



Enabling Grids for E-science

EGEE Middleware: gLite Information Systems (IS)

EGEE Tutorial

GridAsia 2007, Singapore

June 5, 2007

www.eu-egee.org

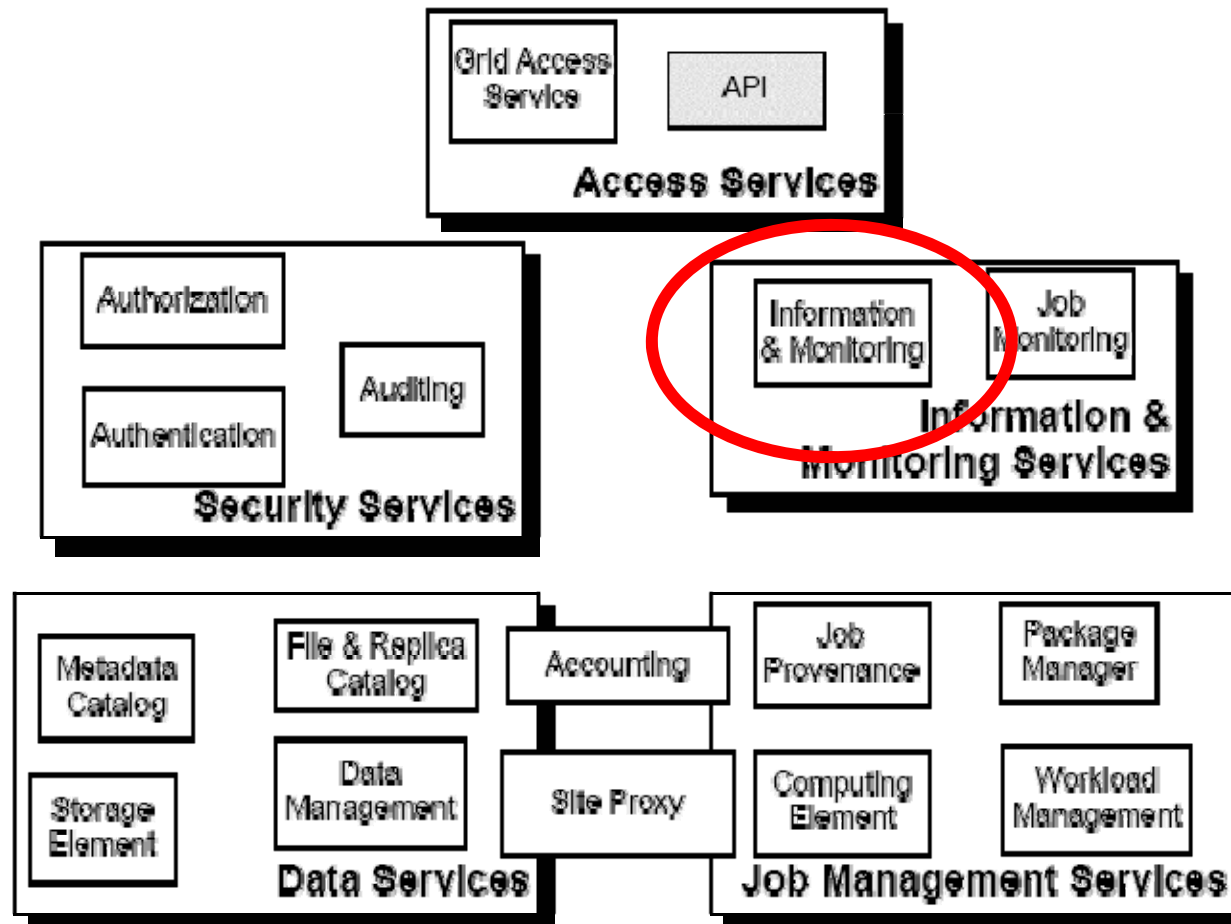


Information Society



- **Introduction**
- **LDAP**
- **Glue Schema**
- **Architecture**
 - Components
 - Relationship
- **Practical**
 - Querying Information System

Overview of gLite Middleware



Service Discovery

What resources are available to the Grid?

