REPORT FOR PROGRAMMING ASSIGNMENT 3

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Question1

Performance Evaluation

1. The loading factor are same for all hash functions.
2. The maximum number of collusions is middle squaring and the minimum number of collusion is Truncation
3. Same loading factor makes sense because size of hash table is 100 and 200 TC is inserted to hash table; as a result, 200/100=2 loading factor is expected.
   Collusion probability is high for middle squaring method for our random input; therefore, if we want to decrease collusion, we should choose truncation which has least collusion probability. Folding collusion performance is almost equal to truncation

```
Collusion: 114
lf: 2
```

Folding

```
Collusion: 178
lf: 2
```

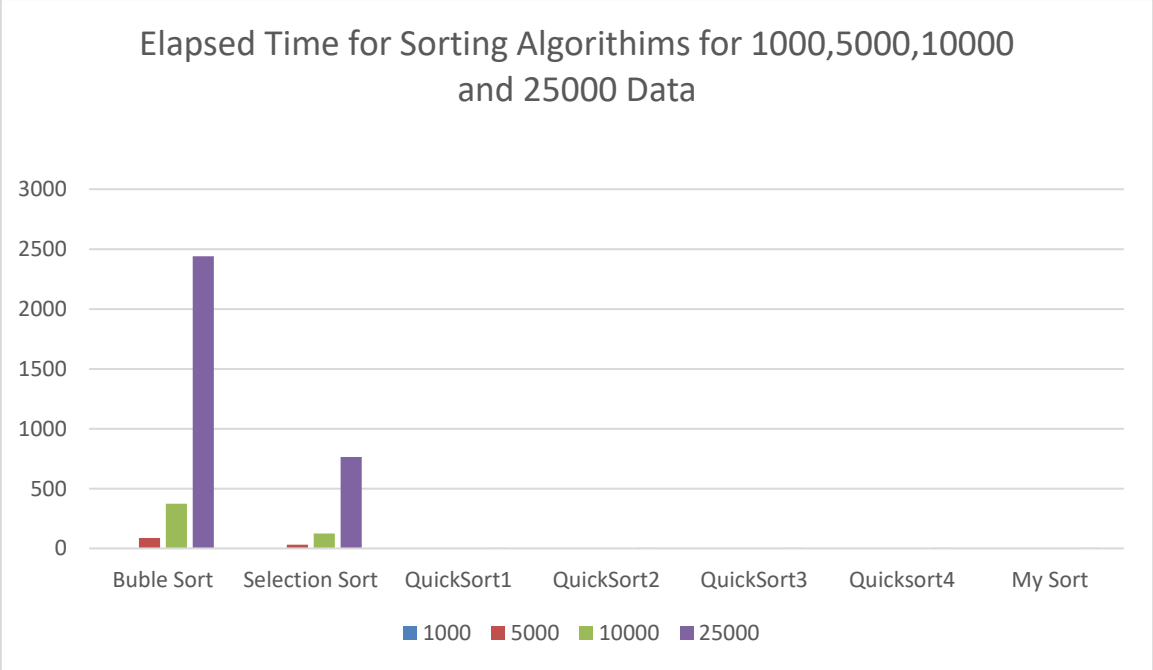
Middle Squaring

```
Collusion: 113
lf: 2
```

