

Hello Interviewers,

Thank you for the opportunity ! My C++ Project was created using x64MinGW32 compiler and CMAKE build system. The editor I used was Visual Studio Code. The testing framework was Googletest. I haven't used many clean code guidelines or C++ best practices in order to finish the tasks in available time.

## Matrix Multiplication

Version	Implementation Description	Running Time(s)	Relative speedup
1	Basic nested for loops (n=4096)	2039	1.00
2	Using Transpose of Matrix B. It saves on Cache-line loading time	1153	1.768
3	Blocks of matrix multiplication method. The idea is to make optimum use of L2 Cache. In addition to matrix transpose	1174	1.736
4	Multithreading with 4 threads. In addition to Transpose method	322	6.33
	Not Implemented: due to lack of time I could not implement the optimizations based on AVX2/FMA. CUDA multi-threading was also in plan		

1) n=4096

## Binomial Coefficient

Version	Implementation Description	Optimization
1	Basic for loops	$O(n*k)$
2	Optimization by eliminating common numerators and denominators and using $C(n,k)=C(n,n-k)$	$O(k)$
	Optimization strategy for fixed range of input: Creating a look-up table based on Pascals Triangle and Formula $(n, k) = (n - 1, k - 1) + (n - 1, k)$	

## Console Spreadsheet

I have used UTF8 textfiles as input and Console as output. For testing I have compared the strings contained in output streams. Unfortunately I have no time left for bonus features.