

# EGEE-III

## DEPLOYMENT GUIDE

### EU MILESTONE: MSA3.5.1

---

Document identifier:	Error! No sequence specified.Error! No sequence specified.
Date:	<b>17/12/2008</b>
Activity:	<b>SA3: Integration, Testing and Certification</b>
Lead Partner:	<b>CERN</b>
Document status:	<b>DRAFT</b>
Document link:	<a href="https://edms.cern.ch/document/edmsId/version">https://edms.cern.ch/document/edmsId/version</a>

---

Abstract: EGEE middleware can be deployed in a multitude of different scenarios. This guide describes the most common setups (can be seen as a user guide for sysadmins).

Copyright notice:

Copyright © Members of the EGEE-III Collaboration, 2008.

See [www.eu-egee.org](http://www.eu-egee.org) for details on the copyright holders.

EGEE-III (“Enabling Grids for E-science-III”) is a project co-funded by the European Commission as an Integrated Infrastructure Initiative within the 7th Framework Programme. EGEE-III began in May 2008 and will run for 2 years.

For more information on EGEE-III, its partners and contributors please see [www.eu-egee.org](http://www.eu-egee.org)

You are permitted to copy and distribute, for non-profit purposes, verbatim copies of this document containing this copyright notice. This includes the right to copy this document in whole or in part, but without modification, into other documents if you attach the following reference to the copied elements: “Copyright © Members of the EGEE-III Collaboration 2008. See [www.eu-egee.org](http://www.eu-egee.org) for details”.

Using this document in a way and/or for purposes not foreseen in the paragraph above, requires the prior written permission of the copyright holders.

The information contained in this document represents the views of the copyright holders as of the date such views are published.

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PROVIDED BY THE COPYRIGHT HOLDERS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE MEMBERS OF THE EGEE-III COLLABORATION, INCLUDING THE COPYRIGHT HOLDERS, OR THE EUROPEAN COMMISSION BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THE INFORMATION CONTAINED IN THIS DOCUMENT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Trademarks: EGEE and gLite are registered trademarks held by CERN on behalf of the EGEE collaboration. All rights reserved"

**Delivery Slip**

	<b>Name</b>	<b>Partner/Activity</b>	<b>Date</b>	<b>Signature</b>
<b>From</b>				
<b>Reviewed by</b>	Moderator and reviewers			
<b>Approved by</b>	AMB & PMB			

**Document Log**

<b>Issue</b>	<b>Date</b>	<b>Comment</b>	<b>Author/Partner</b>
0-1	03/11/2008	Table of Contents	Ioannis Liabotis / GNRET/SA3
0-2	26/11/2008	First Draft	Ioannis Liabotis/GRNET/SA3
0-3	27/11/2008	Added Sections 10.3 & 10.4	Kostantinos Koukopoulos/GRNET(UoA)/SA3
0-4	04/12/2008	Incorporated Comments from Internal SA3 Review	Ioannis Liabotis/GRNET/SA3
0-5	11/12/2008	Incorporated Comments from Internal Review	Ioannis Liabotis/GRNET/SA3
0-6	17/12/2008	Final Editing	Ioannis Liabotis/GRNET/SA3

**Document Change Record**

<b>Issue</b>	<b>Item</b>	<b>Reason for Change</b>

## TABLE OF CONTENTS

<b>1. INTRODUCTION .....</b>	<b>5</b>
1.1. PURPOSE.....	5
1.2. DOCUMENT ORGANISATION .....	5
1.3. APPLICATION AREA .....	5
1.4. REFERENCES .....	5
1.5. DOCUMENT AMENDMENT PROCEDURE .....	5
<b>2. EXECUTIVE SUMMARY .....</b>	<b>6</b>
<b>3. INTRODUCTION TO THE EGEE INFRASTRUCTURE .....</b>	<b>6</b>
<b>4. SITE ARCHITECTURE .....</b>	<b>7</b>
4.1. MINIMAL SITE SERVICES .....	7
4.1.1. User Interface (UI).....	7
4.1.2. Site BDII (sBDII).....	7
4.1.3. Computing Element - lcgCE.....	8
4.1.4. Storage Element (SE) .....	8
4.1.5. Worker Node (WN).....	8
4.1.6. Monitor Service (MON) and R-GMA Server (R-GMA).....	8
4.1.7. Batch Systems/PBS Torque/Maui.....	8
4.2. CORE SERVICES .....	9
<b>5. THE GLITE MIDDLEWARE.....</b>	<b>9</b>
<b>6. MINIMAL SITE SETUP.....</b>	<b>9</b>
6.1. HARDWARE.....	9
6.2. PLATFORMS.....	9
6.3. NETWORKING AND FIREWALL.....	10
6.4. SECURITY .....	10
<b>7. ADMINISTRATORS REQUEST TO BECOME A USER.....</b>	<b>10</b>
<b>8. GLITE INSTALLATION AND CONFIGURATION .....</b>	<b>10</b>
<b>9. SITE REGISTRATION TO EGEE.....</b>	<b>11</b>
<b>10. TROUBLESHOOTING.....</b>	<b>11</b>
<b>11. SITE TESTING .....</b>	<b>11</b>
11.1. TESTING THE INFORMATION SYSTEM .....	12
11.2. TESTING THE UI.....	12
11.2.1. Certificate management and VOMS proxy creation.....	12
11.2.2. Simple Job Submission .....	13
11.2.3. Simple Data management Operations .....	16
11.3. TESTING LOCAL JOB SUBMISSION .....	17
11.4. TESTING DATA MANAGEMENT .....	18
11.5. TESTING R-GMA.....	19
<b>12. CONCLUSIONS.....</b>	<b>20</b>

