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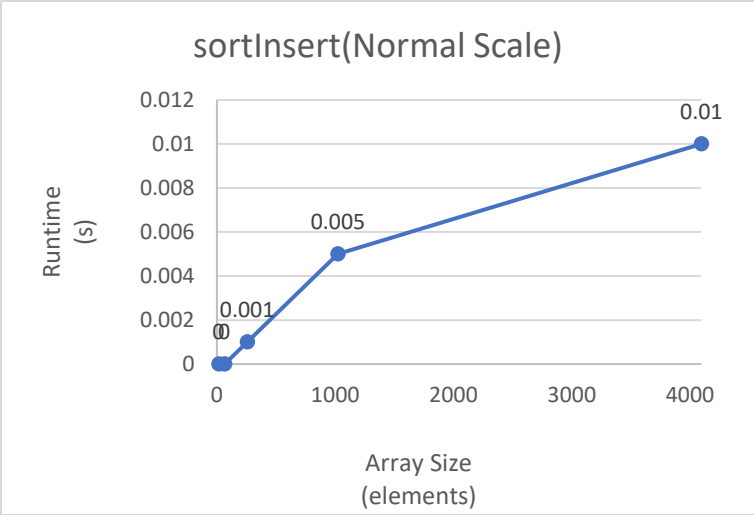
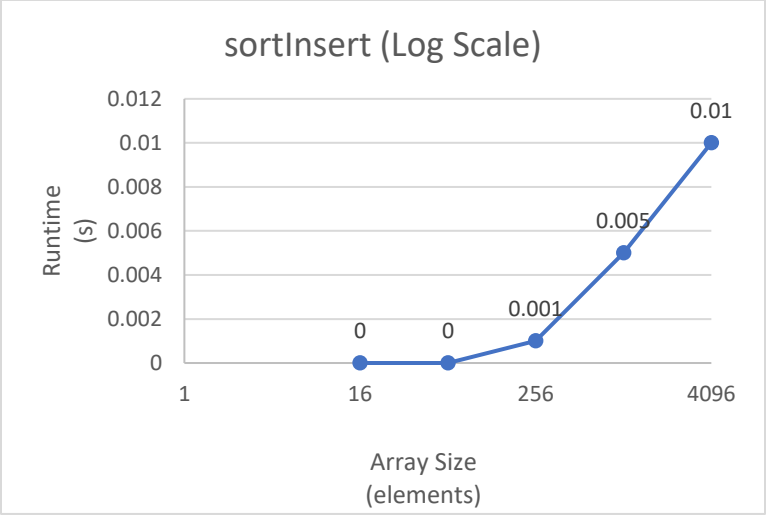
Assignment 1 Analysis Report

	sortInsert (s)	sortComparable (s)	sortBinary (s)	sortHeap (s)	sortMerge (s)
Input Array Size (elements)					
2^4	0.00000	0.00000	0.00000	0.00000	0.00000
2^6	0.00000	0.00000	0.00000	0.00000	0.00000
2^8	0.00100	0.00000	0.00000	0.00000	0.00000
2^{10}	0.00500	0.00400	0.00200	0.00030	0.00010
2^{12}	0.01000	0.02200	0.02000	0.00200	0.00100





<u>Hypothesis for sortInsert order of growth is $O(n^2)$:</u>

$T(n) = a*n^2$

$0.01 \text{ (seconds)} = a * (4096 \text{ elements})^2$

a = 5.96e-10 is the constant.

$T(n) = 5.96e\text{-}10*n^2$

<u>For array sizes with, 16 384 and 65 536 elements respectively, the estimated run time are:</u>

