

# **33rd International Symposium on Distributed Computing**

**DISC 2019, October 14–18, 2019, Budapest, Hungary**

Edited by  
**Jukka Suomela**



*Editors*

**Jukka Suomela**

Aalto University, Finland  
jukka.suomela@aalto.fi

*ACM Classification 2012*

Software and its engineering → Distributed systems organizing principles; Computing methodologies → Distributed computing methodologies; Computing methodologies → Concurrent computing methodologies; Hardware → Fault tolerance; Networks; Information systems → Data structures; Theory of computation; Theory of computation → Models of computation; Theory of computation → Design and analysis of algorithms

**ISBN 978-3-95977-126-9**

*Published online and open access by*

Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany. Online available at <https://www.dagstuhl.de/dagpub/978-3-95977-126-9>.

*Publication date*

October, 2019

*Bibliographic information published by the Deutsche Nationalbibliothek*

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <https://portal.dnb.de>.

*License*

This work is licensed under a Creative Commons Attribution 3.0 Unported license (CC-BY 3.0):  
<https://creativecommons.org/licenses/by/3.0/legalcode>.



In brief, this license authorizes each and everybody to share (to copy, distribute and transmit) the work under the following conditions, without impairing or restricting the authors' moral rights:

- Attribution: The work must be attributed to its authors.

The copyright is retained by the corresponding authors.

Digital Object Identifier: 10.4230/LIPIcs.DISC.2019.0

**ISBN 978-3-95977-126-9**

**ISSN 1868-8969**

<https://www.dagstuhl.de/lipics>

**Printed from e-media by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## Contents

Preface <i>Jukka Suomela</i> .....	0:ix–0:x
Symposium Organization .....	0:xi–0:xiv
2019 Edsger W. Dijkstra Prize in Distributed Computing .....	0:xv
2019 Principles of Distributed Computing Doctoral Dissertation Award .....	0:xvii

## Regular Papers

Consensus with Max Registers <i>James Aspnes and He Yang Er</i> .....	1:1–1:9
Putting Strong Linearizability in Context: Preserving Hyperproperties in Programs that Use Concurrent Objects <i>Hagit Attiya and Constantin Enea</i> .....	2:1–2:17
Long-Lived Counters with Polylogarithmic Amortized Step Complexity <i>Mirza Ahad Baig, Danny Hendler, Alessia Milani, and Corentin Travers</i> .....	3:1–3:16
Distributed Algorithms for Low Stretch Spanning Trees <i>Ruben Becker, Yuval Emek, Mohsen Ghaffari, and Christoph Lenzen</i> .....	4:1–4:14
Optimal Distributed Covering Algorithms <i>Ran Ben-Basat, Guy Even, Ken-ichi Kawarabayashi, and Gregory Schwartzman</i> ..	5:1–5:15
Parameterized Distributed Algorithms <i>Ran Ben-Basat, Ken-ichi Kawarabayashi, and Gregory Schwartzman</i> .....	6:1–6:16
Message Reduction in the LOCAL Model Is a Free Lunch <i>Shimon Bitton, Yuval Emek, Taisuke Izumi, and Shay Kutten</i> .....	7:1–7:15
On the Computational Power of Radio Channels <i>Mark Braverman, Gillat Kol, Rotem Oshman, and Avishay Tal</i> .....	8:1–8:17
Space-Optimal Naming in Population Protocols <i>Janna Burman, Joffroy Beauquier, and Devan Sohier</i> .....	9:1–9:16
Erasure Correction for Noisy Radio Networks <i>Keren Censor-Hillel, Bernhard Haeupler, D. Ellis Hershkowitz, and Goran Zuzic</i> ..	10:1–10:17
Reachability and Shortest Paths in the Broadcast CONGEST Model <i>Shiri Chechik and Doron Mukhtar</i> .....	11:1–11:13
On the Round Complexity of Randomized Byzantine Agreement <i>Ran Cohen, Iftach Haitner, Nikolaos Makriyannis, Matan Orland, and Alex Samorodnitsky</i> .....	12:1–12:17

33rd International Symposium on Distributed Computing (DISC 2019).  
Editor: Jukka Suomela



Leibniz International Proceedings in Informatics  
Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany

