e-NMR gLite Training
Firenze, 16-17 June 2009

Introduction to e-NMR hands-on

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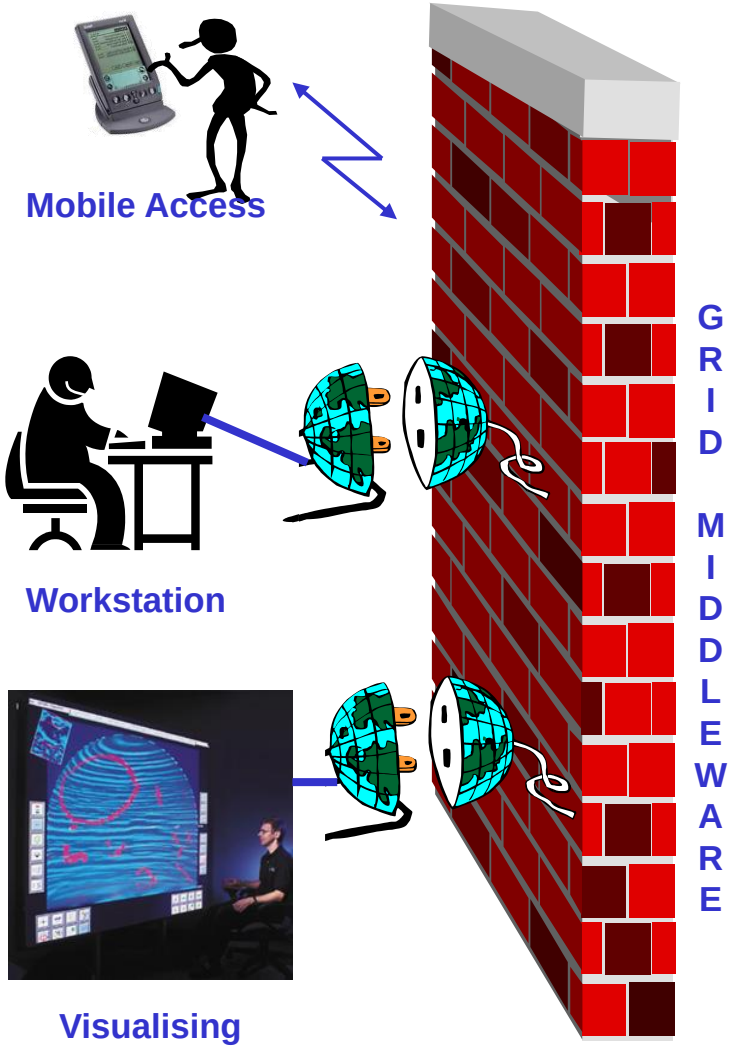
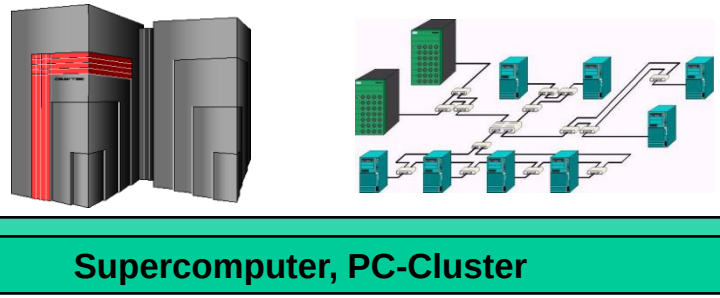
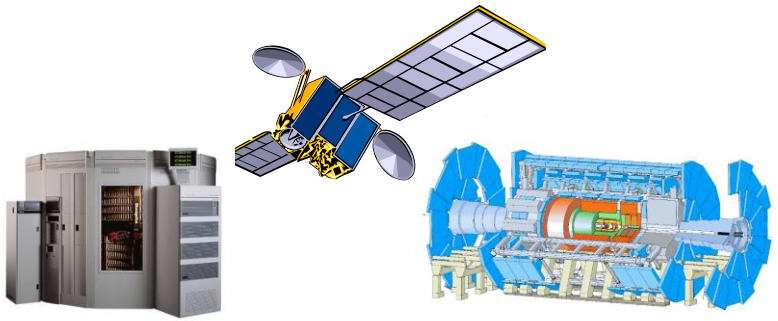
www.e-nmr.eu

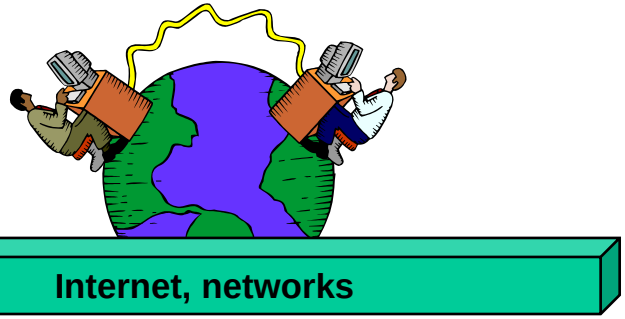
e-NMR (RI-213010) is funded by the European Commission under the Research Infrastructure Programme

The Grid Metaphor









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Key concepts

- "A computational grid is a hardware and software infrastructure that provides dependable, consistent, pervasive and inexpensive access to high-end computational capabilities"

  From "The Grid: Blueprint for a New Computing Infrastructure"
  http://www.globus.org/alliance/publications/papers/chapter2.pdf (1999)

- "Flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions, and resources - what we refer to as Virtual Organizations (VOs)"

  From "The Anatomy of the Grid: Enabling Scalable Virtual Organizations"
  www.globus.org/alliance/publications/papers/anatomy.pdf (2001)

- Example of Virtual Organisations: the 4 LHC experiments, the community of biomedical researchers, the bio-NMR community, etc.

