

REPORT: CoreGRID Fellowship Period-2 (Oct'06 – Jun'07) at STFC Rutherford Appleton Laboratory

Validation and Verification of Grid Application Security Requirements and Derivation of Quality of Service Parameters for Using Semantic Grid Services

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CoreGRID Fellowship

July 01, 2007

Institute on Knowledge and Data Management

CoreGRID - Network of Excellence

URL: <http://www.coregrid.net>

CoreGRID is a Network of Excellence funded by the European Commission under the Sixth Framework Programme

Project no. FP6-00426

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Abstract

This report summarizes the research activities that I performed during the second part of my CoreGRID Fellowship at the Science and Technology Facilities Council Rutherford Appleton Laboratory (STFC-RAL), United Kingdom. This report provides an overview of the scientific results obtained during this part of the fellowship; list of the published papers; scientific talks; tutorial; other scientific activities (conferences served as program committee member, journals served as external reviewer); and the list of the events/meetings attended during the course of this fellowship period.

Acknowledgements

Several people have been instrumental in the course of my fellowship. At the outset, I would like to thank my scientific host Alvaro Arenas for his valuable guidance. I am also indebted to my fellowship co-host Philippe Massonet for his continued involvement in my research activities. Many thanks to IMG Group Leader, Brian Matthews, for keeping his door open to any of my questions and problems. I owe gratitude to the STFC colleagues for their comradeship and personal favours on various occasions. I am equally grateful to the administrative staff members of STFC and CoreGRID Network of Excellence who have been kind enough to help me in their respective roles. A special word of thanks for CETIC Managing Director, Pierre Guisset, for his valued support during the entire period of my fellowship.

This research work is carried out under the FP6 Network of Excellence CoreGRID funded by the European Commission (Contract IST-2002-004265).

Fellowship Assignments

The fellowship assignment – validation and verification of Grid application security requirements and derivation of quality of service parameters for using semantic Grid services – contributes to the general objective of the CoreGRID workpackage-2 (WP2) roadmap: providing an integrated view of data and knowledge management in Grids. The second part of the fellowship at STFC-RAL deals with the methods for deriving Grid security policies for managing virtual organisations (Tasks 2.1, 2.2, & 2.3 of the WP2). Issues related to the derivation of security policies in Grid Data Management Systems (GDMS) were addressed by modelling their security requirements at the application level.

The GDMS security requirements model developed during the first phase of the fellowship was refined to facilitate security policy derivation. Formal techniques were studied so that a formal aspect can be added in the requirements model. Formalisation of the requirements model was found indispensable not only for the validation and verification purposes but also for the derivation of the GDMS executable security policies. Other techniques (such as anti-goals that are the attack patterns) were included to make the whole process (from requirements modelling to the policy derivation) more comprehensive and worthwhile. New dimensions (such as risks assessment, data isolation, forensics, etc.) were introduced to address the Grid specific security requirements and their impact on the virtual organisation security policy management.

The results of this fellowship activity are successfully applied in other domains (such as critical information infrastructure protection, return on security investment, etc.) and its research perspectives have been used by other scientific research projects (such as GridTrust, and XtremOS).

Publications

1. Naqvi S., Ponsard C., Massonet P., Arenas A., 'Security Requirements Elaborations for Grid Data Management Systems', *International Journal of System of Systems Engineering (IJSSE)*, 2007
2. Naqvi S. et al., 'New Research Dimensions for the Formal Analysis of Critical Information Infrastructures Security Requirements', *Fraunhofer Symposium on Future Security*, Karlsruhe, Germany, September 12-14, 2007
3. Lakhani A., Yang E., Matthews B., Johnson I., Naqvi S., Silaghi G., 'Threat Analysis and Attacks on XtremOS: A Grid-Enabled Operating System', *CoreGRID Symposium*, Rennes, France, August 27-28, 2007
4. D'andria F., Martrat J., Kirkham T., Naqvi S., Gallop J., Arenas A., 'The Evolving Use of Service Level Agreements and the Influence of Trust within the Support and Development of Grids to Enable a Next Generation of Business Models', *International Workshop on Service Oriented Computing: a look at the Inside (SOC@Inside'07)*, Vienna, Austria, September 17 2007

Scientific Talks

1. Naqvi S., 'European Commission Framework Programme-6 (FP6) Grid Security Projects: AssessGrid & GridTrust', *CoreGRID Summer School 2007*, Budapest, Hungary, September 07, 2007

2. Naqvi S., 'CoreGRID Fellowship: Outcomes and Lessons Learned', CoreGRID Industrial Advisory Board Meeting, Manchester, UK, May 10, 2007
3. Naqvi S., 'Deriving Policies from Grid Security Requirements Model', Welsh E-Science Centre, Cardiff, UK, April 26, 2007
4. Naqvi S., 'Common Criteria Evaluation and Validation Scheme', XtremOS Training Day, Paris, France, February 27, 2007

Tutorial

1. Naqvi S., 'Grid Security – Principles and Practices', Baltic Grid Summer School 2007 (BGSS'07), Riga, Latvia, July 06, 2007

Programme Committee Member

1. International Conference on Emerging Security Information, Systems and Technologies 2007 (SECURWARE 2007), Valencia, Spain, October 14-20, 2007
2. International Workshop on Critical Information Infrastructures Security 2007 (CRITIS'07), Malaga, Spain, October 03-05, 2007
3. International Conference on Global Defense and Business Continuity 2007 (ICGD&BC 2007), Silicon Valley, USA, July 1-6, 2007
4. International Conference on Computational Science 2007 (ICCS 2007), Beijing, China, May 27-30, 2007
5. International Workshop on Workflow Systems in E-Science 2007 (WSES 07), Beijing, China, May 27-30, 2007

External Reviewer

1. International Journal of Network Security (IJNS)
2. Elsevier Journal of Future Generation Computer Systems (FGCS)
3. Springer Journal of Grid Computing

Meetings Attended

In-House

1. Weekly meetings of the XtremOS Project team members of STFC.
2. Monthly group meetings of the Information Management Group (IMG) of the E-Science Systems Research Department.
3. Occasional exchange of ideas with the personnel of Grid Deployment Group of the E-Science Systems Research Department.
4. Informal interactions with the Akogrimo Project team members of STFC.
5. Visits/briefings of various sites/operations of the Rutherford Appleton Laboratory organised by the OPB (Others People Business) section of the Communications wing of STFC.

External

1. National Grid Service User Forum and Training, Oxford, UK, June 19-20, 2007
2. eGenomics Workshop, Cambridge, UK, June 06-08, 2007
3. CoreGRID Industrial Advisory Board Meeting, Manchester, UK, May 10, 2007
4. Meeting with Omer Rana (Welsh E-Science Centre, School of Computer Science, Cardiff University), Cardiff, UK, April 26, 2007
5. Meeting with Julian Padget (Agents Research Group, Computer Science Department, University of Bath), Bath, UK, March 13, 2007
6. CoreGRID Institute on Knowledge and Data Management (WP2) meeting, Manchester, UK, March 01-02, 2007
7. CoreGRID Storage Security Group Meeting, Manchester, UK, February 28, 2007
8. XtreamOS Training Day, Paris, France, February 27, 2007
9. GRIA (Grid Resources for Industrial Applications) Training at IT Innovation, Southampton, UK, February 01, 2007
10. Workshop on Virtual Organisations and Grids: Applications, Patterns and Infrastructures, Edinburgh, UK, November 21-22, 2006
11. CoreGRID Integration Workshop, Krakow, Poland, October 19-20, 2006