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Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Marian Bubak Tomasz Szepieniec
Kazimierz Wiatr (Eds.)

Building a National Distributed e-Infrastructure – PL-Grid

Scientific and Technical Achievements

Springer

Volume Editors

Marian Bubak
AGH University of Science and Technology
Department of Computer Science and ACC Cyfronet AGH
30-950 Kraków, Poland
E-mail: bubak@agh.edu.pl

Tomasz Szepieniec
AGH University of Science and Technology
ACC Cyfronet AGH
30-950 Kraków, Poland
E-mail: t.szepieniec@cyfronet.pl

Kazimierz Wiatr
AGH University of Science and Technology
ACC Cyfronet AGH and Department of Electronics
30-950 Kraków, Poland
E-mail: k.wiatr@cyfronet.pl

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Preface

The main objective of the PL-Grid project was to provide the Polish scientific community with a grid-based e-infrastructure enabling research in various domains of e-Science. Our infrastructure supports scientific investigations by integrating experimental data and results of advanced computer simulations carried out by geographically distributed research teams.

PL-Grid not only extends the amount of computational resources provided to the Polish scientific community by 215 Tflops of computing power and 2500 TB of storage space, but – more importantly – facilitates effective use of these resources by providing innovative grid services and end-user tools, as well as continuous technical support. Extensive collaboration between project developers and domain scientists has led to the release of new domain-specific services and applications.

Another important achievement of PL-Grid was the introduction of a professional separation of responsibilities upon which the infrastructure is based. This organizational schema enables better user support and ensures consistent quality of service, in line with European Commission policies which actively encourage development and integration of distributed computing infrastructures under the EGI InSPIRE and PRACE umbrella projects.

This book describes the experience and the scientific results obtained by the project partners as well as the outcome of research and development activities carried out within the project.

The first chapter provides an overview of motivation, current status and future development within the PL-Grid e-infrastructure. The second chapter presents the way in which three main grid middleware suites (gLite, UNICORE and QosCosGrid) are integrated in the PL-Grid platform and extended with additional support services. The third chapter describes the experience and current status of service operations. This is followed by three chapters which provide details on the middleware implemented in PL-Grid. The next four chapters are dedicated to essential security mechanisms, including the tools and security solutions implemented in our e-infrastructure. We also present chapters devoted to new methods of infrastructure monitoring, storage provisioning and implementation of service level agreements. Subsequently, seven consecutive chapters provide an in-depth description of user environments: the Eclipse Parallel Tools Platform integrated with QosCosGrid, the Migrating Desktop, Science Gateways based on the Vine Toolkit, the GridSpace Experiment Platform, and the InSilicoLab environment. A very important contribution to the book comes in the form of five chapters prepared by end-user teams. They describe how the PL-Grid middleware and infrastructure are applied to solving such scientific problems as grain morphology analysis, seeking common structural motifs in protein families, chemistry computations, molecular dynamics models, LHC computing, and

Monte Carlo simulations for the Cherenkov Telescope Array. Finally, the last two chapters describe activities which are of great importance in any emerging computing infrastructure – namely, training and dissemination. The book is supplemented with a glossary of terms.

We hope that it will serve as an important intellectual resource for researchers, developers and system administrators working on their own grid infrastructures and promote collaboration and exchange of ideas in the process of constructing a common European e-Infrastructure.

We owe our thanks to all authors and reviewers for their diligent work which ensures the high quality of this book. We would like to express our gratitude to Jacek Kitowski, Director of PL-Grid, for his personal involvement. We are also indebted to Zofia Mosurska, Robert Pająk, Milena Zając, Piotr Nowakowski, Magdalena Szopa, and Joanna Kocot for their enthusiastic editorial work, as well as to numerous colleagues from ACC Cyfronet AGH for their help. Finally, we wish to thank Springer for the fruitful collaboration during the preparation of the book.

We invite you to visit the PL-Grid website (`http://www.plgrid.pl`) which carries up-to-date information regarding our e-Infrastructure.

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Marian Bubak
Tomasz Szepieniec
Kazimierz Wiatr

Book Preparation

This book was prepared with the help of the members of the PL-Grid project.

Editors' Support Team

Help in editing the book:	Z. Mosurska, R. Pająk and M. Zając
English proofreading:	J. Kocot, P. Nowakowski and M. Szopa

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