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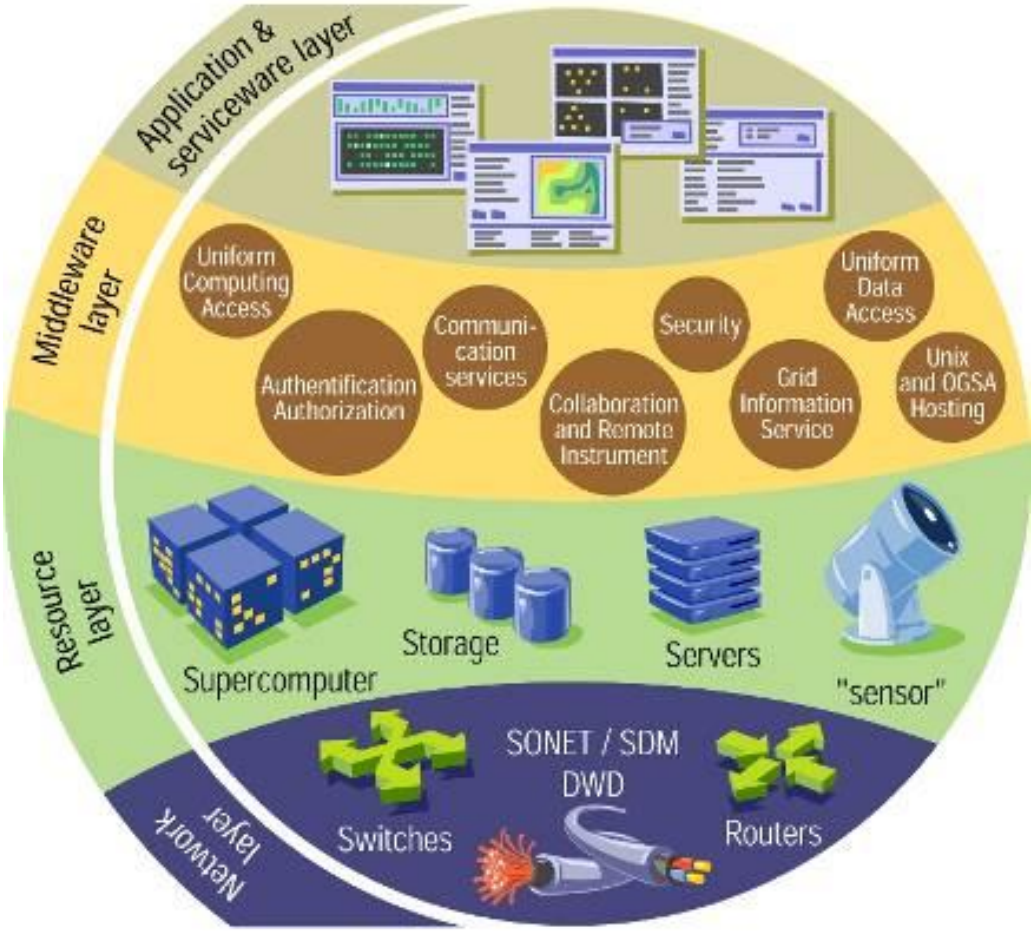
The middleware

- The Grid relies on advanced software, called middleware
- Middleware automatically finds the data the scientist needs, and the computing power to analyse it
- Middleware balances the load on different resources. It also handles security, accounting, monitoring and much more



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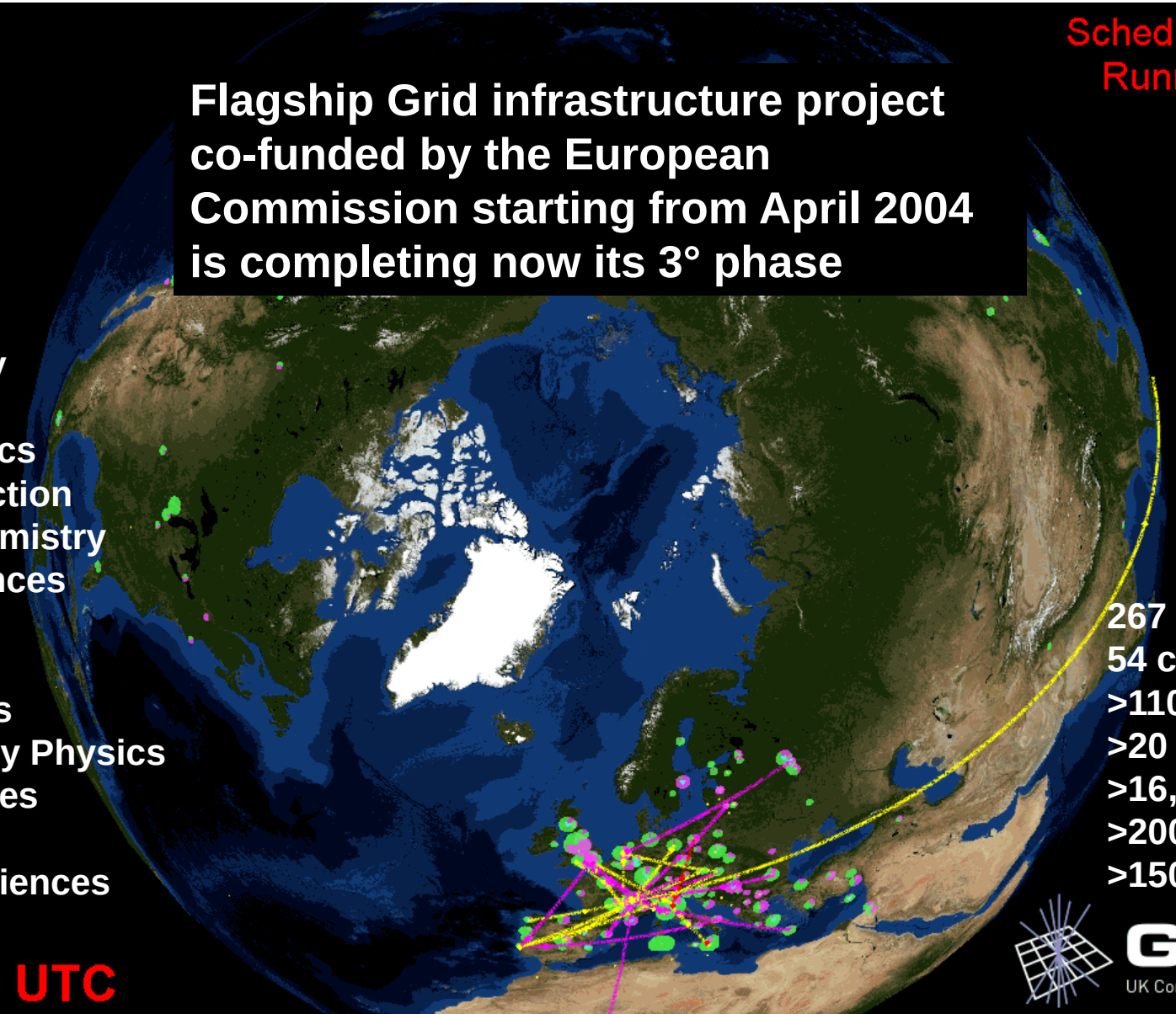
Enabling Grid for E-sciencE project

Enabling Grids for E-sciencE

Scheduled = 21539
Running = 25374

Flagship Grid infrastructure project co-funded by the European Commission starting from April 2004 is completing now its 3° phase



