

Achievements in European Research on Grid Systems

Edited by
Sergei Gorlatch
Marian Bubak
Thierry Priol

Core **GRID**

 Springer

ACHIEVEMENTS IN EUROPEAN RESEARCH
ON GRID SYSTEMS

CoreGRID Integration Workshop 2006 (Selected Papers)

ACHIEVEMENTS IN EUROPEAN RESEARCH
ON GRID SYSTEMS
CoreGRID Integration Workshop 2006
(Selected Papers)

October 19-20, Krakow, Poland

Edited by

Sergei Gorlatch
University of Muenster
Germany

Marian Bubak
ICS/ACC CYFRONET AGH
Krakow, Poland

Thierry Priol
IRISA / INRIA
Rennes, France

Sergei Gorlatch
Universität Münster
FB Mathematik und Informatik
Institut für Informatik
Einsteinstr. 62
48149 Münster
GERMANY
gorlatch@math.uni-muenster.de

Marian Bubak
Academy Mining /Metallurgy
Inst. Computer Science, AGH
Al. A. Mickiewicza 30
30-059 KRAKOW
POLAND
bubak@uci.agh.edu.pl

Thierry Priol
IRISA / INRIA Rennes
Campus de Beaulieu
35042 RENNES CX
FRANCE
thierry.priol@irisa.fr

Achievements in European Research on Grid Systems

Edited by Sergei Gorlatch, Marian Bubak, Thierry Priol

ISBN-13: 978-0-387-72811-7

e-ISBN-13: 978-0-387-72812-4

Library of Congress Control Number: 2007933822

© 2008 Springer Science+Business Media, LLC.

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

Printed on acid-free paper.

9 8 7 6 5 4 3 2 1

springer.com

Contents

Foreword	vii
Contributing Authors	xi
Partitioning Unstructured Peer-to-Peer Systems <i>Harris Papadakis, Paraskevi Fragopoulou, Evangelos P. Markatos, Alexandros Labrinidis, Marios Dikaiakos</i>	1
Validating Desktop Grid Results by Comparing Intermediate Checkpoints <i>Filipe Araujo, Patricio Domingues, Derrick Kondo, Luis Moura Silva</i>	13
Integration of the eNANOS Execution Framework with GRMS <i>Ivan Rodero, Francesc Guim, Julita Corbalan, Jesus Labarta, Ariel Oleksiak, Krzysztof Kurowski, Jarek Nabrzyski</i>	25
User-Transparent Scheduling for HOCs <i>Cătălin L. Dumitrescu, Jan Dünnweber, Sergei Gorlatch, Dick H.J. Epema</i>	41
Problem Solving Environment for Distributed Interactive Applications <i>Katarzyna Rycerz, Marian Bubak, Peter Sloot, Vladimir Getov</i>	55
Fault-Tolerant Data Sharing for High-level Grid Programming <i>Marco Aldinucci, Marco Danelutto, Gabriel Antoniu, Mathieu Jan</i>	67
PAL: Exploiting Java Annotations for Parallelism <i>Marco Danelutto, Marcelo Pasin, Marco Vanneschi, Patrizio Dazzi, Domenico Laforenza, Luigi Presti</i>	83
A New Approach on Network Resources Management in Grids <i>Ranieri Baraglia, Domenico Laforenza, Renato Ferrini, Stefano Giordano, Nicola Tonello, Davide Adami, Ramin Yahyapour</i>	97
Componentising a Scientific Application for the Grid <i>Nikos Parlavantzas, Vladimir Getov, Matthieu Morel, Fabrice Huet, Francoise Baude, Denis Caromel</i>	109
A Peer-to-Peer Framework for Resource Discovery in Large-Scale Grids <i>Domenico Talia, Paolo Trunfio, Jingdi Zeng, Mikael Höggqvist</i>	123