## 1. INTRODUCTION

### 1.1. PURPOSE

The purpose of this milestone document (MSA3.5.1) is to describe the procedures and guidelines for site administrators that want their sites to join the EGEE infrastructure. It provides information on the main organizational structures for site support, the procedures for joining EGEE, and the gLite middleware installation and testing procedures that will enable a relatively small site to join the EGEE infrastructure.

### 1.2. DOCUMENT ORGANISATION

The document starts with an introduction to the EGEE infrastructure and its management structures described in Section 3. Follows a description of a site's architecture and the necessary grid middleware services to setup and run a production EGEE site (Section 4). Section 5 provides a brief description of the gLite middleware while section 6 describes the hardware and software requirements of a minimal site's setup. Sections 7 and 8 provide the necessary steps that the site administrator has to follow in order to install and configure his site. Section 9 provides procedure for the site to register to EGEE. Section 10 gives an overview of the necessary tests that the site administrator needs to perform after the site installation and configuration to validate the setup and be prepared for the site's certification.

### 1.3. APPLICATION AREA

This document is to be used by site administrators that want their sites to join the EGEE infrastructure. It can be used as a basic users guide for the setup and administration of an EGEE site.

### 1.4. REFERENCES

R1	The EGEE Project. <a href="http://public.eu-egee.org/">http://public.eu-egee.org/</a>
R2	Torque Resource manager. <a href="http://www.clusterresources.com/pages/products/torque-resource-manager.php">http://www.clusterresources.com/pages/products/torque-resource-manager.php</a>
R3	MAUI Cluster Scheduler. <a href="http://www.clusterresources.com/pages/products/maui-cluster-scheduler.php/">http://www.clusterresources.com/pages/products/maui-cluster-scheduler.php/</a>
R4	Condor Scheduler. <a href="http://www.cs.wisc.edu/condor/">http://www.cs.wisc.edu/condor/</a>
R5	SUN Grid Engine. <a href="http://gridengine.sunsource.net/">http://gridengine.sunsource.net/</a>
R6	LSF Scheduler. <a href="http://www.platform.com/Products/platform-lsf">http://www.platform.com/Products/platform-lsf</a>
R7	gLite. <a href="http://www.glite.org/">http://www.glite.org/</a>
R8	Scientific Linux. <a href="https://www.scientificlinux.org/">https://www.scientificlinux.org/</a>
R9	Red Hat Enterprise Linux. <a href="http://www.redhat.com/rhel/">http://www.redhat.com/rhel/</a>
R10	Scientific Linux CERN. <a href="http://linux.web.cern.ch/linux/">http://linux.web.cern.ch/linux/</a>
R11	CentOS. <a href="http://www.centos.org/">http://www.centos.org/</a>

### 1.5. DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the authors. The procedures documented in the EGEE “Document Management Procedure” will be followed:

<http://project-EGEE-III-na1-qa.web.cern.ch/project-EGEE-III-NA1-QA/EGEE-III/Procedures/DocManagmtProcedure/DocMngmt.htm>.

## 2. EXECUTIVE SUMMARY

EGEE [0] provides a production quality Grid Infrastructure distributed among most countries of Europe providing distributed computation and storage resources to scientists. EGEE is open to new sites that want to join the EGEE infrastructure and offer their resources. However since EGEE is a production quality infrastructure several administrative and technical procedures exist to ensure that a new site that is being integrated to the infrastructure will be able to meet certain quality criteria. The new sites need to support the middleware used by EGEE. The middleware supported by EGEE is called gLite and this or any other compatible middleware can be used.

This document describes the procedures and guidelines for site administrators that want their sites to join the EGEE infrastructure. It provides information on the main organizational structures for site support, the procedures for joining EGEE, and the gLite middleware installation and testing procedures that will enable the site to join the EGEE infrastructure. This document intends to be a simple site administrator’s guide that will provide all the necessary information and references for new site administrators willing to integrate a small site to the EGEE infrastructure.

## 3. INTRODUCTION TO THE EGEE INFRASTRUCTURE

EGEE provides a production quality Grid Infrastructure distributed in over 30 countries to a large variety of applications from different scientific domains from High Energy Physics, Biomedicine, Earth Sciences, Financial Modelling, Astrophysics and many more. At the time of writing this document the EGEE infrastructure includes more than 250 sites. For up-to-date information on the status of the infrastructure you can visit the EGEE project’s official web site at: <http://www.eu-egee.org/>.

