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CSS 342

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**Sort Comparisons**

Table Comparison of Bubble, Insertion, Quick, Merge, Iterative-Merge, Shell

**Bubble Sort:**

Average Big-O: O(n^2)

Speed: Slowest  
Reason: Bubble sort has to loop through the array twice before it can sort it. This takes lots of time.

**Insertion Sort:**

Average Big-O: O(n^2)

Speed: Near slow  
Reason: The insertion sort has a best case of O(n) which is better than bubble’s O(n^2). This will save it time when running through the list. However, it still has to run through the whole array making it slow.

**Quick Sort:**

Average Big-O: O(n \* log n)

Speed: fastest  
Reason: although my graph does not show it, quick sort is one of the best and fasts sorts. It sorts in place so no additional storage is used. I personally used a different way to fill my arrays which allowed for repeated numbers, throwing off quicksort and the way it pivots.

**Merge Sort:**

Average Big-O: O(n \* log n)

Speed: fast  
Reason: Merge is one of the fastest sorts available. However, it uses lots of cache making new lists to divide the array and merging it back together.

**Iterative Merge Sort:**

Average Big-O: O(n \* log n)

Speed: fast  
Reason: Iterative Merge Sort is faster than Merge as it does not have to make new lists every time it needs to merge.

**Shell Sort:**

Average Big-O: O(n \* log n^2)

Speed: relatively fast  
Reason: Shell sort has a really good best case of O(n) but overall average it takes longer to complete.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Size | BubbleSort | InsertionSort | QuickSort | MergeSort | IterativeMergeSort | ShellSort |
| 5000 | 16 | 0 | 0 | 0 | 0 | 0 |
| 15000 | 250 | 78 | 16 | 15 | 0 | 0 |
| 25000 | 797 | 157 | 63 | 16 | 16 | 15 |
| 35000 | 1703 | 266 | 109 | 31 | 15 | 46 |
| 45000 | 2875 | 360 | 188 | 31 | 15 | 79 |
| 55000 | 4359 | 360 | 281 | 47 | 32 | 94 |
| 65000 | 6031 | 438 | 390 | 62 | 42 | 109 |
| 75000 | 7766 | 531 | 516 | 62 | 47 | 125 |
| 85000 | 9532 | 641 | 672 | 78 | 62 | 140 |
| 95000 | 11250 | 734 | 828 | 78 | 78 | 168 |
| 105000 | 13281 | 922 | 1000 | 109 | 94 | 178 |
| 115000 | 14891 | 906 | 1203 | 110 | 94 | 201 |
| 125000 | 16781 | 1031 | 1437 | 125 | 94 | 224 |
| 135000 | 18843 | 1110 | 1672 | 141 | 109 | 239 |
| 145000 | 21578 | 1234 | 1922 | 147 | 125 | 255 |