

Screenshots

1Kints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 1Kints.txt 0
Java Default a      1.0    20230409_153408    hchoe4    1Kints.txt
Java Default b      0.0    20230409_153408    hchoe4    1Kints.txt
Java Default c      0.0    20230409_153408    hchoe4    1Kints.txt
Java Default d      0.0    20230409_153408    hchoe4    1Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Kints.txt 1
Bubble Sort a       7.0    20230409_153410    hchoe4    1Kints.txt
Bubble Sort b       3.0    20230409_153410    hchoe4    1Kints.txt
Bubble Sort c       1.0    20230409_153410    hchoe4    1Kints.txt
Bubble Sort d       1.0    20230409_153410    hchoe4    1Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Kints.txt 2
Selection Sort a     5.0    20230409_153412    hchoe4    1Kints.txt
Selection Sort b     1.0    20230409_153412    hchoe4    1Kints.txt
Selection Sort c     2.0    20230409_153412    hchoe4    1Kints.txt
Selection Sort d     1.0    20230409_153412    hchoe4    1Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Kints.txt 3
Insertion Sort a     7.0    20230409_153413    hchoe4    1Kints.txt
Insertion Sort b     0.0    20230409_153413    hchoe4    1Kints.txt
Insertion Sort c    15.0    20230409_153414    hchoe4    1Kints.txt
Insertion Sort d     1.0    20230409_153414    hchoe4    1Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Kints.txt 4
Mergesort a         1.0    20230409_153415    hchoe4    1Kints.txt
Mergesort b         0.0    20230409_153415    hchoe4    1Kints.txt
Mergesort c         1.0    20230409_153415    hchoe4    1Kints.txt
Mergesort d         0.0    20230409_153415    hchoe4    1Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Kints.txt 5
Quicksort a         1.0    20230409_153416    hchoe4    1Kints.txt
Quicksort b         0.0    20230409_153416    hchoe4    1Kints.txt
Quicksort c         0.0    20230409_153416    hchoe4    1Kints.txt
Quicksort d         0.0    20230409_153416    hchoe4    1Kints.txt
```

2Kints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 2Kints.txt 0
Java Default a      2.0    20230409_153530    hchoe4    2Kints.txt
Java Default b      0.0    20230409_153530    hchoe4    2Kints.txt
Java Default c      0.0    20230409_153530    hchoe4    2Kints.txt
Java Default d      0.0    20230409_153530    hchoe4    2Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 2Kints.txt 1
Bubble Sort a      16.0    20230409_153532    hchoe4    2Kints.txt
Bubble Sort b       2.0    20230409_153532    hchoe4    2Kints.txt
Bubble Sort c       3.0    20230409_153532    hchoe4    2Kints.txt
Bubble Sort d       6.0    20230409_153532    hchoe4    2Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 2Kints.txt 2
Selection Sort a    11.0    20230409_153533    hchoe4    2Kints.txt
Selection Sort b     3.0    20230409_153533    hchoe4    2Kints.txt
Selection Sort c     2.0    20230409_153533    hchoe4    2Kints.txt
Selection Sort d     1.0    20230409_153533    hchoe4    2Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 2Kints.txt 3
Insertion Sort a     7.0    20230409_153535    hchoe4    2Kints.txt
Insertion Sort b     1.0    20230409_153535    hchoe4    2Kints.txt
Insertion Sort c     1.0    20230409_153535    hchoe4    2Kints.txt
Insertion Sort d     0.0    20230409_153535    hchoe4    2Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 2Kints.txt 4
Mergesort a         2.0    20230409_153536    hchoe4    2Kints.txt
Mergesort b         0.0    20230409_153536    hchoe4    2Kints.txt
Mergesort c         0.0    20230409_153536    hchoe4    2Kints.txt
Mergesort d         0.0    20230409_153536    hchoe4    2Kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 2Kints.txt 5
Quicksort a         2.0    20230409_153537    hchoe4    2Kints.txt
Quicksort b         0.0    20230409_153537    hchoe4    2Kints.txt
Quicksort c         0.0    20230409_153537    hchoe4    2Kints.txt
Quicksort d         1.0    20230409_153537    hchoe4    2Kints.txt
```

