Corey Anderson
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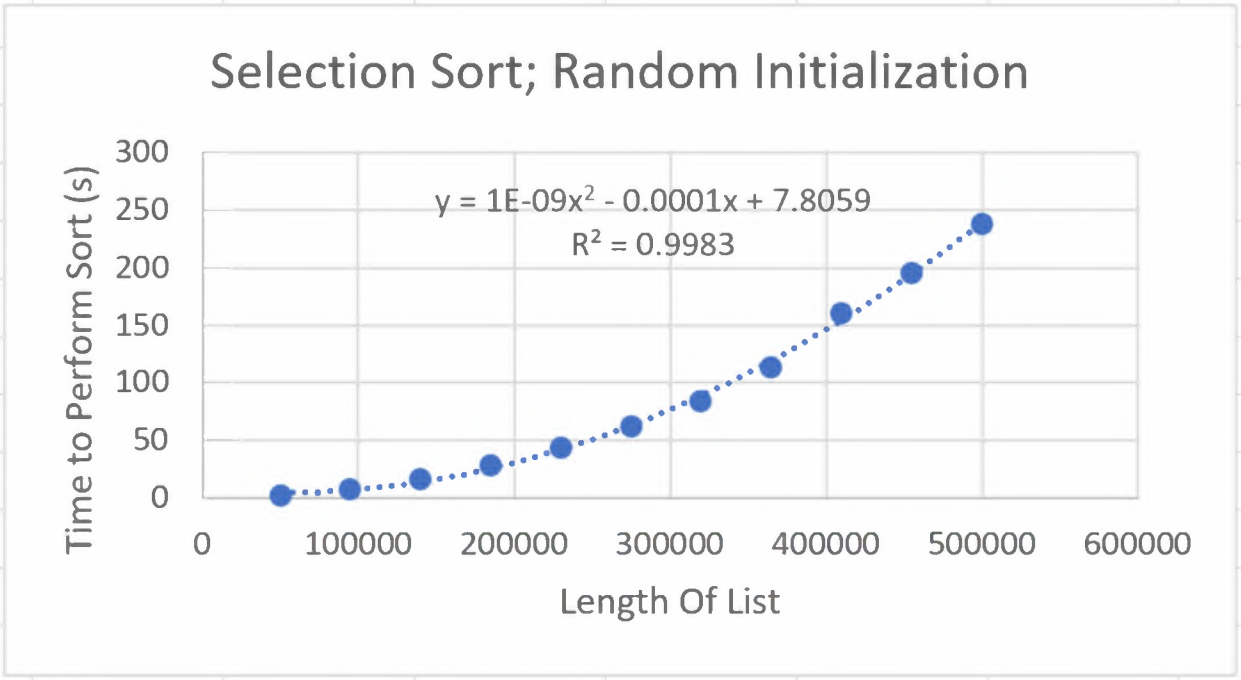
Lab 09

# Selection Sort – Random Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9983.
- Prediction for the time required for Selection Sort to sort a randomly initialized list of length 10,000,000: y(10000000)=101007.8059 seconds or 28.05



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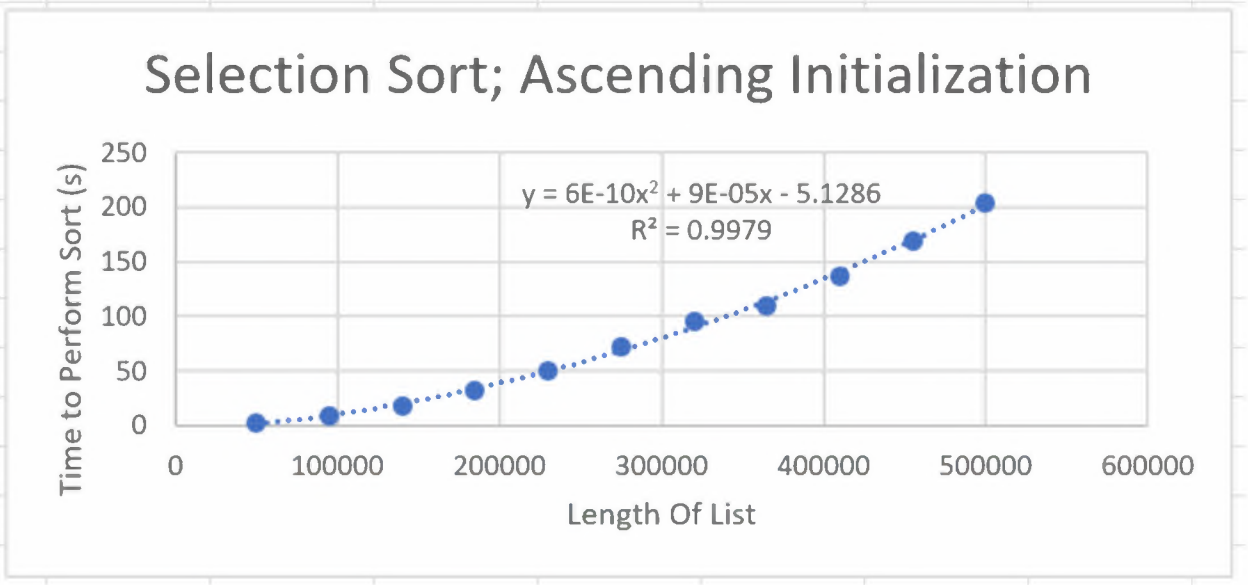
# Selection Sort – Ascending Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9979.
- Prediction for the time required for Selection Sort to sort an ascending (pre-sorted) list of length 10,000,000: y(10000000)=59994.8715 seconds or 16.67 hours



