

UD Computational Science Day 2006

February 14, 2006

Transformation to Parallel Codes for Communication-Computation Overlap

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Abstract

This poster presents program transformations directed toward improving communication-computation overlap in parallel programs that use MPI's collective operations. Our transformations target a wide variety of applications focusing on scientific codes with computation loops that exhibit limited dependence among iterations. We present results from a detailed study of the effect of the message size, level of communication-computation overlap, and amount of communication aggregation on runtime performance in a cluster environment based on an RDMA-enabled network. The targets of our study are two real scientific codes written by domain scientists, but the applicability of our work extends far beyond the scope of these two applications.