GRID Superscalar and GriCoL: Integrating Different Programming Approaches	139
<i>Raül Sirvent, Rosa M. Badia, Natalia Currle-Linde, Michael Resch</i>	
Deriving Policies from Grid Security Requirements Model	151
<i>Syed Naqvi, Alvaro E. Arenas, Philippe Massonet</i>	
Domain-Specific Metadata	165
<i>Jeyarajan Thiyagalingam, Vladimir Getov, Sofia Panagiotidi, Olav Beckmann, John Darlington</i>	
A Service for Reliable Execution of Grid Applications	179
<i>Elżbieta Krępska, Thilo Kielmann, Raül Sirvent, Rosa M. Badia</i>	
Performance monitoring of GRID superscalar with OCM-G/G-PM	193
<i>Rosa M. Badia, Raül Sirvent, Marian Bubak, Piotr Machner, Włodzimierz Funika</i>	
Improving Workflow Execution	207
<i>Philipp Wieder, Oliver Wäldrich, Wolfgang Ziegler, Ramin Yahyapour</i>	
Dependability Evaluation of the OGSA-DAI Middleware	223
<i>William Hoarau, Sébastien Tixeuil, Nuno Rodrigues, Décio Sousa, Luis Silva</i>	
Author Index	237

Foreword

This volume is a selection of best papers presented at the CoreGRID Integration Workshop 2006 (CGIW'2006), which took place on 19–20 October 2006 in Krakow, Poland.

The workshop was organised by the Network of Excellence CoreGRID funded by the European Commission under the sixth Framework Programme IST-2003-2.3.2.8 starting September 1st, 2004 for a duration of four years. CoreGRID aims at strengthening and advancing scientific and technological excellence of Europe in the area of Grid and Peer-to-Peer technologies. To achieve this objective, the network brings together a critical mass of well-established researchers from forty institutions who have constructed an ambitious joint programme of activities.

The goal of the workshop is to promote the integration of the CoreGRID network and of the European research community in the area of Grid and P2P technologies, in order to overcome the current fragmentation and duplication of efforts in this area.

The list of topics of Grid research covered at the workshop included but was not limited to:

- knowledge and data management;
- programming models;
- system architecture;
- Grid information, resource and workflow monitoring services;
- resource management and scheduling;
- systems, tools and environments;
- trust and security issues on the Grid.

Priority at the workshop was given to work conducted in collaboration between partners from different research institutions and to promising research proposals that can foster such collaboration in the future.

The workshop was open to the members of the CoreGRID network and also to the parties interested in cooperating with the network and/or, possibly joining the network in the future.

The Programme Committee who made the selection of papers included:

Sergei Gorlatch, University of Muenster, Chair
Marian Bubak, ICS and ACC CYFRONET AGH
Artur Andrzejak, ZIB
Marco Danelutto, University of Pisa
Vladimir Getov, University of Westminster
Pierre Guisset, CETIC
Domenico Laforenza, ISTI-CNR
Norbert Meyer, Poznan Supercomputing and Networking Center
Ron Perrot, Queen's University Belfast
Thierry Priol, INRIA/IRISA
Uwe Schwiegelshohn, University of Dortmund
Domenico Talia, University of Calabria
Ramin Yahyapour, University of Dortmund
Wolfgang Ziegler, Fraunhofer-Institute SCAI

All papers in this volume were reviewed by the following reviewers whose help we gratefully acknowledge:

Martin Alt
Artur Andrzejak
Mark Baker
Briquet
Maciej Brzezniak
Marian Bubak
Mario Cannataro
Andrei Chernykh
Marco Danelutto
Patrizio Dazzi
Jan Dünneweber
Vladimir Getov
Pierre Guisset
Mikael Höggqvist
Felix Hupfeld
Stavros Isaiadis
Gracjan Jankowski
Radek Januszewski
Ian Kelley
Raj Kettimuthu
Tobias Langhammer
Norbert Meyer
Jakub T. Moscicki

Nikos Parlavantzas
Kathrin Peter
Domenico Talia
Jeyarajan Thiyagalingam
Pawel Wolniewicz
Ramin Yahyapour
Wolfgang Ziegler

We gratefully acknowledge the support from the members of the Scientific Advisory Board and Industrial Advisory Board of CoreGRID, and especially the invited speakers Anssi Karhinen (Nokia) and Michal Turala (IFJ PAN). Special thanks are due to the authors of all submitted papers, the members of the Programme Committee and the Organising Committee, and to all reviewers, for their contribution to the success of this event. We are grateful to ACC Cyfronet AGH for hosting the Workshop and publishing its preliminary proceedings.

