

## Serie 14

*Remark: Programs shall be executed on the cluster lcvmlc1!*

**Exercise 1** *The goal of this exercise is to use Scalapack for solving a linear system with a dense random matrix, partitioned into  $nb \times nb$  square blocks of order  $bl$ ; we define the Blacs grid with the same structure as the matrix partition, that is a  $nb \times nb$  grid of processes. For checking the solution, the right-hand-side is obtained by multiplying the vector with all components equal to 1 by the matrix. One computes the asymptotic number of Gflops, which stems from the number of floating point operations for the LU decomposition and is given by  $n^3/3$ , with  $n$  the matrix order.*

1. *Complete the code in the file `test_scal.c`, generate the executable with the `Makefile`.*
2. *Test the code interactively for  $nb = 2$ , first with  $bl = 4$ , and then  $bl = 64, 128, 256$ .*
3. *Proceed like in point 2., but with  $nb = 4$ .*
4. *Complete the script in the file `test.sub`, which will be submitted to the batch system Sun Grid Engine with the `qsub` command for executing the program as a batch job. Test with the last value of the parameters.*
5. *Run in batch the two cases:  $nb = 2, bl = 896$  and  $nb = 4, bl = 896$ .*
6. *Comment the performances in function of the matrix order and of the number of processors.*