June 13–15, 2015
Portland, OR, USA

Association for Computing Machinery

Advancing Computing as a Science & Profession

SPAA'15

Proceedings of the 27th ACM
Symposium on Parallelism in Algorithms and Architectures

Sponsored by:

ACM SIGACT and ACM SIGARCH

Supported by:

Akamai, Oracle Labs, and Intel Labs

Association for
Computing Machinery

Advancing Computing as a Science & Profession

The Association for Computing Machinery
2 Penn Plaza, Suite 701
New York, New York 10121-0701

ISBN: 978-1-4503-3588-1

Additional copies may be ordered prepaid from:

ACM Order Department
PO Box 30777
New York, NY 10087-0777, USA

Phone: 1-800-342-6626 (USA and Canada)
+1-212-626-0500 (Global)
Fax: +1-212-944-1318
E-mail: acmhelp@acm.org
Hours of Operation: 8:30 am – 4:30 pm ET

Printed in the USA

Foreword

This volume consists of papers that were presented at the 27th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2015) held on 13–15 June 2015, in Portland, Oregon, USA, as part of Federated Computing Research Conference (FCRC 2015). SPAA 2015 was sponsored by the ACM Special Interest Groups on Algorithms and Computation Theory (SIGACT) and Computer Architecture (SIGARCH) and organized in cooperation with the European Association for Theoretical Computer Science (EATCS). Financial support was provided by Akamai, Oracle Labs, and Intel Labs.

We received a total of 131 submissions and the program committee selected 31 papers for full presentation. Of these papers, "Speed Scaling in the Non-clairvoyant Model" by Yossi Azar, Nikhil Devanur, Zhiyi Huang, and Debmalya Panigrahi was selected to receive the Best Paper Award. In addition, the PC selected 11 papers to be presented as brief announcements. Finally, this year's program also included two invited talks: "Myths and Misconceptions about Threads" by Hans-J Boehm and "The Revolution in Graph Theoretic Optimization Problems" by Gary Miller.

The mix of selected papers reflects the unique nature of SPAA in bringing together the theory and practice of parallel computing. SPAA defines parallelism broadly to encompass any computational device or scheme that can perform multiple operations or tasks simultaneously or concurrently. The technical papers in this volume are to be considered preliminary versions, and authors are generally expected to publish polished and complete versions in archival scientific journals. The committee's decisions in accepting brief announcements were based on the perceived interest of these contributions, with the goal that they serve as bases for further significant advances in parallel computing. Extended versions of the SPAA brief announcements may be published later in other conferences or journals.

The reviewing process consisted of multiple steps. Each paper received a minimum of 3 reviews in the initial phase. After this phase, the authors were given a chance to reply to the reviews during a 2-day rebuttal period. After all the rebuttals were received, there was extensive online discussion of the papers over a period of a week and additional reviews were solicited for some papers. The final decisions were made during a phone meeting on March 10.

We would like to thank the program committee as well as the external reviewers for their help during the review and paper selection process. Last, but not least, we want to thank all the authors who submitted papers. The authors, the external reviewers, and the program committee together made it possible to select a great collection of papers for the conference.

Kunal Agrawal
Washington University in St. Louis
SPAA 2015 Program Chair

Guy Blelloch
Carnegie Mellon University
SPAA 2015 General Chair

Table of Contents

Session 4: Tools

Session Chair: Michael Spear *(Lehigh University)*

Session 5: Scheduling

Session Chair: Tao Schardl *(Massachusetts Institute of Technology)*

Keynote Address 2

Session Chair: Guy Blelloch *(Carnegie Mellon University)*

Session 6: Graph Algorithms

Session Chair: Pierre Fraigniaud *(University of Paris-Sud)*

Session 7: Transactional Memory and Concurrent Datastructures

Session Chair: Jim Sukha *(Intel)*

Session 8: Networks, Routing, and Communication

Session Chair: Angelina Lee *(Washington University in St. Louis)*

Session 9: Parallel and Distributed Algorithms

Session Chair: Benjamin Moseley *(Washington University in St. Louis)*

SPAA 2015 Symposium Organization

General Chair: Guy Blelloch (Carnegie Mellon University, USA)

Program Chair: Kunal Agrawal (Washington University in St. Louis, USA)