The organization of operations in EGEE is structured in the following way:

- Operations Coordination Centre (OCC)
- Regional Operations Centres providing core infrastructure services and operational support as well as regional grid operations and responsibilities
- The Global Grid User Support (GGUS) - <https://gus.fzk.de/>

The OCC provides coordination and management of the EGEE grid infrastructure. The ROCs are the main contact points for a site to get operational support.

For a site to join the EGEE infrastructure it has to be associated with one of the available ROCs as described in Section 9.

The list of operating ROCs and their web-site URLs are the following:

- CERN - <http://cern.ch/roc>
- France - <http://egee.in2p3.fr/>
- Italy - <http://grid-it.cnaf.infn.it/index.php?id=sa1italy>
- UK & Ireland - <http://www.ukiroc.eu/>
- Germany and Switzerland - <http://egee.fzk.de/sa1/>
- North Europe - <http://www.egee-ne.org/operations>

- South West Europe - <http://grid.ifca.unican.es/egee-sa1-swe>
- South East Europe - <http://www.egee-see.org/>
- Central Europe - <http://egee.grid.cyfronet.pl/>
- Russia - <http://www.egee-rdig.ru/>
- Asia Pacific - <http://www.twgrid.org/aproc/>

The site wishing to join should contact their ROC after they are associated with one of them or the grid deployment team at OCC and discuss the most suitable site configuration and setup.

The rest of this document provides a description and guides on how to setup a minimal site to join the EGEE infrastructure.

## 4. SITE ARCHITECTURE

Experience has shown that using at the beginning a standardized small setup and evolve from this to a larger more complex system is highly advisable. The typical layout for a minimal site is described in the following:

A user interface node (UI), allows users to submit jobs to the grid. This node will use the information system and workload management system either from the ROC or the central services operated by CERN ROC. The UI is needed for the site administrator to be able to perform test to his site. In order for a site to provide resources it has to add a computing element (CE), that acts as a gateway to computing resources and a storage element (SE), that acts as a gateway to the local storage. In addition a few worker nodes (WN) to provide the computing power must be added. Further more it is required to install an RGMA monitoring node (MON) as a separate machine.

The above describes services to be offered as a minimum from a site that wants to offer computational and storage resources to its users.

Larger sites with many users that submit a large number of jobs or sites that want to offer core services for VOs might add a workload management system (WMS). The WMS distributes the load to different sites that support the user's VO keeping track of the status of their jobs. It is also a good practice to setup a top level BDII on each site that operates a WMS. A complete site will add a MyProxy server node that allows the renewal of proxy certificates.

### 4.1. MINIMAL SITE SERVICES

This section provides a brief description of the site services that need to be installed in a minimal site setup. It is provided for the site administrators to have a general understanding of the installed services.

#### 4.1.1. User Interface (UI)

The User Interface (UI) is the access point for the user to the Grid. It is the machine where the user has a local user account and his Grid certificate installed. From a UI the user can submit jobs or transfer files to and from the grid. The user interface has several middleware clients installed including command-line utilities and APIs for data transfer, data catalogues, replica management, R-GMA, VOMS, WMS, logging and bookkeeping, EDG and LCG middleware clients and VDT/Globus clients.

Although the UI is not necessary for the operations of a site it is important that the site administrators have access to a UI in order to be able to perform testing of their site.

#### 4.1.2. Site BDII (sBDII)

The Berkley Database information index (BDII) is an Information Service (IS), which uses the standard LDAP database. This database is updated periodically, receiving data in the LDIF format by calling a local GIP (Generic Information Provider) script or by performing an LDAP search on other services accessible through a LDAP URL. Each site has to provide a Site BDII to publish the state of the resources of their individual site. A Top Level BDII collects the information from this Site BDII to make them accessible by the Grid Services and applications.

#### 4.1.3. Computing Element - lcgCE

A Grid Computing Element is the Gateway to the computing resources localized at a site. It includes a Grid gateway, which provides a generic interface to the computing cluster/farm. The farm itself consists, in general, of a Local Resource Management System (LRMS) and a collection of computing nodes called Worker Nodes (WN). A batch system like LSF, PBS+variants, condor or Sun Grid Engine (SGE) is a typical example for such LRMS. The Computing Element is responsible for the handling of job submission, staging and cancellation as also for queries of the current status of the job. The LCG-CE makes use of the Globus 2.4 gatekeeper to submit jobs through the Globus Resource Allocation Manager (GRAM) to the LRMS. Authentication and authorization are performed using LCAS and LCMAPS and the CE interfaces to them. At the time of writing this document the CREAM CE was not yet fully deployed in production. The CREAM CE is targeted to replace the lcg-CE.

#### 4.1.4. Storage Element (SE)

The Grid component, which provides an interface to the storage hosted by a particular site, is called a Storage Element (SE). The SE is characterized by offering services and interfaces of the following types:

- A Mass Storage System (MSS) front-end to a disk or tape storage system
- A Storage Resource Manager (SRM) to provide a uniform access to the underlying mass storage system.
- A GridFTP server interface to the storage on the SE.
- Local POSIX like input/output interface.
- Facilities for authentication, authorization and auditing/accounting.

