

Preface

This volume contains the proceedings of the 10th International Conference on Concurrency Theory (CONCUR'99) held in Eindhoven, The Netherlands, 24-27 August 1999.

The purpose of the CONCUR conferences is to bring together researchers, developers and students in order to advance the theory of concurrency and promote its applications. Interest in this topic is continuously growing, as a consequence of the importance and ubiquity of concurrent systems and their applications, and of the scientific relevance of their foundations. The scope of CONCUR'99 covers all areas of semantics, logics and verification techniques for concurrent systems. A list of specific topics includes (but is not limited to) concurrency-related aspects of: models of computation and semantic domains, process algebras, Petri nets, event structures, real-time systems, hybrid systems, stochastic systems, decidability, model-checking, verification techniques, refinement techniques, term and graph rewriting, distributed programming, logic constraint programming, object-oriented programming, typing systems and algorithms, case studies, and tools and environments for programming and verification.

The first two CONCUR conferences were held in Amsterdam (NL) in 1990 and 1991, the following ones in Stony Brook (USA), Hildesheim (D), Uppsala (S), Philadelphia (USA), Pisa (I), Warsaw (PL) and Nice (F). The proceedings have appeared in Springer LNCS, as Volumes 458, 527, 630, 715, 836, 962, 1119, 1243, and 1466.

Of the 91 regular papers submitted this year, 32 were accepted for presentation at the conference and are included in the present volume. Apart from these, the conference included four invited presentations, by Rance Cleaveland (State University of New York at Stony Brook, USA), Javier Esparza (Technische Universität München, D), Rob van Glabbeek (Stanford University, USA) and Catuscia Palamidessi (Pennsylvania State University, USA), and three invited tutorials, by Petr Jančar (Technical University of Ostrava, CZ), Nils Klarlund (AT&T Labs Research, USA) and Jan Tretmans (Universiteit Twente, NL).

We want to thank all members of the program committee, and their subreferees, for selecting the papers to be presented.

Special thanks are due to the local organization committee, chaired by Jan Friso Groote. Dragan Bošnački arranged the tool demonstrations, André Engels was webmaster, Kees Middelburg was in charge of the tutorials, and Martijn Oostdijk took care of the submission software (written by Vladimiro Sassone). Local arrangements, and help with registration, were provided by Marcella de Rooij, Desiree Meijers, and Anne-Meta Oversteegen.

The conference had three satellite events, all held on 23 August 1999. These were PROBMIV'99 (Workshop on Probabilistic Methods in Verification), EXPRESS'99 (6th International Workshop on Expressiveness in Concurrency), and VFM (Symposium on Visual Formal Methods). We thank Eindhoven University

of Technology for hosting the event and providing many facilities. We thank our sponsors IPA (Institute of Programming Research and Algorithmics, NL), Philips Research Eindhoven, and EESI (Eindhoven Embedded Systems Institute).

Eindhoven
June 1999

Jos Baeten and Sjouke Mauw
Program Committee Co-chairs

CONCUR Steering Committee

Jos Baeten (Chair, Eindhoven, NL)
Eike Best (Oldenburg, D)
Kim Larsen (Aalborg, DK)
Ugo Montanari (Pisa, I)
Scott Smolka (Stony Brook, USA)
Pierre Wolper (Liège, B)

CONCUR'99 Program Committee

Ralph Back (Åbo Akademi University, SF)
Jos Baeten (Eindhoven University of Technology, NL, Co-chair)
Jan Bergstra (Universiteit van Amsterdam, NL)
Manfred Broy (Technische Universität München, D)
Rocco De Nicola (Università di Firenze, I)
Andrew Gordon (Microsoft Research, UK)
Roberto Gorrieri (University of Bologna, I)
Tom Henzinger (University of California, USA)
Bengt Jonsson (Uppsala University, S)
Maciej Koutny (University of Newcastle, UK)
Nancy Lynch (MIT, USA)
Sjouke Mauw (Eindhoven University of Technology, NL, Co-chair)
Arend Rensink (University of Twente, NL)
Philippe Schnoebelen (Ecole Normale Supérieure de Cachan, F)
Robert de Simone (INRIA, F)
P.S. Thiagarajan (SPIC Mathematical Institute, IN)
David Walker (Oxford University, UK)
Glynn Winskel (University of Århus, DK)

