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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

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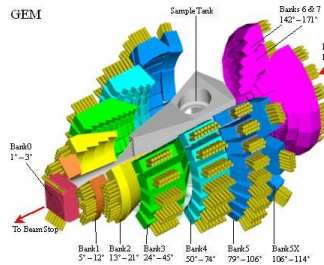
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CCLRC

Council for the Central Laboratory of the Research Councils

Comprising 3 Laboratories

- Daresbury Laboratory in Cheshire
- Rutherford Appleton Laboratory in Oxfordshire
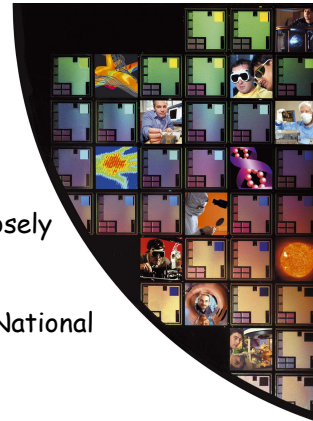- Chilbolton Observatory in Hampshire

GEM

Sample Tank

Banks 6 & 7
142°–171°

Incident Beam

Bank0
1°–3°

To Beam Stop

Bank1   Bank2   Bank3   Bank4   Bank5   BankSX
5°–12°   13°–21° 24°–45° 50°–74° 79°–106° 106°–114°

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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)

...enabling technology for science and discovery...

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Service Oriented Architecture (SOA)
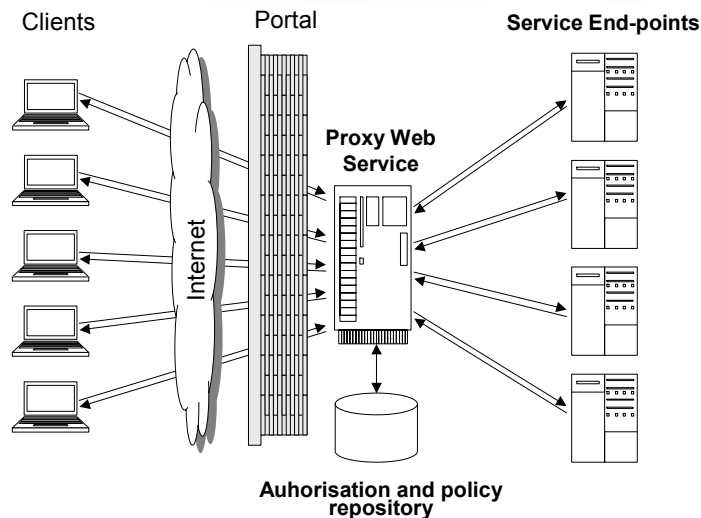
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A SOA is an architectural style that promotes **loose coupling** between interacting software agents.

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.

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Portals & Web Services

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Clients   Portal   **Service End-points**

Internet

Proxy Web Service

Auhorisation and policy repository

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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

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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

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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

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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 National Grid Service
core production computational and data grid

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CCLRC Portals & Web Services

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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 …

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NGS Portal

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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
  o Service-site portal
  o Client-site portal

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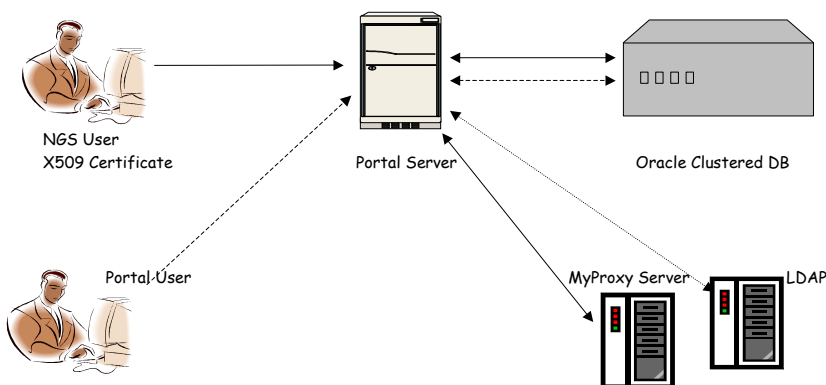## Authentication and Authorisation

Authentication
- **Identification**
- **Who a person or resource is**

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

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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

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SSO National Grid Service Portal

NGS User
X509 Certificate

Portal Server

Oracle Clustered DB

Portal User

MyProxy Server

LDAP

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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

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Desktop Access to the Grid

There are other ways users want to access the Grid from their decktop:

- Existing applications
- C++, C, Fortran, R
- Matlab, Stata, Sabre

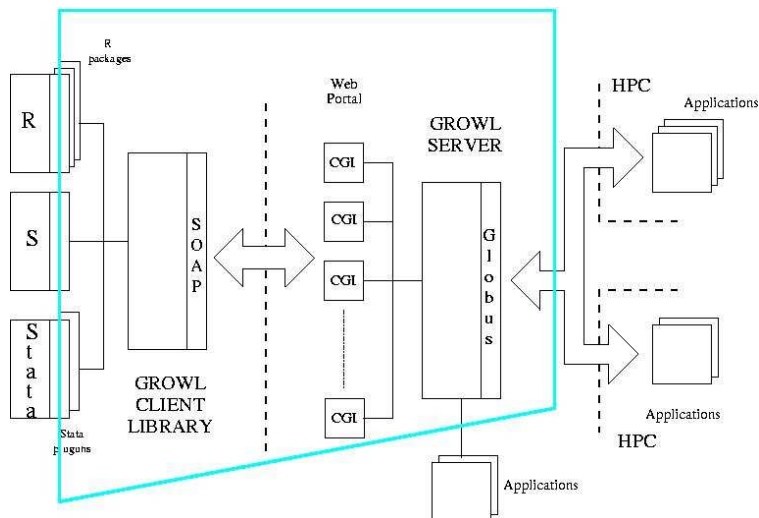It should be possible to access the portal's Web Services from within client programs rather than through a browser (portlets).

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GROWL

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UNIVERSITY OF CAMBRIDGE   JISC   LANCASTER UNIVERSITY

Collaborative project (JISC VRE programme) between CCLRC Daresbury Laboratory and the Universities of Cambridge and Lancaster.

<u>Project Objectives</u>: to produce a lightweight client-side Grid connection toolkit.

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GROWL will provide

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- 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.

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How GROWL works

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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.

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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
  - o 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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- David Meredith

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