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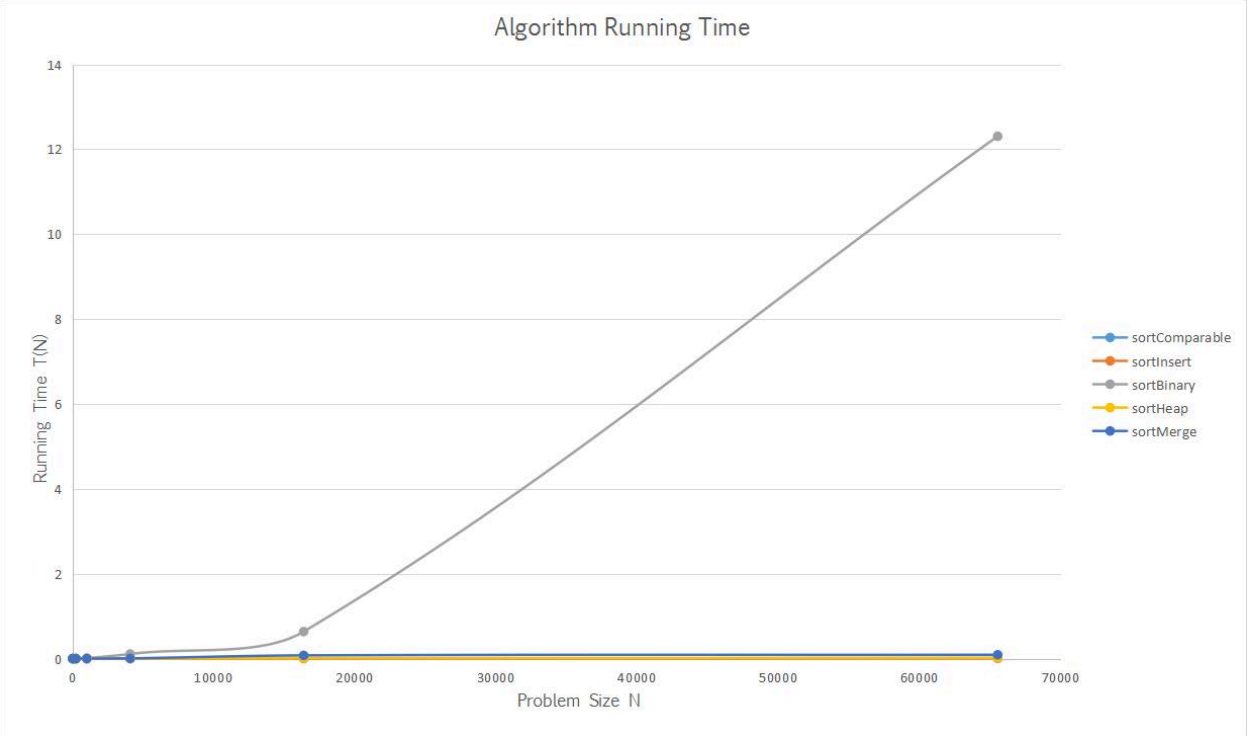
Assignment 2 Analysis

Size of Input	Execution Time of Insertion Sort (s)	Execution Time of Insertion Sort (Comparable) (s)	Execution Time of Insertion Sort (Binary) (s)	Execution Time of Merge Sort (s)	Execution Time of Heap Sort (s)
16	0.00006	0.002	0.00006	0.03	0.002
64	0.00004	0.00001	0.0003	0.0005	0.0002
256	0.00009	0.00006	0.0045	0.0015	0.0006
1024	0.0005	0.0002	0.0195	0.0021	0.0025
4096	0.0019	0.0008	0.105	0.0085	0.0035
16384	0.0085	0.0045	0.185	0.0950	0.0095
65536	0.0100	0.0150	15.050	0.0995	0.0450



