

# VO-aware Monitoring in Grids

**MNM**  
TEAM  
MUNICH NETWORK MANAGEMENT TEAM

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# Functional Requirements for Grid Monitoring

- Support for multiple roles due to
  - Different roles need different data
  - E.G. VO users, VO admins, resource admins, GOC...
- Support for VO views due to
  - Security / Privacy reasons
  - Clear arrangement
- Support for multi middleware grids (D-GRID)
  - Multiple middleware Installations on the same physical resource need to exchange data on running jobs, load, percentual utilization, ...
- Integration of system monitoring tools
  - Enlarge information that is available via middleware sensors, e.g. Nagios
- History
  - Collect data for accounting purposes, longterm analysis, ...

# Informational Requirements for Grid Monitoring

- Monitoring of
  - Resources
    - Computing nodes, Storage, ...
  - Software
    - Information on installed OS
    - Information on installed applications / libraries
  - Services
    - Availability, QoS
    - Inspection windows
  - VOs
    - Contact
  - ROs
    - Contact

# Grid Monitoring Tools

- Globus Toolkit MDS4
  - Based on WS-RF
  - GLUE 1.2
- gLite BDII
  - Based on LDAP
  - GLUE 1.3
- Unicore 6 CIS
  - Based on Exist Database
  - GLUE 2.0
- ...

# Comparing Requirements

	MDS4	BDII	CIS
Roles	x	x	x
VO views	x	x	x
Support for multiple middleware	x	x	x
Integration of system monitoring tools	(✓)	(✓)	(✓)
History	x	x	x
Schema	x	x	✓

⇒ There is no native monitoring system, implementing all these features!

