

# Foreword

ETAPS 2000 was the third 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 comprised five conferences (FOSSACS, FASE, ESOP, CC, TACAS), five satellite workshops (CBS, CMCS, CoFI, GRATRA, INT), seven invited lectures, a panel discussion, and ten 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 program 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. 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 were formerly addressed in separate meetings. The program of ETAPS 2000 included a public business meeting where participants had the opportunity to learn about the present and future organization of ETAPS and to express their opinions about what is bad, what is good, and what might be improved.

ETAPS 2000 was hosted by the Technical University of Berlin and was efficiently organized by the following team:

Bernd Mahr (General Chair)  
Hartmut Ehrig (Program Coordination)  
Peter Pepper (Organization)  
Stefan Jähnichen (Finances)  
Radu Popescu-Zeletin (Industrial Relations)

with the assistance of BWO Marketing Service GmbH. The publicity was superbly handled by Doris Fähndrich of the TU Berlin with assistance from the ETAPS publicity chair, Andreas Podelski. Overall planning for ETAPS conferences is the responsibility of the ETAPS steering committee, whose current membership is:

Egidio Astesiano (Genova), Jan Bergstra (Amsterdam), Pierpaolo Degano (Pisa), Hartmut Ehrig (Berlin), José Fiadeiro (Lisbon), Marie-Claude Gaudel (Paris), Susanne Graf (Grenoble), Furio Honsell (Udine), Heinrich Hußmann (Dresden), Stefan Jähnichen (Berlin), Paul Klint (Amsterdam), Tom Maibaum (London), Tiziana Margaria (Dortmund), Ugo Montanari (Pisa), Hanne Riis Nielson (Aarhus), Fernando Orejas (Barcelona), Andreas Podelski (Saarbrücken), David Sands (Göteborg), Don Sannella (Edinburgh), Gert Smolka (Saarbrücken), Bernhard Steffen (Dortmund), Wolfgang Thomas (Aachen), Jerzy Tiuryn (Warsaw), David Watt (Glasgow), Reinhard Wilhelm (Saarbrücken)

ETAPS 2000 received generous sponsorship from:

the Institute for Communication and Software Technology of TU Berlin  
the European Association for Programming Languages and Systems  
the European Association for Theoretical Computer Science  
the European Association for Software Development Science  
the “High-Level Scientific Conferences” component of the European  
Commission’s Fifth Framework Programme

I would like to express my sincere gratitude to all of these people and organizations, the program 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.

January 2000

Donald Sannella  
ETAPS Steering Committee Chairman

# Preface

The International Conference in Compiler Construction (CC) is a forum for presentation and discussion of recent developments in language processors and language design. It emphasizes practical methods and tools. CC 2000 was the ninth conference in the series.

The CC conference originated as a series of workshops organized since 1986 by Günter Riedewald in East Germany. In 1992 the series was relaunched by Uwe Kastens in Paderborn. It was highly appropriate that the first CC conference of the new millennium should take place in Berlin, newly restored as the capital city of reunified Germany.

The CC conference, originally biennial, federated to ETAPS in 1998 and became annual. Despite that major change, the number of submissions and the number of accepted papers have remained stable. The program committee received 46 submissions for CC 2000, from which eighteen high-quality papers were selected for presentation. These papers are included in these proceedings.

The invited speaker at CC 2000 was Reinhard Wilhelm, whose talk was entitled *Shape Analysis*. A paper based on the invited talk opens these proceedings.

The work of the CC 2000 program committee was conducted entirely by electronic means. This made it practicable for all program committee members to participate fully in discussions of individual papers, to re-read papers, and in some cases to provide extra reviews. I believe that the quality of the paper selection process benefited greatly from this mode of working.

I am glad to acknowledge the hard work and friendly cooperation of all my colleagues on the program committee. I also wish to thank the much larger number of additional reviewers who helped us to read and evaluate the submitted papers. As a first-time program chair I have particular reason to appreciate the support and advice of the ETAPS chair, Don Sannella, and of the CC steering committee. Finally, I wish to thank all the authors of submitted papers for their continued interest, without which the CC conference could not thrive.

January 2000

David Watt

## CC Steering Committee

Peter Fritzson (Sweden)  
Tibor Gyimóthi (Hungary)  
Stefan Jähnichen (Germany)  
Uwe Kastens (Germany)

Kai Koskimies (Finland)  
David Watt (UK)  
Reinhard Wilhelm (Germany)

**CC 2000 Program Committee**

Rudolf Eigenman (USA)	Mooly Sagiv (Israel)
Christine Eisenbeis (France)	Helmut Seidl (Germany)
Christian Ferdinand (Germany)	Martin Simons (Germany)
Guang Gao (USA)	Chau-Wen Tseng (USA)
Görel Hedin (Sweden)	Bruce Watson (South Africa)
Olivier Michel (France)	David Watt (UK, chair)
Simon Peyton Jones (UK)	Hans Zima (Austria)
Lawrence Rauchwerger (USA)	

**CC 2000 Reviewers**

Gagan Agrawal	Alin Jula	Sara Porat
José Nelson Amaral	Daniel Kaestner	Jan Prins
Brian Armstrong	Richard Kennell	James Riely
Denis Barthou	Christoph Kessler	Martin Rinard
Siegfried Benkner	Seon Wook Kim	Sven Robertz
Peter Brezany	Torsten Klein	Erven Rohou
Manuel Chakravarty	Marc Langenbach	Bernhard Scholz
Jong-Deok Choi	James Larus	Ran Shaham
Philippe Clauss	Erwin Laure	Viera Sipkova
Albert Cohen	Daniel Lavery	Anthony Sloane
Jean-François Collard	Jaejin Lee	V.C. Sreedhar
Graham Collins	Xavier Leroy	Arthur Stoutchinin
Charles Consel	Tal Lev-Ami	Doaitse Swierstra
Aino Cornils	Wei Li	Clemens Szyperski
Ron Cytron	Eva Magnusson	Olivier Temam
Franck Delaplace	Florian Martin	Alexandre Tessier
Nurit Dor	Wellington Martins	Henrik Theiling
Étienne Duris	Éduard Mehofer	Stephan Thesing
Daniel Étienne	Oege de Moor	François Thomasset
Paul Feautrier	Rishiyur Nikhil	Michael Voss
Ines Fey	Anders Nilsson	Philip Wadler
Cedric Fournet	Rinetskey Noam	David Wakeling
Jean-Louis Giavitto	Preeti Ranjan Panda	Reinhard Wilhelm
Manish Gupta	Sven Panne	Eran Yahav
David Hanson	Insung Park	Hongbo Yang
Paul Havlak	Michael Parkes	Pen-Chung Yew
Chung-Hsing Hsu	Jonas Persson	Hao Yu
François Irigoien	Patrik Persson	Chihong Zhang
Anders Ive	Wolf Pfannenstiel	Wolf Zimmermann