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Lab 1 Report

Summary Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Bubble | Insertion | Merge | Size |
| Random | 1.07E-06 | 5.72E-07 | 1.52E-06 | 10 |
| Reversed | 9.48E-07 | 5.68E-07 | 1.02E-06 | 10 |
| Unique | 7.29E-07 | 3.04E-07 | 8.91E-07 | 10 |
| Partial Sort | 5.95E-07 | 1.73E-07 | 9.47E-07 | 10 |
| Random | 7.76E-03 | 1.57E-03 | 1.72E-04 | 1000 |
| Reversed | 7.50E-03 | 3.19E-03 | 1.04E-04 | 1000 |
| Unique | 7.19E-03 | 1.52E-03 | 1.54E-04 | 1000 |
| Partial Sort | 4.97E-03 | 6.50E-04 | 1.30E-04 | 1000 |
| Random | 7.45E-01 | 1.66E-01 | 1.97E-03 | 10000 |
| Reversed | 6.86E-01 | 3.15E-01 | 1.96E-03 | 10000 |
| Unique | 6.87E-01 | 1.56E-01 | 2.15E-03 | 10000 |
| Partial Sort | 4.60E-01 | 6.04E-02 | 1.84E-03 | 10000 |
| Random | 6.45E+01 | 1.58E+01 | 2.55E-02 | 100000 |
| Reversed | 6.16E+01 | 3.14E+01 | 1.59E-02 | 100000 |
| Unique | 6.46E+01 | 1.57E+01 | 2.74E-02 | 100000 |
| Partial Sort | 4.34E+01 | 6.07E+00 | 2.14E-02 | 100000 |

Individual Dataset Performance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Bubble | Insertion | Merge | Size |
| Random | 1.07E-06 | 5.72E-07 | 1.52E-06 | 10 |
| Random | 7.76E-03 | 1.57E-03 | 1.72E-04 | 1k |
| Random | 7.45E-01 | 1.66E-01 | 1.97E-03 | 10k |
| Random | 6.45E+01 | 1.58E+01 | 2.55E-02 | 100k |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Bubble | Insertion | Merge | Size |
| Reversed | 9.48E-07 | 5.68E-07 | 1.02E-06 | 10 |
| Reversed | 7.50E-03 | 3.19E-03 | 1.04E-04 | 1k |
| Reversed | 6.86E-01 | 3.15E-01 | 1.96E-03 | 10k |
| Reversed | 6.16E+01 | 3.14E+01 | 1.59E-02 | 100k |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Bubble | Insertion | Merge | Size |
| Partially Unique | 7.29E-07 | 3.04E-07 | 8.91E-07 | 10 |
| Partially Unique | 7.19E-03 | 1.52E-03 | 1.54E-04 | 1k |
| Partially Unique | 6.87E-01 | 1.56E-01 | 2.15E-03 | 10k |
| Partially Unique | 6.46E+01 | 1.57E+01 | 2.74E-02 | 100k |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Bubble | Insertion | Merge | Size |
| Partially Sorted | 5.95E-07 | 1.73E-07 | 9.47E-07 | 10 |
| Partially Sorted | 4.97E-03 | 6.50E-04 | 1.30E-04 | 1k |
| Partially Sorted | 4.60E-01 | 6.04E-02 | 1.84E-03 | 10k |
| Partially Sorted | 4.34E+01 | 6.07E+00 | 2.14E-02 | 100k |

Conclusion

There is a clear trend between all of the datasets, ranking Bubble Sort as the worst performer, Merge Sort as the best performer, and Insertion in between. Bubble sort resolves the problem fairly quickly for datasets 10 through 10,000, but in every case has a very steep increase in the amount of time to sort between the 10,000 dataset and the 100,000 dataset. Insertion Sort and Merge Sort also perform very well for the datasets that are less than or equal to 10,000, but Merge Sort never gets above 1 second while on the 100,000 dataset Insertion Sort ranges from 6 seconds to almost 31 seconds depending on the dataset. Insertion sort appears to be the most effected by the type of dataset. While the random dataset was the worst performer for Bubble Sort, the Reversed dataset was the worst performer for Insertion and the second worst performer for Bubble Sort. Merge sort had fairly uniform times across all datasets.