Pipelined Transpose

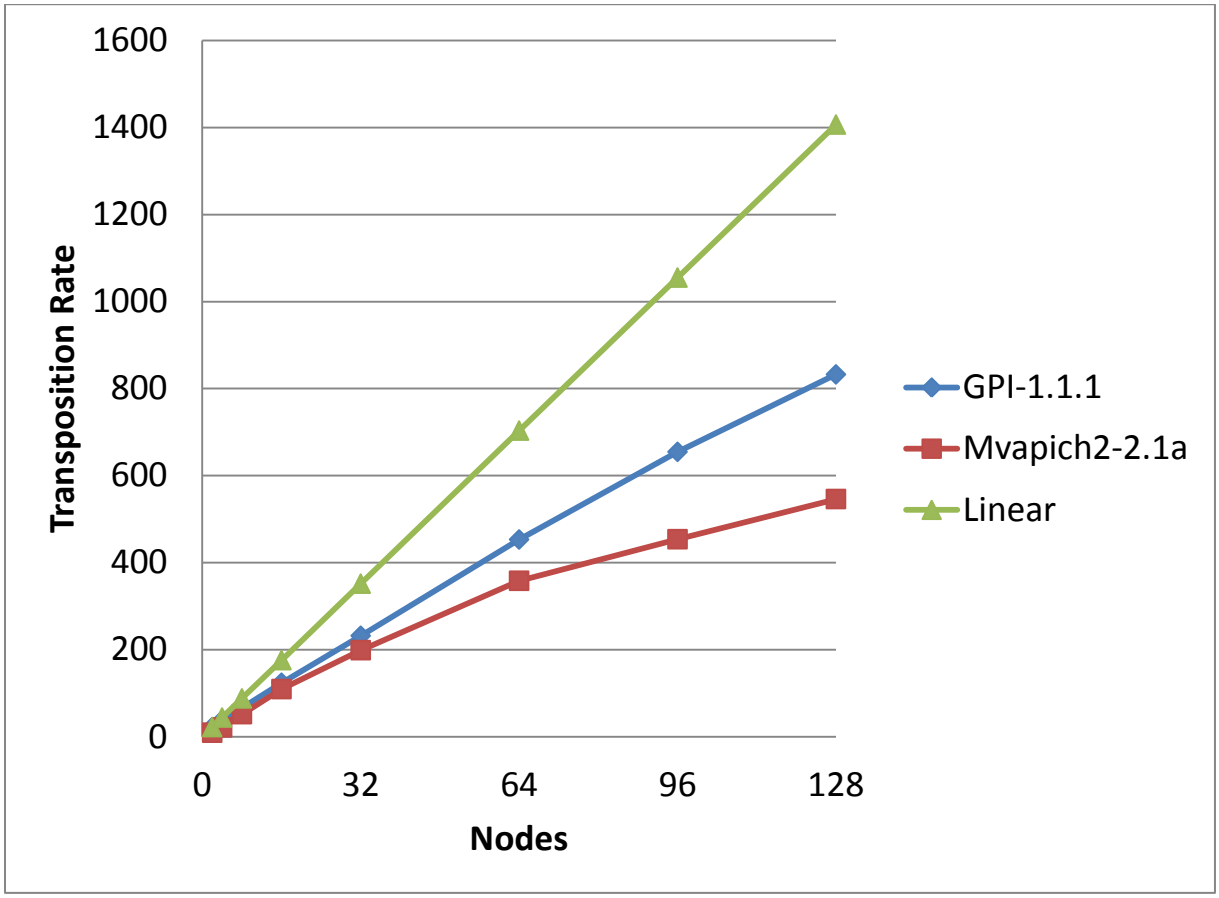
This is the initial release of a pipelined transpose proxy. This kernel is an attempt at establishing a small but meaningful proxy/benchmark for notification based 1-sided communication.

The kernel calculates a global transpose of a matrix for a column-based matrix distribution. This is a hybrid implementation where a global transpose is followed by a local transpose.

While the MPI implementation uses an MPI alltoall for global communication, the GASPI implementation uses a single communication step, in which all required communication to all target ranks is issued in a single loop. The notification based one sided communication requests are scheduled (target rank sequence) such that we minimize network congestion, i.e. we always aim for bidirectional communication even though the actual communication is entirely one-sided.

GASPI here can (and does) leverage pipelining, namely the overlap of a local transpose with the communication of the global transpose.

We note that this (fairly naïve) implementation appears to scale higher than a corresponding existing MPI implementation which make use of MPI_Alltoall.



Strong scaling for Pipelined Transpose (12288x12288 matrix), 24 Threads/Cores per node.