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PA4 - Bucketsort

4/12/2017

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Sequential

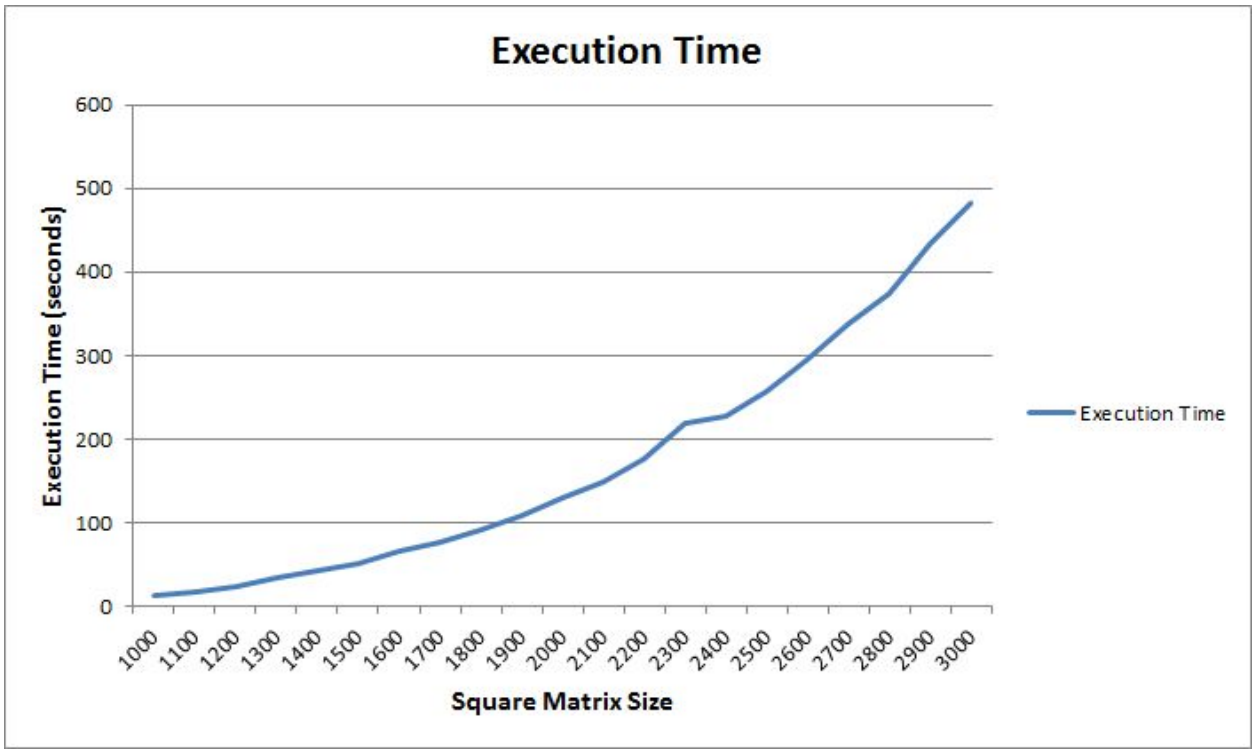
Sequential Implementation

This implementation of matrix multiplication is very simple. It randomly generates numbers to fill two square matrices, then multiplies them together. The matrix multiplication portion of the code is three nested for loops. The outside goes through the rows of the result, the second goes through the columns of the result, and the final goes through the rows and columns of the left and right matrices respectively. It then has the option to print out all three matrices to be sure that everything is executing appropriately.

Sequential Analysis

Matrix multiplication with this algorithm is an $O(N^3)$ algorithm due to the nested for loops. This means that the time required to calculate the matrices grows very quickly. With 1000x1000 matrices, the execution time is 12.434 seconds. At 2700x2700 the program passes the 5 minute execution mark and continues to grow from there. The numbers that are used are too small to show the $O(N^3)$ graph, but it is consistent with what an $O(N^3)$ graph looks like in its early stages.

Sequential Graph and Table



Square Matrix Size	Execution Time	Square Matrix Size	Execution Time
1000	12.434	2000	130.444
1100	17.7073	2100	148.932
1200	24.1395	2200	176.078
1300	33.8468	2300	218.29
1400	42.2615	2400	227.498
1500	52.0867	2500	257.164
1600	65.2436	2600	296.043
1700	76.8786	2700	337.27
1800	92.5956	2800	374.922
1900	108.398	2900	432.798