

Jürgen Becker
Marco Platzner
Serge Vernalde (Eds.)

LNCS 3203

Field-Programmable Logic and Applications

14th International Conference, FPL 2004
Antwerp, Belgium, August/September 2004
Proceedings



Springer

Jürgen Becker Marco Platzner
Serge Vernalde (Eds.)

Field-Programmable Logic and Applications

14th International Conference, FPL 2004
Antwerp, Belgium, August 30–September 1, 2004
Proceedings

 Springer

Volume Editors

Jürgen Becker
Universität Karlsruhe (TH)
Institut für Technik der Informationsverarbeitung (ITIV)
Engesserstr. 5, 76128 Karlsruhe, Germany
E-mail: becker@itiv.uni-karlsruhe.de

Marco Platzner
Swiss Federal Institute of Technology (ETH) Zurich
Computer Engineering and Networks Lab
Gloriastr. 35, 8092 Zurich Switzerland
E-mail: marco.platzner@computer.org

Serge Vernalde
IMEC vzw
Kapeldreef 75, 3001 Leuven, Belgium
E-mail: serge.vernalde@imec.be

Library of Congress Control Number: 2004111058

CR Subject Classification (1998): B.6-7, C.2, J.6

ISSN 0302-9743

ISBN 3-540-22989-2 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2004
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Protago-TeX-Production GmbH
Printed on acid-free paper SPIN: 11311713 06/3142 5 4 3 2 1 0

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

New York University, NY, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Preface

This book contains the papers presented at the 14th International Conference on Field Programmable Logic and Applications (FPL) held during August 30th–September 1st 2004. The conference was hosted by the Interuniversity MicroElectronics Center (IMEC) in Leuven, Belgium.

The FPL series of conferences was founded in 1991 at Oxford University (UK), and has been held annually since: in Oxford (3 times), Vienna, Prague, Darmstadt, London, Tallinn, Glasgow, Villach, Belfast, Montpellier and Lisbon. It is the largest and oldest conference in reconfigurable computing and brings together academic researchers, industry experts, users and newcomers in an informal, welcoming atmosphere that encourages productive exchange of ideas and knowledge between the delegates.

The fast and exciting advances in field programmable logic are increasing steadily with more and more application potential and need. New ground has been broken in architectures, design techniques, (partial) run-time reconfiguration and applications of field programmable devices in several different areas. Many of these recent innovations are reported in this volume.

The size of the FPL conferences has grown significantly over the years. FPL in 2003 saw 216 papers submitted. The interest and support for FPL in the programmable logic community continued this year with 285 scientific papers submitted, demonstrating a 32% increase when compared to the year before. The technical program was assembled from 78 selected regular papers, 45 additional short papers and 29 posters, resulting in this volume of proceedings. The program also included three invited plenary keynote presentations from Xilinx, Gilder Technology Report and Altera, and three embedded tutorials from Xilinx, the Universität Karlsruhe (TH) and the University of Oslo.

Due to the inclusive tradition of the conference, FPL continues to attract submissions from all over the world. The accepted contributions were submitted by researchers from 24 different countries:

USA	37	Canada	6	Netherlands	3	Mexico	2
Spain	21	Portugal	6	Austria	2	Switzerland	2
Germany	20	Brazil	5	Belgium	2	Australia	1
UK	11	Finland	3	Czechia	2	China	1
Japan	9	Ireland	3	Greece	2	Estonia	1
France	7	Poland	3	Italy	2	Lebanon	1

We would like to thank all the authors for submitting their first versions of the papers and the final versions of the accepted papers. We also gratefully acknowledge the tremendous reviewing work done by the Program Committee members and many additional reviewers who contributed their time and expertise towards the compilation of this volume. We would also like to thank the members of the Organizing Committee for their competent guidance and work in the last month. Especially, we acknowledge the assistance of Michael Hübner and Oliver Sander from the Universität Karlsruhe (TH) and RolfENZler from ETH Zurich in compiling the final program. The members of our Program and Organizing Committees as well as all other reviewers are listed on the following pages.

We would like to thank Altera, Synplicity and Xilinx for their sponsorships. We are indebted to Richard van de Stadt, the author of CyberChair. This extraordinary free software made our task of managing the submission and reviewing process much easier.

