Title: Ready Groups: A Path-Based Multicast Algorithm for 2D Torus Networks
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Abstract:

A torus topology is widely used in multicomputer design because of its many features. This paper presents an efficient path-based multicast algorithm in wormhole-routed 2D torus networks. The proposed algorithm can achieve a high degree of parallelism and low communication latency over a wide range of traffic loads. Since, it relies on a new approach that divides the destinations into many groups; hence the name Ready Groups (RG for short) algorithm. The RG algorithm relies on a new approach that divides the 2D torus network into multiple subnetworks to nearly balance the communication load in different parts of the torus. The RG algorithm requires only two start-ups irrespective of the destination nodes involved and most of the destination nodes receive the multicast message in parallel. From the destination groups in each subnetwork, the nearest destination node to the source node is selected to become a leader. In the first startup, the source node sends the message to the leaders. In the second start-up, every leader in turn sends the received message to the rest of the destinations in its own group. A routing function is designed and is used as a basis for the RG algorithm. Results from extensive simulations on different torus networks are discussed to compare the RG algorithm with previous algorithms.