Lecture Notes in Computer Science 4943

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

Roger Woods Katherine Compton
Christos Bouganis Pedro C. Diniz (Eds.)

Reconfigurable Computing: Architectures, Tools and Applications

4th International Workshop, ARC 2008
London, UK, March 26-28, 2008
Proceedings

Springer

Volume Editors

Roger Woods
Queen's University Belfast
ECIT Institute, Queen's Road, Queen's Island, Belfast, BT 3 9DT, UK
E-mail: r.woods@qub.ac.uk

Katherine Compton
University of Wisconsin-Madison
1415 Engineering Drive, Madison, WI 53706, USA
E-mail: kati@engr.wisc.edu

Christos Bouganis
Imperial College London
Department of Electrical and Electronic Engineering
South Kensington Campus, London, SW7 2AZ, UK
E-mail: christos-savvas.bouganis@imperial.ac.uk

Pedro C. Diniz
Technical University of Lisbon
Instituto Superior Técnico, Av. Rovisco Pais, 1049-001 Lisboa, Portugal
E-mail: pedro.diniz@tagus.ist.utl.pt

Library of Congress Control Number: 2008923932

CR Subject Classification (1998): C, B, I.4

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN 0302-9743
ISBN-10 3-540-78609-0 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-78609-2 Springer Berlin Heidelberg New York

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12240425 06/3180 5 4 3 2 1 0

Preface

For many years, the idea of reconfigurable hardware systems has represented the *Holy Grail* for computer system designers. It has been recognized for a long time that the microprocessor provides high flexibility but at a very low performance merit in terms of MIPS/W or other such measures. *Reconfigurable systems* are thus attractive as they can be configured to provide the best match for the computational requirements at that specific time, giving much better area – speed – power performance.

However, the practicalities of achieving such a reconfigurable system are numerous and require the development of: suitable reconfigurable hardware to support the dynamic behavior; programming tools to allow the dynamic behavior of the reconfigurability to be modelled; programming languages to support reconfiguration; and verification techniques that can demonstrate that reconfiguration has happened correctly at each stage. While the problems are many, the existence and development of technologies such as the multi-core processor architecture, reconfigurable computing architectures, and application-specific processors suggest there is a strong desire for reconfigurable systems. Moreover, FPGAs also provide the ideal platforms for the development of such platforms.

The major motivation behind the International Workshop on Applied Reconfigurable Computing (ARC) series is to create a forum for presenting and discussing on-going research efforts in applied reconfigurable computing. The workshop also focuses on compiler and mapping techniques, and new reconfigurable computing architectures. The series of editions started in 2005 in Algarve, Portugal, followed by the 2006 workshop in Delft, The Netherlands, and last year's workshop in Mangaratiba, Rio de Janeiro, Brazil. As in previous years, selected papers have been published as a Springer LNCS *(Lecture Notes in Computer Science)* volume.

This LNCS volume includes the papers selected for the fourth edition of the Workshop (ARC 2008), held at Imperial College London, UK during March 26–28, 2008. The workshop attracted a large number of very good papers, describing interesting work on reconfigurable computing related subjects. A total of 56 papers were submitted to the workshop from 18 countries: UK (9), Republic of China (6), Germany (6), USA (5), The Netherlands (4), France (4), Greece (3), Portugal (3), Brazil (3), Republic of South Korea (2), Japan (2), Spain (2), Poland (2), India (1), Belgium (1), Turkey (1), Thailand (1) and Canada (1).

In most cases, submitted papers were evaluated by at least three members of the Program Committee. After careful selection, 21 papers were accepted as full papers (acceptance rate of 38.1%) and 14 as short papers (global acceptance rate of 63.6%). Those accepted papers led to a very interesting workshop program, which we consider to constitute a representative overview of on-going research efforts in reconfigurable computing, a rapidly evolving and maturing field.

Several people contributed to the success of the 2008 edition of the workshop. We would like to acknowledge the support of all the members of this year's workshop Steering and Program Committees in reviewing papers, in helping the paper selection, and in giving valuable suggestions. Special thanks also to the additional researchers who contributed to the reviewing process, to all the authors that submitted papers to the workshop, and to all the workshop attendees. Last but not least, we would like to thank Springer, and Alfred Hofmann in particular, for their continued support in publishing the proceedings as part of the LNCS series and to Jürgen Becker from the University of Karlsruhe for his continued support role.