We are grateful to Springer, particularly Alfred Hofmann, for his work in publishing this book.

June 2004

Jürgen Becker
Marco Platzner
Serge Vernalde

Organization

Organizing Committee

General Chair	Serge Vernalde, IMEC vzw, Belgium
Program Chair	Jürgen Becker, Universität Karlsruhe, Germany
Ph.D.-Forum Chair	Jürgen Teich, University of Erlangen-Nuremberg, Germany
Publicity Chair	Reiner Hartenstein, University of Kaiserslautern, Germany
Proceedings Chair	Marco Platzner, ETH Zurich, Switzerland
Exhibition/Sponsors Chair	Erik Watzeels, IMEC vzw, Belgium
Finance Chair	Diederik Verkest, IMEC vzw, Belgium
Local Arrangements Chair	Annemie Stas, IMEC vzw, Belgium

Program Committee

Nazeeh Aranki	Jet Propulsion Laboratory, USA
Jeff Arnold	Stretch, Inc., USA
Peter Athanas	Virginia Tech, USA
Jürgen Becker	Universität Karlsruhe, Germany
Neil Bergmann	Queensland University of Technology, Australia
Dinesh Bhatia	University of Texas, USA
Eduardo Boemo	Universidad Autonoma de Madrid, Spain
Gordon Brebner	Xilinx, Inc., USA
Andrew Brown	University of Southampton, UK
Klaus Buchenrieder	Infineon Technologies AG, Germany
João Cardoso	University of the Algarve, Portugal
Steve Casselman	Virtual Computer Corporation, USA
Peter Cheung	Imperial College London, UK
George Constantinides	Imperial College London, UK
Carl Ebeling	University of Washington, USA
Hossam ElGindy	University of New South Wales, Australia
Manfred Glesner	Darmstadt University of Technology, Germany
Fernando Gonçalves	Technical University of Lisbon, Portugal
Steven Guccione	Quicksilver Technology, USA
Reiner Hartenstein	University of Kaiserslautern, Germany
Scott Hauck	University of Washington, USA
Tom Kean	Algotronix Consulting, UK
Andreas Koch	University of Braunschweig, Germany
Dominique Lavenier	University of Montpellier II, France
Philip Leong	Chinese University of Hong Kong, China
Wayne Luk	Imperial College London, UK
Patrick Lysaght	Xilinx, Inc., USA
Oskar Mencer	Imperial College London, UK
Toshiyaki Miyazaki	NTT Network Innovation Labs, Japan
Fernando Moraes	PUCRS, Brazil
Klaus Müller-Glaser	Universität Karlsruhe, Germany
Brent Nelson	Brigham Young University, USA
Horácio Neto	Technical University of Lisbon, Portugal
Sebastien Pillement	ENSSAT, France
Marco Platzner	ETH Zurich, Switzerland
Viktor Prasanna	University of Southern California, USA
Franz Rammig	Universität Paderborn, Germany
Ricardo Reis	Universidade Federal do Rio Grande do Sul, Brazil
Jonathan Rose	University of Toronto, Canada
Zoran Salcic	University of Auckland, New Zealand
Sergej Sawitzki	Philips Research, The Netherlands
Hartmut Schmeck	University of Karlsruhe, Germany
Subarna Sinha	Synopsys, Inc., USA

Gerard Smit	University of Twente, The Netherlands
Jose T. de Sousa	Technical University of Lisbon, Portugal
Rainer Spallek	Dresden University of Technology, Germany
Adrian Stoica	Jet Propulsion Laboratory, USA
Jürgen Teich	University of Erlangen-Nuremberg, Germany
Lothar Thiele	ETH Zurich, Switzerland
Lionel Torres	University of Montpellier II, France
Nick Tredennick	Gilder Technology Report, USA
Stephen Trimberger	Xilinx, Inc., USA
Milan Vasilko	Bournemouth University, UK
Stamatis Vassiliadis	Delft University of Technology, The Netherlands
Ranga Vemuri	University of Cincinnati, USA
Serge Vernalde	IMEC vzw, Belgium
Martin Vorbach	PACT Informationstechnologie, Germany
Steve Wilton	University of British Columbia, Canada
Roger Woods	Queen's University Belfast, UK
Andrej Zemva	University of Ljubljana, Slovenia

