

# kintsugi-stack-dsa-cpp

"Data Structures and Algorithms (DSA) should be viewed as essential tools, akin to the finely tuned parts of a Formula 1 car. The act of problem-solving with DSA serves as a crucial platform to exhibit both intelligence and creative thinking. The coding challenges themselves are simply various permutations of external factors; like the weather, track, wind, and rain in an F1 race. Ultimately, what dictates success in both domains; coding and Formula 1; is the mastery of planning, strategizing, maintaining flow, and ensuring precise code orchestration." - Siddhant Bali

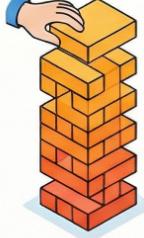
- Author: [Kintsugi-Programmer](#)

## A Developer's Guide to Data Structures & Algorithms

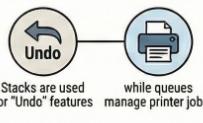
### Fundamental Data Structures: The Building Blocks

#### Stack:

Last-In, First-Out (LIFO)

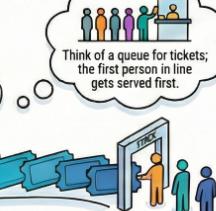


#### Real-World Use Cases



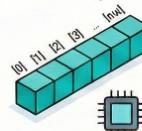
#### Queue:

First-In, First-Out (FIFO)

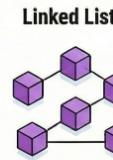


### Arrays vs. Linked Lists

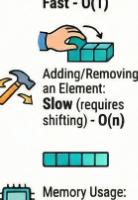
#### Array



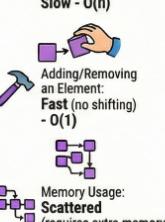
#### Linked List



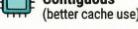
#### Accessing an Element: Fast - O(1)



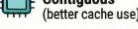
#### Accessing an Element: Slow - O(n)



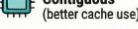
#### Adding/Removing an Element: Slow (requires shifting) - O(n)



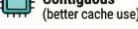
#### Adding/Removing an Element: Fast (no shifting) - O(1)



#### Memory Usage: Contiguous (better cache use)

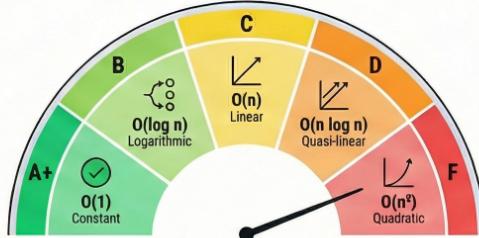


#### Memory Usage: Scattered (requires extra memory)



## Measuring Algorithm Efficiency: Understanding Big O

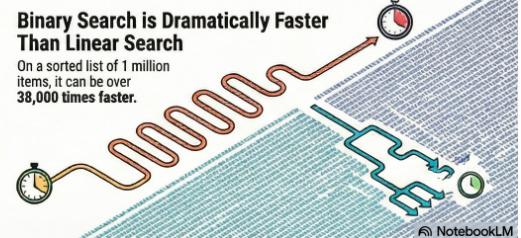
### Performance Grades on Large Datasets



**What is Big O Notation?** It answers the question: "How does my code slow down as data grows?" Complexities range from excellent ( $O(1)$ ) to extremely poor ( $O(n^3)$ ).

### Binary Search is Dramatically Faster Than Linear Search

On a sorted list of 1 million items, it can be over 38,000 times faster.



NotebookLM

Disclaimer: The content presented here is a curated blend of my personal learning journey, experiences, open-source documentation, and invaluable knowledge gained from diverse sources. I do not claim sole ownership over all the material; this is a community-driven effort to learn, share, and grow together.

## SubDIRs: Sub-Directories Containing stuff

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The [kintsugi-stack](#) repository, authored by Kintsugi-Programmer, is less a comprehensive resource and more an Artifact of Continuous Research and Deep Inquiry into Computer Science and Software Engineering. It serves as a transparent ledger of the author's relentless pursuit of mastery, from the foundational algorithms to modern full-stack implementation.

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