# Towards Sustainability: An Interoperability Outline for a Regional ARC based Infrastructure in the WLCG and EGEE Infrastructures

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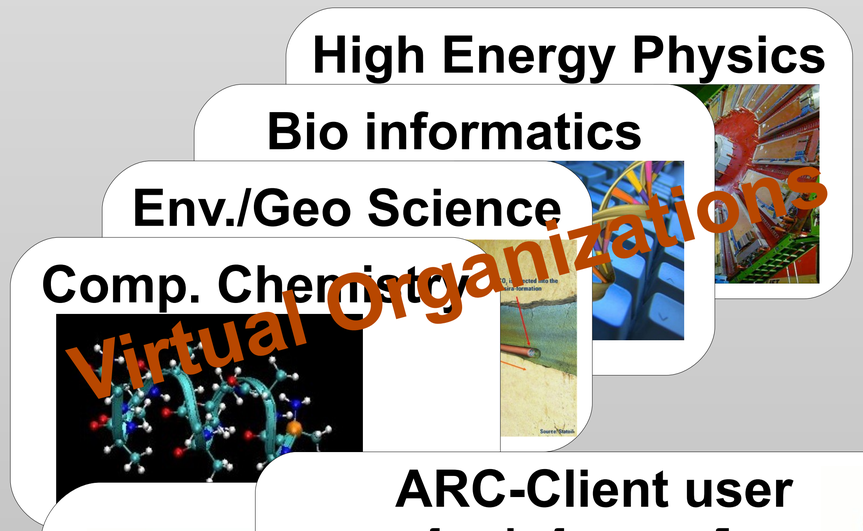
***Abstract***

Interoperability of grid infrastructures is becoming increasingly important in the emergence of large scale grid infrastructures based on national and regional initiatives. To achieve interoperability of grid infrastructures adaptions and bridging of many different systems and services needs to be tackled. A grid infrastructure offers services for authentication, authorization, accounting, monitoring, operation besides from the services for handling and data and computations. This poster presents an outline of the work done to integrate the Nordic Tier-1 and 2s, which for the compute part is based on the ARC middleware, into the WLCG grid infrastructure co-operated by the EGEE project. Especially, a throughout description of integration of the compute services is presented.




**ARC-Client user**

```
arcsub job.xrsl
```

- Ressource Lookup
- Brokering
- Status checking

**gLite-UI user**

```
glite-wms-job-submit job.jdl
```

LDAP LDAP GridFTP

GIIS'es

Soft Registration

VMProxy

## Compute Service

**- a cluster at a site**

OGF-BES

**ARC-CE**

**HED**

**AREX**
ARC Remote Execution Service

**BACKENDS**
Local batch system interfaces

**Data handling service**

**Info Providers**

**BDII**

**GLUE1.3**

**ARC schema**

**GridFTP Server**

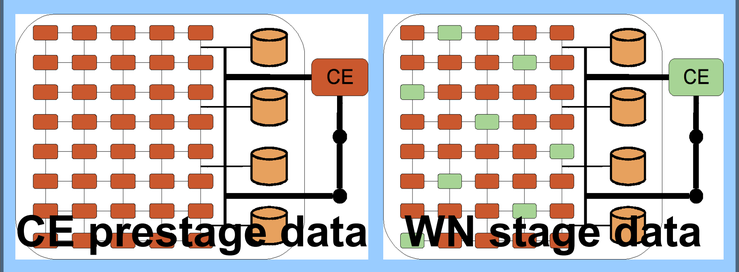
WN
WN
WN
WN
WN
WN

***Did you know ?***

*- That the team behind the ARC-CE are very active in the OGF based standardization efforts and hence the ARC-CE supports OGF-BES as one of the submission protocols*

***Return of Investment***

*Did you know?*
*- That ARC-CEs on average provide a 10 to 15% better ressource utilization than CEs from similar middleware:*
*The automatic prestaging of datafiles enables the Worker Node CPUs only to spend time on computations – not on data transfers...*
*- This means 10 to 15% more resources!*




***Did you know ?***

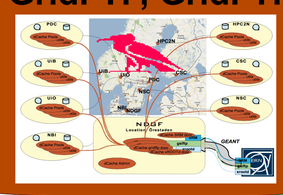
*- That the ARC-CE support more batch systems than any other CE type. The list currently include:*
- *PBS / Torque*
- *LSF*
- *SGE / Sun Grid Engine*
- *LoadLeveler*
- *Condor*
- *SLURM*
- *EASY*
- *fork*