Truncation

Question2

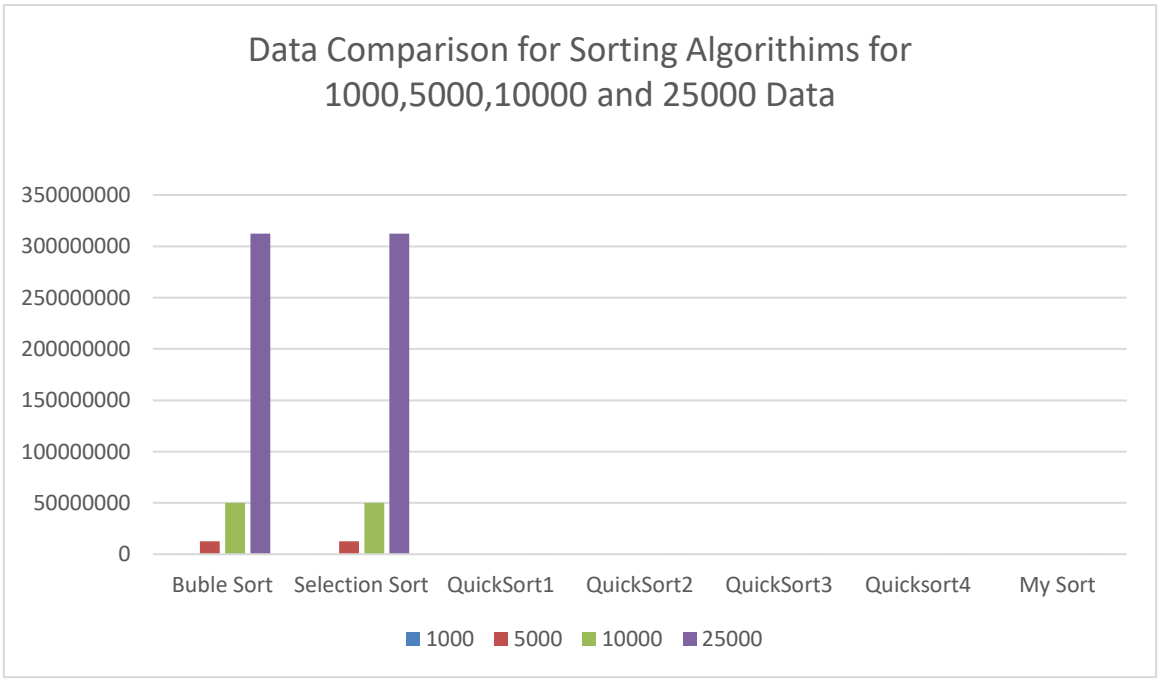
Performance Evaluation



	1000	5000	10000	25000
Buble Sort	3	86,6	372,2	2440,6
Selection Sort	1,4	32	125,2	765
QuickSort1	0	0,6	1,4	3,6
QuickSort2	0,2	0,6	1,4	3,6
QuickSort3	0,2	0,8	1,6	4,2
Quicksort4	0,2	1,2	2	5,4
My Sort	0	0,6	1,4	3,6

Comment:

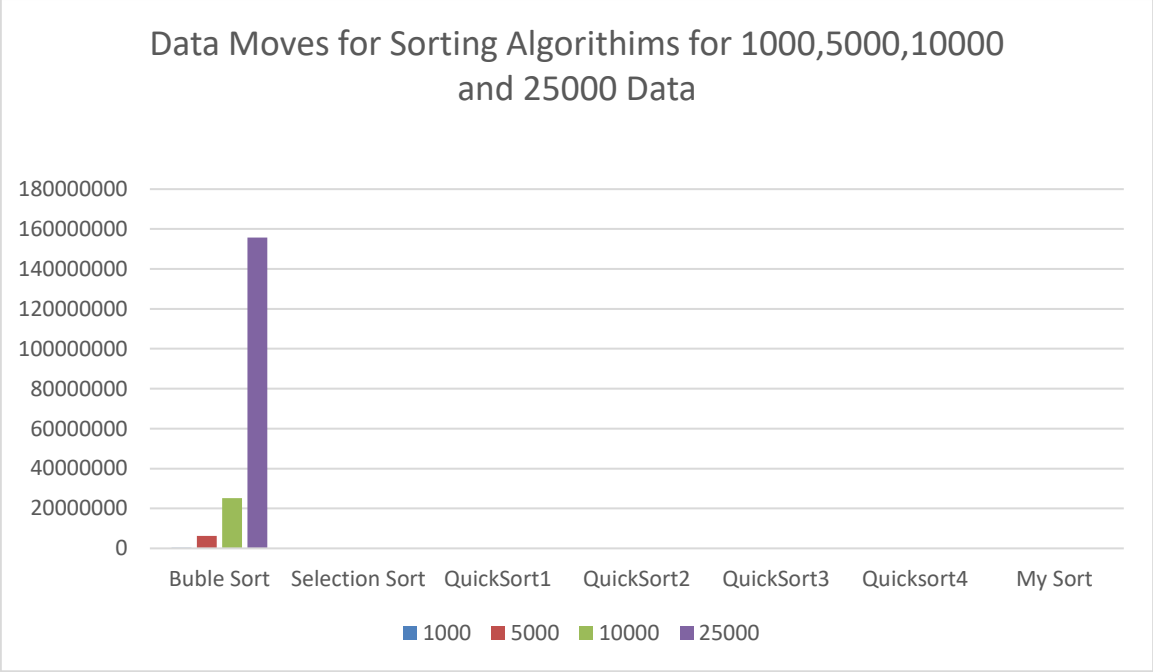
Bubble Sort increases rapidly this result is expected because its complexity is N^2 when number of data increase elapsed time increases the fastest way. Elapsed time of selection sort also increase rapidly while data increases this is also expected because complexity is N^2. The best performances belong to QuickSort algorithms their results almost same but in this experiment QuickSort1 has the best. My sort is composed of QuickSort 1 and selection sort. It's results good for time and similar to QuickSort1.