Steering Committee

Jose T. de Sousa	Technical University of Lisbon, Portugal
Manfred Glesner	Darmstadt University of Technology, Germany
John Gray	Independent Consultant, UK
Herbert Grünbacher	Carinthia Technical Institute, Austria
Reiner Hartenstein	University of Kaiserslautern, Germany
Andres Keevallik	Tallinn Technical University, Estonia
Wayne Luk	Imperial College London, UK
Patrick Lysaght	Xilinx, Inc., USA
Michel Renovell	University of Montpellier II, France
Roger Woods	Queen's University Belfast, UK

Additional Reviewers

Waleed Abdulla	Eduardo Augusto Bezerra
Ali Ahmadinia	Carsten Bieser
Kupriyanov Alexey	Abbas Bigdeli
Iosif Antochi	Morteza Biglari-Abhari
Chris Assad	Christophe Bobda
Liping Bai	Peter Boll
Zachary Baker	Matthias Bonn
Marcelo Barcelos	Christos-Savvas Bouganis
Michael Beauchamp	Ney Calazans
Marcus Bednara	Humberto Calderon
Stevan Berber	Nicola Campregher
Jean-Luc Beuchat	Joao Paulo Carvalho

Ewerson Luiz de Souza Carvalho
 Bryan Catanzaro
 Mark L. Chang
 Francois Charot
 C.C. Cheung
 Charles Chiang
 Daniel Chillet
 Seonil Choi
 Tim Courtney
 G. Figueiredo Coutinho
 S. Craven
 Dan Crisu
 Miro Cupak
 Raphael David
 Joze Dedic
 A. Derbyshire
 Steven Derrien
 Dirk Desmet
 Florent de Dinechin
 Matthias Dyer
 Ilos Eix
 Rolf Enzler
 C.T. Ewe
 Erwan Fabiani
 Suhaib Fahmy
 George Ferizis
 A. Fidjeland
 Matjaz Finc
 Robert Fischer
 A. Abdul Gaffar
 Carlo Galuzzi
 Georgi N. Gaydadjiev
 Gokul Govindu
 Michael Guntsch
 Said Hamdioui
 Manish Handa
 Frank Hannig
 Michael Haselman
 Christian Haubelt
 Michael Hübner
 Fabiano Hessel
 Samih Hijwel
 Clint Hilton
 Th. Hinze
 Christian Hochberger

Mark Holland
 Thomas Hollstein
 Zhedong Hua
 Renqiu Huang
 Finn Hughes
 Jung Hyun Choi
 Leandro Soares Indrusiak
 Hideyuki Ito
 Xin Jia
 Eric Johnson
 Ralf König
 Thorsten Köster
 Heiko Kalte
 F. Gusmão de Lima Kastensmidt
 Jamil Kawa
 Ronan Keryell
 Jawad Khan
 Mohammed Ghiath Khatib
 Kichul Kim
 Dirk Koch
 Franci Kopac
 Georgi Kuzmanov
 Julien Lamoureux
 Pepijn de Langen
 Dong-U Lee
 Gareth Lee
 Seokjin Lee
 Yujie Lee
 Stan Liao
 Yang Liu
 Marcelo Lubaszewski
 Ralf Ludewig
 A. Mahar
 Mateusz Majer
 Usama Malik
 André Malz
 Freddy Mang
 César Augusto Missio Marcon
 Theodore Marescaux
 John McAllister
 Wim J. C. Melis
 Aline Vieira de Mello
 Jean-Yves Mignolet
 Will Moffat
 Sumit Mohanty

Leandro Heleno Möller
Anca Molnos
Edson Ifarraguirre Moreno
Carlos Morra
Gareth Morris
Elena Moscu Panainte
Erdem Motuk
Tudor Murgan
Takahiro Murooka
Kouichi Nagami
Yoshiki Nakane
Vincent Nollet
Juan Jesus Ocampo-Hidalgo
Yuichi Okuyama
Luciano Copello Ost
Jingzhao Ou
K. Paar
José Carlos Sant'Anna Palma
Joseph Palmer
Alex Panato
Sujan Pandey
Mihail Petrov
Jean-Marc Philippe
Shawn Phillips
Thilo Pionteck
Christian Plessl
Kara Poon
Adam Postula
Bernard Pottier
Brad Quinton
Frédéric Raimbault
M. Rans
Rainer Rawer
Darren Reilly
T. Rissa
Pasko Robert
Partha Roop
Andrew Royal
Stéphane Rubini
Luc Rynders
Oliver Sander
Gilles Sassatelli
Bernd Scheuermann
Clemens Schlachta
Joerg Schneider

