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MDS Overview, Status, and Plans

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Outline

- What is MDS4?
- MDS Use Case: Earth System Grid
- What's new in MDS in GT 4.2?
- What's next for MDS?

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What is MDS4?

- Monitoring and Discovery System
- Resource discovery
  - finding resources in a VO that are available and suitable for applications
- Resource monitoring
  - tracking the state of VO resources

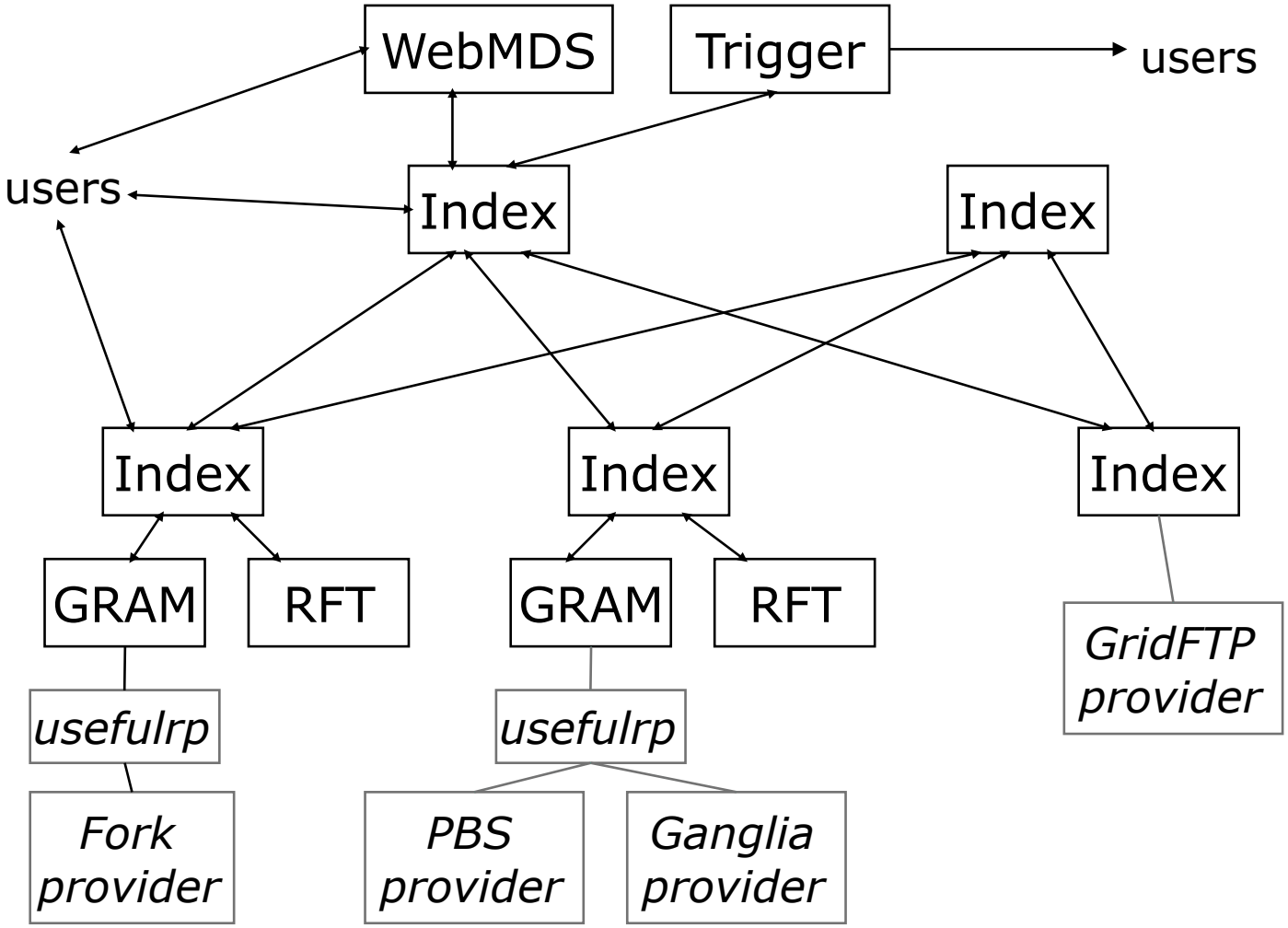
Standard MDS Services and Interfaces

- Index Service
  - Collects aggregated information and responds to queries
- Trigger Service
  - Collects aggregated information and performs actions when conditions are met
- WebMDS
  - Provides access to formatted state data via a simple http interface

