Week 4 Lab Exercise 4: Sorting

Purpose: To test the length of time that it takes for a Bubblesort and a Quicksort to complete sorting arrays of integers with varying lengths of entries.

Hypothesis: The Bubblesort will be faster than the Quicksort with the smaller arrays of 20 or less items.

Results:

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| --- | --- | --- |
| List Length | Bubblesort Time (seconds) | Quicksort Time (seconds) |
| 5 | 4e-7 | 6e-7 |
| 10 | 7e-7 | 9e-7 |
| 15 | 1.2e-6 | 1e-6 |
| 25 | 2.1e-6 | 1.7e-6 |
| 50 | 7.9e-6 | 2.9e-6 |
| 100 | 3.32e-5 | 8.3e-6 |
| 300 | 2.805e-4 | 2.84e-5 |
| 600 | 8.531e-4 | 4.85e-5 |
| 900 | 1.8838e-3 | 6.18e-5 |
| 1000 | 2.0192e-3 | 8.28e-5 |

Outcome: The Quicksort was faster at sorting arrays that contained 15 items and greater.

Conclusion: When looking at the performance of both sorting methods, we can see the Bubblesort becoming less efficient than that Quicksort with as little as 15 items in the array that is being sorted. However with arrays that were smaller than 15 items, the Bubblesort was more efficient than the Quicksort. This is due to the Quicksort having to establish a pivot, then work through the array from one side of the pivot until it has to establish a new pivot to work on the other side of the array. This extra logic for a smaller array is overkill for the task at hand, while the Bubblesort is able to iterate through the smaller array repeatedly until it is sorted much faster. This will cause some consideration when choosing which method to use: if the array is smaller then a Bubblesort should be considered, while a Quicksort would be the preferred method for larger and more cumbersome data sets.