Trade-Offs in Distributed Interactive Proofs <i>Pierluigi Crescenzi, Pierre Fraigniaud, and Ami Paz</i> .....	13:1–13:17
The Capacity of Smartphone Peer-To-Peer Networks <i>Michael Dinitz, Magnús M. Halldórsson, Calvin Newport, and Alex Weaver</i> .....	14:1–14:17
Sublinear-Time Distributed Algorithms for Detecting Small Cliques and Even Cycles <i>Talya Eden, Nimrod Fiat, Orr Fischer, Fabian Kuhn, and Rotem Oshman</i> .....	15:1–15:16
A Distributed Algorithm for Directed Minimum-Weight Spanning Tree <i>Orr Fischer and Rotem Oshman</i> .....	16:1–16:16
Stable Memoryless Queuing under Contention <i>Paweł Garncarek, Tomasz Jurdziński, and Dariusz R. Kowalski</i> .....	17:1–17:16
Improved Network Decompositions Using Small Messages with Applications on MIS, Neighborhood Covers, and Beyond <i>Mohsen Ghaffari and Julian Portmann</i> .....	18:1–18:16
On Bioelectric Algorithms <i>Seth Gilbert, James Maguire, and Calvin Newport</i> .....	19:1–19:17
Parallel Finger Search Structures <i>Seth Gilbert and Wei Quan Lim</i> .....	20:1–20:18
Wait-Free Solvability of Equality Negation Tasks <i>Éric Goubault, Marijana Lazić, Jérémie Ledent, and Sergio Rajsbaum</i> .....	21:1–21:16
Scalable Byzantine Reliable Broadcast <i>Rachid Guerraoui, Petr Kuznetsov, Matteo Monti, Matej Pavlovic, and Dragos-Adrian Seredinschi</i> .....	22:1–22:16
Fast Distributed Algorithms for LP-Type Problems of Low Dimension <i>Kristian Hinnenthal, Christian Scheideler, and Martijn Struijs</i> .....	23:1–23:16
Privatization-Safe Transactional Memories <i>Artem Khyzha, Hagit Attiya, and Alexey Gotsman</i> .....	24:1–24:17
Low-Congestion Shortcut and Graph Parameters <i>Naoki Kitamura, Hirotaka Kitagawa, Yota Otachi, and Taisuke Izumi</i> .....	25:1–25:17
The Complexity of Symmetry Breaking in Massive Graphs <i>Christian Konrad, Sriram V. Pemmaraju, Talal Riaz, and Peter Robinson</i> .....	26:1–26:18
Stellar Consensus by Instantiation <i>Giuliano Losa, Eli Gafni, and David Mazières</i> .....	27:1–27:15
A Scalable, Portable, and Memory-Efficient Lock-Free FIFO Queue <i>Ruslan Nikolaev</i> .....	28:1–28:16
Byzantine Approximate Agreement on Graphs <i>Thomas Nowak and Joel Rybicki</i> .....	29:1–29:17
Small Cuts and Connectivity Certificates: A Fault Tolerant Approach <i>Merav Parter</i> .....	30:1–30:16

Monotonically Relaxing Concurrent Data-Structure Semantics for Increasing Performance: An Efficient 2D Design Framework <i>Adones Rukundo, Aras Atalar, and Philippas Tsigas</i>	31:1–31:15
Phase Transitions of Best-of-Two and Best-of-Three on Stochastic Block Models <i>Nobutaka Shimizu and Takeharu Shiraga</i>	32:1–32:17
Distributed Data Summarization in Well-Connected Networks <i>Hsin-Hao Su and Hoa T. Vu</i>	33:1–33:16
Polynomial-Time Fence Insertion for Structured Programs <i>Mohammad Taheri, Arash Pourdamghani, and Mohsen Lesani</i>	34:1–34:17

## Brief Announcements

Brief Announcement: On Self-Adjusting Skip List Networks <i>Chen Avin, Iosif Salem, and Stefan Schmid</i>	35:1–35:3
Brief Announcement: Streaming and Massively Parallel Algorithms for Edge Coloring <i>Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Marina Knittel, and Hamed Saleh</i>	36:1–36:3
Brief Announcement: Memory Lower Bounds for Self-Stabilization <i>Lélia Blin, Laurent Feuilloley, and Gabriel Le Bouder</i>	37:1–37:3
Brief Announcement: Wait-Free Universality of Consensus in the Infinite Arrival Model <i>Grégoire Bonin, Achour Mostéfaoui, and Matthieu Perrin</i>	38:1–38:3
Brief Announcement: Asymmetric Distributed Trust <i>Christian Cachin and Björn Tackmann</i>	39:1–39:3
Brief Announcement: Implementing Byzantine Tolerant Distributed Ledger Objects <i>Vicent Cholvi, Antonio Fernández Anta, Chryssis Georgiou, and Nicolas Nicolaou</i>	40:1–40:3
Brief Announcement: Model Checking Rendezvous Algorithms for Robots with Lights in Euclidean Space <i>Xavier Défago, Adam Heriban, Sébastien Tixeuil, and Koichi Wada</i>	41:1–41:3
Brief Announcement: Massively Parallel Approximate Distance Sketches <i>Michael Dinitz and Yasamin Nazari</i>	42:1–42:3
Brief Announcement: Neighborhood Mutual Remainder and Its Self-Stabilizing Implementation of Look-Compute-Move Robots <i>Shlomi Dolev, Sayaka Kamei, Yoshiaki Katayama, Fukuhito Ooshita, and Koichi Wada</i>	43:1–43:3
Brief Announcement: Revisiting Consensus Protocols through Wait-Free Parallelization <i>Suyash Gupta, Jelle Hellings, and Mohammad Sadoghi</i>	44:1–44:3
Brief Announcement: The Fault-Tolerant Cluster-Sending Problem <i>Jelle Hellings and Mohammad Sadoghi</i>	45:1–45:3

Brief Announcement: On the Correctness of Transaction Processing with External Dependency <i>Masoomeh Javidi, Kishi, Ahmed Hassan, and Roberto Palmieri</i> .....	46:1–46:3
Brief Announcement: Towards Byzantine Broadcast in Generalized Communication and Adversarial Models <i>Chen-Da Liu-Zhang, Varun Maram, and Ueli Maurer</i> .....	47:1–47:3
Brief Announcement: Integrating Temporal Information to Spatial Information in a Neural Circuit <i>Nancy Lynch and Mien Brabecba Wang</i> .....	48:1–48:3
Brief Announcement: Faster Asynchronous MST and Low Diameter Tree Construction with Sublinear Communication <i>Ali Mashreghi and Valerie King</i> .....	49:1–49:3