



Institut of Numerical Mathematics

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Quiz 8

High Performance Computing I (WS 2016/2017)

Deadline: 3 February 2017, 2pm

Notice:

Please type your responses in a simple text file named “quiz08.txt” and submit it on our server *thales* using the following command:

```
thales$ submit hpc quiz08 quiz08.txt
```

Question 1

Specify the MPI data type of a 2×3 matrix of **float** in col-major organization that is to be sent in row-major order as sequence of tuples $T = \{(et_1, o_1), (et_2, o_2), \dots, (et_n, o_n)\}$. Which value has extent(T)?

Question 2

Assume you have following matrices A and B :

```
GeMatrix<double> A(5, 7, StorageOrder::RowMajor);  
auto B = A(1, 1, 3, 3);
```

Is it possible to create the MPI data type for B for a transfer in row-major order using a single call of `MPI_Type_vector` (and one of `MPI_Type_commit`)? If yes, write down how `MPI_Type_vector` is to be called for B . Otherwise, explain why this is impossible.

Question 3

In the sample solution for the Jacobi solver with two-dimensional partitioning we have in `jacobi-2d.cpp` at line 151 following code:

```
copy(B1, B2); /* actually just the border needs to be copied */
```

where B_1 and B_2 represent the block matrices that are used to perform an Jacobi iteration from B_1 to B_2 or vice versa in one of the processes. What exactly needs to be copied here and why?