Topic 12
Theory and Algorithms for Parallel Computation

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Topic Chairs

Theory of parallel computation is still a widely unanswered field of research. The lack of truly parallel data structures (such as quantum computing may provide one day) still prevents us from obtaining a unified framework for the design of parallel algorithms, and the design of parallel algorithms remains a case-by-case challenge. As the complexity-related questions have been progressively (and regrettably) abandoned, theoretical research in parallel computing focuses today on two main areas: the classical design of parallel algorithms for specific problems; and very recently, modeling, understanding and formalizing how entities/structures/networks interact in parallel in order to design better parallel algorithms.

Fourteen papers were submitted to this topic and five were accepted. Three of them belong to the first category. In "2D Cutting Stock Problem: a New Parallel Algorithm and Bounds", the authors present new upper and lower bounds for the 2D cutting problem to improve the speed of a parallel implementation of a branch-and-bound strategy that solves the problem exactly. In "Periodic Load Balancing on the N-Cycle: Analytical and Experimental Evaluation", the authors analyze precisely the convergence time of a classical load balancing protocol on a ring by the conductance method. In "Hirschberg's Algorithm on a GCA and its Parallel Hardware Implementation", the authors present a space-efficient implementation on reconfigurable cellular automata of Hirshberg's algorithm for determining connected components in a dense graph.

The last paper belongs to the second category. In "Acyclic Preference Systems in P2p Networks", the authors explore a new formalism based on preference lists to improve the efficiency of P2P networks.