LBL Updates

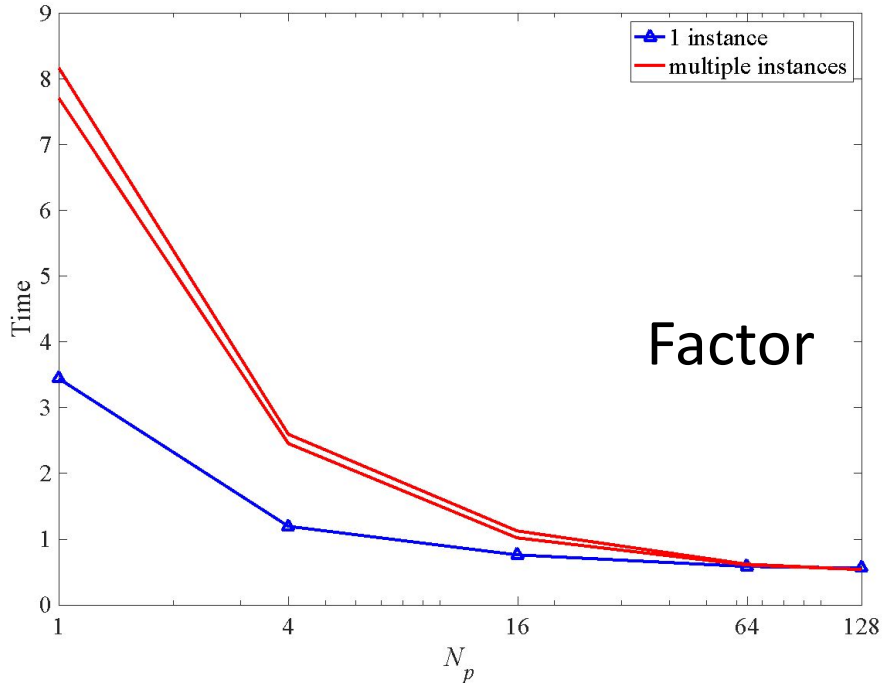
August, 2022

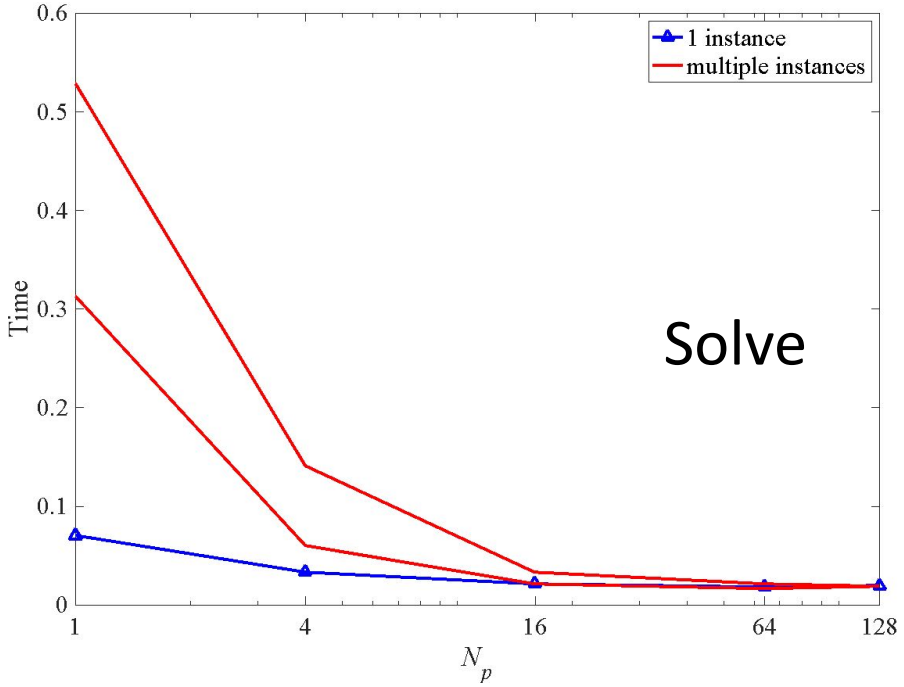
Topics

- Scaling Experiments on Perlmutter
- One-sided Communication for Solvers
- MG work
- Q&A

