

When databases met my Grid

A New Data Source Oriented CE for GRID

Taffoni Giuliano INAF - SI

- **What is a G-DSE**
- **An overview of the GDSE**
- **Some practice**
- **A use case: the AstroDB**

People:

- ✓ Edgardo Amborsi
- ✓ Giuliano Taffoni
- ✓ Andrea Barisani
- ✓ Claudio Vuerli
- ✓ Antonia Ghiselli

- I have a DB and I want to **USE** it from my **GRID**.
- I have a number of DBs and I want to **USE** all of them.
- Move the execution to the data and not data to the code.
- Fully compliant with (LCG) GLite
- No space for WS.

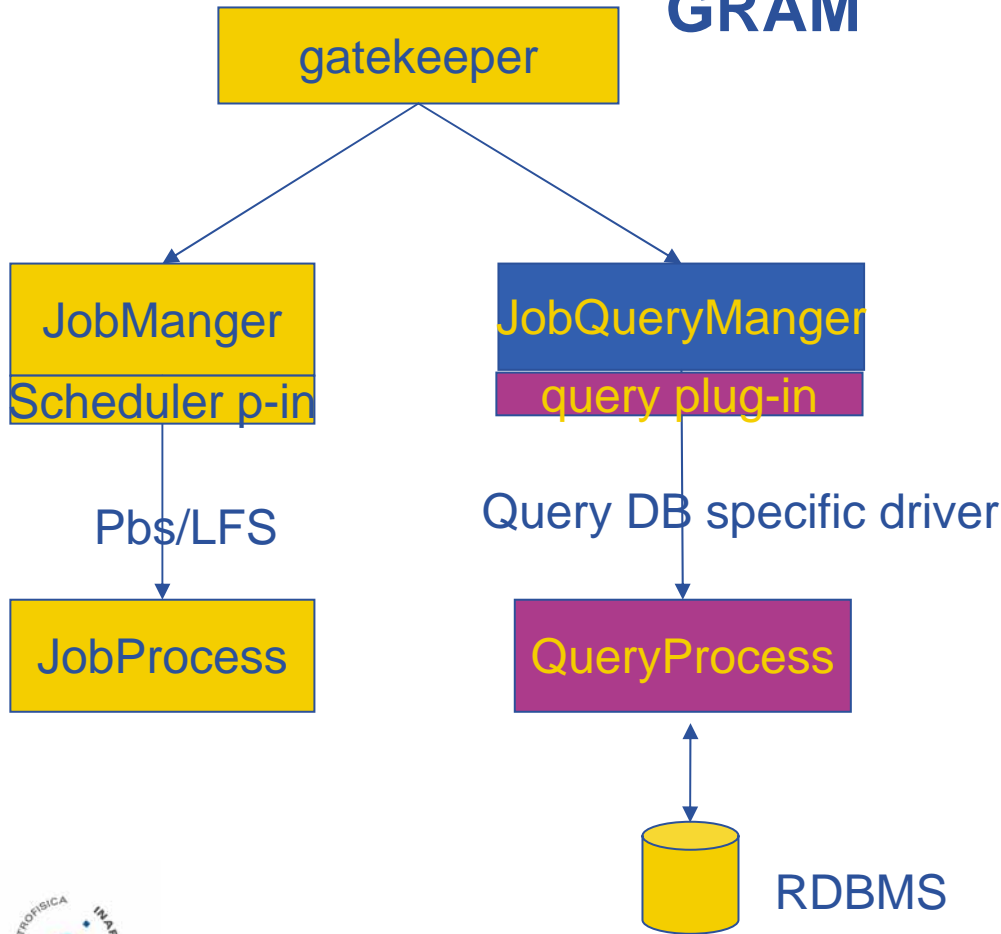
- **The Grid limit: it is able to execute binary code or shell scripts and stores files;**
- **DB in the Grid? Extension of the existing Resource Manager of Globus for providing transparent access to heterogeneous DS and DSE**

- **Provide a proper extension of the Grid to care a new resource**
- **Security GSI: no need to extend but to use!**
- **First theory (Grid ASM) then...application.**