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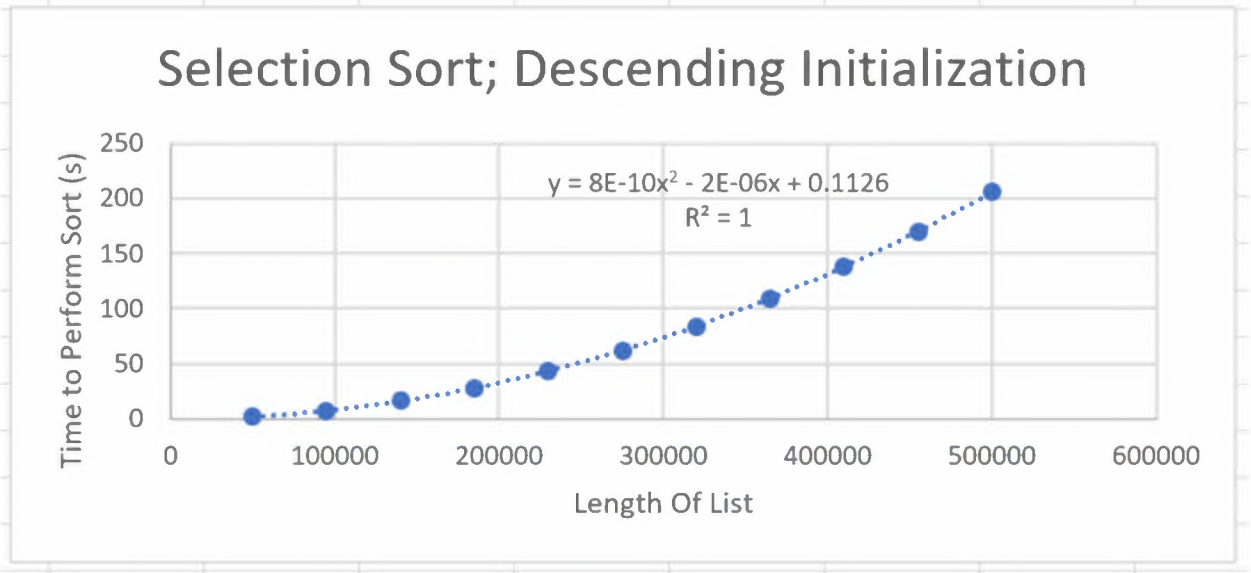
# Selection Sort – Descending Initialization

- The 11 data points indicate $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9999.
- Prediction for the time required for Selection Sort to sort a descending (reverse sorted) list of length 10,000,000: y(10000000)=79940.1126 seconds or 22.21 hours



