

Topic 09

Distributed Systems and Algorithms

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This topic deals with new developments in distributed systems and algorithms. The wide acceptance of the Internet standards and technologies makes it hard to imagine a situation in which it would be easier to argue about their importance than it is today.

Areas of interest include, but are not limited to:

- mobile computing
- distributed algorithms in telecommunications
- fault tolerance of distributed systems
- resource sharing in distributed systems
- openness in distributed systems
- concurrency, performance and scalability in distributed systems
- transparency in distributed systems
- design and analysis of distributed algorithms
- real-time distributed algorithms and systems

Out of nineteen submissions to this track, seven papers were accepted and are presented in two sessions. The first session, containing three papers altogether, starts out with a presentation analyzing balancing networks with antitokens allowed. It is of interest which properties are preserved under this generalized definition. A necessary and sufficient condition for these properties is presented. The second paper considers the standard Internet routing strategy (each intermediate node knows the next edge of a shortest path to the target node) in a modified scenario: “Liars”, nodes which give bad advice, are allowed. Three different models are examined in the context of various topologies, giving interesting results. The final paper in this session proposes a method which enables the systematic design of complete exchange algorithms for a wide range of topologies, including meshes and tori. In several cases the new algorithm outperforms previously known approaches for a significant range of system parameters.

The second session consists of three papers. The first concerns a special application of permutation routing in mesh topologies to automated guided vehicles. Under the constraint that no more than two vehicles (resp. packages) meet at any time an $O(n \log n)$ algorithm is obtained. The next paper, entitled “Self-Stabilizing Protocol for Shortest Path Tree for Multi-cast Routing in Mobile Networks”, again, as the second paper in the first session, deals with the standard Internet routing strategy, although in a different setting and with a different goal: The nodes of the network can move and a parallel algorithm is sought which

updates the routing tables using only local information at the nodes. Such an algorithm is presented and analyzed.

Replication of data in asynchronous distributed systems can increase reliability and availability drastically, but also involves complicated coordination issues. The third paper addresses the replica management problem in which processes can crash and recover. A new solution to this problem is described. The last paper is about timestamping algorithms which are used to capture the causal ordering or the concurrency of events in distributed computations. This paper introduces a formal framework on timestamping algorithms, by characterizing some conditions which they have to satisfy in order to capture causality.

We would like to express our sincere appreciation to the other members of the program committee for their invaluable help in the entire selection process. We would also like to thank the numerous reviewers for their precious time and effort.