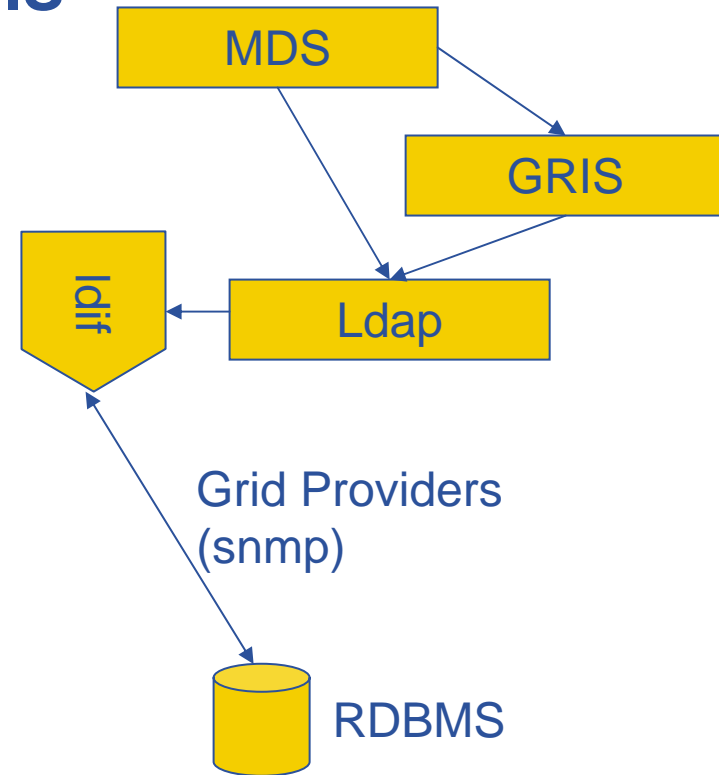
“A Formal Framework for Defining Grid Systems”

Zsolt N. Nemeth & Vaidy Sunderam
2nd IEEE/ACM (CCGRID'02)