#### 4.1.5. Worker Node (WN)

The Worker Node is the computing node inside the Grid where the user's Grid jobs are executed by one of the sites. The job having been submitted to the Computing Element and the Local Resource Management (LRMS). On the WN the necessary middleware clients like Logging and Bookkeeping, Replica manager, and R-GMA clients need to be installed. Additional software components may be necessary according to the requirements of the site supported VOs.

#### 4.1.6. Monitor Service (MON) and R-GMA Server (R-GMA)

The information and monitoring system R-GMA (Relational Grid Monitoring Architecture) implements the Grid Monitoring Architecture from the Global Grid Forum (GGF) and serves a relational view of the collected data. Its architecture implements a simple Consumer-Producer model, where the information infrastructure components of the Grid are the consumers and producers, which request and provide information. A central R-GMA registry mediates the communication between both. The producers contact the registry when they want to publish data and the consumer asks the registry for the producer which provides the required data. After receiving this information the data passes directly from the producer to the consumer.

#### 4.1.7. Batch Systems/PBS Torque/Maui

There are several Local Resource Management Systems (LRMS) that can be integrated with the Computing Element and provide a site's computational resources to the users of the EGEE



infrastructure. The standard gLite supported LRMS is Torque [0]. Torque is an open source LRMS, providing the low-level functionality to start, hold, cancel and monitor batch jobs running in distributed computing resources. Torque can integrate with the Maui Cluster Scheduler [0] to improve overall utilization of the resources on the cluster. The Maui Cluster Scheduler is an open source job scheduler for clusters and supercomputers. It is an optimized, configurable tool capable of supporting an array of scheduling policies, dynamic priorities, extensive reservations, and fair-share capabilities. A possible configuration to manage a batch system, and the one presented here, is using Torque in combination with Maui. Many EGEE sites have adopted the option of Torque and Maui and the Grid services including gLite and lcg-CEs are fully supported. Other batch systems in use and supported in EGEE are Condor [0], SGE [0] and LSF [0] however we assume that a new small site would opt for Torque/Maui as an LRMS since it is the default LRMS supported by gLite.

## 4.2. CORE SERVICES

As describes above a large site or a site that wants to offer specific services to its VO users might want to install a Workload Management System (WMS), an LCG File Catalogue (LFC) etc. At this document intends to provide information on the minimal site setup further information on Core Services is not provided. Site administrators that wish to setup and maintain core services can find more material at the gLite documentation page:

<http://glite.web.cern.ch/glite/documentation/default.asp>

## 5. THE GLITE MIDDLEWARE

The supported middleware in EGEE is called gLite [0] and provides a framework for building grid applications tapping into the power of distributed computing and storage resources across the Internet. The latest release of gLite can be found in <http://glite.web.cern.ch/glite/packages/latestRelease.asp>.

The gLite software is distributed as a set of different deployment modules / node types that can be installed separately. The recommended way of installation is via the gLite yum repository that is available at: <http://linuxsoft.cern.ch/EGEE/gLite/R3.1/> while configuration is performed using the YAIM tool that is available at: <https://twiki.cern.ch/twiki/bin/view/LCG/YaimGuide400>

## 6. MINIMAL SITE SETUP

### 6.1. HARDWARE

The following list provides an estimation of the characteristics of the required hardware to run the above minimal site services:

- **LCG-CE:** disk  $\geq$  80GB, memory  $\geq$  1GB, CPU  $\geq$  2GHz (one or more cores);
- **MON:** disk  $\geq$  10GB disk, memory  $\geq$  2GB at least 2 cores;
- **DPM:** mirrored disks for the head node  $\geq$  160GB, 512 - 1GB memory, CPU  $\geq$  2GHz, for the pool nodes whatever disks you need;
- **UI:** Can run on 1GB of RAM, 2GhZ CPU, 1 core machine

An alternative to the above setup would be for a sites to deploy the site services using virtualized machines for service nodes running under XEN or similar is actively used and supported.

### 6.2. PLATFORMS

The major OS platform for the gLite middleware is Scientific Linux (SL) [0], which is a Linux Distribution

build from the freely available Red Hat Enterprise Linux (RHEL) [0] sources under the terms and condition of the Red Hat EULA. A lot of sites are using a special SL version built at CERN called Scientific Linux CERN (SLC) [0]. This distribution includes some additional software to fulfill the requirements in the CERN environment (afs support etc.) and has in general a shorter lifetime than SL/RHEL. The major release number of SL/SLC corresponds to the number of the native RHEL version. Sites can decide which of the three flavors they prefer to deploy according to their requirements and possibly after consulting their corresponding ROC. CentOS [0] is also a widely used and supported by gLite distribution of the Linux Operating System that a site is able to use for the installation of the middleware. The officially supported platforms for any given gLite release is provided in: <http://glite.web.cern.ch/glite/packages/latestRelease.asp>

### 6.3. NETWORKING AND FIREWALL

Taking into account the scale of a small site the requirements for the internal site network could be a switched 100 MBit LAN with the same connectivity to the outside. The networking requirements vary a lot depending on the size of the site (number of CPU cores and storage available), its number of users and type of workload the users submit.