4Kints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 4kints.txt 0
Java Default a      2.0    20230409_153634    hchoe4    4kints.txt
Java Default b      0.0    20230409_153634    hchoe4    4kints.txt
Java Default c      0.0    20230409_153634    hchoe4    4kints.txt
Java Default d      0.0    20230409_153634    hchoe4    4kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 4kints.txt 1
Bubble Sort a      29.0    20230409_153636    hchoe4    4kints.txt
Bubble Sort b      38.0    20230409_153636    hchoe4    4kints.txt
Bubble Sort c      24.0    20230409_153636    hchoe4    4kints.txt
Bubble Sort d      10.0    20230409_153636    hchoe4    4kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 4kints.txt 2
Selection Sort a    23.0    20230409_153638    hchoe4    4kints.txt
Selection Sort b    11.0    20230409_153638    hchoe4    4kints.txt
Selection Sort c     9.0    20230409_153638    hchoe4    4kints.txt
Selection Sort d     5.0    20230409_153638    hchoe4    4kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 4kints.txt 3
Insertion Sort a    14.0    20230409_153640    hchoe4    4kints.txt
Insertion Sort b     0.0    20230409_153640    hchoe4    4kints.txt
Insertion Sort c     9.0    20230409_153640    hchoe4    4kints.txt
Insertion Sort d     1.0    20230409_153640    hchoe4    4kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 4kints.txt 4
Mergesort a         3.0    20230409_153642    hchoe4    4kints.txt
Mergesort b         1.0    20230409_153642    hchoe4    4kints.txt
Mergesort c         1.0    20230409_153642    hchoe4    4kints.txt
Mergesort d         7.0    20230409_153642    hchoe4    4kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 4kints.txt 5
Quicksort a         4.0    20230409_153643    hchoe4    4kints.txt
Quicksort b         0.0    20230409_153644    hchoe4    4kints.txt
Quicksort c         0.0    20230409_153644    hchoe4    4kints.txt
Quicksort d         1.0    20230409_153644    hchoe4    4kints.txt
```

8Kints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 8kints.txt 0
Java Default a      7.0    20230409_153717  hchoe4  8kints.txt
Java Default b      1.0    20230409_153717  hchoe4  8kints.txt
Java Default c      0.0    20230409_153717  hchoe4  8kints.txt
Java Default d      1.0    20230409_153717  hchoe4  8kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 8kints.txt 1
Bubble Sort a     122.0    20230409_153719  hchoe4  8kints.txt
Bubble Sort b      70.0    20230409_153719  hchoe4  8kints.txt
Bubble Sort c      47.0    20230409_153720  hchoe4  8kints.txt
Bubble Sort d      31.0    20230409_153720  hchoe4  8kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 8kints.txt 2
Selection Sort a   66.0    20230409_153721  hchoe4  8kints.txt
Selection Sort b   53.0    20230409_153721  hchoe4  8kints.txt
Selection Sort c   40.0    20230409_153721  hchoe4  8kints.txt
Selection Sort d   26.0    20230409_153721  hchoe4  8kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 8kints.txt 3
Insertion Sort a   17.0    20230409_153723  hchoe4  8kints.txt
Insertion Sort b    0.0    20230409_153723  hchoe4  8kints.txt
Insertion Sort c   37.0    20230409_153723  hchoe4  8kints.txt
Insertion Sort d    2.0    20230409_153723  hchoe4  8kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 8kints.txt 4
Mergesort a        3.0    20230409_153725  hchoe4  8kints.txt
Mergesort b        2.0    20230409_153725  hchoe4  8kints.txt
Mergesort c        2.0    20230409_153725  hchoe4  8kints.txt
Mergesort d        3.0    20230409_153725  hchoe4  8kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 8kints.txt 5
Quicksort a        4.0    20230409_153726  hchoe4  8kints.txt
Quicksort b        0.0    20230409_153726  hchoe4  8kints.txt
Quicksort c        0.0    20230409_153726  hchoe4  8kints.txt
Quicksort d        0.0    20230409_153726  hchoe4  8kints.txt
```