Muenster and Krakow, May 2007

Sergei Gorlatch and Marian Bubak (workshop organizers)
Thierry Priol (Scientific Coordinator of CoreGRID)

Contributing Authors

Davide Adami CNIT Research Unit, Department of Information Engineering, University of Pisa, 56100 Pisa, Italy
(davide.adami@cnit.it)

Marco Aldinucci Computer Science Department, University of Pisa, Largo Bruno Pontecorvo 3, 56127 Pisa, Italy
(aldinuc@di.unipi.it)

Gabriel Antoniu Campus de Beaulieu, 35042 Rennes, France
(gabriel.antoniu@irisa.fr)

Filipe Araujo CISUC, Department of Informatics Engineering, University of Coimbra, Portugal
(filipius@dei.uc.pt)

Alvaro E. Arenas STFC Rutherford Appleton Laboratory, United Kingdom
(A.E.Arenas@rl.ac.uk)

Rosa M. Badia Barcelona Supercomputing Center and Universitat Politècnica de Catalunya, Barcelona, Spain
(rosab@ac.upc.edu)

Ranieri Baraglia Information Science and Technologies Institute, CNR, 56126 Pisa, Italy
(ranieri.baraglia@isti.cnr.it)

Francoise Baude INRIA Sophia Antipolis, 2004, route des Lucioles, BP 93, France
(Francoise.Baude@inria.fr)

Olav Beckmann Department of Computing, Imperial College London, 180 Queen's Gate, London SW7 2AZ, UK

Marian Bubak Institute of Computer Science, AGH, al. Mickiewicza 30, 30-059 Kraków, Poland
Academic Computer Centre – CYFRONET, Nawojki 11, 30-950 Kraków, Poland
(bubak@agh.edu.pl)

Denis Caromel INRIA Sophia Antipolis, 2004, route des Lucioles, BP 93, France
(denis.caromel@inria.fr)

Julita Corbalan Barcelona Supercomputing Center, Universitat Politècnica de Catalunya (UPC), Spain
(julita.corbalan@bsc.es)

Natalia Curre-Linde High Performance Computing Center (HLRS), University of Stuttgart, Germany
(linde@hlrs.de)

Marco Danelutto Computer Science Department, University of Pisa, Largo Bruno Pontecorvo 3, 56127 Pisa, Italy
(marcod@di.unipi.it)

John Darlington Department of Computing, Imperial College London, 180 Queen's Gate, London SW7 2AZ, UK
(jd@doc.ic.ac.uk)

Patrizio Dazzi IMT (Lucca Institute for Advanced Studies), Lucca, Italy
ISTI/CNR, Pisa, Italy
(patrizio.dazzi@isti.cnr.it)

Marios Dikaiakos Department of Computer Science, University of Cyprus, P.O. Box 537, CY-1678 Nicosia, Cyprus
(mdd@ucy.ac.cy)

Patricio Domingues School of Technology and Management, Polytechnic Institute of Leiria, Portugal
(patricio@estg.ipleiria.pt)

Cătălin L. Dumitrescu Mathematics and Computer Science Department, The University of Münster
(dumitres@uni-muenster.de)

Jan Dünnweber Mathematics and Computer Science Department, The University of Münster
(duennweb@uni-muenster.de)

Dick H.J. Epema Electrical Eng., Mathematics and Computer Science Department, Technical University of Delft
(d.h.j.epema@tudelft.nl)

Renato Ferrini Information Science and Technologies Institute, CNR, 56126 Pisa, Italy
(renato.ferrini@isti.cnr.it)

Paraskevi Fragopoulou Institute of Computer Science, Foundation for Research and Technology-Hellas, P.O. Box 1385, 711 10 Heraklion-Crete, Greece
(fragopou@ics.forth.gr)

Włodzimierz Funika Institute of Computer Science, AGH, al. Mickiewicza 30, 30-059 Kraków, Poland
(funika@agh.edu.pl)

Vladimir Getov School of Computer Science, University of Westminster, Watford Rd, Northwick Park Harrow HA1 3TP, UK
(v.s.getov@westminster.ac.uk)

Stefano Giordano Department of Information Engineering, University of Pisa, 56100 Pisa, Italy
(s.giordano@iet.unipi.it)

Sergei Gorlatch Mathematics and Computer Science Department,
The University of Münster
(gorlatch@uni-muenster.de)

Francesc Guim Barcelona Supercomputing Center, Universitat Politècnica
de Catalunya (UPC), Spain
(francesc.guim@bsc.es)

