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GridCOMP

Grid programming with COMPonents : an advanced component platform for an effective invisible grid

STREP Project

Advanced Grid Technologies, Systems and Services

D.DIS.05 – Proceedings of the second GridCOMP workshop

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Summary

This document contains proceedings of final dissemination events organised by the GridCOMP project on the Grid Component Model (GCM) held in Sophia Antipolis, on 21st and 22nd October 2008. The conference on GCM and a technical concertation meeting, gathering several EU funded projects, composed these events. They were part of the 5th GRIDS@WORK week organised by INRIA, ERCIM and ETSI at the INRIA facilities, Sophia Antipolis, France.

The main objective of the conference was to show the final results produced by the GridCOMP project such as the core technologies as well as the industrial use cases. In addition, it was the opportunity for some GCM users, outside GridCOMP, to present their work on the GCM and their use of the ProActive/GCM reference implementation.

After this conference, a technical concertation meeting gave the possibility to share the current work on components and services technologies between EU funded projects. During one day about 15 EU-funded projects discussed the following thematic areas: components, services and utilities under the title *Converging Components, Services, SLA+QoS for Effective Utilities over Network Infrastructure*.

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1 Introduction

The Grid Component Model (GCM[1]), firstly defined in the CoreGRID Network of Excellence, specifies a component framework targeting development of Grid application. The GridCOMP project further refined this definition and provides the reference implementation. In order to disseminate these outcomes GridCOMP organized events held in Sophia Antipolis, on 21st and 22nd October 2008. The first day was dedicated to the GridCOMP conference being the 5th ProActive/GCM user group, this conference directly ensue from the 1st workshop organized one year ago in Beijing[2]. This event is described in section 2 of this document. The second day was organised as a technical concertation meeting, gathering several EU-funded projects. These events were part of the 5th GRIDS@WORK week organised by INRIA, ERCIM and ETSI at the INRIA facilities, Sophia Antipolis, France.

The main objective of the 5th ProActive/GCM user group was to show the final results produced by the GridCOMP project. GridCOMP provides the references implementation of the GCM which is composed of the core programming framework, the non functional features and a graphical tool. In addition, four industrial use cases demonstrating the use of the GCM in several areas such as telecommunication, business intelligence, aeronautic, etc was also developed. In addition, it was the occasion to give opportunity for some GCM users to present their work with the technologies provided by GridCOMP.

The technical concertation meeting gave attendees the opportunity to share the current work on components and services technologies between EU funded projects. It aimed at gathering the key projects identified as capable of bringing a key contribution to the services and IT utility challenge. The key objective of the EU project technical concertation meeting was to set-up collaboration and to enforce visibility to participating projects, and also help to achieve dissemination and concertation objectives.

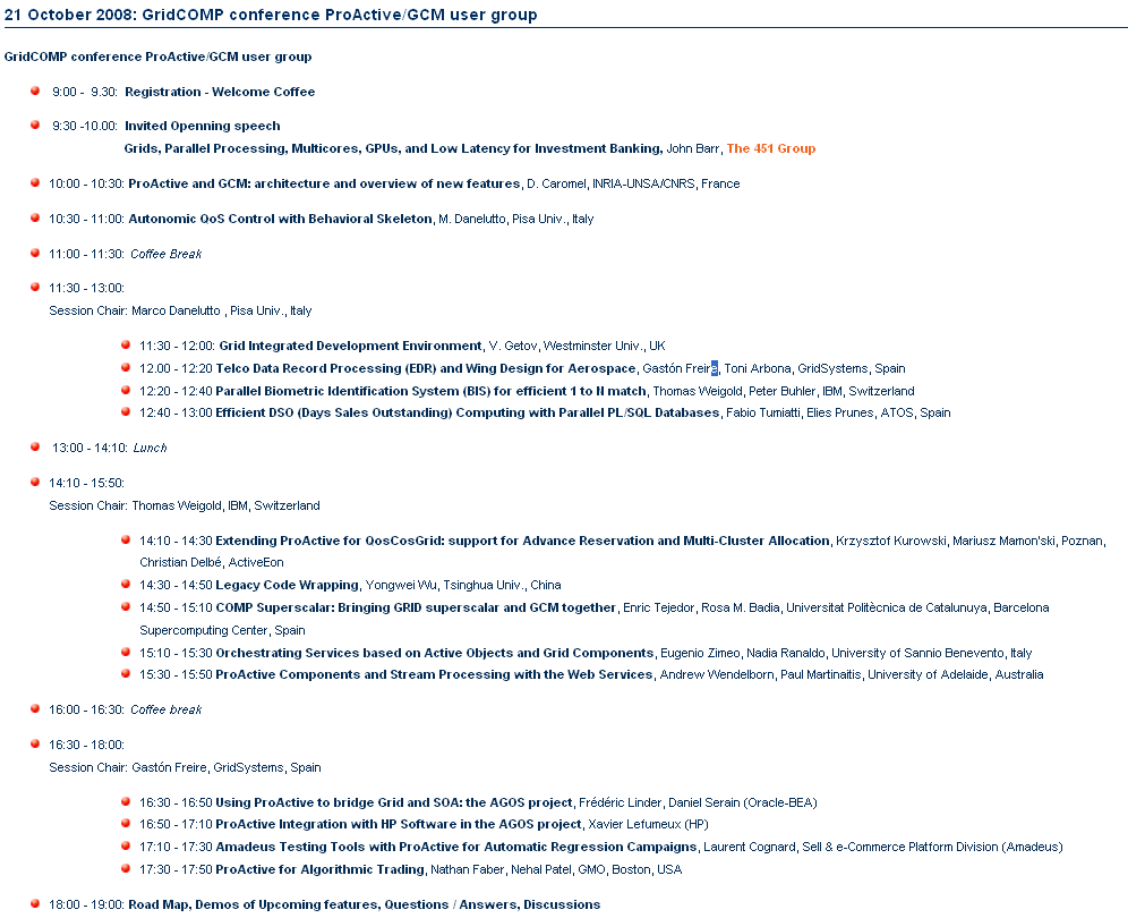
The agenda and the presentations given during these two days are publicly available at http://gridcomp.ercim.org/content/view/39/16/ for the GridCOMP conference (see Figure 1) and at http://gridcomp.ercim.org/content/view/37/16/ for the technical concertation meeting (Figure 2).

