Lecture Notes in Computer Science

Commenced Publication in 1973 Founding and Former Series Editors: Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison Lancaster University, UK Takeo Kanade Carnegie Mellon University, Pittsburgh, PA, USA Josef Kittler University of Surrey, Guildford, UK Jon M. Kleinberg Cornell University, Ithaca, NY, USA Friedemann Mattern ETH Zurich. Switzerland John C. Mitchell Stanford University, CA, USA Moni Naor Weizmann Institute of Science, Rehovot, Israel Oscar Nierstrasz University of Bern, Switzerland C. Pandu Rangan Indian Institute of Technology, Madras, India Bernhard Steffen University of Dortmund, Germany Madhu Sudan Massachusetts Institute of Technology, MA, USA Demetri Terzopoulos University of California, Los Angeles, CA, USA Doug Tygar University of California, Berkeley, CA, USA Moshe Y. Vardi Rice University, Houston, TX, USA Gerhard Weikum Max-Planck Institute of Computer Science, Saarbruecken, Germany Jeannette Janssen Paweł Prałat (Eds.)

Combinatorial and Algorithmic Aspects of Networking

4th Workshop, CAAN 2007 Halifax, Canada, August 14, 2007 Revised Papers



Volume Editors

Jeannette Janssen Paweł Prałat Dalhousie University Department of Mathematics and Statistics Halifax, NS, B3H 3J5, Canada E-mail: {janssen,pralat}@mathstat.dal.ca

Library of Congress Control Number: 2007941336

CR Subject Classification (1998): F.1.1, F.2.1-2, C.2, G.2.1-2, E.1

LNCS Sublibrary: SL 5-Computer Communication Networks and Telecommunications

ISSN	0302-9743
ISBN-10	3-540-77293-6 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-77293-4 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2007 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper SPIN: 12204793 06/3180 543210

Preface

The advent of the Internet has opened up a wealth of applications, but also given rise to a host of new problems. Many of those problems have led to exciting new research directions in mathematics and theoretical computer science, especially in the areas of combinatorics and algorithms. The Fourth Workshop on Combinatorial and Algorithmic Aspects of Networking (CAAN 2007) was organized to be a place where the latest research developments on all aspects of networking could be presented. The topics covered were diverse, with talks on strategies for searching in networks, for cleaning networks of unwanted intruders, on different routing strategies, and on scheduling and load balancing. The workshop started with an invited lecture by Peter Winkler of Dartmouth College, who gave a general talk on a topic related to probability, a concept central to network modeling and managing. The afternoon opened with a short invited talk by Alejandro López-Ortiz, who gave an overview of various issues in designing resilient backbone networks.

CAAN 2007 took place on August 14, 2007, at Dalhousie University in Halifax, Nova Scotia, Canada, co-located with the Workshop on Algorithms and Data Structures (WADS 2007). Three previous CAAN workshops were held in Chester, UK (CAAN 2006), Waterloo, Ontario, Canada (CAAN 2005), and in Banff, Alberta, Canada (CAAN 2004), respectively.

In response to the call for paper we received 17 submissions. Each submission was reviewed by three referees. Almost all submissions were relevant to the topic of the workshop, and most contained interesting ideas. Based on the reviews of the referees we accepted nine papers for presentation at the workshop and inclusion in this volume. The volume also includes an abstract of the invited talk by Peter Winkler and an invited paper by Alejandro López-Ortiz.

We would like to thank all those that helped to make this workshop a success, with special thanks to Anne Publicover, our administrative assistant. Thanks to the Atlantic Association for Research in Mathematics (AARMS) for financial support. Many thanks to Andrei Voronkov for providing the EasyChair conference system; with this system, managing the electronic submissions and the refereeing process has been a breeze. Thanks also to Norbert Zeh, the Local Arrangements Chair of WADS 2007. Finally, we thank all participants in the workshop, all authors of the contributed papers, and especially the invited speakers for their contribution in making CAAN 2007 into a collegial and stimulating platform for new ideas about networks.

October 2007

Jeannette Janssen Paweł Prałat

Organization

Steering Committee

Andrei Broder
Angèle Hamel
Srinivasan Keshav
Alejandro López-Ortiz
Rajeev Motwani
Ian Munro

Yahoo! Inc., USA Wilfrid Laurier University, Canada University of Waterloo, Canada University of Waterloo, Canada Stanford University, USA University of Waterloo, Canada

Program Committee

Dimitris Achlioptas	UC Santa Cruz, USA
Anthony Bonato	Wilfrid Laurier University, Canada
Allan Borodin	University of Toronto, Canada
Colin Cooper	King's College, UK
Erik Demaine	MIT, USA
Thomas Erlebach	University of Leicester, UK
Angèle Hamel	Wilfrid Laurier University, Canada
Jan van den Heuvel	London School of Economics, UK
Klaus Jansen	Universität Kiel, Germany
Jeannette Janssen	Dalhousie University, Canada
Valerie King	University of Victoria, Canada
Danny Krizanc	Wesleyan University, USA
Stefano Leonardi	Università di Roma "La Sapienza", Italy
Alejandro López-Ortiz	University of Waterloo, Canada
Lata Narayanan	Concordia University, Canada
Richard Nowakowski	Dalhousie University, Canada
Paweł Prałat	Dalhousie University, Canada
Sunil Shende	Rutgers-Camden, USA
Eva Tardos	Cornell University, USA

Table of Contents

Invited Lectures (Abstracts)

Luck vs. Skill (Long Invited Talk) Peter Winkler	1
Valiant Load Balancing, Benes Networks and Resilient Backbone	
Design (Short Invited Talk)	2
Alejandro López-Ortiz	

Contributed Papers

Valiant Load Balancing, Capacity Provisioning and Resilient Backbone Design Alejandro López-Ortiz	3
Cleaning Random d-Regular Graphs with Brushes Using a Degree-Greedy Algorithm Margaret-Ellen Messinger, Pawel Prałat, Richard J. Nowakowski, and Nicholas Wormald	13
Nonadaptive Selfish Routing with Online Demands Tobias Harks and László A. Végh	27
Vertex Pursuit Games in Stochastic Network Models Anthony Bonato, Paweł Prałat, and Changping Wang	46
Preemptive Scheduling on Selfish Machines Leah Epstein and Rob van Stee	57
Selfish Routing and Path Coloring in All-Optical Networks Ioannis Milis, Aris Pagourtzis, and Katerina Potika	71
A Worst-Case Time Upper Bound for Counting the Number of Independent Sets <i>Guillermo De Ita and Aurelio López-López</i>	85
Improving the Efficiency of Helsgaun's Lin-Kernighan Heuristic for the Symmetric TSP Dirk Richter, Boris Goldengorin, Gerold Jäger, and Paul Molitor	99
Combinatorial Algorithms for Listing Paths in Minimal Change Order Zareen Alamgir and Sarmad Abbasi	112

Improving Topological Routing in N2R Networks	131
Jose M. Gutierrez Lopez, Ruben Cuevas Rumin,	
Jens M. Pedersen, and Ole B. Madsen	
Author Index	149