$T(n) = 5.96e\text{-}10*16\,384^2$

T(16384) = 0.16 seconds

$T(n) = 5.96e\text{-}10*65536^2$

T(65536) = 2.56 seconds

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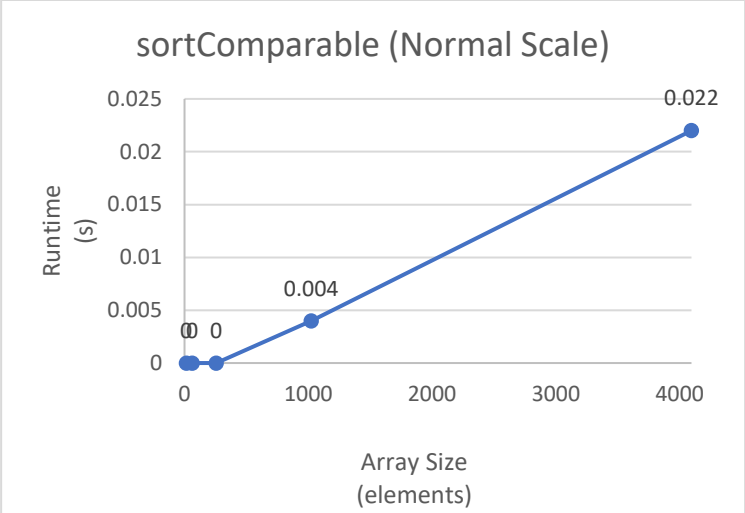
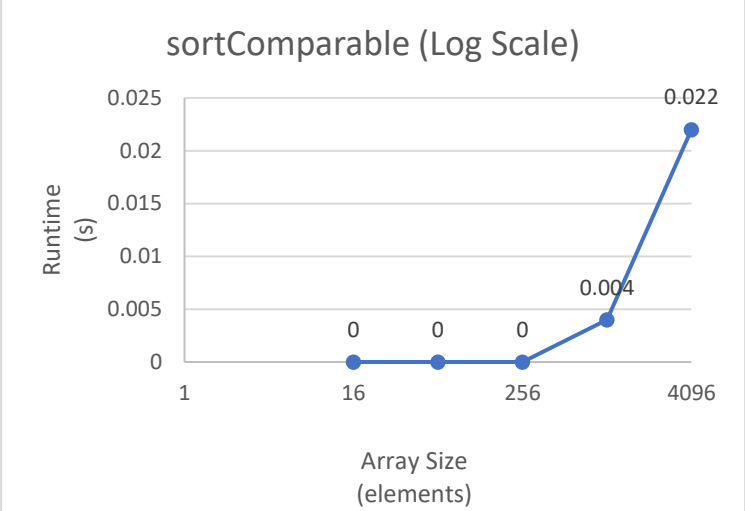
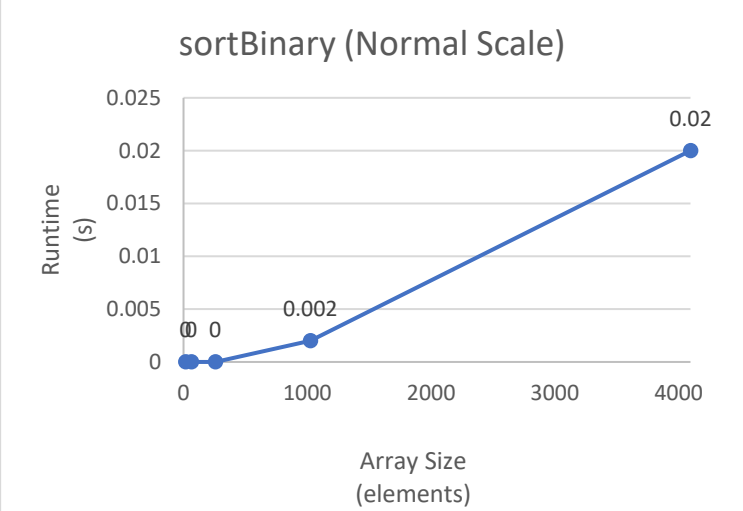






<u>Hypothesis for sortComparable order of growth is $O(n^2)$:</u>

$T(n) = a*n^2$

$0.022 \text{ (seconds)} = a * (4096 \text{ elements})^2$

a = 1.311e-9 is the constant.

$T(n) = 1.331e\text{-}9*n^2$

<u>For array sizes with, 16 384 and 65 536 elements respectively, the estimated run time are:</u>

$T(n) = 1.331e\text{-}9*16\,384^2$

T(16384) = 0.352 seconds

$T(n) = 1.331e\text{-}9*65536^2$

T(65536) = 5.62 seconds

<u>Hypothesis for sortBinary order of growth is $O(n^2)$:</u>

$T(n) = a*n^2$

$0.02 \text{ (seconds)} = a * (4096 \text{ elements})^2$

a = 1.192e-9 is the constant.

