Kaiden Pollesch – Sorting Ex 1

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| Insertion Sort | | | | |
| **N** | **Average Time (t\_avg)** | **RUNS** | **N^2** | **t\_avg / N^2** |
| 1000 | 0.00114 | 1024 | 1000000 | 1.14E-09 |
| 2000 | 0.004102 | 1024 | 4000000 | 1.03E-09 |
| 4000 | 0.017376 | 512 | 16000000 | 1.09E-09 |
| 8000 | 0.067181 | 256 | 64000000 | 1.05E-09 |
| 16000 | 0.265797 | 128 | 256000000 | 1.04E-09 |
|  |  |  |  |  |
|  |  |  |  |  |
| Selection Sort | | | | |
| **N** | **Average Time (t\_avg)** | **RUNS** | **N^2** | **t\_avg / N^2** |
| 1000 | 0.00003 | 1024 | 1000000 | 2.96E-11 |
| 2000 | 0.000062 | 1024 | 4000000 | 1.55E-11 |
| 4000 | 0.000137 | 512 | 16000000 | 8.56E-12 |
| 8000 | 0.000286 | 256 | 64000000 | 4.48E-12 |
| 16000 | 0.000589 | 128 | 256000000 | 2.30E-12 |

These plots show that insertion sort is very quick for smaller amounts of data but as more data is being sorted it becomes exponentially harder to sort. Meaning that the more pieces of data, it will take exponentially longer per data item to be sorted.

Selection Sort is the opposite that the smaller the data set the longer it will take for the item to sort the data. The larger the data set the quicker per piece of data it will be to sort when using selection sort.

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| Insertion Sort Prediction | | | | |
| N | Seconds | Minutes | Hours | Days |
| 100000 | 1.14E+01 | 1.901E-01 | 3.168E-03 | 1.320E-04 |
| 1000000 | 1.03E+03 | 1.709E+01 | 2.849E-01 | 1.187E-02 |
| 10000000 | 1.09E+05 | 1.810E+03 | 3.017E+01 | 1.257E+00 |
| 100000000 | 1.05E+07 | 1.750E+05 | 2.916E+03 | 1.215E+02 |
| 1000000000 | 1.04E+09 | 1.730E+07 | 2.884E+05 | 1.202E+04 |
| Selection Sort Prediction | | | | |
| N | Seconds | Minutes | Hours | Days |
| 100000 | 2.96E-01 | 4.933E-03 | 8.221E-05 | 3.426E-06 |
| 1000000 | 1.55E+01 | 2.578E-01 | 4.297E-03 | 1.790E-04 |
| 10000000 | 8.56E+02 | 1.427E+01 | 2.378E-01 | 9.909E-03 |
| 100000000 | 4.48E+04 | 7.461E+02 | 1.243E+01 | 5.181E-01 |
| 1000000000 | 2.30E+06 | 3.832E+04 | 6.387E+02 | 2.661E+01 |