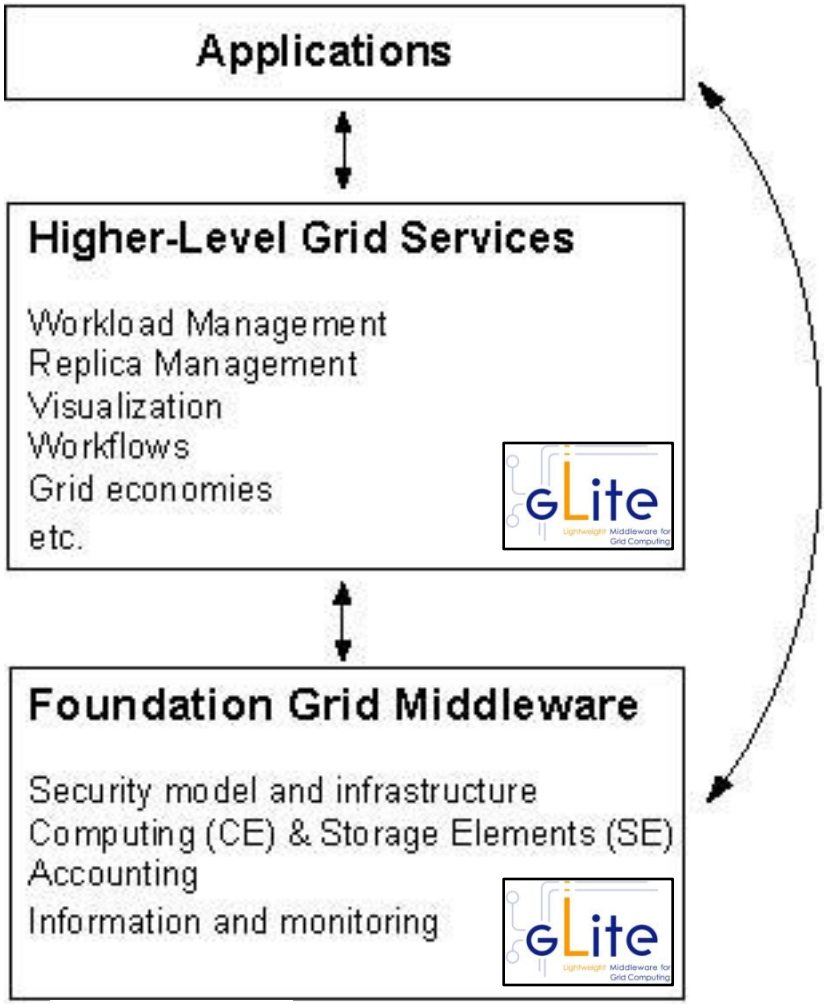
- Archeology
- Astronomy
- Astrophysics
- Civil Protection
- Comp. Chemistry
- Earth Sciences
- Finance
- Fusion
- Geophysics
- High Energy Physics
- Life Sciences
- Multimedia
- Material Sciences
- …

21:13:50 UTC

267 sites
54 countries
>110,000 CPUs
>20 PetaBytes
>16,000 users
>200 VOs
>150,000 jobs/day

GridPP
UK Computing for Particle Physics

The EGEE middleware: gLite



- Applications have access both to Higher-level Grid Services and to Foundation Grid Middleware
- Higher-Level Grid Services are supposed to help the users building their computing infrastructure but should not be mandatory
- Foundation Grid Middleware will be deployed on the EGEE infrastructure
  - Must be complete and robust
  - Should allow interoperation with other major grid infrastructures
  - Should not assume the use of Higher-Level Grid Services

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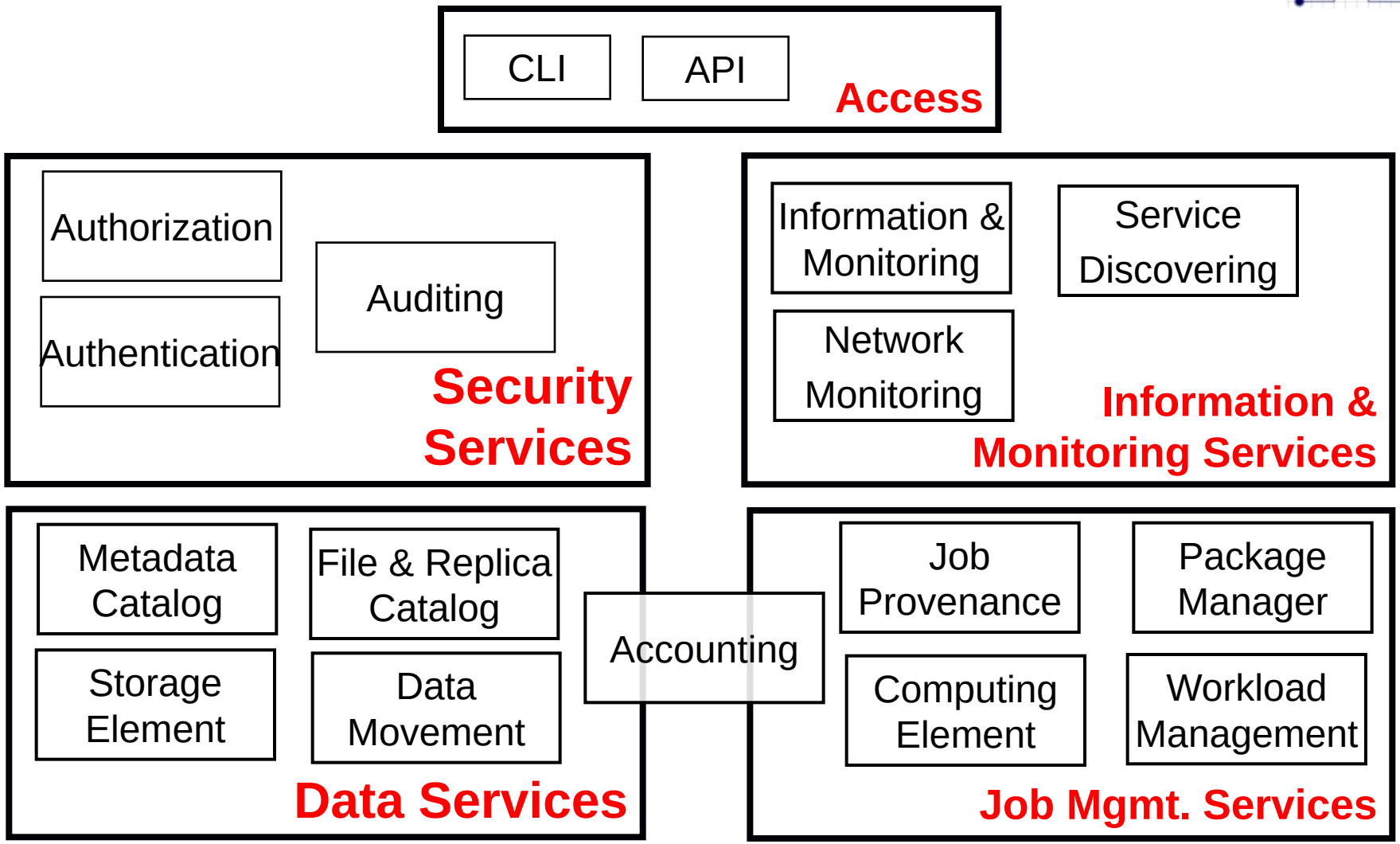
gLite Services Decomposition



