



Enabling Grids for E-scienceE

The gLite Information System

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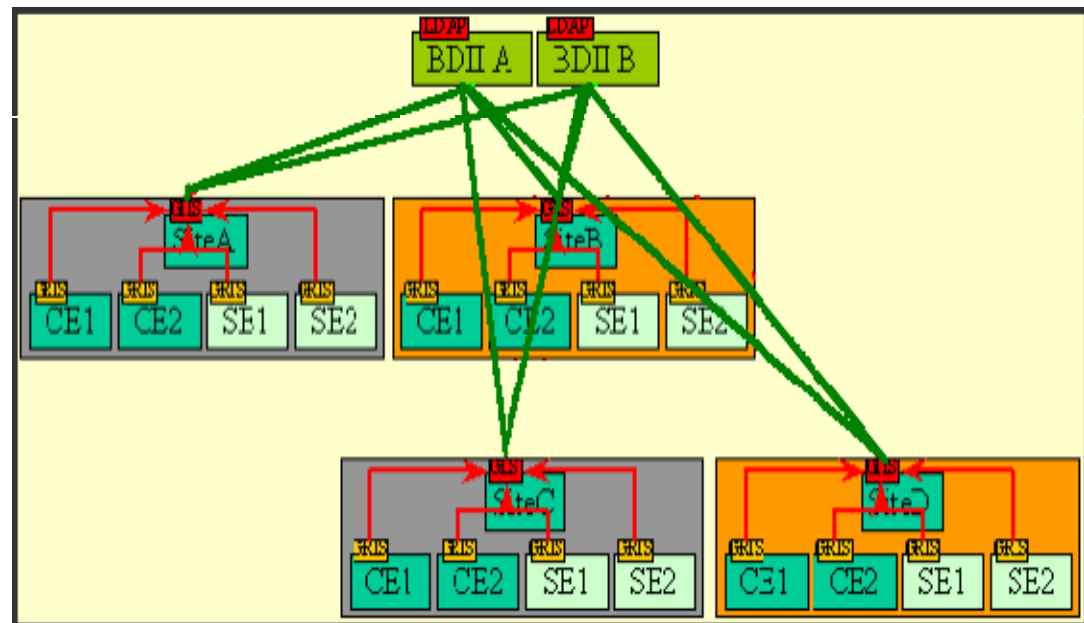


How to discover resources ?

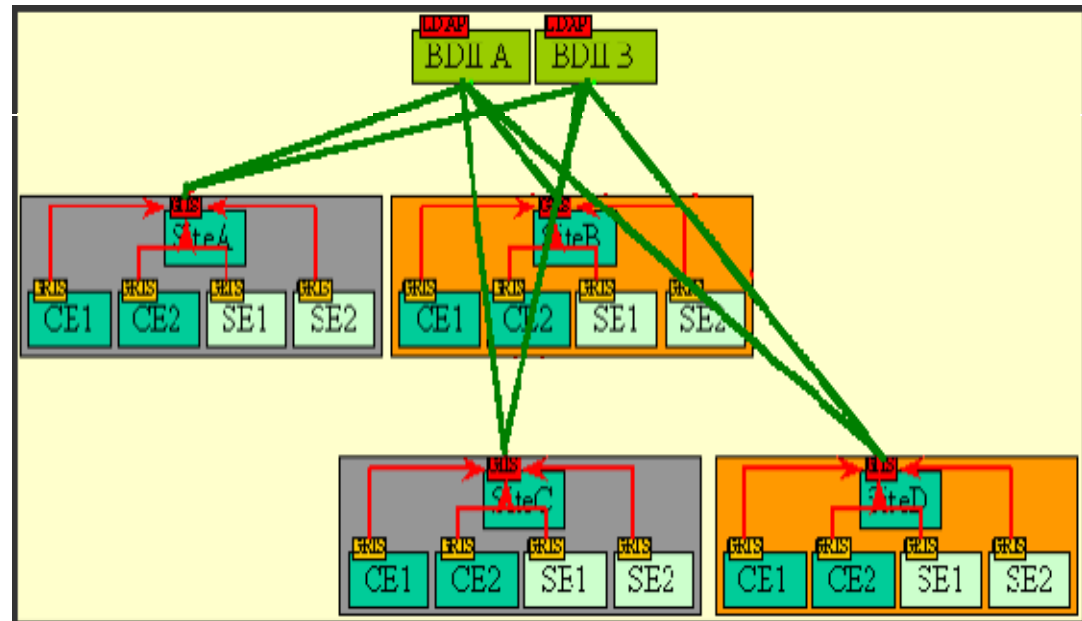
- Once an user is logged into an User Interface (s)he is ready to take advantage of the Grid Power for his/her own application.
- But what are the available resources to accomplish his/her tasks?
- The answer to this question comes through the interactions with the **Information System (IS)**.
- The Information System (IS) provides information about the LCG-2 Grid resources and their status.

