

# EUROPEAN MIDDLEWARE INITIATIVE

## EMI WN v. 3.0.0

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## Functional Description

The Worker Node (WN) is the computing node inside the Grid where the user's jobs are finally executed at a site, the job having been submitted to the Computing Element and the Batch System. On the WN the necessary middleware components such as the Logging and Bookkeeping, File and Storage clients need to be installed. Additional software components may be necessary according to the requirements of the site supported VOs.

## EMI Middleware clients & libraries present on an EMI WN

- AMGA:
  - emi.amga.amga-cli
- dCache:
  - dcap
  - dcap-tunnel-gsi
  - dcap-tunnel-telnet
  - dcap-tunnel-krb
  - dcap-tunnel-ssl
  - dcap-libs
  - dcap-devel
  - dcache-srmclient

- CERN Grid DataManagement: - (\*) - An asterisk indicates a package which should be installed in both 32 and 64 bit versions on x86\_64
  - DPM
    - dpm
    - dpm-libs (\*)
    - dpm-perl
    - dpm-python
    - dpm-python26 (SL5 only)
  - LFC
    - ffc
    - lfc-libs (\*)
    - lfc-perl
    - lfc-python
    - lfc-python26 (SL5 only)
  - LCGDM common
    - lcgdm-libs (\*)
    - lcgdm-devel (\*)
  - GFAL, LCG\_Util
    - gfal (\*)
    - gfal-py26 (SL5 only)
    - gfal-python
    - lcg-util
    - lcg-util-libs (\*)
    - lcg-util-py26 (SL5 only)
    - lcg-util-python
    - gridftp-ifce (\*)
    - srm-ifce (\*)
    - is-interface (\*)
  - GFAL 2.0
    - gfal2-all
    - gfal2-python
    - gfalFS
    - gfal2-doc
    - gfal2-devel
- lcg-info clients
  - lcg-info
  - lcg-infosites
- GridSite:
  - gridsite-libs
- L & B:
  - glite-jobid-api-c
  - glite-lb-client
  - glite-lb-client-progs
  - glite-lb-common
  - glite-lbjp-common-gss
  - glite-lbjp-common-trio
- SAGA
  - emi.saga-adapter.context-cpp
  - emi.saga-adapter.isn-cpp

- emi.saga-adapter.sd-cpp
- VOMS:
  - voms-clients3
  - voms-devel
- WMS:
  - glite-wms-brokerinfo-access
- Others:
  - a1\_grid\_env
  - c-ares
  - cleanup-grid-accounts
  - emi-version
  - fetch-crl
  - glite-service-discovery-api-c
  - glite-wn-info
  - glite-yaim-clients
  - glite-yaim-core
  - lcg-ManageVOTag
  - lcg-tags
  - openldap-clients
  - python-ldap
  - uberftp
  - util-c

## Client Installation & Configuration

General information on installation and configuration can be found at:

- <https://twiki.cern.ch/twiki/bin/view/EMI/GenericInstallationConfigurationEM3>

You can find some details bellow.

### Installing the Operating System

For the moment EMI WNs are fully supported on the **SL5/x86\_64** & **SL6/x86\_64** platforms with EPEL as repository for external components.

#### Scientific Linux 5 & 6

For more information on Scientific Linux please check:

<http://www.scientificlinux.org>

All the information to install this operating system can be found at

<https://www.scientificlinux.org/download>

Example of **sl5.repo** file:

```
[core]
name=name=SL 5 base
baseurl=http://linuxsoft.cern.ch/scientific/5x/$basearch/SL
      http://ftp.scientificlinux.org/linux/scientific/5x/$basearch/SL
```

[http://ftp1.scientificlinux.org/linux/scientific/5x/\\$basearch/S](http://ftp1.scientificlinux.org/linux/scientific/5x/$basearch/S)  
[http://ftp2.scientificlinux.org/linux/scientific/5x/\\$basearch/S](http://ftp2.scientificlinux.org/linux/scientific/5x/$basearch/S)  
protect=0

Example of **sl6.repo** file:

```
[core] name=name=SL 6 base
baseurl=http://linuxsoft.cern.ch/scientific/6x/$basearch/SL
        http://ftp.scientificlinux.org/linux/scientific/6x/$basearch/SL
protect=0
```

### Node synchronization, NTP installation and configuration

A general requirement is that the nodes are synchronized. This requirement may be fulfilled in several ways. If your nodes run under AFS they are most likely already synchronized. Otherwise, you can use the NTP protocol with a time server.

Instructions and examples for a NTP client configuration are provided in this section. If you are not planning to use a time server on your machine you can just skip this section.

Use the latest ntp version available for your system. If you are using APT, an apt-get install ntp will do the work.

- Configure the file /etc/ntp.conf by adding the lines dealing with your time server configuration such as, for instance:

```
restrict <time_server_IP_address> mask 255.255.255.255 nomodify
notrap noquery          server <time_server_name>
```

Additional time servers can be added for better performance results. For each server, the hostname and IP address are required. Then, for each time-server you are using, add a couple of lines similar to the ones shown above into the file /etc/ntp.conf.

