)$				
Insertion Sort		$\Omega(n)$	$\Theta(n^2)$	$\Theta(n^2)$	$\Theta(1)$				
Selection Sort		$\Omega(n^2)$	$\Theta(n^2)$	$\Theta(n^2)$	$\Theta(1)$				
Tree Sort		$\Omega(n \log(n))$	$\Theta(n \log(n))$	$\Theta(n^2 \log(n))$	$\Theta(n)$				
Shell Sort		$\Omega(n \log(n))$	$\Theta(n(\log(n))^2)$	$\Theta(n(\log(n))^2)$	$\Theta(1)$				
Bucket Sort		$\Omega(n+k)$	$\Theta(n+k)$	$\Theta(n^2)$	$\Theta(n)$				
Radix Sort		$\Omega(nk)$	$\Theta(nk)$	$\Theta(nk)$	$\Theta(n+k)$				
Counting Sort		$\Omega(n+k)$	$\Theta(n+k)$	$\Theta(n+k)$	$\Theta(k)$				
Cubesort		$\Omega(n)$	$\Theta(n \log(n))$	$\Theta(n \log(n))$	$\Theta(n)$				