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[?GridWay](#) is an open-source component for meta-scheduling in the Grid. GridWay gives end users, application developers and managers of Grid infrastructures a scheduling functionality. It is completely functional on [?Gisela](#), being able to interface with the computing, file transferring and information services available within the Gisela infrastructure. GridWay does not intend to substitute the resource brokers available in the Gisela distribution, but to provide a meta-scheduling alternative with greater functionality and higher performance for given application profiles.

## Installation on an UI

### Required Middleware

The following middlewares should be installed to use the corresponding drivers:

- Globus Toolkit 4 or 5
- gLite UI 3.1 (GRAM2-based)
- gLite UI 3.2 (CREAM-based)

### Download

Our **GridWay-5.7** version has **GT2**, **CREAM** and **DRM4G** drivers for **x86\_64** architecture

Download [GridWay?](#) (i. e. on your HOME directory) compatible with Linux Kernel 2.6.x or superior:

```
[user@ui~]$ wget http://www.meteo.unican.es/work/DRM4G/drm4g_gridway_x86_64_r1087.zip
```

1. Unzip the distribution file:

```
[user@ui~]$ unzip drm4g_gridway_x86_64_r1087.zip
```

### Environment Configuration

Set up the environment variables "GW\_LOCATION" and "PATH" for GridWay.

```
[user@ui~]$ export GW_LOCATION=$HOME/drm4g_gridway
[user@ui~]$ export PATH=$GW_LOCATION/bin:$PATH
```

And set up the enviroment for **Gisela**:

Create a file (i.e. *gilesa.sh*) with these variables:

```
export LCG_CATALOG_TYPE=lfc
export LFC_HOST=lfc.eela.ufrj.br
export LCG_GFAL_INFOSYS=bdii.eela.ufrj.br:2170
export LFC_HOME=/grid/prod.vo.eu-eela.eu
export VO="prod.vo.eu-eela.eu"
```

- Evaluate the file.

```
[user@ui~]$ source gilesa.sh
```

### Available Resources

[?lcg-infosites](#) command can be used to obtain VO information on Grid resources. Before using *lcg-infosites* you have to [evaluate gilsela.sh](#) file for Gisela Infrastructure. Some using examples are showed below:

- Find out the CEs of your VO:

```
[user@ui-1]$ lcg-infosites --vo $VO ce
#CPU    Free    Total Jobs    Running Waiting ComputingElement
-----
 16      16      0              0        0    gantt.cefet-rj.br:8443/cream-pbs-prod
21561    0      3409           7        3402  ce206.cern.ch:8443/cream-lsf-grid_eela
21561    826    3409           7        3402  ce204.cern.ch:8443/cream-lsf-grid_eela
21561    826    3409           7        3402  ce203.cern.ch:8443/cream-lsf-grid_eela
21561    0      3409           7        3402  ce205.cern.ch:8443/cream-lsf-grid_eela
21561    826    3409           7        3402  ce208.cern.ch:8443/cream-lsf-grid_eela
21561    0      3409           7        3402  ce207.cern.ch:8443/cream-lsf-grid_eela
21561    826    3409           7        3402  ce130.cern.ch:2119/jobmanager-lcglsf-grid_eela
21561    826    3409           7        3402  ce132.cern.ch:2119/jobmanager-lcglsf-grid_eela
21561    826    3409           7        3402  ce131.cern.ch:2119/jobmanager-lcglsf-grid_eela
21561    826    3409           7        3402  ce133.cern.ch:2119/jobmanager-lcglsf-grid_eela
260     107      4              4         0    ce01-tic.ciemat.es:2119/jobmanager-lcgpbs-prod_eela
1160    467      0              0         0    gridgate.cs.tcd.ie:2119/jobmanager-pbs-sixhour
1160    467      0              0         0    gridgate.cs.tcd.ie:2119/jobmanager-pbs-thirtym
1160    467      5              4         1    gridgate.cs.tcd.ie:2119/jobmanager-pbs-threeday
1160    467      2              2         0    gridgate.cs.tcd.ie:2119/jobmanager-pbs-oneday
 10      10      0              0         0    ce01.unlp.edu.ar:2119/jobmanager-lcgpbs-long
.....
```

- Find out CE list with running jobs, free cpus, and maximum wallclock and CPU time.

```
[user@ui-1]$ lcg-info --vo $VO --list-ce --attrs RunningJobs,FreeCPUs,MaxWCTime,MaxCPUtime
- CE: axon-g01.ieeta.pt:2119/jobmanager-lcgpbs-prod
- RunningJobs      0
- FreeCPUs         5
- MaxWCTime        4320
- MaxCPUtime       2880

- CE: cale.uniandes.edu.co:8443/cream-pbs-prod
- RunningJobs      3
- FreeCPUs         94
- MaxWCTime        4320
- MaxCPUtime       2880
.....
```

- Find out the SEs of your VO.

```
[user@ui-1]$ lcg-infosites --vo $VO se
Avail Space(Kb) Used Space(Kb) Type    SEs
-----
1258363960      8651392      n.a    se.labmc.inf.utfsm.cl
288012854      11517683563  n.a    lnx097.eela.if.ufrj.br
187037782      27605724     n.a    se01.macc.unican.es
```

For more information you could execute `lcg-infosites --help` or see [?gLite information](#)

## Configuration to access to Gisela Resources

Next steps describe an specific configuration of the drivers for Gisela infrastructure.

