

High-Performance Matrix Computations Homework #2

Prof. **Paolo Bientinesi**

`pauldj@aices.rwth-aachen.de`

Due: Saturday, June 20th, 23.59pm



Step 1: Installation

- Download ELAPS
<http://github.com/elmar-peise/ELAPS>
- Setup and compile one or more Samplers
Use at least one optimized BLAS: MKL, OpenBLAS, BLIS, Accelerate, (ATLAS)
- Describe the hardware and software setup of the Samplers
- Test GEMM's performance with the Sampler:
matrix size (< 4000) vs GFLOPS/s

Step 2: BLAS-3

- Choose one BLAS-3 operation (not GEMM).
- Use ELAPS to study the efficiency of the operation
- Vary the problem size ($20 \leq m, n \leq 1000s$)
- Test all different datatypes
- Consider a sequence of operations, in which one the input matrices is fixed, and the others vary. Compare multithreading vs. parallel region.

Step 3: Cholesky

- Implement the three blocked variants (slide 6, 12/05) in ELAPS
fix the blocksize to 32.
- Compare them for different matrix sizes
- For $n = 2500$, pick the fastest variant and optimize the blocksize
- Use that blocksize for all three variants ($n = 2500$);
analyze scalability varying the number of threads
- Identify & study bottlenecks

Rules and Submission

- Format: pdf, webpage, ...
- Turn in **all** your code and data (code, makefiles, input/output/data files, reports, plots, ...) and reference what is used/produced where and how.
- Submission by email to `pauldj@aices.rwth-aachen.de`
- Email's subject: "HPMC-15 HW2 your_last_name"
- **Deadline: Saturday, June 20th, 23.59pm**