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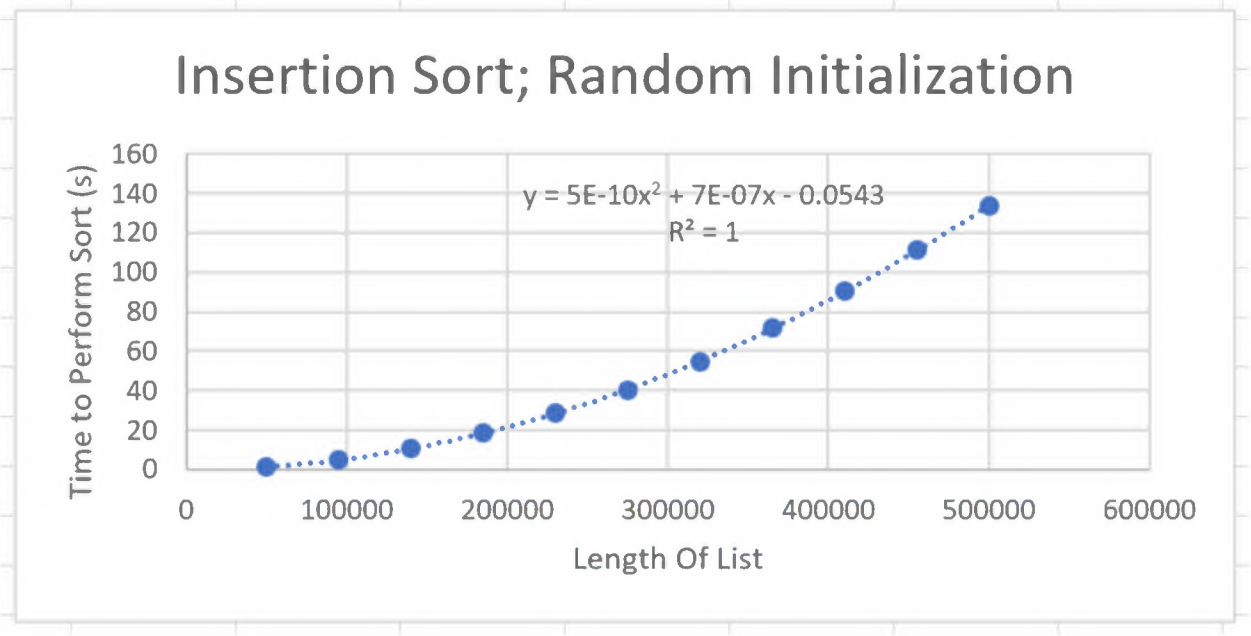
# Insertion Sort – Random Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9999.
- Prediction for the time required for Insertion Sort to sort a randomly initialized list of length 10,000,000: y(10000000)=50006.9457 seconds or 13.89 hours



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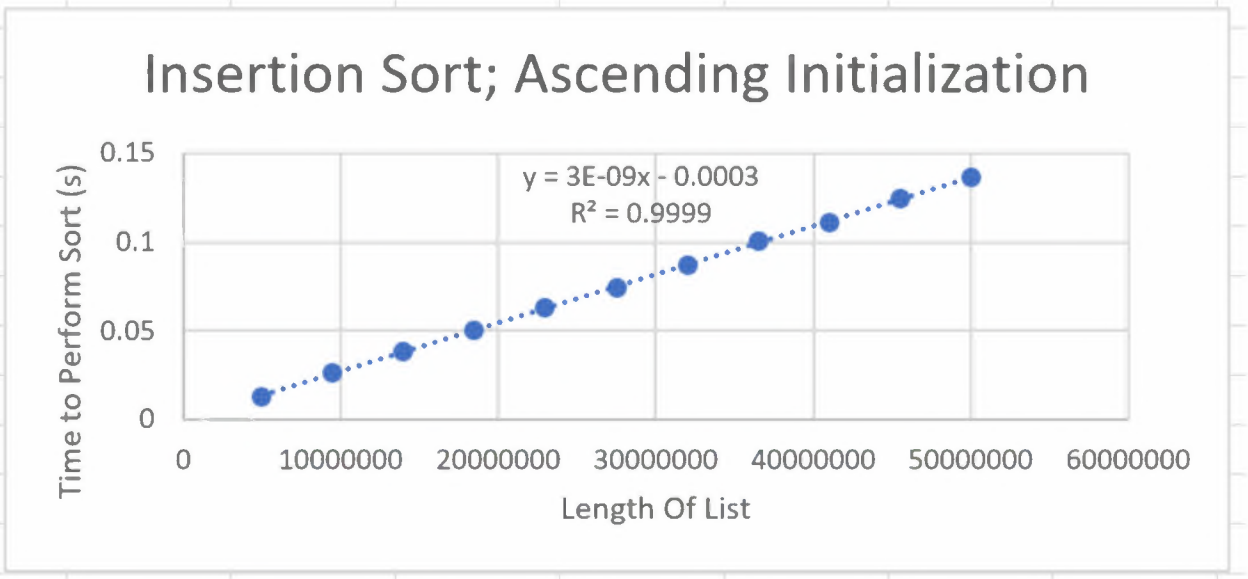
# Insertion Sort – Ascending Initialization

- The 11 data points indicate an linear relationship O(n) between list length and sorting time. The linear trendline fits the data with an $R^2$ value of .9999.
- Prediction for the time required for Insertion Sort to sort an ascending (pre-sorted) list of length 10,000,000,000: y(10000000000)=29.9997 seconds



