**Tutorial 08**

**Advanced Sort – Quick Sort**

1. Using Quick Sort binary tree, trace the execution of quick sort with the following list of numbers, and using the first element of the list/sublists as the pivot value:
   1. 4, 7, 1, 8, 3, 2, 6, 5 (in ascending order)

Diagram

Description automatically generated

* 1. 5, 2, 7, 8, 1, 4, 6, 3 (in descending order)

Diagram

Description automatically generated

1. A stable sorting algorithm maintains the relative order of records with equal keys. That is, a sorting algorithm is stable if whenever there are two records R and S with the same key and with R appearing before S in the original list, R will appear before S in the sorted list.

For example:

20 10 30 10

Stable Sort

**Initial List**:

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Data Structures & Algorithms



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sorted List**:      Unstable Sort | 10 | 10 | 20 | 30 |
| **Initial List**: | 20 | 10 | 30 | 10 |

**Sorted List**: 10 10 20 30

Are the sorting algorithms we have discussed so far i.e. bubble sort, selection sort, insertion sort, merge sort and quick sort stable algorithm?

**Solution:**

Stable Sort:

* Bubble Sort
* Insertion Sort
* Merge Sort

Unstable Sort:

* Selection Sort
* Quick Sort

1. List one similarity and one difference between Merge Sort and Quick Sort.

**Solution:**

Similarities:

* Both are sorting algorithms based on the divide-and-conquer strategy.
* Both are sorting algorithms based on recursion.

Differences

* Merge Sort is a stable algorithm, whereas the standard Quick Sort implementation is not.
* Quick Sort is an in-place algorithm, whereas the standard Merge Sort implementation is not.
* Quick Sort uses a pivot value for partitioning the elements, whereas Merge Sort does not.
* Quick Sort partition the list in any ratio, depending on the pivot value. Merge Sort partition the list into 2 halves, i.e. n/2.

***-- End of Tutorial --***

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