Ronald Scrofano
Pete Sedcole
Olivier Sentieys
Balasubramanian Sethuraman
A. Shahbahrani
Akshay Sharma
Nalin Sidahao
Reetinder Sidhu
Ivan Saraiva Silva
Mihai Sima
Alastair Smith
Keith So
O. Soffke
Raphael Some
Galileu Batista de Sousa
N. Steiner
Piotr Stepień
S. Stone
Thilo Streichert
Qing Su
Peter Sutton
Alex Thomas
D. Thomas
Andrej Trost
Richard Turner
Michael Ullmann
G. Vanmeerbeeck
Matjaz Verderber
François Verdier
Carlos Y Villalpando
Patrick Vollmer
Herbert Walder
Jian Wang
Xin Wang
John Williams
Laurent Wojcieszak
Christophe Wolinski
Stephan Wong
James Wu
Yunfei Wu
Andy Yan
Jenny Yi-Chun Kua
Jae Young Hur
Frank Zee
Cong Zhang

XII Organization

Ling Zhuo
Daniel Ziener

Heiko Zimmer
Peter Zipf

Lecture Notes in Computer Science

For information about Vols. 1–3086

please contact your bookseller or Springer

- Vol. 3220: J.C. Lester, R.M. Vicari, F. Paragana\c cu (Eds.), *Intelligent Tutoring Systems*. XXI, 920 pages. 2004.
- Vol. 3208: H.J. Ohlbach, S. Schaffert (Eds.), *Principles and Practice of Semantic Web Reasoning*. VII, 165 pages. 2004.
- Vol. 3207: L.T. Jang, M. Guo, G.R. Gao, N.K. Jha, *Embedded and Ubiquitous Computing*. XX, 1116 pages. 2004.
- Vol. 3205: N. Davies, E. Mynatt, I. Siio (Eds.), *UbiComp 2004: Ubiquitous Computing*. XVI, 452 pages. 2004.
- Vol. 3203: J. Becker, M. Platzner, S. Vernalde (Eds.), *Field-Programmable Logic and Applications*. XXX, 1198 pages. 2004.
- Vol. 3198: G.-J. de Vreede, L.A. Guerrero, G. Marín Raventós (Eds.), *Groupware: Design, Implementation and Use*. XI, 378 pages. 2004.
- Vol. 3194: R. Camacho, R. King, A. Srinivasan (Eds.), *Inductive Logic Programming*. XI, 361 pages. 2004. (Subseries LNAI).
- Vol. 3192: C. Bussler, D. Fensel (Eds.), *Artificial Intelligence: Methodology, Systems, and Applications*. XIII, 522 pages. 2004. (Subseries LNAI).
- Vol. 3186: Z. Bellahsene, T. Milo, M. Rys, D. Suciu, R. Unland (Eds.), *Database and XML Technologies*. X, 235 pages. 2004.
- Vol. 3184: S. Katsikas, J. Lopez, G. Pernul (Eds.), *Trust and Privacy in Digital Business*. XI, 299 pages. 2004.
- Vol. 3183: R. Traunmüller (Ed.), *Electronic Government*. XIX, 583 pages. 2004.
- Vol. 3182: K. Bauknecht, M. Bichler, B. Pröhl (Eds.), *E-Commerce and Web Technologies*. XI, 370 pages. 2004.
- Vol. 3181: Y. Kambayashi, M. Mohania, W. Wöß (Eds.), *Data Warehousing and Knowledge Discovery*. XIV, 412 pages. 2004.
- Vol. 3180: F. Galindo, M. Takizawa, R. Traunmüller (Eds.), *Database and Expert Systems Applications*. XXI, 945 pages. 2004.
- Vol. 3178: W. Jonker, M. Petkovic (Eds.), *Secure Data Management*. VIII, 219 pages. 2004.
