Description

Last year open competition project for solving huge linear systems ($N > 10^6$ unknowns), winner was MKL PARDISO library. Example benchmark results for PARDISO, applied to Laplace equation on rectangular grid, are shown below. Processor used is Intel Xeon E5-1650 v2.

N x N	Time	Memory
512 x 512	0.9 s	
640 x 640	1.3 s	
800 x 800	2.1 s	0.5 GB
1024 x 1024	3.8 s	
1200 x 1200	4.9 s	1 GB
1600 x 1600	9.5 s	1.75 GB
2048 x 2048	17.7 s	3.5 GB
4096 x 4096	88 s	16 GB

Above timings are still unbeaten. Untested approach, possibly faster, is to use GPU cards. For example, MAGMA https://icl.utk.edu/magma/ library can be used, but any approach using GPU's is acceptable.

Main goal of the project is to evaluate efficiency of graphic cards as linear solver for linear equations resulting from elliptic boundary problems, and compare it with PARDISO.