GRAM

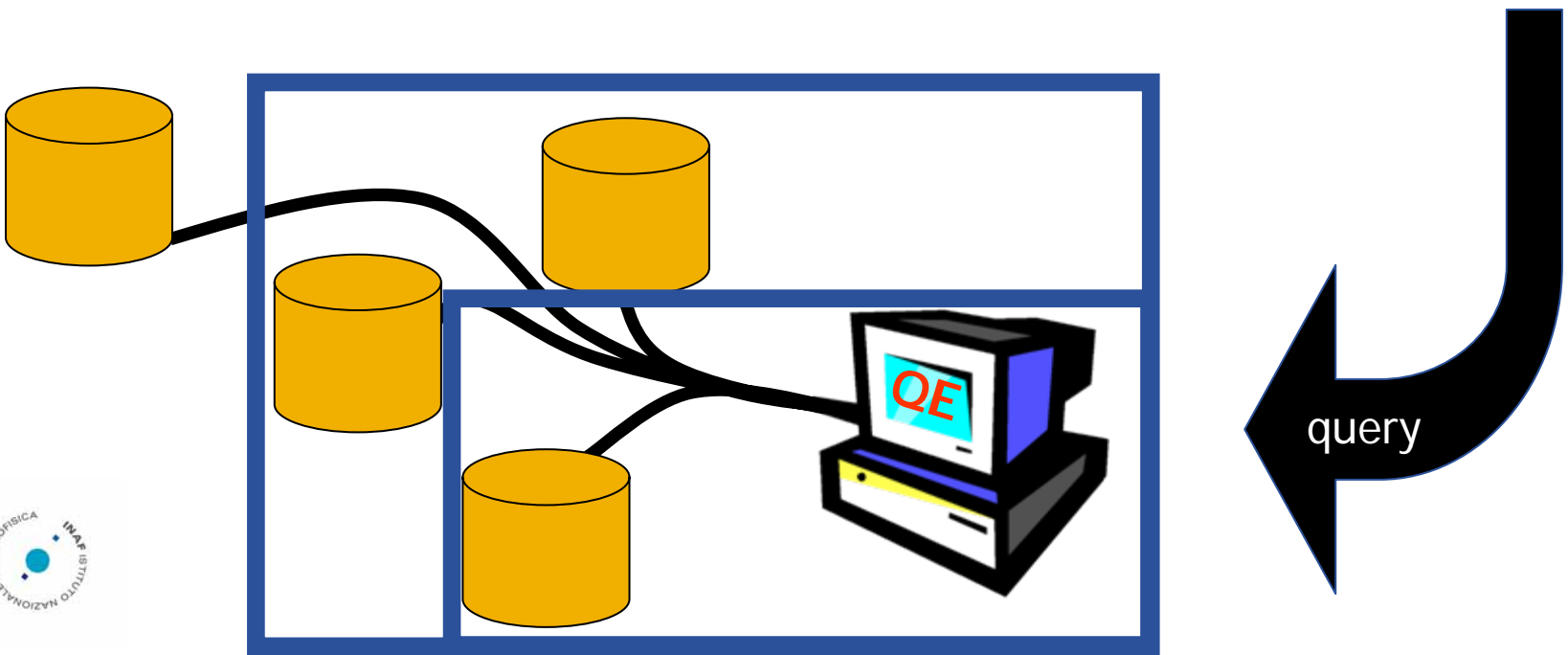


GIS

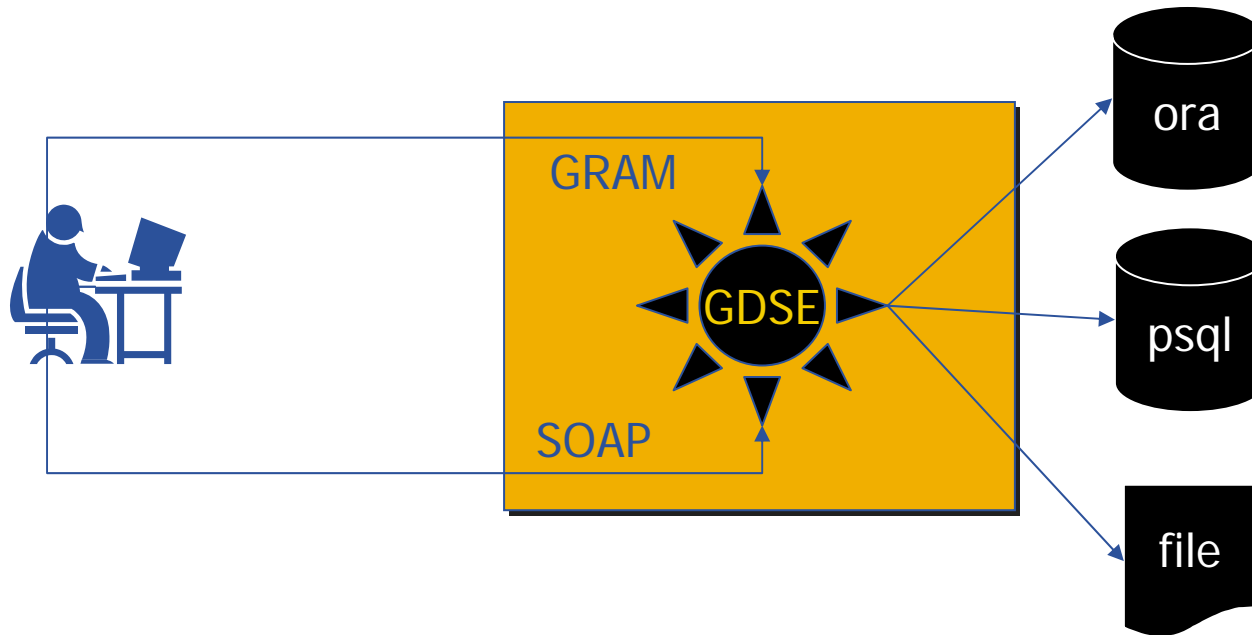


- **New Grid component:**
 - Integrated within the Grid Information System
 - May be integrated in the WMS
- **New Grid Element** on top of the G-DSE component

the Query Element



- Runs on any linux/unix flavor: **GT \geq 2.4.3**
- Backbends: any DB vendor (MySQL, Oracle, PostgreSQL etc...) + flat files
- Two protocols: **GRAM** or **WS**
- API: **C, C++, python, Java, perl**



- **Access control using GSI and VOMS**
 - The certificate + roles identify the user permissions on DB



Super user: create, modify, admin, grant and revoke users.... ANYTHING!!!