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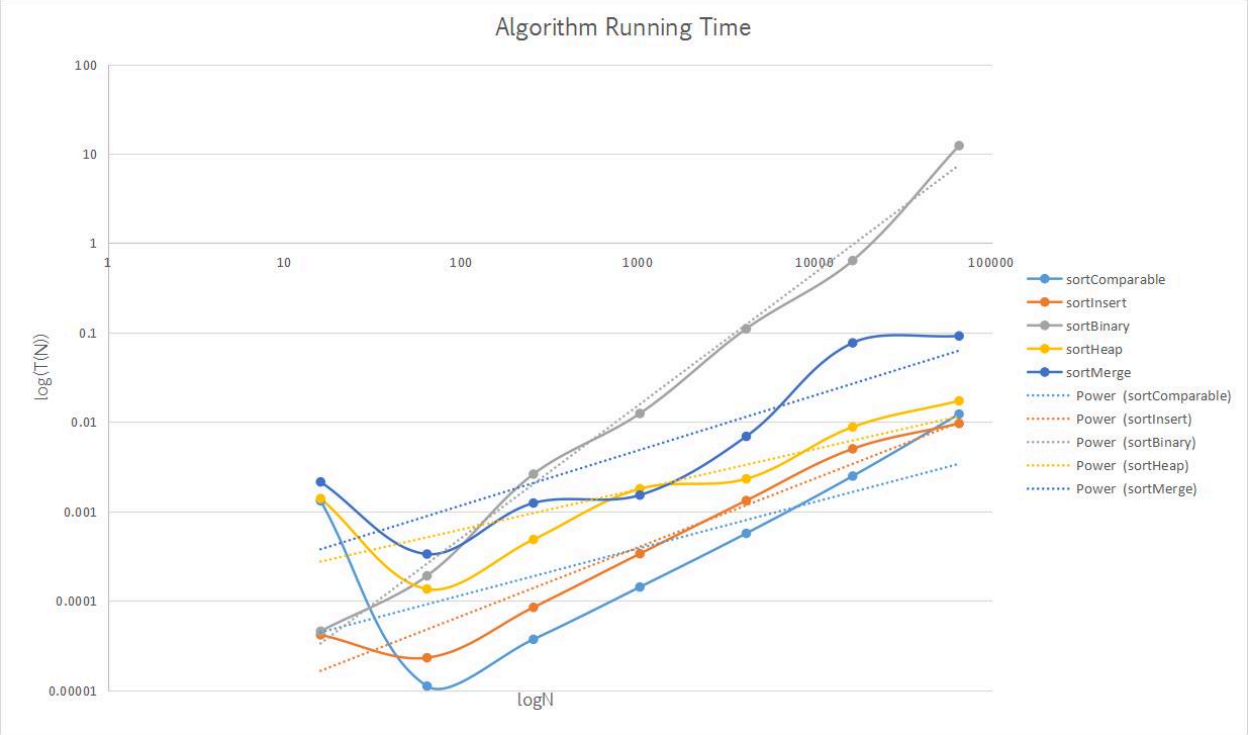

My hypotheses based upon my observations regarding the running times of my implementation of the three types of sorting algorithms are:

- Insertion Sort: O(N^2)
- Insertion Sort Comparable: O(N^2)
- Insertion Sort Binary: O(N^2)
- Merge Sort: O(NlogN)
- Heap Sort: O(NlogN)

Using my hypotheses, my prediction for the execution time of my implementation of the five sorting algorithms for an array size of 2^14 and 2^16 are:

Size	Insertion Sort	Insertion Comparable	Insertion Binary	Merge Sort	Heap Sort
2^14	0.008	0.005	0.190	0.100	0.010
2^16	0.010	0.015	15.00	0.100	0.050

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My implementation of the sorting classes adopted modified versions of the ones on the Algorithms course. The following are the sources:

http://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/Insertion.java.html

http://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/InsertionX.java.html

http://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/BinaryInsertion.java.html

http://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/Merge.java.html

http://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/Heap.java.html