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Distributed Computing

21st International Symposium, DISC 2007
Lemesos, Cyprus, September 24-26, 2007
Proceedings

Volume Editor

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Preface

DISC, the International Symposium on Distributed Computing, is an annual forum for presentation of research on all aspects of distributed computing, including the theory, design, implementation and applications of distributed algorithms, systems and networks. The 21st edition of DISC was held during September 24–26, 2007, in Lemesos, Cyprus.

This volume of proceedings begins with abstracts of three invited talks. The keynote speakers of DISC 2007 were: Burkhard Monien from the University of Paderborn, Germany, David Peleg from The Weizmann Institute of Science, Israel, and Michel Raynal from IRISA, Université de Rennes, France.

There were 100 ten-page-long extended abstracts submitted to DISC this year and this volume contains 32 contributions selected by the Program Committee among these 100 submissions. Every submitted paper was read and evaluated by Program Committee members assisted by external reviewers. The final decisions regarding acceptance or rejection of each paper were made during the electronic Program Committee meeting held in June/July 2007. Revised and expanded versions of a few best selected papers will be considered for publication in a special issue of the journal *Distributed Computing*.

The Best Student Paper Award of DISC 2007 was awarded to David Eisenstat for the paper "Fast Robust Approximate Majority" coauthored with Dana Angluin and James Aspnes.

This volume of proceedings also contains nine two-page-long brief announcements (BA). These BAs present ongoing work or recent results whose full description is not yet ready; it is expected that full papers containing those results will soon appear in other conferences or journals. The main purpose of the BA track is to announce ongoing projects to the distributed computing community and to obtain feedback for the authors. Each BA was also read and evaluated by the Program Committee.

This volume concludes with a section devoted to the 20th anniversary of the DISC conferences that took place during DISC 2006, held September 18–20, 2006, in Stockholm, Sweden.

DISC 2007 was organized in cooperation with the University of Cyprus. The main sponsor of DISC 2007 was CYTA - Cyprus Telecommunications Authority. The support of the Cyprus Tourism Organisation, Microsoft (Cyprus) and COST Action 295 DYNAMO is also gratefully acknowledged.

July 2007 Andrzej Pelc

The 2007 Edsger W. Dijkstra Prize in Distributed Computing

The 2007 Edsger W. Dijkstra Prize in Distributed Computing was presented at DISC 2007 for the paper "Consensus in the Presence of Partial Synchrony" by Cynthia Dwork, Nancy Lynch, and Larry Stockmeyer, which appeared in the Journal of the ACM (Vol. 35, No. 2, April, 1988. pages 288–323). A preliminary version appeared in PODC 1984.

This paper introduces a number of practically motivated partial synchrony models that lie between the completely synchronous and the completely asynchronous models, and in which consensus is solvable. It gives practitioners the right tool for building fault-tolerant systems, and contributes to the understanding that safety can be maintained at all times, despite the impossibility of consensus, and progress is facilitated during periods of stability. These are the pillars on which every fault-tolerant system has been built for two decades. This includes academic projects such as Petal, Frangipani, and Boxwood, as well as real-life data centers, such as the Google file system.

In distributed systems, balancing the pragmatics of building software that works against the need for rigor is particularly difficult because of impossibility results such as the FLP theorem. The publication by Dwork, Lynch, and Stockmeyer was in many respects the first to suggest a path through this thicket, and has been enormously influential. It presents consensus algorithms for a number of partial synchrony models with different timing requirements and failure assumptions: crash, authenticated Byzantine, and Byzantine failures. It also proves tight lower bounds on the resilience of such algorithms.

The eventual synchrony approach introduced in this paper is used to model algorithms that provide safety at all times, even in completely asynchronous runs, and guarantee liveness once the system stabilizes. This has since been established as the leading approach for circumventing the FLP impossibility result and solving asynchronous consensus, atomic broadcast, and state-machine replication.

In particular, the distributed systems engineering community has been increasingly drawn towards systems architectures that reflect the basic split between safety and liveness cited above. Dwork, Lynch, and Stockmeyer thus planted the seed for a profound rethinking of the ways that we should build, and reason about, this class of systems. Following this direction are many foundational solutions. First, these include state-machine replication methods such as Lamport's seminal Paxos algorithm and many group communication methods. Another important branch of research that directly follows this work is given by Chandra and Toueg's unreliable failure detector abstraction, which is realized in the eventual synchrony model of this paper. As Chandra and Toueg write:"we argue that partial synchrony assumptions can be encapsulated in the

unreliability of failure detectors. For example, in the models of partial synchrony considered in Dwork et al. it is easy to implement a failure detector that satisfies the properties of ◊W." Finally, the insight by Dwork, Lynch, and Stockmeyer also led to various timed-based models of partial synchrony, such as Cristian and Fetzer's Timed-Asynchronous model and others.

The award committee would like to acknowledge the sincere efforts by the nominators of this work, as well as all other (worthy!) nominations which came short of winning.

The Committee wishes to pay a special tribute via this award to Larry Stockmeyer, who passed away on July 31, 2004. Larry's impact on the field through this paper and many others will always be remembered.

The Committee of the 2007 Edsger W. Dijkstra Prize
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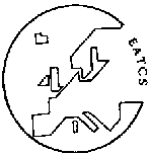
Organization

DISC, the International Symposium on Distributed Computing, is an annual forum for presentation of research on all aspects of distributed computing. It is organized in cooperation with the European Association for Theoretical Computer Science (EATCS). The symposium was established in 1985 as a biannual International Workshop on Distributed Algorithms on Graphs (WDAG). The scope was soon extended to cover all aspects of distributed algorithms as WDAG came to stand for International Workshop on Distributed AlGorithms, and in 1989 it became an annual symposium. To reflect the expansion of its area of interest, the name was changed to DISC (International Symposium on DIStributed Computing) in 1998. The name change also reflects the opening of the symposium to all aspects of distributed computing.



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