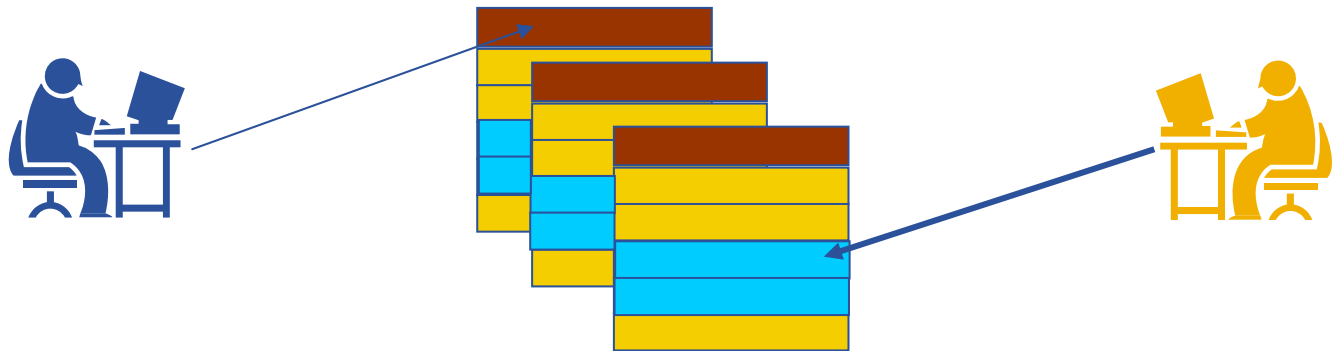
Standard user: select+ insert



Simple user: select

And so on...

- **Granularity access control:**
 - Permissions on whole DB, on one table, on one row;
 - “rw” or “ro” or “rwx” etc...
 - “delegation”



The super user from a UI can modify the acl or delegate a new user to do it.

- **The present**
 - Interactive query
 - Off line access
 - **Parallel sql** to many DSE: SIMD, MIMD
 - Redirect output to a SE
 - Discovery system: BDII integrated.
- **The future**
 - XIO (distributed join)
 - Automatic intra-GDSE parallel access
 - WMS integration
 - Workflow implementation

- UI/QE interactions trough a STANDARD LANGUAGE
- RSL(SQL)

```
> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 "select
a,b from table;"
```

```
-----
| a      | b      |
-----
| Uno    | 001    |
| Due    | 002    |
| Tre    | 003    |
-----
```

Off line access

```
> globus-job-submit g.dse.host/dbmanager-ODBC -queue PSQL1
"select a,b from table;"
https://g.dse.host/20001/23297/113699980234
>globus-job-status https://g.dse.host/20001/23297/113699980234
DONE
>globus-job-get-output https://g.dse.host/20001/23297/113699...
```

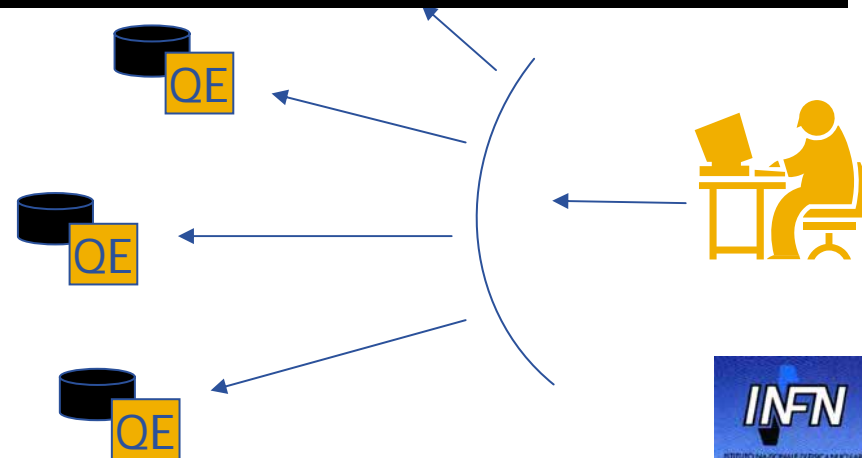
```
-----
| a      | b      |
-----
| Uno   | 001   |
| Due   | 002   |
| Tre   | 003   |
-----
```