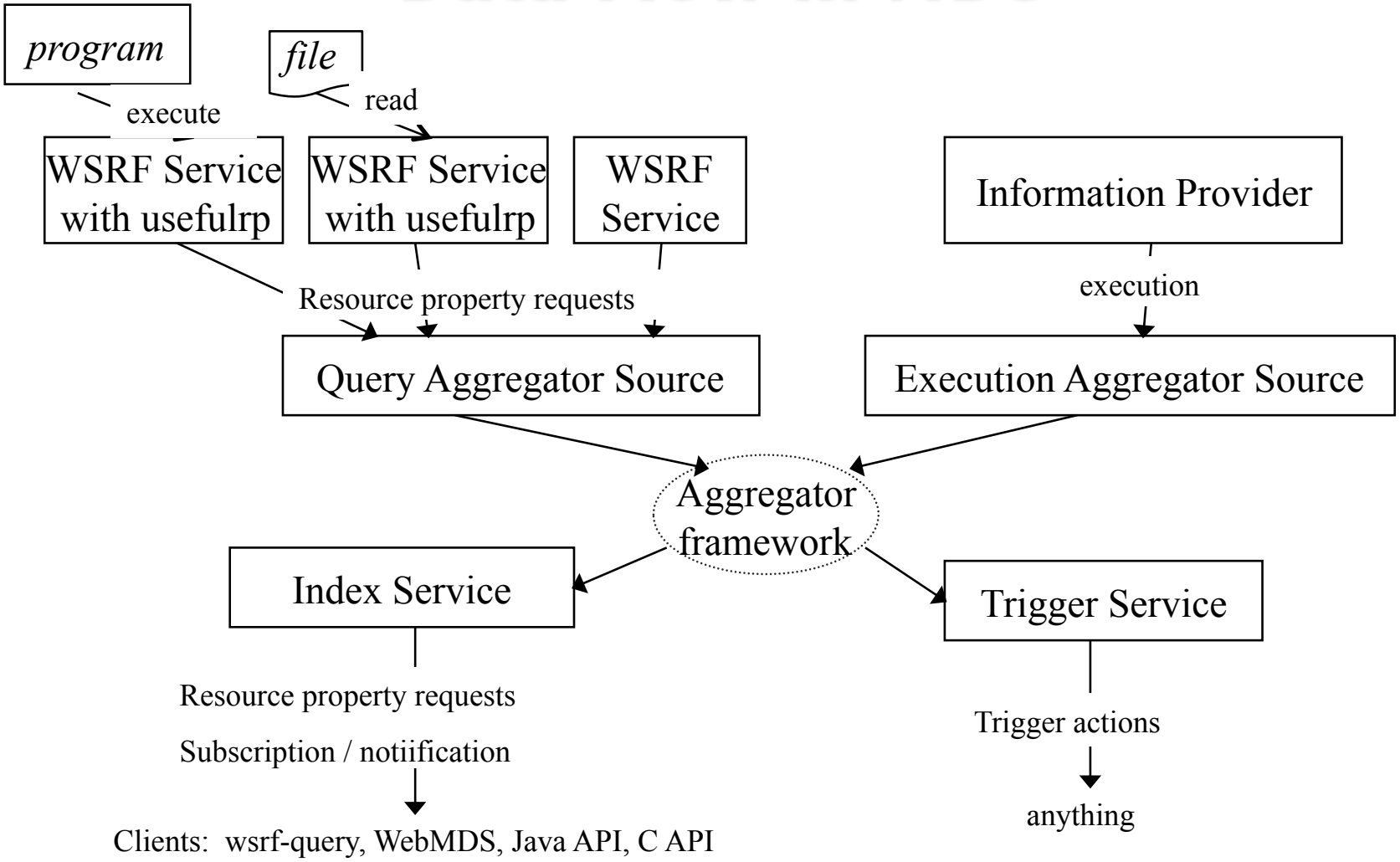
Interfaces for Information Publishers

- UsefulRP – Utility package for advertising resource properties
  - Can be called by any service running in a Globus container
  - Can create resource properties by reading them from static files, executing programs, running java classes, or a combination.
- Aggregator Framework – mechanism by which MDS gathers information
  - WS interface for configuring information sources
  - Info sources can be resource properties, executable programs, or java classes

An Example MDS4 Deployment



Data Flow in MDS



Standard MDS4 Information Providers

- Info from WSRF resource properties
  - Services like GRAM4, RFT, other Index servers
- Info from static XML-formatted files
- New in 4.2:
  - General system information (via gkrellm)
  - GridFTP server status
  - Web server status
  - Service certificate expiration time