2 GridCOMP conference: 5th ProActive and GCM User Group

The GridCOMP conference gathered both GridCOMP partners and external academics and industrials using ProActive and/or the GCM. The user group was a good opportunity for the consortium to disseminate the latest progress made in the implementation of the GCM.

[1] The definition made in the CoreGRID NoE EU funded project is available at http://www.coregrid.net/mambo/images/stories/Deliverables/d.pm.04.pdf

[2] See the D.DIS.03 GridCOMP deliverable, "Proceedings of the first GridCOMP workshop", http://gridcomp.ercim.org/content/view/30/15/



21 October 2008: GridCOMP conference ProActive/GCM user group

GridCOMP conference ProActive/GCM user group

- 9:00 - 9:30: **Registration - Welcome Coffee**
- 9:30 -10.00: **Invited Openning speech**
  Grids, Parallel Processing, Multicores, GPUs, and Low Latency for Investment Banking, John Barr, **The 451 Group**
- 10:00 - 10:30: **ProActive and GCM: architecture and overview of new features**, D. Caromel, INRIA-UNSA/CNRS, France
- 10:30 - 11:00: **Autonomic QoS Control with Behavioral Skeleton**, M. Danelutto, Pisa Univ., Italy
- 11:00 - 11:30: *Coffee Break*
- 11:30 - 13:00:
  Session Chair: Marco Danelutto , Pisa Univ., Italy
  - 11:30 - 12:00: **Grid Integrated Development Environment**, V. Getov, Westminster Univ., UK
  - 12.00 - 12:20 **Telco Data Record Processing (EDR) and Wing Design for Aerospace**, Gastón Freire, Toni Arbona, GridSystems, Spain
  - 12:20 - 12:40 **Parallel Biometric Identification System (BIS) for efficient 1 to N match**, Thomas Weigold, Peter Buhler, IBM, Switzerland
  - 12:40 - 13:00 **Efficient DSO (Days Sales Outstanding) Computing with Parallel PL/SQL Databases**, Fabio Tumiatti, Elies Prunes, ATOS, Spain
- 13:00 - 14:10: *Lunch*
- 14:10 - 15:50:
  Session Chair: Thomas Weigold, IBM, Switzerland
  - 14:10 - 14:30 **Extending ProActive for QosCosGrid: support for Advance Reservation and Multi-Cluster Allocation**, Krzysztof Kurowski, Mariusz Mamon'ski, Poznan, Christian Delbé, ActiveEon
  - 14:30 - 14:50 **Legacy Code Wrapping**, Yongwei Wu, Tsinghua Univ., China
  - 14:50 - 15:10 **COMP Superscalar: Bringing GRID superscalar and GCM together**, Enric Tejedor, Rosa M. Badia, Universitat Politècnica de Catalunuya, Barcelona Supercomputing Center, Spain
  - 15:10 - 15:30 **Orchestrating Services based on Active Objects and Grid Components**, Eugenio Zimeo, Nadia Ranaldo, University of Sannio Benevento, Italy
  - 15:30 - 15:50 **ProActive Components and Stream Processing with the Web Services**, Andrew Wendelborn, Paul Martinaitis, University of Adelaide, Australia
- 16:00 - 16:30: *Coffee break*
- 16:30 - 18:00:
  Session Chair: Gastón Freire, GridSystems, Spain
  - 16:30 - 16:50 **Using ProActive to bridge Grid and SOA: the AGOS project**, Frédéric Linder, Daniel Serain (Oracle-BEA)
  - 16:50 - 17:10 **ProActive Integration with HP Software in the AGOS project**, Xavier Lefumeux (HP)
  - 17:10 - 17:30 **Amadeus Testing Tools with ProActive for Automatic Regression Campaigns**, Laurent Cognard, Sell & e-Commerce Platform Division (Amadeus)
  - 17:30 - 17:50 **ProActive for Algorithmic Trading**, Nathan Faber, Nehal Patel, GMO, Boston, USA
- 18:00 - 19:00: **Road Map, Demos of Upcoming features, Questions / Answers, Discussions**

Figure 1 GridCOMP: 5th ProActive and GCM user group agenda

About 70 registered academics and industrials coming from Europe, Oceania, America and Asia composed the audience (see Annex p. 16).