January 2008

Roger Woods
Katherine Compton
Christos Bouganis
Pedro C. Diniz

Organization

Organizing Committee

General Chairs	Christos-Savvas Bouganis (Imperial College London, UK)
	Pedro C. Diniz (Instituto Superior Técnico, Portugal)
Program Chairs	Katherine Compton (University of Wisconsin-Madison, USA)
	Roger Woods (Queen's University Belfast, UK)
Proceedings Chair	Pete Sedcole (Imperial College London, UK)
Local Arrangements Chairs	Alastair Smith (Imperial College London, UK)
	Terrence Mak (Imperial College London, UK)
Web Design	Iosifina Pournara (Birkbeck College, UK)
Secretary	Wiesia Hsissen (Imperial College London, UK)

Steering Committee

George Constantinides	Imperial College London, UK
João M.P. Cardoso	IST/INESC-ID, Portugal
Koen Bertels	Delft University of Technology, The Netherlands
Mladen Berekovic	Braunschweig University of Technology, Germany
Pedro C. Diniz	Instituto Superior Técnico, Portugal
Walid Najjar	University of California Riverside, USA

In memory of Stamatis Vassiliadis [1951–2007], Steering Committee Member for ARC 2006 and 2007.

Program Committee

Jeff Arnold	Stretch Inc., USA
Nader Bagherzadeh	University of California, Irvine, USA
Jürgen Becker	University of Karlsruhe (TH), Germany
Mladen Berekovic	Braunschweig University of Technology, Germany
Neil Bergmann	University of Queensland, Australia
Koen Bertels	Delft University of Technology, The Netherlands
Christos-Savvas Bouganis	Imperial College London, UK
Gordon Brebner	Xilinx Corp., USA
Mihai Budiu	Microsoft Research, USA
Tim Callahan	Carnegie Mellon University, USA

João M.P. Cardoso	IST/INESC-ID, Portugal
Mark Chang	Olin College, USA
Peter Cheung	Imperial College London, UK
Paul Chow	University of Toronto, Canada
Katherine Compton	University of Wisconsin-Madison, USA
George Constantinides	Imperial College London, UK
Oliver Diessel	University of New South Wales, Australia
Pedro C. Diniz	Instituto Superior Técnico, Portugal
Tarek El-Ghazawi	George Washington University, USA
Robert Esser	Xilinx Corp., Ireland
Antonio Ferrari	University of Aveiro, Portugal
Reiner Hartenstein	University of Kaiserslautern, Germany
Román Hermida	Complutense University of Madrid, Spain
Ryan Kastner	University of California, Santa Barbara, USA
Andreas Koch	Darmstadt University of Technology, Germany
Philip Leong	Chinese University of Hong Kong, China
Wayne Luk	Imperial College London, UK
John McAllister	Queen's University Belfast, UK
Maria-Cristina Marinescu	IBM T.J. Watson Research Center, USA
Eduardo Marques	University of São Paulo, Brazil
Kostas Masselos	University of Peloponnese, Greece
Seda Ö. Memik	Northwestern University, USA
Oskar Mencer	Imperial College London, UK
Walid Najjar	University of California Riverside, USA
Horácio Neto	INESC-ID/IST, Portugal
Joon-seok Park	Inha University, Seoul, South Korea
Andy Pimentel	University of Amsterdam, The Netherlands
Joachim Pistorius	Altera Corp., USA
Marco Platzner	University of Paderborn, Germany
Bernard Pottier	University of Bretagne, France
Tsutomu Sasao	Kyushu Institute of Technology, Japan
Pete Sedcole	Imperial College London, UK
Lesley Shannon	Simon Fraser University, USA
Russell Tessier	University of Massachusetts, USA
Pedro Trancoso	University of Cyprus, Cyprus
Ranga Vemuri	University of Cincinnati, USA
Markus Weinhardt	PACT Informationstechnologie AG, Germany
Stephan Wong	Delft University of Technology, The Netherlands
Roger Woods	Queen's University Belfast, UK

Additional Reviewers

Esther Andres	Qiang Liu
Kubilay Atasu	Antonio Roldao Lopes
Alberto del Barrio	Enno Lübbers
David Boland	Yi Lu

Vanderlei Bonato
Lars Braun
Hagen Gädke
Carlo Galuzzi
Angamuthu Ganesan
Heiner Giefers
Jose I. Gomez
Laiq Hasan
José Arnaldo Mascagni de Holanda
Jae Young Hur
Matthias Kuehnle
Mahendra Kumar
Loic Lagadec
Y.M. Lam
Martin Langhammer
Terrence Mak
Thomas Marconi
Shahnam Mirzaei
Abhishek Mitra
Shinobu Nagayama
Juanjo Noguera
Christian Plessl
Fredy Rivera
Mojtaba Sabeghi
Thomas Schuster
K. Susanto
Timothy Todman
Kieron Turkington
Qiang Wu

Table of Contents

Keynotes

Programming and Compilation

DNA and String Processing Applications

Scientific Applications

Reconfigurable Computing Hardware and Systems

Image Processing

Run-Time Behavior

Instruction Set Extension

Random Number Generation and Financial Computation

Posters