- Computing resources
- Storage resources
- Site and Services

What is their current status?

If you are a user

Retrieve information about resources

- where you can run your job?
- where you can copy your files?

If you are a middleware developer

Workload Management System:

Matching job requirements and Grid resources

Monitoring Services:

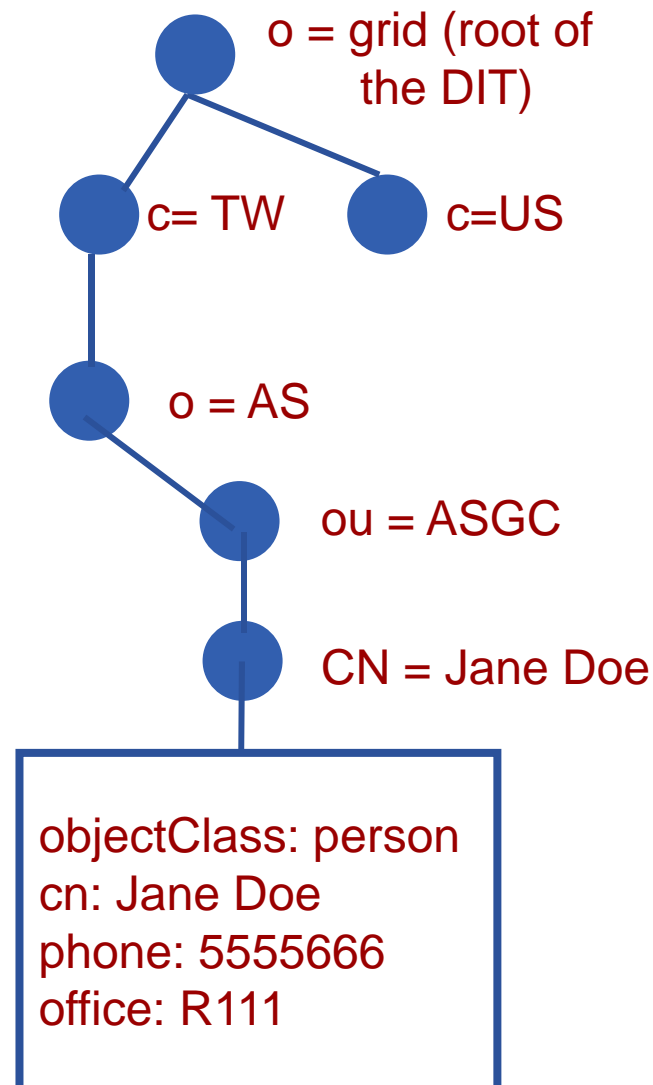
Retrieving information about Grid Resources status and availability

If you are site manager or service

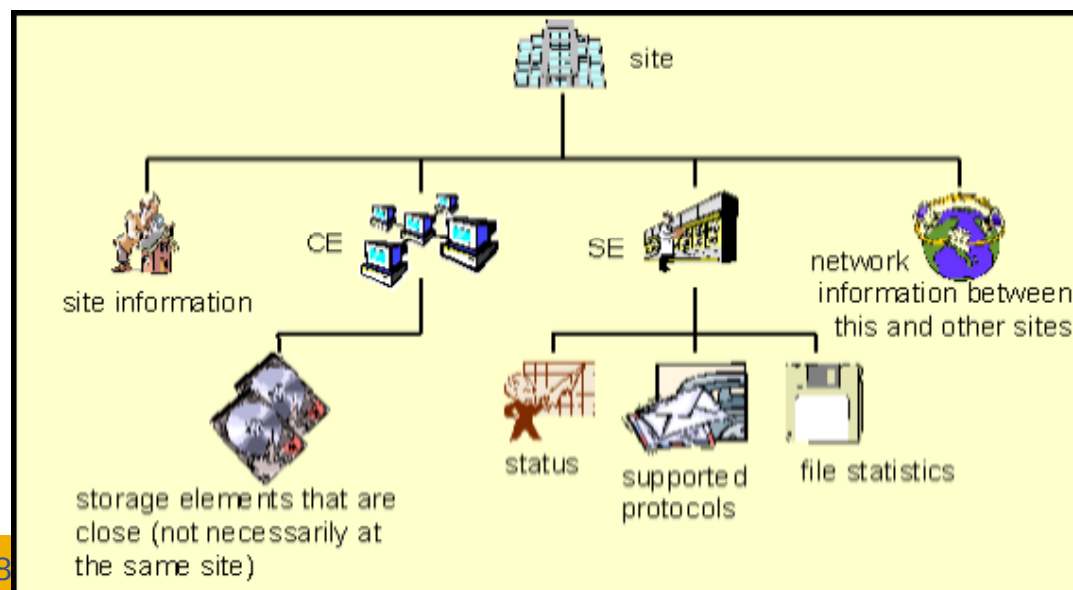
You “publish” the information about the services you provide.

