

Integration of Security Solutions in Component-based Grid Systems

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1. Introduction

This report provides a summary of the activities performed during the CoreGRID sponsored research exchange programme (REP) in the Department of Computer Science of the ACC CYFRONET AGH, Krakow, Poland in April and May 2008.

2. Specific links and added value with the CoreGRID

The research exchange contributed to the general objective of the WP7 roadmap [1]. The use of generic platform (Task 7.1) and mediator components (Task 7.2) for the integration of security solutions (such as GSI, and Shibboleth) are investigated. MOCCA framework [2] developed by ACC CYFRONET AGH under Tasks 7.3 & 7.4 is used for the proof of the concept implementation. The work directly contributed to the Security in Grid Platforms research group in WP7. The security activity in CoreGRID runs as a horizontal integration activity related to all the research areas. The CoreGRID WP2 (where the REP beneficiary is involved) has established competencies in the security requirements analysis [3, 4] that are leveraged to integrate security solutions in the component-based Grid systems developed under the auspices of CoreGRID WP7. Generic integration solutions are proposed to benefit wide variety of component-based Grid systems.

3. Description of the activities carried out during the research exchange

- Context

MOCCA is a CCA (Common Component Architecture) compliant component framework based on H2O resource sharing platform. CCA is a component standard designed to support large-scale scientific applications, and it can be adapted to distributed environments, such as Grid systems. MOCCA also provides mechanisms for interoperability with Grid Component Model (GCM) [5]. ACC CYFRONET AGH has explored a number of security features for the MOCCA Framework [6, 7]. The research exchange activity facilitated the analysis of threats and security requirements of component-based Grid systems in general and MOCCA in particular.

- Work done

1. Study of the relevant projects running at ACC CYFRONET AGH
 - a. GREDIA (Grid enabled access to rich media content)
 - b. VIROLAB (Virtual Laboratory)
 - c. GridSpace Platform

2. Analysis of the security requirements of component-based Grid systems with MOCCA as a case study.
3. Analysis and modeling of threats to the component-based Grid systems with MOCCA as a case study.
4. Investigation of the existing security solutions (GSI, and Shibboleth) and their suitability in the context of component-based Grid systems with MOCCA as a case study.
5. Integration of security solutions in the MOCCA framework:
 - a) GSI Authenticator for achieving single sign-on functionality
 - b) Credential delegation by using Shibboleth
 - i) Short lived Shibboleth handle is found a bottleneck in the delegation design
 - ii) This shortcoming is overcome by bridging Shibboleth to GSI
 - iii) Prospects of integrating Shibboleth with MyProxy is evaluated
6. A set of experimentations is proposed for evaluating the impact of integrating these security solutions on MOCCA – i.e. overall performance analysis of the framework.
7. Publication plan for disseminating the results of this activity is sketched. The results of two experimentations (GSI authenticator and Shibboleth based credential delegation) will be submitted to Cracow Grid Workshop 2008 (CGW08) and corresponding CoreGRID Technical Reports will be published. Later an extended paper of the overall results achieved will be submitted in a reputed conference/journal.

4. Acknowledgements

This research activity was sponsored by the European funded Network of Excellence CoreGRID (Project number IST-2002-004265). I would also like to thank my scientific host Professor Marian Bubak and his team members notably Maciej Malawski, Jan Meizner, Michal Dyrda for their help and fruitful discussions.

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