DSA Practical 1 Activity 4

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\*note: 3 repeats done for every data point

Bubble Sort:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Ascending | Descending | Random |
| 10 | 0.0000152499997057020 | 0.00023829999827285064 | 0.0008337999997820589 |
| 100 | 0.0000472500005344045 | 0.006156199998258671 | 0.00994635000006383 |
| 1000 | 0.0003906500005541602 | 0.5590352499993969 | 0.39548629999990226 |
| 10000 | 0.004001250000328582 | 54.73759654999958 | 32.740063200001714 |

Chart

Description automatically generated

Chart, scatter chart

Description automatically generated

Chart, scatter chart

Description automatically generated

## Selection Sort:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Ascending | Descending | Random |
| 10 | 0.00003859999924316071 | 0.00018619999991642544 | 0.0008642500006317277 |
| 100 | 0.0009543500000290805 | 0.0015027000008558389 | 0.007748150000224996 |
| 1000 | 0.09116935000020021 | 0.09506745000089722 | 0.16072125000027881 |
| 10000 | 9.111874049999642 | 9.141679649999787 | 9.574428050000279 |

A picture containing table

Description automatically generated

A picture containing application

Description automatically generated

Chart, scatter chart

Description automatically generated

Insertion Sort:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Ascending | Descending | Random |
| 10 | 0.000016349999896192458 | 0.00020959999892511405 | 0.0008330999999088817 |
| 100 | 0.000050600000577105675 | 0.005494099999850732 | 0.009409900000719063 |
| 1000 | 0.0004347500007497729 | 0.5781268999999156 | 0.36291759999949136 |
| 10000 | 0.0041988500006482354 | 54.989725700000236 | 28.66848459999892 |

Table

Description automatically generated with low confidence

Chart, scatter chart

Description automatically generated

Scatter chart

Description automatically generated with medium confidence

# Runtime Results:

For Insertion sort and bubble sort the ascending dataset time increased linearly with the number of data points, for them this is the best case scenario where the data is already sorted. The descending data is the worst case scenario so takes the longest while the random is average, so it is in between. For random and descending data, they take the form of n^2 as the number of data points increases, the times increase exponentially.

Selection sort is different from the other two, at n = 10000 data points, there is little difference in time to complete between all three data sets. For each one, as n increases, the time increases n^2.

Comparing n = 10000 size datasets, the selection sort is most efficient for both descending and random data sets but for ascending bubble and insertion are about as fast as each other.