The first invited talk *Grids, Parallel Processing, Multicores, GPUs, and Low Latency for Investment Banking* was presented by John Barr from The 451 Group. This interesting presentation analysed the use of distributed programming and presented the current landscape of parallel solution for Grid computing including the ProActive Parallel Suite. Finally, the conclusion focussed on investment banking applications and the specific needs in this domain of distributed computing.

The first session was dedicated to the core GCM solution and the status of the component programming framework implemented in GridCOMP.

2.1 GCM technologies

The first set of presentations was focused on the programming framework and tool provided by GridCOMP.

Denis Caromel from INRIA presented the *ProActive and GCM: architecture and overview of new features.* This talk explained the current status of the GCM reference implementation in ProActive, and listed the last major improvements in the ProActive/GCM middleware such as

the GCM Interoperability Deployment and GCM Application Description both recent ETSI standards. In addition, the main concepts of the GCM programming model were presented:

- Primitive and composite components and hierarchical composition of components.
- Server, client and non-functional (controller) interfaces with detailed presentation of the collective communication provided by the multicast and gathercast cardinality.

These explanations showed the ability of the model and its implementation to provide solutions for parallel, distributed and multi-core computing.
In addition, the progress made in the implementation of graphical tools around ProActive has been detailed. The IC2D GUI, a tool for monitoring and optimizing ProActive application, is now completed with plug-ins allowing user to chart reports for performance analysis using a large set of metrics. Also, improvements added to the Scheduler tool have been presented. It has shown how the scheduler combined with resource manager leverage the GCM deployment to provide an efficient use of various resources to schedule different type of tasks.

Following the presentation of the core framework, Marco Aldinucci from University of Pisa discussed the non functional features provided by the GCM component model during the *Autonomic QoS Control with Behavioural Skeleton* talk. In this presentation, the approach to autonomic behaviour with GCM was explained. The key points of the GCM are the hierarchical compositional model, the advanced interactions among components and the management of the non-functional aspects of components.
The key point of the autonomic computing paradigm is the autonomic feedback loop, in which a manager supervises a set of component and triggers corrective actions at run-time to reconfigure the components. This is done in order to satisfy user-level goals specified through QoS contracts. GCM introduces the concept of behavioural skeleton as a way to abstract parametric paradigms of component assembly, such as functional replication, proxy, wrappers, etc. A behavioural skeleton is specialized to solve one or more management goals establishing a parametric orchestration schema of inner components. To conclude, a demonstration illustrated the technology presented.

The slides, *Grid Integrated Development Environment*, presented by Vladimir Getov from Westminster University gave to the audience an overview of the Grid IDE (GIDE) tool developed in the GridCOMP project. The GIDE provides several perspectives targeting each kind of role related to the development and the management of GCM applications. The composition perspective provides a toolbox with a list of components and with a set of tools so that applications can be visually composed using components. Although it functions similarly to a drawing package, the back-end of the composition perspective generates necessary GCM specific development artefacts such as component definition ADL files and Java interface and class definitions. The GIDE also provides a perspective for component monitoring allowing users to show the actual component assembly at runtime. It allows launcher to check the correct status of each part of the running composition.

The *Legacy Code Wrapping* solution provided by GridCOMP using GCM components was explained by Yongwei Wu from Tsinghua University. The aim of legacy application wrapping is to develop techniques and methods for turning legacy code into components. Using predefined components one can wrap its legacy application without changing the code and easily integrate in its component assembly. This solution can be used with API or configuration. More advanced legacy code wrapping can be achieved using specific API to communicate with native code such as MPI application.
A Bioinformatics application has been implemented to validate the GCM legacy code wrapping solution. This application is composed of four independent parts. Each of the four

parts is deployed as a component on an individual node, and each component runs the wrapped legacy code.

2.2 GCM use cases

The selected GridCOMP use cases are not only a presentation of the technical functionalities developed within the project, but they have also been selected because of their exploitation potential. Therefore, this session aimed at disseminating the final results achieved using GCM in enterprise world.
Contrary to the previous edition, the 5th ProActive and GCM user group included numerous talks outside GridCOMP partners (see section 2.3). It was a good opportunity to see achievements made between GridCOMP internal user and other users.

During the *Telco Data Record Processing (EDR) and Wing Design for Aerospace* presentation, Gastón Freire, from GridSystems company, presented two of the four use cases developed within GridCOMP.
The EDR processing application is a common telecom computing application. This kind of application processes huge amount of data, for instance the information from the calls their customers make, then draw useful conclusions and thus obtain valuable business knowledge. The transformation usually takes a lot of time and requires a considerable amount of computing resources. The use of the GCM framework results in a more efficient version, well-designed and portable. In addition, it is a cheap and easy-to-scale solution.
The second application (Wing Design) comes from the aerospace sector. It computes the aerodynamic wing performance for a given configuration. This use case parallelizes and wraps a legacy application written in Fortran. It shows how developers can leverage the GCM programming framework to reused sequential legacy code in parallel software in order to scale old application.