# Architecture for VO-aware Monitoring in Grids

## VO User Management

Knows about users and their membership in VOs

## VO Resource Management

Knows about resources and VO specific access permissions

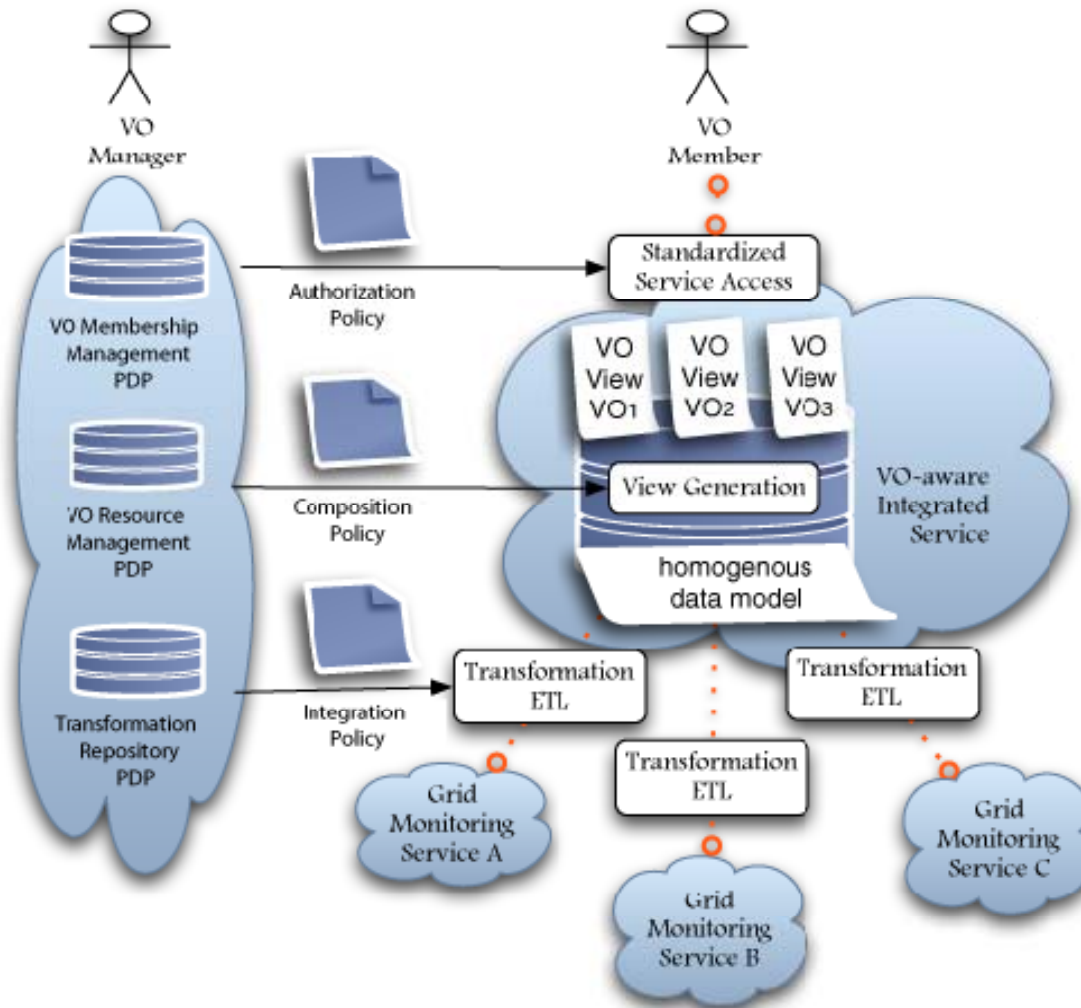
## Central Monitoring Database

Collects and aggregates information

Generation of VO views

## Transformation

Adapter to extract, transform and load (store) information



# Transformation

- Adapter extracts data from middleware monitoring service
  - wsrp-query (MDS4)
  - ldapsearch -> ldapXML (BDII)
  - ucc showdoc (CIS)
- XML document gets transformed into a mySQL Insert/Update Statement
  - Example for Globus Toolkit MDS4:

```
wsrp-query -a -z none -s myMDS4Adress | xmlproc  
mds4.xslt -
```
- Pipe the result to the Database
  - Example for Globus Toolkit MDS4:

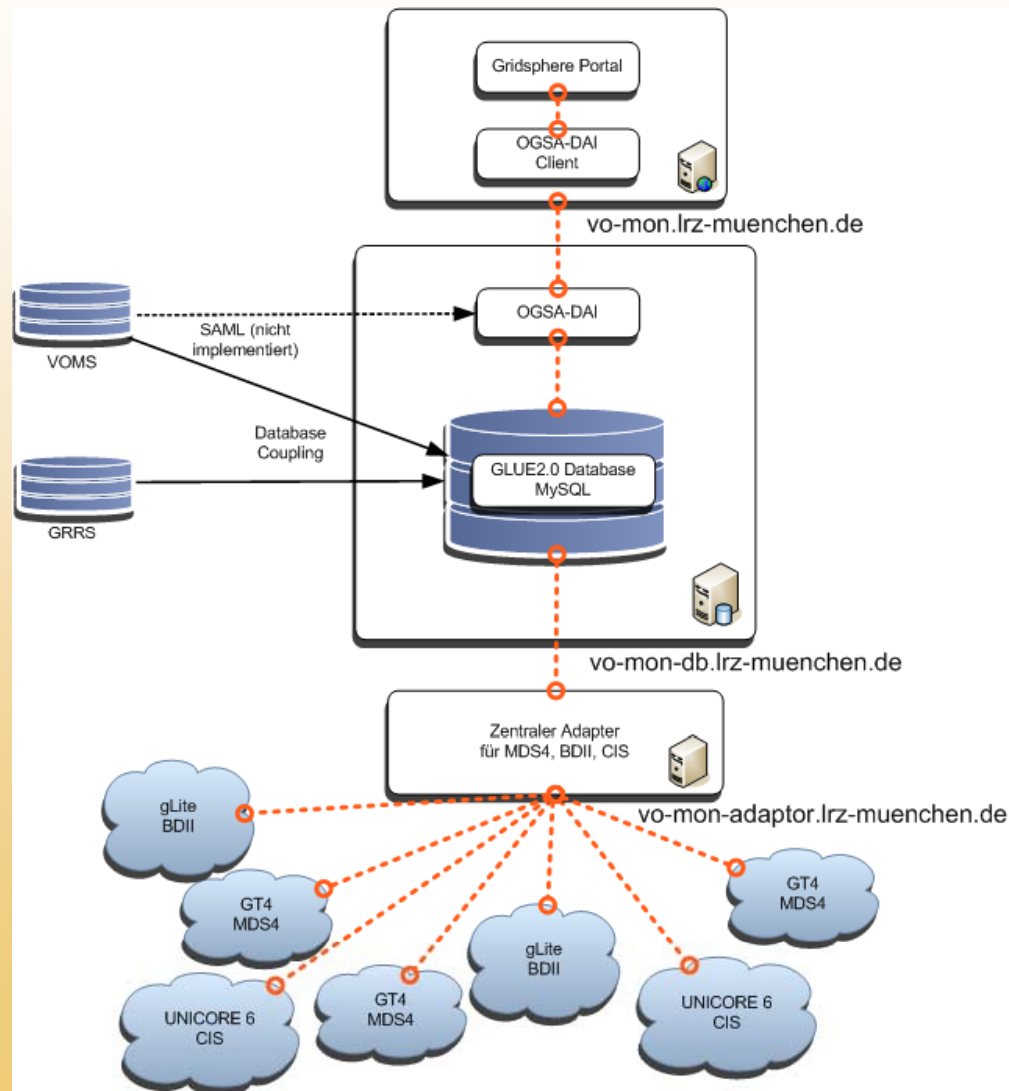
```
wsrp-query -a -z none -s myMDS4Adress | xmlproc  
mds4.xslt - | mysql GLUE20 $DATABASE --user=$USER --  
password=$PASSWORD --host=$HOST
```