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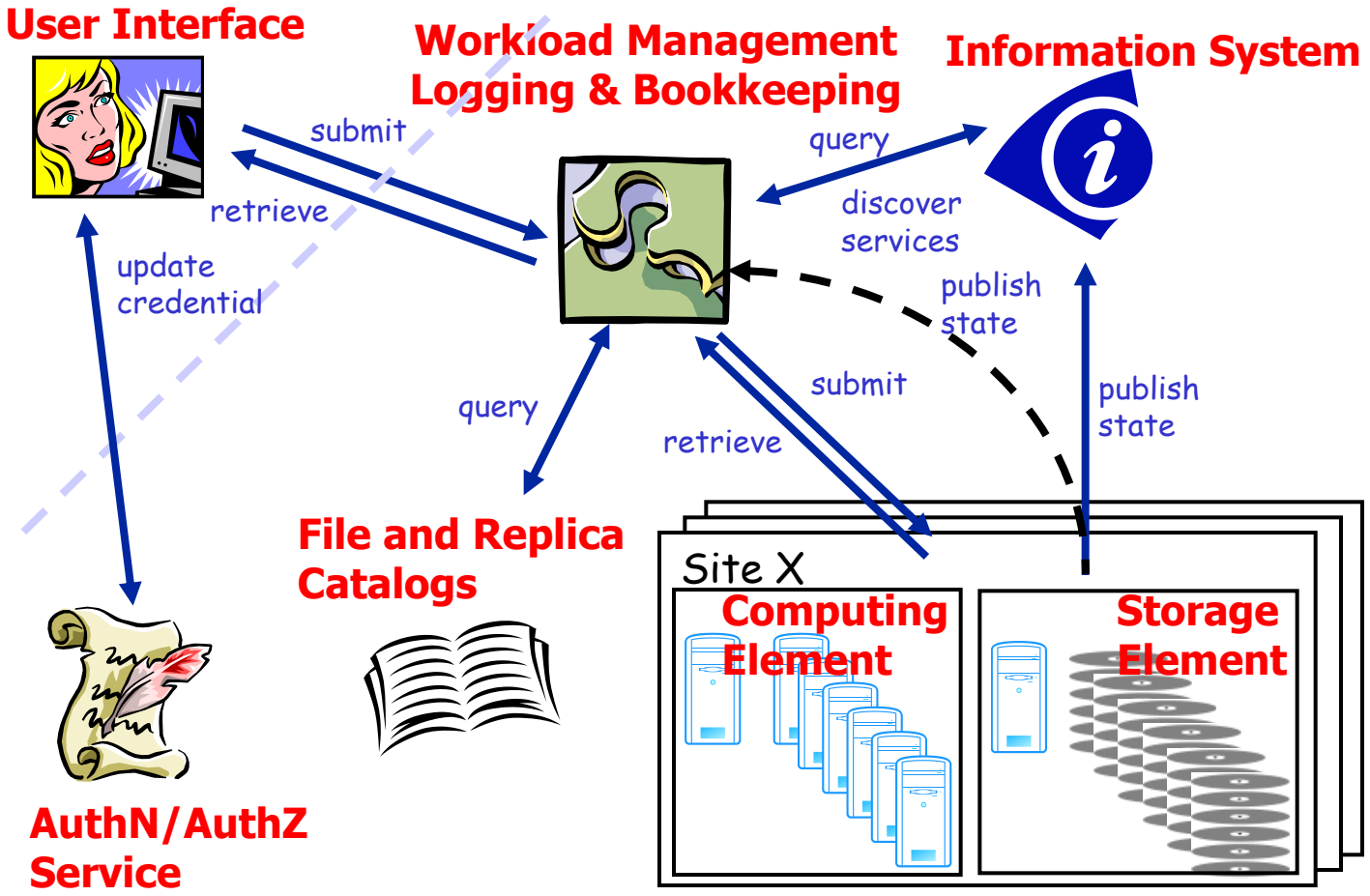
gLite services orchestration



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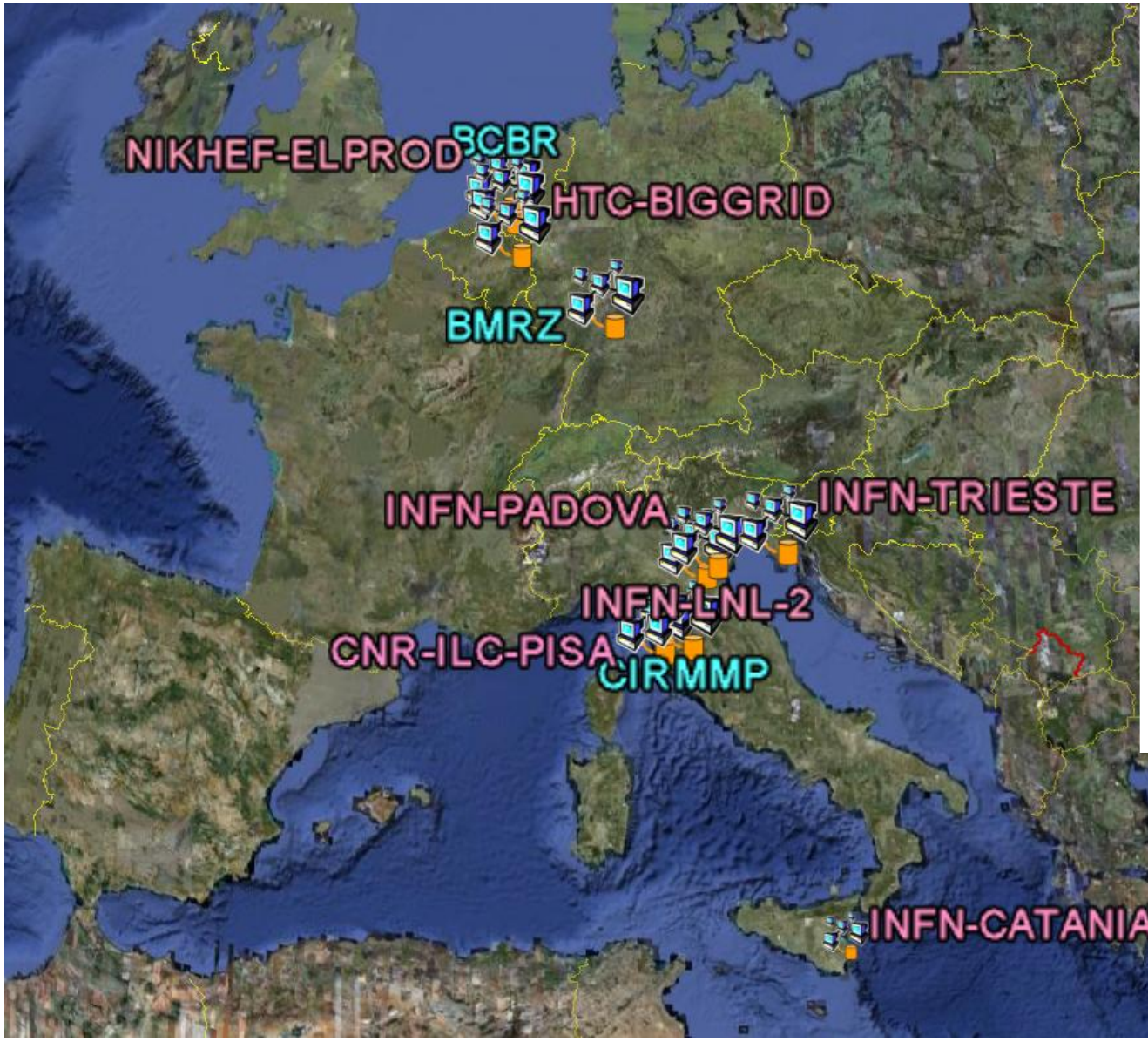
e-NMR Grid in June 2009



