

# The EU DataGrid Information and Monitoring Services

## The European DataGrid Project Team

<http://www.eu-datagrid.org>



# EDG Tutorial Overview



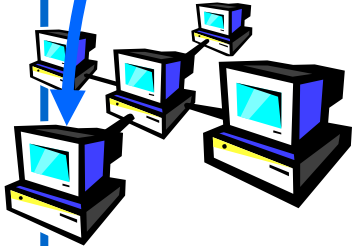
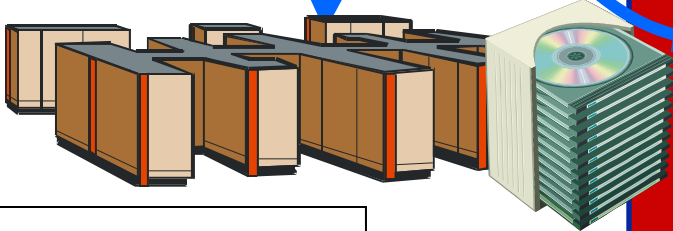
Workload Management Services

Data Management Services

Networking



Information Service

An illustration of a spiral-bound binder with several sheets of paper.

Fabric Management

# Aim



- ◆ The aim of the Information and Monitoring Service is to deliver a flexible infrastructure that provides information on both
  1. The EU DataGrid itself
    - Mainly for the middleware packages
  2. Grid applications
    - For users
  
- ◆ The current system is based on MDS
  - The user may query it to understand the status of the DataGrid

# Overview of Talk



- ◆ Requirements of an information and monitoring service
  
- ◆ Globus MDS (Metacomputing Directory Service or Monitoring and Discovery Service as it is now called)
  - OpenLDAP, a hierarchical database
  - EDG GRIS/GIIS hierarchy
  - EDG information providers
  - Searching the information system

# Some Requirements of a Grid Information & Monitoring Service



- ◆ The system must be able to cope with nodes in a distributed environment
- ◆ Dynamic addition and deletion of information providers should be supported
- ◆ It must have a security system able to address the access to information at a fine level of granularity
- ◆ It must be able to work well on an unreliable Wide Area Network (WAN)
- ◆ The system must allow new data types to be defined

# Globus MDS

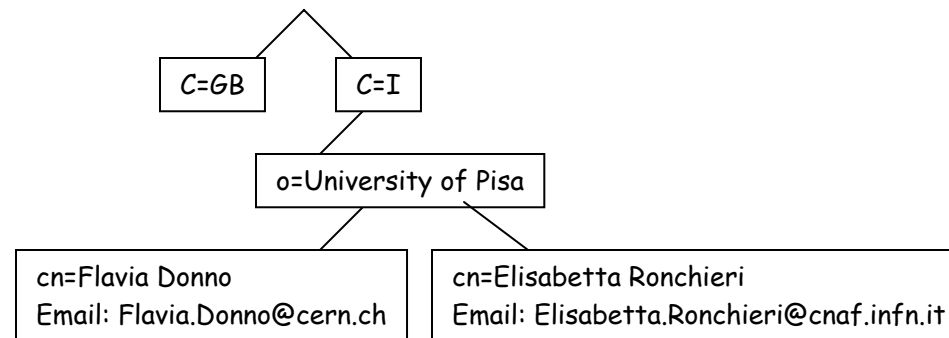


# LDAP attributes

- ◆ EDG currently uses Globus MDS which is built on OpenLDAP
- ◆ A schema describes the attributes and the types of the attributes associated with entries or data objects.
- ◆ Example - some attributes of SiteInfo:
  - siteName: RALDEV
  - sysAdminContact: grid.sysadmin@rl.ac.uk
  - userSupportContact: grid.support@rl.ac.uk
  - siteSecurityContact: grid.security@rl.ac.uk
  - dataGridVersion: 1.2
  - InstallationDate: 20020704142800Z

# LDAP hierarchy

- ◆ Lightweight Directory Access Protocol (LDAP) offers a hierarchical view of information
- ◆ The entries are arranged in a Directory Information Tree (DIT)