- Vol. 3177: Z.R. Yang, H. Yin, R. Everson (Eds.), *Intelligent Data Engineering and Automated Learning – IDEAL 2004*. XVIII, 852 pages. 2004.
- Vol. 3175: C.E. Rasmussen, H.H. Bülthoff, B. Schölkopf, M.A. Giese (Eds.), *Pattern Recognition*. XVIII, 581 pages. 2004.
- Vol. 3174: F. Yin, J. Wang, C. Guo (Eds.), *Advances in Neural Networks - ISNN 2004*. XXXV, 1021 pages. 2004.
- Vol. 3172: M. Dorigo, M. Birattari, C. Blum, L. M. Gambardella, F. Mondada, T. Stützle (Eds.), *Ant Colony, Optimization and Swarm Intelligence*. XII, 434 pages. 2004.
- Vol. 3170: P. Gardner, N. Yoshida (Eds.), *CONCUR 2004 - Concurrency Theory*. XIII, 529 pages. 2004.
- Vol. 3166: M. Rauterberg (Ed.), *Entertainment Computing – ICEC 2004*. XXIII, 617 pages. 2004.
- Vol. 3159: U. Visser, *Intelligent Information Integration for the Semantic Web*. XIV, 150 pages. 2004. (Subseries LNAI).
- Vol. 3158: I. Nikolaidis, M. Barbeau, E. Kranakis (Eds.), *Ad-Hoc, Mobile, and Wireless Networks*. IX, 344 pages. 2004.
- Vol. 3157: C. Zhang, H. W. Guesgen, W.K. Yeap (Eds.), *PRICAI 2004: Trends in Artificial Intelligence*. XX, 1023 pages. 2004. (Subseries LNAI).
- Vol. 3156: M. Joye, J.-J. Quisquater (Eds.), *Cryptographic Hardware and Embedded Systems - CHES 2004*. XIII, 455 pages. 2004.
- Vol. 3155: P. Funk, P.A. González Calero (Eds.), *Advances in Case-Based Reasoning*. XIII, 822 pages. 2004. (Subseries LNAI).
- Vol. 3154: R.L. Nord (Ed.), *Software Product Lines*. XIV, 334 pages. 2004.
- Vol. 3153: J. Fiala, V. Koubek, J. Kratochvíl (Eds.), *Mathematical Foundations of Computer Science 2004*. XIV, 902 pages. 2004.
- Vol. 3152: M. Franklin (Ed.), *Advances in Cryptology – CRYPTO 2004*. XI, 579 pages. 2004.
- Vol. 3150: G.-Z. Yang, T. Jiang (Eds.), *Medical Imaging and Augmented Reality*. XII, 378 pages. 2004.
- Vol. 3149: M. Danelutto, M. Vanneschi, D. Laforenza (Eds.), *Euro-Par 2004 Parallel Processing*. XXXIV, 1081 pages. 2004.
- Vol. 3148: R. Giacobazzi (Ed.), *Static Analysis*. XI, 393 pages. 2004.
- Vol. 3146: P. Érdi, A. Esposito, M. Marinaro, S. Scarpetta (Eds.), *Computational Neuroscience: Cortical Dynamics*. XI, 161 pages. 2004.
- Vol. 3144: M. Papatriantafyllou, P. Hunel (Eds.), *Principles of Distributed Systems*. XI, 246 pages. 2004.
- Vol. 3143: W. Liu, Y. Shi, Q. Li (Eds.), *Advances in Web-Based Learning – ICWL 2004*. XIV, 459 pages. 2004.
- Vol. 3142: J. Diaz, J. Karhumäki, A. Lepistö, D. Sannella (Eds.), *Automata, Languages and Programming*. XIX, 1253 pages. 2004.
- Vol. 3140: N. Koch, P. Fraternali, M. Wirsing (Eds.), *Web Engineering*. XXI, 623 pages. 2004.
- Vol. 3139: F. Iida, R. Pfeifer, L. Steels, Y. Kuniyoshi (Eds.), *Embodied Artificial Intelligence*. IX, 331 pages. 2004. (Subseries LNAI).