The network should be secured using a firewall or IP filters. More details on the exact firewall configurations based on the types of nodes installed can be found in the following URL: <https://twiki.cern.ch/twiki/bin/view/LCG/LCGPortTable>.

### 6.4. SECURITY

Security has to be taken seriously into account when a site joins the EGEE infrastructure as its resources could be shared among thousands of users as the site interacts with the whole EGEE infrastructure. The security guidelines for the gLite middleware are given at the gLite Security Best Practice Page (<http://rss-grid-security.cern.ch/glite.php>)

The following list provides the various security issues that have to be taken into account according to those guidelines.

- Grid security
- Systems monitoring
- Systems housekeeping
- Systems testing

## 7. ADMINISTRATORS REQUEST TO BECOME A USER

Before installation and configuration of a site the site administrator needs to obtain his own grid user certificate from his country's certification authority. A list with contact details of certification authorities in each European country is provided in the EUGridPMA Membership page (<http://www.eugridpma.org/members/membership>). A user certificate is needed for two reasons. First for the site administrator to be able to request host certificates for the basic site services that require such certificate in order to be configured and second for the site administrator to be able to test his site by submitting simple jobs and performing simple data management operations. Details on site testing are provided in Section 11.

After obtaining the user certificate the user has to register with a virtual organization that will be supported and configured by the site. For testing purposes the dteam Virtual Organization can be used. The Virtual Organization Management System that the site administrators can apply for membership is located at: <https://lcg-voms.cern.ch:8443/vo/dteam/vomrs>. Note that different ROCs might advise the site administrator to register with different regional Virtual Organizations dedicated for site testing. In this case the site administrator has to register with this VO and also setup his site to support this regional testing VO.

## 8. GLITE INSTALLATION AND CONFIGURATION

The site installation procedures are described in detail in the generic installation and configuration guide for gLite 3.1 (<https://twiki.cern.ch/twiki/bin/view/LCG/GenericInstallGuide310>).

A summary of the basic installation steps is provided in the following list:

1. Operating System Installation
2. NTP installation and configuration
3. Obtaining Host certificates
4. Middleware Installation from gLite repositories using yum based on the specific node type.
5. Middleware Configuration using YAIM based in the specific node type.

## 9. SITE REGISTRATION TO EGEE

As described in Section 3 in order for a site to join the EGEE infrastructure it has to be associated with a specific Regional Operating Centre (ROC). EGEE has established specific Site to ROC Association Procedure. The latest version can be found in: [http://egee-docs.web.cern.ch/egee-docs/list.php?dir=./SAI/Site-ROC\\_association/&](http://egee-docs.web.cern.ch/egee-docs/list.php?dir=./SAI/Site-ROC_association/&)

In the following we summarise the Site-ROC association and site registration procedure:

- Usually the Site-ROC association is done according to the country that the site belongs to.
- An application from the site administrator has to be sent to the identified ROC providing basic information such as the site administrator's details together with the policy acceptance Agreement.
- When the ROC accepts the site, the ROC manager has to create the new site's record in the GOC database (<https://goc.gridops.org/>). Write access to this record will be given to Site manager, Resource Administrator and ROC manager. At this stage the site status will be marked as 'candidate'.
- Then the site administrator with the assistance of the ROC manager has to add all the relevant site details to the ROC database.
- When all required information are added the ROC managers set the status of the site to 'uncertified'
- After performing middleware installation the site has also to perform initial testing as described in Section 11.
- The site certification performed by the ROC starts. When the site passes the certification process, its status is set by the ROC manager to 'certified'.

Further information on the specific requirements for site registration and certification in each ROC is provided by the ROCs themselves via their web sites as provided in Section 3.

## 10. TROUBLESHOOTING

Site administrators can get support regarding the installation and operations of a site via their ROC, via the GGUS or via the troubleshooting guides published in the GOCWiki portal.

- <http://goc.grid.sinica.edu.tw/gocwiki/SiteProblemsFollowUpFaq>
- <http://goc.grid.sinica.edu.tw/gocwiki>

## 11. SITE TESTING

When the site is setup, gLite middleware is installed and configured and usually before the ROC starts the site certification process the site administrator has to perform some basic tests to ensure that the site is operational. These tests are not intended to replace the ROCs site certification tests but provide a good indication that the site is operational. In order for the site to perform the necessary tests as well as for the certification process the ROC has to provide the name of a suitable BDII that includes uncertified sites. All tests described in the following sections are performed via the UI of the site. Before testing the site services the site administrator should test that his UI is correctly set-up by testing the standard job submission and data management commands using another site that is known to be working well.