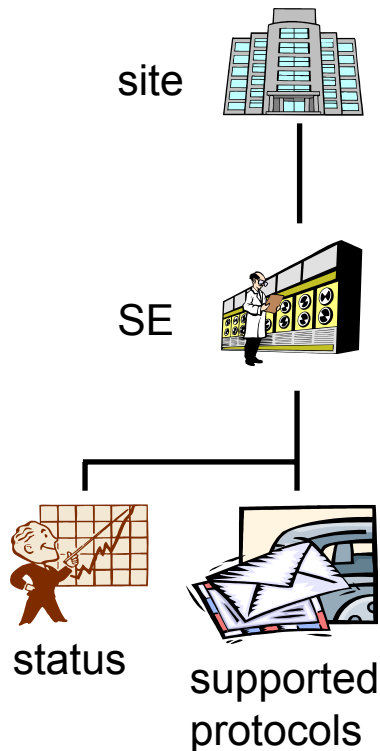
- ◆ The entry name represent the Relative Distinguished Name (RDN). Es: "cn=Flavia Donno"
- ◆ An entry is identified by its Distinguished Name
  - This is its RDN with the Distinguished name of its parent. Es: "C=I, o=University of Pisa, cn=Flavia Donno"



# RDNs and DNs



## ◆ RDN



- SE
  - seId=dev02.hepgrid.clrc.ac.uk
- Status
  - in=status
- Protocols
  - seProtocol=gridftp
  - seProtocol=rfio
  - seProtocol=file

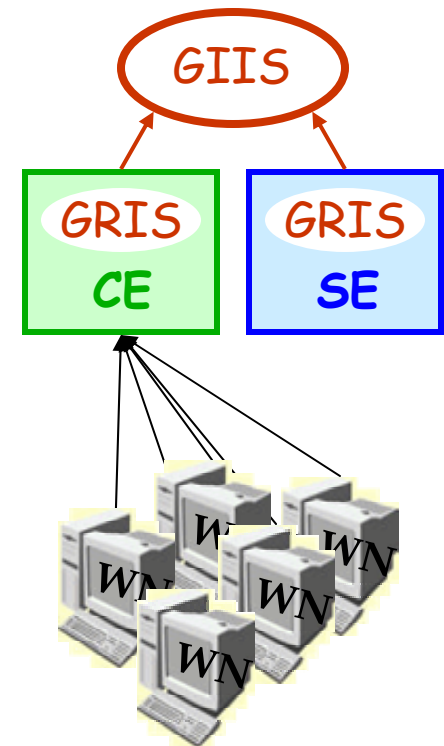
## ◆ DN

- Site
  - Mds-Vo-name=ral-dev, o=Grid
- SE
  - seId=dev02.hepgrid.clrc.ac.uk, Mds-Vo-name=ral-dev, o=Grid
- Status
  - in=status,seId=dev02.hepgrid.clrc.ac.uk,Mds-Vo-name=ral-dev, o=Grid
- Protocols
  - seProtocol=gridftp, seId=dev02.hepgrid.clrc.ac.uk, Mds-Vo-name=ral-dev, o=Grid
  - seProtocol=rfio, seId=dev02.hepgrid.clrc.ac.uk, Mds-Vo-name=ral-dev, o=Grid
  - seProtocol=file, seId=dev02.hepgrid.clrc.ac.uk, Mds-Vo-name=ral-dev, o=Grid

