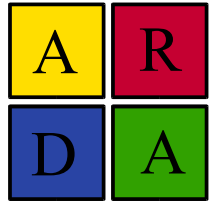


Birger Koblitz for the ARDA Group  
CHEP 2004, Interlaken, September 29<sup>th</sup> 2004

## Overview

- What is ARDA, what gLite?
- Accessing gLite
- The gLite shell
- Job Submission
- Package Management
- File Access
- Metadata Catalogue
- Future Developments





**ARDA: A R** Realization of **D**istributed **A**nalysis for LHC

- Project started April 1st, 2004
- Task: **Provide 4 HEP experiments** with grid **prototypes** building on EGEE middleware
- **Collect and forward HEP requirements** to EGEE

**gLite: Lightweight Middleware for Grid Computing** (Talk by E. Laure)

- **EGEE prototype** software
- Strongly influenced by Alien grid-middleware (Alice)
- Delivered on May18th to ARDA
- **Evolve prototype** into full grid in next 1½ years



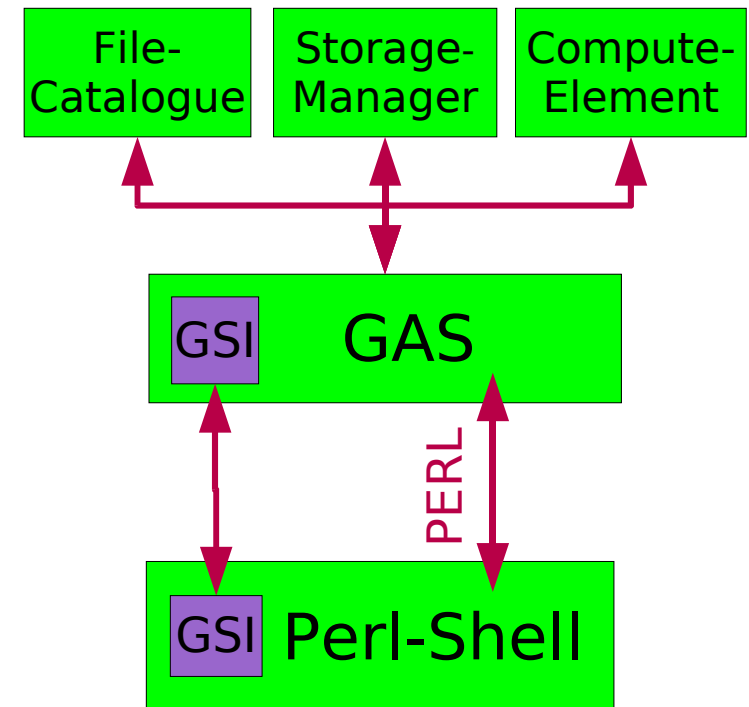
gLite uses Globus 2.4 Grid-**Certificates** (X.509) to authenticate + authorize, session not encrypted:

→ Problems with VOMS:

- Browser setup, Naming conventions, communication

gLite can be accessed by its own **shell** and a **Perl API**:

- **Nice Shell** implemented in Perl, very intuitive **hierarchical file catalogue**
- **No API** to compile against, but Perl-API sufficient for tests
- Perl API **poorly documented**
- No Protocol documentation



gLite provides own shell:

- Shell shows **virtual file-system** central to gLite
- Several known **shell commands** recreated

```
/egee/user/b/bkoblitz/ > ls
metadata
t10000
/egee/user/b/bkoblitz/ > add AAA file://lxplus025/tmp/koblitz/AAA
Sep 23 14:28:53 info Registering the file [.....]
Sep 23 14:29:09 info File /egee/user/b/bkoblitz/AAA inserted in the catalog
/egee/user/b/bkoblitz/ > ls -l
-rwxr-xr-x bkoblitz bkoblitz 101667 Sep 23 14:29 AAA
drwxr-xr-x bkoblitz bkoblitz 0 Sep 23 14:19 metadata
drwxr-xr-x bkoblitz bkoblitz 0 Jul 14 16:33 t100000
/egee/user/b/bkoblitz/ > whereis AAA
And the file is in EGEE::CERN::SRM
srm://lxb2027.cern.ch:8000/castor/cern.ch/home/egee/03/44069/008ef0b2-c...
```

Many **advanced shell features** not implemented:

Pipes, text-tools,...