- Schema GLUE 2.0
  - Newest GLUE version
  - CIS is already based on GLUE 2.0
  - Most comprehensive information repository
- MySQL 5.1
  - Support for Federated Databases  
(needed to connect to VO Management Databases in D-GRID)
  - ⇒ Joining of monitoring databases and VO management databases enables creation of VO Views
  - Support for schedules, needed for cleaning the database regularly
  - Generation of parameterized database views is possible
  - ⇒ Creating VO aware views is possible by setting a parameter and querying a generic view
  - Free of charge 😊

# Service Access Point

- OGSA-DAI 3.1
  - WS-RF enabled standard for accessing databases in grids
  - Authentication / Authorization via SAML-VOMS
    - Integrates seamless into grid infrastructure
    - No need to create additional accounts in mySQL for users
  - Automatically choosing the right VO view is possible , since the VO parameter can be extracted from SAML Certificate

# Implementation in D-GRID



- OGSA-DAI Command Line Client written in Java for querying the Database in context of the VO AstroGrid (ad)
  - Based on standard OGSA-DAI CLC
  - Extended to set a session parameter in SQL before the ultimate query
  - Example:

```
java DMONSQLClient  
-u http://dmondb.lrz-muenchen.de:8080/dai/services/  
-d DMONDataResource  
-q "SELECT * FROM ComputingService_VO"  
-v ad
```

➡ *shows all instances of ComputingService Entries,  
which can be accessed by a member of VO AstroGrid*

# Problems in Real Life

- ROs are independant Organisations
  - Some ROs do not want to give away monitoring /accounting data
  - Some ROs break the naming schema of resources and services
    - > automatic aggregation of resources / services and VO management information becomes impossible
    - e.g. Site IDs „LRZ“ and „LRZ-München“ can not be matched
- A list of all native monitoring services has to be created and must be administrated