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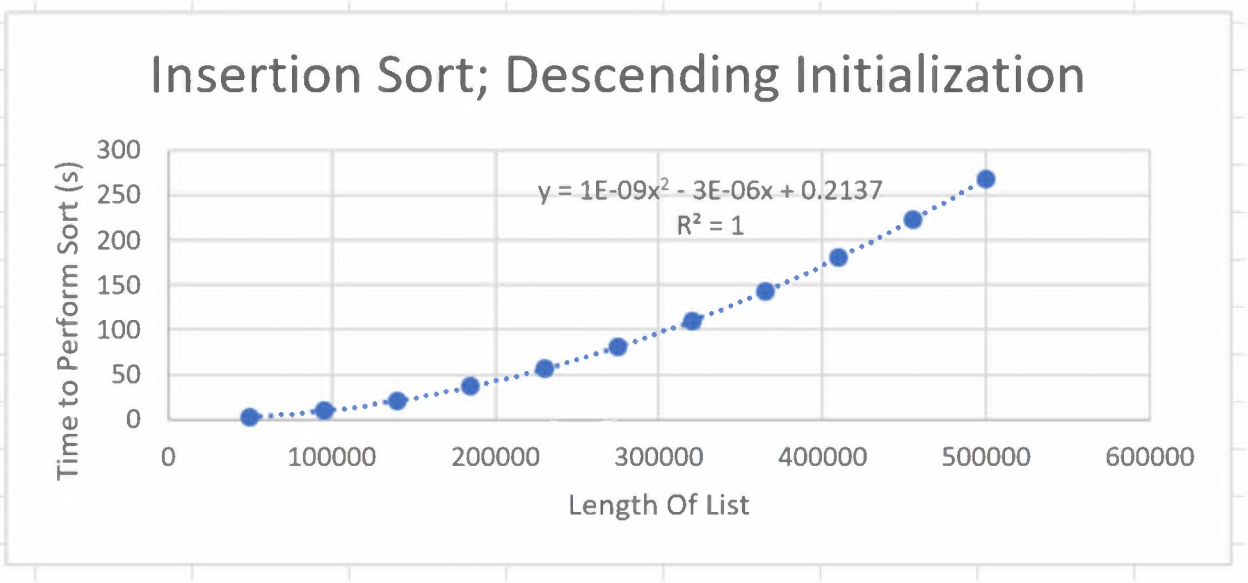
# Insertion Sort – Descending Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9999.
- Prediction for the time required for Insertion Sort to sort a descending (reverse sorted) list of length 10,000,000: y(10000000)=99970.2137 seconds or 27.77 hours



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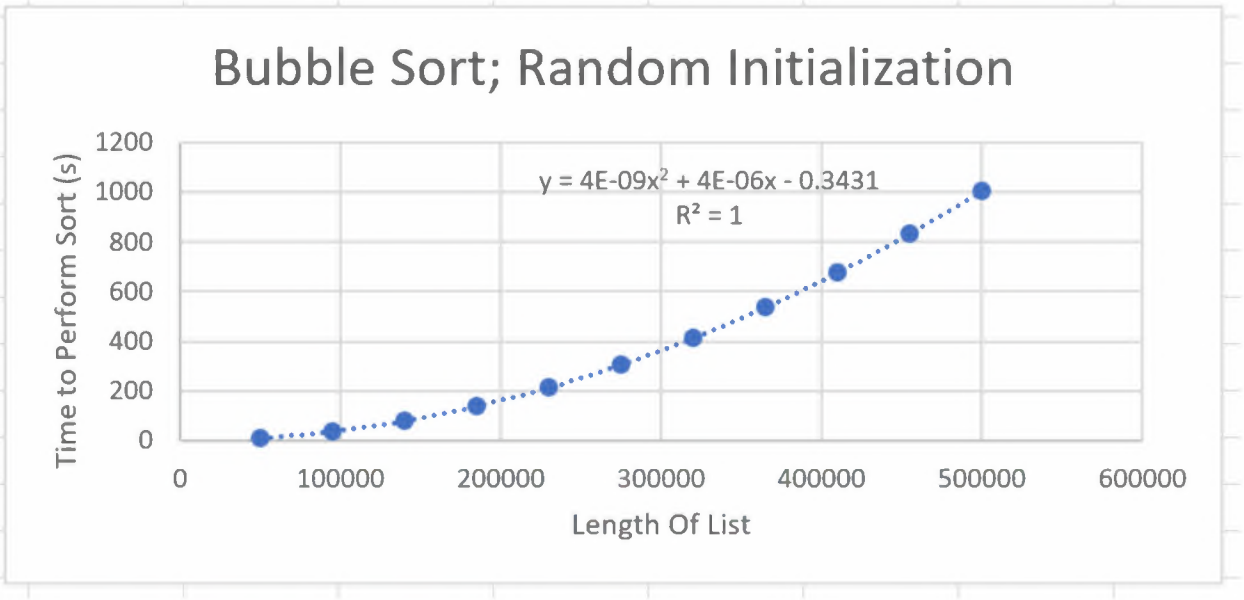
# Bubble Sort – Random Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9999.
- Prediction for the time required for Insertion Sort to sort a randomly initialized list of length 10,000,000: y(10000000)=99970.2137 seconds or 27.77 hours