In file "\$GW\_LOCATION/etc/gwd.conf":

```
# Example GT2
IM_MAD = glisela_gt2:gw_im_mad_mds2_glue-bdii:-l etc/gt2.list -g (GlueCEAccessControlBaseRule=VO\prod.vo.eu-eela.eu) -s b
EM_MAD = em_gt2:gw_em_mad_gram2::rs1_nsh
TM_MAD = tm_gt2:gw_tm_mad_dummy:-u gsiftp\://ui01.macc.unican.es
```

```
# Example CREAM
IM_MAD = glisela_cream:gw_im_mad_mds2_glue-bdii:-l etc/cream.list -q (GlueCEAccessControlBaseRule=VO\:prod.vo.eu-eela.eu)
EM_MAD = em_cream:gw_em_mad_cream::jdl
TM_MAD = tm_cream:gw_tm_mad_dummy:-g
```

There are three options for the configuration of the IM MAD:

- -l: host list file to be used by GridWay.
  - Example of gt2.list for Gisela:

```
[user@ui-]~$ lcg-infosites --vo $VO ce | awk 'NR>2 {print $6}'|grep jobmanager |awk -F ":" '{print $1}' | uniq
ce01-tic.ciemat.es
ce01.unlp.edu.ar
ce.labmc.inf.utfsm.cl
tochtli.nucleares.unam.mx
grid012.ct.infn.it
ce01.eela.if.ufrj.br
ce.cp.di.uminho.pt
ce01.macc.unican.es
ce01.up.pt
grid001.fe.up.pt
```

- Example of cream.list for Gisela:

```
[user@ui-]~$ lcg-infosites --vo $VO ce | awk 'NR>2 {print $6}'|grep cream |awk -F ":" '{print $1}' | uniq
gantt.cefet-rj.br
ce206.cern.ch
ce204.cern.ch
ce205.cern.ch
ce207.cern.ch
ce208.cern.ch
tochtli64.nucleares.unam.mx
ce02.eela.if.ufrj.br
cream01.cecalc.ula.ve
ce.egee.di.uminho.pt
cale.uniandes.edu.co
grid001.fc.up.pt
```

- -q: it is possible to configure a GridWay instance to only use queues authorized to your VO by filtering them.
- -s: information server in a hierarchical configuration.

```
IM_MAD = glisela_gt2:gw_im_mad_mds2_glue-bdii:-l etc/gt2.list -q (GlueCEAccessControlBaseRule=VO\:prod.vo.eu-eela.eu) -s
```

There are two options for the configuration of the TM MAD:

- -g: starts a GASS server.
- -u: specifies the URL of a GridFTP server running in the client. For example:

```
TM_MAD = tm_gt2:gw_tm_mad_dummy:-u gsiftp://ui01.macc.unican.es
```

## Accessing the VOMS servers

To use the Gisela resources, the user should initialize the proxy through voms server:

```
[user@ui-]~$ voms-proxy-init --voms prod.vo.eu-eela.eu
Cannot find file or dir: /oceanogmeteo/users/carlos/.glite/vomses
```

```

Enter GRID pass phrase:
Your identity: /DC=es/DC=irisgrid/O=unican/CN=josecarlos.blanco
Creating temporary proxy ..... Done
Contacting voms.eela.ufrj.br:15003 [/C=BR/O=ICPEDU/O=UFF BrGrid CA/O=UFRJ/OU=IF/CN=host/voms.eela.ufrj.br] "prod.vo.eu-ee
Creating proxy ..... Done
Your proxy is valid until Tue Aug 23 22:15:06 2011

```

## Quick Start Guide

By default, it includes a configuration to use Gisela infrastructure. Follow the steps below:

1. Start GridWay. "GW\_LOCATION" and "PATH" variables must be exported.

```
[user@ui~]$ gwd
```

Show information about all available resources. **gwhost** command needs some seconds to update the information:

```

[user@ui~]$ gwhost
HID PRIO OS          ARCH  MHZ  %CPU  MEM(F/T)  DISK(F/T)  N(U/F/T) LRMS  HOSTNAME
0  1  ScientificSLBor  x86_6 3200  0  1024/1024  0/0  0/78/260 jobmanager-lcgpbs ce01-tic.ciemat.es
1  1  ScientificSLBer  i686  1865  0  900/900  0/0  0/10/10  jobmanager-lcgpbs ce01.unlp.edu.ar
2  1  ScientificSLBer  x86_6 1600  0  2048/2048 0/0  0/116/132 jobmanager-lcgpbs ce.labmc.inf.utfsm.
3  1  ScientificSLBer  i686  2400  0  3072/3072 0/0  0/4/4  jobmanager-lcgpbs tochtli.nucleares.u
4  1  ScientificSLBer  i686  2193  0  4096/4096 0/0  0/43/115 jobmanager-lcglsf grid012.ct.infn.it
5  1  Scientific Linu  x86_6 2000  0  8150/8150 0/0  0/17/48  cream-pbs  ce01.eela.if.ufrj.br
6  1  ScientificCERNS i386  2330  0  512/512  0/0  0/12/12  jobmanager-lcgpbs ce.cp.di.uminho.pt
7  1  CentOSFinal    x86_6 2400  0  16000/16000 0/0  0/229/454 jobmanager-lcgpbs ce01.macc.unican.es
8  1  ScientificSLSL  x86_6 2400  0  4058/4058 0/0  0/34/36  jobmanager-lcgsge ce01.up.pt
9  1  ScientificSLSL  x86_6 2400  0  4058/4058 0/0  0/22/22  jobmanager-lcgsge grid001.fe.up.pt
10 1  ScientificSLBer i686  2330  0  2048/2048 0/0  0/18/18  cream-pbs  gantt.cefet-rj.br
11 1  0  0  0/0  0/0  0/0/21818 cream-lsf  ce206.cern.ch
12 1  0  0  0/0  0/0  0/833/21818 cream-lsf  ce204.cern.ch
13 1  0  0  0/0  0/0  0/0/21818 cream-lsf  ce205.cern.ch
14 1  0  0  0/0  0/0  0/0/21818 cream-lsf  ce207.cern.ch
15 1  0  0  0/0  0/0  0/833/21818 cream-lsf  ce208.cern.ch
16 1  CentOSFinal    x86_6 2670  0  12000/12000 0/0  0/25/40  cream-pbs  tochtli64.nucleares
17 1  Scientific Linu  x86_6 2000  0  8178/8178 0/0  0/55/200  cream-pbs  ce02.eela.if.ufrj.br
18 1  ScientificSLBor x86_6 3000  0  2048/2048 0/0  0/24/24  cream-pbs  cream01.cecalc.ula.v
19 1  0  0  0/0  0/0  0/0/0  ce.gege.di.uminho.pt
20 1  ScientificCERNS x86_6 1600  0  4096/4096 0/0  0/138/188 cream-pbs  cale.uniandes.edu.co
21 1  ScientificSLSL  x86_6 2400  0  4058/4058 0/0  0/20/22  cream-sge  grid001.fc.up.pt

```

Prepare for job submission. "\$GW\_LOCATION/examples" contains templates to submit. Job templates allow you to configure job requirements, in terms of needed files, generated files, requirements and ranks of execution hosts. The next template is basically a Linux `date` command. Submit it to check **GridWay**.

```

[user@ui~]$ cat $GW_LOCATION/examples/date/date.jt
EXECUTABLE=/bin/date

```

Submit the job. **gwsuubmit** command can submit a job to available resources:

```
[user@ui~]$ gwsuubmit $GW_LOCATION/examples/date/date.jt
```

Check the evolution of the job. **gwps** command reports current job status:

```

[user@ui~]$ gwps
USER      JID DM  EM  START  END      EXEC  XFER  EXIT NAME      HOST
user:0    0  pend ---- 19:39:09 --:--:-- 0:00:00 0:00:00 --  date.jt  --

```

If you execute successive **gwps**, you can see the different states of job:

```

user:0      0   pend ---- 19:39:09 --:--:-- 0:00:00 0:00:00 --  date.jt      --
user:0      0   prol ---- 19:39:09 --:--:-- 0:00:00 0:00:00 --  date.jt      --
user:0      0   wrap pend 19:39:09 --:--:-- 0:00:00 0:00:00 --  date.jt      ce01.macc.unican.es/jobmanager-lcgpbs
user:0      0   wrap actv 19:39:09 --:--:-- 0:00:05 0:00:00 --  date.jt      ce01.macc.unican.es/jobmanager-lcgpbs
user:0      0   epil ---- 19:39:09 --:--:-- 0:00:10 0:00:00 --  date.jt      ce01.macc.unican.es/jobmanager-lcgpbs
user:0      0   done ---- 19:39:09 19:39:27 0:00:10 0:00:01 0   date.jt      ce01.macc.unican.es/jobmanager-lcgpbs

```

5. **pend** => the job is waiting for a resource to run on  
**prol** => the remote system is being prepared for execution.  
**wrap pend** => the job has been successfully submitted to the local DRM system and it is waiting for the local DRM system.  
**wrap actv** => the job is being executed by the local DRM system.  
**epil** => the job is finalizing  
**done** => the job has finished
6. Results are standard output (stdout) and standard error (stderr), both files will be in the same directory of job template:

```

[user@ui~]$ cat $GW_LOCATION/examples/date/stdout.0
jue may  5 20:01:56 CEST 2011
[user@ui~]$ cat $GW_LOCATION/examples/date/stderr.0

```

## Support

If you have any problem or question, you should put a [Ticket](#).