### 11.1. TESTING THE INFORMATION SYSTEM

From the UI you can also query your site-BDII and verify correctness of the data issuing the following command:

```
ldapsearch -x -H ldap://<CE FQDN>:2170 -b mds-vo-name=<SITE-NAME>,o=grid
```

where <CE FQDN> should be replaced by your CE hostname, and <SITE-NAME> with the appropriate name of your site entered into the site-info.def

The output should provide a list of all services that are provided by the site, the names of the different queues that are setup for the VOs and all other site specific details.

Verify that your CE and SE are visible by top level BDII. Note that as stated in Section 9 at the stage of testing and site certification the ROC provides the site with a top level BDII suitable for testing:

```
lcg-infosites --vo dteam ce  
lcg-infosites --vo dteam se
```

### 11.2. TESTING THE UI

Simple tests that are relevant to the UI are: management of certificates and the creation of proxies, simple job submission to a CE that is known to be working well, and simple data management operations using an SE that is known to working well.

#### 11.2.1. Certificate management and VOMS proxy creation

To do that, use the following procedure:

1. Login to the UI as a simple user (not root).
2. Copy your personal certificate to the ~/.globus directory
3. Create a VOMS proxy for e.g. the dteam VO by running the following command:

```
$ voms-proxy-init -voms dteam
```

If the commands success you should see a message like that:

```

Cannot find file or dir: /home/iliaboti/.glite/vomses
Enter GRID pass phrase:
Your identity: /C=GR/O=HellasGrid/OU=grnet.gr/CN=Ioannis Liabotis
Creating temporary proxy ..... Done
Contacting voms.cern.ch:15004 [/DC=ch/DC=cern/OU=computers/CN=voms.cern.ch]
"dteam" Done
Creating proxy ..... Done
Your proxy is valid until Wed Nov 26 15:32:11 2008
  
```

### 11.2.2. Simple Job Submission

Simple Job Submission testing is done using the following procedure:

1. Create a simple JDL file named *testJob.jdl* E.g.:

```

[
Type = "Job";
Executable = "/bin/hostname";
Arguments = "";
StdOutput = "message.txt";
StdError = "stderr";
OutputSandbox = {"message.txt", "stderr"};
]
  
```

2. Identify all available CEs that could run your job:

```
$ glite-wms-job-list-match -a testJob.jdl
```

The results should be similar to this:

```
Connecting to the service https://wms02.egee-see.org:7443/glite_wms_wmproxy_server
```

```
=====
```

#### COMPUTING ELEMENT IDs LIST

The following CE(s) matching your job requirements have been found:

*\*CEId\**

- *CE.pakgrid.org.pk:2119/jobmanager-lcgpbs-dteam*
- *agh2.atlas.unimelb.edu.au:2119/jobmanager-lcgpbs-dteam*
- *alice003.nipne.ro:2119/jobmanager-lcgpbs-dteam*
- *alice19.spbu.ru:2119/jobmanager-lcgpbs-dteam*
- *atlas-ce-01.roma1.infn.it:2119/jobmanager-lcglsf-atlasgcert*
- *atlasce.phys.sinica.edu.tw:2119/jobmanager-lcgcondor-dteam*
- *atlasce1.lnf.infn.it:2119/jobmanager-lcgpbs-cert*
- *boalice3.bo.infn.it:2119/jobmanager-lcgpbs-cert*

...  
...

=====

3. Now that you have identified the list of available CEs you can submit the job to one of them:

```
$glite-wms-job-submit -a -r atlasce1.lnf.infn.it:2119/jobmanager-lcgpbs-cert testJob.jdl
```

the output should be something like this:

```
Connecting to the service https://wms01.egee-see.org:7443/glite_wms_wmproxy_server
```

```
=====glite-wms-job-submit Success =====
```

*The job has been successfully submitted to the WMPProxy*

*Your job identifier is:*

```
https://lb01.egee-see.org:9000/erbvAe4o7IGB3l8UdcG7eQ
```

=====

4. Check the status of the submitted Job by using the appropriate job identifier. In this case:

```
https://lb01.egee-see.org:9000/erbvAe4o7IGB3l8UdcG7eQ
```

```
$ glite-wms-job-status https://lb01.egee-see.org:9000/erbvAe4o7IGB3l8UdcG7eQ
```

When the job is Done the results should be similar to this:

\*\*\*\*\*

*BOOKKEEPING INFORMATION:*

*Status info for the Job : <https://lb01.egee-see.org:9000/erbvAe4o7IGB3l8UdcG7eQ>*

*Current Status: Done (Success)*

*Logged Reason(s):*

- 
- Job terminated successfully

*Exit code: 0*

*Status Reason: Job terminated successfully*

*Destination: atlasce1.lnf.infn.it:2119/jobmanager-lcgpbs-cert*

*Submitted: Wed Nov 26 04:05:35 2008 EET*

\*\*\*\*\*

Until the job is Done it can be in one of the following statuses: Waiting, Scheduled, Ready, Running. In case the job has failed it will be in status Failed.

