Assignment 6 – Sorting

Method: I have created a while loop to loop through the array ten times. Clicking on the sort type and type of order. Then stating the size of the array. It then prints out the speed it took to sort the array. At the end it prints the average of the ten rounds.

In general over all of the sorts and orders the first round was generally slower and over the ten rounds

Key points found from results tables:

Selection Sort:
1. At size 100 reverse was the fastest
2. The sorted array at size >10000 takes for ever to compile
3. Not to much difference between the 3 order types
4. Slowest sort overall

Selection Sort 2:
1. Size > 20000 the array took a very long time to sort.
2. Selection 1 was significantly faster than selection 2;
3. I believe it wasn't faster because it sorted from front and back but didn't stop at the middle

Insertion Sort:
1. A ordered sort is significantly faster than random/reverse
2. Random is very slow

Insertion Sort 2:
1. I possibly didn't write the code correctly for this method, anything size > 10000 will take well over a minute to compile.
2. For 100 and 1000 similar results for insertion 1

Merge Sort:

1. Significantly faster than Selection and insertion sort.
2. Ordered is fastest as the size increases
3. Reversed and random are similar speeds

Merge Sort 2:
1. Faster in all results against merge 1.
2. The fastest sorting algorithm in all the of the results
3. Ordered is the winner, reverse and random are similar speeds

Quick Sort:
1. Similar results across the board, ordered is quicker

Quick Sort 2:
2. Very similar results to the first quick sort

Quick Sort 3:
3. I think something didn't quite work out with my code to find the median as it takes a very long time to sort now the results are as bad as selection or insertion sort.

Conclusion

Out of the altered sorts the merge sort was the only sort than made a significant increase in performance. The insertion and selection sorts struggled to sort large size arrays. The first sort was generally the slowest – the CPU/Java finds the path of least resistance. At a small size array 1000 or less the results where all pretty much instantaneous.

From this assignment I have a through understanding of how the sorts work. The speed it takes is also understandable. I have also googled and read up on other sorts. Altering the sorts was challenging but I got a great buzz when the array sorted for the first time. I am learning a lot each week and trying to make sure I attempt the challenges.

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Report

Selection Sort

Size											Average
100	0.001	0.001	0	0	0	0	0	0	0	0	0.0002
1000	0.008	0.005	0.004	0.003	0.003	0.002	0.003	0.004	0.004	0.003	0.0039
10000	0.309	0.307	0.271	0.296	0.308	0.279	0.288	0.289	0.293	0.29	0.293
100000	105.148	89.198	98.157	101.613	79.09	85.163	90.989	65.502	88.387	88.8	89.2047
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Ordered										
100	0.001	0.001	0	0	0	0	0	0	0	0	0.0002
1000	0.003	0.004	0.002	0.003	0.002	0.002	0.002	0.003	0	0.003	0.0024

10000	0.276	0.276	0.298	0.276	0.276	0.279	0.282	0.286	0.279	0.289	0.2817
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Reverse										
100	0.001	0	0	0.001	0.001	0	0	0	0	0	0
1000	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.002	0.0018
10000	0.168	0.175	0.178	0.117	0.197	0.178	0.16	0.176	0.178	0.172	0.1699
100000	41.392	51.037	49.439	52.94	53.372	50.089	40.915	47.471	48.827	47.351	48.2833
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Selection Sort 2

Size											Average
100	0.001	0.001	0	0.001	0.001	0	0	0	0	0	0.0004
1000	0.006	0.005	0.006	0.006	0.005	0.005	0.006	0.006	0.005	0.005	0.0055
10000	0.453	0.446	0.481	0.445	0.448	0.48	0.446	0.444	0.451	0.46	0.4554
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	#DIV/0!

