

ACM SIGACT 1999–2000 Annual Report

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on behalf of the SIGACT Executive Committee

July 2000

1 Overall Mission

The primary mission of ACM SIGACT (Association for Computing Machinery Special Interest Group on Algorithms and Computation Theory) is to foster and promote the discovery and dissemination of high quality research in the domain of theoretical computer science. The field of theoretical computer science is interpreted broadly so as to include algorithms, data structures, complexity theory, distributed computation, parallel computation, VLSI, machine learning, computational biology, computational geometry, information theory, cryptography, quantum computation, computational number theory and algebra, program semantics and verification, automata theory, and the study of randomness. Work in this field is often distinguished by its emphasis on mathematical technique and rigor.

The SIGACT community is a rich mix of professors, researchers, and entrepreneurs who are driven by and who drive the foundations of computing. SIGACT actively sponsors numerous symposia, workshops, and awards (often in cooperation with other SIGs and Societies) as well as a quarterly newsletter.

2 Recent SIGACT Initiatives

SIGACT sponsors or cooperates in the running of 21 high-quality conferences and workshops per year. Some of the newer annual conferences sponsored include the Conference on Research in Computational Molecular Biology (RECOMB), the Workshop on Discrete Algorithms and Methods for Mobile Computing and Computations (DIALM), and the Workshop on I/O in Parallel and Distributed Systems (IOPADS). SIGACT's annual flagship conference, the Symposium on the Theory of Computing (STOC), was recently held for the 32nd time.

Several SIGACT members took part in the 1999 and 2000 workshops on Challenges for Theory of Computing, co-sponsored with the National Science Foundation. The 1999 report complements the February 1999 report of the President's Information Technology Advisory Committee (PITAC) and urges increased funding in basic research in theoretical computer science. The 2000 report, which is under preparation, is geared more to enhance collaborations and to increase awareness of theoretical computer science among fellow researchers.

SIGACT continues to be a supporter of the FCRC meetings and of the ACM electronic publishing initiatives. We are actively working on cooperative ventures with the European Association for Theoretical Computer Science (EATCS), including co-location of our flagship conferences STOC '01 and ICALP '01 in Crete, Greece in July 2001.

During the recent years, SIGACT has refined procedures for electronic program committee meetings for its flagship conference STOC. The software gathers scores and comments and produces web pages with organized rankings and comments on papers. The electronic submission server is now installed and running without problems on SIGACT's home machine sigact.acm.org. The procedures have been disseminated to other conferences and societies. We have recently developed policy guidelines for our conference program committees, including how to incorporate outside reviewers.

3 SIGACT Awards

SIGACT awarded four prizes of its own in the past year (the first three endowed by SIGACT) and participated in the awarding of an ACM award, partially endowed by SIGACT:

1. We awarded the eighth Gödel Prize in conjunction with the EATCS to Moshe Vardi and Pierre Wolper for their article “Reasoning about Infinite Computations,” *Information and Computation*, 115 (1994), 1–37, which showed how temporal logic statements could be converted to statements about infinite automata, thus simplifying and rendering more practical the process of model checking used in software verification. The Prize included \$5,000 plus a \$1,000 travel fund.
2. We awarded the third Donald E. Knuth Prize for Outstanding Contributions to the Foundations of Computer Science to Laszlo Lovász at FOCS '99 in October 1999 for his outstanding work on a range of areas, including the Lovász Local Lemma, basis reduction, ellipsoid method, theory of inapproximability, and mixing rates. The Prize included \$5,000 plus a \$1,000 travel fund.
3. We awarded the fourth SIGACT Distinguished Service Award at STOC '00 in May 2000 to Rao Kosaraju for his substantial service to SIGACT and the theoretical computer science community, including roles as SIGACT Chair, as STOC program committee chair, and on numerous service committees. The Award included a \$1,000 prize and \$500 for travel.
4. We awarded the STOC 2000 Best Student Paper Award to Andris Ambainis for “Quantum lower bounds by quantum arguments.” The Award included a \$500 stipend.
5. SIGACT contributed to the endowment for the ACM Paris Kanellakis Theory and Practice Award, which was awarded for the fourth time. The recipients were Daniel Sleator and Robert Tarjan for their invention of the now widely-used “Splay Tree” data structure.

In addition SIGACT has contributed to the endowments of the best student paper and influential paper awards for the COLT and PODS conferences.

4 SIGACT Conference Activities

One of SIGACT’s primary roles and successes is its sponsorship of symposia. These conferences are full of exciting new solutions to long-standing problems as well as exciting new applications and frameworks that will drive future technology (not to mention startups!). Some of the newer emerging topic areas include quantum computing, DNA computing, zero knowledge, cryptography, massive data organization, data mining on the web, distributed computing on the web, genome analysis, computational biology, and computational finance. Several conferences include keynote speakers who discuss groundbreaking new developments. For example, STOC '00 included an invited talk about content distribution on the web given by Tom Leighton, ex-SIGACT Chair and founder of Akamai Technologies.

During the past year SIGACT was affiliated with 21 conferences. It was full sponsor of the following two conferences:

- 32nd Symposium on the Theory of Computing (STOC).
- 4th Conference on Research in Computational Molecular Biology (RECOMB).

SIGACT co-sponsored the following eight conferences:

- 27th Symposium on Principles of Programming Languages (POPL), co-sponsored with SIGPLAN.
- 12th Symposium on Discrete Algorithms (SODA), co-sponsored with SIAM.
- 19th Symposium on Principles of Distributed Computing (PODC), co-sponsored with SIGOPS.
- 6th Workshop on Input/Output in Parallel and Distributed Systems (IOPADS), co-sponsored with SIGARCH, SIGMETRICS, and SIGOPS.
- 16th Symposium on Computational Geometry (SCG), co-sponsored with SIGGRAPH.
- 12th Symposium on Parallel Algorithms and Architectures (SPAA), co-sponsored with SIGARCH.
- 4th Workshop on Discrete Algorithms and Methods for Mobile Computing and Computations (DIALM), co-sponsored with SIGMOBILE.
- 2nd Workshop on Challenges for Theory of Computing, co-sponsored with SIAM, DIMACS, and NSF.