William Hoarau LRI-CNRS 8623 and INRIA Grand Large, Université
Paris Sud XI, France
(hoarau@lri.fr)

Mikael Höggvist Konrad-Zuse-Zentrum für Informationstechnik Berlin,
Takusstrasse 7, D-14195 Berlin-Dahlem, Germany
(hoegqvist@zib.de)

Fabrice Huet INRIA Sophia Antipolis, 2004, route des Lucioles, BP 93,
France
(fabrice.huet@inria.fr)

Mathieu Jan Campus de Beaulieu, 35042 Rennes, France
(mathieu.jan@irisa.fr)

Thilo Kielmann Dept. of Computer Science, Vrije Universiteit, Amsterdam,
The Netherlands
(kielmann@cs.vu.nl)

Derrick Kondo Laboratoire de Recherche en Informatique/INRIA Futurs,
France
(dkondo@lri.fr)

Elżbieta Krępska Dept. of Computer Science, Vrije Universiteit, Amsterdam,
The Netherlands
(e.krepska@gmail.com)

Krzysztof Kurowski Poznan Supercomputing and Networking Center,
Poland
(kikas@man.poznan.pl)

Jesus Labarta Barcelona Supercomputing Center, Universitat Politècnica de Catalunya (UPC), Spain
(jesus.labarta@bsc.es)

Alexandros Labrinidis Department of Computer Science, University of Pittsburgh, Pittsburgh 15260, USA
(labrinid@cs.pitt.edu)

Domenico Laforenza Information Science and Technologies Institute, CNR, 56126 Pisa, Italy
(domenico.laforenza@isti.cnr.it)

Piotr Machner Institute of Computer Science, AGH, al. Mickiewicza 30, 30-059 Kraków, Poland
(machner@student.agh.edu.pl)

Evangelos P. Markatos Institute of Computer Science, Foundation for Research and Technology-Hellas, P.O. Box 1385, 71110 Heraklion-Crete, Greece
(markatos@ics.forth.gr)

Philippe Massonet Centre of Excellence in Information and Communication Technologies (CETIC), Belgium
(philippe.massonet@cetic.be)

Matthieu Morel INRIA Sophia Antipolis, 2004, route des Lucioles, BP 93, France
(matthieu.morel@inria.fr)

Jarek Nabrzyski Poznan Supercomputing and Networking Center, Poland
(naber@man.poznan.pl)

Syed Naqvi Centre of Excellence in Information and Communication Technologies (CETIC), Belgium
STFC Rutherford Appleton Laboratory, United Kingdom
(snaqvi@ieee.org)

Ariel Oleksiak Poznan Supercomputing and Networking Center, Poland
(ariel@man.poznan.pl)

Sofia Panagiotidi Department of Computing, Imperial College London, 180 Queen's Gate, London SW7 2AZ, UK

Harris Papadakis Institute of Computer Science, Foundation for Research and Technology-Hellas, P.O. Box 1385, 71110 Heraklion-Crete, Greece
(adanar@ics.forth.gr)

Nikos Parlavantzas Harrow School of Computer Science, University of Westminster, HA1 3TP, UK
(N.Parlavantzas@westminster.ac.uk)

Marcelo Pasin Dept. Computer Science, Univ. of Pisa, Italy & CoreGRID Programming Model Institute
EIA/FR, Fribourg, Switzerland
(marcelopasin@gmail.com)

Luigi Presti IMT (Lucca Institute for Advanced Studies), Lucca, Italy
(luigi.presti@imtlucca.it)

Michael Resch High Performance Computing Center (HLRS), University of Stuttgart, Germany
(resch@hls.de)

Ivan Rodero Barcelona Supercomputing Center, Universitat Politècnica de Catalunya (UPC), Spain
(ivan.rodero@bsc.es)

Nuno Rodrigues Dep. Engenharia Informática, University of Coimbra, Polo II, 3030-Coimbra, Portugal

Katarzyna Rycerz Institute of Computer Science, AGH, al. Mickiewicza 30, 30-059 Kraków, Poland
Academic Computer Centre – CYFRONET, Nawojki 11, 30-950 Kraków, Poland
(kzajac@agh.edu.pl)

Luis Moura Silva CISUC, Department of Informatics Engineering, University of Coimbra, Portugal