Getting Data From the Index Service

- Data aggregated by the Index Service is exposed as resource properties
  - XML format data
- Can be queried with the WSRF QueryResourceProperty request
  - Query language is XPath
  - Java and C APIs
  - CLI and web-based interfaces
  - WebMDS can be used to provide a simple http interface

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MDS4 Trigger Service

- Collects aggregated data
  - Using the same mechanism as the Index Service
- Evaluates that data against a set of pre-configured conditions (triggers)
  - Conditions are expressed as XPath queries
- When a condition matches, executes an action
  - An executable program is run
    - Set of possible actions is configured by administrators
  - The most common trigger action is to send email

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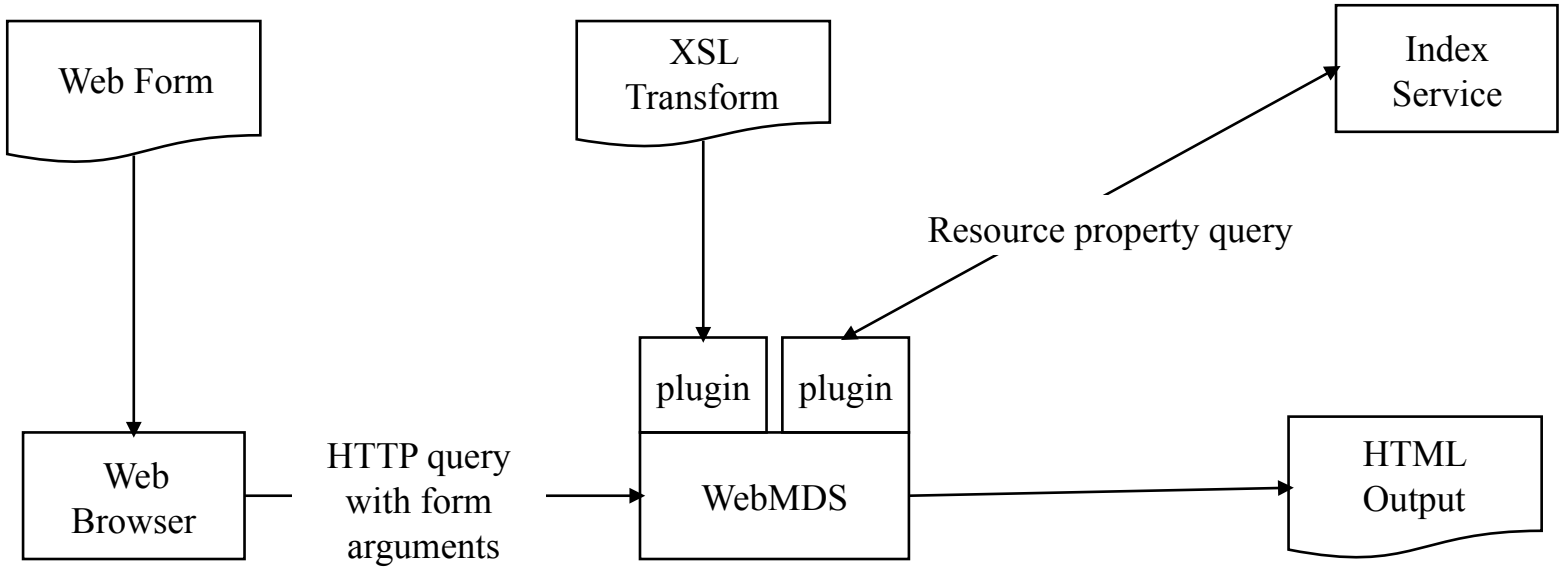
WebMDS