• UI implementation

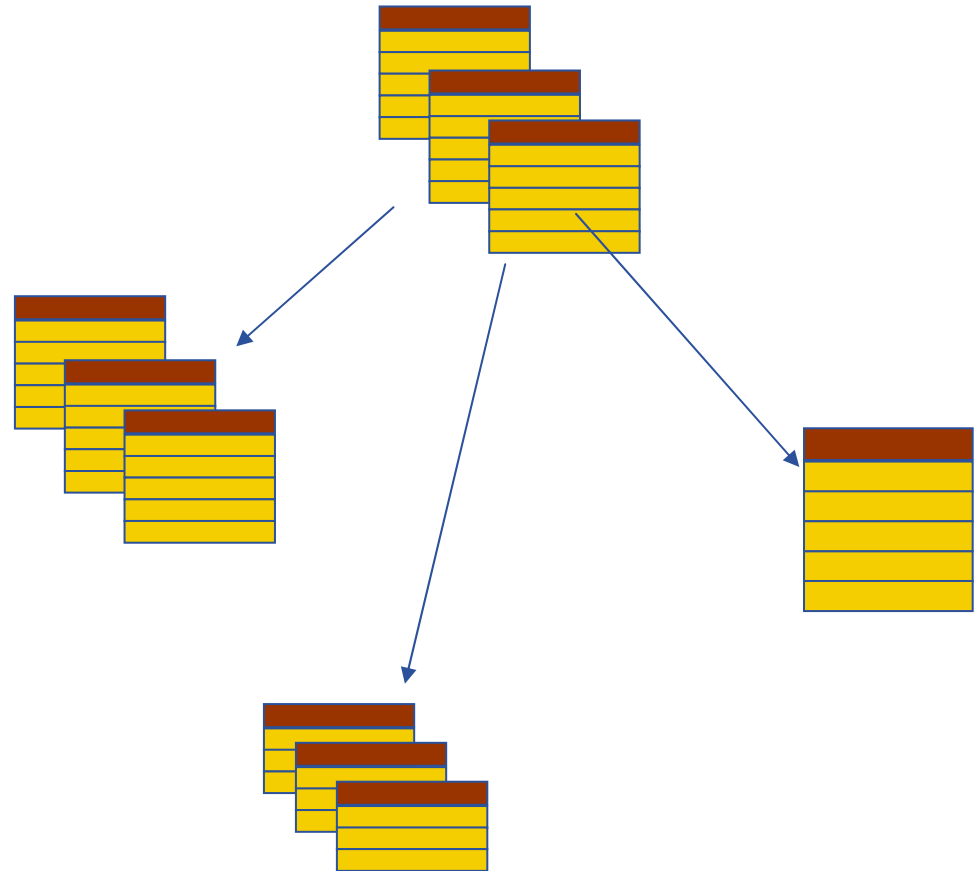
- glite-query-submit -h g.dse.mane -sql “select a from onetable where.. ;” -o gsiftp://se.name/tmp/out.dat
- glite-query -h g.dse.mane
 - > interactive usage.

- **Co-allocator: concurrently allocates more than one G-DSE**
- **Single SQL on multiple data**
- **Multiple SQL on same data**

```
> globus-job-submit -: g.dse.host/dbmanager-ODBC -queue PSQL.1
> globus-job-submit -: g.dse.host/dbmanager-ODBC -queue PSQL
"select a,b from table where a < 10;" -: g.dse2.host/dbmanager-
ODBC -queue PSQL "select a,b from table where a between 10 and
20;" -: g.dse.host3/dbmanager-ODBC -queue PSQL "select a,b from
table where a > 20;"
```



- **Scalability**
- **Reliability**
- **Two implementations:**
 - DB replica
 - Data replica
- **Performances**
 - SIMD
 - MIMD
- **Partial replica**



[Home page](#)



Web [Immagini](#) [Gruppi](#) [Directory](#) [News](#) [altro »](#)

My resource is an Astro DB

Cerca con Google

Mi sento fortunato

[Ricerca avanzata](#)