# MDS GRISs & GIISs



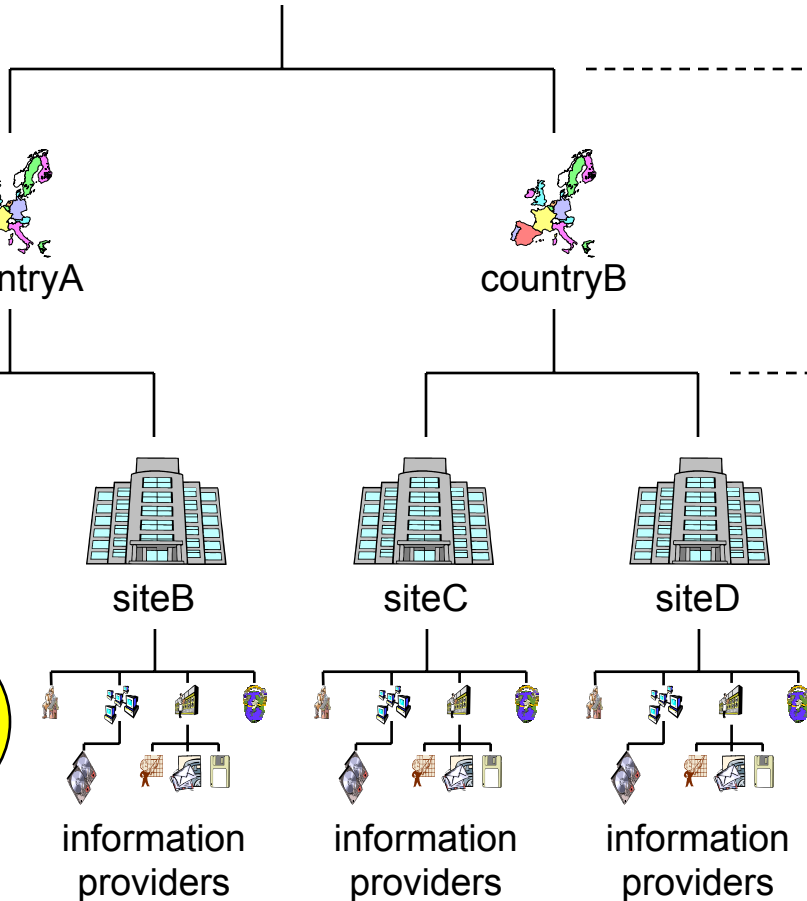
- ◆ Information providers are scripts which when invoked by the LDAP server make available the desired information
  - Information is cached by the server to improve performance
  - LDAP was designed for use with relatively static data, not rapidly changing data
- ◆ Within MDS the EDG information providers are invoked by a local LDAP server, the Grid Resource Information Server (GRIS)
- ◆ “Aggregate directories”, Grid Information Index Servers (GIIS), are used to group resources
- ◆ The GRISs use soft state registration to register with one or more GIISs
- ◆ The GIIS can then act as a single point of contact for a number of resources
  - A GIIS may represent a site, country, virtual organization, etc.
- ◆ In turn a GIIS may register with another GIIS



# EDG GRIS/GIIS Hierarchy



datagrid



- ◆ There is a top level datagrid GIIS to which all of the country GIISs register