Thomas Weigold, from the IBM Zurich research lab, discussed the *Parallel Biometric Identification System (BIS) for efficient 1 to N match* use case. The core problem is to identify a given person solely on his biometric information by comparing its fingerprints against a large database of enrolled (known) identities. This requires massive computing power because biometric matching algorithms are non trivial and must be applied many times. Therefore, the identification system takes advantage of a Grid infrastructure and appropriate GridCOMP/GCM components, distributes the problem across the nodes, and this way achieves real-time identification performance. This GCM application can be easily deployed to arbitrary existing hardware and thus is cost-efficient; it can easily be scaled without any software change.

The last use case was detailed by Fabio Luiz Tumiatti and Irati R. Sáez de Urabain, from ATOS Origin Research and Innovation, with the *Efficient DSO (Days Sales Outstanding) Computing with Parallel PL/SQL Database* presentation. The selected use case uses PL/SQL-based source code, and the candidate application selected was the so called “Computing of DSO value”. The DSO is the mean time that clients delay to pay an invoice to ATOS. This information updated as much as possible is needed by several internal departments, and the process takes about 4 hours to compute around 6.600 clients.
The GCM framework allowed ATOS to parallelize this application in order to reduce the execution time without upgrading the infrastructure. With this it is possible to update the

information more frequently and maintain or reduce infrastructure cost. For this, it was possible to avoid the rewriting of the PL/SQL code.

2.3 ProActive/GCM users experience

The *Extending ProActive for QosCosGrid: support for Advance Reservation and Multi-Cluster Allocation* speech presented by Christian Delbé, from the ActiveEon company showed how ProActive has been used to supply a programming framework in Java in the FP6 QosCosGrid project. He presented in details how the project contributed to ProActive by developing an additional communication protocol RMIQCG with the help of ActiveEon which provides professional support on the ProActive technologies.

Enric Tejedor, from Universitat Politècnica de Catalunya, detailed how the GCM reference implementation has been used to implement the Integrated Toolkit, a framework which enables the easy development of Grid-unaware applications. The *COMP Superscalar: Bringing GRID superscalar and GCM together* presentation showed architecture of the application and how it leverages GCM features such as parallel communication and customizable aggregation result.

The next presentation *Orchestrating Services based on Active Objects and Grid Components* was presented by Nadia Ranaldo from University of Sannio. She presented the architecture of a Grid scheduler exploiting the advantages of the composition in time and composition in space approaches. She also explained how the GCM components can be used to define workflow.

The *ProActive Components and Stream Processing with Web Services* detailed experiments seeking to explore the implementation of stream-based workflows implemented as GCM components and deployed as web services. Andrew Wendelborn from University of Adelaide explained how they used web services (WS) to communicate between the components. Using ProActive they publish the server interfaces (StreamSource) as a WS; next they bind the "consumer" of the stream to the corresponding StreamSource by using an attribute which points to a WS client.

The two presentations *Using ProActive to bridge Grid and SOA: the AGOS project* and *ProActive Integration with HP Software in the AGOS project* was related to the AGOS project. AGOS is a French funded project integrating Grid Computing and Service Oriented Architecture. The first speaker, Frédéric Linder from Oracle-BEA showed the AGOS generic architecture for SOA with Grids. Xavier Lefumeux from HP detailed how AGOS provides solution for a secured software platform including reference architecture, library of services based on standards, and a set of tools to build comprehensive applications both Grid and SOA compliant. He also detailed the integration of this solution with the HP contribution in term of architecture and software product.

Laurent Cognard from Amadeus, a company providing IT solutions for travel industry, discussed *Amadeus Testing Tools with ProActive for Automatic Regression Campaigns*. He explained the selection process of ProActive to achieve the distribution of huge regression test for tools internally developed.

Nehal Patel showed how the GMO company uses *ProActive for Algorithmic Trading*. They

use ProActive to easily parallelize and distribute algorithms for trading. It allows separation of concerns and high speed simulation with an easy deployment.

2.4 ProActive/GCM upcoming features

Numerous short presentations detailed at the end of the ProActive and GCM user group the upcoming features in the ProActive/GCM implementation. Among the ongoing development, the ProActive team is focused on the following topics:

- Step-By-Step ProActive debugging.
- J2EE and ProActive integration.
- ProActive parallel Web Services for SOA integration.
- Graphical editors for component specification and verification.
- Overall features for legacy code wrapping.
- ProActive scheduling with virtualization (VM).
- ProActive features for firewall and NAT.
- ProActive Data Space: Accessing and managing remote files and data.

3 Technical concertation meeting: From Components to Services to Utilities

The technical concertation meeting entitled *Converging Components, Services, SLA+QoS for Effective Utilities over Network Infrastructure* aimed at stimulating cooperation and knowledge exchange between all members of EU projects related to **Components**, **Services** and **Utilities** for Grid and large scale IT systems. Even if it does not belong to the series of EC-organised concertation meetings attracting all projects from a given unit, we expected by organizing this event to attract participation from a reduced set of EC-funded projects from Unit INFSO/D3 (Software & Service Architectures and Infrastructures) and Unit INFSO/F3 (GÉANT & e-Infrastructure) related to specific topics. The key objective of the EU project technical concertation meeting is to set-up collaboration and to enforce visibility to participating projects, and also help to achieve dissemination and concertation objectives.