- The data published in the IS conforms to the **GLUE** (Grid Laboratory for a Uniform Environment) Schema. The **GLUE Schema** aims to define a common conceptual data model to be used for Grid resources
- In LCG-2, the *BDII* (*Berkeley DB Information Index*), based on an updated version of the **Monitoring and Discovery Service (MDS)**, was adopted as main provider of the Information Service
- In gLite, *R-GMA* (*Relational Grid Monitoring Architecture*) is adopted as IS

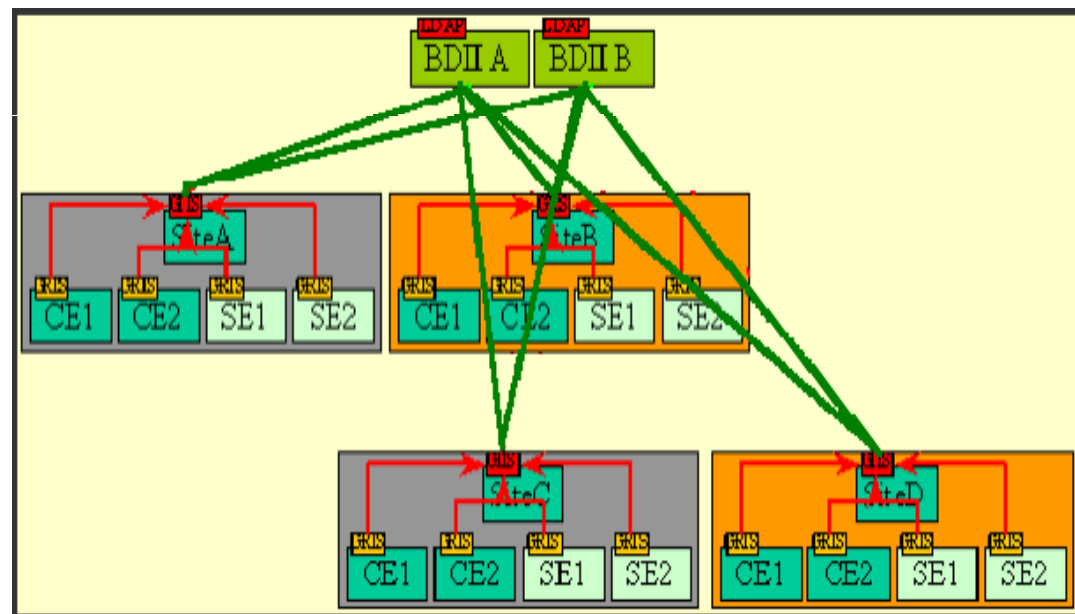
- Computing and storage resources at a site implement an entity called **Information Provider**, which generates the relevant information of the resource (e.g.: the used space in a SE).
- This information is published by the **Grid Resource Information Servers**, or GRISes.