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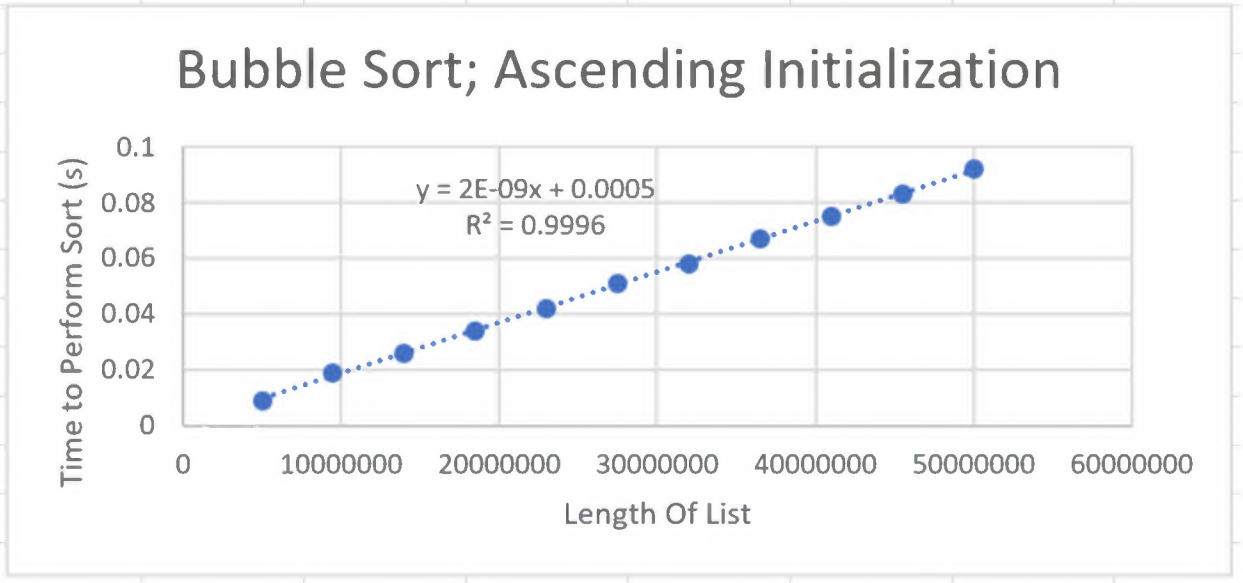
# Bubble Sort – Ascending Initialization

- The 11 data points indicate an O(n) relationship between list length and sorting time. The linear trendline fits the data with an $R^2$ value of .9996.
- Prediction for the time required for Insertion Sort to sort an ascending (pre-sorted) list of length 10,000,000,000: y(10000000000)=20.0005 seconds



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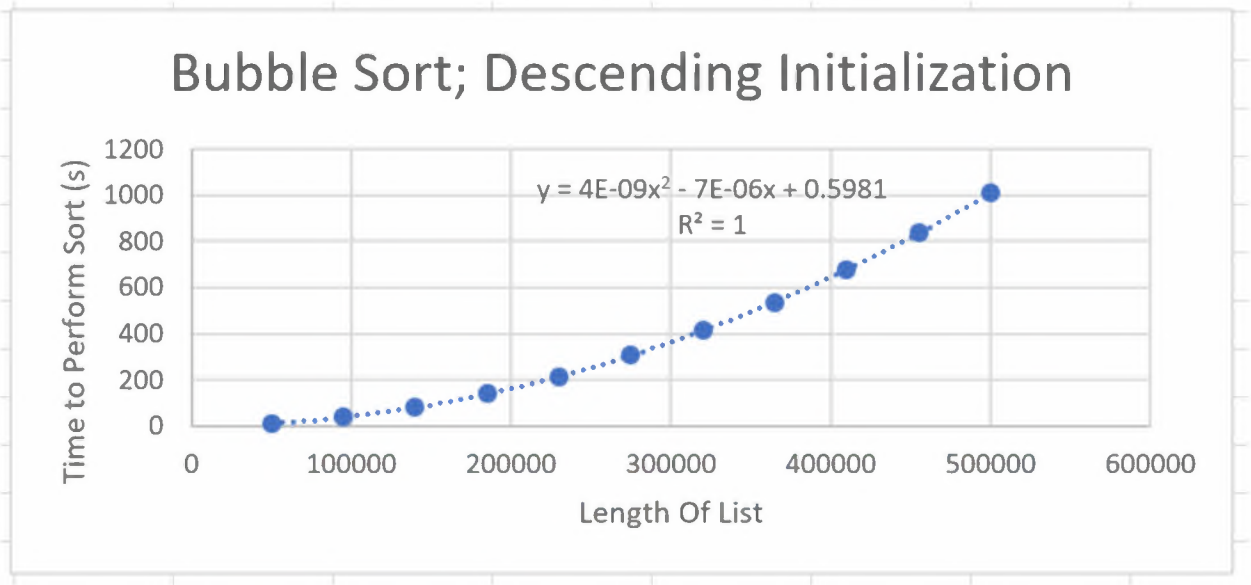
# Bubble Sort – Descending Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The quadratic trendline fits the data with an $R^2$ value of .9999.
- Prediction for the time required for Bubble Sort to sort a descending (reverse sorted) list of length 10,000,000: y(10000000)=399930.5981 seconds or 111.09 hours