Components are the building blocks for composable and reusable software, allowing building flexible services in a cost-effective manner. Moreover, applications are turned into services with the capacity to scale-up to match Service Level Agreement. In this way, Quality of Services can be enforced, opening the way to real utilities where resources are added or relinquished upon application demand.
The objective was to gather the key projects identified as capable of bringing a key contribution to the services and IT utility challenge. To achieve this goal, participating projects mainly come from the new wave of projects accepted from the FP 7 Call 1. The early stage of these projects holds the potential of strong synergies if we identify early the complementarities and possible interactions.
As an outcome of the discussion and presentations, we produce this report in order to identify for each project the potential key contributions in terms of software, and symmetrically the potential expertise/software that could be used from other projects.
The welcome address was presented by Jorge Gasós project officer from the European Commission, in the Software & Service Architectures and Infrastructures unit.

22 October 2008: Technical Concertation meeting

Converging Components, Services, SLA+QoS for Effective Utilities over Network Infrastructure

- 9:00 **Opening Session**

  Introduction, **Denis Caromel, INRIA-UNSA-CNRS, Patricia Ho-Hune, ERCIM**

  Welcome Address from the European Commission
  Jorge Gasós
  European Commission
  Information Society and Media Directorate General
  Software & Service Architectures and Infrastructures Unit
  EC INFSO SSA&I

- 9:30 **Services**
  Chair: Cédric Dalmasso, INRIA
  - **SOA4ALL: A Web for billions of Services**
    Speaker: **Santi Ristol**, ATOS
  - **SLA@SOI: Empowering the Service Economy with SLA-aware Infrastructures**
    Speaker: **Gregor Berginc**, XLAB & **Tariq Ellahi**, SAP
  - **IRMOS: Interactive Realtime Multimedia Applications on Service Oriented Infrastructures**
    Speaker: **Theodora Varvarigou, Dimos Kyriazis**, ICCS/NTUA

- 10:45 **Networking Coffee**

- 11:15 **Virtualization of Resources/Infrastructure**
  Chair: Klaus Pohl, University Duisburg-Essen
  - **Reservoir: Resources and Services Virtualization without Barriers**
    Speaker: **Philipp Drum**, Sun Microsystems
  - **DEPLOY: Industrial deployment of system engineering methods providing high dependability and productivity**
    Speaker: **Alexander Romanovsky**, University of Newcastle
  - **ADMIRE: Advanced Data Mining for Heterogeneous Distributed resources**
    Speaker: **Amy Krause**, The University of Edinburgh
  - **g-Eclipse: GUI and toolkit for accessing Grids and Clouds: gLite, GRIA and Amazon Websevices**
    Speaker: **Ariel Garcia**, KIT

- 13:00 **Lunch**

- 14:00 **Virtualization of Resources/Infrastructure** *(Continuation)*
  Chair: Vladimir Getov, Westminster University
  - **S-Cube: The Software Services and Systems Network**
    Speaker: **Klaus Pohl**, University Duisburg-Essen
  - **STREAM: Scalable Autonomic Streaming Middleware for Real-time Processing of Massive Data Flow**
    Speaker: **Ricardo Jimenez-Peris**, Universidad Politecnica de Madrid
  - **QosCosGrid: Solutions for Quasi-Opportunistic Supercomputers**
    Speaker: **Guillaume Mecheneau & Bernhard Schott**, Platform
  - **XTreemOS: Enabling Linux for the Grid**
    Speaker: **Ana Oprescu**, Vrije University

- 15:40 **Standards and Standardization**
  Chair: Alexander Romanovsky, University of Newcastle
  - **GridCOMP: An Advanced Component Platform for an Effective Invisible Grid**
    Speaker: **Denis Caromel**, INRIA

- 16:00 **Networking Coffee**

- 16:30 **Standards and Standardization** *(Continuation)*
  Chair: Alexander Romanovsky, University of Newcastle
  - **EDGeS: Enabling Desktop Grids for e-Science**
    Speaker: **Robert Lovas**, Laboratory of Parallel and Distributed Systems, MTA SZTAKI and **Ad Emmen**, AlmereGrid
  - **ETSI: ETSI and TC Grid - Exploiting Research via Standards**
    Research and Standardisation in Europe
    Speaker: **Mike Fisher**, BT and **Laurent Vreck & Patrick Guillemin**, ETSI

- 17:20 **Special Session: NESSI-Grid SRA and NEXOF-RA**
  Chair: Eric Madelaine, INRIA
  - **NESSI-Grid: Overview of the NESSI-Grid SRA**
    Speaker: **Ricardo Jiménez Peris**, Universidad Politecnica de Madrid
  - **The NESSI-Grid SRA: an Open Process that involved the Grid Community**
    Speaker: **Juan A. Caceres**, Telefónica
  - **NEXOF-RA: Delivering components for the future Internet of Services:**
    the NEXOF-RA project
    Speaker: **Mike Fisher**, BT and **Juanjo Hierro**, Telefónica

- 18:50 **Panel: Open discussion between presenters**

Figure 2 Technical concertation meeting agenda

3.1 Services

The first session dedicated to services included the SOA4All, SLA@SOI and IRMOS projects. Fabio Luiz Tumiatti from ATOS described the SOA4All project which aims at realising a Web of billions of services, a world where billions of parties are exposing and consuming services *via* advanced Web technology. The outcome of the SOA4All project will be a comprehensive framework and infrastructure. This SOA platform integrating the services of enterprises in a transparent manner for users needs an underlying middleware. The GCM standards may be used to deploy the infrastructure. Also, they may use components to raise Services and to Manage Services using reconfiguration.