- ◆ Each country has a GIIS to which all of the site GIISs register

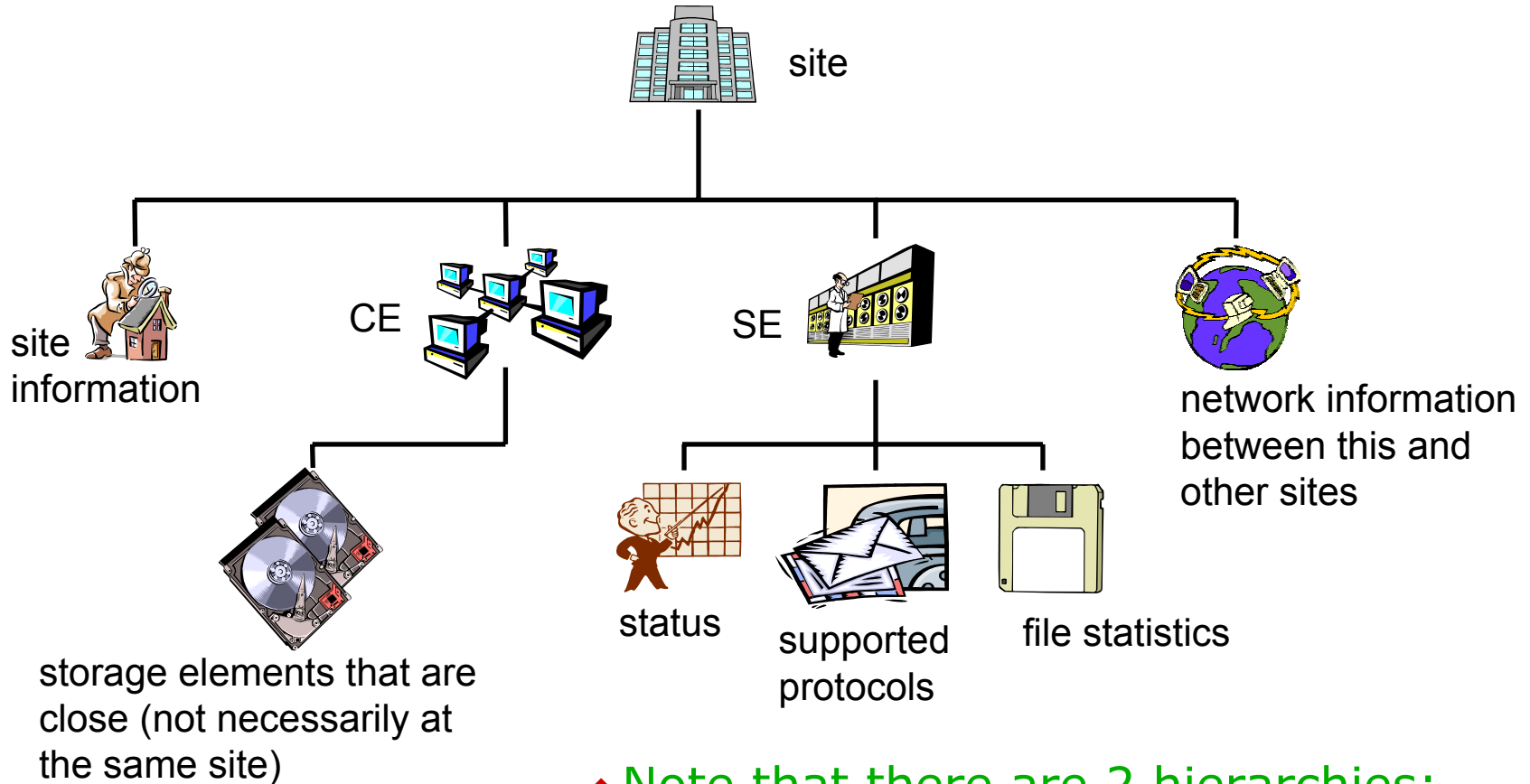
- ◆ Each Site has a Grid Information Index Server (GIIS) which acts as a single point of contact for all of the sites resources. The GRISs register with their site GIIS

- ◆ Information providers publish information to a local LDAP server known as a Grid Resource Information Server (GRIS)

# EDG Information Providers

- ◆ The EDG have produced information providers:
  - Site information
  - The Computing Element
  - The Storage Element
  - Network Monitoring
  
- ◆ All of the EDG data objects are dynamic, they have a time stamp and a time to live (used by the cache mechanism) associated with them

# EDG Information Providers & the Directory Information Tree



- ◆ Note that there are 2 hierarchies:
  - The GIIS/GRIS structure
  - The DIT

# Siteinfo



in=siteinfo,Mds-Vo-name=ral-dev,Mds-Vo-name=uk,o=Grid

objectClass: SiteInfo

objectClass: DataGridTop

objectClass: DynamicObject

siteName: RALDEV

sysAdminContact: grid.sysadmin@rl.ac.uk

userSupportContact: grid.support@rl.ac.uk

siteSecurityContact: grid.security@rl.ac.uk

dataGridVersion: 1.2

installationDate: 20020704142800Z

# Storage Element



seId=dev02.hepgrid.clrc.ac.uk,Mds-Vo-name=ral-dev,Mds-Vo-name=uk,o=Grid

objectClass: StorageElement

objectClass: DataGridTop

objectClass: DynamicObject

SEId: dev02.hepgrid.clrc.ac.uk

CloseCE: dev01.hepgrid.clrc.ac.uk:2119/jobmanager-pbs-M

SEtypearchitecture: disk

SEsize: 13177

SEResourceContactString: grid.support@rl.ac.uk

SEvo: wpsix, ./flatfiles/05/wpsix

# Storage Element Protocols



seProtocol=gridftp, seId=dev02.hepgrid.clrc.ac.uk,Mds-Vo-name=ral-dev,Mds-Vo-name=uk,o=Grid

objectClass: StorageElementProtocol

objectClass: DataGridTop

objectClass: DynamicObject

SEId: dev02.hepgrid.clrc.ac.uk

SEProtocol: gridftp

Port: 2811

seProtocol=rpio, seId=dev02.hepgrid.clrc.ac.uk,Mds-Vo-name=ral-dev,Mds-Vo-name=uk,o=Grid