16Kints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 16kints.txt 0
Java Default a      3.0    20230409_153800    hchoe4    16kints.txt
Java Default b      1.0    20230409_153800    hchoe4    16kints.txt
Java Default c      0.0    20230409_153800    hchoe4    16kints.txt
Java Default d      2.0    20230409_153800    hchoe4    16kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 16kints.txt 1
Bubble Sort a      399.0    20230409_153802    hchoe4    16kints.txt
Bubble Sort b      212.0    20230409_153803    hchoe4    16kints.txt
Bubble Sort c      290.0    20230409_153803    hchoe4    16kints.txt
Bubble Sort d      115.0    20230409_153803    hchoe4    16kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 16kints.txt 2
Selection Sort a    159.0    20230409_153806    hchoe4    16kints.txt
Selection Sort b    158.0    20230409_153806    hchoe4    16kints.txt
Selection Sort c    116.0    20230409_153806    hchoe4    16kints.txt
Selection Sort d    162.0    20230409_153806    hchoe4    16kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 16kints.txt 3
Insertion Sort a     58.0    20230409_153809    hchoe4    16kints.txt
Insertion Sort b      0.0    20230409_153809    hchoe4    16kints.txt
Insertion Sort c     87.0    20230409_153809    hchoe4    16kints.txt
Insertion Sort d     16.0    20230409_153809    hchoe4    16kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 16kints.txt 4
Mergesort a        14.0    20230409_153811    hchoe4    16kints.txt
Mergesort b         2.0    20230409_153811    hchoe4    16kints.txt
Mergesort c         2.0    20230409_153811    hchoe4    16kints.txt
Mergesort d         3.0    20230409_153811    hchoe4    16kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 16kints.txt 5
Quicksort a         4.0    20230409_153812    hchoe4    16kints.txt
Quicksort b         0.0    20230409_153813    hchoe4    16kints.txt
Quicksort c         0.0    20230409_153813    hchoe4    16kints.txt
Quicksort d         0.0    20230409_153813    hchoe4    16kints.txt
```

32Kints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 32kints.txt 0
Java Default a      5.0    20230409_153905    hchoe4    32kints.txt
Java Default b      1.0    20230409_153905    hchoe4    32kints.txt
Java Default c      2.0    20230409_153905    hchoe4    32kints.txt
Java Default d      4.0    20230409_153905    hchoe4    32kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 32kints.txt 1
Bubble Sort a    1826.0    20230409_153909    hchoe4    32kints.txt
Bubble Sort b     811.0    20230409_153909    hchoe4    32kints.txt
Bubble Sort c     620.0    20230409_153910    hchoe4    32kints.txt
Bubble Sort d     490.0    20230409_153911    hchoe4    32kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 32kints.txt 2
Selection Sort a   539.0    20230409_153914    hchoe4    32kints.txt
Selection Sort b   564.0    20230409_153914    hchoe4    32kints.txt
Selection Sort c   454.0    20230409_153915    hchoe4    32kints.txt
Selection Sort d   288.0    20230409_153915    hchoe4    32kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 32kints.txt 3
Insertion Sort a   134.0    20230409_153917    hchoe4    32kints.txt
Insertion Sort b     1.0    20230409_153917    hchoe4    32kints.txt
Insertion Sort c   201.0    20230409_153917    hchoe4    32kints.txt
Insertion Sort d    29.0    20230409_153917    hchoe4    32kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 32kints.txt 4
Mergesort a        9.0    20230409_153920    hchoe4    32kints.txt
Mergesort b        3.0    20230409_153920    hchoe4    32kints.txt
Mergesort c        2.0    20230409_153920    hchoe4    32kints.txt
Mergesort d        3.0    20230409_153920    hchoe4    32kints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 32kints.txt 5
Quicksort a        8.0    20230409_153922    hchoe4    32kints.txt
Quicksort b        1.0    20230409_153922    hchoe4    32kints.txt
Quicksort c        1.0    20230409_153922    hchoe4    32kints.txt
Quicksort d        1.0    20230409_153922    hchoe4    32kints.txt
```

