



Institut of Numerical Mathematics

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Quiz 9

## High Performance Computing I (WS 2016/2017)

Deadline: 17 February 2017, 2pm

### Notice:

This extra quiz is reserved for those who have currently less than 12 points.

Please type your responses in a simple text file named "quiz09.txt" and submit it on our server *thales* using the following command:

```
thales$ submit hpc quiz09 quiz09.txt
```

### Question 1

Write some code segment for setting up a MPI communicator *comm* that organizes all nodes in a two-dimensional, non-periodic grid.

### Question 2

Extend the previous solution (or assume the required communicator *comm* already exists) such that each node also sets up a communicator *commRow* and *commCol*, connected to grid-nodes in the same row and column, respectively.

### Question 3

Assume the communicators *comm*, *commRow* and *commCol* described above exist. Extend the following code snippet

```
void  
testBroadcast(MPI_Comm comm, MPI_Comm commRow, MPI_Comm commCol,  
              int srcRow, int srcCol)  
{  
    // ... your code ...  
}
```

such that:

1. Each node first determines its position  $myRow$ ,  $myCol$  within the grid.
2. In case that  $myRow$  equals  $srcRow$ , a node sends the **double**-value  $42*srcRow$  to all nodes connected to  $commCol$ . Otherwise, a node receives a **double**-value from  $commCol$ .
3. In case that  $myCol$  equals  $srcCol$ , a node sends the **double**-value  $42+srcCol$  to all nodes connected to  $commRow$ . Otherwise, a node receives a **double**-value from  $commRow$ .