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Tom Maibaum (Ed.)

Fundamental Approaches to Software Engineering

Third International Conference, FASE 2000
Held as Part of the Joint European Conferences
on Theory and Practice of Software, ETAPS 2000
Berlin, Germany, March 25 – April 2, 2000
Proceedings

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Volume Editor

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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)

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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 Science and Technology
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 conference on Fundamental Approaches to Software Engineering (FASE) is one of the confederated conferences within ETAPS. It aims at providing a forum where rigorous methods (in the sense used by scientists and engineers) for the software production process may be discussed. FASE is related to the correspondingly 'acronymed', but differently named conference that was traditionally part of the late TAPSOFT series. There is thus a tradition to uphold, but also a shift in emphasis: we wish to address issues in software engineering rigorously, but not necessarily simply mathematically. Engineers in the classical disciplines use a mixture of formal and heuristic methods in a design process, which has been legitimized by being well founded with respect to scientific and mathematical foundations, and by repeated and repeatable successes in delivering artefacts that are 'fit for purpose'.

The call for papers stated this view as follows:

To achieve the status of a proper engineering discipline, software engineering requires engineering design and analysis METHODS which are firmly grounded on scientifically sound concepts as well as well-founded software tools and analyses based on sound engineering principles. Fundamental approaches are sought, integrating formal approaches with principled methods, providing the bridge between theory and practice and aimed at producing engineering methods and tools for the various phases of software development. FASE is intended to provide a forum where fundamental approaches to software engineering are presented, compared and discussed. Contributions should focus on the problems and methods of software engineering; papers are especially welcome on the following topics:

- Methods for the design of high quality software, relying on formal approaches to specification, refinement, testing, and validation
- The use of program derivation and transformation methods to support software production
- Integration of formal notations and methods with engineering notations and methods
- Combining programming in the small and programming in the large software architectures
- Principled approaches to reverse engineering, legacy software, reuse and evolution
- Case studies of the application of principled software engineering methods
- Reports evaluating industrial experience of the use of software engineering methods
- Rigorous experimental studies of the effectiveness and applicability of principled methods

The program committee consisted of:

Gul Agha, University of Illinois Urbana
David Basin, Albert-Ludwigs-Universität Freiburg
Dan Craigen, ORA Canada
Peter Dybjer, Chalmers University of Technology
José Luiz Fiadeiro, University of Lisbon
Jean-Pierre Finance, University of Nancy
Hans-Dieter Ehrich, Technical University of Braunschweig
Heinrich Hußmann, Technical University of Dresden
Michael Lowry, NASA Ames Research Center
Jeff Magee, Imperial College
Tom Maibaum (chair), King's College London
Dino Mandrioli, Politecnico di Milano
Narciso Martí-Oliet, Universidad Complutense Madrid
Peter Mosses, University of Aarhus
Andrzej Tarlecki, University of Warsaw

We received almost 60 papers and used an electronic method of review. We did not actually meet physically. This has been tried before and worked well. I believe that this was again the case. This was in no small measure due to the PC and to the referees that agreed to help them. The names of these referees are listed immediately after the preface and I would like to take this opportunity to heartily thank them all! I would also like to thank Anna Maros for her administrative help and particularly Kelly Androutsopoulos for her hard extensive efforts in making the electronic system work!

The result of all this effort is on display in this volume. I hope that you will find the 21 papers useful and inspirational. Three short papers related to tools demonstrations relevant to FASE further supplement the volume. The demonstrations were chosen using a different, global mechanism and then assigned to relevant conferences. Also, we have the contributions of 3 invited speakers assigned to this volume. The FASE invited speaker, Wlad Turski, has contributed an intriguing assessment of software engineering at the turn of the century. He looks back to the original conference 'establishing' the discipline, its focus over the last few decades, and the need to refocus our efforts in different directions so as to better support the present needs of software engineering. He ends on a somewhat pessimistic note.... I look forward to the discussions which I am certain will be generated at the conference.

The two 'global' invited speakers, David Harel and Richard Mark Soley, have made short contributions related to their invited talks. Harel focuses on the need to do further research on bahaviour and how to represent it, a topic also taken up extensively by Turski. Soley focuses on the need to develop the capability of dynamically linking information on the Web so as to enhance our ability to find and use information.

Referees

Agha, Gul
Alexandre, Francis
Ambroszkiewicz, Stanislaw
Andrade, L.
Andreu, I. Pita
Ayari, Abdelwaheb
Baresi, Luciano
Basin, David
Baumeister, Hubert
Bednarczyk, Marek
Bidoit, Michel
Blanc, B.
Boyd, Mark
Brat, Guillaume
Craigen, Dan
Cugola, Giampaolo
Danvy, Olivier
de Frutos-Escrig, David
de Groote, Philippe
Demuth, Birgit
Duran, Francisco
Dybjer, Peter
Eckstein, Silke
Ehrich, Hans-Dieter
Festor, Olivier
Fiadeiro, José Luis
Finance, Jean-Pierre
Fischer, Bernd
Fischer, Mike
Fitzgerald, J. S.
Friedric, Stefan
Fuenfstueck, Falk
Galan Corroto, L. Antonio
Godart, Claude
Grau, Antonio
Grudzinski, Grzegorz
Havelund, Klaus
Hussmann, Heinrich
Jabłonowski, Janusz
Jacquot, J. P.
Jamali, Nadeem
Jaray, Jacques
Kubica, Marcin
Kuester Filipe, Juliana
Kumichel, Frank-Ulrich
Laprie, Jean-Claude
Lasota, Sławomir
Llana-Diaz, Luis F.
Lopes, A.
Lowry, Michael
Lukaszewicz, Witold
Magee, Jeff
Maibaum, Tom
Mandrioli, Dino
Marroquin Alonso, Olga
Martí-Oliet, Narciso
Monga, Mattia
Mosses, Peter D.
Méry, Dominique
Neumann, Karl
Nipkow, Tobias
Nunes, I.
Orso, Alex
Park, Seungjoon
Pecheur, Charles
Penczek, W.
Penix, John
Pinger, Ralf
Pressburger, Thomas
Roegel, Denis
Rossi, Matteo
Schumann, Johan
Segura, Clara
Sernadas, Cristina
Souquières, Jeanine
Tarlecki, Andrzej
Thati, Prasannaa
Thiemann, Peter
Varela, Carlos
Verdejo, Alberto
Vigano, Luca
Visser, Willem
Wermelinger, M.
Whittle, Jonathan
Winkowski, J.
Wolff, Burkhart
Ziaei, Reza

I want to thank Don Sannella, chair of the ETAPS steering committee for his many great efforts on behalf of the ETAPS community. The organizers in Berlin should also be thanked for their work in making the conference a great success. Finally, I would also like to thank Matt Bishop for his hard work in putting together the proceedings.

January 2000 Tom Maibaum

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