1Mints.txt

```
jameschoe@Jamess-MBP Lab6 % java Sorting 1Mints.txt 0
Java Default a      101.0    20230409_164105    hchoe4    1Mints.txt
Java Default b       4.0     20230409_164105    hchoe4    1Mints.txt
Java Default c       6.0     20230409_164106    hchoe4    1Mints.txt
Java Default d      46.0     20230409_164106    hchoe4    1Mints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Mints.txt 1
^C%
jameschoe@Jamess-MBP Lab6 % java Sorting 1Mints.txt 2
^C%
jameschoe@Jamess-MBP Lab6 % java Sorting 1Mints.txt 3
Insertion Sort a  94950.0    20230409_164301    hchoe4    1Mints.txt
Insertion Sort b   5.0     20230409_164301    hchoe4    1Mints.txt
Insertion Sort c 663709.0    20230409_165405    hchoe4    1Mints.txt
Insertion Sort d 76792.0    20230409_165522    hchoe4    1Mints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Mints.txt 4
Mergesort a      180.0    20230409_165543    hchoe4    1Mints.txt
Mergesort b      100.0    20230409_165543    hchoe4    1Mints.txt
Mergesort c      120.0    20230409_165544    hchoe4    1Mints.txt
Mergesort d       82.0    20230409_165544    hchoe4    1Mints.txt
jameschoe@Jamess-MBP Lab6 % java Sorting 1Mints.txt 5
Quicksort a      136.0    20230409_165547    hchoe4    1Mints.txt
Quicksort b       34.0    20230409_165547    hchoe4    1Mints.txt
Quicksort c       18.0    20230409_165547    hchoe4    1Mints.txt
Quicksort d       40.0    20230409_165547    hchoe4    1Mints.txt
```

Tables

Array A

	1Kints.txt	2Kints.txt	4Kints.txt	8Kints.txt	16Kints.txt	32Kints.txt	1Mints.txt
Array a	1	2	4	8	16	32	1000
Java Default	1	2	2	7	3	5	101
Bubble Sort	7	16	29	122	399	1826	N/A
Selection Sort	5	11	23	66	159	539	N/A
Insertion Sort	7	7	14	17	58	134	94950
Mergesort	1	2	3	3	14	9	180
Quicksort	1	2	4	4	4	8	136

Array B

	1Kints.txt	2Kints.txt	4Kints.txt	8Kints.txt	16Kints.txt	32Kints.txt	1Mints.txt
Array b	1	2	4	8	16	32	1000
Java Default	0	0	0	1	1	1	4
Bubble Sort	3	2	38	70	212	811	N/A
Selection Sort	4	3	11	53	158	564	N/A
Insertion Sort	0	1	0	0	0	1	5
Mergesort	0	0	1	2	2	3	100
Quicksort	0	0	0	0	0	1	34

Array C

	1Kints.txt	2Kints.txt	4Kints.txt	8Kints.txt	16Kints.txt	32Kints.txt	1Mints.txt
Array c	1	2	4	8	16	32	1000
Java Default	0	0	0	0	0	2	6
Bubble Sort	1	3	24	47	290	620	N/A
Selection	2	2	9	40	116	454	N/A

Sort							
Insertion Sort	15	1	9	37	87	201	N/A
Mergesort	1	0	1	2	2	2	120
Quicksort	0	0	0	0	0	1	18

