- The slides that were/will be used in week 36-38 can be found via the Blackboard System. We will cover / covered "Single Processor Machines: Memory Hierarchies and Processor Features" with the "Case Study: Tuning Matrix Multiply". The slides are the main source of information and should be sufficient for understanding. However, many articles are cited on the slides in case you want to get more information.
- Chapters 2 and 3 of the book "Dongarra, J., et al. 2002. The Sourcebook of Parallel Computing, Morgan Kaufmann." has been uploaded in the Blackboard system as additional reading material.
- Note again, that the first mandatory assignment is already online. The deadline will be fixed during week 37 (expect early October).
- In week 37 we will probably also start with "Introduction to Parallel Machines and Programming Models". The slides will be available very soon.

Exercise (discussed in classed if wished)

In the lectures in week 37 we discussed two different approaches for matrix-matrix multiplication, namely the naive approach and the blocked matrix-matrix multiplication. For both of them we determined the computational intensity. The goal of this exercise is to investigate a striped version of matrix-matrix multiplication. Suppose for the product $A = B \times C$ the matrices A, B, and C (each matrix has size $n \times n$) are striped in N stripes, i.e. matrices A and C are divided in N blocks of size $n/N \times n$, and matrix B is divided in stripes of size $n \times n/N$. Let $b = n/N$ denote the block size.

$$\begin{pmatrix} C_1 \\ \hline C_2 \\ \hline \dots \\ \hline C_N \end{pmatrix} = \begin{pmatrix} A_1 \\ \hline A_2 \\ \hline \dots \\ \hline A_N \end{pmatrix} \cdot \left(\begin{array}{c|c|c|c} B_1 & B_2 & \dots & B_N \\ & & & \end{array}\right)$$

a) Write the pseudo code for this algorithm.

b) Determine the number of slow memory accesses (suppose that three blocks of size $n \times b$ fit into fast memory).

c) What is the number of arithmetic operations?

d) Determine the computational intensity.

e) Compare this computational intensity with the computational intensity of the blocked version presented in the lecture.