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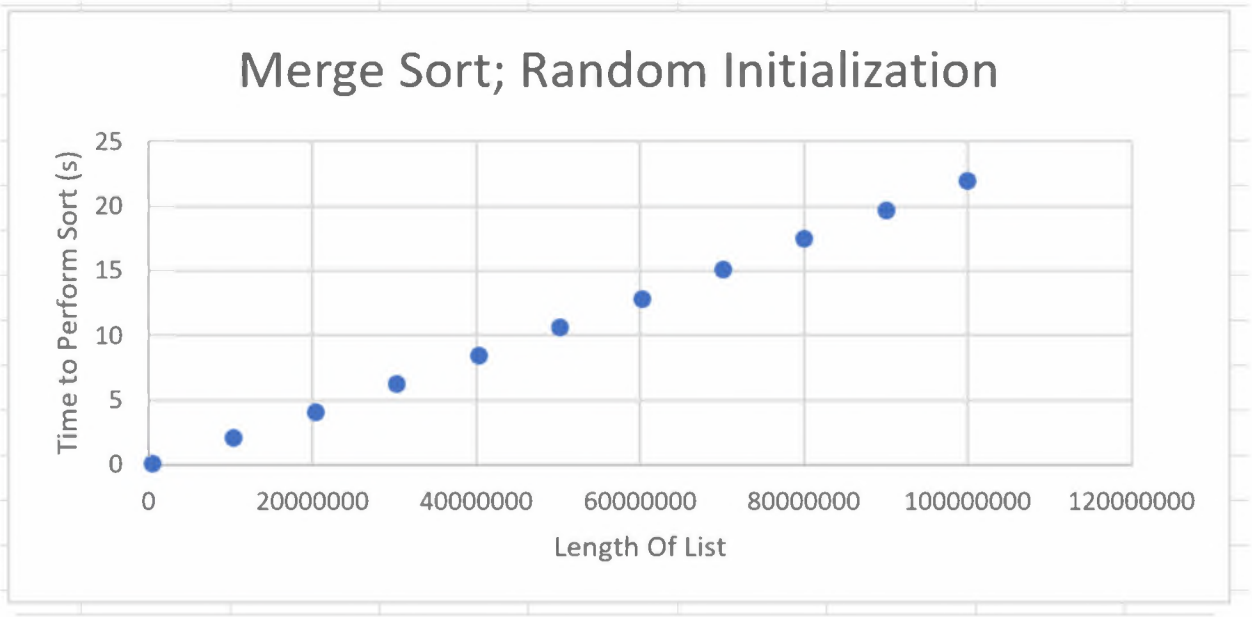
# Merge Sort – Random Initialization

- The 11 data points indicate an $O(n \log_2 n)$ relationship between list length and sorting time. The relation can be modeled by $n*\log_2(n)/120667964.798$.
- Prediction for the time required for Merge Sort to sort a randomly initialized list of length 10,000,000,000,000: y(100000000000)=2752.95 seconds or 45.88 minutes



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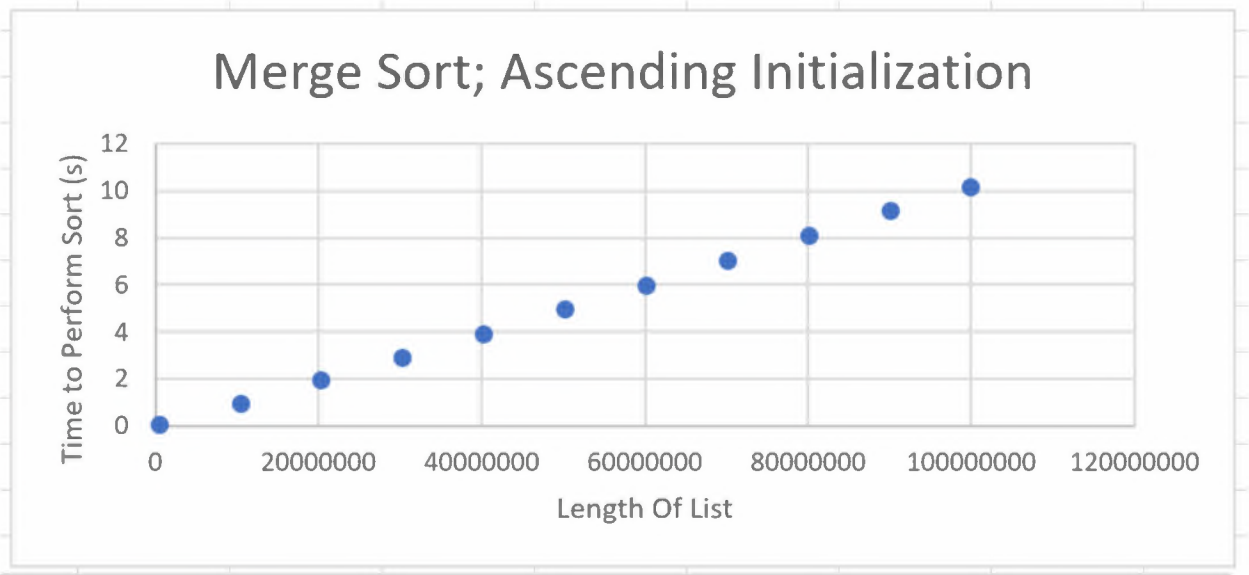
# Merge Sort – Ascending Initialization