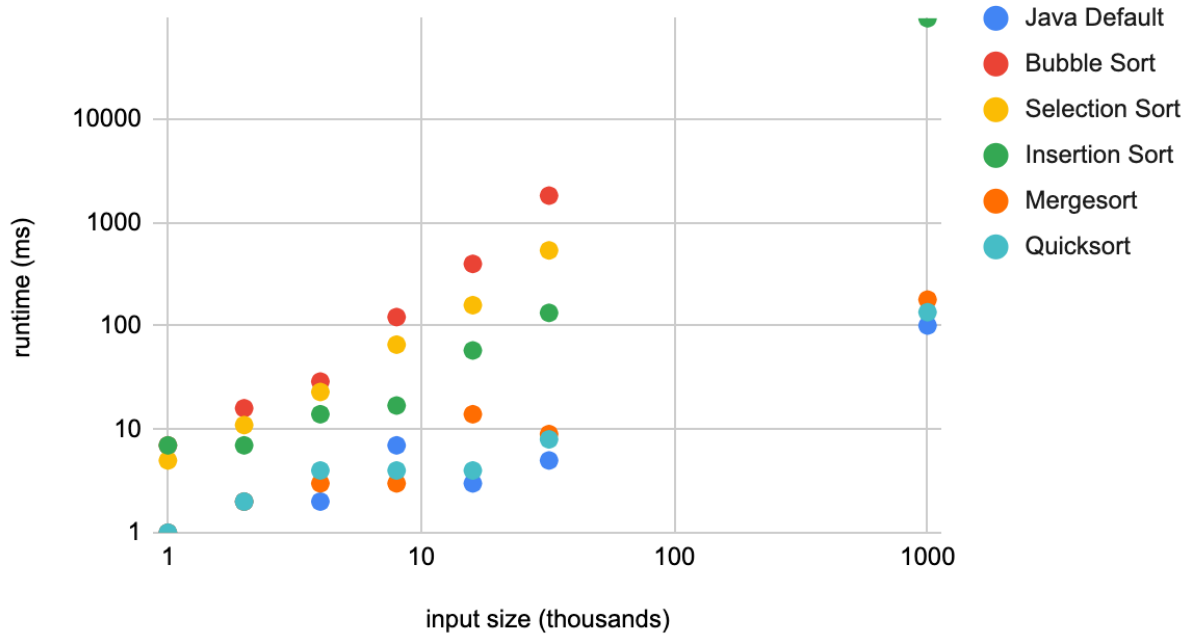
Array D

	1Kints.txt	2Kints.txt	4Kints.txt	8Kints.txt	16Kints.txt	32Kints.txt	1Mints.txt
Array d	1	2	4	8	16	32	1000
Java Default	0	0	0	1	2	4	46
Bubble Sort	1	6	10	31	115	490	N/A
Selection Sort	4	1	5	26	162	288	N/A
Insertion Sort	1	0	1	2	16	29	76792
Mergesort	0	0	7	3	3	3	82
Quicksort	0	1	1	0	0	1	40

