



Institut of Numerical Mathematics

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3 November 2017
Quiz 2

High Performance Computing I (WS 2016/2017)

Deadline: 10 November 2017, 2pm

Notice:

Please register yourself in SLC for HPC I. The registration will allow you to submit your answers to the following questions. Please type your responses in two simple text files named "quiz02.txt" and "quiz02.c". Submit these files to our server *thales* using the following command:

```
thales$ submit hpc quiz02 quiz02.txt quiz02.c
```

Question 1

In BLAS, the GEMV (general matrix-vector product) operation is defined as

$$y \leftarrow \alpha Ax + \beta y \quad \text{where} \quad \alpha, \beta \in \mathbb{F}, A \in \mathbb{F}^{m \times n}, x \in \mathbb{F}^n, \text{ and } y \in \mathbb{F}^m$$

where \mathbb{F} denotes a set of floating point numbers (e.g. single or double precision floating point numbers).

Write down the algorithm in *quiz02.txt* in mathematical terms for a simple cache optimization where it does not matter whether A is organized in column or row major.

Question 2

Implement the algorithm in *quiz02.c*. You are free to take the framework from the fourth lab session. But make sure that MAX_M and MAX_N are adapted such that your program does not run longer than five minutes.

Question 3

Please add the answers to the following questions to *quiz02.txt*:

- What is the difference between wall time and CPU time?

- What is the purpose of the *MIN_T* macro parameter in the benchmark program?
- Which matrix organization is favored by the *initMatrix* function in session04/gemv.c?