

Preface

Physical systems which right themselves after being disturbed evoke our curiosity because we want to understand how such systems are able to react to unexpected stimuli. The mechanisms are all the more fascinating when systems are composed of small, simple units, and the ability of the system to self-stabilize emerges out of its components. Faithful computer simulations of such physical systems exhibit the self-stabilizing property, but in the realm of computing, particularly for distributed systems, we have greater ambition. We imagine that all manner of software, ranging from basic communication protocols to high-level applications, could enjoy self-corrective properties.

Self-stabilizing software offers a unique, non-traditional approach to the crucial problem of transient fault tolerance. Many successful instances of modern fault-tolerant networks are based on principles of self-stabilization. Surprisingly, the most widely accepted technical definition of a self-stabilizing system does not refer to faults: it is the property that the system can be started in any initial state, possibly an “illegal state,” and yet the system guarantees to behave properly in finite time. This, and similar definitions, break many traditional approaches to program design, in which the programmer by habit makes assumptions about initial conditions. The composition of self-stabilizing systems, initially seen as a daunting challenge, has been transformed into a manageable task, thanks to an accumulation of discoveries by many investigators. Research on various topics in self-stabilization continues to supply new methods for constructing self-stabilizing systems, determines limits and applicability of the paradigm of self-stabilization, and connects self-stabilization to related areas of fault tolerance and distributed computing.

The Workshop on Self-Stabilizing Systems (WSS) is the main forum for research in the area of self-stabilization. The first workshop was held in Austin (1989), and since 1995, workshops have been held biennially: Las Vegas (1995), Santa Barbara (1997), Austin (1999), and Lisbon (2001). WSS 2001 was thus our first workshop held outside North America, and reflected the strong growth and international participation in the area. We received 27 submitted papers for this workshop, which is a 50% increase from the previous workshops. The program committee selected 14 of the submitted papers, and Sukumar Ghosh presented our invited contribution.

This volume covers many areas within the field and reflects current trends and new directions in self-stabilization. Important applications of distributed computing are topics in several papers (routing, group membership, publish-subscribe systems). Other papers strike a methodological tone, describing tools to construct self-stabilizing systems. Three papers have “agent” in their titles, which is a topic not mentioned in any previous workshop. Several papers investigate non-standard definitions (or weakenings) of self-stabilization. Our field continues to grow and evolve.

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