EU project: RI1031844-OMII-Europe

Fact-Sheet EUFORIA Interoperability Scenario

Context

- A real-world use case demonstrating how OMII-Europe components can be used in e-Infrastructures
- A particular set of OMII-Europe components mapped to interoperability requirements of one project

Background: e-Infrastructure Islands of Europe

- e-Infrastructure Islands in Europe: DEISA and EGEE
- Distributed European Infrastructure for Supercomputing Applications (DEISA)
  - Supercomputing / High Performance Computing (HPC) Community
  - Link: http://www.deisa.org
  - Deployed non WS-based UNICORE 5 that uses a proprietary job description language named as Abstract Job Object (AJO) and a proprietary protocol named as UNICORE Protocol Layer (UPL)
  - Grid suitable for massively parallel scientific jobs (MPI, OpenMP, etc.)
- Enabling Grids for e-Science (EGEE)
  - Mainly High Energy Physics (HEP) community and other communities
  - Link: http://www.eu-egee.org
  - Deployed non WS-based gLite/lcg that uses a proprietary job description language named as Job Description Language (JDL) and proprietary protocols for component interactions
  - Grid suitable for embarrassingly parallel scientific jobs / farming jobs
- Both Grids are in 2007 not technically interoperable and had less adoption of standards in the past

Requirements of EU Fusion for ITER Applications (EUFORIA) Project

- ITER is an international tokamak (magnetic, confinement fusion) research/engineering proposal for an experimental project that will help to make the transition from today's studies of plasma physics to future electricity-producing fusion power plants.
- EUFORIA aims to support this fusion modelling community, http://www.euforia-project.eu/EUFORIA/
- Develops a comprehensive framework and infrastructure for core and edge transport and turbulence simulation, linking Grid (EGEE resources) and High Performance Computing (i.e. DEISA resources)
- The novel aspect is the dynamic coupling and integration of codes and physic applications running on a set of heterogeneous platforms into a single coupled framework through a workflow engine
- e-Scientists use the Kepler workflow tool (and implied so-called actors to access different infrastructures and technologies) to submit ~20 different kinds of fusion codes
- Idea: Use HPC resources in DEISA and farming resources in EGEE with OMII-Europe Components
- **GOAL: Enable fusion scientists to simulate the full fusion process of ITER seamlessly with resources in EGEE and DEISA using OMII-Europe components**

Description of interoperability scenario

- This interoperability scenario is a demonstrator of how EUFORIA e-Scientists can use both infrastructures EGEE and DEISA to improve their daily work
- This scenario represents a whole class of similar interoperability scenarios with similar requirements for interoperability between EGEE and DEISA
- It shows how OMII-Europe components are used to enable interoperability between upcoming standard-compliant versions of UNICORE 6 and gLite that might be deployed in the e-Infrastructure EGEE and DEISA soon.

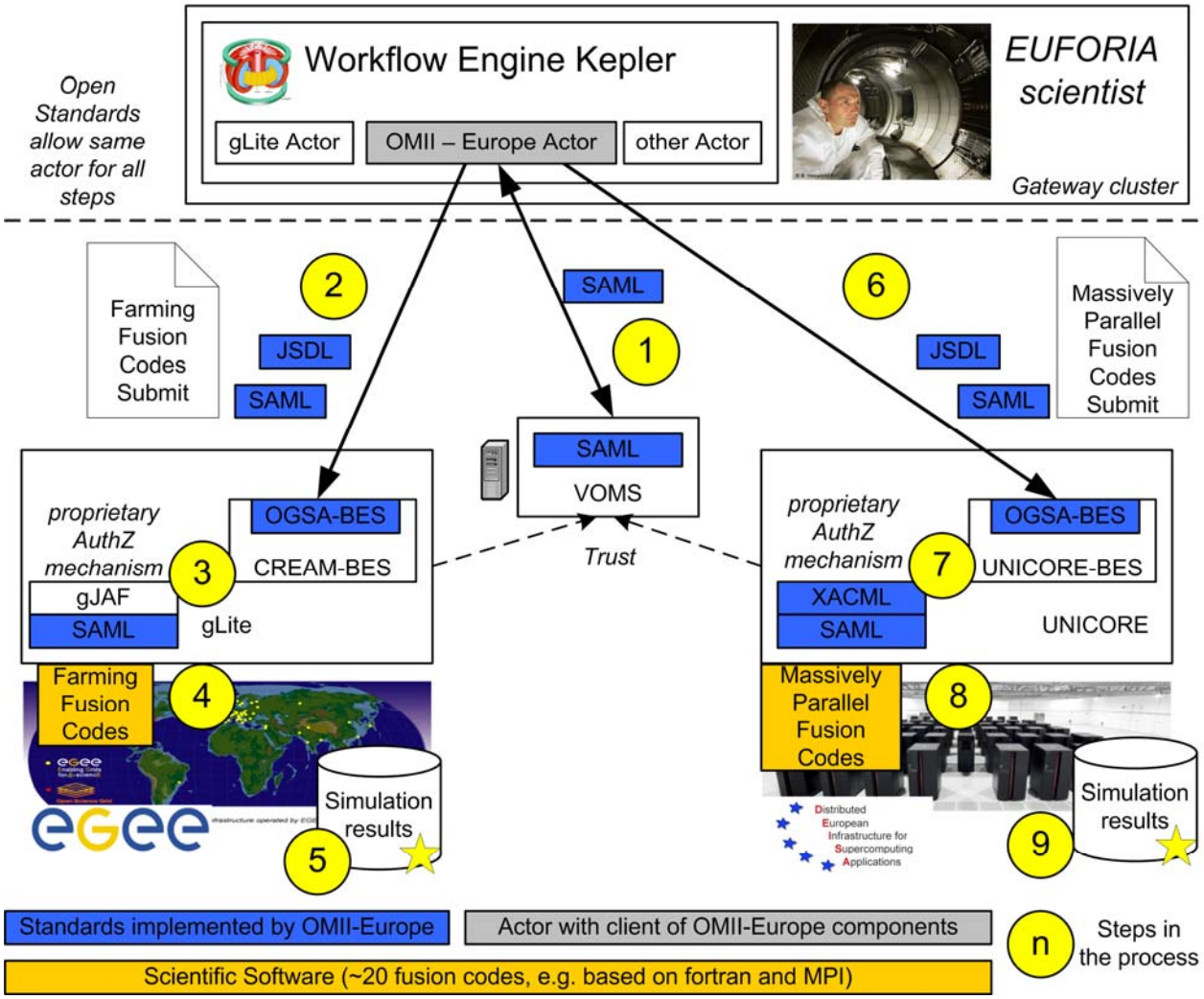
Version: 1.1 - Author: M. Riedel (m.riedel@fz-juelich.de), M. Hardt, I. Campos, M. Plóciennik – Date: 2008-04-10