- The 11 data points indicate an $O(n \log_2 n)$ relationship between list length and sorting time. The relation between length of list and time can be modeled by $n*\log_2(n)/259558503.407$.
- Prediction for the time required for Merge Sort to sort an ascending (pre-sorted) list of length 10,000,000,000: y(10000000000)=1279.84 seconds or 21.33 minutes



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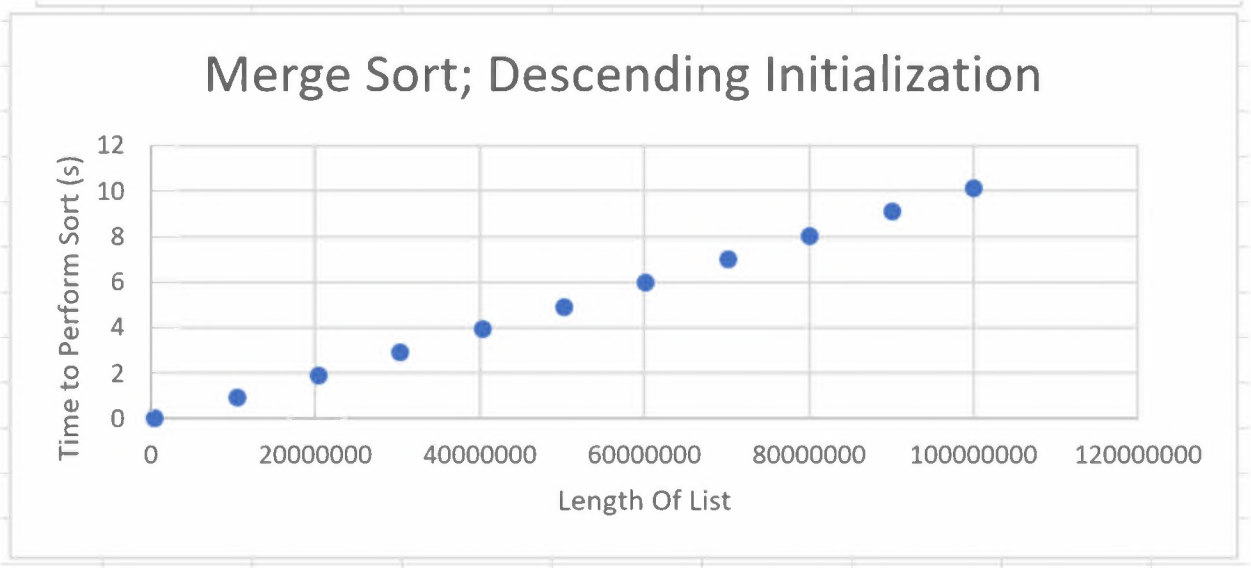
# Merge Sort – Descending Initialization

- The 11 data points indicate an $O(n \log_2 n)$ relationship between list length and sorting time. The relation between length of list and time can be modeled by $n*\log_2(n)/472462081.921$.
- Prediction for the time required for Merge Sort to sort a descending (reverse sorted) list of length 10,000,000,000: y(10000000000)=703.110 seconds or 11.72 minutes