1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.023	0.007	0.008	0.005	0.007	0.007	0.008	0.007	0.007	0.007	0.0086
10000	0.456	0.45	0.452	0.45	0.525	0.458	0.458	0.52	0.463	0.453	0.4685
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Reverse										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.008	0.005	0.004	0.004	0.005	0.004	0.004	0.006	0.004	0.005	0.0049
10000	0.451	0.467	0.467	0.451	0.453	0.458	0.512	0.47	0.454	0.451	0.4634
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Insertion Sort

Size	Random	

Size											
100	0.001	0.001	0	0.001	0.001	0	0	0	0	0	0.0004
1000	0.016	0.002	0.002	0.002	0.001	0.002	0.002	0.001	0.002	0.002	0.0032
10000	0.143	0.14	0.145	0.167	0.163	0.159	0.157	0.172	0.168	0.162	0.1576
100000	47.862	44.033	57.492	49.796	46.893	54.993	60.461	45.159	58.244	37.948	50.2881
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0
10000	0.001	0	0	0	0	0	0	0	0	0	0
100000	0.012	0.009	0.006	0.007	0.008	0.009	0.006	0.006	0.006	0.006	0.0075
1000000	0.094	0.091	0.07	0.071	0.077	0.073	0.073	0.075	0.085	0.082	0.0791
Size	Reverse										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.003	0.001	0.001	0.002	0.002	0.001	0.001	0	0	0	0.0011
10000	0.0018	0.003	0.004	0.003	0.004	0.008	0.002	0.003	0.003	0.004	0.00358
100000	0.065	0.062	0.068	0.055	0.074	0.066	0.059	0.068	0.064	0.065	0.0646

1000000	0.661	0.665	0.663	0.672	0.669	0.681	0.659	0.665	0.82	0.64	0.6795

Insertion Sort 2

Size	Random										
100	0.001	0	0	0	0	0	0	0	0	0	0.0001
1000	0.021	0.002	0.002	0.002	0.001	0	0.001	0.001	0.001	0.001	0.0032
10000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0
10000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Size	Reverse										

100	0	0	0	0	0	0	0	0	0	0	0
1000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
10000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Merge Sort

Size	Random										
100	0	0.001	0	0	0	0	0	0	0	0	0
1000	0.004	0.001	0.002	0.006	0	0.001	0	0	0	0	0.0014
10000	0.035	0.012	0.008	0.005	0.008	0.008	0.001	0.009	0.008	0.008	0.0102
100000	0.097	0.025	0.029	0.026	0.027	0.024	0.025	0.026	0.029	0.024	0.0332
1000000	0.719	0.74	0.668	0.665	0.665	0.687	0.688	0.797	0.675	0.697	0.7001

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.001	0.002	0.002	0.003	0.004	0.002	0.002	0.001	0.001	0.001	0.0019
10000	0.001	0	0	0	0	0	0	0	0	0	0.0001

100000	0.012	0.009	0.006	0.007	0.008	0.009	0.006	0.006	0.006	0.006	0.0075
1000000	0.501	0.442	0.378	0.389	0.409	0.401	0.421	0.396	0.383	0.4	0.412

Size	Reverse										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.004	0.002	0.001	0.004	0.005	0.001	0.001	0	0	0	0.0018
10000	0.0005	0.003	0.004	0.003	0.004	0.004	0.002	0.003	0.004	0.004	0.00315
100000	0.065	0.062	0.068	0.055	0.074	0.066	0.059	0.068	0.064	0.065	0.0646
1000000	0.661	0.665	0.663	0.672	0.669	0.681	0.659	0.665	0.82	0.64	0.6795

Merge Sort 2

Size	Random										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.001	0.002	0.001	0.004	0.005	0.002	0	0	0.001	0	0.0016
10000	0.003	0.004	0.001	0.003	0.003	0.002	0.002	0.004	0.002	0.004	0.0028
100000	0.037	0.038	0.037	0.036	0.038	0.038	0.037	0.037	0.037	0.039	0.0374
1000000	0.209	0.207	0.204	0.207	0.192	0.209	0.2	0.233	0.207	0.196	0.2064

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0.001	0	0.0001
10000	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.0014
100000	0.034	0.043	0.039	0.041	0.037	0.048	0.05	0.044	0.038	0.046	0.042
1000000	0.207	0.218	0.226	0.213	0.217	0.213	0.214	0.217	0.214	0.218	0.2157

