Question 2

The log(n) complexity can be simply explained by the divide and conquer nature of the merge_sort() function itself. However, nlog(n) comes from the merge() function having to do n comparisons given a worse-case scenario. If given an array of 8 elements, its worst-case scenario would be {0, 2, 4, 6, 1, 3, 5, 7}. In the code, left_arr would be {0, 2, 4, 6} and right_arr would be {1, 3, 5, 7}. To merge, we use two pointers at the beginning of each temporary array, taking the smallest element and inserting it back into the original array. In this scenario, we will have to compare 7 times (n – 1) until one of the arrays reaches its end. Thus, the worst-case complexity of merge sort with n elements would be $(n - 1)\log_2(n)$, or O(nlog(n)).

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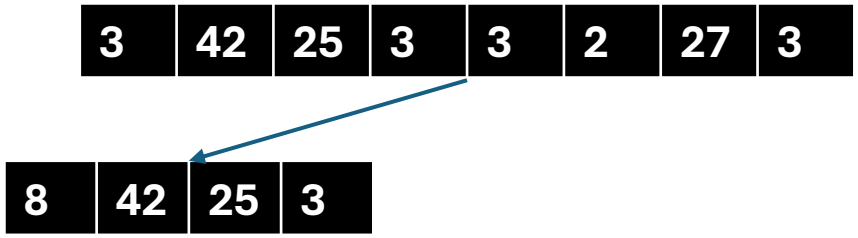
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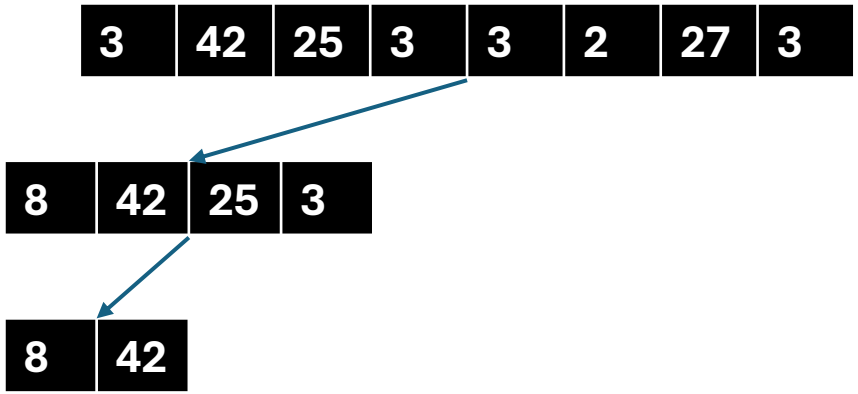
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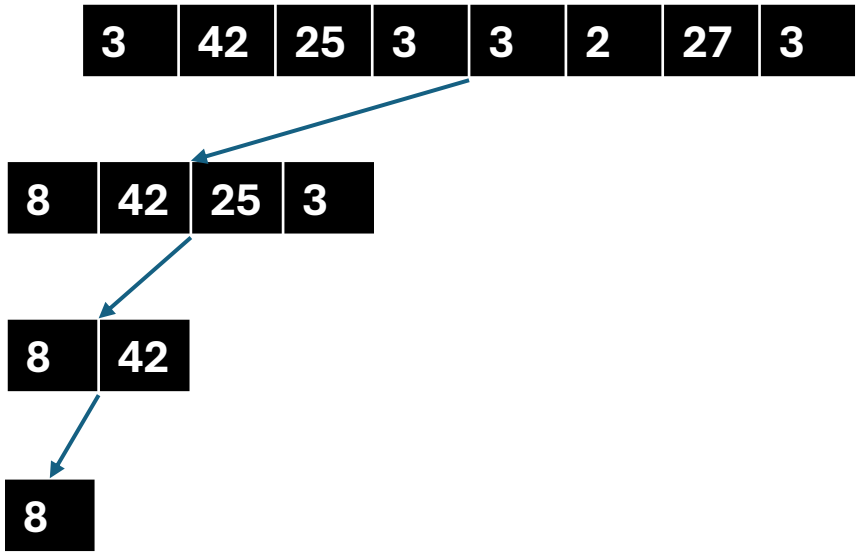