objectClass: StorageElementProtocol

objectClass: DataGridTop

objectClass: DynamicObject

SEId: dev02.hepgrid.clrc.ac.uk

SEProtocol: rpio

Port: 3147

seProtocol=file, seId=dev02.hepgrid.clrc.ac.uk,Mds-Vo-name=ral-dev,Mds-Vo-name=uk,o=Grid

objectClass: StorageElementProtocol

objectClass: DataGridTop

objectClass: DynamicObject

SEId: dev02.hepgrid.clrc.ac.uk

SEProtocol: file



# Storage Element Status



in=status,seId=dev02.hepgrid.clrc.ac.uk,Mds-Vo-name=ral-dev,Mds-Vo-name=uk,o=Grid

objectClass: StorageElementStatus

objectClass: DataGridTop

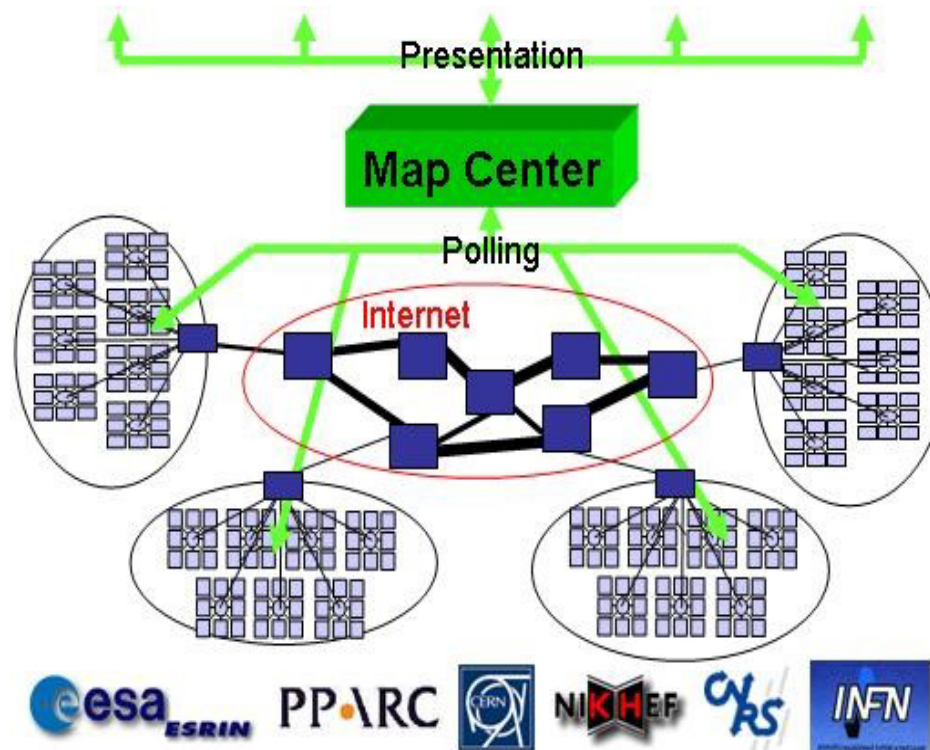
objectClass: DynamicObject

SEfreespace: 12031

SEId: dev02.hepgrid.clrc.ac.uk

# Map Centre

- ◆ An easy way to browse the data available in the Information and Monitoring Service is to use Map Centre
- ◆ <http://ccwp7.in2p3.fr/mapcenter/datagrid-d/>



# Querying the Information & Monitoring Service



- ◆ Queries can be posed to the current Information and Monitoring Service using LDAP search commands:

```
$ldapsearch\  
-x\  
-H ldap://lxshare0225.cern.ch:2135\  
-b 'Mds-Vo-name=datagrid,o=grid' \  
'objectclass=StorageElement' \  
seId SEsize \  
-s base|one|sub
```

- ◆ "simple" authentication
- ◆ uniform resource identifier
- ◆ base distinguished name for search filter
- ◆ attributes to be returned
- ◆ scope of the search specifying just the base object, one-level or the complete subtree

