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Quick sort and merge sort analysis

Quicksort is an in-place sort, so it's more efficient than merge, which requires $O(N)$ additional storage. Both kinds have an average complexity of $O(N \log N)$, but quicksort is often preferred due to its cache-friendly nature and tail recursive properties. Random quicksort is commonly used to avoid the worst time complexity and has an expected time complexity of $O(N \log N)$. All in all, Quick Sort is a practical sorting algorithm for arrays due to its efficiency and cache locality.

Linked lists have a different memory allocation than arrays, so they are better for inserting items in the middle. Merge sort can be implemented without additional space for linked lists. However, quicksort requires random access, which is not efficient in linked lists because accessing the i -th index requires traversing each node from the head. As a result, merge sort is often preferred for linked lists due to its sequential approach and low need for random access.