# **Preface**

This volume constitutes the proceedings of the fifth European Conference on Object-Oriented Programming, ECOOP, held in Geneva, Switzerland, July 15–19, 1991. Previous ECOOP conferences were held in Paris (France), Oslo (Norway), Nottingham (England), and (jointly with OOPSLA) in Ottawa (Canada). Next year's ECOOP is planned to take place in the Netherlands.

From their beginning, the ECOOP conferences have been very successful as a forum of high scientific quality where the newest developments connected to object-oriented techniques could be discussed, and we are confident that this year's conference will continue this tradition. Over the last few years object-oriented technology has quickly gained widespread use and considerable popularity. In parallel with this, the field has matured scientifically. Fortunately, there is still a lot of room for new ideas and for hot debates over fundamental issues, as will become clear from these proceedings.

The 22 papers in this volume were selected by the programme committee from 129 submissions. The only selection criterion was the quality of the papers themselves; there was no desired distribution over subject fields or over countries. The paper selection was a hard task, and many good papers had to be rejected because of space limitations. The members of the programme committee and the other referees invested a large effort in this, and they more than deserve my sincere thanks. Of course, I also thank the authors of the submitted papers: without them there would be no proceedings.

Apart from the presentation of the selected papers, the conference also offers tutorials, workshops, invited lectures, and a panel. I thank the organizers and participants for their contributions. Further thanks are due to Eugene Fiume, who designed the ECOOP '91 graphic; to the organizers of the TOOLS conference and the conference co-sponsors for the help with mailing; to the organizers of previous ECOOP conferences (particularly Steve Cook and Gillian Lovegrove) for their help and advice; to Liliane Noël, the conference secretary; to the local organization team, Eduardo Casais, Laurent Dami, Betty Junod, Vicki de Mey, Xavier Pintado, Serge Renfer, and Marc Stadelmann; to the student helpers, Adriana Fernandez and Maria Marina Zouridis; and to Frank Stoots, who organized the programme committee meeting. All these people were essential in making ECOOP such a lively and stimulating conference.

May 1991

Pierre America ECOOP '91 Programme Chair

#### Organization

Conference Chair: Dennis Tsichritzis (Switzerland)
Programme Chair: Pierre America (The Netherlands)
Organizing Chair: Oscar Nierstrasz (Switzerland)

North American Coordinator: Karl Lieberherr (USA)

#### **Tutorial Organization**

CHOOSE (Swiss Group for OO Systems and Environments)

# **Sponsor**

The Centre Universitaire d'Informatique of the University of Geneva.

# **Co-sponsoring Organizations**

SI (Swiss Informaticians Society)
GI (German Computer Society)
OCG (Austrian Computer Society)
AFCET (French Computer Society)

Hewlett-Packard, SA

IBM. Suisse

Georg Heeg Smalltalk-80-Systems

### **Programme Committee**

Pierre America Philips Research, The Netherlands
Bruce Anderson University of Essex, United Kingdom

François Bancilhon Altaïr, France

Jean Bézivin Université de Nantes, France

Luca CardelliDEC SRC, USAJoëlle CoutazLGI/IMAG, FranceBrad CoxStepstone, USA

Simon Gibbs University of Geneva, Switzerland

Joseph Goguen Oxford University, England

Theo Härder University of Kaiserslautern, Germany

Chris Horn Trinity College, Ireland
Gerti Kappel University of Vienna, Austria
Ole Lehrmann Madsen Aarhus University, Denmark
Boris Magnusson Lund University, Sweden

Luís Monteiro Universidade Nova de Lisboa, Portugal

Barbara Pernici Politecnico di Milano, Italy
Markku Sakkinen University of Jyväskylä, Finland
Dave Thomas Carleton University, Canada
Mario Tokoro Keio University, Japan

Stanley Zdonik Brown University, USA

#### List of Referees

Antonio J. Alencar Birger Andersen Valeria De Antonellis Constantin Arapis Lex Augusteiin Lars Bak Sean Baker

Joaquim M. Baptista Brian M. Barry

Michel Beaudouin-Lafon

Mats Bengtsson Paul Bergstein Anders Biörnerstedt Franck Boissiere Wim Bronnenbera Marc H. Brown Vinny Cahill Eduardo Casais José C. Cunha Elspeth Cusack Lars-Ove Dahlin Laurent Dami Stefan Deßloch

Razvan Diaconescu Alexis Donnelly Christophe Dony John Duimovich

Johann Eder Maria Grazia Fugini Sanjay Ghemawat

José Félix Gomes da Costa

Saniiv Gossain Peter Grogono Görel Hedin Sandra Heiler Leen Helmink Alex Heung lan M. Holland

Kohei Honda Yasuaki Honda Jim J. Hornina Ben J. A. Hulshof Walter Hürsch Anette Hviid Yutaka Ishikawa Jan Martin Jansen Kevin D. Jones

Eric Jul Betty Junod

Niels Christian Juul

Bill Kalsow

Jørgen Lindskov Knudsen

Shinji Kono Dimitri Konstantas Kai Koskimies Kevin Charles Lano Jean-Marie Larchevêque

Doug Lea

Christophe Lecluse Daniel Lesage Theodore W. Leung Karl Lieberherr Roberto Majocchi Jean-Claude Mamou Satoshi Matsuoka Nelson Mattos Brian Mayoh James McGugan Vicki W. de Mev Scott Mevers Mike Milinkovich

Gail Mitchell Roland Mittermeir John P. Morrison Thomas Mück

Sten Minör

Jocelyne Nanard Oscar Nierstrasz Claus Nørgård Chisato Numaoka Dan Oscarsson Jukka Paakki Jens Palsberg Michael Papathomas Xavier Pintado Gustav Pomberger Vassilis Prevelakis Joachim Reinert Serge Renfer Philippe Richard Olivier Roux Jean-Claude Rover Pierangela Samarati Elmer Sandvad

Michael Schwartzbach Etsuva Shibayama Ignacio Silva-Lepe Adolfo Socorro J. Michael Spivey Marc Stadelmann Lynn Andrea Stein Markus Stumptner Hiroyasu Sugano Ikuo Takeuchi Brendan Tangney Magnus Taube Juha Vihavainen Bridget Walsh Takuo Watanabe Mike Wilson Cun Xiao

Yasuhiko Yokote

Michael Schreft