Size	Reverse										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0
10000	0.002	0.007	0.002	0.002	0.001	0.002	0.004	0.004	0.001	0.004	0.0029
100000	0.036	0.037	0.037	0.037	0.037	0.037	0.031	0.03	0.031	0.029	0.0342
1000000	0.202	0.201	0.198	0.196	0.201	0.204	0.198	0.197	0.2	0.209	0.2006

Quick Sort

Size	Random										
100	0	0	0	0.001	0	0	0	0	0	0	0
1000	0.005	0	0.001	0	0	0.001	0	0	0	0.001	0.0008

10000	0.016	0.004	0.003	0.003	0.002	0.002	0.003	0.004	0.003	0.003	0.0043
100000	0.068	0.041	0.048	0.077	0.053	0.069	0.07	0.074	0.068	0.061	0.0629
1000000	0.696	0.772	0.667	0.652	0.646	0.641	0.642	0.664	0.663	0.64	0.6683

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.001	0.002	0.002	0.003	0.004	0.002	0.002	0.001	0.001	0.001	0.0019
10000	0.001	0	0	0	0	0	0	0	0	0	0.0001
100000	0.012	0.009	0.006	0.007	0.008	0.009	0.006	0.006	0.006	0.006	0.0075
1000000	0.501	0.442	0.378	0.389	0.409	0.401	0.421	0.396	0.383	0.4	0.412

Size	Reverse										
100	0.001	0	0	0	0	0	0	0	0	0	0
1000	0.003	0.002	0.001	0	0	0	0	0	0	0	0.0006
10000	0.0018	0.003	0.004	0.003	0.004	0.008	0.002	0.003	0.003	0.004	0.00358
100000	0.065	0.062	0.068	0.055	0.074	0.066	0.059	0.068	0.064	0.065	0.0646
1000000	0.661	0.665	0.663	0.672	0.669	0.681	0.659	0.665	0.82	0.64	0.6795

Quick Sort 2

Size	Random										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.005	0	0.001	0	0	0.001	0	0	0	0	0.0007
10000	0.013	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.0041
100000	0.058	0.039	0.046	0.07	0.078	0.071	0.067	0.066	0.067	0.065	0.0627
1000000	0.696	0.627	0.612	0.668	0.652	0.631	0.649	0.631	0.634	0.638	0.6438

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.001	0.002	0.002	0.003	0.004	0.002	0.002	0.001	0.001	0.001	0.0019
10000	0.001	0	0	0	0	0	0	0	0	0	0.0001
100000	0.012	0.009	0.006	0.007	0.008	0.009	0.006	0.006	0.006	0.006	0.0075
1000000	0.501	0.442	0.378	0.389	0.409	0.401	0.421	0.396	0.383	0.4	0.412

Size	Reverse										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.002	0.003	0.001	0	0.001	0	0	0	0	0.001	0.0008

10000	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0031
100000	0.071	0.062	0.055	0.067	0.08	0.066	0.066	0.088	0.06	0.072	0.0687
1000000	0.663	0.629	0.649	0.654	0.668	0.667	0.672	0.656	0.78	0.977	0.7015

Quick Sort 3

Size	Random										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.029	0.007	0.006	0.004	0.004	0.004	0.005	0.005	0.005	0.004	0.0073
10000	0.66	0.779	0.699	0.714	0.719	0.648	0.633	0.664	0.705	0.006	0.6227
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Ordered										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.034	0.006	0.005	0.005	0.006	0.004	0.006	0.006	0.004	0.006	0.0082
10000	0.07	0.076	0.065	0.076	0.054	0.076	0.078	0.067	0.065	0.064	0.0691
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Size	Reverse										
100	0	0	0	0	0	0	0	0	0	0	0
1000	0.004	0.005	0.003	0.005	0.004	0.01	0.004	0.003	0.003	0.004	0.0045
10000	0.062	0.062	0.065	0.061	0.059	0.067	0.057	0.063	0.063	0.055	0.0614
100000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1000000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A