				1			1
a	1K	2K	4K	8K	16K	32K	1M
Arrays.sort()	17	18	25	25	34	42	212
Bubble	24	31	49	130	372	1714	10m+
Selection	23	26	42	80	244	877	10m+
Insertion	21	26	37	81	242	871	10m+
Merge	18	21	24	26	33	40	189
Quick	18	19	24	31	34	41	241
b	1K	2K	4K	8K	16K	32K	1M
Arrays.sort()	3	1	3	4	6	10	86
Bubble	4	2	7	21	133	802	10m+
Selection	3	4	16	56	217	898	10m+
Insertion	3	5	16	58	215	836	10m+
Merge	3	1	2	26	8	11	153
Quick	5	3	9	32	131	N/A	N/A
С	1K	2K	4K	8K	16K	32K	1M
Arrays.sort()	1	2	3	5	7	10	104
Bubble	1	3	10	53	127	547	10m+
Selection	2	4	15	57	209	923	10m+
Insertion	2	5	7	58	209	878	10m+
Merge	2	2	3	4	6	11	88
Quick	4	2	8	30	80	N/A	N/A
	•	•	•	•	•	•	
d	1K	2K	4K	8K	16K	32K	1M
Arrays.sort()	1	1	3	3	6	6	51
Bubble	1	3	10	50	127	511	10m+
Selection	2	5	16	58	214	846	10m+
Insertion	2	5	7	58	211	856	10m+
Merge	1	1	2	4	5	5	92
Quick	1	3	8	30	83	N/A	N/A

```
ees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Kints.txt 0
                                                                                         17.0
2.0
                                                                                                                           20220410_200845 31830539 1Kints.txt
20220410_200845 31830539 1Kints.txt
20220410_200845 31830539 1Kints.txt
Arrays.sort() a Arrays.sort() b
  Arrays.sort()
                                                                                                                            20220410 200845 31830539 1Kints.txt
 Arrays.sort() d
                                                                                                 1.0
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Kints.txt 1

Bubble Sort a 23.0 20220410_200853 31830539 1Kints.txt

Bubble Sort b 3.0 20220410_200853 31830539 1Kints.txt

Bubble Sort c 2.0 20220410_200853 31830539 1Kints.txt

Bubble Sort d 1.0 20220410_200853 31830539 1Kints.txt

Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Kints.txt 2

Selection Sort a 22.0 20220410_200855 31830539 1Kints.txt

Selection Sort b 3.0 20220410_200855 31830539 1Kints.txt

Selection Sort c 2.0 20220410_200855 31830539 1Kints.txt

Selection Sort c 2.0 20220410_200855 31830539 1Kints.txt

Selection Sort d 1.0 20220410_200855 31830539 1Kints.txt

Selection Sort d 1.0 20220410_200855 31830539 1Kints.txt

Insertion Sort a 22.0 20220410_200855 31830539 1Kints.txt

Insertion Sort b 3.0 20220410_200857 31830539 1Kints.txt

Insertion Sort b 3.0 20220410_200857 31830539 1Kints.txt

Insertion Sort d 1.0 20220410_200857 31830539 1Kints.txt

Insertion Sort d 1.0 20220410_200857 31830539 1Kints.txt

Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Kints.txt
   Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Kints.txt 1
                                                                                                    joonhyuplee% java Sorting 1Kints.txt 4
20220410_200859 31830539 1Kints.txt
  Lees-MacBook-Pro:lab6
 Mergesort a
Mergesort b
                                                                17.0
                                                                            3.0
  Mergesort c
                                                                              2.0
  Mergesort d

      Mergesoft d
      1.0
      20220410_200339
      1830339
      181818.184

      Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Kints.txt 5
      Quicksort a
      18.0
      20220410_200901
      31830539
      1Kints.txt

      Quicksort b
      5.0
      20220410_200901
      31830539
      1Kints.txt

      Quicksort c
      4.0
      20220410_200901
      31830539
      1Kints.txt

      Quicksort d
      1.0
      20220410_200901
      31830539
      1Kints.txt
```

```
ees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 2Kints.txt 0
rrays.sort() a 20.0 20220410_200943 31830539 2Kints.txt
rrays.sort() b 1.0 20220410_200943 31830539 2Kints.txt
rrays.sort() c 2.0 20220410_200943 31830539 2Kints.txt
rrays.sort() d 1.0 20220410_200943 31830539 2Kints.txt
 Arrays.sort() a
Arrays.sort() b
   Arrays.sort()
Arrays.sort() d 1.0 20220410_200943 31830539 ZKINTS.tx
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting ZKints.txt 1
Bubble Sort a 31.0 20220410_200957 31830539 ZKints.txt
Bubble Sort b 2.0 20220410_200957 31830539 ZKints.txt
Bubble Sort c 3.0 20220410_200957 31830539 ZKints.txt
Bubble Sort d 3.0 20220410_200957 31830539 ZKints.txt
 | Colored | Colo
                                                                                                                                                                                                                                             20220410_201000 31830539 2Kints.txt
20220410_201000 31830539 2Kints.txt
 Selection Sort c
Selection Sort d
                                                                                                                                                                                            4.0
 | Selection | Solidar | Substitution | Substitution
   Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 2Kints.txt 4
Mergesort a 21.0 20220410_201003 31830539 2Kints.txt
 Mergesort a
                                                                                                                                                                                                                                                                                                                                                                                                                          2Kints.txt
                                                                                                                                                                                                 20220410_201003 31830539 2Kints.txt
20220410_201003 31830539 2Kints.txt
20220410_201003 31830539 2Kints.txt
                                                                                                                                         1.0
 Mergesort b
 Mergesort c
 Mergesort d