Gregor Berginc from XLAB presented the SLA@SOI project willing to empower the service economy with SLA-aware infrastructures. SLA@SOI aims at providing a multi-layer SLA management framework harmonized for providers and customers. It can be achieved by defining standards for SLA specification, negotiation and monitoring. To achieve these goals SLA@SOI will provide adaptive SLA-aware infrastructures and prediction tool for SOA and SOI components.

The IRMOS project targets to enable real-time interaction between people and application on Service Oriented Infrastructure. This requirement is particularly visible in the field of multimedia applications. Dimos Kyriazis from ICCS/NTUA explained how the IRMOS framework provides tools to achieve QoS and SLA at all levels (network, processing, storage, application, workflow and business).

3.2 Virtualization of Resources/Infrastructure

This session gathered the RESERVOIR, DEPLOY, ADMIRE, g-Eclipse, S-Cube, STREAM, QosCosGrid and XtreemOS projects on the virtualization theme. Philipp Drum from Sun Microsystems started with the RESERVOIR project. This project aims at virtualizing resources and services without barriers to avoid expensive over-provisioning. The main goal of RESERVOIR is to supply architecture and reference implementation for a service-oriented infrastructure, which will be built on open standards and new technologies. It will provide Virtual Execution Environment (VEE) which will host the executed service without any knowledge of the real executing place. Currently, ProActive/GCM is a prospect to be used as part of the framework.

The objectives of the DEPLOY project are to provide improved engineering methods for dependable systems through the deployment of formal engineering methods. Alexander Romanovsky, University of Newcastle, explained that these methods will be supported by the developments of tool providing system level modelling at multiple levels of abstraction (proof, incremental tool) deployed in a professional scalable development environment. The Eclipse platform is used to implement this environment. It was raised during the discussion that automatic formal verification can take a long time. It can be interesting to try to parallelize such verification and automatic proofs which may be done using the ProActive/GCM framework.

Amy Krause from The University of Edinburgh presented the ADMIRE project which focus on advanced data mining. The goal of this project is to accelerate access to Data, and improve the benefits of using distributed and heterogeneous sources of data.

The g-Eclipse project made a toolkit to ease access to the Grid. Ariel Garcia from KIT presented the features of the g-Eclipse tool based on the Eclipse platform. Several perspectives allow users, administrators, etc. to access Grids and Clouds (gLite, GRIA, Amazon Webservices). The platform is easily extensible to support new middleware and present uniform view to users for the different infrastructure accessed. After discussion, it appears that this tool can be used by ProActive/GCM users only for simple use cases but some extensions can be achieved.

The presentation of the S-Cube Network Excellence made by Klaus Pohl from University Duisburg-Essen was really interesting by the clear ideas stating the actual list of services and infrastructure capabilities in the Grid domain. S-Cube aims at establishing a Software Services and Systems Network. The distributed services, autonomy, QoS management, abstraction, reusability, composability and extensibility aspects are actively investigated in the research community, and S-Cube has been funded by the European Union to investigate about a stronger interaction between the Software/Services Engineering community and the Grid Computing community. Two GridCOMP partners are involved in this project and plan to use the GridCOMP project outcomes as a starting point in the discussion with S-Cube partners from the service engineering communities.

Ricardo Jimenez-Peris from Universidad Politecnica de Madrid presented the STREAM project which aimed at developing a highly scalable middleware infrastructure to process massive data flows in real time. The framework will provide Self-healing, Self-configuring and Self-provisioning. These developments specially target telco, services and financial domains.

The QosCosGrid project previously mentioned aimed at providing solutions for quasi-opportunistic supercomputers. Guillaume Mecheneau from Platform company explained the QosCosGrid vision, which see the Grid as a supercomputer for complex systems.

The XtreemOS objective is to enable Linux for the Grid. Ana Oprescu from Vrije University explained that XtreemOS designs and implements an open source Linux-based Grid Operating System with native VO support. It aims at bringing Grid to standard users thanks to the transparency and the scalability of the solution. Furthermore, features like XtreemFS (a Grid File System), VO management and security will help to achieve this goal. Some collaboration with GridCOMP has been identified:

- Use the GCM Deployment standard and implementation in order to integrate non XtreemOS resources (with support in GridCOMP GUI tool).
- Add an XtreemOS part in the GCM Deployment standard
- Use Behavioural Skeleton to provide autonomic services features in XtreemOS.

3.3 Standards and Standardization

During this session the GridCOMP and the EDGeS projects were presented together with the ETSI standardization body.

Denis Caromel detailed the GridCOMP project with a particular focus on the GCM success story. The GCM coming from the CoreGRID NoE has been implemented in GridCOMP and in parallel standardized at ETSI. He detailed capabilities of the GCM reference implementation provided with the ProActive Parallel Suite and the non-functional allowing component to autonomic management following predefined behavioural skeleton. In addition,

the Grid IDE, an eclipse based tool, featuring component application design and monitoring was presented.

The EDGeS project has the objective to enable desktop Grids for e-Science. Ad Emmen from AlmereGrid presented the EDGeS Grid infrastructure and the collaboration with the EGEE project. He identified the needs of standardization and detailed the standardization activities with OGF which aimed at setting up a research group on Desktop Grid.

