Grid Middleware Portal Infrastructure
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Outline

- CCLRC Daresbury Laboratory
- SOAs
- Portal Frameworks and Portal Standards
- NGS and e-HTPX Portals
- Single Sign-on (SSO)
- Web Services for Lightweight Grid clients
- Summary
- Acknowledgments
CCLRC

Council for the Central Laboratory of the Research Councils

Comprising 3 Laboratories
- Daresbury Laboratory in Cheshire
- Rutherford Appleton Laboratory in Oxfordshire
- Chilbolton Observatory in Hampshire

Middleware for Grid Computing Workshop
Middleware 2005, Grenoble
2nd November 2005

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Grid Technology Group
e-Science Centre

What do we do?

- One of Europe’s largest multidisciplinary research organisations
- Operates world-class large-scale research facilities:
  - CLF: Central Laser Facility
  - SRS: Synchrotron Radiation Source, closely collaborating with ESRF in Grenoble.
  - ISIS: neutron and muon source
  - HPCx: (46 in TOP500), part of the UK National Grid Service (NGS)

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Service Oriented Architecture (SOA)

A SOA is an architectural style that promotes loose coupling between interacting software agents.

It is essentially a collection of self contained, pluggable, loosely coupled services with well-defined interfaces and functionality.

Each service invokes a unit of work done by a service provider to achieve desired end results for a service consumer.

The consumer-provider role is abstract and the precise relationship relies on the context of that specific problem.

Portals & Web Services
Portal Frameworks

What is a portal?
- An integrated and personalized web-based interface to information, applications and collaborative services.
- Portals aggregate one or more portlets into web pages

What is a portlet?
- Individual component offering a service
- Provides content (html fragment) for a portal
- Java technology similar in nature to Servlet but slightly different in behaviour

Portal Framework Benefits

Benefits of a Portal Framework?
- Configurable and extensible
- Enhanced user experience
- Recognised standards (see later)
- Reuse of portlets
- Open source community
- Ease of maintenance
- Natural fit for SOA
Portal Standards

Java Portlet API
- Known as JSR 168 Specification
- Provides a standard for interoperability between portlets and portals, and between different vendors

Web Services for Remote Portlets (WSRP)
- Another standard created by OASIS
- Specifies the remote rendering of Portlets
- A portlet can be hosted ("produced") locally or remotely, separate from the portal using ("consuming") the portlet

The National Grid Service
- The NGS is the core UK Grid, resulting from the UK’s e-Science programme.
- NGS is intended for the production use of computational and data grid resources.
- NGS is supported by JISC, and is run by the Grid Operations Support Centre.

http://www.ngs.ac.uk
NGS Portal

- Core production use of computational and data grid resources
- Stringbeans JSR 168 compliant portal framework
- Single Sign-on
- Core portlets
  - MyProxy Management
  - MDS Resource Discovery
  - GRAM Job Submission
  - GridFTP
  - Job Status Monitor
- Further development in progress...
CCLRC Portals & Web Services

e-HTPX (High Throughput Protein Crystallography) Portal
- Build communication infrastructure and user interfaces to allow planning and remote executions of protein crystallography experiments
- Distributable Web application
- Single point of access to underlying e-HTPX Web services framework
- Acts as Web service client
  - Service-site portal
  - Client-site portal

Authentication and Authorisation

Authentication
- Identification
- Who a person or resource is

Authorisation
- Permissions/capabilities
- What a person/resource is permitted to do
- Possibly role-based
Single Sign On

- Important requirement for CCLRC
- Security framework
  - LDAP server
  - NT Authentication
  - MyProxy server (X509 certificates)
- User login independent of the authentication mechanism
- JAAS (Java Authentication & Authorisation Service)
  - Set of API
  - Part of Java 2 SDK 1.4 (also now J2EE)
  - Based on PAM (Pluggable Authentication Module)
  - flexible access control policy for authorisation
  - SSO support

SSO National Grid Service Portal

NGS User
X509 Certificate

Portal User

Portal Server

Oracle Clustered DB

MyProxy Server

LDAP
Single Sign On

Pros and cons of using JAAS
- Authentication mechanism can be easily extended
- Authentication is tightly coupled with portal framework

Future work with SSO
- Evaluation of JOSSO framework
  - Java Open Single Sign On
  - Support for multiple simultaneous authentication systems
  - Authentication using X509 certificate
  - Security model based on open standards, JAAS, SOAP Web services, EJB and Struts
  - Compatible with Java and non Java web applications
- Shibboleth

Desktop Access to the Grid
There are other ways users want to access the Grid from their desktop:
- Existing applications
- C++, C, Fortran, R
- Matlab, Stata, Sabre

It should be possible to access the portal’s Web Services from within client programs rather than through a browser (portlet).
Collaborative project (JISC VRE programme) between CCLRC Daresbury Laboratory and the Universities of Cambridge and Lancaster.

Project Objectives: to produce a lightweight client-side Grid connection toolkit.

GROWL will provide:

- Transparent client-side handling of Grid-related issues e.g. security, file transfer etc.
- Modules, libraries and wrappers that interface with existing client software tools
- Extensibility via a simple API with common language mappings (C++, C and Fortran).
- A persistent multi-client server linked to existing grid components (primarily the Globus toolkit) providing access to HPC resources, session management, scheduling, authentication etc.
How GROWL works

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This diagram illustrates the architecture of the GROWL (Grid-Rich Object-Model for Web-enhanced Library) system. It shows how a client library interacts with a server to facilitate grid computing tasks. The diagram includes components such as SOAP (Simple Object Access Protocol) for communication, CGI (Common Gateway Interface) for handling web requests, and HPC (High-Performance Computing) resources.

Lightweight Grid Workshop

We are planning a Lightweight Grid Workshop early next year.
We hope to have presentations from a variety of projects who are trying to make access to the Access easier for scientists who are not Grid-aware.

Venue: TBD, somewhere in NW of England
Date: possibly February.
Summary

- CCLRC is using portal technology to support users of its experimental, computational and data storage facilities
- Portlets can be reused and shared
- Many open-source frameworks are available
  - uPortal, GridSphere, Liferay, eXo platform, Stringbeans
- Portal frameworks can allow users to customise, personalise and internationalise their UI
- Security and SSO can be implemented and extended easily

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