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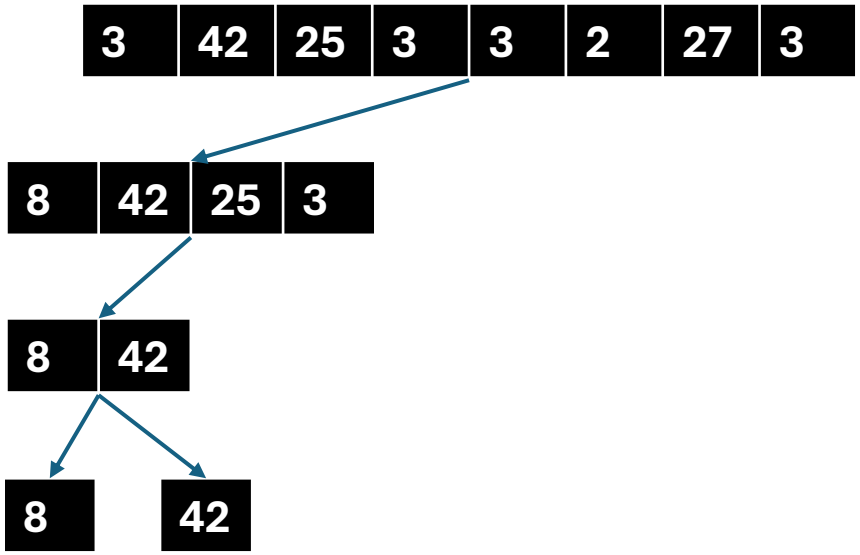
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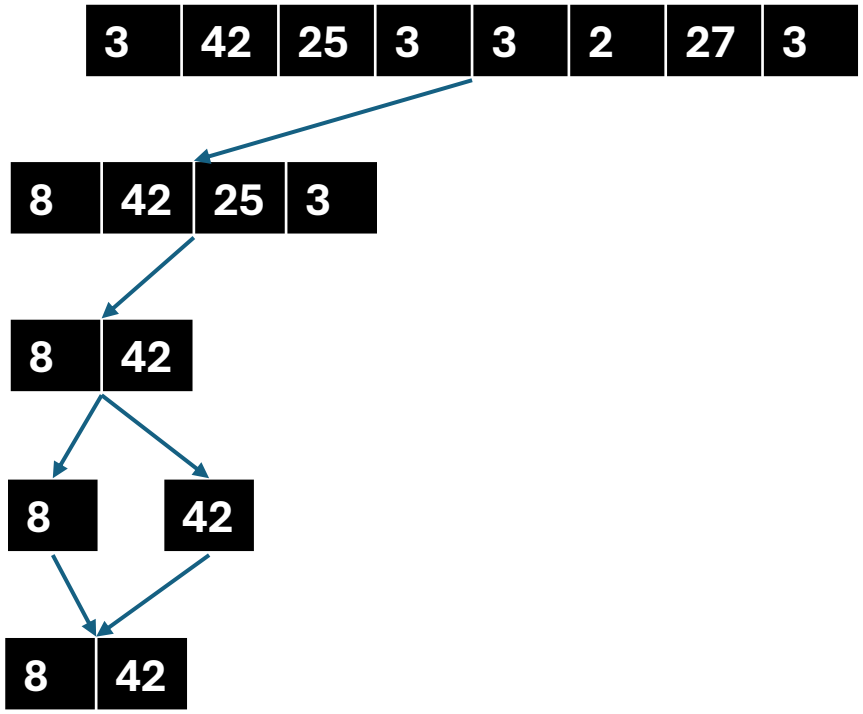
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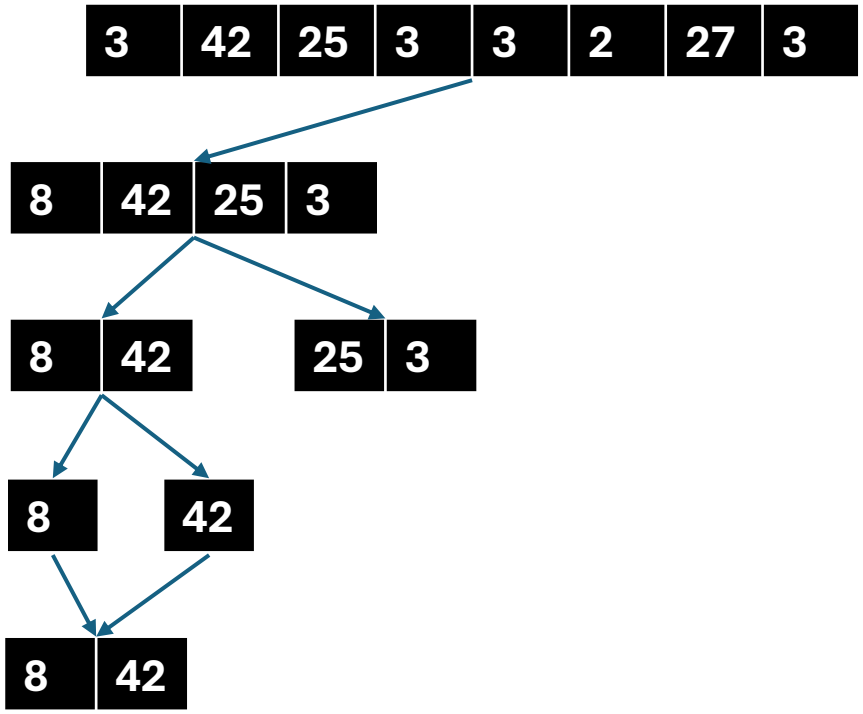
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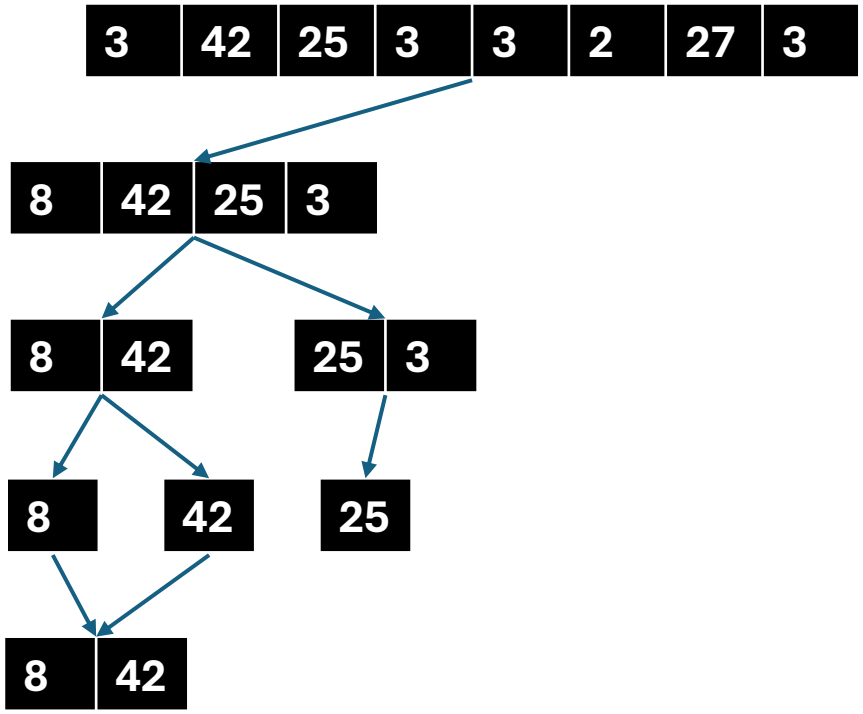
