

# CO2201 Data Structures and Algorithms

## Lab 02

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## Exercise2: Sorting Algorithms

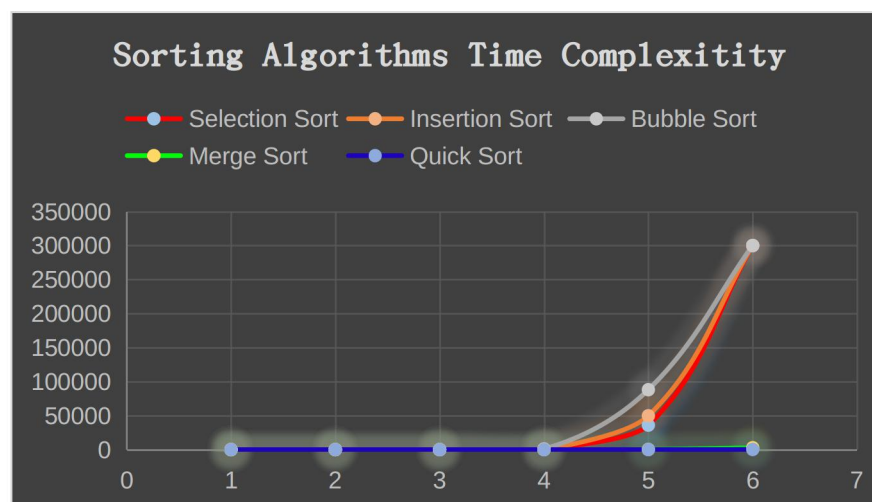
	Amount	Range
Set 1	10	1-10
Set 2	100	1-100
Set 3	1,000	1-1,000
Set 4	10,000	1-1,000
Set 5	100,000	1-1,000
Set 6	1,000,000	1-10,000

	Time (ms)				
	Selection Sort	Insertion Sort	Bubble Sort	Merge Sort	Quick Sort
Set 1	0.002	0.003	0.002	0.033	0.002
Set 2	0.048	0.054	0.083	0.241	0.015
Set 3	4.262	7.029	10.101	3.222	0.199
Set 4	415.333	465.25	880.819	23.842	1.922
Set 5	35963.6	49722.6	88089.5	280.118	23.838
Set 6	15min >	15min >	15min >	2701.56	255.178

Time Complexity of Sorting Algorithms for random sets 1.0

For small set all Algorithms are take relative same time to sort(ex : Set 1 ) but as number sets is become larger Selection Sort,Insertion sort and Bubble sort take too much time comparing to Merge sort and Quick sort.For the Set 6 sorting time of Selection sort ,Insertion sort and Bubble sort are higher than 15 min.

When we considering Merge sort and Quick Sort Quick sort is the Fastest sorting algorithm



### Exercise3: Compare Sorting Algorithms

	Amount	Values	Remarks
Set A	10,000	Any value in the range of 1-10,000	Totally random.
Set B	10,000	Any value in the range of 1-10,000	Sorted in ascending order.
Set C	10,000	Any value in the range of 1-10,000	Sorted in descending order.
Set D	10,000	Any value in the range of 1-10,000	Nearly sorted in ascending order. Every value should be within $k$ distance from its original place. (Take $k = 10$ in this example)
Set E	10,000	Multiples of 100 in the range of 1-1,000 (100,200,300,...,1,000)	With few unique values

	Time (ms)				
	Selection Sort	Insertion Sort	Bubble Sort	Merge Sort	Quick Sort
Set A	386.805	523.407	903.23	29.228	2.159
Set B	407.459	0.125	431.156	40.123	1.149
Set C	561.011	1020.42	933.738	23	0.838
Set D	414.037	0.608	360.211	29.565	1.29
Set E	529.683	530.363	891.224	23.993	1.699

Time Complexity of Sorting Algorithms for arranged sets 1.1

As discussed above “ Quick sort “ is the fastest algorithm to sort unsorted value sets but test result of Time Complexity of Sorting Algorithms for arranged sets 1.1 chart shows that “ Insertion Sort “ is much faster than all other algorithms in sorting already ascending sorted and ascending nearly sorted sets.