- **gLite adopted the Globus Monitoring and Discovery Service (MDS) architecture as it's Information System**
- **The build blocks include**
 - LDAP protocol as the access protocol
 - Glue Schema to define the format and information
- **Architecture and Components**
 - GRIS
 - GIIS
 - BDII

- Specialized service for reading, browsing and searching for information
 - Consists of **entries** that describe objects
 - **with associated attributes and values**
 - Organizes entries as a **tree**: Directory Information Tree (DIT)
 - Following a path from the node back to the root of the DIT
 - **Distinguished Name (DN) is built**
 - **Uniquely identifier for entry**
- `"cn=Jane Doe,ou=ASGC,o=AS,c=TW,o=grid"`



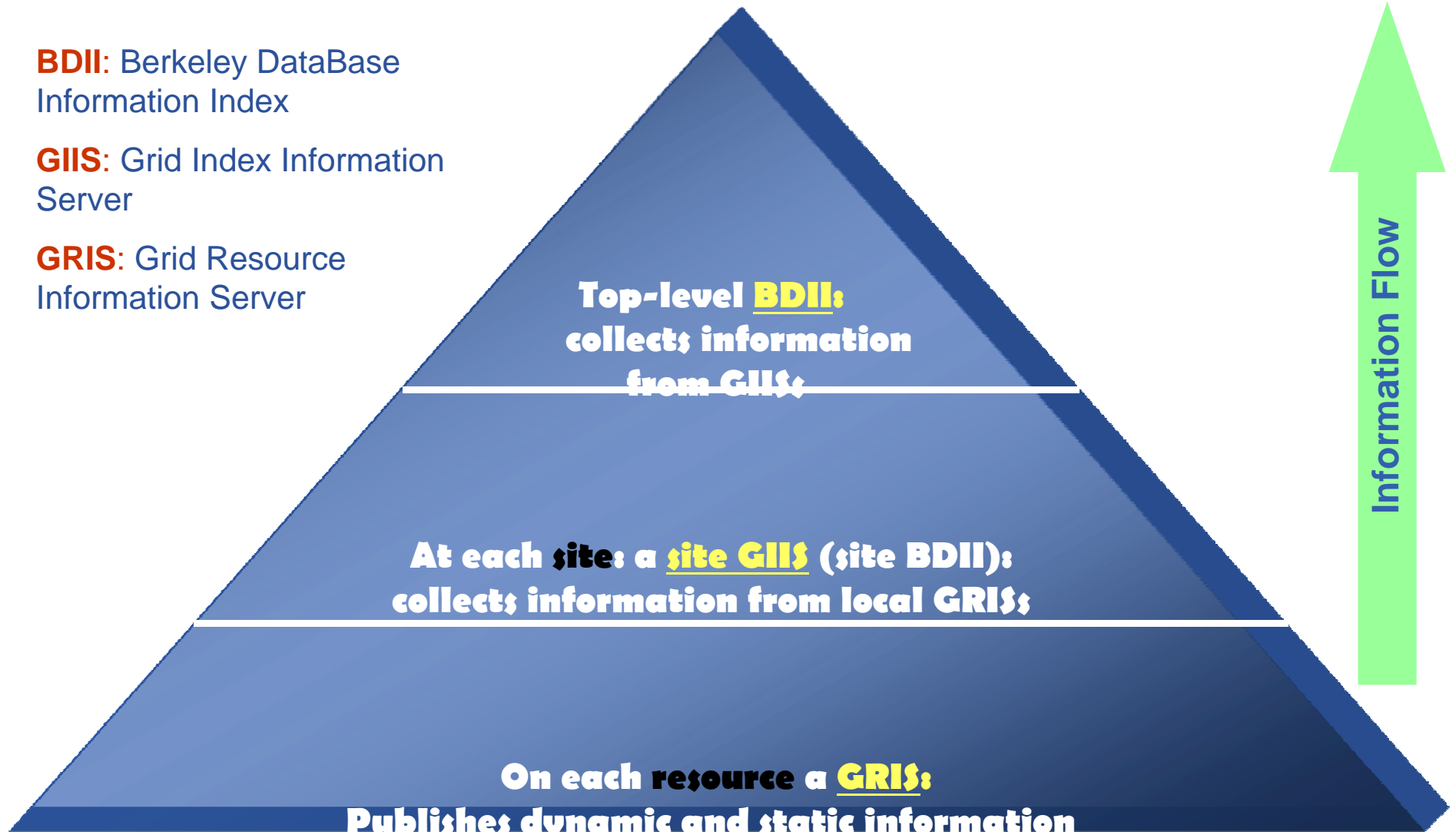
- The data published in the Information System (IS) conforms to the GLUE Schema.
- **GLUE Schema** is a common conceptual data model to describe Grid resources and defines:
 - **Structure of DIT: Hierarchy**
 - **Entries and attributes**
 - **Description of entries/attributes**
 - <http://glueschema.forge.cnaf.infn.it/>

