

Properties of Sorting

Properties of Sorting

In-place and stable

- A sort algorithm is said to be an **in-place sort** if it requires only a constant amount (i.e. $O(1)$) of extra space during the sorting process.
- A sorting algorithm is **stable** if the relative order of elements with the same key value is preserved by the algorithm.
- Example application of stable sort:
 - Assume that names have been sorted in alphabetical order.
 - Now, if this list is sorted again by tutorial group number, a stable sort algorithm would ensure that all students in the same tutorial groups still appear in alphabetical order of their names.

Sortings

Lower Bound: Comparison-Based Sort

- It is known that all comparison-based sorting algorithms have a complexity lower bound of $n \cdot \log(n)$.
- Therefore, any comparison-based sorting algorithm with worst-case complexity $O(n \cdot \log(n))$ is optimal.