$T(n) = 1.192e\text{-}9 *n^2$

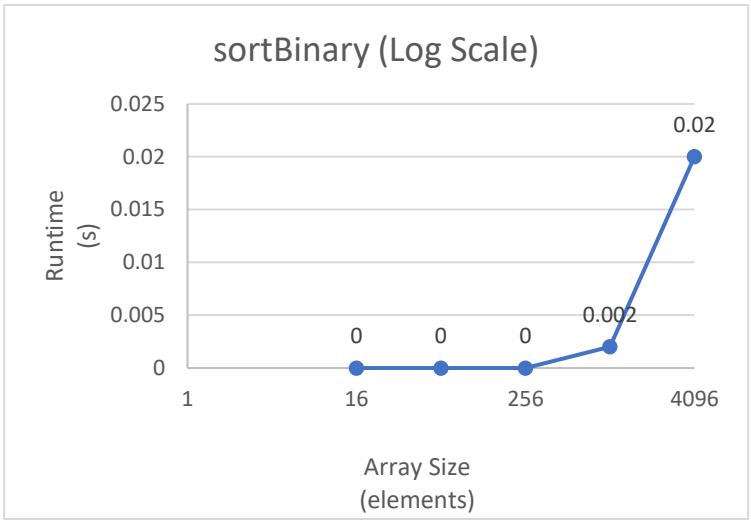
<u>For array sizes with, 16 384 and 65 536 elements respectively, the estimated run time are:</u>

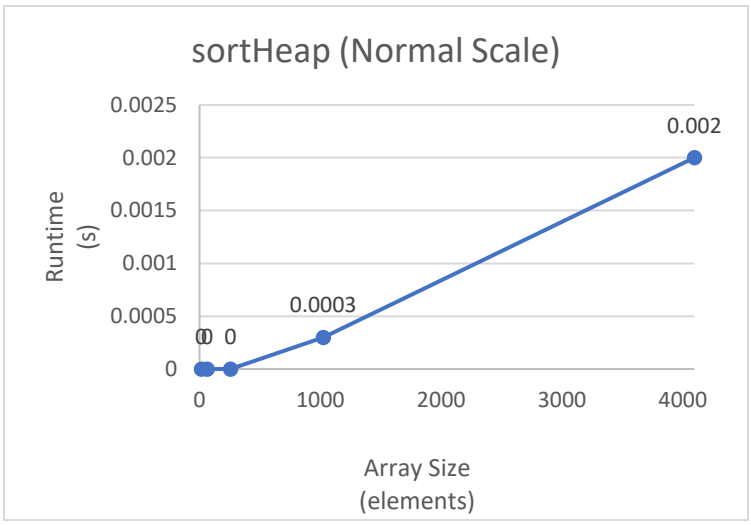
$T(n) = \mathbf{1.192e\text{-}9} *16\,384^2$

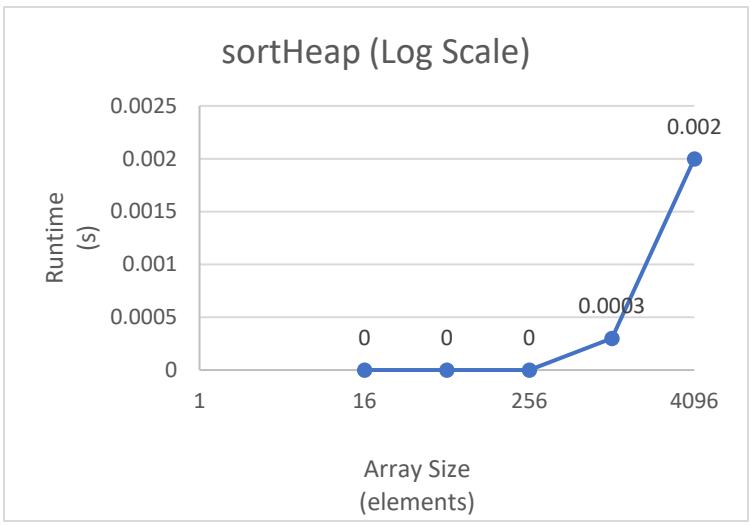
T(16384) = 0.32 seconds

$T(n) = \mathbf{1.192e\text{-}9} *65536^2$

T(65536) = 5.09 seconds







Hypothesis for sortHeap order of growth is O(n lg n):

$T(n) = a*n \lg n$

0.002 (seconds) = a * (4096 elements)* lg(4096)

a = 4.069e-8 is the constant.