**Shared file system**
GPFS/NFS server(s)

**RTEs / Apps**
**GLITE RTE**

**Storage Element**
**ARC-SE: gridftp**

**Storage Element**
**dCache: GridFTP, GridFTP2, SRM2**



LDAP GridFTP LDAP

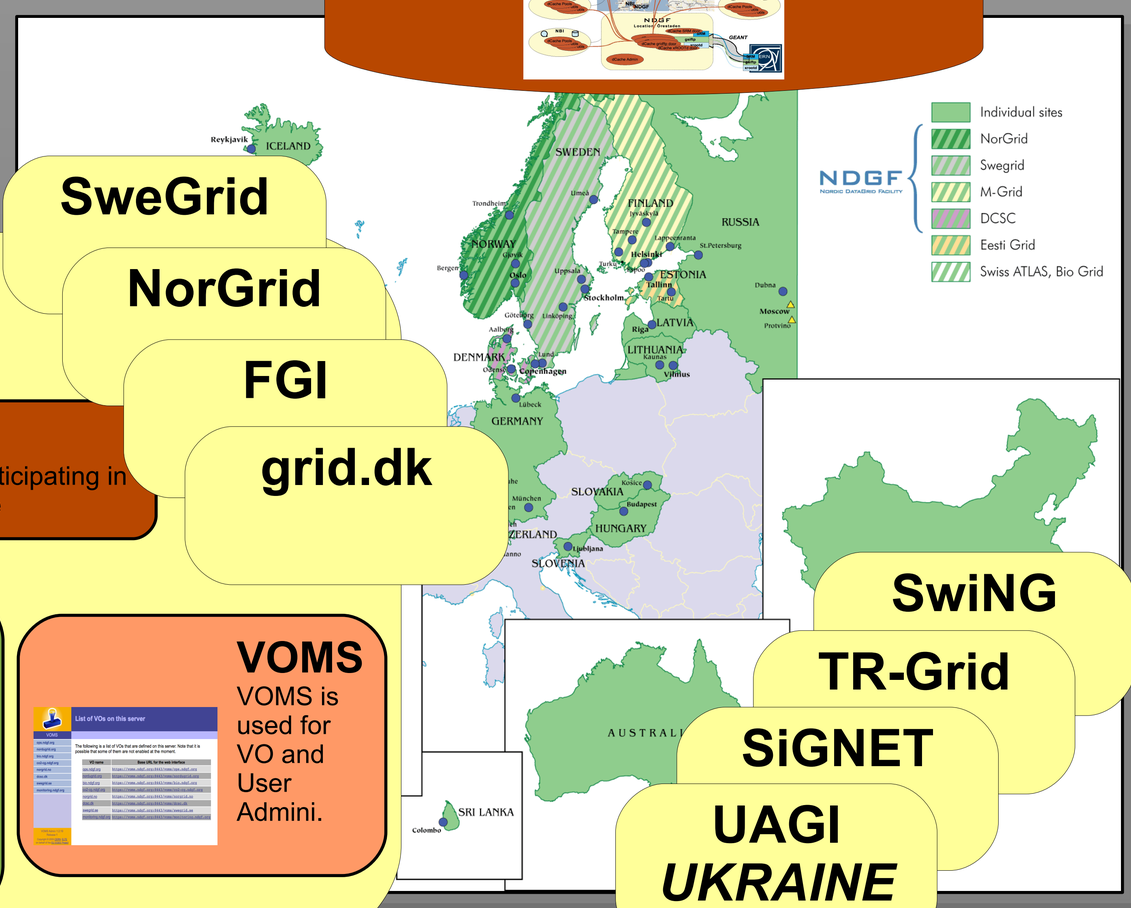
**gLite-WMS**
**arc-wms.cern.ch**

- Ressource lookup
- Brokering
- Interface to Monitoring
- Interface to Logging

**Top Level BDII**

HTTPG

***Did you know? -*** *That NDGF in 2007 and 8 was the biggest* European ATLAS Tier-1 and number 3 worldwide* **in terms of delivered CPU cycles*




**SweGrid**

**NorGrid**

**FGI**

**grid.dk**

**SwiNG**

**TR-Grid**

**SiGNET**

**UAGI**
***UKRAINE***

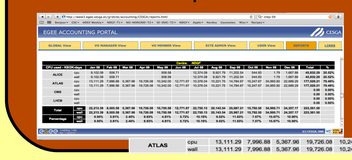
# EGEE & WLCG

## Logging

The ARC-CE supports the logging calls to the gLite-LB server. This means that detailed jobstates can be obtained also from ARC-CE sites, enabeling advanced realtime monitoring of production flow.

## Accounting

The ARC-CE suports accounting via SGAS. SGAS can export to APEL.

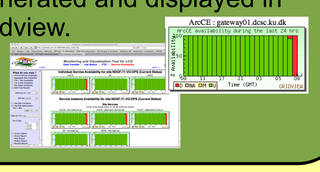



## Registration

The ARC-CE is supported as a ressource type in the GOCDB. Setup your ARC Ressource just like gLite.


## Monitoring

The ARC-CE is tested with special ARC-CE SAM sensors. Availability statistics are generated and displayed in gridview.




# NDGF

## SGAS

Accounting for sites participating in the NDGF infrastructure

## Nagios

NDGF operates a multi country Nagios monitoring system


## VOMS

VOMS is used for VO and User Admini.




## Operation

The EGEE NE-ROC and NDGF cooperate on the day to day operation, sites using the ARC-CE are serviced by NDGF staff and tickets related to this infrastructure component are handled by ARC-CE experts. ARC-CE support is hence tied into the entire support chain from first line, COD, ROC to TPM level operation.

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