Referees

Parosh Aziz Abdulla	Fabrice Le Fessant	Ingolf Krueger
Luca Aceto	Hans Fleischhack	Ruurd Kuiper
Alessandro Aldini	Cedric Fournet	K. Narayan Kumar
Luca de Alfaro	Daniel Fridlender	Orna Kupferman
Roberto Amadio	Fabio Gadducci	Marta Kwiatkowska
Henrik Reif Andersen	Mauro Gaspari	Anna Labella
Suzana Andova	Simon Gay	Rom Langerak
Ralph Back	Thomas Gehrke	Izak van Langevelde
Jos Baeten	Herman Geuvers	François Laroussinie
Christel Baier	Rob van Glabbeek	Alexander Lavrov
Twan Basten	Stefania Gnesi	Francesca Levi
Marek A. Bednarczyk	Andrew Gordon	Xuandong Li
Michael von der Beeck	Roberto Gorrieri	Johan Lilius
Saddek Bensalem	Jan Friso Groote	Jorn Lind-Nielsen
Jan Bergstra	Irène Guessarian	Michele Loreti
Marco Bernardo	Dilian Gurov	Victor Luchangco
G. Berry	Paul Hankin	Bas Luttik
Eike Best	Boudewijn Haverkort	Nancy Lynch
Michele Boreale	Matthew Hennessy	Davide Marchignoli
Andrzej Borzyszkowski	Thomas Henzinger	A. Mateescu
Victor Bos	Holger Hermanns	Sjouke Mauw
Dragan Bošnački	Thomas T. Hildebrandt	Richard Mayr
Ahmed Bouajjani	Tony Hoare	Kees Middelburg
Gerard Boudol	Leszek Holenderski	Leonid Mikhajlov
Mario Bravetti	Kohei Honda	Anna Mikhajlova
Max Breitling	Furio Honsell	Faron Moller
Antonio Brogi	Benjamin Horowitz	Rémi Morin
Stephen Brookes	Franz Huber	Laurent Mounier
Nadia Busi	Michaela Huhn	Olaf Mueller
Martin Büchi	Kees Huizing	Madhavan Mukund
P. Caspi	Thomas Hune	Gustaf Naeser
Flavio Corradini	Anna Ingólfssdóttir	Rajagopal Nagarajan
Jordi Cortadella	Daniel Jackson	Margherita Napoli
Pedro R. D'Argenio	Petr Jančar	Wolfgang Naraschewski
Silvano Dal-Zilio	Ryszard Janicki	Monica Nesi
Mads Dam	Alan Jeffrey	Uwe Nestmann
Philippe Darondeau	Bengt Jonsson	Rocco De Nicola
Alexandre David	Marcin Jurdzinski	Peter Niebert
Anuj Dawar	Joost-Pieter Katoen	Mogens Nielsen
Conrado Daws	Claude Kirchner	Jan Nyström
Raymond Devillers	Hanna Klaudel	Vincent van Oostrom
André Engels	Maciej Koutny	Giuseppe Pappalardo
Emanuela Fachini	Dexter Kozen	Joachim Parrow
G. Ferrari	S Krishnan	Adriano Peron

Paul Pettersson
Anna Philippou
Jan Philipps
Claudine Picaronny
Sophie Pinchinat
Marco Pistore
A. Podelski
Jaco van de Pol
Ivan Porres
John Power
Sanjiva Prasad
Leonor Prensa-Nieto
Corrado Priami
Rosario Pugliese
Paola Quaglia
Mauno Rönkkö
R. Ramanujam
J-F. Raskin
Julian Rathke
Andreas Rausch
Antonio Ravara
Michel Reniers
Arend Rensink

Christian Retore
Judi Romijn
Bill Roscoe
Giuseppe Rosolini
Brigitte Rozoy
Theo C. Ruys
Jeff Sanders
Robert Sandner
Davide Sangiorgi
Birgit Schieder
Vincent Schmitt
Philippe Schnoebelen
Claus Schröter
Bernhard Schätz
Roberto Segala
Peter Sewell
Robert de Simone
Arne Skou
Konrad Slind
Scott Smolka
Katharina Spies
Thomas Stauner
Jason Steggle

Colin Stirling
Laurent Théry
P. S. Thiagarajan
Luca Trevisan
Yaroslav S. Usenko
Mandana Vaziri
Betti Venneri
Bjorn Victor
Patrick Viry
Marc Voorhoeve
Farn Wang
Heike Wehrheim
Jack van Wijk
Tim Willemse
Poul Frederick Williams
Glynn Winskel
J. von Wright
Alex Yakovlev
Wang Yi
Nobuko Yoshida
Sergio Yovine
Mark van der Zwaag