Parallel Algorithms HW 2

Cache effects are extremely important for large linear algebra. We want to get some experience with these effects.

1. Implement $M_{i,j} = \sum_k A_{i,k} B_{k,j}$ to compute $M = A.B$ for compatible matrices $A \in \mathbb{R}^{n \times m}$ and $B \in \mathbb{R}^{m \times p}$ in C. Your code will have three loops. Pick a reasonably large problem and compare the time it takes to compute in all possible loop orders i.e. $\{i, j, k\}$, $\{j, i, k\}$, $\{k, i, j\}$, $\{k, j, i\}$, $\{i, k, j\}$, and $\{j, k, i\}$. Explain the effects if you can.

2. Use a BLAS library to compute the matrix vector product. Compare the timing to the best loop order of your home-made code on a

3. Create an interesting plot of the times for your code as a function of two of the size parameters.