Mike Fisher, chairman of the ETSI Technical committee on Grid, from BT briefly presented ETSI before explaining the TC grids goals. He also detailed the currently on-going standardization activities in the TC Grid and the achievements recently reached. After that, Patrick Guillemin from ETSI presented a couple of slides to encourage people to take advantage of standardization of European technologies considering the possibility to link European research work to a sustainable standardisation activity within ETSI. GridCOMP already have strong relations with the TC Grid, since two parts of the GCM have been published as ETSI standard in 2008.

3.4 NESSI-Grid SRA and NEXOF-RA

A special session was dedicated to the NESSI initiative. The first two presentations were dedicated to the NESSI-Grid project and the presentation of the last version of the Strategic Research Agenda (SRA) made in collaboration with the Grid community. Ricardo Jiménez Peris from Universidad Politecnica de Madrid provided an overview of the NESSI-Grid SRA. This document contains among other things a state of the art and defines many business scenarios and research challenges and conclude with a roadmap. This meeting with experts was organized to collect comments to the last version of SRA before its publication in December 2008. Actually, the writing of the NESSI-Grid SRA is the result a long process of collection from the Grid community as presented by Juan A. Caceres from Telefónica, ensuring a solid basis for the presented ideas.

The last presentation aimed at fostering response to the NEXOF-RA invitation to contribute on issues related to Service Aware Infrastructures. NEXOF-RA project aims at building the Reference Architecture (RA) for the NESSI Open Service Framework (NEXOF) leveraging research in the area of service-based systems, and to consolidate and trigger innovation in service-oriented economies. Mike Fisher from BT discussed how NEXOF-RA plan to build the RA through consensus within the NESSI Community, validated and widely adopted to support the European Service Economy. He presented the NEXOF functional view including the identified link with the SLA@SOI, SOA4ALL, RESERVOIR, MASTER and EzWeb projects.

3.5 Technical concertation meeting conclusion/outcome

To conclude this meeting a final discussion between the attendees summarized the results of the presentations made during the day. During this technical concertation meeting, related FP7 projects have been classified according to their contribution to the following 3 layers (defined by the S-Cube NoE) of Software and Services stack (see Figure 3 Projects classification):

- Business Process Management (Process Monitoring, QoS, BI, etc.)
- Service Composition & Coordination (Components, Workflow engine, ESB, etc.)
- Service Infrastructure (Virtualization, Meta-scheduling)

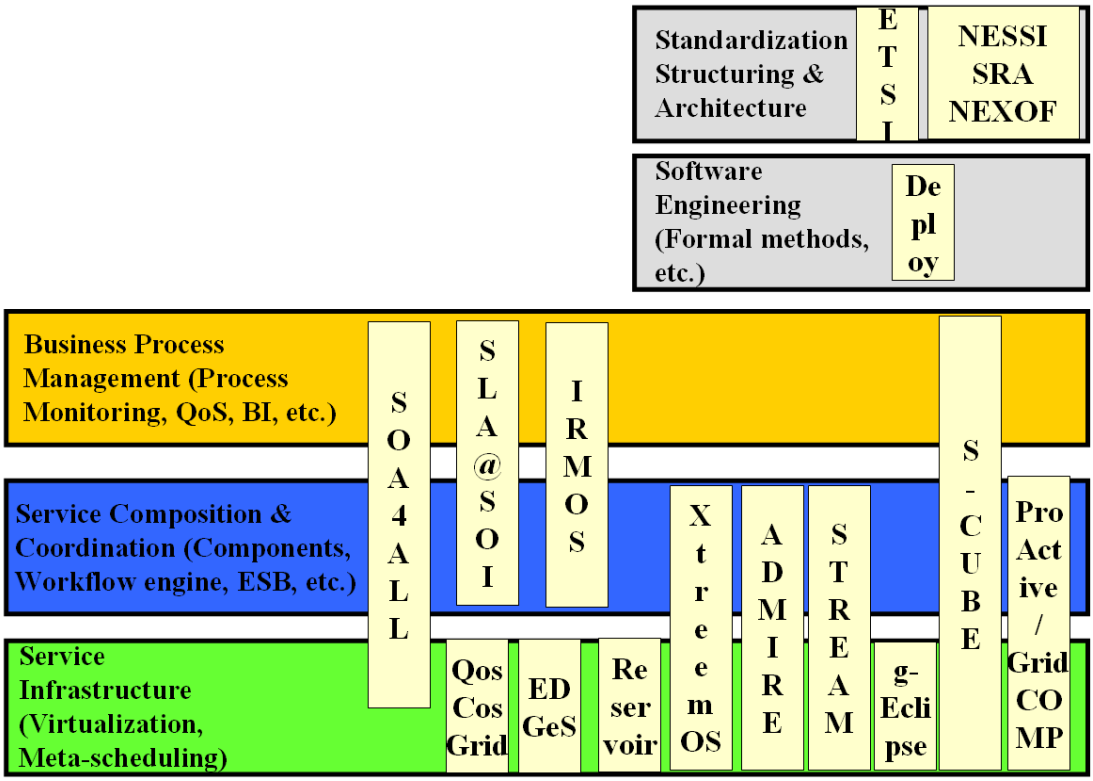


Figure 3 Projects classification

It is clear that some of the projects overlap, with respect to their goals and needs; one project should be able to use some outcomes of others. Also, when developments occur in parallel, projects could exploit synergies in order to coordinate developments, investing in the same or complementary technology.