- Vol. 3138: A. Fred, T. Caelli, R.P.W. Duin, A. Campilho, D.d. Ridder (Eds.), *Structural, Syntactic, and Statistical Pattern Recognition*. XXII, 1168 pages. 2004.
- Vol. 3137: P. De Bra, W. Nejdl (Eds.), *Adaptive Hypermedia and Adaptive Web-Based Systems*. XIV, 442 pages. 2004.
- Vol. 3136: F. Meziane, E. Métais (Eds.), *Natural Language Processing and Information Systems*. XII, 436 pages. 2004.
- Vol. 3134: C. Zannier, H. Erdogmus, L. Lindstrom (Eds.), *Extreme Programming and Agile Methods - XP/Agile Universe 2004*. XIV, 233 pages. 2004.
- Vol. 3133: A.D. Pimentel, S. Vassiliadis (Eds.), *Computer Systems: Architectures, Modeling, and Simulation*. XIII, 562 pages. 2004.
- Vol. 3132: B. Demoen, V. Lifschitz (Eds.), *Logic Programming*. XII, 480 pages. 2004.
- Vol. 3131: V. Torra, Y. Narukawa (Eds.), *Modeling Decisions for Artificial Intelligence*. XI, 327 pages. 2004. (Subseries LNAI).
- Vol. 3130: A. Syropoulos, K. Berry, Y. Haralambous, B. Hughes, S. Peter, J. Plaipe (Eds.), *TeX, XML, and Digital Typography*. VIII, 265 pages. 2004.
- Vol. 3129: Q. Li, G. Wang, L. Feng (Eds.), *Advances in Web-Age Information Management*. XVII, 753 pages. 2004.
- Vol. 3128: D. Asonov (Ed.), *Querying Databases Privately*. IX, 115 pages. 2004.
- Vol. 3127: K.E. Wolff, H.D. Pfeiffer, H.S. Delugach (Eds.), *Conceptual Structures at Work*. XI, 403 pages. 2004. (Subseries LNAI).
- Vol. 3126: P. Dini, P. Lorenz, J.N.d. Souza (Eds.), *Service Assurance with Partial and Intermittent Resources*. XI, 312 pages. 2004.
- Vol. 3125: D. Kozen (Ed.), *Mathematics of Program Construction*. X, 401 pages. 2004.
- Vol. 3124: J.N. de Souza, P. Dini, P. Lorenz (Eds.), *Telecommunications and Networking - ICT 2004*. XXVI, 1390 pages. 2004.
- Vol. 3123: A. Belz, R. Evans, P. Piwek (Eds.), *Natural Language Generation*. X, 219 pages. 2004. (Subseries LNAI).
- Vol. 3122: K. Jansen, S. Khanna, J.D.P. Rolim, D. Ron (Eds.), *Approximation, Randomization, and Combinatorial Optimization*. IX, 428 pages. 2004.
- Vol. 3121: S. Nikolettseas, J.D.P. Rolim (Eds.), *Algorithmic Aspects of Wireless Sensor Networks*. X, 201 pages. 2004.
- Vol. 3120: J. Shawe-Taylor, Y. Singer (Eds.), *Learning Theory*. X, 648 pages. 2004. (Subseries LNAI).
- Vol. 3118: K. Miesenberger, J. Klaus, W. Zagler, D. Burger (Eds.), *Computer Helping People with Special Needs*. XXIII, 1191 pages. 2004.
- Vol. 3116: C. Rattray, S. Maharaj, C. Shankland (Eds.), *Algebraic Methodology and Software Technology*. XI, 569 pages. 2004.
- Vol. 3114: R. Alur, D.A. Peled (Eds.), *Computer Aided Verification*. XII, 536 pages. 2004.
- Vol. 3113: J. Karhumäki, H. Maurer, G. Paun, G. Rozenberg (Eds.), *Theory Is Forever*. X, 283 pages. 2004.