- Provides a simple HTTP interface to query an MDS Index Service
  - Really, to query resource properties of any WS-Resource
  - Custom providers can be written to get information from additional sources.
- Optionally applies XSLT transforms to the query results.
- Designed as a user interface, to be used with a web browser

WebMDS: How it Works



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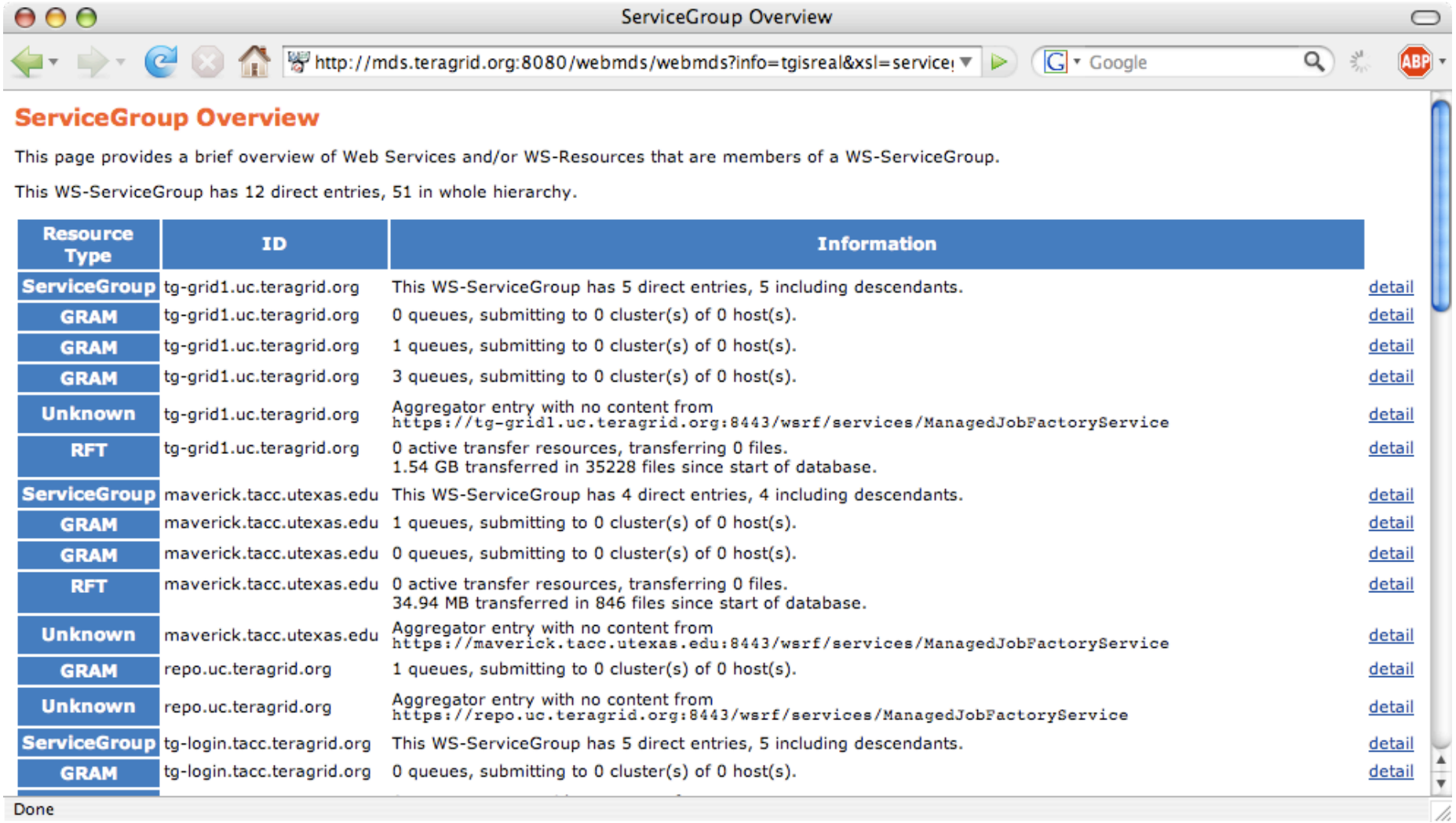
Standard WebMDS Views



