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CSS 342
23 November 2016

Comparison of Sorting Algorithms

Table 1: Time Complexity of Bubble and Insertion Sort

Elements	Bubble Sort (ms)	Insertion Sort (Ms)
1000	234	110
2000	937	422
3000	1968	922
4000	3532	1672
5000	5797	2562
6000	8860	3735
7000	11313	5016
8000	14359	6781
9000	17844	8532
10000	22187	10469

Figure 1: Graph of Bubble and Insertion Sorts

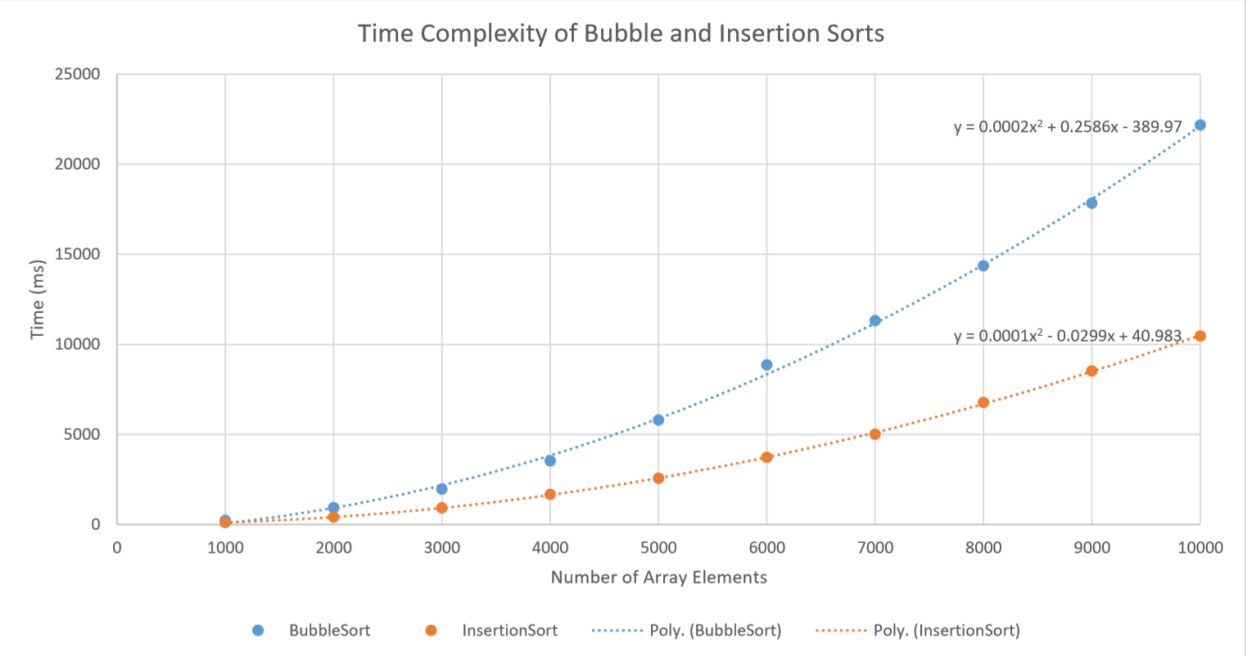
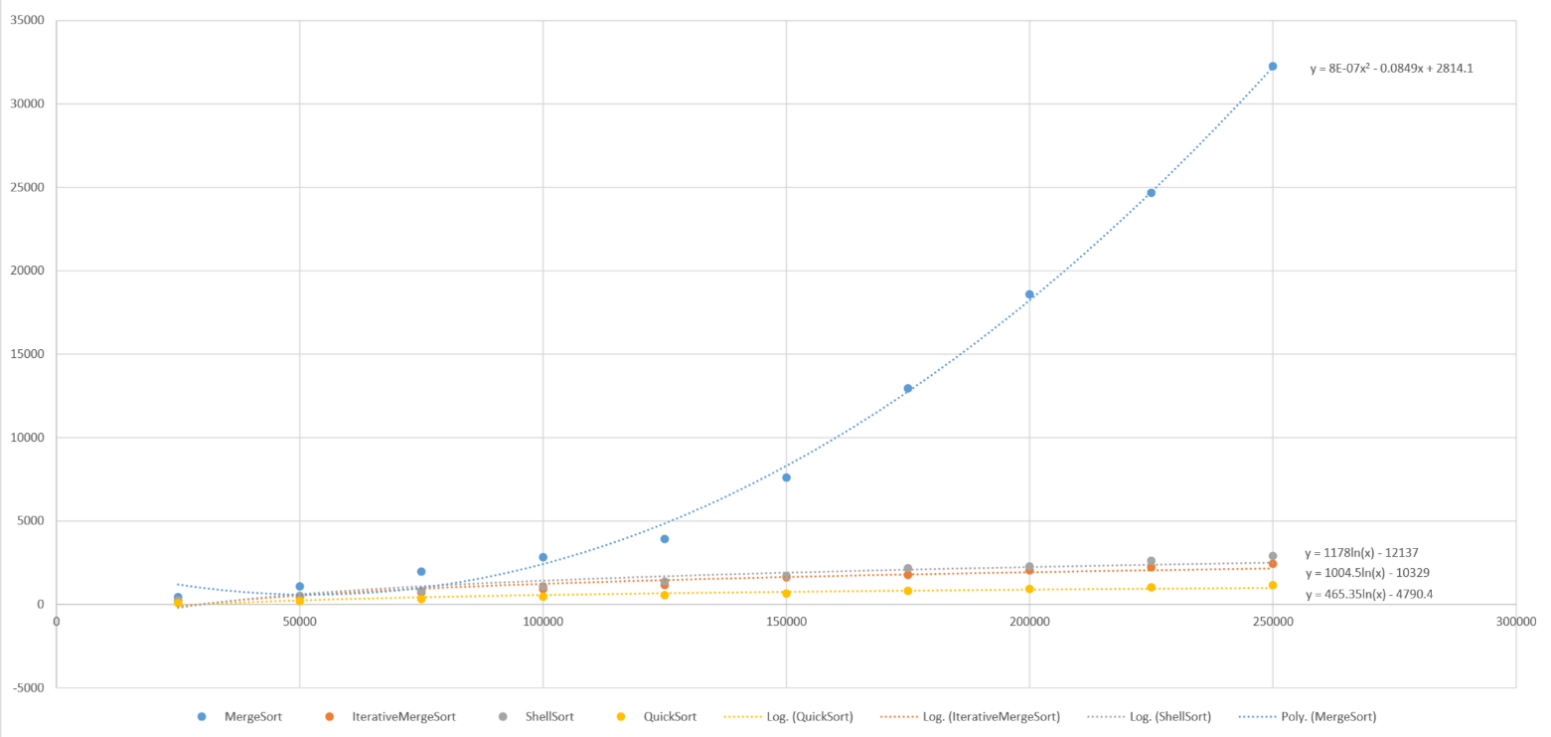


Table 2: Time Complexity of Merge, Iterative Merge, Shell, and Quick Sort

Elements	Merge Sort (ms)	Iterative Merge Sort (ms)	Shell Sort (ms)	Quick Sort (ms)
25000	438	234	250	94
50000	1078	437	515	203
75000	1969	719	813	328
100000	2828	922	1078	468
125000	3922	1172	1375	562
150000	7609	1625	1703	657
175000	12954	1781	2171	813
200000	18593	2047	2282	937
225000	24672	2235	2625	1031
250000	32266	2437	2906	1156



Conclusion:

- Bubble and Insertion Sort's time complexities grew exponentially.
- Merge sort did not have the same time complexity as shell and quick sort, however; iterative merge sort did.
    - A possible explanation for this is because merge sort used recursion while iterative merge sort did not.
- Merge, Shell, Iterative Merge, and Quick sort were all more vastly efficient when compared to Bubble and Insertion Sort. (i.e. Bubble sort took 22 seconds for 10,000 elements vs Quick Sort which took 94 ms for 25,000 elements).