The homework questions are due at the 23:59 on Saturday 22 October. Please turn in source codes, compilation, submission scripts used and also output files. Please cite any references you use.

1 BLAS and LAPACK

**Homework question 1**

a) What is BLAS?

b) What is LAPACK?

c) How were these packages initially programmed?

d) Why might you pay for a BLAS and Lapack implementation even though some are freely available?

e) Find a webpage and/or a paper which describes a parallel implementation of a BLAS or LAPACK routine and summarize what is done, in particular how is parallelizm implemented.

f) How are BLAS functions used in machine learning or some other application area that you find interesting?

2 Graph Blas

**Homework question 2**

a) What is Graph BLAS?

b) Write a serial program that uses the matrix approach to doing breadth first search and compare it’s speed to your serial program for two graphs of your choice.
3 Parallelization

Homework question 3
Use a shared memory parallelization library such as threads or openmp to make your breadth first search programs parallel. Measure speedup on rocket on upto 20 cores on one node. Is thread placement important? How do the pointer and matrix based approaches compare?

Homework question 4
Read and summarize the papers

References