

Post-Exascale Star Product Networks and Allreduce Spanning Trees

Abstract

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Networks are based on mathematical graphs. One important family of networks is based on the star product graph. This is a generalization of network topologies based on Cartesian products (such as HyperX), and includes networks such as SlimFly and PolarFly that target post-exascale systems.

For these star-product networks to be useful, they must support collectives such as Allreduce (including broadcast and reduction) and others. These problems map immediately to the problem of finding a large number of more or less edge-disjoint spanning trees in the network graph.

In this talk, we look at results that construct a maximal number of truly edge-disjoint trees on Cartesian networks. We attempt to generalize these results to the class of star-product networks. Success here would mean a general method of constructing spanning trees enabling efficient Allreduce that would apply to all networks in this emerging post-exascale family of networks.