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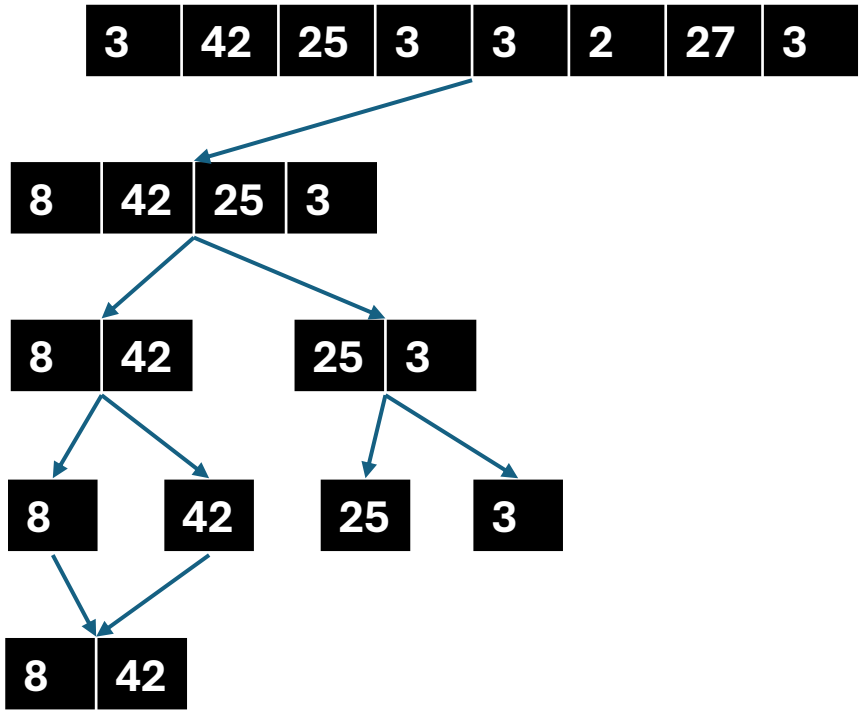
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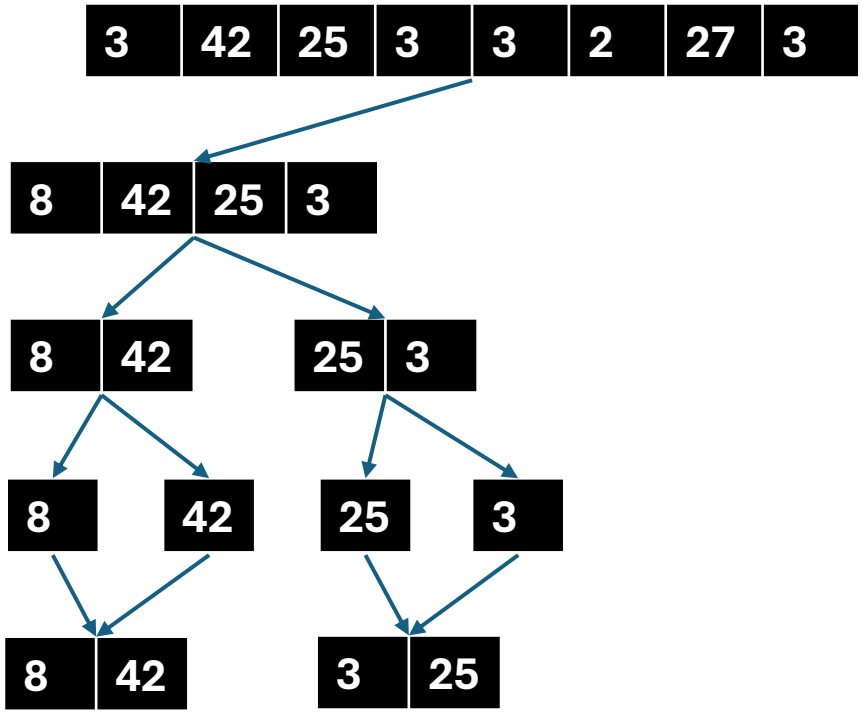
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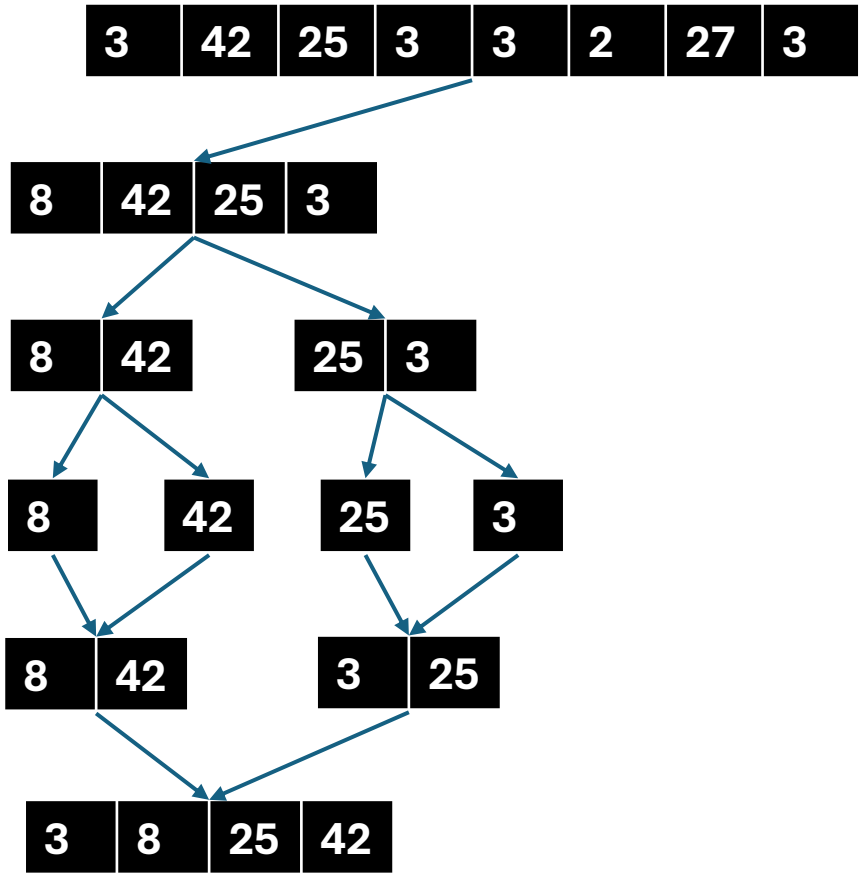