Scaling Experiments on Perlmutter

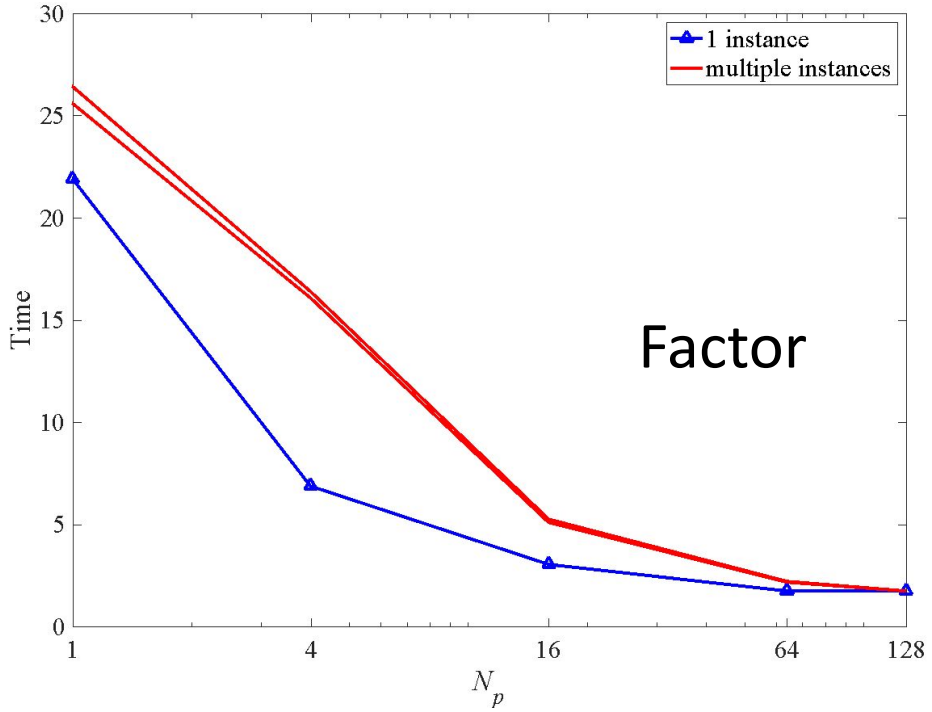
- Running concurrent matrix factorizations/solves to occupy all cores of a Perlmutter CPU nodes mimics the usage of SuperLU_DIST in M3DC1, which can handle multiple planes/matrices on one compute node.
- s1_mat_0_126936

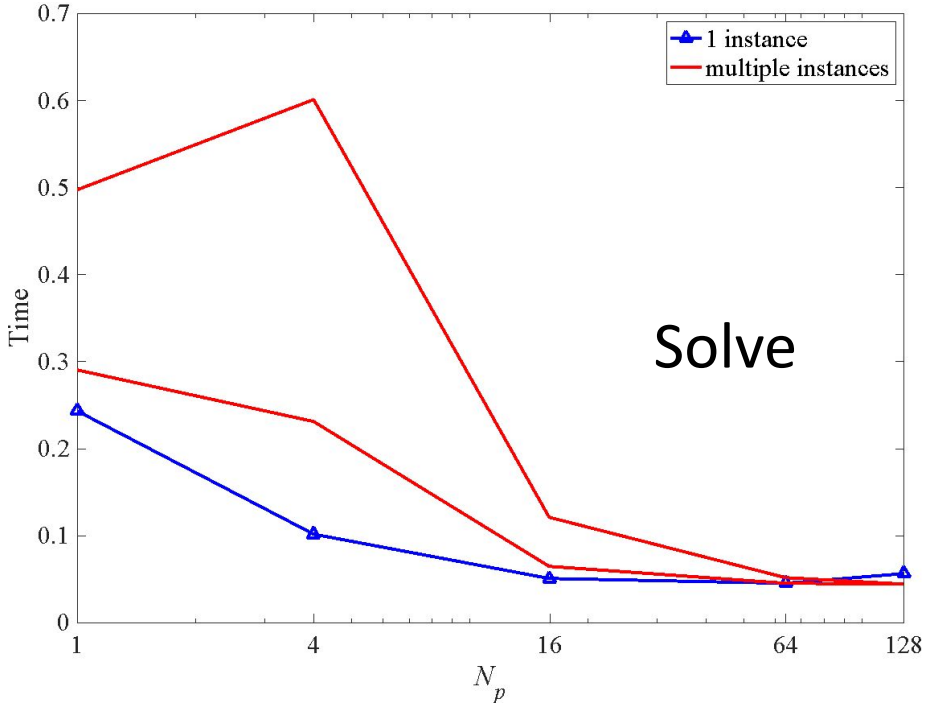




Scaling Experiments on Perlmutter

- Running concurrent matrix factorizations/solves to occupy all cores of a Perlmutter CPU nodes mimics the usage of SuperLU_DIST in M3DC1, which can handle multiple planes/matrices on one compute node.
- s1_mat_0_253872





One-sided Communication for Solvers

- The solve performance of existing one-sided CPU solve (foMPI, put data+checksum payload) is equivalent to two-sided: need a new one-sided solution

- Explore the potential of standard one-sided MPI using microbenchmarks on Perlmutter and Crusher
  - foMPI is no longer maintained over Slingshot
  - Perlmutter: standard one-sided MPI (put data, flush, put signal) can outperform two-sided MPI by 1.3x (intra-node) and 2.5x (inter-node)
  - Crusher: network issue, file a ticket to HPE

MG Work

- Have identified personnel/effort to explore MG
- We will start August 8th after my vacation
- Plan of Record:
  - Start with Steve's 1D problem… anything (even Matlab for Proof-of-Concept)
  - Generalize to 1D (toroidal preconditioning via flexible GMRES)... C for PETSc
  - Generalize to 3D (poloidal hierarchy)... Fortran?