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Advances in Cryptology – CRYPTO '89

Proceedings

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CRYPTO '89

A conference on the Theory and Applications of Cryptology

held at the University of California, Santa Barbara,
through the cooperation of the
Computer Science Department

August 20 - 24, 1989

sponsored by:

The International Association for Cryptologic Research

in cooperation with

The IEEE Computer Society Technical Committee on Security and Privacy

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Preface

Pour Alice
Qui est venue au monde
Trois semaines avant l'avalanche

CRYPTO is a conference devoted to all aspects of cryptologic research. It has been held each year on the campus of the University of California at Santa Barbara since 1981, when it was first organized by Alan Gersho. Annual meetings also take place in Europe under the name of EUROCRYPT. Both CRYPTO and EUROCRYPT conferences are now sponsored by the *International Association for Cryptologic Research* (IACR), which was founded in the wake of CRYPTO '82. You are now holding the proceedings of the ninth CRYPTO meeting: CRYPTO '89. Recent previous proceedings of CRYPTO and EUROCRYPT can be cited as [2, 3, 4, 5, 6]. For citations of yet earlier proceedings, please consult the preface of EUROCRYPT '87 [2].

This year's conference took place on August 20 – 24, 1989. It attracted 263 participants coming from 23 countries, showing a steady increase in size, and requiring a change to a larger lecture room. This growth is better appreciated if one goes back to the preface of CRYPTO '82, which claims that "[it] was the largest conference of its kind [... it] attracted over 100 participants" [1]! Approximately 40% of the attendees were from the industry, 40% from universities, and 20% from governments. The great success of this year's conference was largely due to the enthusiasm and wonderful work done by Kevin McCurley, who was holding the general chair. We all owe him a debt of gratitude for his total commitment to making CRYPTO '89 a memorable event. For a more elaborate report on CRYPTO '89, please read the report that Kevin has written with my collaboration in the *IACR Newsletter* [8]. Details on the new policies that I enforced as program chairperson can be found in [7].

The call for papers resulted in 93 submissions coming from 18 countries. Out of those, 6 were not considered because they arrived after the deadline, 1 was withdrawn, 45 were accepted, and 2 pairs were asked to merge. The accepted papers were selected by the program committee, sometimes on the basis of a rather short abstract. As an experiment for the CRYPTO conference, I enforced a blind refereeing process by which the name of the authors were not revealed to the other members of the program committee. The final papers were not refereed at all, and the authors retain full responsibility for their contents. Several of the papers are preliminary reports of continuing research. It is anticipated that many of these papers will appear in more polished form in various technical journals, including IACR's *Journal of Cryptology*. There will be a special issue of the *Journal of Cryptology* devoted to some of the best papers of the conference this year. These papers will be refereed by the usual process, and Joan Feigenbaum will serve as the special editor for the issue.

In addition to the contributed papers, I scheduled three invited talks: "Keying the German navy's Enigma" by David Kahn, "Digital signatures: The evolution of a fundamental primitive" by Silvio Micali, and "A survey of hardware implementations of RSA" by Ernest F. Brickell. Moreover, in order to encourage a balance between practical and theoretical topics at the conferences, this year's program featured an invited special session on practical aspects of cryptology, which was organized and chaired by Russell L. Brand. Thus, 53 regular papers were presented at the conference. Furthermore, 26 additional papers were submitted on the first day of the conference for the traditional "rump session" of impromptu talks organized as always by Whitfield Diffie. Of those, 17 were accepted for short presentation on Tuesday evening, as selected by Whitfield and me.

These proceedings contain papers for all the contributed and all but one of the invited talks given at the conference. The exception is the invited talk of Silvio Micali. Short papers (I imposed a strict limit of four pages) are also included for 8 of the 17 impromptu talks. Reflecting the structure of the conference, the proceedings are arranged in 13 sections (followed by an author index). Each section corresponds to one session of the conference. The first 12 sections contain the contributed and invited papers in the order in which they were presented. The last section is devoted to the rump session. The sections are organized according to the following themes: opening session, why is cryptography harder than it looks?, pseudo-randomness and sequences, cryptanalysis and implementation, signature and authentication I and II, threshold schemes and key management, key distribution and network security, fast computation, odds and ends, zero-knowledge and oblivious transfer, multiparty computation, and the rump session.

Two papers in this collection are of historical significance. The proceedings open with a short paper by David Kahn on the Enigma. You will also find an antique paper by Ralph Merkle, describing "A certified digital signature", which was accepted a decade ago for publication in the *Communications of the ACM*, but which has never seen the light of day. I trust you will agree that despite its old age, this paper has lost none of its interest. Because I wanted Merkle's paper to appear exactly as it was written ten years ago, I allowed the author one page above the otherwise very strict page limit imposed on all other authors. (Please don't throw bricks at me!)

It is my great pleasure to acknowledge the efforts of those who contributed to making the conference and its proceedings possible. First of all, I wish to thank the program committee, without whom my task would have been hopeless. Most of them read and made detailed comments on at least 29 submissions. Besides myself, the committee consisted of Josh Benaloh (University of Toronto), Russell L. Brand (Special session chairperson, Lawrence Livermore National Laboratory), Claude Crépeau (Massachusetts Institute of Technology), Whitfield Diffie (Bell Northern Research), Joan Feigenbaum (AT&T Bell Laboratories), James L. Massey (ETH Zentrum, Zurich), Jim Omura (Cylink Corporation), Gustavus J. Simmons (Sandia National Laboratories), and Scott Vanstone (University of Waterloo). Moreover,

many colleagues outside the program committee offered their occasional help. Among them, Manuel Blum, Ernest F. Brickell, Jeff Lagarias, Michael Merritt, Larry Ozarow, Carl Pomerance, Jim Reeds, and Moti Yung.

Of course, the most important contribution was that of the authors (including those whose submissions could not be accepted because of the large number of very high quality submissions to the conference this year). I wish to thank the authors for taking so seriously into account my deadline for submission of the final papers. The timeliness of these proceedings is their doing, together with heavy use of electronic mail. More than 300 messages were exchanged by electronic mail between me and the authors, totalizing over half a megabyte of information. Compared to that, I had to make only about 25 long distance phone calls, and 8 FAX's were exchanged.

I also wish to thank the session chairpersons. In addition to program committee members, sessions were chaired by Bob Blakley, Joan Boyar, Ernest F. Brickell, and Kevin McCurley. James L. Massey was scheduled to chair session 10, but he was unfortunately unable to attend the conference because of an accident on the way to the airport. Bob Blakley was kind enough to chair his session on short notice.

Many other people deserve thanks for the organization of the conference. Chief among them, of course, is Kevin McCurley, the general chairperson. I wish to thank also everyone else who took part in the organization of the meeting, IACR officers and directors, and all attendees. I am also grateful to three students who helped me greatly with my task: André Berthiaume, Philippe Hébrais and Sophie Laplante. Lynn Montz and Suzanne Anthony were instrumental at Springer–Verlag in helping me put the proceedings together.

Last but not least, I wish to express my deepest gratitude to my wife Isabelle and newborn daughter Alice for putting up with me while I was working overtime on the program in the spring and on the proceedings in the fall.

Montréal, December 1989 *Gilles Brassard*

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