                                                                                                                                                  1.0
 Quicksort d
                                                                                                                                                                                                   20220410 201004
                                                                                                                                                                                                                                                                                                                                              31830539
                                                                                                                                                                                                                                                                                                                                                                                                                                    2Kints.txt
```

```
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 4Kints.txt 0
Arrays.sort() a 24.0 20220410_201054 31830539 4Kints
Arrays.sort() b 3.0 20220410_201054 31830539 4Kints
                                                                                                                                    4Kints.txt
                                                                                                                                  4Kints.txt
                                                                 20220410_201054 31830539
20220410_201054 31830539
Arrays.sort() c
                                                    2.0
                                                                                                                                   4Kints.txt
Arrays.sort() d
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 4Kints.txt 1
Bubble Sort a 41.0 20220410_201056 31830539 4Kints.txt
Bubble Sort b 15.0 20220410_201056 31830539 4Kints.txt
Bubble Sort c 11.0 20220410_201056 31830539 4Kints.txt
Bubble Sort d 10.0 20220410_201056 31830539 4Kints.txt
[Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 4Kints.txt 2
Bubble Sort c
Bubble Sort d
                                                                    yupiee5 java Sorting 4kints.txt 2
20220410_201058 31830539 4Kints.txt
20220410_201058 31830539 4Kints.txt
20220410_201058 31830539 4Kints.txt
20220410_201058 31830539 4Kints.txt
Selection Sort a
Selection Sort b
                                                  41.0
                                                   16.0
Selection Sort c
                                                    15.0
Selection Sort d
                                                    15.0

      Selection Sort d
      15.0
      20220410_201808
      31830537
      4Kints.txt

      Lees-MacBook-Pro:lab6 joonhyuplee%
      java Sorting 4Kints.txt

      Insertion Sort a
      41.0
      20220410_201859
      31830539
      4Kints.txt

      Insertion Sort b
      16.0
      20220410_201059
      31830539
      4Kints.txt

      Insertion Sort c
      16.0
      20220410_201059
      31830539
      4Kints.txt

      Insertion Sort d
      15.0
      20220410_201059
      31830539
      4Kints.txt

Mergesort d
                                          3.0
                                                        20220410_201100
                                                                                                 31830539
                                                                                                                       4Kints.txt
                                                                                                 Sorting 4Kints.txt 5
31830539 4Kints.txt
31830539 4Kints.txt
Lees-MacBook-Pro:lab6 joonhyuplee$ java
Quicksort a 24.0 20220410_201102
                                       24.0
                                                        20220410_201102
20220410_201102
20220410_201102
Quicksort b
                                         8.0
                                                                                                 31839539
                                                                                                                       4Kints.txt
Quicksort c
Quicksort d
                                                                                                  31830539
```

```
ees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 8Kints.txt 0
Arrays.sort() a 26.0 20220410_201138 31830539 8Kints.txt
Arrays.sort() b 4.0 20220410_201138 31830539 8Kints.txt
  Arrays.sort() a
                                                                                                                                               20220410_201138 31830539 8Kints.txt
20220410_201138 31830539 8Kints.txt
20220410_201138 31830539 8Kints.txt
  Arrays.sort() b
                                                                                                              4.0
                                                                                                                 3.0
  Arrays.sort() c
  Arrays.sort() d
Selection Sort d 57.0 20220410_201143 31830639 8Kints.txt Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 8Kints.txt Insertion Sort a 81.0 20220410_201145 31830639 8Kints.txt Insertion Sort b 55.0 20220410_201145 31830639 8Kints.txt Insertion Sort c 54.0 20220410_201145 31830639 8Kints.txt Insertion Sort d 58.0 20220410_201145 31830639 8Kints.txt
  | 1868 | 20220410_201146 | 31830539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 31850539 | 318505
Mergesort a
Mergesort b
  Mergesort d
Mergesort d
                                                                                          3.0
                                                                                                                           20220410_201146