Also, it must be pointed out that very good open source software have been developed by FP6 EU projects, some of which are officially standardized. There is clearly a need and an opportunity for FP7 projects to reuse these results, and increment European impact by taking to the next steps those achievements. Therefore, we attempt in the following tables (see Figure 4 Potential input/output identified) to show the potential collaborations seen during the day.

Project	Needs	Features
SOA4ALL	Basic Middleware (GCM Deployment)	Scalable SOA Platform
SLA@SOI	Middleware	SOA Platform
IRMOS		SOA in Real Time for Multimedia
Reservoir		Virtual Execution Environment

DEPLOY	Virtualized infrastructures	Formal method adoption 8 Plugins (Model Checking, …)
ADMIRE		Language for Data Mining
g-Eclipse	Deployment Standards (JSDL, GCM)	Eclipse Plugins
XTreemOS	Programming model	OS tuned for the Grid
GridCOMP		Component framework for the Grid (GCM)
NESSI-Grid/NexOF-RA	Contributions to implement the reference architecture	Reference Architecture

Figure 4 Potential input/output identified between participating projects

4 Conclusion

The GRIDS@WORK week attracted more than two hundred people. The organisation of the GridCOMP conference and the technical concertation meeting during this event allowed us to broadly disseminate the results of the GridCOMP project. People from different communities and many places had the opportunity to know better the GridCOMP outcomes. In addition, these events were the occasion to initiate future collaborations and identify some starting projects having interests to leverage the GCM component and model and its reference implementation within ProActive to achieve their goals.

Therefore, these events assessed the impact of the GridCOMP project. The GridCOMP conference particularly showed that the GCM is starting to gather a community of researchers and industrials using the reference implementation and adopting the GCM component model. The technical concertation meeting reinforced these positive elements since the presentations and the discussions showed that principles and results from GridCOMP is getting adopted by some EU funded projects, for instance SOA4ALL, RESERVOIR, XtreemOS or S-Cube. The achievements made with the ETSI standardization body to publish the GCM specification as official standards, publicly available, will definitely help to have a widespread usage of the GCM and will ensure the sustainability of the model.

Annex GridCOMP conference participant list

Lastname	Firstname	Organization	Country
Aldinucci	Marco	University of Pisa	Italy
Amedro	Brian	INRIA	France
Barbry	Pascal	CNRS	France
Barr	John	The 451 Group	UK
Basso	Alessandro	University of Westminster	UK
Baudelle	Pierre	Hewlett Packard	France
Belloulou	Lea	ERCIM	France
Bratu	Florin	INRIA	France
Cabannes	Geraldine	ActiveEon	France
Caromel	Denis	INRIA	France
Caryer	Geoffrey	ETSI	UK
Cave	Vincent	INRIA	France
Cognard	Laurent	Amadeus	France
Contes	Arnaud	ActiveEon	France
Dalmasso	Cédric	INRIA	France
Delbé	Christian	ActiveEon	France
Drum	Philipp	Sun Microsystems	Germany
Duvigneau	Régis	INRIA	France
Emmen	Ad	AlmereGrid	Netherlands
Feng	Yu	INRIA	France
Fradj	Johann	INRIA	France
Freire	Gaston	Grid Systems S.A.	Spain
Getov	Vladimir	University of Westminster	UK
Guillaume	Jean-Michel	ActiveEon	France
Ho-Hune	Patricia	ERCIM	France
Imen	Filali	INRIA	France
Isnard	Elaine	INRIA	France
Kapur	Ankush	INRIA	France
Khan	Muhammad Uzair	INRIA	France
Laurent	Guillaume	INRIA	France
Lebrigand	Kevin	IPMC – CNRS	France
Lefumeux	Xavier	Hewlett Packard	France
Legrand	Virginie	INRIA	France
Leyton	Mario	INRIA	France
Linder	Frédéric	Oracle	France
Loulergue	Frédéric	Université d'Orléans	France
Mathias	Elton	INRIA	France
Mecheneau	Guillaume	Platform Computing	France
Menant	Maxime	ActiveEon	France
Metsch	Thijs	Sun Microsystems	Germany
Oprescu	Ana-Maria	Vrije Universiteit	Netherlands
Qadir	Kamran	INRIA	France

Pasquier	Claude	CNRS	France
Patel	Nehal	GMO	USA
Patsenker	Mike	GMO LLC	USA
Perrina	Franca	INRIA	France
Peretti Pezzi	Guilherme	Société du Canal de Provence	France
Ranaldo	Nadia	University of Sannio	Italy
Reissman	Pierre-Jean	Amadeus	France
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Ruz	Cristian	INRIA	France
Salageanu	Emil	ActiveEon	France
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Vanni	Laurent	INRIA	France
Viale	Fabien	INRIA	France
Vialle	Stephane	SUPELEC	France
Waldmann	Rainer	IPMC-CNRS-UNICE	France
Weigold	Thomas	IBM	Switzerland
Wendelborn	Andrew	School of Computer Science	Australia
Wu	Yongwei	Tsinghua University	China
Zimeo	Eugenio	University of Sannio	Italy