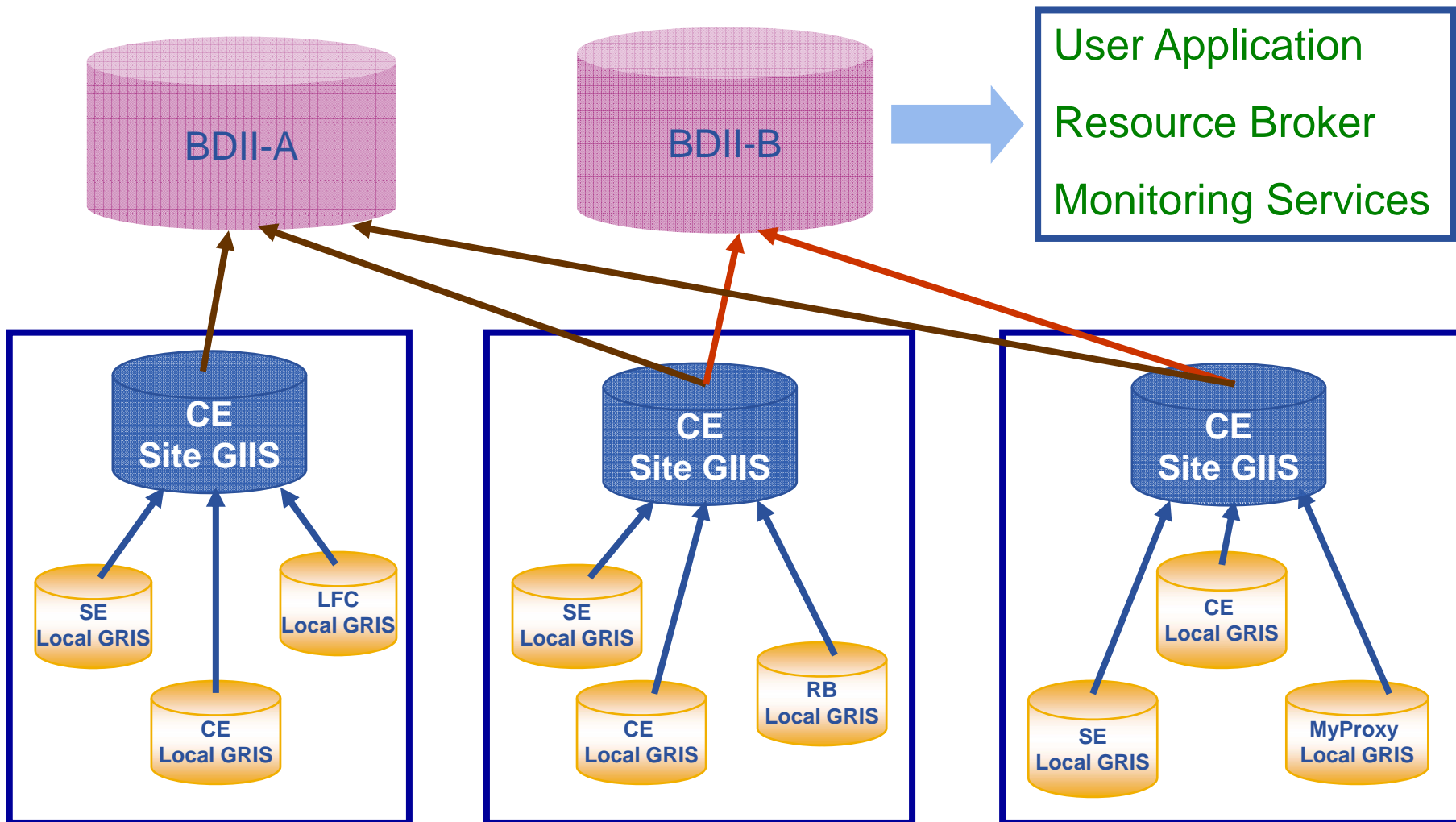


BDII: Berkeley DataBase Information Index

GIIS: Grid Index Information Server

GRIS: Grid Resource Information Server

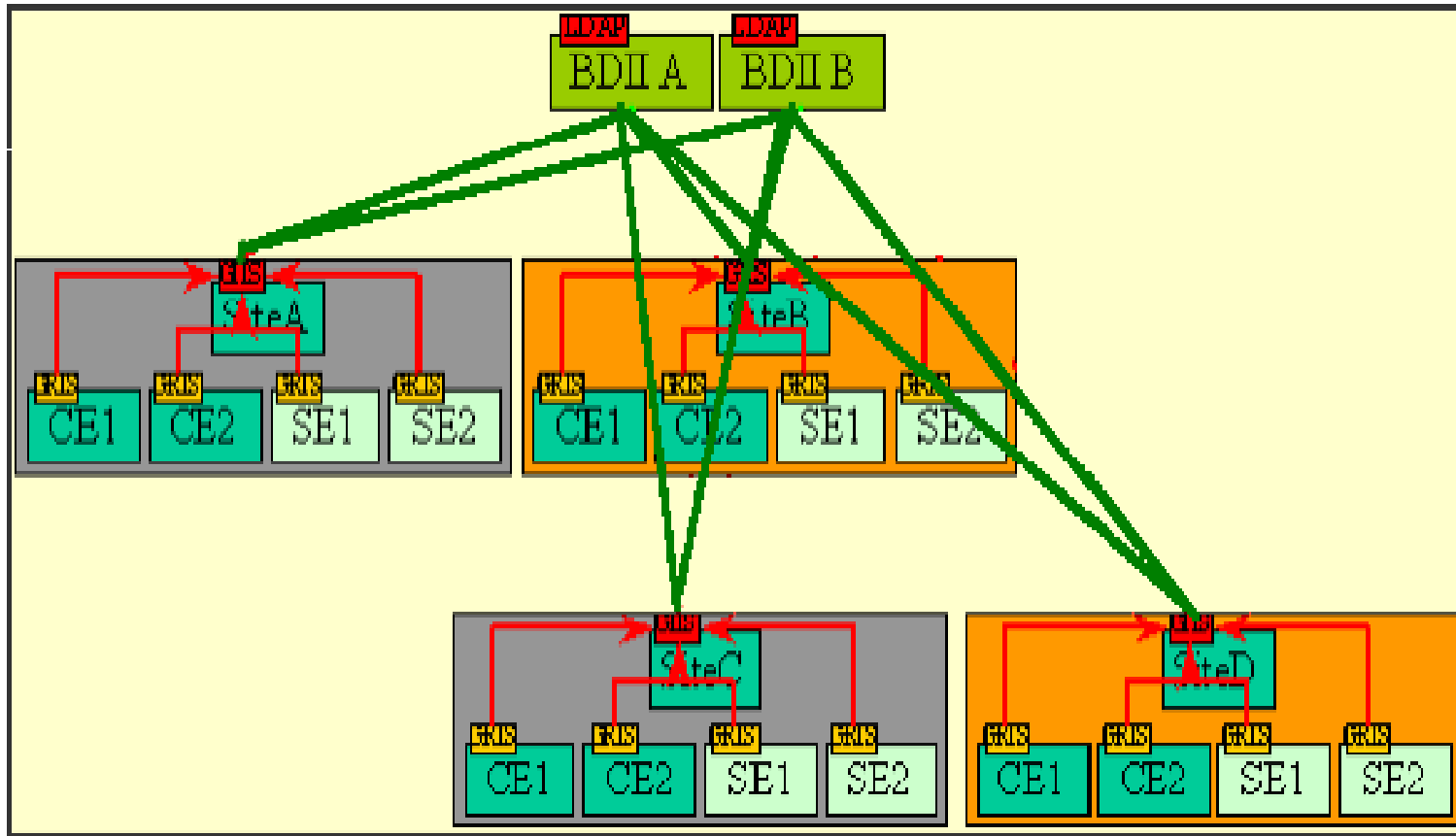




Two sets of commands:

- **lcg-infosites**: simple, meets most needs
- **lcg-info**: supports more complex queries

- a user or a service can query
 - the BDI (usual mode)
 - LDAP servers on each site or resource



ce	The information related to number of CPUs, running jobs, waiting jobs and names of the CEs are provided. All these data group all VOs together. With "-v 1" only the names of the queues will be printed while with "-v 2" The RAM Memory together with the operating system and its version and the processor included in each CE are printed.
se	The names of the SEs supported by the user's VO together with the kind of Storage System, the used and available space will be printed. With "-v 1" only the names of the SEs will be printed.