# Querying the GRIS/GIIS Hierarchy



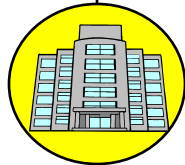
Mds-Vo-name  
=datagrid



Mds-Vo-name  
=countryA



Mds-Vo-name  
=countryB



Mds-Vo-name  
=siteA

Mds-Vo-name  
=siteB

Mds-Vo-name  
=siteC

Mds-Vo-name  
=siteD

- ◆ Mds-Vo-name=datagrid,o=grid
  - This will look at all the data
- ◆ Mds-Vo-name=siteB, Mds-Vo-name=countryA, Mds-Vo-name=datagrid,o=grid
  - This will look at all the data from siteB
- ◆ Mds-Vo-name=countryA,o=grid
  - This will look at all the data from countryA
- ◆ Mds-Vo-name=siteB, Mds-Vo-name=countryA,o=grid
  - This will look at all the data from siteB
- ◆ Mds-Vo-name=siteB,o=grid
  - This will look at all the data from siteB

# Other LDAP Browsers



The screenshot shows an LDAP browser window with a menu bar (File, Edit, View, LDIF, Help) and a toolbar. The left pane displays a directory tree with the following structure:

- Mds-Vo-Name=cc-in2p3,o=grid
  - seld=ccgridli07.in2p3.fr
    - seProtocol=gridftp
    - seProtocol=rfio
    - in=status
  - Mds-Host-hn=ccgridli07.in2p3.fr
    - Mds-Device-Group-name=processors
    - Mds-Device-Group-name=memory
    - Mds-Device-Group-name=filesystems
    - Mds-Device-Group-name=networks
    - Mds-Software-deployment=operating system
  - hn=ccgridli08.in2p3.fr
  - Mds-Host-hn=ccgridli08.in2p3.fr
    - in=siteinfo
  - hn=ccgridli03.in2p3.fr
    - celd=ccgridli03.in2p3.fr:2119\/jobmanager-bqs-A
    - celd=ccgridli03.in2p3.fr:2119\/jobmanager-bqs-C
    - celd=ccgridli03.in2p3.fr:2119\/jobmanager-bqs-G
    - celd=ccgridli03.in2p3.fr:2119\/jobmanager-bqs-I
    - celd=ccgridli03.in2p3.fr:2119\/jobmanager-bqs-S
    - celd=ccgridli03.in2p3.fr:2119\/jobmanager-bqs-T
    - ldap://ccgridli03.in2p3.fr:2135/Mds-Host-hn=ccgridli03.
  - Mds-Host-hn=ccgridli03.in2p3.fr

The right pane displays a table of attributes and values for the selected entry:

Attribute	Value
userSupportContact	user.support@in2p3.fr
sysAdminContact	edg-site-admin@cc.in2p3.fr
dataGridVersion	edg1_4_3
siteName	CC-IN2P3
installationDate	20030114122900Z
objectClass	SiteInfo
objectClass	DataGridTop
objectClass	DynamicObject
siteSecurityContact	sysunix@in2p3.fr

At the bottom of the window, it says "Ready. 7 entries returned." and there is a small "A" icon in the bottom right corner.

# Other LDAP Browsers



The screenshot shows a Netscape browser window titled "LDAP Search Results - Netscape". The address bar contains the URL: `ldap://ccgridi03.in2p3.fr:2135/in=siteinfo,mds-vo-name=cc-in2p3,o=grid`. The main content area displays the following LDAP entry details:

<a href="#">siteinfo</a>	
Object Class	<b>SiteInfo</b>
	<b>DataGridTop</b>
	<b>DynamicObject</b>
siteName	<b>CC-IN2P3</b>
sysAdminContact	<b>edg-site-admin@cc.in2p3.fr</b>
userSupportContact	<b>user.support@in2p3.fr</b>
siteSecurityContact	<b>sysunix@in2p3.fr</b>
dataGridVersion	<b>edg1_4_3</b>
installationDate	<b>20030114122900Z</b>

The browser's status bar at the bottom indicates "Document: Done".

# Summary



- ◆ The current information system is Globus MDS
  - This uses LDAP as its underlying data interface
  - There are a number of EDG information providers
  
- ◆ A new information services should be available on the next Datagrid Release (R-GMA)

# The End

- ◆ Information and Monitoring Services
  - <http://hepunx.rl.ac.uk/edg/wp3/>
- ◆ To continue, please check the following link
  - [Information Monitoring](#)