Foreword

ETAPS'99 is the second instance of the European Joint Conferences on Theory and Practice of Software. ETAPS is an annual federated conference that was established in 1998 by combining a number of existing and new conferences. This year it comprises five conferences (FOSSACS, FASE, ESOP, CC, TACAS), four satellite workshops (CMCS, AS, WAGA, CoFI), seven invited lectures, two invited tutorials, and six contributed tutorials.

The events that comprise ETAPS address various aspects of the system development process, including specification, design, implementation, analysis and improvement. The languages, methodologies and tools which support these activities are all well within its scope. Different blends of theory and practice are represented, with an inclination towards theory with a practical motivation on one hand and soundly-based practice on the other. Many of the issues involved in software design apply to systems in general, including hardware systems, and the emphasis on software is not intended to be exclusive.

ETAPS is a loose confederation in which each event retains its own identity, with a separate programme committee and independent proceedings. Its format is open-ended, allowing it to grow and evolve as time goes by. Contributed talks and system demonstrations are in synchronized parallel sessions, with invited lectures in plenary sessions. Two of the invited lectures are reserved for "unifying" talks on topics of interest to the whole range of ETAPS attendees. As an experiment, ETAPS'99 also includes two invited tutorials on topics of special interest. The aim of cramming all this activity into a single one-week meeting is to create a strong magnet for academic and industrial researchers working on topics within its scope, giving them the opportunity to learn about research in related areas, and thereby to foster new and existing links between work in areas that have hitherto been addressed in separate meetings.

ETAPS'99 has been organized by Jan Bergstra of CWI and the University of Amsterdam together with Frans Snijders of CWI. Overall planning for ETAPS'99 was the responsibility of the ETAPS Steering Committee, whose current membership is:

André Arnold (Bordeaux), Egidio Astesiano (Genoa), Jan Bergstra (Amsterdam), Ed Brinksma (Enschede), Rance Cleaveland (Stony Brook), Pierpaolo Degano (Pisa), Hartmut Ehrig (Berlin), José Fiadeiro (Lisbon), Jean-Pierre Finance (Nancy), Marie-Claude Gaudel (Paris), Susanne Graf (Grenoble), Stefan Jähnichen (Berlin), Paul Klint (Amsterdam), Kai Koskimies (Tampere), Tom Maibaum (London), Ugo Montanari (Pisa), Hanne Riis Nielson (Aarhus), Fernando Orejas (Barcelona), Don Sannella (Edinburgh), Gert Smolka (Saarbrücken), Doaitse Swierstra (Utrecht), Wolfgang Thomas (Aachen), Jerzy Tiuryn (Warsaw), David Watt (Glasgow)

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> The European Association for Programming Languages and Systems
> The European Association for Theoretical Computer Science

I would like to express my sincere gratitude to all of these people and organizations, the programme committee members of the ETAPS conferences, the organizers of the satellite events, the speakers themselves, and finally Springer-Verlag for agreeing to publish the ETAPS proceedings.

Edinburgh, January 1999   Donald Sannella
                                           ETAPS Steering Committee Chairman

Preface

The International Conference "Foundations of Software Science and Computation Structures" (FOSSACS) is a constituent of the "Joint European Conferences on Theory and Practice of Software" (ETAPS). The present volume contains the contributions to FOSSACS'99, the second conference in this series, which took place in Amsterdam.

As formulated in the call for papers, FOSSACS focusses on "papers which offer progress in foundational research with a clear significance for software science. A central issue is theories and methods which support the specification, transformation, verification, and analysis of programs and software systems." The articles in this volume represent a wide spectrum of approaches to this general aim. In many papers, one finds the study of new concepts and methods which are motivated by recent trends (or problems) in the practical use of software and information technology.

The volume contains 18 contributed papers, preceded by three invited papers. The first, by M. Abadi, accompanies his "unifying invited lecture" addressed to the whole ETAPS audience. The second, by J. Esparza and J. Knoop, contains an application of the results presented by J. Esparza in his invited lecture to FOSSACS'99. The third summarizes an invited tutorial by D. Sangiorgi presented to ETAPS'99.

The selection of the contributed papers was in the hands of a programme committee consisting of R. di Cosmo (Paris), E.A. Emerson (Austin, TX), J. Engelfriet (Leiden), H. Ganzinger (Saarbrücken), D. Kozen (Ithaca, NY), B. Jonsson (Uppsala), A. Jung (Birmingham), M. Nielsen (Aarhus), T. Nipkow (Munich), D. Niwiński (Warsaw), C. Palamidessi (University Park, PA), A. Petit (Cachan), C. Stirling (Edinburgh), and W. Thomas (Aachen, chair). From 40 submissions, 18 were selected in a procedure which consisted of an e-mail discussion and a physical meeting in Aachen. Four members were present at this meeting (H. Ganzinger, B. Jonsson, A. Petit, W. Thomas); the others were contacted by e-mail in individual cases and provided with intermediate summaries of the discussion. I would like to thank all members of the programme committee and all subreferees for their diligent work and efficient cooperation. Special thanks go to Marianne Kuckertz and Jesper G. Henriksen for their excellent support regarding secretarial work and the electronic infrastructure and communication.

Aachen, January 1999   Wolfgang Thomas
                                        FOSSACS'99 Programme Committee Chair

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