CEs, SEs and UIs at sites:

236 CPU-cores
2.9 TB storage
dedicated

+

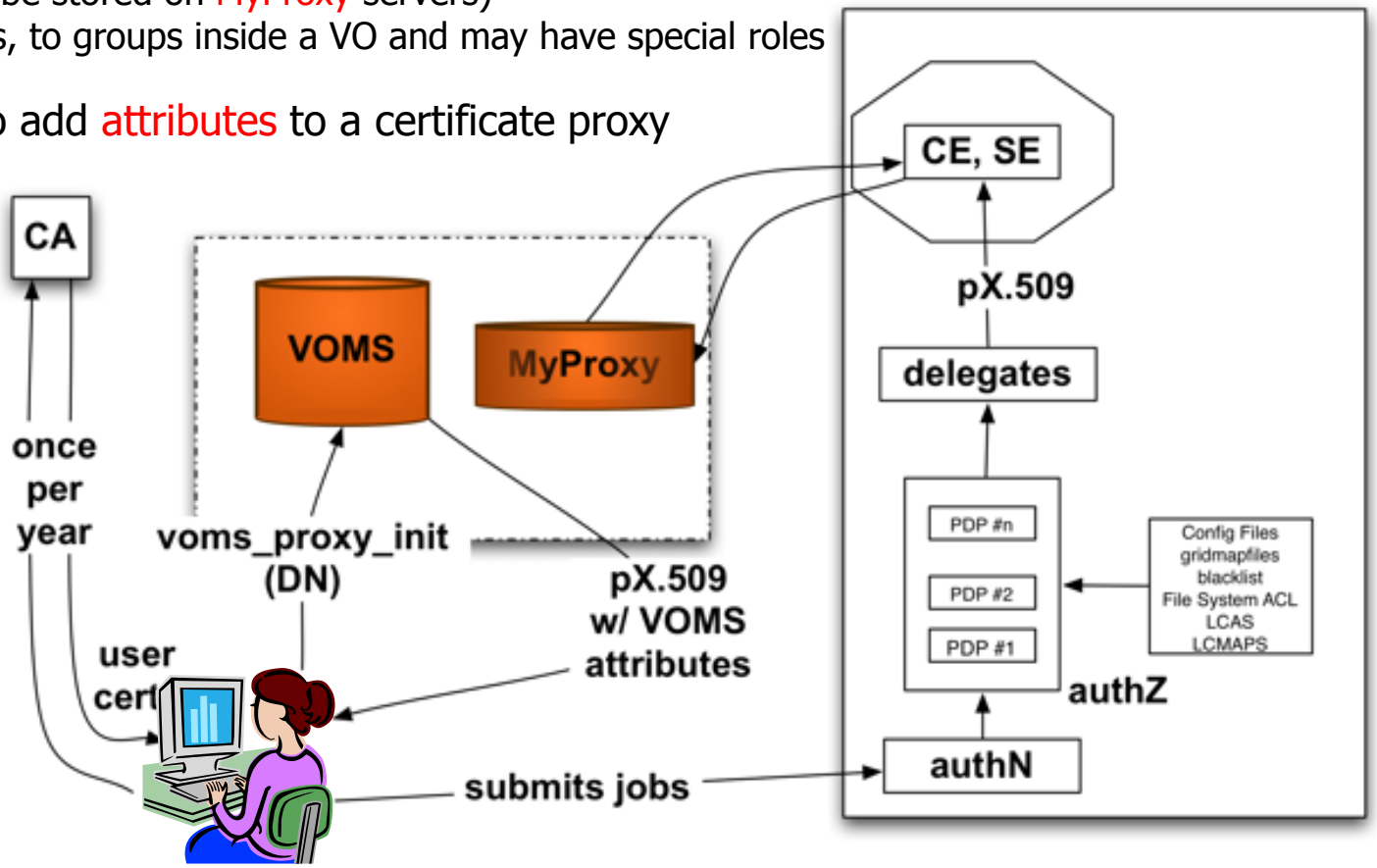
3290 CPU-cores
35.2 TB storage
shared with
IGI and BigGRID

Security Services

GSI Authentication based on PKI X.509 SSL infrastructure

- Certificate Authorities (CA) issue (long lived) certificates identifying individuals (much like a passport)
- to reduce vulnerability, on the Grid user identification is done by using (short lived) proxies of their certificates (they can be stored on MyProxy servers)
- users belong to VO's, to groups inside a VO and may have special roles