5. Retrieve the Job output:

`$glite-wms-job-output https://lb01.egee-see.org:9000/erbvAe4o7IGB3l8UdcG7eQ`

the output of the command should look like:

Connecting to the service [https://wms01.egee-see.org:7443/glite\\_wms\\_wmproxy\\_server](https://wms01.egee-see.org:7443/glite_wms_wmproxy_server)

=====

*JOB GET OUTPUT OUTCOME*

*Output sandbox files for the job:*

*<https://lb01.egee-see.org:9000/erbvAe4o7IGB3l8UdcG7eQ>*

*have been successfully retrieved and stored in the directory:*

*/tmp/jobOutput/iliaboti\_erbvAe4o7IGB3l8UdcG7eQ*

=====

6. Examine the Job output:

```
$ cat /tmp/jobOutput/iliaboti_erbvAe4o7IGB3l8UdcG7eQ
```

the result should look like:

```
atlascn017.lnf.infn.it
```

### 11.2.3. Simple Data management Operations

Data management operations for testing the UI can be performed by testing an already working SE. Follows a list of relevant data management tests.

1. To find out which SEs supports your virtual organization (in these examples we assume that you have a VOMS proxy with the dteam VO) run the following command:

```
$lcg-infosites --vo dteam se
```

The result will be something like:

```
Avail Space(Kb) Used Space(Kb) Type SEs
-----
300000000000 160000000000 n.a gridka-dCache.fzk.de
9140000000 n.a n.a argose01.na.infn.it
1934334304 507477888 n.a se.hep.ntua.gr
568980616 2635663264 n.a se01.afroditi.hellasgrid.gr
---
---
---
```

2. Now try to store the file specifying a LFN

```
lcg-cr --vo dteam -d se01.afroditi.hellasgrid.gr -l lfn:/grid/dteam/my_alias1
file:/home/iliaboti/testJob.jdl
```

the result should be like:

```
guid:7d59a3f1-e818-4902-aaa0-1286de7c4650
```



3. To test if the file has been stored you can use the following command:

```
$ lcg-ls -v --vo dteam lfn:/grid/dteam/my_alias1
```

and the result should be:

```
lfn:/grid/dteam/my_alias1
```

4. The last test should be to try to retrieve the file back to the UI running the following command:

```
$ lcg-cp -v --vo dteam lfn:/grid/dteam/my_alias1 file:/home/iliaboti/test
```

The result should be:

```

Using grid catalog type: lfc
Using grid catalog : prod-lfc-shared-central.cern.ch
VO name: dteam
Source SE type: SRMv1
Source SRM Request Token: 658737
Source URL: lfn:/grid/dteam/my_alias1
File size: 158
Source                URL                for                copy:
gsiftp://se01.afroditi.hellasgrid.gr/se01.afroditi.hellasgrid.gr:/data01/dteam/2008-11-
26/file8179143e-051d-4df6-bcac-76a76bbd1e3f.658702.0
Destination URL: file:/home/iliaboti/test
# streams: 1
# set timeout to 0 (seconds)
          0 bytes   0.00 KB/sec avg   0.00 KB/sec
Transfer took 1010 ms
  
```

### 11.3. TESTING LOCAL JOB SUBMISSION

After the UI tests are performed and the administrator makes sure that it UI is properly configured it is time for him to test its local site by performing some Local Job Submission testing.

From the UI run a simple job:

```
$ voms-proxy-init -voms <VO>
```

```
$ globus-job-run <CE FQDN>/jobmanager-lcgpbs-<VO> /usr/bin/id
```

You should see the following output:

```
uid=9872(<VO>1) gid=9872(<VO>1) groups=9872(<VO>1)
```

Now try a batch job:

```
$ globus-job-submit <CE FQDN>/jobmanager-lcgpbs-<VO> /bin/date
```

This should produce a job identifier like this:

```
https://<CE FQDN>:45001/<JOB ID>
```

On the CE host you should verify that the jobmanager logs the submission. The default location for the logfile is /var/log/globus-gatekeeper.log.

You can query the job status with the following command:/

```
$ globus-job-status https://<CE FQDN>:45001/<JOB ID>/
DONE
```

While the job is still running you can query the information provider with the following command:

```
ldapsearch -h <CE FQDN> -p 2170 -x -b \
  GlueCEUniqueID=<CE FQDN>:8443/jobmanager-pbs-<VO>,\
  Mds-Vo-name=resource,o=grid GlueCEStateRunningJobs
```

And get the output with:

```
$ globus-job-get-output https://<CE FQDN>:45001/<JOB ID>/
Thu Jan 1 00:00:00 EST 2000
```

After performing the job submission using the globus-job-run commands the administrator should use the wms-job-submit commands that where described in Section 11.2 by trying to submit jobs to his own CE in order to make sure that the site is properly configured.

#### 11.4. TESTING DATA MANAGEMENT

This section provides some simple data management for the DPM SE only.