closeSE	The names of the CEs where the user's VO is allowed to run together with their corresponding closest SEs are provided.
lfc	Name of the lfc Catalog for the user's VO.
tag	The names of the tags relative to the software installed in site is printed together with the corresponding CE.
all	It groups together the information provided by ce, se, lrc and rmc.
is	If not specified the BDII defined in default by the variable LCG GFAL INFOSYS will be queried. However the user may want to query any other BDII without redefining this environment variable. This is possible specifying this argument followed by the name of the BDII which the user wants to query. All options admits this argument.

- **This introduces use of the commands to access the information system**
- **You will be exploring the GILDA grid, seeing what computing elements and storage elements exist.**
- **Please go to the link for this practical.**

This is an entry; collection of attributes. It's defined by a unique DN (Distinguished Name)

```

dn: <distinguished name>
objectclass:<objectclassname>
<attributetype>:<attributevalue>
<attributetype>:<attributevalue>

dn: <distinguished name>
objectclass:<objectclassname>
<attributetype>:<attributevalue>
<attributetype>:<attributevalue>
    
```

Objectclass: attribute

- specifies which object class this entry belongs to
- specifies what attributes may or must be defined
- can be used to filter entries

White space to separate entries from each other

The information is imported and exported by **LDIF files** (LDAP Data Interchange Format) shown above

Entries, attributes and objectclass names is defined by a **schema**

Object classes for CE

- **Base Class for the CE information** (objectclass: GlueCETop)
 - No attributes

- **CE** (objectclass: GlueCE)
 - **GlueCEUniqueID**: unique identifier for the CE
 - **GlueCEName**: human-readable name of the service