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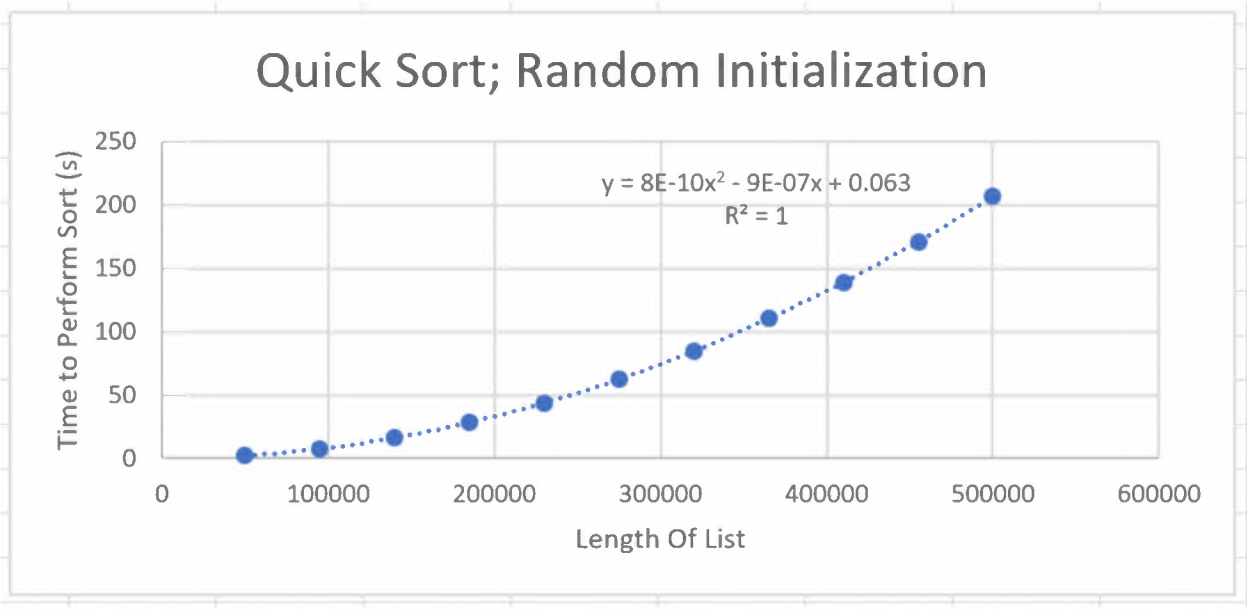
# Quick Sort – Random Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The relation between length of list and time can be modeled by $.000000000828*n^2-.0000009*n+.063$
- Prediction for the time required for Merge Sort to sort a randomly initialized list of length 10,000,000: y(10000000)=82791.063 seconds or 23.00 hours



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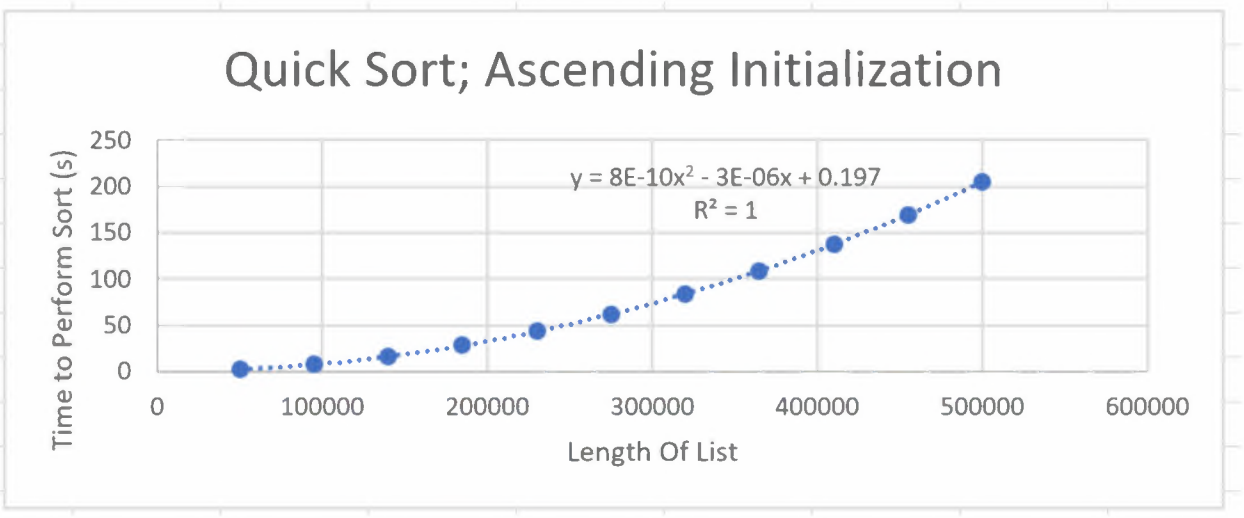
# Quick Sort – Ascending Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The relation between length of list and time can be modeled by $.000000000823*n^2-.000003*n+.197$
- Prediction for the time required for Merge Sort to sort an ascending (pre-sorted) list of length 10,000,000: y(10000000)=82270.197 seconds or 22.85 hours



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# Quick Sort – Descending Initialization

- The 11 data points indicate an $O(n^2)$ relationship between list length and sorting time. The relation between length of list and time can be modeled by $.00000000083*n^2-.000003*n+.1894$
- Prediction for the time required for Merge Sort to sort descending (reverse sorted) list of length 10,000,000: y(10000000)=82970.1894 seconds or 23.05 hours