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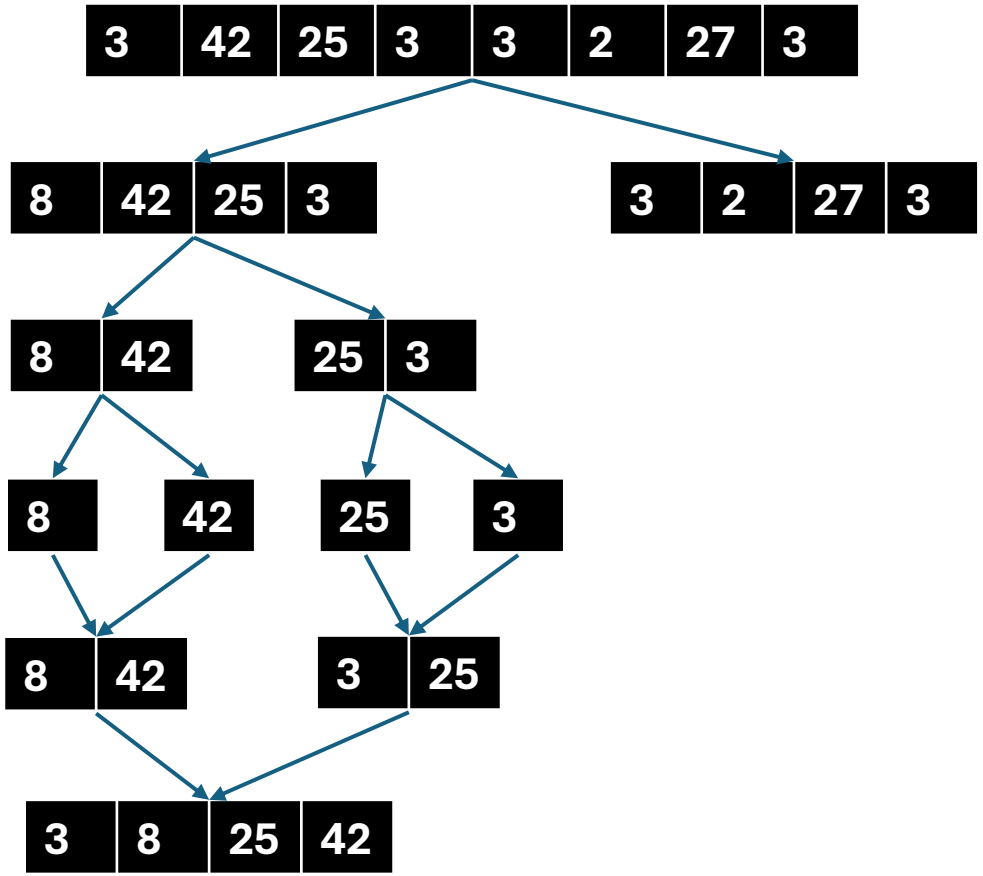
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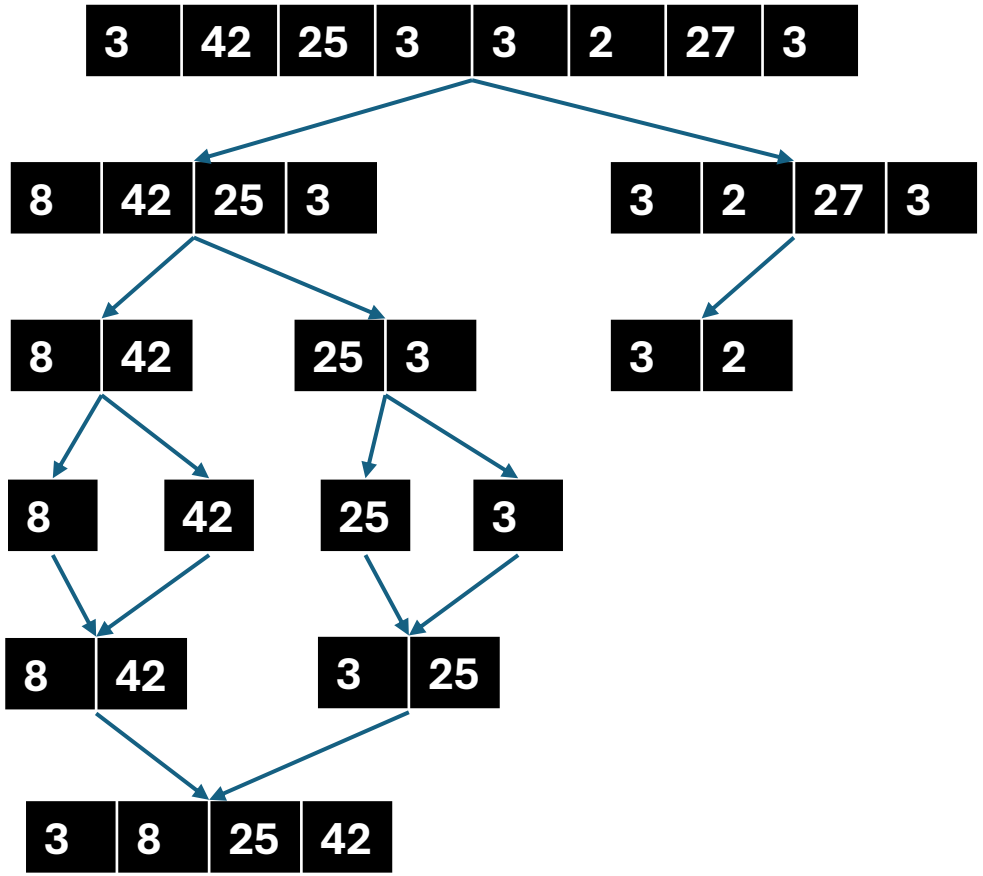
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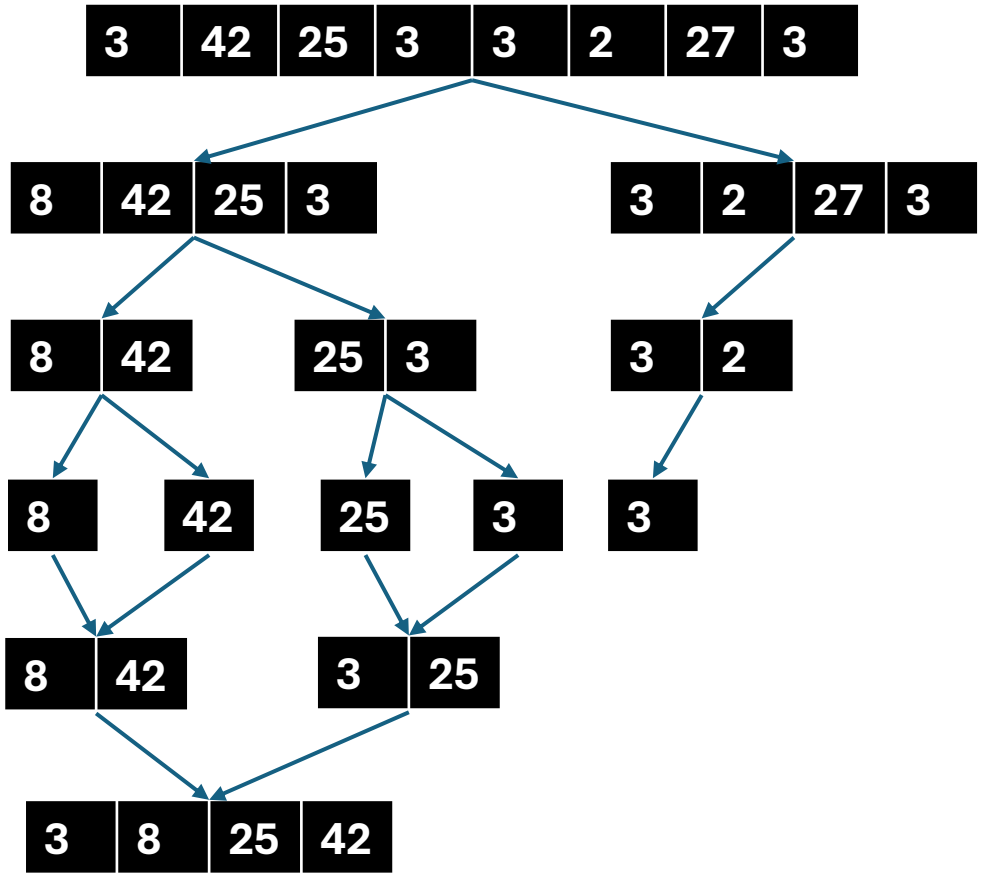
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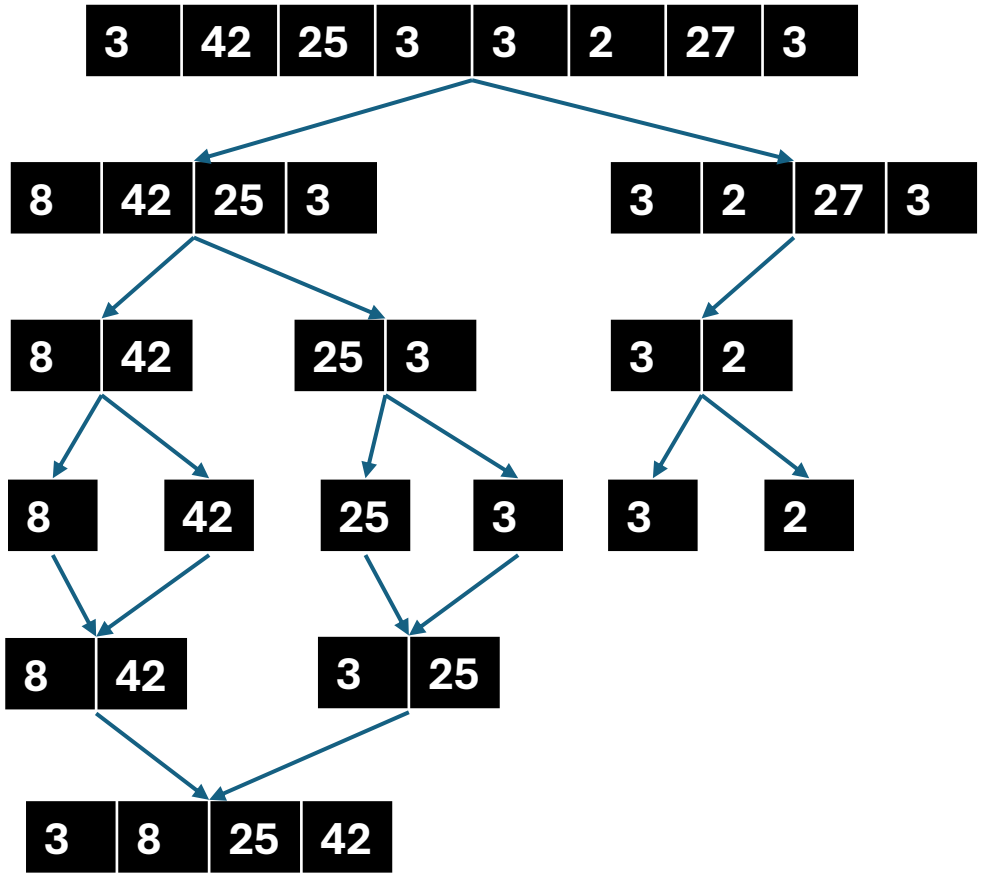