Plots

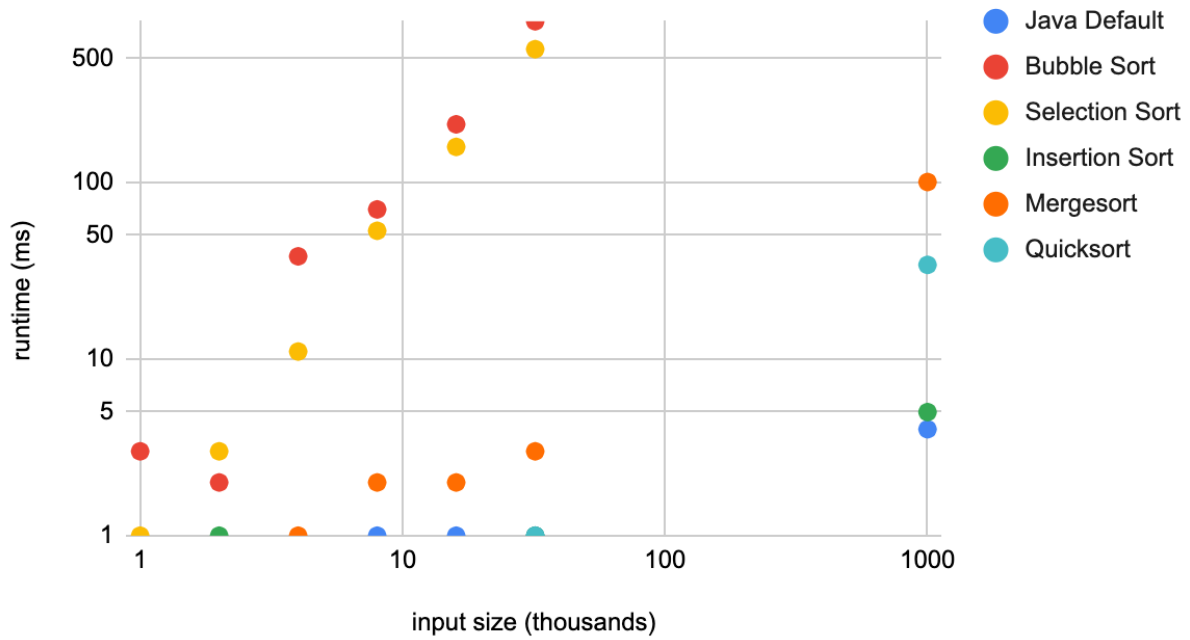
Array A

Sorting Algorithms: Array A (Random Numbers/Input File)



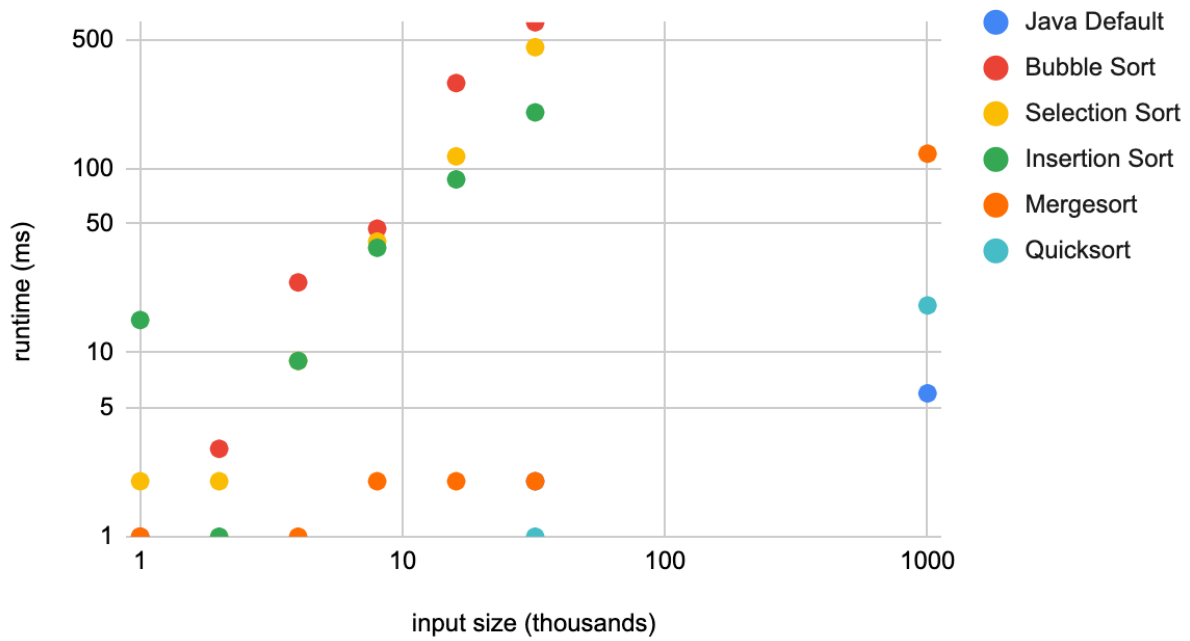
Array B

Sorting Algorithms: Array B (Sorted)



Array C

Sorting Algorithms: Array C (Sorted Reverse)



Array D

Sorting Algorithms: Array D (Almost Sorted)