From the UI execute

```
$ export DPNS_HOST=<SE FQDN>
$ dpns-ls -l /dpm/<SITE-TLD>/home
```

If you haven't created a proxy yet you should see

```
send2nsd: NS002 - send error : client_establish_context: Could not find or use a credential
/dppm: Bad credentials /
```

In that case create a proxy,

```
$ voms-proxy-init --voms <VO>
```

And repeat the command:

```
$ dpns-ls -l /dpm/<SITE-TLD>/home
```

In both cases, you should see something similar to the following output

```
drwxrwxr-x 1 root 102          0 Oct 06 12:43 dteam
drwxrwxr-x 1 root 103          0 Aug 18 17:57 ops
```

```
drwxrwxr-x 1 root 104          0 Aug 18 17:57 see
```

...

Now execute:

```
$ dpns-mkdir /dpm/<SITE-TLD>/home/<VO>/testDir
$ dpns-ls -l /dpm/<SITE-TLD>/home/<VO>/
```

You should see something like the following:

```
...
drwxrwxr-x 0 102 102          0 Nov 26 18:16 testDir
```

...

Now execute the following commands to test GridFTP operations::

```
$ globus-url-copy file:/boot/vmlinux-2.4.21-32.0.1.EL \
  gsiftp://<SE-FQDN>/dpm/<SITE-TLD>/home/<VO>/testDir/kernel
$ globus-url-copy gsiftp://<SE-FQDN>/dpm/<SITE-TLD>/home/<VO>/testDir/kernel \
  file:/tmp/kernel
$ diff /boot/vmlinux-2.4.21-32.0.1.EL /tmp/kernel
$ dpns-ls -l /dpm/<SITE-TLD>/home/<VO>/testDir/kernel
```

The last command should produce something like this:

```
-rw-rw-r-- 1 <uid> <gid>      2904532 Jul 29 17:07
/dpm/<SITE-TLD>/home/<VO>/testDir/kerne
```

Last clean up after ourselves:!

```
$ dpns-rm -fr /dpm/<SITE-TLD>/home/<VO>/testDir
$ dpns-rm /dpm/<SITE-TLD>/home/<VO>/testDir
```

The second command should produce the following:

```
/dpm/<SITE-TLD>/home/see/testDir: No such file or directory
```

## 11.5. TESTING R-GMA

R-GMA comes with two testing scripts. The first script can be used on any node that has the R-GMA client installed (CE, SE, RB, UI, MON). To start the test, use the following command:

```
$ rgma-client-check
```

the result should look like this:

```
*** Running R-GMA client tests on ui01 ***
```

```
Checking C API: Success
Checking C++ API: Success
Checking Command-line API: Success
Checking Java API: Success
Checking Python API: Success
```

```
*** R-GMA client test successful ***
```

This script will check that R-GMA has been configured correctly. This is accomplished by publishing data using various APIs and verifying that the data is available via R-GMA.

The second script is intended to run only on an R-GMA MON box. It checks if the R-GMA server is configured correctly and tries to connect to the servlets. To run the script, use:

```
$ rgma-server-check
```

Successful output should look like:

```
*** Running R-GMA server tests on lxn1193.cern.ch ***  
Checking servlets...  
Connecting to http://lxn1193.cern.ch:8080/R-GMA/ConsumerServlet:OK  
Connecting to streaming port 8088 on lxn1193.cern.ch:OK  
Connecting to http://lxn1193.cern.ch:8080/R-GMA/StreamProducerServlet:OK  
Connecting to http://lxn1193.cern.ch:8080/R-GMA/LatestProducerServlet:OK  
Connecting to http://lxn1193.cern.ch:8080/R-GMA/DBProducerServlet:OK  
Connecting to http://lxn1193.cern.ch:8080/R-GMA/CanonicalProducerServlet:OK  
Connecting to http://lxn1193.cern.ch:8080/R-GMA/ArchiverServlet:OK  
*** R-GMA server test successful ***
```

If either test fails. The common reasons are that the servlets are down or that there is a firewall problem (make sure ports 8443 and 8088 for the secure mode or 8088 and 8080 for the insecure mode are open). Check that the values for the Servlets and Registry are correct in the file `/opt/edg/var/edg-rgma/rgma.conf`.

Take the URL from this file, append `/getStatus` to the end and use a browser to connect to the servlet. If you can not connect to the servlet, check the URL again. Try to restart the tomcat server on the MON node

```
/sbin/service tomcat5 restart
```

If there are problems starting the servlets some information can be found in the tomcat logs.

```
/var/log/tomca5/catalina.out
```

## 12. CONCLUSIONS

MSA3.5.1 document describes the procedures and guidelines for site administrators that want their sites to join the EGEE infrastructure. It provides information on the main organizational structures for site support, the procedures for joining EGEE, and the gLite middleware installation and testing procedures that will enable the site to join the EGEE infrastructure. Site administrators that have no prior experience with the EGEE infrastructure and/or the gLite middleware can read this guide as a starting point as it provides the basic information needed to familiarize themselves with the procedures and requirements of the infrastructure and the middleware. Furthermore the document provides pointers to detailed information on all the covered procedures and guidelines.