- In each site an element called the **Site Grid Index Information Server (GIIS)** collects all the information of the different GRISes and publishes it.
- This **BDII** queries the GIISes and acts as a cache, storing information about the Grid status in its database.



- Querying the BDII a user or a service has all the available information about the status of the grid resources.
- Moreover in order to get more up-to-date information it is possible to querying directly the GISes or GRISes.



- The local GRISes runs on Computing Elements and Storage Elements and reports information on the characteristics and status of the services.
 - They give both static and dynamic information.

- In order to interrogate the GRIS on a specific Grid Element
 - the *hostname* (**- h**) of the Grid Element and the *TCP port* where the GRIS run must be specified (**- p**).
 - Port is always 2135.
 - **- x** option indicates that simple authentication should be used;
 - **- b** option is used to specify the initial entry from which starts the search in the LDAP tree.

E.g.: `$ ldapsearch -x -h <hostname>`
`-p 2135`
`-b "mds-vo-name=local, o=grid"`

or

`$ ldapsearch -x -H <LDAP_URI>`
`-b "mds-vo-name=local, o=grid"`

- The command used to interrogate the GRIS located on host `lxn1181.cern.ch` is:

```
$ ldapsearch -x
```

```
-h lxn1181.cern.ch
```

```
-p 2135
```

```
-b "mds-vo-name=local, o=grid"
```

or:

```
$ ldapsearch -x
```

```
-H ldap://lxn1181.cern.ch:2135
```

```
-b "mds-vo-name=local, o=grid"
```

```

version: 2
#
# filter: (objectclass=*)
# requesting: ALL
#

# lxn1181.cern.ch/siteinfo, local, grid
dn: in=lxn1181.cern.ch/siteinfo,Mds-Vo-name=local,o=grid
objectClass: SiteInfo
objectClass: DataGridTop
objectClass: DynamicObject
siteName: CERN-LCG2
sysAdminContact: hep-project-grid-cern-testbed-managers@cern.ch
userSupportContact: hep-project-grid-cern-testbed-managers@cern.ch
siteSecurityContact: hep-project-grid-cern-testbed-managers@cern.ch
dataGridVersion: LCG-2_0_0beta
installationDate: 20040106120000Z

[...]
```

- At each site, a Site GII collects information about all resources coming from all the GRISes.
- Usually a site GII runs on a Computing Element.
- In order to interrogate the Site GII
 - the *hostname* (- **h**) of the Grid Element and the *TCP port* where the GII run must be specified (- **p**).
 - Port is always 2135.
 - - **x** option indicates that simple authentication should be used;
 - - **b** option is used to specify the initial entry from which starts the search in the LDAP tree.
 - A different base name must be used !

- The command used to interrogate the Site GIIIS located on lcgce02.ifae.es is:

```
$ ldapsearch -x
```

```
-H ldap://lcgce02.ifae.es:2170
```

```
-b "mds-vo-name=piclcg2,o=grid"
```

```

version: 2
#
# filter: (objectclass=*)
# requesting: ALL
#
# https://edt003.cnaf.infn.it:7772, infn-cnaf, grid
dn: GlueServiceURI=https://edt003.cnaf.infn.it:7772,Mds-Vo-
    name=infn-cnaf,o=gr
id
objectClass: GlueService
objectClass: GlueSchemaVersion
GlueServiceURI: https://edt003.cnaf.infn.it:7772
GlueServiceAccessPointURL: https://edt003.cnaf.infn.it:7772
GlueServiceType: ResourceBroker
GlueServicePrimaryOwnerName: LCG
GlueServicePrimaryOwnerContact: mailto:sitemanager@cnaf.infn.it
GlueServiceHostingOrganization: INFN-CNAF
GlueServiceMajorVersion: 1
GlueServiceMinorVersion: 00
[...]

```

- In order to query directly the IS elements two high level tools are provided.

lcg-infosites

lcg-info

- These tools should be enough for most common user needs and will usually avoid the necessary of raw LDAP queries.