- Vol. 3112: H. Williams, L. MacKinnon (Eds.), *Key Technologies for Data Management*. XII, 265 pages. 2004.
- Vol. 3111: T. Hagerup, J. Katajainen (Eds.), *Algorithm Theory - SWAT 2004*. XI, 506 pages. 2004.
- Vol. 3110: A. Juels (Ed.), *Financial Cryptography*. XI, 281 pages. 2004.
- Vol. 3109: S.C. Sahinalp, S. Muthukrishnan, U. Dogrusoz (Eds.), *Combinatorial Pattern Matching*. XII, 486 pages. 2004.
- Vol. 3108: H. Wang, J. Pieprzyk, V. Varadharajan (Eds.), *Information Security and Privacy*. XII, 494 pages. 2004.
- Vol. 3107: J. Bosch, C. Krueger (Eds.), *Software Reuse: Methods, Techniques and Tools*. XI, 339 pages. 2004.
- Vol. 3106: K.-Y. Chwa, J.I. Munro (Eds.), *Computing and Combinatorics*. XIII, 474 pages. 2004.
- Vol. 3105: S. Göbel, U. Spierling, A. Hoffmann, I. Iurgel, O. Schneider, J. Dechau, A. Feix (Eds.), *Technologies for Interactive Digital Storytelling and Entertainment*. XVI, 304 pages. 2004.
- Vol. 3104: R. Kralovic, O. Sykora (Eds.), *Structural Information and Communication Complexity*. X, 303 pages. 2004.
- Vol. 3103: K. Deb, e. al. (Eds.), *Genetic and Evolutionary Computation - GECCO 2004*. XLIX, 1439 pages. 2004.
- Vol. 3102: K. Deb, e. al. (Eds.), *Genetic and Evolutionary Computation - GECCO 2004*. L, 1445 pages. 2004.
- Vol. 3101: M. Masoodian, S. Jones, B. Rogers (Eds.), *Computer Human Interaction*. XIV, 694 pages. 2004.
- Vol. 3100: J.F. Peters, A. Skowron, J.W. Grzymała-Busse, B. Kostek, R.W. Świniarski, M.S. Szczuka (Eds.), *Transactions on Rough Sets I*. X, 405 pages. 2004.
- Vol. 3099: J. Cortadella, W. Reisig (Eds.), *Applications and Theory of Petri Nets 2004*. XI, 505 pages. 2004.
- Vol. 3098: J. Desel, W. Reisig, G. Rozenberg (Eds.), *Lectures on Concurrency and Petri Nets*. VIII, 849 pages. 2004.
- Vol. 3097: D. Basin, M. Rusinowitch (Eds.), *Automated Reasoning*. XII, 493 pages. 2004. (Subseries LNAI).
- Vol. 3096: G. Melnik, H. Holz (Eds.), *Advances in Learning Software Organizations*. X, 173 pages. 2004.
- Vol. 3095: C. Bussler, D. Fensel, M.E. Orlowska, J. Yang (Eds.), *Web Services, E-Business, and the Semantic Web*. X, 147 pages. 2004.
- Vol. 3094: A. Nürnberger, M. Detyniecki (Eds.), *Adaptive Multimedia Retrieval*. VIII, 229 pages. 2004.
- Vol. 3093: S. Katsikas, S. Gritzalis, J. Lopez (Eds.), *Public Key Infrastructure*. XIII, 380 pages. 2004.
- Vol. 3092: J. Eckstein, H. Baumeister (Eds.), *Extreme Programming and Agile Processes in Software Engineering*. XVI, 358 pages. 2004.
- Vol. 3091: V. van Oostrom (Ed.), *Rewriting Techniques and Applications*. X, 313 pages. 2004.
- Vol. 3089: M. Jakobsson, M. Yung, J. Zhou (Eds.), *Applied Cryptography and Network Security*. XIV, 510 pages. 2004.
- Vol. 3087: D. Maltoni, A.K. Jain (Eds.), *Biometric Authentication*. XIII, 343 pages. 2004.