# Problems in Real Life

MySQL Query Browser - Connection: dmon@129.187.255.27:3306 / dmon

Datei Bearbeiten Ansicht Abfrage Skript Tools Fenster MySQL Enterprise Hilfe

`SELECT * FROM GLUE20.AdminDomain A;`

Zurück Nächster Aktualisieren Ausführen Stopp

**Ergebnismenge 1**

name	description	dis...	adminDomainID	informationProvi...	sourceAddr	insertTime
Dgrid-wup	Dgrid-wup	0	dgrid-globus4.physik.uni-wup...	MDS4	129.187.254.39	2008-07-29 11:...
Deutsches Klimareche...	D-Grid / C3Grid Se...	0	dkrz.de	MDS4	129.187.254.39	2008-08-07 11:...
German National Mete...	C3-Grid Data Provi...	0	dwd.de	MDS4	129.187.254.39	2008-08-07 11:...
Eridanus CAF	D-Grid Resource of...	0	eridanus.caf.dlr.de	MDS4	129.187.254.39	2008-08-07 11:...
Forschungszentrum Ju...	Forschungszentru...	0	FZJ	MDS4	129.187.254.39	2008-08-07 11:...
Forschungszentrum Kar...	D-Grid Services at ...	0	fzk	MDS4	129.187.254.39	2008-08-07 11:...
FZK-DGRID	Karlsruhe, Germany	0	NULL	BDII-gLite	iwrmon-bdii.fzk.de	2008-07-29 10:...
FZK-DGRID-G3	Karlsruhe, Germany	0	NULL	BDII-gLite	iwrmon-bdii.fzk.de	2008-07-29 10:...
FZK-LCG2	Karlsruhe, Germany	0	NULL	BDII-gLite	iwrmon-bdii.fzk.de	2008-07-29 10:...
UMRGrid	D-Grid Services at ...	0	globus-hn.mathematik.uni-ma...	MDS4	129.187.254.39	2008-08-07 11:...
grid.tu-dortmund.de	D-Grid Services at ...	0	Globus4.0.5@TU_Dortmund	MDS4	129.187.254.39	2008-08-07 11:...
grid.uni-dortmund.de	D-Grid Services at ...	0	Globus4.0.5@UniDo	MDS4	129.187.254.39	2008-08-07 11:...
grid.uni-dortmund.de	D-Grid Services at ...	0	Globus4.0.5_TEST@UniDo	MDS4	129.187.254.39	2008-07-29 11:...
grid.tu-dortmund.de	D-Grid Services at ...	0	Globus4.0.7 Pre Production...	MDS4	129.187.254.39	2008-08-07 11:...
GSI-LCG2	Darmstadt, Germany	0	NULL	BDII-gLite	iwrmon-bdii.fzk.de	2008-07-29 10:...
GSI Darmstadt	D-Grid Services at ...	0	gsi.de	MDS4	129.187.254.39	2008-07-29 11:...
Hochleistungsrech...	InGrid	0	gt4.dgrid.hlr.de	MDS4	129.187.254.39	2008-08-07 11:...
GWVG-DGRID	Goettingen, Germany	0	NULL	BDII-gLite	iwrmon-bdii.fzk.de	2008-07-29 10:...
JSC	Juelich Super Com...	0	NULL	CIS	134.94.105.15	2008-07-29 11:...
Forschungszentrum Kar...	D-Grid Services at ...	0	iwrqt4.fzk.de	MDS4	129.187.254.39	2008-07-29 11:...
Juggle-DGRID	Juelich, Germany	0	NULL	BDII-gLite	iwrmon-bdii.fzk.de	2008-07-29 10:...
Leibniz-Rechenzentru...	Leibniz-Rechenzen...	0	LRZ	MDS4	129.187.254.39	2008-08-07 11:...
Zuse Institute Berlin (Z...	ZIB Compute clust...	0	mardschana.zib.de	MDS4	129.187.254.39	2008-08-07 11:...
grid.uni-dortmund.de	D-Grid Services at ...	0	MDS@UniDo	MDS4	129.187.254.39	2008-07-29 11:...
GWVG Grid	MediGRID	0	MediGRID	MDS4	129.187.254.39	2008-08-07 11:...
MediGRID at GWVG	MediGRID service...	0	medigrid-srv.gwdg.de	MDS4	129.187.254.39	2008-08-07 11:...

57 Zeilen in 0,0047 s (0,0423 s) geholt

Bearbeiten Übernehmen Verwerfen Erster Letzter Search

**Schemata** Lesezeichen Chronik

- GLUE20
  - AccessPolicy
  - AdminContact
  - AdminDomain
  - AdminDomainLocation
  - AppEnvExecEnv
  - ApplicationEnvironment
  - ApplicationEnvironment\_MVA
  - ApplicationHandle
  - AttributeTypes
  - Benchmark
  - ComputingActivity
  - ComputingActivity\_MVA
  - ComputingEndpoint
  - ComputingManager
  - ComputingManager\_MVA
  - ComputingMappingPolicy

**Syntax** Funktionen Params Trx

- Data Definition Statements
- Data Manipulation Statements
- MySQL Utility Statements
- MySQL Transactional and Locking ...
- Database Administration Statements
- Replication Statements
- SQL Syntax for Prepared Statements

# Experiences

- Misconfigurations and inconsistent configurations can be found, when several monitoring systems report in parallel
- Aggregated information of several native monitoring services is a value added service

# Future Work

- Integrate even more monitoring tools and services
- Create History of Data
  - Can be done easily by a trigger
  - Which data should be archived? Which one mustn't due to legal regulation?

# The End

## Questions?

