# Lecture Notes in Computer Science

Edited by G. Goos and J. Hartmanis

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# Formal Methods and Software Development

TAPSOFT

Proceedings of the International Joint Conference on Theory and Practice of Software Development (TAPSOFT)
Berlin, March 25–29, 1985

Volume 2:
Colloquium on Software Engineering (CSE)

Edited by Hartmut Ehrig, Christiane Floyd, Maurice Nivat and James Thatcher

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# PREFACE

TAPSOFT is an international Joint Conference on Theory and Practice of Software Development. The idea for TAPSOFT originated when it was suggested that the 1985 annual Colloquium on Trees in Algebra and Programming (CAAP) should be held in Berlin. In view of the desired interaction between theory and practice, it was decided to supplement CAAP with a corresponding Colloquium on Software Engineering (CSE), and an advanced seminar connecting both parts. The overall aim of the conference is, to bring together theoretical computer scientists and software engineers (researchers and practitioners) with a view to discussing how formal methods can usefully be applied in software development.

TAPSOFT is being held from March 25-29, 1985 at the Technical University of Berlin. It is organized by the Technical University of Berlin, the Gesellschaft für Informatik, and the European Association for Theoretical Computer Science. The general organizers are Hartmut Ehrig (TU Berlin), Christiane Floyd (TU Berlin), Maurice Nivat (Université de Paris VI) and Jim Thatcher (IBM Research, Yorktown Heights).

TAPSOFT comprises three parts:

- Advanced Seminar on the Role of Semantics in Software Development

  The aim of this advanced seminar is to bring together leading experts in the fields of formal semantics and software engineering so as to enable them to present their own work and views on the role of semantics in software development, and to provide a forum for discussions between seminar speakers and all other conference participants.

  The seminar consists of invited lecturers and a panel discussion chaired by W. Turski and entitled "Formalism - or else?". Each lecture is followed by a brief response, giving a critical appraisal, and by a general discussion.

  The invited speakers are

  J. Backus (USA)
  M. Broy (Germany)
  R.M. Burstall (UK)
  A.P. Ershov (USSR)
  J.J. Horning (USA)
  C.B. Jones (UK)
  H.D. Mills (USA)
  U. Montanari (Italy)
  P. Naur (Denmark)
  D.L. Parnas (Canada)
  J.C. Reynolds (USA)
  D. Scott (USA)

The invited lectures are arranged in three sections:

Concepts of Semantics with a View to Software Development
The Role of Semantics in Language Design
The Role of Semantics in the Development of Software Systems

with a considerable overlap between the concerns of the contributions to the different sections.

- Colloquium on Trees in Algebra and Programming (CAAP '85)

The previous Colloquia on Trees in Algebra and Programming were held in France and Italy as autonomous conferences. CAAP '85 is integrated into the TAPSOFT conference.

Following the CAAP tradition, papers accepted for CAAP '85 cover a wide range of topics in theoretical computer science. In line with the theme of the TAPSOFT conference, special emphasis is given in the CAAP '85 program to problems arising in software development.

The selected papers are organized in six sections:

Algorithms and Combinatorics
Rewriting
Concurrency
Graph Grammars and Formal Languages
Specifications
Semantics and Data-Types.

The program committee for CAAP '85 consists of:

A. Arnold (France)
G. Ausiello (Italy)
E. Blum (USA)
W. Brauer (Germany)
R. Cori (France)
M. Dauchet (France)
H.D. Ehrich (Germany)
H. Ehrig (Chair, Germany)
M.C. Gaudel (France)
H.-J. Kreowski (Germany)
B. Mahr (Germany)
U. Montanari (Italy)
M. Nivat (France)
G. Plotkin (UK)
G. Rozenberg (Netherlands)
E. Wagner (USA)

- Colloquium on Software Engineering (CSE)

CSE focusses on the relevance of formal methods to software development. It tries to answer the following questions:

- Can notions of software engineering be clarified with the help of formal concepts?

- Can concepts of formal semantics be applied in practical software development? Which supporting tools are needed?
- What experiences have been gained using formal methods and how are they related to the claims of their proponents?
- What alternatives to formal methods can be proposed?

These questions are taken up by researchers presenting concepts together with their realisation, and by practitioners reporting on industrial experience with methodical approaches. This session is supplemented by invited lectures given by experts from leading computer and software companies.

The selected papers are presented in the sections listed below:

Concepts and Methods in Software Development
Tools and Environments
Rigorous Approaches to Programming
Abstract Data Types in Software Development
Views of Concurrency
Industrial Experience

The program committee for CSE consists of:

C. Floyd (Chair, Germany)
C. Haenel (Germany)
P. Henderson (UK)
H.-J. Hoffmann (Germany)
C.B. Jones (UK)
G. Kahn (France)
W. Koch (Germany)
C.H.A. Koster (Netherlands)
P. Löhr (Germany)
P. Naur (Denmark)
M. Sintzoff (Belgium)
J. Thatcher (USA)
W. Turski (Poland)
H. Weber (Germany)
J. Witt (Germany)

The TAPSOFT conference proceedings are published in advance of the conference in two volumes. The first volume includes the first two sections of invited papers for the Advanced Seminar and the final versions of 19 papers from CAAP '85, selected from a total of 54 papers. One additional selected paper from CAAP '85 was withdrawn by the authors because of an error in the proofs. The second volume includes the third section of invited papers from the Advanced Seminar, the final versions of 20 papers from CSE, selected from a total of 62 papers, together with three invited papers on industrial experience.

We would like to extend our sincere thanks to all program committee members and referees of CAAP '85 and CSE, as well as to the subreferees for CAAP '85 listed below for their care in reviewing and selecting the submitted papers:

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