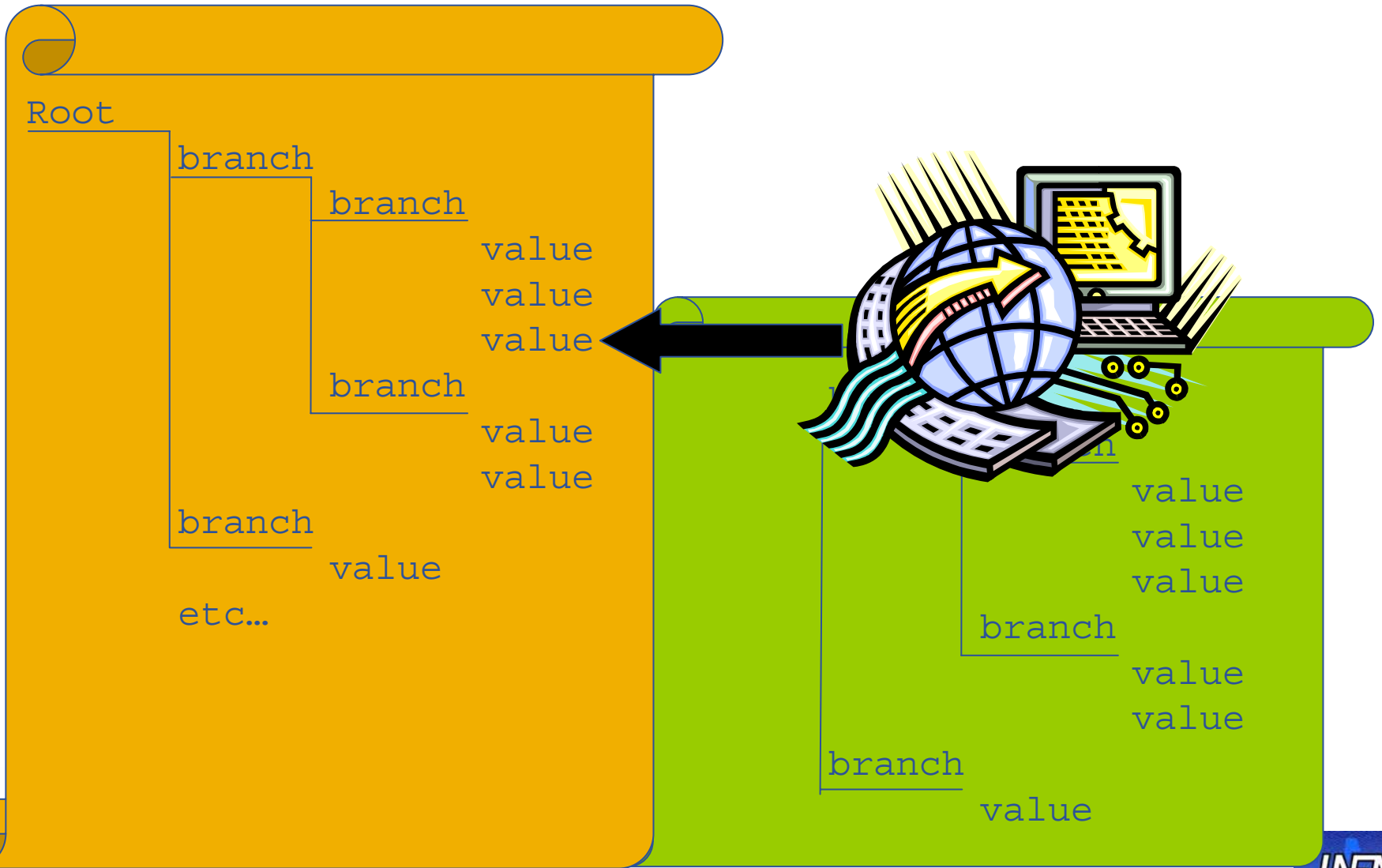
[Preferenze](#)

[Strumenti per le lingue](#)

Cerca: il Web pagine in Italiano pagine provenienti da: Italia

[Pubblicità](#) - [Soluzioni Aziendali](#) - [Tutto su Google](#) - [Google.com in English](#)

©2006 Google



```
> ldapsearch -LLL -x -H g.dse.host -b "mds-vo-
name=site,o=grid"
```

```
dn:GlueDSEUniqueID=g.dse.host:2119/dbmanager-ODBC, mds-vo-
name=local,o=grid
```

```
objectClass: GlueCETop
```

```
objectClass: GlueCE
```

```
objectClass: GlueDSE
```

```
objectClass: GlueDSETop
```

```
objectClass: GlueKey
```

```
GlueDSEName: TESTDB
```

```
GlueDSEStateStatus: Production
```

```
GlueDSEInfoLRMSType: Postgresql
```

```
GlueDSEInfoLRMSVersion:7.3
```

- G-DSE supports Data Source (DS) and DSE indexing, monitoring, management and recovery through a rich set of Meta-Data bound to standard GIS.
- DS have their core engine into G-DSE, that provides a framework for activity and task management.
- A RSL/JDL Transaction/Query permits a number of tasks to be specified, together with their parameters, inputs, outputs and control flow.
- The response to a request is generated by the GDSE within a JobQueryManager *Session*. The GDSE analyses incoming Task and conducts authentication and authorisation
- The standard Grid WorkLoad Manager constructs an optimised execution graph.
- GIS will monitor a DS's and DSE's status digest produced by its internal monitor.
- The GDSE has been designed to support dynamic configuration, sessions, transactions, recovery and concurrency.

