Loop Tiling

The entries in both dense matrices are random numbers between 1 and 9 with the following restrictions which provide a symmetric, positive definite matrix.

1. The off-diagonal entries are negative and symmetric.

2. The diagonal entries are the absolute value of the row sums.

The codes were written to calculate Matrix-Matrix multiplication using a) traditional 3 loop implementation, b) 6 loop implementation, and c) 6 loop implementation and OpenMP. For the 6 loop variant, it is required to determine a range for the block size (s) that is dependent on the size of the CPU's L1 cache. The time of best performance for each implementation was written in Table 1 and scaling profile was demonstrated in Figure 1.

Table 1. The results of three different methods for Matrix-matric multiplication

Matrix size	1000	2000	4000
Traditional 3 loop	4.3 s	73.1 s	564.8 s
Block Size with 6 loop	3.7 s	30.5 s	239.8 s
Block Size with 6 loop and OpenMP	0.8 s	8.1 s	50.4 s

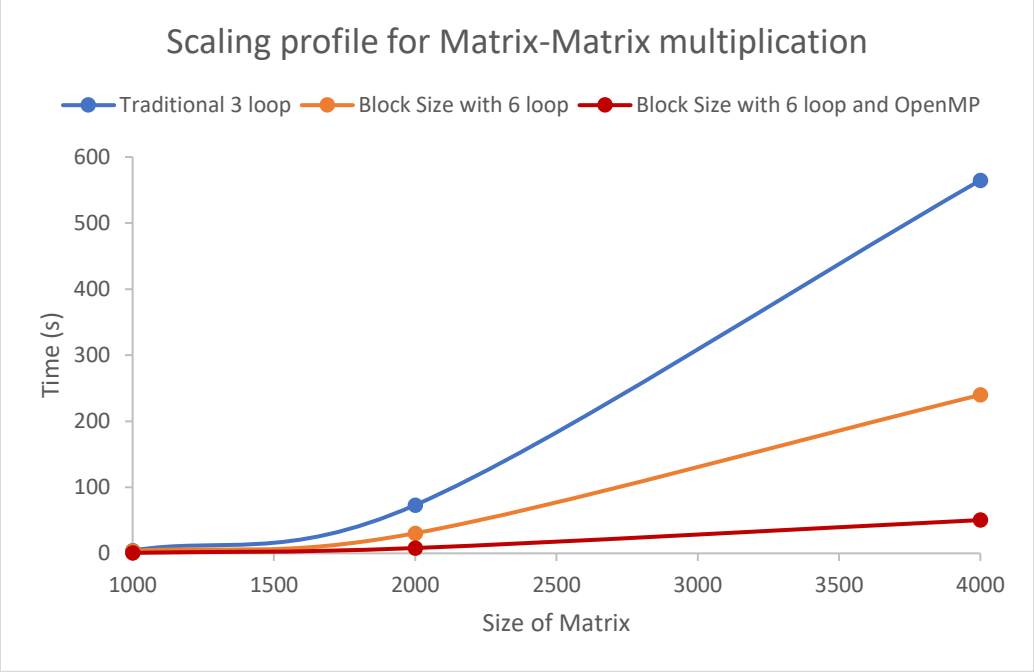

Fig 1. Scaling profile of matrix-matrix multiplication