- The **lcg-infosites** command can be used as an easy way to retrieve information on Grid resources for the most use cases.

USAGE: lcg-infosites --vo <vo name> options -v <verbose level> --is <BDII to query>

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.


```
$ lcg-infosites --vo gilda ce
```

```
*****
```

These are the related data for gilda: (in terms of queues and CPUs)

```
*****
```

#CPU	Free	Total Jobs	Running	Waiting	ComputingElement
4	3	0	0	0	cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-long
4	3	0	0	0	cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-short
34	33	0	0	0	grid010.ct.infn.it:2119/jobmanager-lcgpbs-long
16	16	0	0	0	grid011f.cnaf.infn.it:2119/jobmanager-lcgpbs-long
1	1	0	0	0	grid006.cecalc.ula.ve:2119/jobmanager-lcgpbs-log
2	1	1	0	1	gildace.oact.inaf.it:2119/jobmanager-lcgpbs-short
[..]					

```
$ lcg-infosites --vo gilda ce --v 2
```

RAMMemory	Operating System	System Version	Processor	CE Name
1024	SLC	3	P4	ced-ce0.datagrid.cnr.it
4096	SLC	3	Xeon	cn01.be.itu.edu.tr
1024	SLC	3	PIII	cna02.cna.unicamp.br
917	SLC	3	PIII	gilda-ce-01.pd.infn.it
1024	SLC	3	Athlon	gildace.oact.inaf.it
1024	SLC	3	Xeon	grid-ce.bio.dist.unige.it
[..]				



```
$ lcg-infosites --vo gilda se
```

```
*****
```

These are the related data for gilda: (in terms of SE)

```
*****
```

Avail Space(Kb)	Used Space(Kb)	Type	SEs
143547680	2472756	disk	cn02.be.itu.edu.tr
168727984	118549624	disk	grid009.ct.infn.it
13908644	2819288	disk	grid003.cecalc.ula.ve
108741124	2442872	disk	gildase.oact.inaf.it
28211488	2948292	disk	testbed005.cnaf.infn.it
349001680	33028	disk	gilda-se-01.pd.infn.it
31724384	2819596	disk	cna03.cna.unicamp.br
387834656	629136	disk	grid-se.bio.dist.unige.it



```
$ lcg-infosites --vo gilda closeSE
```

Name of the CE: cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-long

Name of the close SE: cn02.be.itu.edu.tr

Name of the CE: cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-short

Name of the close SE: cn02.be.itu.edu.tr

Name of the CE: grid010.ct.infn.it:2119/jobmanager-lcgpbs-long

Name of the close SE: grid009.ct.infn.it

Name of the CE: grid011f.cnaf.infn.it:2119/jobmanager-lcgpbs-long

Name of the close SE: testbed005.cnaf.infn.it



```
$ lcg-infosites --vo gilda tag
```

```
*****
```

Information for gilda relative to their software tags included in each CE

```
*****
```

Name of the TAG: VO-gilda-GEANT
Name of the TAG: VO-gilda-GKS05
Name of the CE:cn01.be.itu.edu.tr

Name of the TAG: VO-gilda-slc3_ia32_gcc323
Name of the TAG: VO-gilda-CMKIN_5_1_1
Name of the TAG: VO-gilda-GEANT
Name of the TAG: VO-gilda-GKS05
Name of the CE:grid010.ct.infn.it

[..]



- This command can be used to list either CEs or the SEs that satisfy a given set of conditions, and to print the values of a given set of attributes.
- The information is taken from the BDII specified by the **LCG_GFAL_INFOSYS** environment variable.

- The query syntax is like this:

attr1 op1 valueN, ...
attrN opN valueN

After the upgrading of the new GLUE SCHEMA it's not possible use the operators '>' and '<'

where *attrN* is an attribute name

op is =, >= or <=, and the cuts are ANDed.

