Dragon Graph: A New Interconnection Network for Massively Computing

by

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In recent years, among many interconnection networks, the *hypercube* has been the focus of many researchers due to its structural regularity, potential for the parallel computation of various algorithms, and the high degree of fault tolerance capabilities. However, the hypercube has a practical limitation. Each processor of the *n*-dimensional hypercube is connected to *n* other processors. Consequently, hypercube is unfeasible for practical implementation of massively computing because its large fanout logarithmically proportional to the number of nodes. To overcome the disadvantage of the hypercube, some variations of hypercube with constant degree such as *cube-connected-cycle*, *bufferfly networks*, *debruijn networks*, *shuffle exchange graphs* have been proposed.

In this paper, *dragon graph*, a new variation of hypercube with constant degree(degree four) has been proposed. Dragon graph gains many advantages. For example, it is with a smaller diameter and cost (degree multiply diameter), node symmetry and edge symmetry. In this paper, the authors prove that the dragon graph is Hamiltonian. A routing algorithm and a broadcasting algorithm are given. The authors also show that the ascend/descend algorithms can be executed on the dragon graph with more efficiency than the cube-connected-cycle.