- **CE Status** (objectclass: GlueCEState)
 - **GlueCEStateRunningJobs**: number of running jobs
 - **GlueCEStateWaitingJobs**: number of jobs not running
 - **GlueCEStateTotalJobs**: total number of jobs (running + waiting)
 - **GlueCEStateStatus**: queue status:
 - queuing (jobs accepted but not running)
 - production (jobs accepted and run)
 - closed (neither accepted nor run)
 - draining (jobs not accepted but those already queued are running)
 - **GlueCEStateWorstResponseTime**: worst possible time between the submission of the job and the start of its execution

--list-attrs	Prints a list of the attributes that can be queried.
--list-ce	Lists the CEs which satisfy a query, or all the CEs if no query is given.
--list-se	Lists the SEs which satisfy a query, or all the SEs if no query is given.
--query	Restricts the output to the CEs (SEs) which satisfy the given query.
--bdii	Allows to specify a BDII in the form <code>[:]</code> . If not given, the value of the environmental variable <code>LCG_GFAL_INFOSYS</code> is used. If that is not defined, the command returns an error.
--sed	Print the output in a "sed-friendly" format.
--attrs	Specifies the attributes whose values should be printed.
--vo	Restricts the output to CEs or SEs where the given VO is authorized. Mandatory when VO-dependent attributes are queried upon.

\$ lcg-info --list-attrs

Attribute name Glue object class

Glue attribute name

MaxTime	GlueCE	GlueCEPolicyMaxWallClockTime
CEStatus	GlueCE	GlueCEStateStatus
TotalJobs	GlueCE	GlueCEStateTotalJobs
CEVOs	GlueCE	GlueCEAccessControlBaseRule
TotalCPUs	GlueCE	GlueCEInfoTotalCPUs
FreeCPUs	GlueCE	GlueCEStateFreeCPUs
CE	GlueCE	GlueCEUniqueID
WaitingJobs	GlueCE	GlueCEStateWaitingJobs
RunningJobs	GlueCE	GlueCEStateRunningJobs
CloseCE	GlueCESEBindGroup	GlueCESEBindGroupCEUniqueID
CloseSE	GlueCESEBindGroup	GlueCESEBindGroupSEUniqueID
SEVOs	GlueSA	GlueSAAccessControlBaseRule
UsedSpace	GlueSA	GlueSAStateUsedSpace
AvailableSpace	GlueSA	GlueSAStateAvailableSpace
Type	GlueSE	GlueSEType
SE	GlueSE	GlueSEUniqueID
Protocol	GlueSEAccessProtocol	GlueSEAccessProtocolType
ArchType	GlueSL	GlueSLArchitectureType
Processor	GlueSubCluster	GlueHostProcessorModel
OS	GlueSubCluster	GlueHostOperatingSystemName
Cluster	GlueSubCluster	GlueSubClusterUniqueID
Tag	GlueSubCluster	GlueHostApplicationSoftwareRunTimeEnvironment
Memory	GlueSubCluster	GlueHostMainMemoryRAMSize



List all the CE(s) that can run MPICH, giving the number of free CPUs and the tags of installed software

```
$ lcg-info --vo gilda --list-ce --query 'Tag=MPICH' --attrs 'FreeCPUs,Tag'
```

• Careful here!

• No space allowed here!

```
-.....
CE: grid-ce.bio.dist.unige.it:2119/jobmanager-lcgpbs-long
- FreeCPUs      6
- Tag           LCG-2
                LCG-2_1_0
                LCG-2_1_1
....
```



- **GridICE**

- <http://infnforge.cnaf.infn.it/gridice/index.php/Main/GridICEWork>
- Select a URL for GILDA
 - VO view (menu)
 - Select GILDA (column, far left)
 - Charts
- Try also for LCG

- **GStat**

- <http://goc.grid.sinica.edu.tw/gstat/>
- Checks health of Information System at each site

- **Real Time Monitoring**

- <http://gridportal.hep.ph.ic.ac.uk/rtm/>
- Not using standard EGEE middleware interfaces
- its requires access to RB Logging and Bookkeeping services