There were also 11 conferences held in cooperation with SIGACT:

- 40th Symposium on Foundations of Computer Science (FOCS), in cooperation with IEEE TCMCS.
- 13th Conference on Computational Learning Theory (COLT), in cooperation with SIGART.
- 2000 Euro-Par Conference, in cooperation with IFIP, SIGARCH, SIGNUM, and SIGPLAN.
- IFIP International Conference on Theoretical Computer Science (TCS), in cooperation with IFIP.
- 15th Conference on Computational Complexity (CCC), in cooperation with IEEE TCMCS.
- 19th Symposium on Principles of Database Systems (PODS), in cooperation with SIGMOD and SIGART.
- 15th Symposium on Logic in Computer Science (LICS), in cooperation with IEEE TCMCS.
- European Joint Conferences on Theory and Practice of Software (ETAPS), in cooperation with Technische Universität Berlin.
- Half Century of Automata Theory (HCAT), in cooperation with University of Western Ontario.
- 2001 International Conference on Database Theory (ICDT), in cooperation with the British Computer Society.
- 5th Conference on Implementation and Application of Automata (CIAA), in cooperation with University of Western Ontario.

5 SIGACT Publications

The publications of the conferences sponsored by SIGACT are published by the ACM. SIGACT members have free online access to all SIGACT-affiliated publications in the ACM Digital Library. SIGACT is participating in making all past proceedings of its sponsored conference online. SIGACT also maintains an active web page at <http://www.acm.org/sigact/> with links to several items of interest.

The SIGACT newsletter, *SIGACT News*, prints timely research news columns in several areas of theoretical computer science. It also publishes book reviews and curricula and outlines of CS courses as they are taught at various universities. *SIGACT News* is published four times per year. In 1999, the 30th volume, the four issues comprised a total of 324 pages. It is mailed in hardcopy to all members and is available on the SIGACT web page.

6 SIGACT Educational Activities

SIGACT sponsors deeply discounted registration fees for students at most of its conferences. We committed between \$10K and \$15K this year for the purposes of reduced registration fees for students at FCRC '99. We also budget \$10K per year for travel support for students going to STOC. The SIGACT student lunch program allows students at STOC, SODA, and FOCS to eat for free with full-paying registrants.

7 Collaboration With Other SIGs and Organizations in the U.S. and Canada

SIGACT collaborates extensively with IEEE Computer Society, Computing Research Association, SIAM, and other SIGs and organizations. Several examples of conferences that are co-sponsored with other groups are included above. SIGACT co-sponsors the Knuth Prize with the IEEE TCMFC. SIGACT looks forward to future collaboration with other SIGs and societies and is enthusiastic about its involvement in the federated meetings.

8 International Efforts

SIGACT works closely with overseas organizations such as EATCS and IFIP. SIGACT and EATCS jointly sponsor the Gödel Prize and are in the midst of planning several cooperative ventures, including the co-location of STOC '01 and ICALP '01 along with other workshops in Crete, Greece in July 2001. This event will represent the first time in its 33 years that STOC is being organized outside the U.S.

Many foreign countries have local SIGACT chapters, and SIGACT routinely sponsors or cooperates with conferences that are held overseas. SIGACT also sponsors a proceedings donation program for researchers in underdeveloped countries.

9 SIGACT Institutional Sponsors

Industrial research laboratories are a major employer of theoretical computer scientists, and SIGACT maintains close connections with several leading companies. The following eight companies are SIGACT institutional sponsors and provide financial support to SIGACT: Academic Press, Akamai Technologies, AT&T Labs–Research, IBM Research, Lucent Technologies–Bell Laboratories, Microsoft Research, Star Labs–InterTrust Technologies, and Tektronix.

10 Self-Assessment and Ongoing Concerns

SIGACT is fulfilling its commitments well: The newsletter is frequent, informative, and timely. Its many conferences are forums for research of the highest quality. Items of immediate interest are routinely posted on the Internet. We are actively developing joint initiatives with our international colleagues in the EATCS, some of which we hope to report on in the near future.

SIGACT is doing very well financially. The SIGACT fund balance is currently slightly in excess of one-half million dollars, up about 5 percent from 12 months ago. As a result, SIGACT has removed budgeting for contingency items in its conferences (thus lowering registration fees), it has increased student travel funding, and it is helping to endow awards for excellence in the conferences that it sponsors.

Membership in SIGACT has decreased by about 30 percent from roughly 1950 to 1350 during the past four years—a trend common to most SIGs, many of whom experienced a larger decrease in membership. Budget and membership information is included separately in the ACM documents. Increasing membership and the visibility of theoretical computer science is one of the challenges over the next several years.

Several years ago a primary concern of the SIGACT membership was the decline in academic job opportunities for its graduate students. The past two years have seen a dramatic upturn in job opportunities for students in theoretical computer science; the situation may be turning itself around.

The SIGACT community has worked together with funding agencies and industry to adapt to the changes in the job market. An increasing number of theory students are applying their analytical expertise in applied and/or non-academic positions after they receive their degree. SIGACT will continue to pay attention to related applied fields. At the same time SIGACT continues to highlight the accomplishments of its community and to advocate for the strategic importance of theoretical computer science. Those intertwined themes were the focus of the past two workshops on Challenges for Theory of Computing, co-sponsored with the National Science Foundation.