

Lab 6 Analysis

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ArrayList (Random)

10	12208
30	17292
50	24000
100	17333
500	150833
1000	33000
5000	246250
10000	316250
20000	313000
30000	15094334
50000	467250
100000	796292

ArrayList (Sorted)

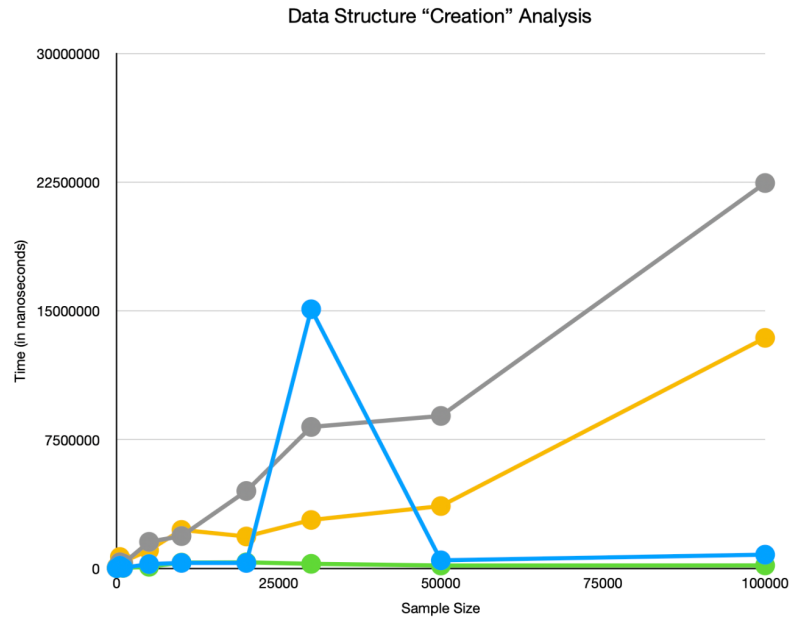
10	15708
30	10125
50	21042
100	10625
500	41916
1000	26167
5000	88791
10000	333375
20000	348625
30000	261334
50000	164125
100000	169667

TreeSet (Random)

10	18834
30	32375
50	56917
100	79041
500	348000
1000	272750
5000	1542458
10000	1877959
20000	4504750
30000	8237458
50000	8877625
100000	22446458

TreeSet (Sorted)

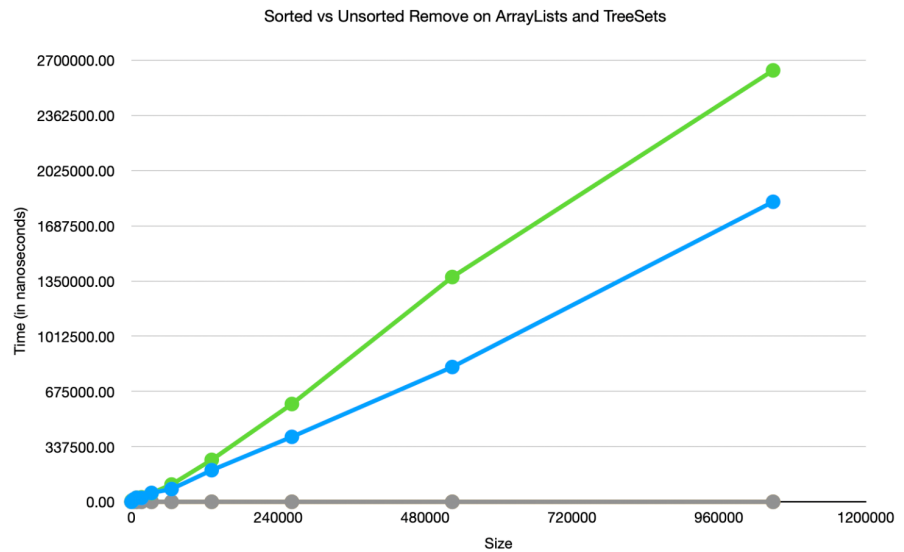
10	35750
30	50084
50	91583
100	132750
500	663000
1000	389042
5000	1048250
10000	2239250
20000	1855709
30000	2816667
50000	3627583
100000	13427416



Creating the ArrayList-backed heap (both Random and Sorted) performed better than both versions of TreeSet. There was a random spike in my ArrayList at a size of 3000, but I'm assuming that was an anomaly. The group that I worked with don't have a spike in their ArrayList. I think the closest the TreeSet resembles is $O(\log N)$. ArrayList stays at about $O(1)$.

alRemoveSorted		alRemoveShuffle	
1	168.32	1	582.08
2	112.88	2	229.59
4	237.09	4	988.35
8	217.49	8	355.43
16	458.75	16	367.06
32	1058.75	32	584.17
64	2644.57	64	1284.17
128	3319.12	128	1784.17
256	3492.88	256	3586.2
512	2253.33	512	7019.58
1024	4034.13	1024	3390.37
2048	8123.77	2048	7472.48
4096	15742.5	4096	13854.14
8192	24745.01	8192	24627.9
16384	23596.7	16384	27482.51
32768	54279.17	32768	52745.87
65536	77820.0	65536	105618.35
131072	193304.16	131072	256362.06
262144	397248.75	262144	598009.55
524288	824254.97	524288	1374511.24
1048576	1834591.24	1048576	2638292.51

TreeRemSorted		treeRemShuffle	
1	150.07	1	153.66
2	2247.99	2	212.84
4	116.38	4	133.36
8	104.68	8	164.56
16	99.0	16	92.24
32	170.69	32	167.83
64	111.02	64	110.01
128	107.18	128	317.95
256	105.64	256	242.08
512	102.94	512	84.59
1024	113.19	1024	83.8
2048	112.8	2048	44.17
4096	114.25	4096	44.56
8192	108.86	8192	42.16
16384	124.49	16384	41.73
32768	50.0	32768	212.08
65536	42.89	65536	21.68
131072	145.05	131072	13.74
262144	22.1	262144	15.02
524288	18.76	524288	15.44
1048576	14.59	1048576	13.75



For ArrayList, the Big O notation it most closely resembles is $O(N)$ as it grows alongside the inputs. In this graph, it looks like it could be a small combination of $O(1)$ or $O(\log N)$. It can be hard to see the unsorted TreeSet plot (yellow) but it is slightly peaking through the sorted plot.