

Data Structures and Algorithms

Advanced Sorting Algorithms

Lab Sheet 09

Answer all questions.

1. Define Insertion Sort.

Simple sorting algorithms like Insertion Sort are effective for tiny lists or lists that are almost sorted. By continuously putting each element into the appropriate spot within a sorted subarray, it sorts an array.

2. Explain how it works.

- The first element of the array is sorted at the beginning of the procedure.
- The following element is then considered, and its values are compared to those in the sorted subarray.
- In the sorted subarray, the current element is continuously shifted backward until it finds its proper place according to the sorting order.
- Every element in the array goes through this procedure once, progressively growing the sorted subarray until the full array is sorted.

3. Explain the concept of Merge Sort.

An effective sorting algorithm based on the divide-and-conquer strategy is merge sort. The input array is split in half, with each half being recursively sorted before being combined to create the final sorted array.

4. how it divides and conquers to sort an array.

- Divide: The technique repeatedly splits the unsorted array in half until each subarray is empty or has just one entry. The division stage is now.

- Conquer: After dividing them, the algorithm sorts the individual components or subarrays so that merging them produces the sorted order. The final phase is to conquer.
- Merge: The algorithm joins the subarrays in the sorted order after sorting them first. The larger subarrays are merged in sorted order using this merging procedure to produce a single sorted array.

5. Which scenarios is Insertion Sort preferred over Merge Sort

- For tiny arrays, Insertion Sort outperforms Merge Sort in terms of performance. When there are fewer elements, its efficiency is improved by its simplicity and lower overhead.
- Insertion Sort is effective for partially sorted arrays when there are only a few elements out of position or when the array is nearly sorted. Insertion Sort may be quicker in these circumstances since it makes use of array elements that have previously been sorted.
- Insertion Sort can be accomplished in-place, which eliminates the need for extra memory to store the array's sorted data. On the other hand, Merge Sort is less suitable for situations with limited memory because it needs additional space to merge the subarrays.
- Simplicity: Insertion Sort features an easy-to-understand implementation that makes it simpler.