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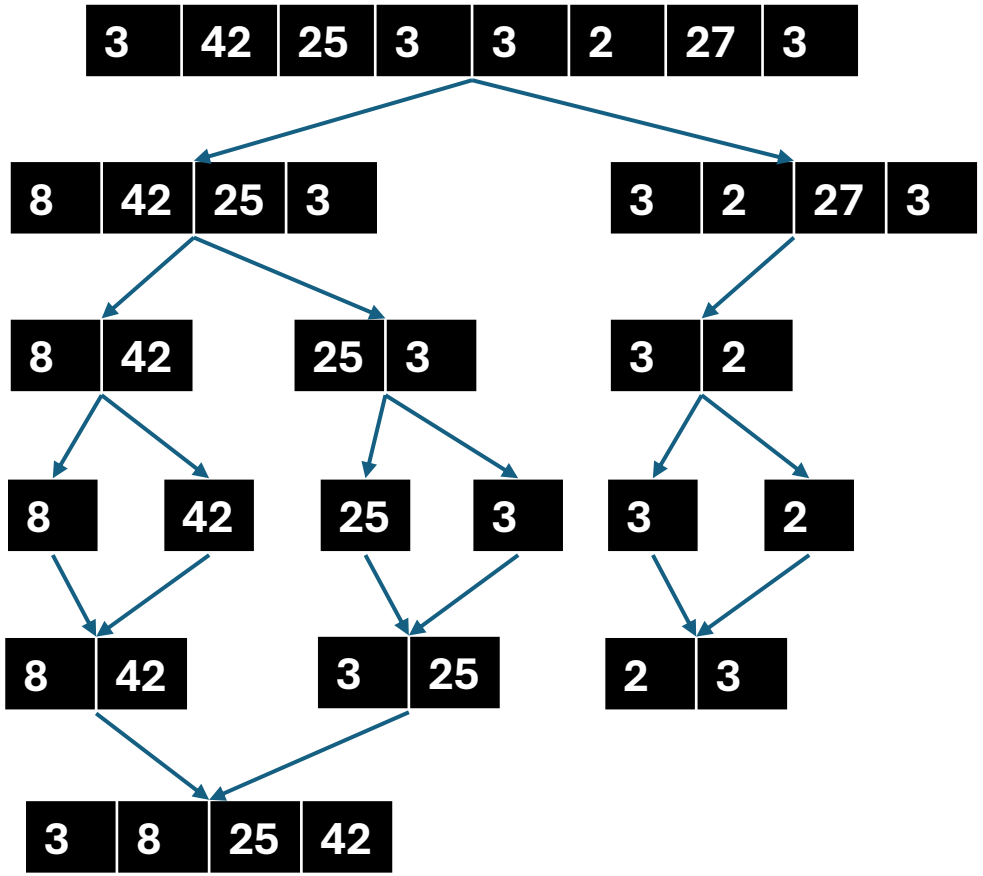
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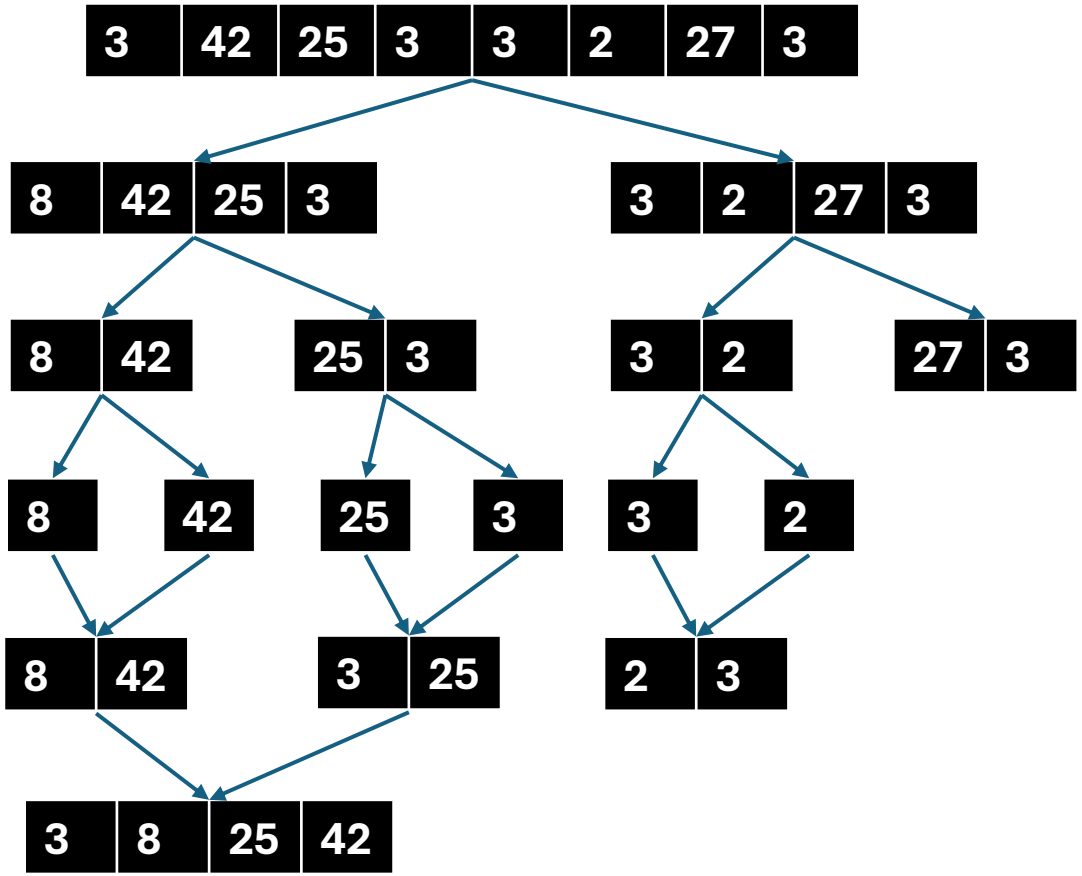
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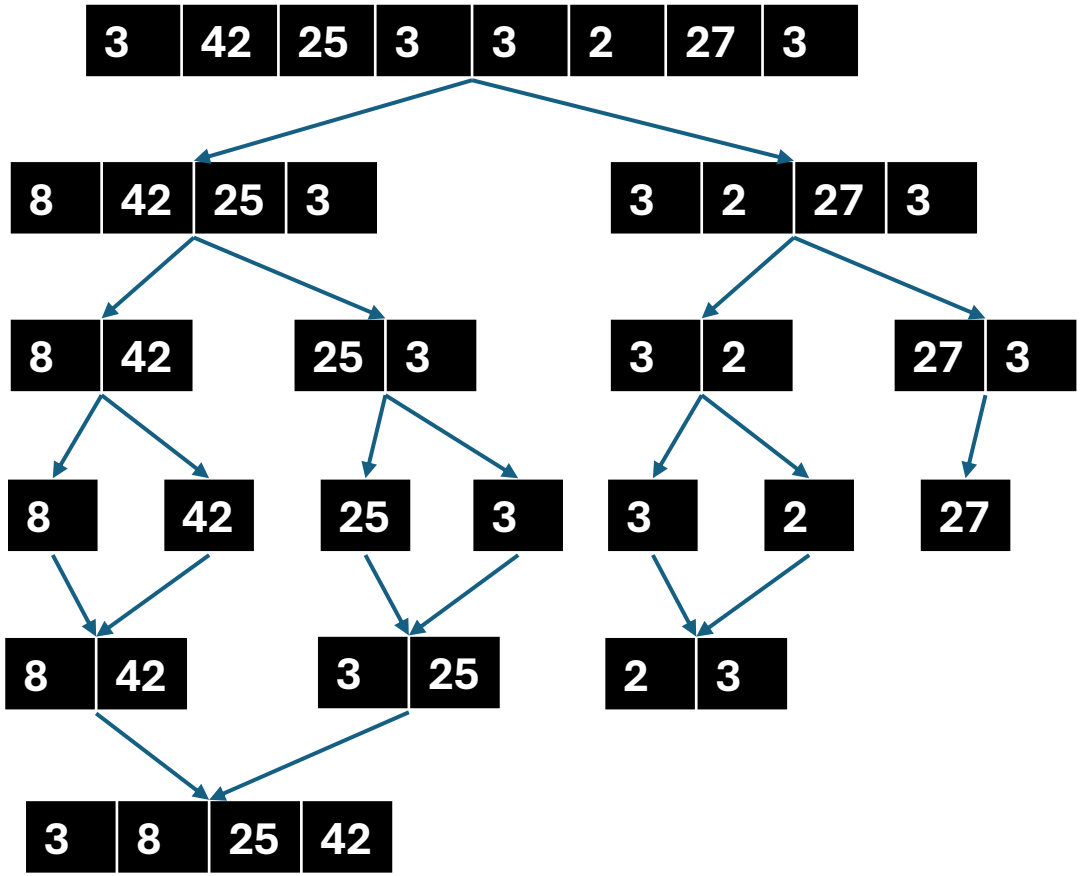
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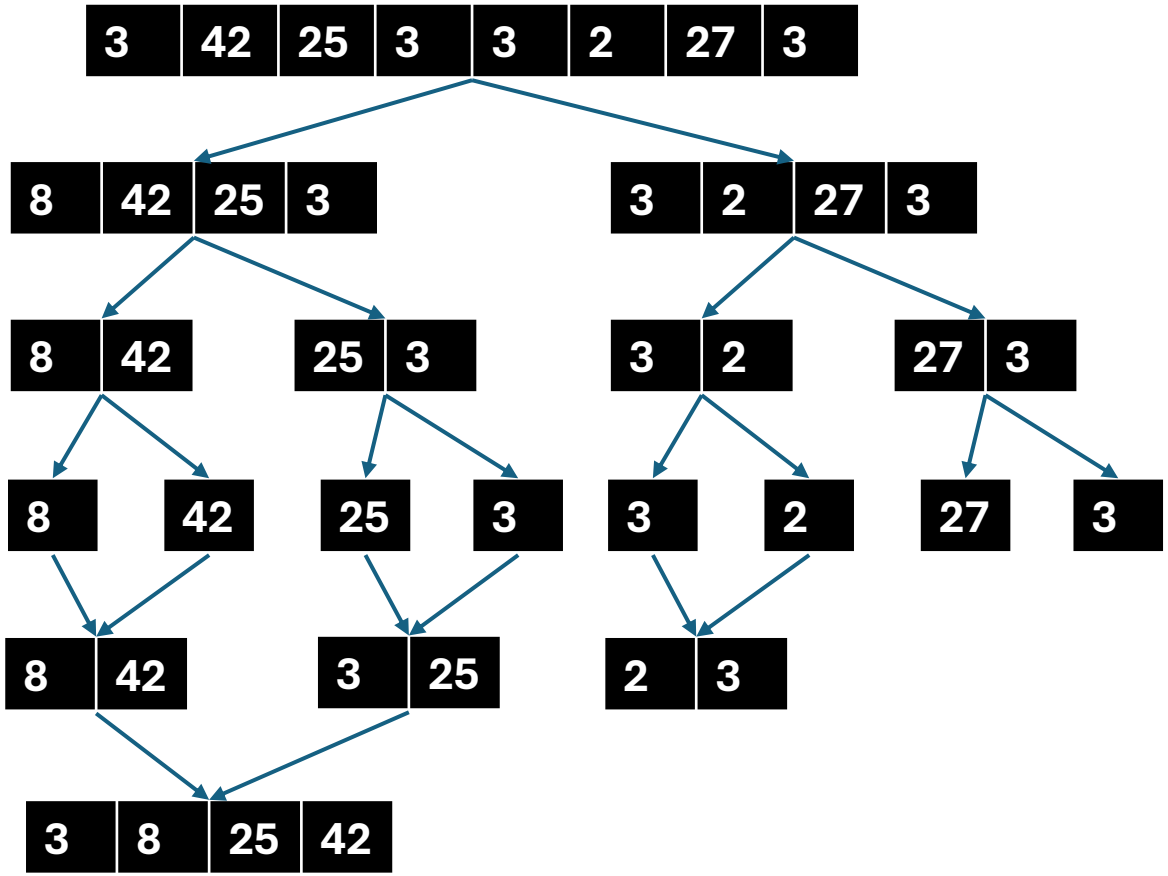
