Preface

Self-stabilization is an established principle of modern distributed system design. The advantages of systems that self-recover from transient failures, temporary security attacks, and spontaneous reconfiguration are obvious. Less obvious is how the ambitious goal of recovering from the most general case of a transient fault, namely that of an arbitrary initial state, can lead to a simpler system design than dealing with particular cases of failures. In the area of mathematical problem-solving, Pólya gave the term “the inventors paradox” to such situations, where generalizing the problem may simplify the solution. The dramatic growth of distributed systems, peer-to-peer distribution networks, and large grid computing environments confronts designers with serious difficulties of complexity and has motivated the call for systems that self-recover, self-tune, and self-manage. The principles of self-stabilization can be useful for these goals of autonomous system behavior.

The Symposium on Self-Stabilizing Systems (SSS) is the main forum for research in the area of self-stabilization. Previous Workshops on Self-Stabilizing Systems (WSS) were held in 1989, 1995, 1997, 1999, and 2001. The previous Symposium on Self-Stabilizing Systems (SSS) took place in 2003. Thirty-three papers were submitted to SSS 2005 by authors from Europe (16), North America (8), Asia (4), and elsewhere (5). From the submissions, the program committee selected 15 for inclusion in these proceedings. In addition to the presentation of these papers, the symposium event included a poster session with brief presentations of recent work on self-stabilization.

The technical contributions to the symposium this year showed that the area has matured deeply since its first mathematical definition more than thirty years ago. Although there remains a core of four “classical” self-stabilization papers (that close gaps and open problems), the main part of the proceedings is dedicated to either extensions of self-stabilization (six contributions, dealing with snap-stabilization, code stabilization, self-stabilization with either dynamic, faulty or Byzantine components) or to applications of self-stabilization (five contributions, related to operating systems, security, or mobile and ad hoc networks).

The symposium of 2005 was one of the events of MANWEEK 2005, which also included the International Conference on Management of Multimedia Networks and Services (MMNS 2005), the International Workshop on IP Operations and Management (IPOM 2005), and the IEEE/IFIP International Workshop on Autonomic Grid Networking and Management (AGNM 2005). The site for the symposium and the other conferences was the Universitat Politècnica de Catalunya, in Barcelona. The SSS 2005 sessions were held on October 26 and 27.

We thank the organizers of MANWEEK 2005, especially Joan Serrat of the Universitat Politècnica de Catalunya, for making local arrangements.

August 2005

Ted Herman
Sébastien Tixeuil
Organization

Steering Committee
Anish Arora, The Ohio State University
Ajoy K. Datta, University of Nevada at Las Vegas
Shlomi Dolev, Ben-Gurion University of the Negev
Sukumar Ghosh, University of Iowa
Mohamed G. Gouda, University of Texas at Austin
Ted Herman, University of Iowa
Shing-Tsaan Huang, National Central University, Taiwan
Vincent Villain, Université de Picardie

Program Committee
Jorge Cobb, University of Texas at Dallas
Pascal Felber, Université de Neuchâtel
Roy Friedman, Technion
Felix Gärtner, RWTH Aachen
Maria Gradinariu, IRISA / INRIA Rennes
Ted Herman (Chair), University of Iowa
Jaap-Henk Hoepman, Radboud University Nijmegen
Hirotsugu Kakugawa, Hiroshima University
Mikhail Nesterenko, Kent State University
Marina Papatriantafilou, Chalmers University
Manish Parashar, Rutgers University
Franck Petit, Université de Picardie
Srikanta Tirthapura, Iowa State University
Sébastien Tixeuil, Université Paris-Sud

Additional Reviewers
Doina Bein
Ken Calvert
Bertrand Ducourthial
Stéphane Devismes
Sukumar Ghosh
Lisa Higham
Ronen Kat
Sandeep Kulkarni
Toshimitsu Masuzawa
Yoshihiro Nakaminami
Sriram Pemmaraju
Nir Tzachar
Vincent Villain
Guangsen Zhang

Christian Boulinier
Thomas Clouser
Ajoy Datta
Shlomi Dolev
Mohamed Gouda
Shing-Tsaan Huang
Yoshiaki Katayama
Mikel Larrea
Vincent Matossian
Michel de Rougemont
Rajesh Patel
Oliver Theel
Antonino Virgillito
Anat Bremler-Bar

Praveen Danturi
Murat Demirbas
Martin Gairing
Yinnon Haviv
Sayaka Kamei
Boris Koldehofe
Xiaolin Li
Stephane Messika
Phillipe Raipin Parvedy
Laurent Rosaz
Philippas Tsigas
Chen Zhang
## Table of Contents

Snap-Stabilizing Optimal Binary Search Tree  
*Doina Bein, Ajoy K. Datta, Vincent Villain* .............................. 1

Synchronous vs. Asynchronous Unison  
*Christian Boulinier, Franck Petit, Vincent Villain* .................. 18

A Snap-Stabilizing DFS with a Lower Space Requirement  
*Alain Cournier, Stéphane Devismes, Vincent Villain* .............. 33

Self-stabilization of Byzantine Protocols  
*Ariel Daliot, Danny Dolev* ............................................. 48

Self-stabilization with r-Operators Revisited  
*Sylvie Delaët, Bertrand Ducourthial, Sébastien Tixeuil* .......... 68

Self-stabilization Preserving Compiler  
*Shlomi Dolev, Yinnon Haviv, Mooly Sagiv* ........................... 81

Self-stabilizing Mobile Node Location Management and Message Routing  
*Shlomi Dolev, Limor Lahiani, Nancy Lynch, Tina Nolte* ........ 96

Memory Management for Self-stabilizing Operating Systems  
*Shlomi Dolev, Reuven Yagel* .......................................... 113

Code Stabilization  
*Felix C. Freiling, Sukumar Ghosh* .................................... 128

Stabilizing Certificate Dispersal  
*Mohamed G. Gouda, Eunjin (EJ) Jung* .............................. 140

On the Possibility and the Impossibility of Message-Driven Self-stabilizing Failure Detection  
*Martin Hutle, Josef Widder* ........................................ 153

Approximation of Self-stabilizing Vertex Cover Less Than 2  
*Jun Kiniwa* ........................................................... 171

Self-stabilization in Spite of Frequent Changes of Networks: Case Study of Mutual Exclusion on Dynamic Rings  
*Toshimitsu Masuzawa, Hirotugu Kakugawa* ......................... 183
Towards Automatic Convergence Verification of Self-stabilizing Algorithms

Jens Oehlerking, Abhishek Dhama, Oliver Theel ...................... 198

About the Self-stabilization of a Virtual Topology for Self-organization in Ad Hoc Networks

Fabrice Theoleyre, Fabrice Valois ........................................ 214

Author Index ................................................................. 229