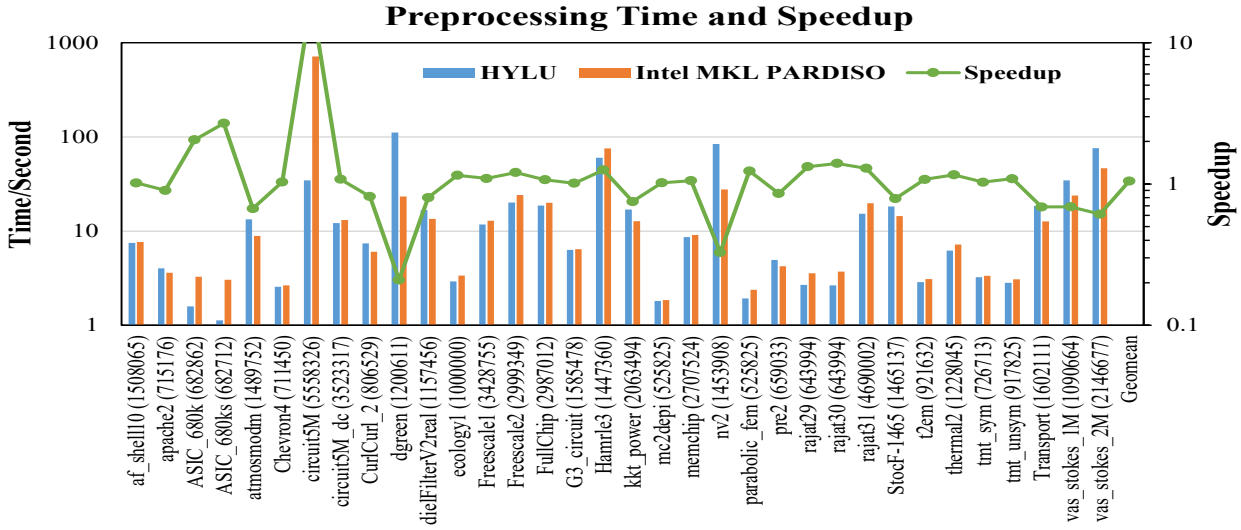
Test Results of HYLU and Performance Comparisons with Intel MKL PARDISO

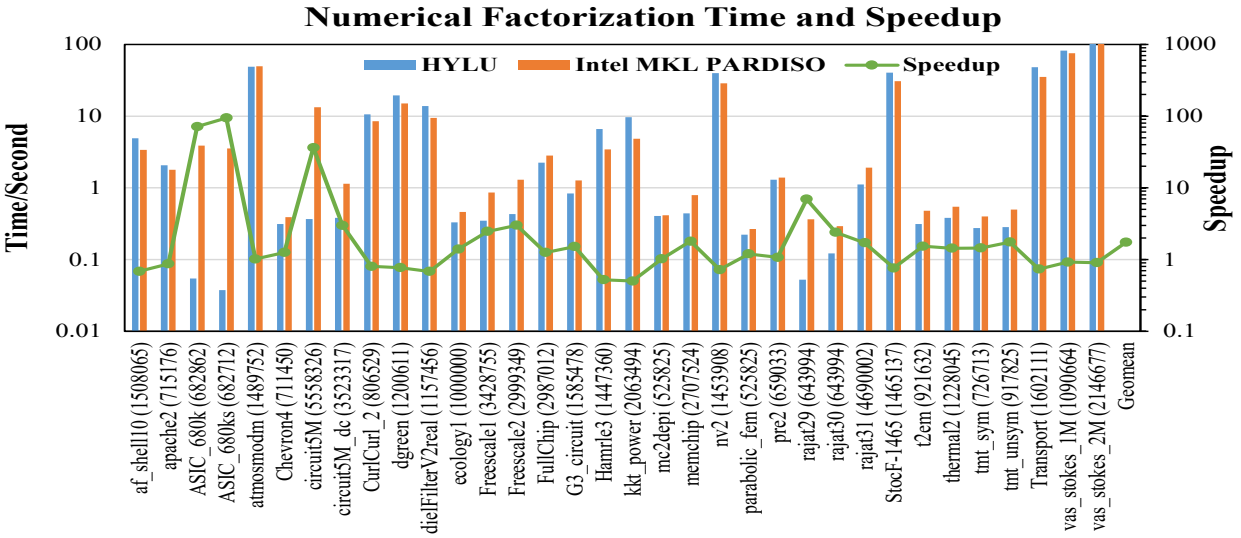
The experiments were carried out on a Linux server. The main hardware and software configurations are listed in the following table. All results presented in this document are wall-time measurements from **16-thread parallel execution**.

