# Big O Cheat Sheet

A quick reference of the time and space complexity of all the major data structures and sorting algorithms

## Data Structures

| | index | search | insert | delete |
|---|---|---|---|---|
| **Array** | $O(1)$ | $O(n)$ | $O(n)$ | $O(n)$ |
| **Dynamic Array** | $O(1)$ | $O(n)$ | $O(n)$ | $O(n)$ |
| **Linked List** | $O(n)$ | $O(n)$ | $O(n)$ | $O(1)$ |
| **Queue** | $O(1)$ | $O(n)$ | $O(1)$ | $O(1)$ |
| **Stack** | $O(1)$ | $O(n)$ | $O(1)$ | $O(1)$ |
| **Hash Table** | — | $O(1)$ | $O(1)$ | $O(1)$ |
| **Binary Search Tree** | $O(\lg n)$ | $O(\lg n)$ | $O(\lg n)$ | $O(\lg n)$ |
| **Trie** | — | $O(m)$ | $O(m)$ | $O(m)$ |
| **Heap** | $O(n)$ | $O(n)$ | $O(\lg n)$ | $O(n)$ |
| **Priority Queue** | $O(n)$ | $O(n)$ | $O(\lg n)$ | $O(1)$ |
| **Bloom filter** | — | $O(1)$ | $O(1)$ | — |
| **LRU Cache** | — | $O(1)$ | $O(1)$ | $O(1)$ |

## Sorting Algorithms

| | worst | best | average | space |
|---|---|---|---|---|
| **Selection Sort** | $O(n^2)$ | $O(n^2)$ | $O(n^2)$ | $O(1)$ |
| **Insertion Sort** | $O(n^2)$ | $O(n)$ | $O(n^2)$ | $O(1)$ |
| **Merge Sort** | $O(n \lg n)$ | $O(n \lg n)$ | $O(n \lg n)$ | $O(n)$ |
| **Quicksort** | $O(n^2)$ | $O(n \lg n)$ | $O(n \lg n)$ | $O(\lg n)$ |
| **Heapsort** | $O(n \lg n)$ | $O(n)$ | $O(n \lg n)$ | $O(1)$ |
| **Counting Sort** | $O(n)$ | $O(n)$ | $O(n)$ | $O(n)$ |
| **Radix Sort** | $O(n)$ | $O(n)$ | $O(n)$ | $O(n)$ |

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