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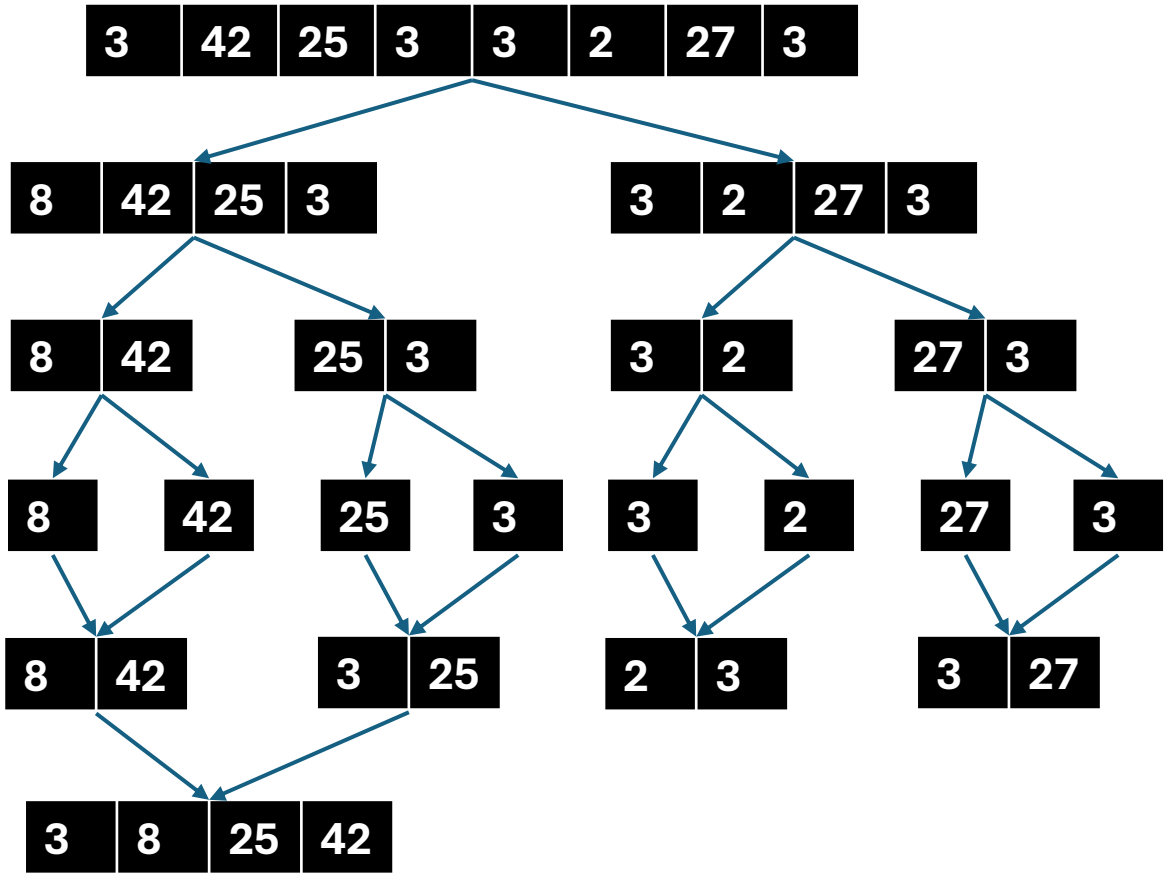
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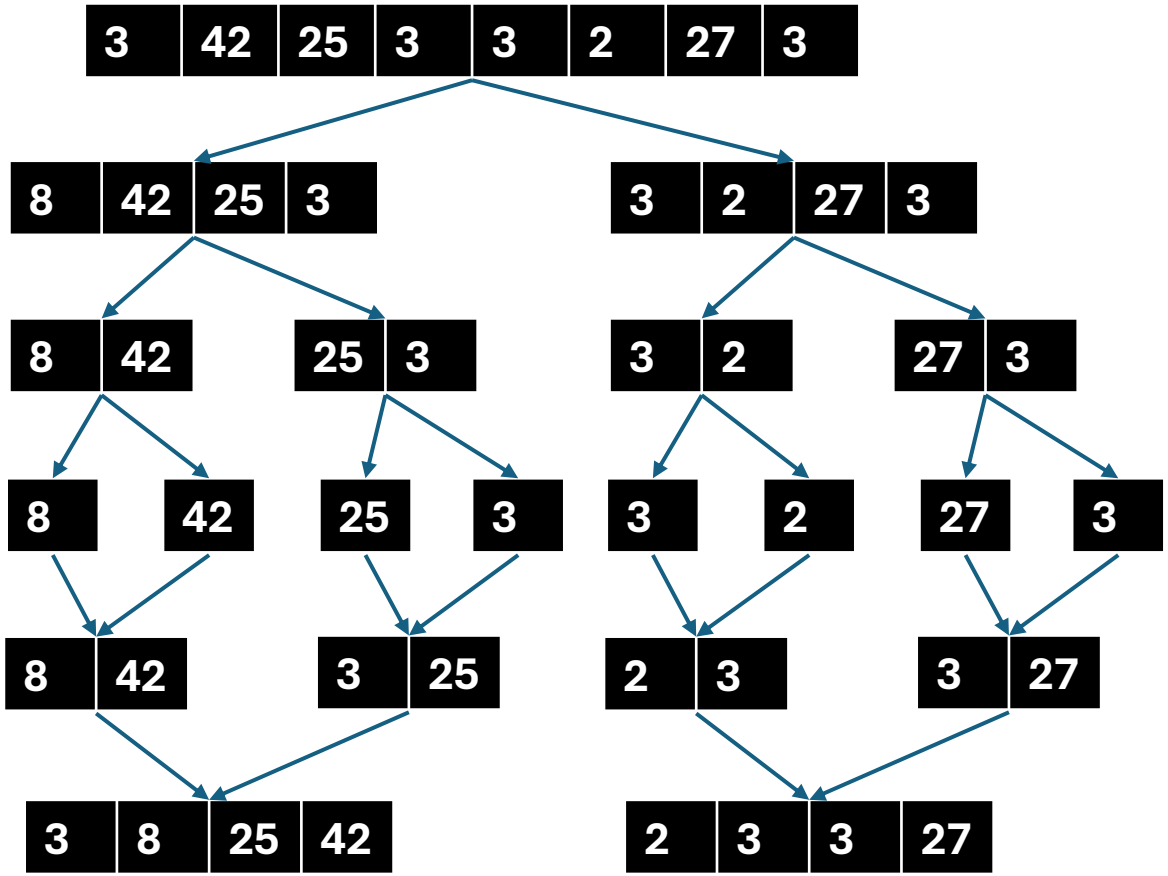
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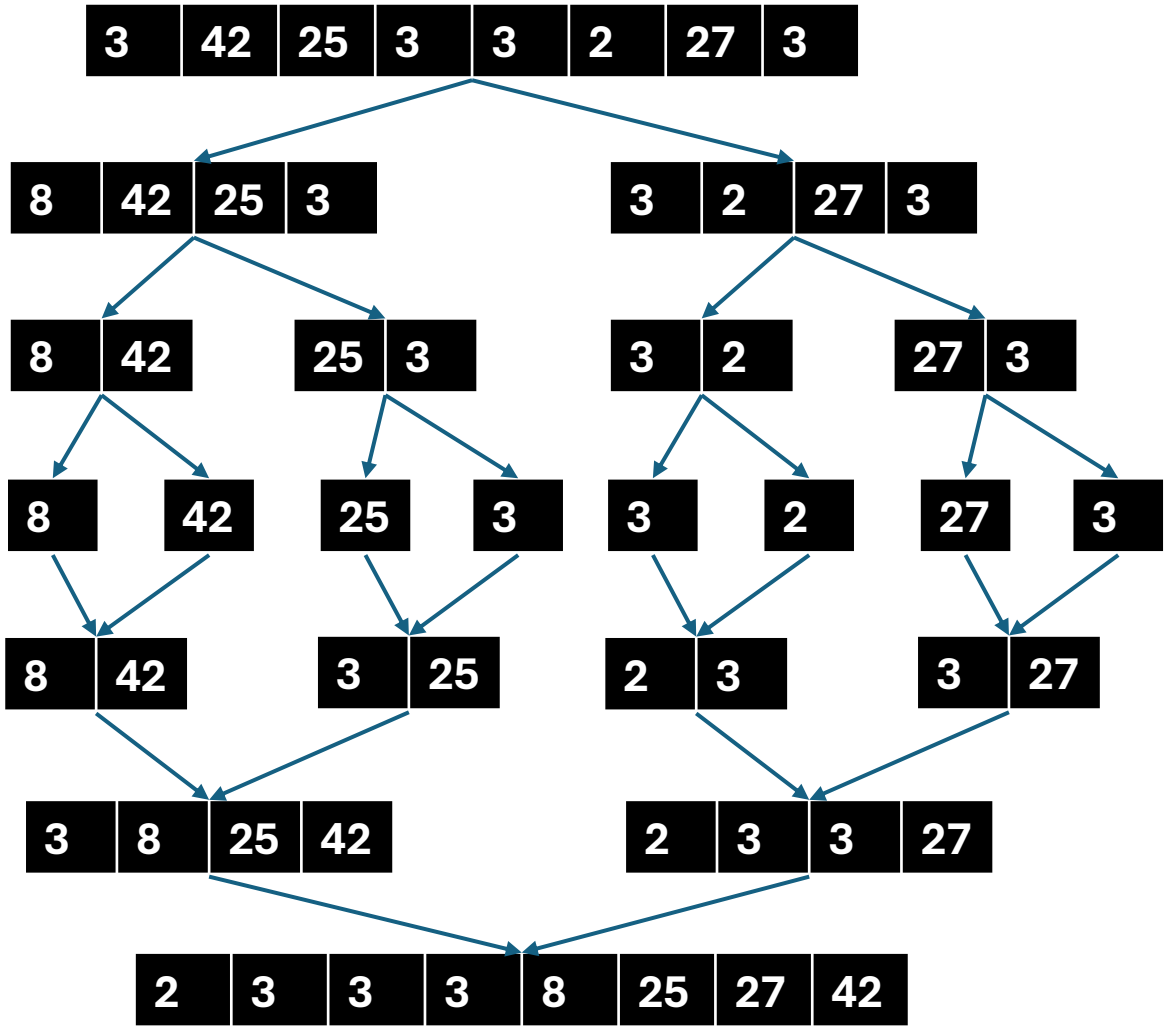
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