Biomed	
Private	medinfo
Code	Code
Family_name	Occupation
Name	disease
Address	Hospital
Telephone	

```

> voms-proxy-init -voms gilda:/gilda/Role=gildaDBAdmin
Your Identity ...

> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 \
"CREATE TABLE Private (
    Code          integer NOT NULL,
    FamilyName    char(10) NOT NULL,
    Name          char(10) NOT NULL,
    Address       varchar(20) DEFAULT 'unknown',
    Telephone     varchar(20),
    PRIMARY KEY (Code) );"

> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 \
"CREATE TABLE medinf (
    Code          integer NOT NULL,
    Occupation    varchar(20),
    Disease       varchar(20) NOT NULL,
    Hospital      varchar(20) NOT NULL);"
    
```

```
> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 \  
  "INSERT INTO Private VALUES (...);  
- - -  
> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 \  
  "SELECT Private.familyname, Private.name,  
  medinfo.occupations, medinfo.disease FROM Private , medinfo  
  WHERE Private.code = medinfo.code ... ;"
```

```
-----  
| Family Name | Name | Work | Disease |  
-----  
| Rossi | Ugo | Ricercatore | gastrite |  
| etc .. |  
-----
```

```
> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 \  
"GRANT SELECT on medinfo to inafdbuser;
```

```
> globus-job-run g.dse.host/dbmanager-ODBC -queue PSQL1 \  
"CREATE VIEW flue AS SELECT Private.name, Private.Telephone  
WHERE medinfo.disease = 'flue';  
SELECT name from flue;  
START TRANSACTION; INSERT INTO Private VALUES (...); INSERT  
INTO medinfo VALUES (...); COMMIT;  
"
```

```
-----  
| Name      |  
-----  
| Bianchi  |  
| Rossi    |  
| Neri     |  
-----
```

The International Virtual Observatory Alliance (IVOA) was formed in June 2002 with a mission to *facilitate the international coordination and collaboration necessary for the development and deployment of the tools, systems and organizational structures necessary to enable the international utilization of astronomical archives as an integrated and interoperating virtual observatory.*



GRID

VO



- **No access to astronomical databases from the Grid middleware chosen for the GRID.IT project**
- **Some possible solutions evaluated (Spitfire, OGSA-DAI)**
- **A tight correlation between data access/management and computation of paramount importance within the Astronomical Community**

- **Astronomical Resources**
 - Catalogues & Archives structured in DB
 - Complex DBs
- **Astronomical Standards**
 - VOResource
 - VOTable
 - VOQL
 - SOAP
- **Computational Operations, statistical analysis etc on DataBases**
 - Ex. exploring the values at the extreme of some distribution can take 2 hours

- Any Astronomical DB is a Resource

```

<resource>
  <description>
  <info>
  <coosys>
  <param>
  <link>
  <table>
  <DATA>
</resource>
  
```

↓

```

<instrument>
<coverage>
  <spatial>
  <spectral>
    <bandpass>
    <central Wlength>
    <min Wlength>
    <max Wlength>
  </spectral>
</coverage>
<resolution> ...
  
```

- **Verify the ability of the GIS to act as VOTable**
- **Astronomical Resource XSD => Astronomical Resource GLUE;**
- **BDII ~= Registry**
- **VOQL (XML) query;**

BDII DB status

host/2119:dbmanager-ODBC-Lotar

branch

branch

value
value
value

branch

value
value

branch

value

etc...

```
GlueIVOAContactName=host/2119
GlueIVOAResourceTitle=
GlueIVOAResourceShortName=
GlueIVOAResourceCoverage=
GlueIVOAResourceCoverageSpectral=
...
```


- **New Grid services (RGMA,...)**
- **New Features on G-DSE**
- **May be integrated in the WMS**
- **G-DSE is going now to be installed in all sites within the VO INAF (extended tests of G-DSE within that VO in a short time).**
- **Bioinformatics**
- **ArcheoGrid**
- **G-DSE as FileStorage (some tests done...)**
- **Instruments...**

End of Presentation

Thank you for your attention

