Evolution of Interconnection Networks: The Impact on the Design of Parallel Algorithms

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Abstract

In the design of parallel algorithms, especially those involve various collective communication patterns, such as various types of one-to-all, all-to-one, and all-to-all communications, the underlying communication technology plays a vital role in determining the communication efficiency of these algorithms. In the past twenty years, we have repeatedly investigated the same problem, e.g., broadcast, due to different switching technologies or evaluation criteria. This talk will first give an overview of the evolution of interconnection networks from various angles, such as switching technologies, network topologies, distance coverage, network bandwidth, and communication reliability. I'll then illustrate the difference in the design of some communication algorithms for different networks including the classical point-to-point networks, wormhole networks, system area networks, P2P networks, grid networks, ad hoc networks, and sensor networks. The importance of various performance metrics will also be addressed.

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