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Kim G. Larsen Sven Skyum
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# Automata, Languages and Programming

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# Foreword

The International Colloquium on Automata, Languages, and Programming (ICALP) is the annual conference series of the European Association for Theoretical Computer Science (EATCS). It is intended to cover all important areas of theoretical computer science, such as computability, automata, formal languages, new computing paradigms, term rewriting, analysis and design of algorithms, computational geometry, computational complexity, symbolic and algebraic computation, cryptography and security, data types and data structures, theory of data bases and knowledge bases, semantics of programming languages, program specification and verification, foundations of functional and logic programming, parallel and distributed computation, theory of concurrency, theory of robotics, theory of logical design and layout.

ICALP'98 was hosted by Basic Research in Computer Science (BRICS) and Department of Computer Science at Aalborg University, Denmark, from July 13 to July 17, 1998. ICALP'98 was accompanied by the four satellite events: Software Tools for Technology Transfer (STTT), INFINITY'98, Semantics of Objects as Processes (SOAP), and APPROX'98 as well as a summer school in Cryptology and Data Security.

Previous colloquia were held in Bologna (1997), Paderborn (1996), Szeged (1995), Jerusalem (1994), Lund (1993), Vienna (1992), Madrid (1991), Warwick (1990), Stresa (1989), Tampere (1988), Karlsruhe (1987), Rennes (1986), Nafplion (1985), Antwerp (1984), Barcelona (1983), Århus (1982), Haifa (1981), Amsterdam (1980), Graz (1979), Udine (1978), Türkü (1977), Edinburgh (1976), Saarbrücken (1974), and Paris (1972). ICALP'99 will be held in Prague, Czech Republic, during the second week of July, 1999.

The Program Committee selected 70 papers from a total of 182 submissions. Authors of submitted papers came from 35 countries covering all continents. Each submitted paper was sent to at least four Program Committee members, who were often assisted by subreferees. The Program Committee meeting took place at BRICS, Aarhus University, on March 14 and 15, 1998. This volume contains the 70 papers selected at the meeting plus 8 invited papers.

We would like to thank all the Program Committee members and the subreferees who assisted them in their work. Also, members of the Organizing Committee and further members of BRICS deserve our gratitude for their contributions throughout the preparations. A special thanks to Vladimiro Sassone who created the WWW software used for electronic submission and reviewing.

We gratefully acknowledge support from Bosch-Telecom, Beologic, Department of Computer Science at Aalborg University, BRICS, and the City of Aalborg.

May 1998 Kim Guldstrand Larsen, Sven Skyum, and Glynn Winskel
BRICS

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Gilles Brassard, Montréal
Thomas A. Henzinger, Berkeley
Mark Overmars, Utrecht
Andrew Pitts, Cambridge
Amir Pnueli, Weizmann Institute
Leslie G. Valiant, Harvard
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