Access to files is slow (first copied from SE)

Future: Provide commands using **C-API** as extensions to bash (ARDA)

## Two CEs set up in CERN/Wisconsin

(Scientific Linux 3 / CERN-Linux 7.3):

- Currently 2+1 Nodes only, will have ~30 Nodes in couple of weeks

Jobs are submitted with JDL script:

```
[lxb2041.cern.ch:3308] /egge/user/b/bkoblitz/ > cat job.jdl
Executable="Example";
requirements = other.CE == "EGEE::CERN::CONDOR";
Arguments="$1";
InputFile={"LF:/cms/example/binary.tar.gz",
           "LF:/cms/data/87000001/data/EVD0_Events.22187b7ab[...]_TkMu_g133_CMS"};
OutputFile={"job.87000001.log","bt03_ttH115_6j1l.87000001.root"};
[lxn5220.cern.ch:3308] /bin/ > submit /jdl/helloSite.jdl
```

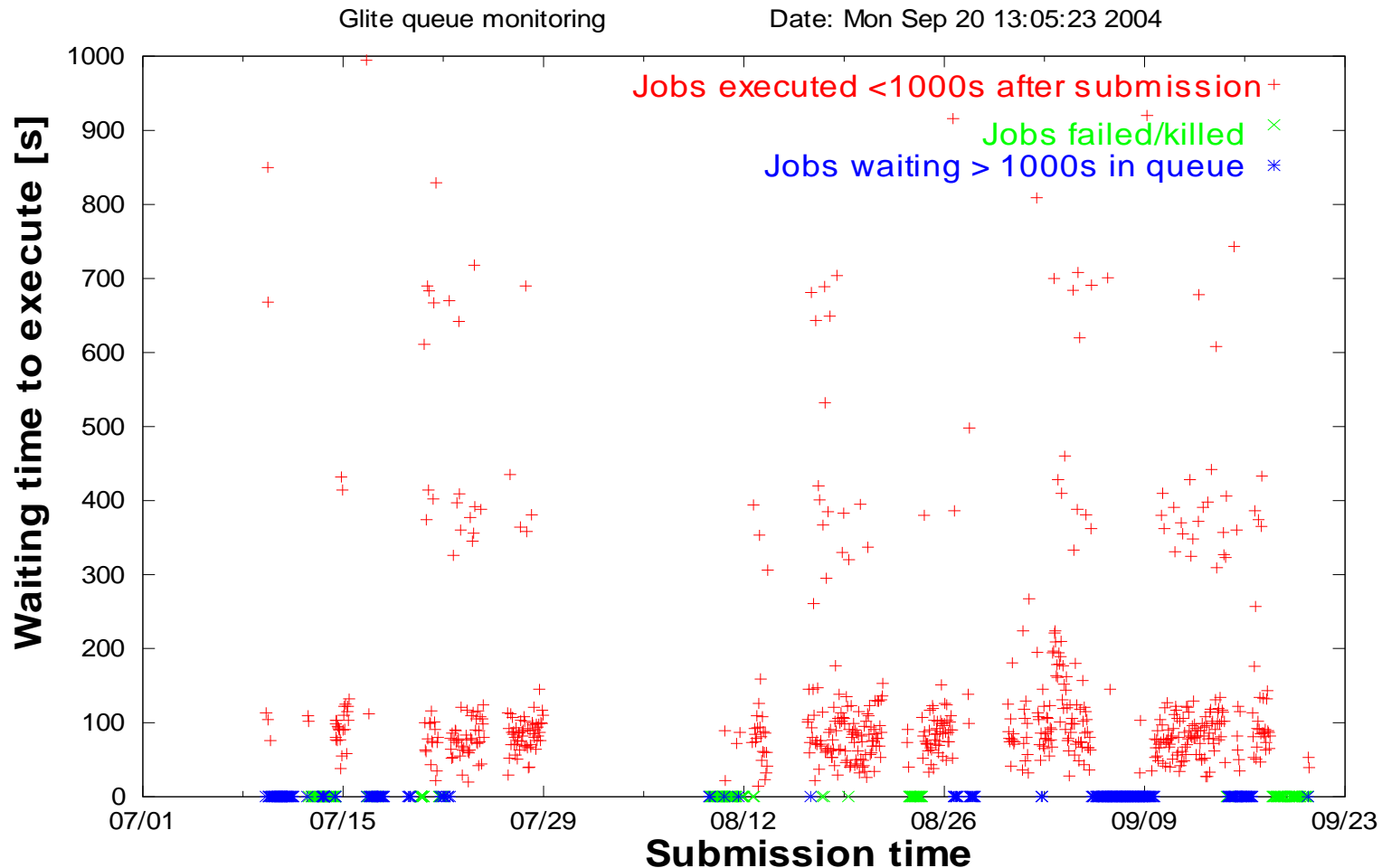
Allows advanced feature:

**Job-Splitting** on file/directory-level

# Jobs: Stability

Job queues monitored at CERN every hour:

- 80% Success rate (Jobs don't do anything real)



**External software** or executables are accessed through **packages (User installable!)**:  
TAR-Files in /egee/<home>/packages/version  
(Common an private packages)

```
glite> pwd
/egee/user/k/koblitz/packages/R00T/4.0/
glite> register Linux-i686 file://pcegee02.cern.ch/tmp/R00T.tar.gz
/egee/user/k/koblitz/packages/R00T/4.0/Linux-i686 inserted in the catalog
```

Allows high flexibility (complexity?) via **post-installation scripts**: PATH, LD\_LIBRARY\_PATH,...

Problem: User currently required to provide all packages: compiler, system libraries, ...

**No way to check OS on Node or ask for packages installed by system!**

# File Access

gLite allows users to access files on AFS (temporary!), CASTOR and dCache SEs:

- **Very important to test experiment software!**
- Files accessible via RFIO
- Automatic local staging of CASTOR files

SE setup with CASTOR backend was very painful:

- General instability of CASTOR
- Several problems with setting up of virtual castor user
- CASTOR access solved by end of August

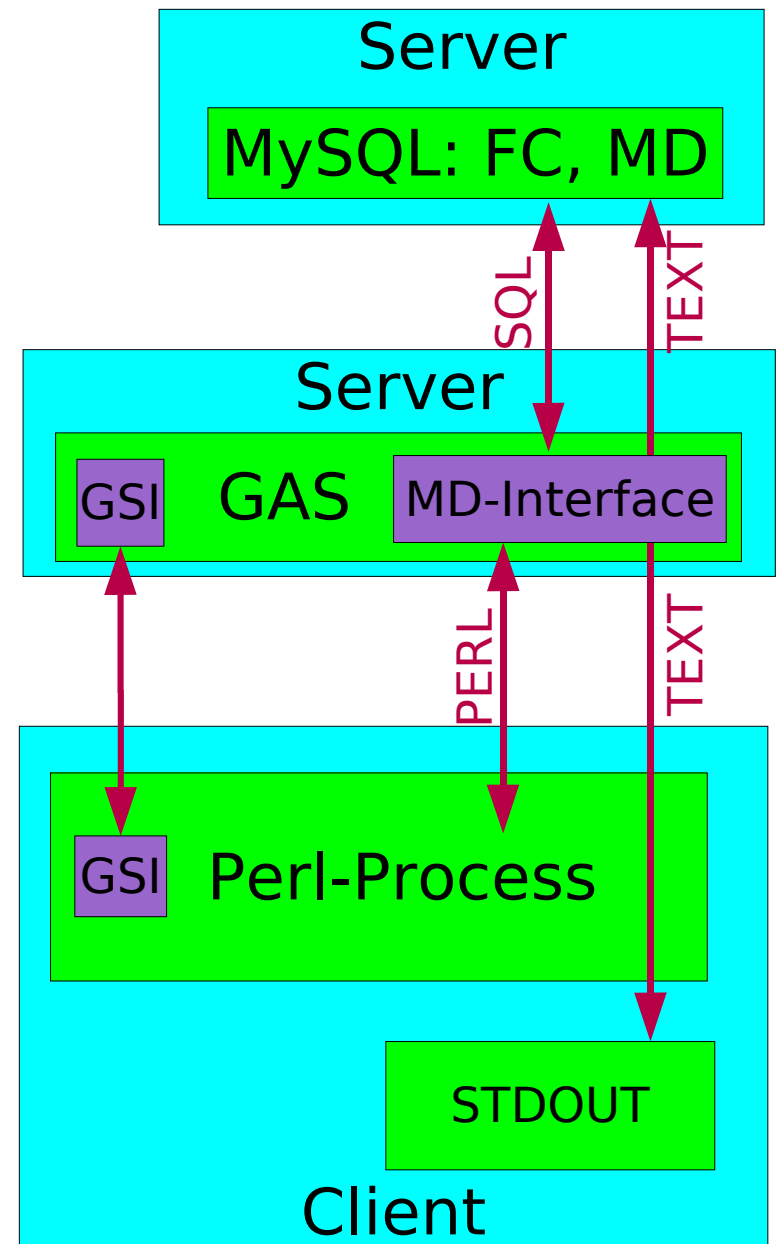
**SE(CASTOR) access via local staging now stable!**



# Metadata

gLite stores Metadata in additional Tables in File-Catalogue:

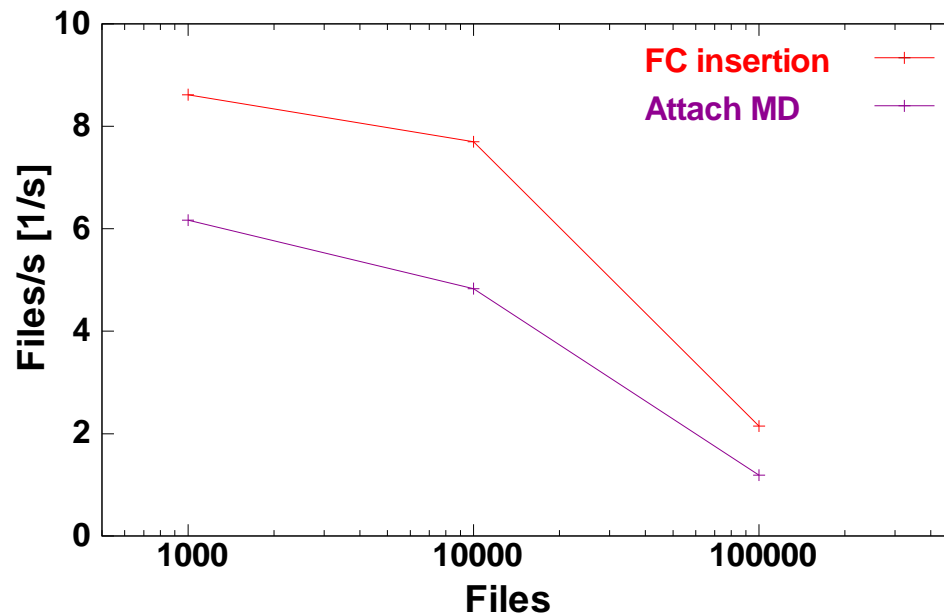
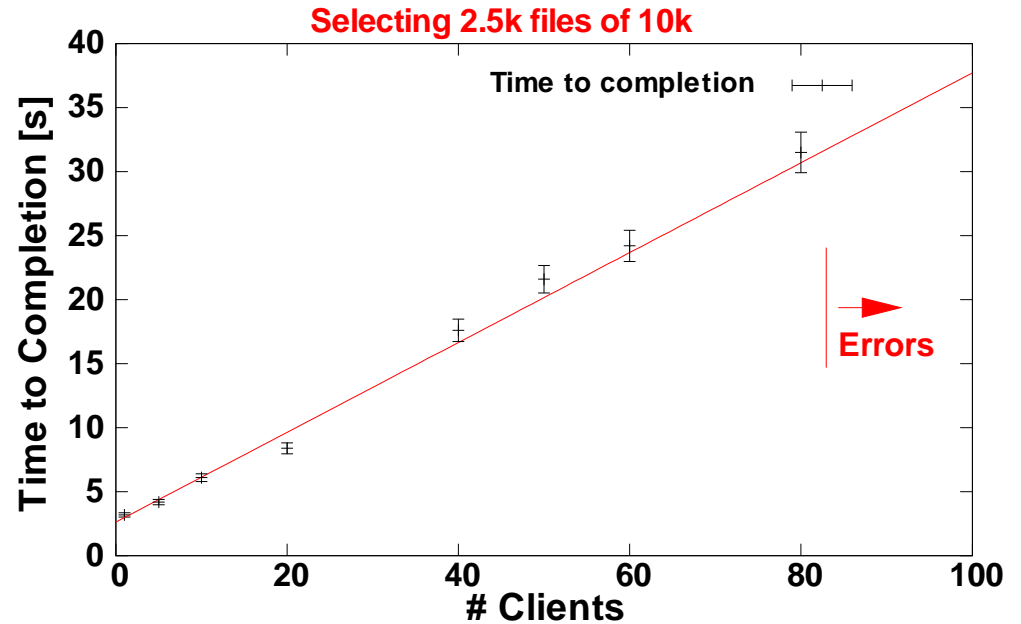
- User **uploads SQL table** description into File-Catalogue
- User **associates directory** with table
- User **fills in table** on a per file basis
- Access through gLite-shell, Perl scripts
- **Knowledge of Schema required**
- **No Schema evolution**



Metadata catalogue performs well:

Find matching  
2500 entries in  
10000 entry dir:

- 80 concurrent queries
- 0.35 s/query
- 2.6s startup time



Comparison with all  
Experiment MD-C:

- **Fast: Streaming,**  
**combined with FC**

# A new C-API

Lack of C/C++ API largest problem for experiment prototypes

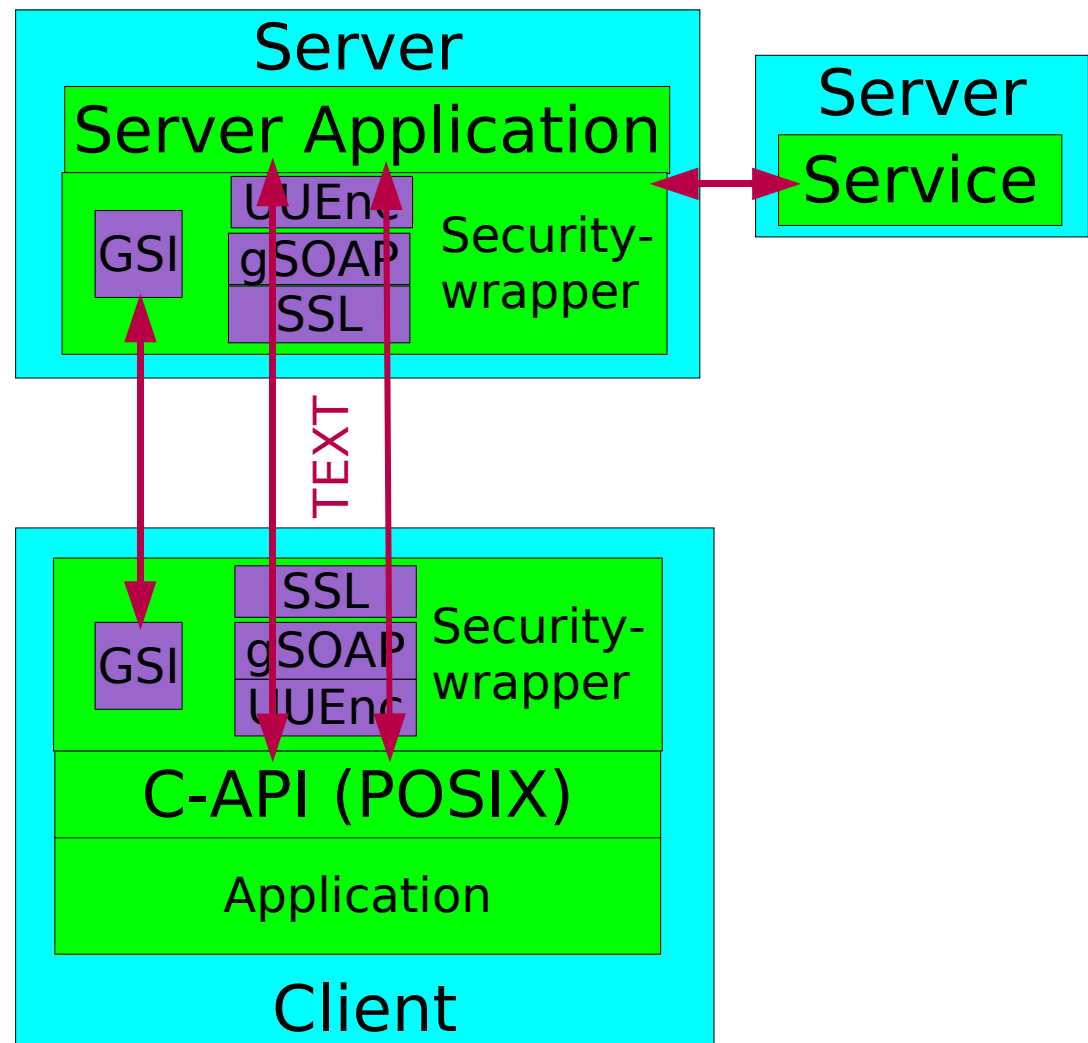
Create Interface sending text-commands to server:

- **UUEncode Strings**
- Send Strings via **gSOAP**
- Encrypt with **SSL**

Authentication via **GSI**  
(Globus TK3)

**+High performance**  
increase compared to SOAP calls with structures

- Protocol quite **proprietary...**



## ARDA will follow gLite development:

- **Validate interface** (currently being defined)
- **Study new implementation** of components  
e.g. New File-Catalogue: Fireman
- Contribute to **generic metadata** catalogue

## Experiences with **larger installation**

## Further **integrate gLite into experiment software**:

- ATLAS: Integration of gLite into Don Quixote
- ALICE: Integration into ROOT-Framework  
→ PROOF-clients on gLite WNs

Collect **user feed-back** on experiment prototypes

**3<sup>rd</sup> ARDA workshop 20-22 October 2004 at CERN**

gLite approach using prototype very successful

- Real participation of experiments
- See constant progress
- Many stability issues already solved
- Can run+monitor jobs, access data
- **First analysis jobs work!**

gLite concept of **filesystem-like** file-catalogue allows **intuitive usage** of gLite prototype

**Gained experience** comparing gLite and Experiment implementations:

Metadata-Catalogues, File-Transfer, Job-Submission

**We would like to thank the gLite team for a the very fruitful collaboration!**