VOMS provides a way to add attributes to a certificate proxy



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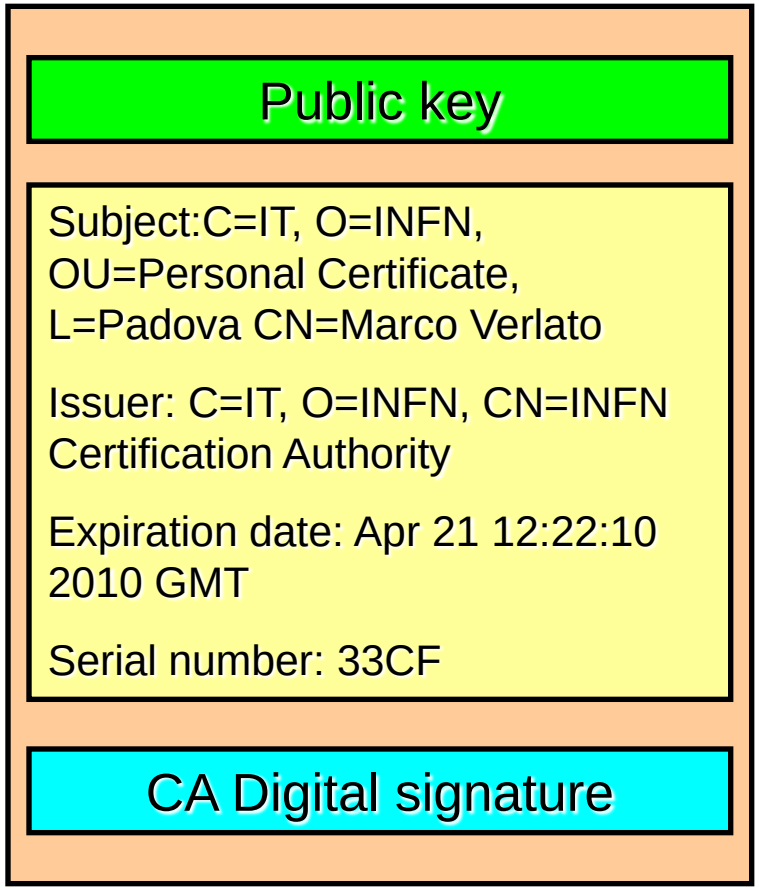
X.509 Certificates

- An X.509 Certificate contains:
  - owner's public key;
  - identity of the owner;
  - info on the CA;
  - time of validity;
  - Serial number;
  - digital signature of the CA

Structure of a X.509 certificate



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Which CA are trusted in EGEE?

IGTF International Grid Trust Federation AP | EU | TAG

About the IGTF

IGTF Charter
Tokyo Accord (2003)

Member PMAs and Registries

APGridPMA
EUGridPMA
TAGPMA
TACAR

Authentication Profiles

Classic X.509 CAs
Short-Lived Credential Services (SLCS)
Member Integrated Credential Services

Download the Distribution
Download the Utilities

Open Grid Forum Relationships

CA Operations WG
OGF Documents

Links

Open Grid Forum
TERENA TF-EMC2
e-Infrastructure Reflection Group

Comments to info@igtf.net
Disclaimer and Privacy notice

The International Grid Trust Federation

News

The latest IGTF trust anchor distribution is always available from the PMA web sites: EUGridPMA and APGridPMA. Please refer to the README and CHANGES files for information about the distribution and its use.

The international community is deploying large scale distributed computing grids on a production scale, across organisations, across countries, and across continents, for the advancement of science and engineering. In shaping this common grid infrastructure, many of these grids are relying on common practices, policies and procedures to reliably identify grid subscribers and resources.

The International Grid Trust Federation (IGTF) is a body to establish common policies and guidelines between its Policy Management Authorities (PMAs) members and to ensure compliance to this Federation Document amongst the participating PMAs. The IGTF does not provide identity assertions but instead ensures that within the scope of the IGTF charter the assertions issued by accredited authorities of any of its member PMAs meet or exceed an authentication profile relevant to the accredited authority.

Functions and the Trust Anchor Distribution

The IGTF maintains a list of trust anchors, root certificates and related meta-information for all the accredited authorities, i.e., those that meet or exceed the criteria mentioned in the *Authentication Profiles*. The Distribution contains Certificate Revocation List (CRL) locations, contact information, and signing policies.

- Download the latest update of the Common Distribution
- Download the Distribution Tools and the *fetch-crl* utility

www.igtf.net

Constituency

The IGTF constituency consists of our three member PMAs: the APGridPMA covering Asia and the Pacific, the EUGridPMA covering Europe, the Middle East and Africa, and The Americas Grid PMA covering Latin America, the Carribean and North America. All registered members in each regional PMA are also members of the IGTF. These include identity providers, CAs, and their major Relying Parties, such as the international Grid Deployment and Infrastructure projects.

Each member PMA holds regular meetings and manages a (closed) email list for discussion. The open IGTF meetings are held at the Open Grid Forum's regular meetings. You can get in contact with the IGTF through your Regional PMA.

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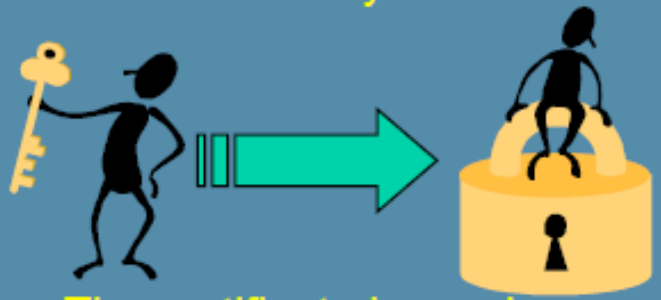
Obtaining a certificate

- **How to obtain a certificate:**

A certificate request is performed

The user identify is confirmed by the RA

The certificate is issued by the CA



The certificate is used as a key to access the grid

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Certificate management

– You receive typically a PKCS12 certificate (can import it directly into the web browser)
– For future use, you will need *usercert.pem and userkey.pem in a* directory ~/.globus on your UI
– Export the PKCS12 cert to a local dir on UI and use again *openssl:*

$ openssl pkcs12 -nocerts -in my_cert.p12 -out userkey.pem
$ openssl pkcs12 -clcerts -nokeys -in my_cert.p12 –out usercert.pem