	1000	5000	10000	25000
Buble Sort	495414	12492961	49976754	312456185
Selection Sort	499500	12497500	49995000	312487500
QuickSort1	11091	70401	153023	444988
QuickSort2	9975	67971	151229	451717
QuickSort3	10546	68736	154231	422935
Quicksort4	9763	59478	134569	372995
My Sort	12206	76005	164365	474534

Comment:

Bubble Sort and Selection Sort has the biggest data comparisons. Quick Sorts results are almost same but My Sort data comparison is a bit bigger than Quick sort algorithms because My sort is composed of QuickSort 1 and selection sort.



	1000	5000	10000	25000
Buble Sort	251930	6217810	25231823	155709455
Selection Sort	999	4999	9999	24999
QuickSort1	2405	14578	31549	85634
QuickSort2	2426	14644	31608	85632
QuickSort3	2419	14691	31474	86591
Quicksort4	2447	14972	32186	88663
My Sort	2410	14646	31658	85694

Comment:

Bubble Sort has the most data moves and when number of data increase move operation of bubble sort increase rapidly. Selection sort moves is lower than QuickSort's moves. My sort is almost same as My Sort.

```
Array size: 1000 numbers

Bubble Sort:
Data comparision: 495414
Data moves: 251930
Time: 3

Selection Sort:
Data comparision: 499500
Data moves: 999
Time: 1.4

Quick Sort1:
Data comparision: 11091
Data moves: 2405
Time: 0

Quick Sort2:
Data comparision: 9975
Data moves: 2426
Time: 0.2

Quick Sort3:
Data comparision: 10546
Data moves: 2419
Time: 0.2

Quick Sort4:
Data comparision: 9763
Data moves: 2447
Time: 0.2

My Own Sort:
Data comparision: 12206
Data moves: 2410
Time: 0
```

```
Array size: 5000 numbers

Bubble Sort:
Data comparision: 12492961
Data moves: 6217810
Time: 86.6

Selection Sort:
Data comparision: 12497500
Data moves: 4999
Time: 32

Quick Sort1:
Data comparision: 70401
Data moves: 14578
Time: 0.6

Quick Sort2:
Data comparision: 67971
Data moves: 14644
Time: 0.6

Quick Sort3:
Data comparision: 68736
Data moves: 14691
Time: 0.8

Quick Sort4:
Data comparision: 59478
Data moves: 14972
Time: 1.2

My Own Sort:
Data comparision: 76005
Data moves: 14646
Time: 0.6
```

```
Array size: 10000 numbers

Bubble Sort:
Data comparision: 49976754
Data moves: 25231823
Time: 372.2

Selection Sort:
Data comparision: 49995000
Data moves: 9999
Time: 125.2

Quick Sort1:
Data comparision: 153023
Data moves: 31549
Time: 1.4

Quick Sort2:
Data comparision: 151229
Data moves: 31608
Time: 1.4

Quick Sort3:
Data comparision: 154231
Data moves: 31474
Time: 1.6

Quick Sort4:
Data comparision: 134569
Data moves: 32186
Time: 2

My Own Sort:
Data comparision: 164365
Data moves: 31658
Time: 1.4
```

```
Array size: 25000 numbers

Bubble Sort:
Data comparision: 312456185
Data moves: 155709455
Time: 2440.6

Selection Sort:
Data comparision: 312487500
Data moves: 24999
Time: 765

Quick Sort1:
Data comparision: 444988
Data moves: 85634
Time: 3.6

Quick Sort2:
Data comparision: 451717
Data moves: 85632
Time: 3.6

Quick Sort3:
Data comparision: 422935
Data moves: 86591
Time: 4.2

Quick Sort4:
Data comparision: 372995
Data moves: 88663
Time: 5.4

My Own Sort:
Data comparision: 474534
Data moves: 85694
Time: 3.6
```