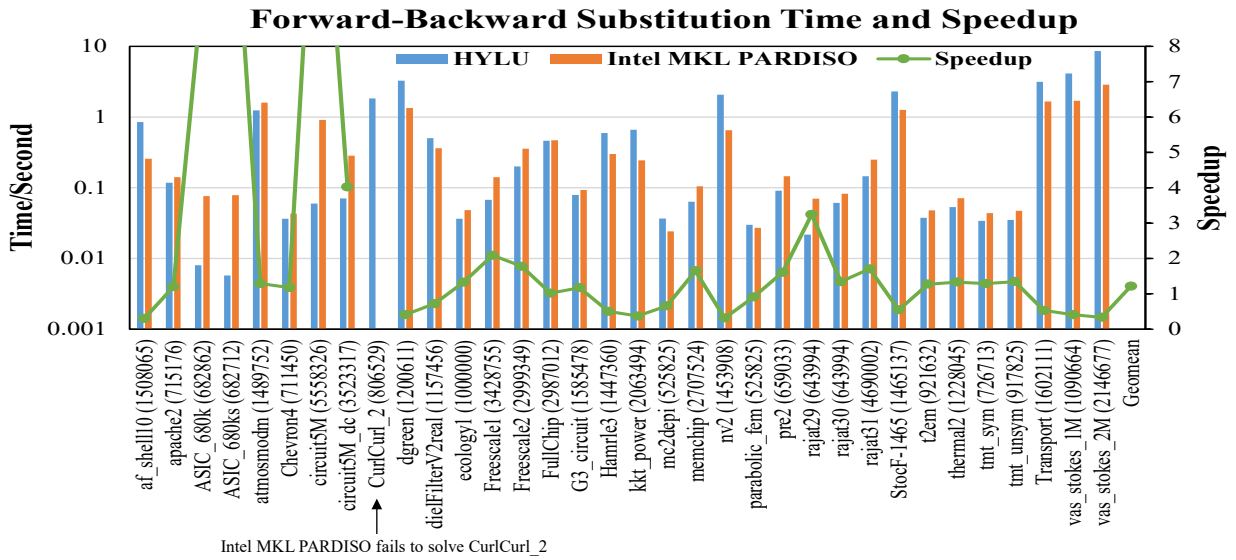
CPU	Intel Xeon Gold 6130 @ 2.1GHz
Memory	256GB
Operating system	Ubuntu 24.04 LTS for test/CentOS 7.9 for HYLU compilation
Compiler	gcc 13.3.0 for test code compilation/gcc 4.8.5 for HYLU compilation
MKL version	2025.0.1.16
Benchmarks	34 matrices from SuiteSparse Matrix Collection, dimensions from 525,825 to 5,558,326

1. One-Time Solve

On geometric mean, HYLU achieves a **1.74X speedup in numerical factorization** compared with Intel MKL PARDISO, while the preprocessing and forward-backward substitution performance are both similar (1.05X and 1.22X speedups, respectively).







2. Repeated Solve

HYLU offers an optimization option for repeated solve of linear systems with an identical sparse pattern in the coefficient matrix. In this case, HYLU achieves a **2.26X geometric mean speedup in numerical factorization** over Intel MKL PARDISO, while the forward-backward substitution performance is similar (1.00X speedup).