

## LU Factorization on Shared Memory System

Much progress have been made in order to speed up the LU factorization [1, 2] on a shared memory system. PLASMA project has been actively optimizing this routine on heterogeneous machines with tile data layout.

The difficulty of implementing LU when compared with, for example Cholesky factorization is that in order to maintain numerical stability, partial pivoting needs to be performed but that incurs a lot of data movement overhead. Also the panel factorization poses as a major bottleneck as well [1].

For my final project work, I propose to replicate the OpenMP result obtained in [3]. Specifically, using OpenMP task framework to schedule subtasks of tile LU decomposition with partial pivoting. The goals are to get familiar with the tasking framework of OpenMP and to achieve as much of the machine performance as possible.

## References

- [1] Jack Dongarra, Mathieu Faverge, Hatem Ltaief and Piotr Luszczek. *Achieving Numerical Accuracy and High Performance using Recursive Tile LU Factorization*. LAPACK Working Note 259.
- [2] Jakub Kurzak, Piotr Luszczek, Mathieu Faverge and Jack Dongarra. *LU Factorization with Partial Pivoting for a Multi-CPU, Multi-GPU Shared Memory System*. LAPACK Working Note 266.
- [3] Asim YarKhan, Jakub Kurzak, Piotr Luszczek and Jack Dongarra. *Porting the PLASMA Numerical Library to the OpenMP Standard*. Int J Parallel Prog (2017) 45: 612. doi:10.1007/s10766-016-0441-6.