Step-wise description of interoperability scenario shown in overview

- Precondition: A EUFORIA e-Scientists is using the Kepler Workflow Engine tool and a dedicated OMII-Europe actor that is augmented with the **integration code developed in JRA3 – Task 2.**The same integration code has been used within the GridSphere portal but in this scenarios it is necessary to create plug-in like extension to the Kepler Workflow engine and that extensions are named actors. The OMII-Europe actor is augmented with an OGSA – Basic Execution Services (BES) Web service (WS) client to interact with OGSA-BES compliant services and consists of a VOMS client. By Re-using the integration code (with security libraries) this step is not a high amount of work.
- **Step 1:** By using the Kepler Workflow tool (and implied OMII-Europe actor), a Web service callout is started to the new **Security Assertion Markup Language (SAML)-based Virtual Organization Membership Service (VOMS)** that releases signed SAML assertions stating the identification and role possession of the EUFORIA scientist.
- **Step 2:** After receiving the SAML assertion it is used by the OMII-Europe actor to access the OGSA-BES compliant CREAM-BES service of gLite. This Web service callout also includes a job description compliant with the **Job Submission Description Language (JSDL)** describing the start of fusion applications via gLite on the EGEE infrastructure for farming-based processing.
- **Step 3:** As part of gLite in the near future, the CREAM-BES service is using the JSDL document to invoke the fusion applications via gLite, including parameters written in JSDL. Before both can be finally started on the infrastructure, an authorization of the scientific JSDL job must be performed by using the SAML assertion in conjunction with proprietary authorization systems so far. CREAM-BES is using the gJAF framework for this authorization process.
- **Step 4:** The fusion codes are computed on the EGEE infrastructure as embarrassingly parallel scientific applications. The outcome of this job is available afterwards.
- **Step 5:** By using gLite on EGEE the outcome of this job can be obtained.
- **Step 6**: After having successful worked with farming-based applications in Step 1-4, the EUFORIA e-Scientists use again the Kepler workflow tool to submit another JSDL-compliant job to the UNICORE OGSA-BES interface implementation. This time the JSDL describes the highly scalable and massively parallel fusion codes for an execution within DEISA. Again, the (not necessarily same) SAML assertion must be transferred during this WS call to ensure the authorization of the scientist later within UNICORE. This is done via the OMII-Europe actor.
- **Step 7**: As part of UNICORE 6, the UNICORE-BES service is using the JSDL document to invoke the massively parallel fusion applications via UNICORE, including parameters written in JSDL. Before this application can be finally started on the DEISA infrastructure, an authorization of the scientific JSDL job must be performed by using SAML assertions in conjunction policies based on the **Extensible Access Control Markup Language (XACML)** standard.
- **Step 8**: The fusion application is computed on the DEISA infrastructure as massively parallel scientific application using MPI. This step leverages the high amount of CPUs available within DEISA and the fast interconnection of CPUs. Afterwards, the outcome of this job is the available in DEISA via the GPFS.
- **Step 9**: Finally, by using UNICORE on DEISA the outcome of this job can be obtained.

All in all, the fusion codes have been seamlessly executed on DEISA and EGEE with the common tool of the EUFORIA e-Scientists named as Kepler.

Overview



Disclaimer

- This scenario describes a technical interoperability between gLite and UNICORE enabled by the OMII-Europe project and thus the usage of DEISA and EGEE as described above is still subject to the scientists to negotiate with the respective infrastructures.

Links

- UNICORE Grid Middleware, http://www.unicore.eu
- gLite Grid Middleware, http://glite.web.cern.ch/glite/
- OGF JSDL, http://www.ogf.org/documents/GFD.56.pdf
- OGF OGSA-BES, http://www.ogf.org/documents/GFD.108.pdf
- OASIS SAML, www.oasis-open.org/committees/security/
- OASIS XACML, www.oasis-open.org/committees/xacml/

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