$T(n) = 4.069e\text{-}8*n^2$

For array sizes with, 16 384 and 65 536 elements respectively, the estimated run time are:

T(n) = **4.069e-8***16 384*lg*(16384)

T(16384) = 0.00933 seconds

T(n) = **4.069e-8***65536*lg*(65536)

T(65536) = 0.042seconds

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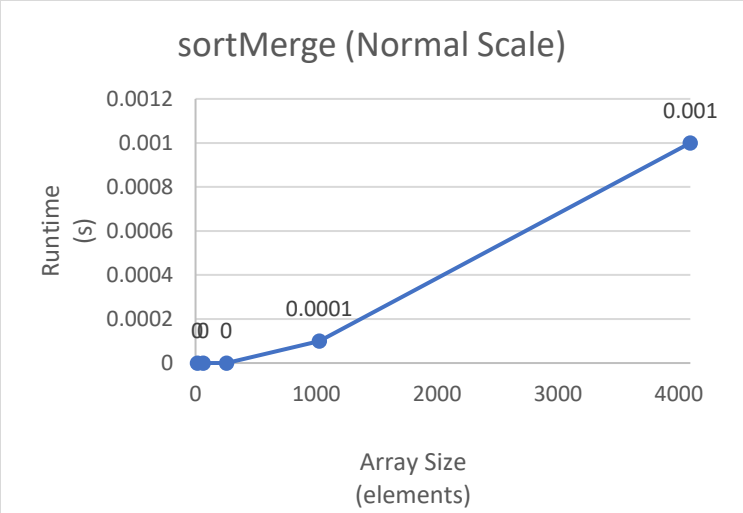

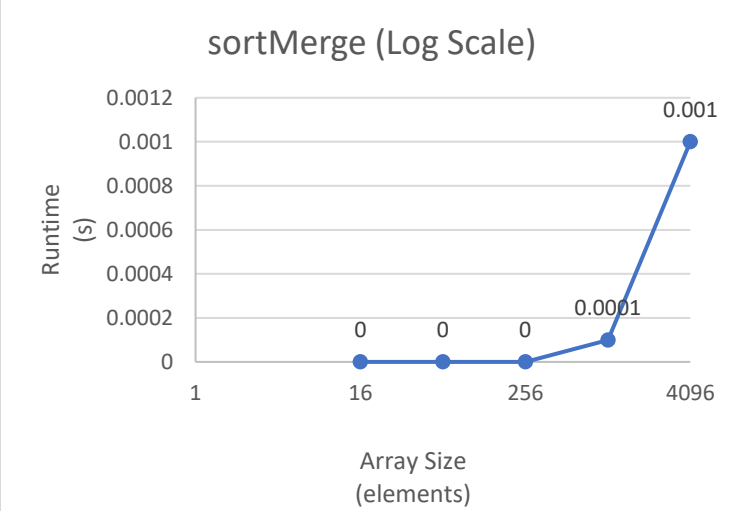

<u>Hypothesis for sortMerge order of growth is O(n lg n):</u>

$T(n) = a*n \lg n$

0.001 (seconds) = a * (4096 elements)* lg(4096)

a = 2.035e-8 is the constant.

$T(n) = 2.035e\text{-}8 * n^2$

<u>For array sizes with, 16 384 and 65 536 elements respectively, the estimated run time are:</u>

T(n) = **2.035e-8** *16 384*lg*(16384)

T(16384) = 0.00467 seconds

T(n) = **2.035e-8** *65536*lg*(65536)

T(65536) = 0.0213seconds

<u>Results for 2^{14} and 2^{16} size input arrays.</u>

	sortInsert (s)	sortComparable (s)	sortBinary (s)	sortHeap (s)	sortMerge (s)
Input Array Size (elements)					
2^{14}	0.11600	0.27500	0.12100	0.00600	0.00900
2^{16}	2.55200	6.96400	2.80700	0.05600	0.01800