ServiceGroup Overview

This page provides a brief overview of Web Services and/or WS-Resources that are members of a WS-ServiceGroup.

This WS-ServiceGroup has 12 direct entries, 51 in whole hierarchy.

Resource Type	ID	Information	
ServiceGroup	tg-grid1.uc.teragrid.org	This WS-ServiceGroup has 5 direct entries, 5 including descendants.	detail
GRAM	tg-grid1.uc.teragrid.org	0 queues, submitting to 0 cluster(s) of 0 host(s).	detail
GRAM	tg-grid1.uc.teragrid.org	1 queues, submitting to 0 cluster(s) of 0 host(s).	detail
GRAM	tg-grid1.uc.teragrid.org	3 queues, submitting to 0 cluster(s) of 0 host(s).	detail
Unknown	tg-grid1.uc.teragrid.org	Aggregator entry with no content from https://tg-grid1.uc.teragrid.org:8443/wsrf/services/ManagedJobFactoryService	detail
RFT	tg-grid1.uc.teragrid.org	0 active transfer resources, transferring 0 files. 1.54 GB transferred in 35228 files since start of database.	detail
ServiceGroup	maverick.tacc.utexas.edu	This WS-ServiceGroup has 4 direct entries, 4 including descendants.	detail
GRAM	maverick.tacc.utexas.edu	1 queues, submitting to 0 cluster(s) of 0 host(s).	detail
GRAM	maverick.tacc.utexas.edu	0 queues, submitting to 0 cluster(s) of 0 host(s).	detail
RFT	maverick.tacc.utexas.edu	0 active transfer resources, transferring 0 files. 34.94 MB transferred in 846 files since start of database.	detail
Unknown	maverick.tacc.utexas.edu	Aggregator entry with no content from https://maverick.tacc.utexas.edu:8443/wsrf/services/ManagedJobFactoryService	detail
GRAM	repo.uc.teragrid.org	1 queues, submitting to 0 cluster(s) of 0 host(s).	detail
Unknown	repo.uc.teragrid.org	Aggregator entry with no content from https://repo.uc.teragrid.org:8443/wsrf/services/ManagedJobFactoryService	detail
ServiceGroup	tg-login.tacc.teragrid.org	This WS-ServiceGroup has 5 direct entries, 5 including descendants.	detail
GRAM	tg-login.tacc.teragrid.org	0 queues, submitting to 0 cluster(s) of 0 host(s).	detail