$ cat .globus/usercert.pem

-----BEGIN CERTIFICATE-----
MIIF1zCCBL+gAwIBAgICA4wDQYJKoZIhvcNAQEEBQAwQzELMAkGA1UEBhMCSVQx
DTALBgNVBAoTBElORk4xJTAjBgNVBAMTHElORk4gQ2VydGlmaWNhdGlvbiBBdXRo
b3JpdHkwHhcNMDQwNTEwMTMxNTIyWhcNMDUwNTEwMTMxNTIyWjCBjzELMAkGA1UE
BhMCSVQxDTALBgNVBAoTBElORk4xHTAbBgNVBAsTFFBlcnNvbmFsIENlcnRpZmlj
YXRlMQ0wCwYDVQQHEwRDTkFGMRcwFQYDVQQDEw5EYW5pZWxlIENlc2luaTEqMCgG
CSqGSIb3DQEJARYbZGFuaWVsZS5jZXNpbmlAY25hZi5pbmZuLml0MIIBIjANBgkq
hkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAnEvVPBpTjKLA4F0K+Zgc8pWyEPGDnwLW
glktBI6+mYTLuemPzgkZ4CTyrZL7bw5ywXUe717e1Rmg6wDfPANRLkxxRNKNaron
kS19eNKjPYpklEKNq2gSGsK0/SsYB2YUG4kWLqtFC93x1Ffdc1Tz0xgrXH3kC0jq
NqHImDrbpB7VtvAGC7/e/EJhy9MvlPA4W2vbUnwBocjMA/en3GXs2KY19tbFA3Tg
jyIpCMbIeu3GlyTnbSJFoy3eeHkNLsf9c29RAJ5gWxMF7arM++NyURQ9qaEdMINj
Cqb7dHJEj8E/AwSsYeWmWHfaPXnjj5aP23UlRTc31nSwh+5y0bMnFwIDAQABo4IC
hjCCAoIwDAYDVR0TAQH/BAIwADAOBgNVHQ8BAf8EBAMCBPAwNgYDVR0fBC8wLTAr
oCmgJ4YlaHR0cDovL3NlY3VyaXR5LmZpLmluZm4uaXQvQ0EvY3JsLmNybDAXBgNV
HSAEEDAOMAwGCisGAQQB0SMKAQQwHQYDVR0OBBYEFCM+8mfoaenmQ76tHy+7hX+5
RKJ6MGsGA1UdIwRkMGKAFMoR710dBwSYqaW1WBpmTgoWK+BJoUekRTBDMQswCQYD
VQQGEwJJVDENMAsGA1UEChMESU5GTjElMCMGA1UEAxMcSU5GTiBDZXJ0aWZpY2F0
-----END CERTIFICATE-----

$ grid-cert-info -file .globus/usercert.pem

Certificate:
  Data:
    Version: 3 (0x2)
    Serial Number: 13263 (0x33cf)
    Signature Algorithm: sha1WithRSAEncryption
    Issuer: C=IT, O=INFN, CN=INFN CA
    Validity
      Not Before: Apr 21 12:22:10 2009 GMT
      Not After : Apr 21 12:22:10 2010 GMT
    Subject: C=IT, O=INFN, OU=Personal Certificate, L=Padova, CN=Marco Verlato

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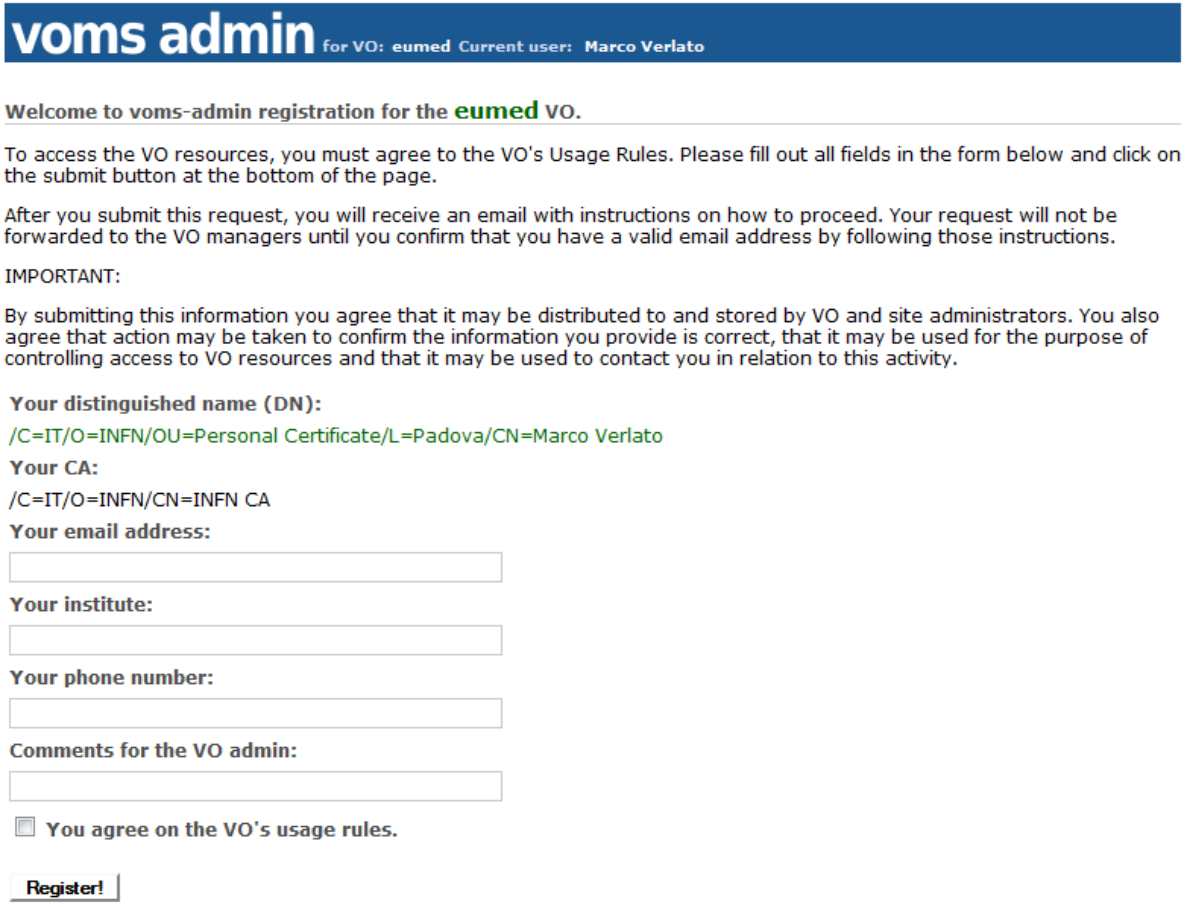
Registering with enmr.eu VO

https://voms2.cnaf.infn.it:8443/voms/enmr.eu/

- Bare certificates are not enough for defining user capabilities on the grid
- Users belong to VO's, to **groups** inside a VO and may have special **roles**
- You need your certificate uploaded into your browser



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voms-proxy-init

$ voms-proxy-init -voms enmr.eu

```
Cannot find file or dir: /users/grid/verlato/.glite/vomses
Enter GRID pass phrase:
Your identity: /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco Verlato
Creating temporary proxy ..... Done
Contacting  voms-02.pd.infn.it:15014 [/C=IT/O=INFN/OU=Host/L=Padova/CN=voms-02.pd.infn.it] "enmr.eu" Done
Creating proxy ..... Done
Your proxy is valid until Mon Feb 16 08:02:24 2009
```

