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 denominatorsand 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.