Done

Standard WebMDS Detail View

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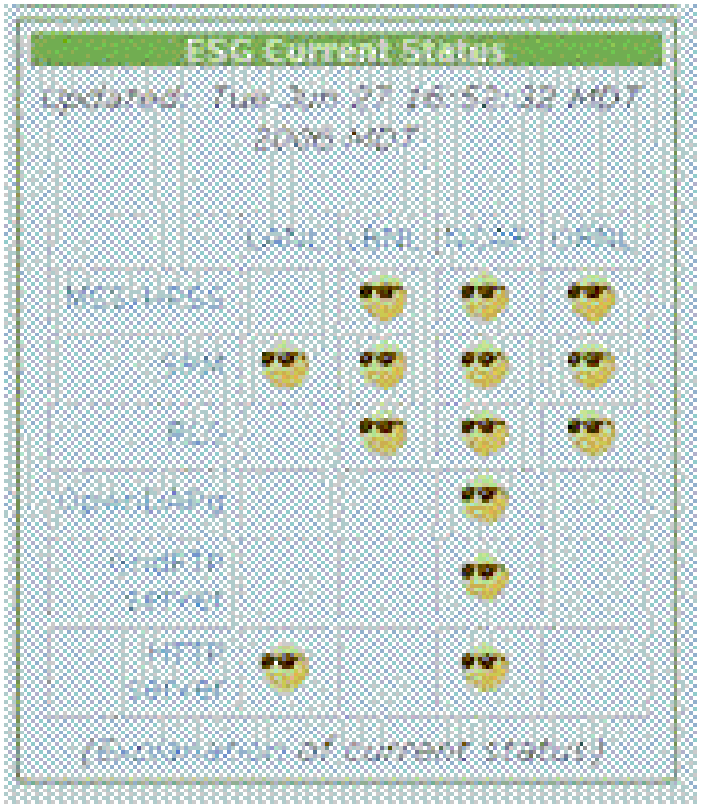
MDS4 in the Earth System Grid

- Index Service provides system status to the ESG web portal
- Trigger services monitors services and reports problems

MDS4 Index Service use in ESG

- Monitored data are collected in MDS4 Index service
- Information providers check resource status at a configured frequency
- Currently, every 10 minutes
- Report status to Index Service
- This resource information in Index Service is queried by the ESG Web portal
- Used to generate overall picture of state of ESG resources
- Displayed on ESG Web portal



ESG Services Currently Monitored

- GridFTP server: NCAR
- OPeNDAP server: NCAR
- Web Portal: NCAR
- HTTP Dataserver: LANL, NCAR
- RLS servers: LANL , LBNL, NCAR, ORNL
- Storage Resource Managers: LBNL, NCAR, ORNL
- Hierarchical Mass Storage Systems: LBNL, NCAR, ORNL

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Earth System Grid

Example Monitoring Information in ESG

Total error messages for May 2006	**47**
Messages related to certificate and configuration problems at LANL	38
Failure messages due to brief interruption in network service at ORNL on 5/13	2
HTTP data server failure at NCAR 5/17	1
RLS failure at LLNL 5/22	1
Simultaneous error messages for SRM services at NCAR, ORNL, LBNL on 5/23	3
RLS failure at ORNL 5/24	1
[illegible] BNL 5/31	1

Ann Chervenak, USC/ISI

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What's New in 4.2?

- Trigger Service
  - Reimplemented with more flexible management interface
- Index Service
  - Ability to specify namespace mappings in queries
- WebMDS
  - Improved error reporting
  - New query and display options

New Info Providers in 4.2

- Gridftp and web providers
  - check basic status of those services
- Cert-check provider
  - checks status/lifetime of a remote server's X.509 certificate
- Gkrellm info provider
  - provides basic system status (cpu, memory, disk, etc.)
  - requires gkrellmd server.

Coming (relatively) soon in MDS

- New testing framework for information provider
  - "Debug" option to save raw data
  - "Test" option to run using saved data
  - Should facilitate both debugging and unit testing of info providers
- Scalability improvements for Index Service
  - Currently, index is kept entirely in memory
  - Provide a database backend to support larger indexes and possibly more efficient (indexed) searches.
- Archive Service evaluation

Acknowledgements

- Mike D'Arcy, Jen Schopf, Neill Miller, Robert Miller, JP Navarro, Lee Liming, Eric Blau, John Bresnahan, Ann Chervenak, Mei-Hui Su

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For More Information

- MDS documentation: http://www.globus.org/toolkit/docs/<version>/info/
- Mailing lists: http://dev.globus.org/wiki/MDS4#Mailing_Lists