Program Committee:
Umut Acar (Carnegie Mellon University, USA)
Grey Ballard (Sandia National Labs, USA)
Petra Berenbrink (Simon Fraser University, Canada)
Dave Dice (Oracle Labs, USA)
Jeremy Fineman (Georgetown University, USA)
Pierre Fraigniaud (University of Paris-Sud, France)
Seth Gilbert (National University of Singapore, Singapore)
Rachid Guerraoui (EPFL, Switzerland)
MohammadTaghi HajiAghayi (University of Maryland, USA)
Maurice Herlihy (Brown University, USA)
Martin Hoefer (MPI Saarbrücken, Germany)
Peter Kling (University of Pittsburgh, USA)
Bradley Kuzsmaul (Massachusetts Institute of Technology, USA)
Angelina Lee (Washington University in St. Louis, USA)
Ryan Newton (Indiana University, USA)
Gopal Pandurangan (University of Houston, USA)
Michael Spear (Lehigh University, USA)
Cliff Stein (Columbia University, USA)
Kanat Tangwongsan (Mahidol University, Thailand)
Sivan Toledo (Tel Aviv University, Israel)
Uzi Vishkin (University of Maryland, USA)

Publicity Chair: Jeremy Fineman (Georgetown University, USA)

Treasurer: David Bunde (Knox College, USA)

Secretary: Christian Scheideler (University of Paderborn, Germany)

Steering Committee:
Guy Blelloch (Carnegie Mellon University, USA)
David Culler (University of California, Berkeley, USA)
Frank Dehne (Carleton University, Canada)
Pierre Fraigniaud (University of Paris-Sud, France)
Phil Gibbons (Intel Research, USA)
Maurice Herlihy (Brown University, USA)
Tom Leighton (MIT and Akamai Technologies, USA)
Charles Leiserson (Massachusetts Institute of Technology, USA)
Fabrizio Luccio (University of Pisa, Italy)
Friedhelm Meyer auf der Heide (University of Paderborn, Germany)
Gary Miller (Carnegie Mellon University, USA)
Burkhard Monien (University of Paderborn, Germany)
Franco Preparata (Brown University, USA)

Steering Committee (continued):

Vijaya Ramachandran (University of Texas, Austin, USA)
Arnold Rosenberg (University of Massachusetts, Amherst, USA)
Paul Spirakis (CTI, Greece)
Uzi Vishkin (University of Maryland, USA)

Additional Reviewers:

Fidaa Abed
Michael Anderson
Antonios Antoniadis
John Augustine
Rachata Ausavarungnirun
Oana Balmau
Scott Beamer
Michael Bender
Austin Benson
Aaron Bernstein
Mohammad Slim Bouguerra
Rezaul Chowdhury
Andrew Davidson
Sina Dehghani
Pawel Dlotko
Soheil Ehsani
Yousef El-Kurdi
Leah Epstein
Hossein Esfandiari
David Moises Fernandez
Dimitris Fotakis
Tom Friedetzky
Nick Harvey
Derek Juba
Tim Kaler
Shahin Kamali
Maleq Khan
Rohit Khandekar
Reza Khani
Nicholas Knight
Bojana Kodric
Justin Kopinsky
Guy Kortsarz
Ravi Kumar
Silvio Lattanzi
William Leiserson
Christoph Lenzen
Peng Li
Frederik Mallmann
Euripides Markou
Russell Martin
Kevin Matulef
Morteza Monemizadeh
Ehab Morsy
Benjamin Moseley
Viswanath Nagarajan
Lars Nagel
Danupon Nanongkai
Rupesh Nasre.
Calvin Newport
Krzysztof Onak
Dominik Pajak
Debmalya Panigrahi
Ali Pinar
Bogdan Prisacari
Kirk Pruhs
Manish Purohit
Harald Räcke
Vijay Reddi
Peter Robinson
Barna Saha
Kanthi Sarpatwar
Thomas Sauerwald
Anshul Sawant
Tao Schardl
Christian Scheideler
Scott Schneider
Oded Schwartz
Michele Scquizzato
Saeed Seddighin
Hadas Shachnai
Don Sheehy
Harsha Vardhan Simhadri
Edgar Solomonik
Hsin-Hao Su
Tim Suess
Amitabh Trehan
David Wagner
Joel Wolf
Maxwell Young
Igor Zablotchi
Morteza Zadimoghaddam
Uri Zwick

SPAA 2015 Sponsors & Supporters

Sponsors:

SIGACT

SIGARCH

Supporters:

Akamai

Oracle Labs

intel LABS