Table of Contents

Plenary Keynotes

FPGAs and the Era of Field Programmability	1
<i>W. Roelandts</i>	
Reconfigurable Systems Emerge.....	2
<i>N. Tredennick, B. Shimamoto</i>	
System-Level Design Tools Can Provide Low Cost Solutions in FPGAs: TRUE or FALSE?	12
<i>M. Dickinson</i>	

Organic and Biology Computing

Hardware Accelerated Novel Protein Identification	13
<i>A. Alex, J. Rose, R. Isserlin-Weinberger, C. Hogue</i>	
Large Scale Protein Sequence Alignment Using FPGA Reprogrammable Logic Devices	23
<i>S. Dydel, P. Bala</i>	

Security and Cryptography 1

A Key Management Architecture for Securing Off-Chip Data Transfers	33
<i>J. Graf, P. Athanas</i>	
FPGA Implementation of Biometric Authentication System Based on Hand Geometry	43
<i>C. López-Ongil, R. Sanchez-Reillo, J. Liu-Jimenez, F. Casado, L. Sánchez, L. Entrena</i>	

Platform Based Design

SoftSONIC: A Customisable Modular Platform for Video Applications...	54
<i>T. Rissa, P.Y.K. Cheung, W. Luk</i>	
Deploying Hardware Platforms for SoC Validation: An Industrial Case Study	64
<i>A. Bigot, F. Charpentier, H. Krupnova, I. Sans</i>	

Algorithms and Architectures

Algorithms and Architectures for Use in FPGA Implementations of Identity Based Encryption Schemes	74
<i>T. Kerins, E. Popovici, W. Marnane</i>	
Power Analysis Attacks Against FPGA Implementations of the DES	84
<i>F.-X. Standaert, S.B. Örs, J.-J. Quisquater, B. Preneel</i>	

Acceleration Application 1

Monte Carlo Radiative Heat Transfer Simulation on a Reconfigurable Computer	95
<i>M. Gokhale, J. Frigo, C. Ahrens, J.L. Tripp, R. Minnich</i>	
Stochastic Simulation for Biochemical Reactions on FPGA	105
<i>M. Yoshimi, Y. Osana, T. Fukushima, H. Amano</i>	

Architecture 1

Dynamic Adaptive Runtime Routing Techniques in Multigrain Reconfigurable Hardware Architectures	115
<i>A. Thomas, J. Becker</i>	
Interconnecting Heterogeneous Nodes in an Adaptive Computing Machine	125
<i>F. Furtek, E. Hogenauer, J. Scheuermann</i>	
Improving FPGA Performance and Area Using an Adaptive Logic Module	135
<i>M. Hutton, J. Schleicher, D. Lewis, B. Pedersen, R. Yuan, S. Kaptanoglu, G. Baeckler, B. Ratchev, K. Padalia, M. Bourgeault, A. Lee, H. Kim, R. Saini</i>	
A Dual- V_{DD} Low Power FPGA Architecture	145
<i>A. Gayasen, K. Lee, N. Vijaykrishnan, M. Kandemir, M.J. Irwin, T. Tuan</i>	

Physical Design 1

Simultaneous Timing Driven Clustering and Placement for FPGAs	158
<i>G. Chen, J. Cong</i>	
Run-Time-Conscious Automatic Timing-Driven FPGA Layout Synthesis	168
<i>J. Anderson, S. Nag, K. Chaudhary, S. Kalman, C. Madabhushi, P. Cheng</i>	

Compact Buffered Routing Architecture	179
<i>A. Lodi, R. Giansante, C. Chiesa, L. Ciccarelli, F. Campi, M. Toma</i>	
On Optimal Irregular Switch Box Designs	189
<i>H. Fan, Y.-L. Wu, C.-C. Cheung, J. Liu</i>	

Arithmetic 1

Dual Fixed-Point:	
An Efficient Alternative to Floating-Point Computation.....	200
<i>C.T. Ewe, P.Y.K. Cheung, G.A. Constantinides</i>	
Comparative Study of SRT-Dividers in FPGA	209
<i>G. Sutter, G. Bioul, J.-P. Deschamps</i>	
Second Order Function Approximation	
Using a Single Multiplication on FPGAs	221
<i>J. Detrey, F. de Dinechin</i>	
Efficient Modular Division Implementation	
(ECC over GF(p) Affine Coordinates Application)	231
<i>G. Meurice de Dormale, P. Bulens, J.-J. Quisquater</i>	

Multitasking

A Low Fragmentation Heuristic for Task Placement	
in 2D RTR HW Management	241
<i>J. Tabero, J. Septién, H. Mecha, D. Mozos</i>	
The Partition into Hypercontexts Problem	
for Hyperreconfigurable Architectures	251
<i>S. Lange, M. Middendorf</i>	

Circuit Technology

A High-Density Optically Reconfigurable Gate Array	
Using Dynamic Method	261
<i>M. Watanabe, F. Kobayashi</i>	
Evolvable Hardware for Signal Separation and Noise Cancellation	
Using Analog Reconfigurable Device	270
<i>D. Keymeulen, R. Zebulum, A. Stoica, V. Duong, M.I. Ferguson</i>	