$ voms-proxy-info -all

```
subject   : /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco Verlato/CN=proxy
issuer    : /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco Verlato
identity  : /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco Verlato
type      : proxy
strength  : 1024 bits
path      : /tmp/x509up_u3801
timeleft  : 11:55:54
=== VO enmr.eu extension information ===
VO        : enmr.eu
subject   : /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco Verlato
issuer    : /C=IT/O=INFN/OU=Host/L=Padova/CN=voms-02.pd.infn.it
attribute : /enmr.eu/Role=NULL/Capability=NULL
attribute : /enmr.eu/cirmmp/Role=NULL/Capability=NULL
timeleft  : 11:55:54
uri       : voms-02.pd.infn.it:15014
```

VO

Attributes

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Long term proxy - myproxy

- Grid tasks may need a time longer than the proxy lifetime (short for security reasons)

- A MyProxy server is used to create and store a long term proxy which is used to renew short term proxies when they are going to expire

```
$ myproxy-init -s myproxy.cnaf.infn.it -d
Your identity: /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco Verlato
Enter GRID pass phrase for this identity:
Creating proxy ..... Done
Proxy Verify OK
Your proxy is valid until: Mon Feb 23 16:48:24 2009
Enter MyProxy pass phrase:
Verifying - Enter MyProxy pass phrase:
A proxy valid for 168 hours (7.0 days) for user /C=IT/O=INFN/OU=Personal Certificate/L=Padova/CN=Marco
Verlato now exists on myproxy.cnaf.infn.it.
```

- A dedicated service on the WMS can renew automatically the proxy on your behalf contacting the MyProxy server (the MyProxy server should be indicated in the job description)

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User Interface (UI)

- **The access point to the EGEE Grid is the User Interface (UI)**
- **It provides the CLI tools to access the functionalities offered by the gLite Services**
- **They allow to perform some basic Grid operations:**
  - create the user proxy needed for authentication/authorization
  - retrieve the status of different resources from the Information System
  - copy, replicate and delete files from the Grid
  - list all the resources suitable to execute a given job
  - submit jobs for execution
  - cancel jobs
  - retrieve the output of finished jobs
  - show the status of submitted jobs
  - retrieve the logging and bookkeeping information of jobs
- **It provides the APIs to allow the development of Grid-enabled applications**

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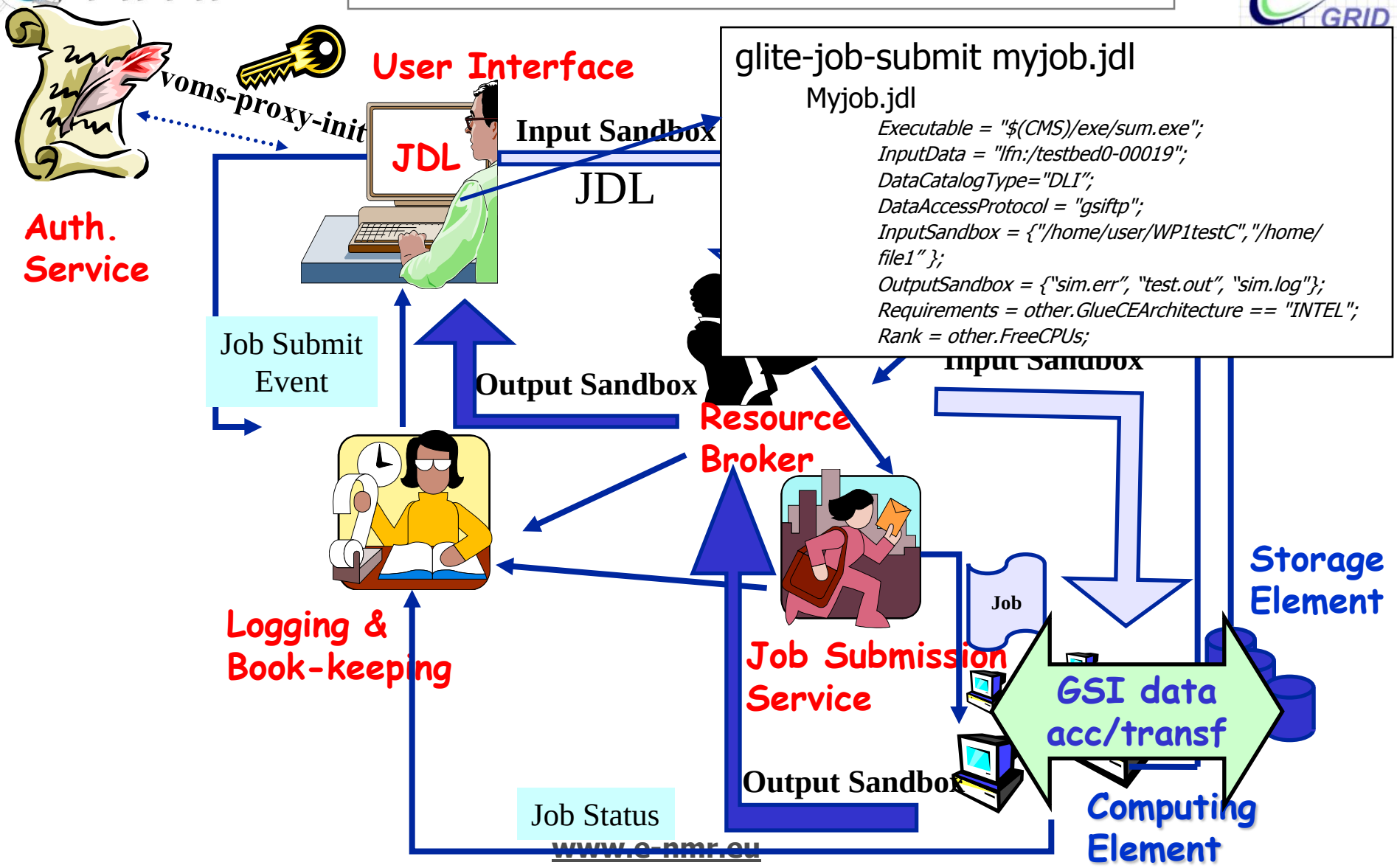
Job Submission Workflow



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References

http://www.enmr.eu/eNMR-registration

https://gilda.ct.infn.it/UIPnP.html

https://grid.ct.infn.it/twiki/bin/view/GILDA/UserTutorials

https://edms.cern.ch/file/722398/1.2/gLite-3-UserGuide.pdf

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Hands-on set up

In this course all security stuffs have already been setup for you

- **you have an account on a linux machine**
- **you have a proxy certificate in /tmp/cert_proxy**
- **I'll show you how to install and use a UI**

Access:

40 accounts enmr1 → enmr40

passwd meetingf

ssh enmr1→40@v3-enmr.cerm.unifi.it

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