WEEK\_1\_ALGORITHMS\_DATA\_STRUCTURES

Exercise 3: **Sorting Customer Orders**

1. Explain different sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Merge Sort).

Bubble sort - A comparison-based sorting algorithm. It repeatedly steps through the list, compares adjacent elements, and swaps them if they are in the wrong order. This process is repeated until the list is sorted.

Insertion sort – This sorting technique builds the sorted list one item at a time by repeatedly taking the next item and inserting it into the correct position within the sorted part of the list.

Quick sort - A divide-and-conquer algorithm. It picks a 'pivot' element, partitions the array into elements less than and greater than the pivot, and recursively sorts the subarrays.

Merge sort - A divide-and-conquer algorithm. It divides the list into two halves, recursively sorts them, and then merges the sorted halves.

1. Compare the performance (time complexity) of Bubble Sort and Quick Sort.

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| --- | --- | --- | --- |
|  | Best case | Average case | Worst case |
| Bubble sort | O(n log n) | O(n log n) | O(n^2) |
| Quick sort | O(n) | O(n^2) | O(n^2) |

1. Discuss why Quick Sort is generally preferred over Bubble Sort.

* Lower time complexity
* In place sorting technique
* Is more scalable for large datasets