The cuts are comma-separated and spaces are not allowed.

USAGE

lcg-info --list-ce [--bdii bdii] [--vo vo] [--sed] [--query query] [--attrs list]

lcg-info --list-se [--bdii bdii] [--vo vo] [--sed] [--query query] [--attrs list]

lcg-info --list-attrs

lcg-info --help

--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) in the BDII satisfying given conditions

```
$ lcg-info --list-ce --query 'TotalCPUs=10,OS=SL*' --attrs
  'RunningJobs,FreeCPUs'
```

- CE: dgt01.ui.savba.sk:2119/jobmanager-lcgpbs-long
 - RunningJobs 0
 - FreeCPUs 10

 - CE: dgt01.ui.savba.sk:2119/jobmanager-lcgpbs-short
 - RunningJobs 0
 - FreeCPUs 10

 - CE: dgt01.ui.savba.sk:2119/jobmanager-lcgpbs-infinite
 - RunningJobs 1
 - FreeCPUs 10

 - CE: gilda-ce-01.pd.infn.it:2119/jobmanager-lcgpbs-long
 - RunningJobs 0
 - FreeCPUs 10

 - CE: grid011f.cnaf.infn.it:2119/jobmanager-lcgpbs-gilda
 - RunningJobs 0
 - FreeCPUs 10
- [..]



```
$ lcg-info --list-ce --query 'CE=*grid-ce.bio.dist.unige.it*'
--attrs 'Tag'
```

PBS
INFN
LCG-2
LCG-2_1_0
LCG-2_1_1
LCG-2_2_0
LCG-2_3_0
LCG-2_3_1
LCG-2_4_0
R-GMA
AFS
CMS-1.1.0
ATLAS-6.0.4
GATE-1.0.0-3
LHCb-1.1.1
IDL-5.4
CMSIM-125
ALICE-4.01.00
ALIEN-1.32.14
POVRAY-3.5
DEMTTOOLS-1.0

CMKIN-VALID
CMKIN-1.1.0
CMSIM-VALID
CSOUND-4.13
MPICH
VIRGO-1.0
CMS-OSCAR-2.4.5
LHCb_dbase_common-v3r1
GEANT4-6
VLC-0.7.2
EGEODE-1.0
RASTER3D
SCILAB-2.6
G95-3.5.0
MAGIC-6.19
CODESA3D-1.0
VO-gilda-slc3_ia32_gcc323
VO-gilda-CMKIN_5_1_1
VO-gilda-GEANT
VO-gilda-GKS05



```
$ lcg-info --vo gilda --list-ce --query
  `Tag=*MPICH*` --attrs `CE`
```

- CE: cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-long
- CE cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-long

- CE: cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-short
- CE cn01.be.itu.edu.tr:2119/jobmanager-lcglsf-short

- CE: grid010.ct.infn.it:2119/jobmanager-lcgpbs-long
- CE grid010.ct.infn.it:2119/jobmanager-lcgpbs-long

- CE: grid011f.cnaf.infn.it:2119/jobmanager-lcgpbs-long
- CE grid011f.cnaf.infn.it:2119/jobmanager-lcgpbs-long

- CE: ced-ce0.datagrid.cnr.it:2119/jobmanager-lcgpbs-long
- CE ced-ce0.datagrid.cnr.it:2119/jobmanager-lcgpbs-long

[..]



```
$ lcg-info --vo gilda --list-se --query  
  'AvailableSpace=912356260' --attrs 'CloseCE'
```

- SE: grid005.iucc.ac.il
- CloseCE grid004.iucc.ac.il:2119/jobmanager-lcglsf-long
 grid004.iucc.ac.il:2119/jobmanager-lcglsf-short
 grid004.iucc.ac.il:2119/jobmanager-lcglsf-infinite



LCG-2 User Guide Manual Series

<https://edms.cern.ch/file/454439/LCG-2-UserGuide.html>