                                                                                                                                                                                                                    31830539 8Kints.txt
                                                                                                                     joonhyuplee$ java Sorting 8Kints.txt 5'
20220410_201148 31830539 8Kints.txt
20220410_201148 31830539 8Kints.txt
   Lees-MacBook-Pro:lab6
  Quicksort a
                                                                                    31.0
 Quicksort b
                                                                                     32.0
Quicksort c
Quicksort d
                                                                                      30.0
                                                                                                                          20220410_201148
20220410_201148
                                                                                                                                                                                                                    31830539
                                                                                                                                                                                                                                                                          8Kints.txt
                                                                                                                                                                                                                     31830539
```

```
20220410_201228 31830539
20220410_201228 31830539
20220410_201228 31830539
Arrays.sort() a
Arrays.sort() b
                                          31.0
                                                                                                                    16Kints.txt
                                                                                                                     16Kints.txt
                                                                                                                    16Kints.txt
Arrays.sort() c
Arrays.sort() d
                                                          Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 16Kints.txt 1
Bubble Sort a 386.0 20220410_201231 31830539 16Kints.txt
Bubble Sort b 69.0 20220410_201231 31830539 16Kints.txt
Bubble Sort c 126.0 20220410_201231 31830539 16Kints.txt
                                           128.0 20220410_201231 31830539 16Kints.txt
 ^[[ABubble Sort d
"[[ABUDDIE SOFT 0 128.6 20220410_201231 31830539 16Kints.tx"]
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 16Kints.txt 2
Selection Sort a 237.0 20220410_201233 31830539 16Kints.txt
Selection Sort b 219.0 20220410_201233 31830539 16Kints.txt
Selection Sort c 209.0 20220410_201233 31830539 16Kints.txt
Selection Sort d 207.0 20220410 201233 31830539 16Kints.txt
Selection Sort a
Selection Sort b
                                                           20220410_201233 31830539
20220410_201233 31830539
Selection Sort c
Selection Sort d
Insertion Sort d 208.0 20220410_201235 31830539 16kints.test 4
Mergesort a 33.0 20220410_201238 31830539 16kints.txt
Mergesort b 7.0 20220410_201238 31830539 16kints.txt
Mergesort c 5.0 20220410_201238 31830539 16kints.txt
Mergesort d 7.0 20220410_201238 31830539 16kints.txt
Mergesort a
Mergesort b
                                    5.0
7.0
Mergesort d
                                                  20220410_201238
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 16Kints.txt 5
Quicksort a 34.0 20220410_201240 31830539 16Kints.txt
Quicksort b 131.0 20220410_201240 31830539 16Kints.txt
Quicksort a
Quicksort b
Quicksort d
                                 83.0
                                                 20220410 201240
                                                                                      31830539
                                                                                                           16Kints.txt
```

```
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Mints.txt 0
                  228.0
                          20220410 201943 31830539
Arrays.sort() a
                                                    1Mints.txt
Arrays.sort() b
                   99.0
                          20220410_201943
                                          31830539
                                                    1Mints.txt
Arrays.sort() c
                  114.0
                          20220410_201943
                                          31830539
                                                    1Mints.txt
Arrays.sort() d
                   58.0
                          20220410 201943 31830539
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Mints.txt 1
^CLees-MacBook-Pro:lab6 joonhyuplee$
[Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Mints.txt 2
[^CLees-MacBook-Pro:lab6 joonhyuplee$
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Mints.txt 3
^CLees-MacBook-Pro:lab6 joonhyuplee$
Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Mints.txt 4
                      20220410_202007 31830539
              188.0
Mergesort a
                                                1Mints.txt
              164.0
                      20220410_202007 31830539
Mergesort b
                                                1Mints.txt
Mergesort c
               88.0
                      20220410_202007 31830539
                                                1Mints.txt
               83.0
                     Lees-MacBook-Pro:lab6 joonhyuplee$ java Sorting 1Mints.txt 5
                      20220410_202011 31830539
                                                1Mints.txt
Quicksort a
              222.0
Exception in thread "main" java.lang.StackOverflowError
       at Sorting.QuickSort(Sorting.java:279)
```