- Edit the file /etc/ntp/step-tickers adding a list of your time server(s) hostname(s), as in the following example:

```
137.138.16.69
137.138.17.69
```

- If you are running a kernel firewall, you will have to allow inbound communication on the NTP port. If you are using iptables, you can add the following to /etc/sysconfig/iptables

```
-A INPUT -s NTP-serverIP-1 -p udp --dport 123 -j ACCEPT
-A INPUT -s NTP-serverIP-2 -p udp --dport 123 -j ACCEPT
```

Remember that, in the provided examples, rules are parsed in order, so ensure that there are no matching REJECT lines preceding those that you add. You can then reload the firewall

```
# /etc/init.d/iptables restart
```

- Activate the ntpd service with the following commands:

```
# ntpdate <your ntp server name>
# service ntpd start
# chkconfig ntpd on
```

- You can check ntpd's status by running the following command
- ```
# ntpq -p
```

## Installing & Configuring the Middleware

### The Certification Authority repository

All the details on how to install the CAs can be found in EGI IGTF release pages ([https://wiki.egi.eu/wiki/EGI\\_IGTF\\_Release](https://wiki.egi.eu/wiki/EGI_IGTF_Release)). It contain information about how to configure YUM & APT managers for downloading and installing the trust anchors ("Certification Authorities" or "CAs") that all sites should install.

### The EPEL repository

If not present by default on your nodes, you should enable the EPEL repository (<https://fedoraproject.org/wiki/EPEL>).

EPEL has an 'epel-release' package that includes gpg keys for package signing and repository information. Installing the latest version of epel-release package available on EPEL5 and EPEL6 repositories like:

- [http://download.fedoraproject.org/pub/epel/5/x86\\_64/](http://download.fedoraproject.org/pub/epel/5/x86_64/),

or

- [http://www.nic.funet.fi/pub/mirrors/fedora.redhat.com/pub/epel/6/x86\\_64/](http://www.nic.funet.fi/pub/mirrors/fedora.redhat.com/pub/epel/6/x86_64/)

should allow you to use normal tools, such as yum, to install packages and their dependencies. By default the stable EPEL repo is enabled.

### The middleware (EMI) repositories

All EMI products are distributed from a **single repository** (<http://emisoft.web.cern.ch/emisoft>)

The packages are signed with the EMI gpg key, that can be downloaded from <http://emisoft.web.cern.ch/emisoft/dist/EMI/3/RPM-GPG-KEY-emi>.

Please import the key **BEFORE** starting!

The fingerprint of the key is:

```
pub    1024D/DF9E12EF 2011-05-04
       Key fingerprint = AC82 01B1 DD50 6F4D 649E DFFC 27B3 331E
DF9E 12EF
uid          Doina Cristina Aiftimiei (EMI Release Manager)
aiftim@pd.infn.it
sub    2048g/C1E57858 2011-05-04
```

- for SL5/SL6 save the key under `/etc/pki/rpm-gpg/`
- ```
# rpm --import http://emisoft.web.cern.ch/emisoft/dist/EMI/3/RPM-GPG-KEY-emi
```



## Configuring the use of EMI 3 repositories

- EMI 3 production repositories are available at:
  - <http://emisoft.web.cern.ch/emisoft/dist/EMI/3/>
- YUM & APT configuration files are available at:
  - SL5 - <http://emisoft.web.cern.ch/emisoft/dist/EMI/3/repos/sl5/>
  - SL6 - <http://emisoft.web.cern.ch/emisoft/dist/EMI/3/repos/sl6/>
- Use Case 1: - update EMI repositories on a node with EMI 1 middleware to EMI 3 (SL5/x86\_64):
  - remove first the emi-release package installed on your node:

```
# rpm -e emi-release
```
  - install the EMI 3 emi-release package:

```
# wget
http://emisoft.web.cern.ch/emisoft/dist/EMI/3/sl5/x86_64/base/emi-release-3.0.0-2.el5.noarch.rpm
# yum localinstall emi-release-3.0.0-2.el5.noarch.rpm
```
- Use Case 2: - update EMI repositories on a node with EMI 2 middleware to EMI 3 (SL5/x86\_64):

```
# rpm -Uvh
http://emisoft.web.cern.ch/emisoft/dist/EMI/3/sl5/x86_64/base/emi-release-3.0.0-2.el5.noarch.rpm
```
- Use Case 3: - install EMI 2 repositories on a fresh node, without EMI middleware:
  - SL5/x86\_64:

```
# wget
http://emisoft.web.cern.ch/emisoft/dist/EMI/3/sl5/x86_64/base/emi-release-3.0.0-2.el5.noarch.rpm (*)
# yum localinstall emi-release-3.0.0-2.el5.noarch.rpm
```
  - SL6/x86\_64:

```
# wget
http://emisoft.web.cern.ch/emisoft/dist/EMI/3/sl6/x86_64/base/emi-release-3.0.0-2.el6.noarch.rpm (*)
# yum localinstall emi-release-3.0.0-2.el6.noarch.rpm
```

(\*) - please add the option "--nogpgcheck" if you didn't download first the key.

These packages will install required dependencies, the EMI public key and ensures the precedence of EMI repositories over EPEL

## Installation

You need to have enabled only the above repositories (Operating System, EPEL, Certification Authority, EMI).

- SL5/SL6:

```
# yum install emi-wn
```

## Configuration

Please see <https://twiki.cern.ch/twiki/bin/view/LCG/YaimGuide400> for more details on how to use YAIM for configuring a WN.

Few details on the specific configuration files and variables needed in the WN case:

- [https://twiki.cern.ch/twiki/bin/view/LCG/YaimGuide400#WN\\_list](https://twiki.cern.ch/twiki/bin/view/LCG/YaimGuide400#WN_list)
- you should use the same `<site-info.def>`, `<users.conf>`, `<groups.conf>` files you used for configuring your CE

## YAIM configuration variables

- **Mandatory general variables**
  - BDII\_HOST
  - MON\_HOST (not needed anymore in gLite 3.2 WN)
  - SE\_LIST
  - SITE\_NAME
  - USERS\_CONF
  - VOS
  - VO\_<vo-name>\_SW\_DIR
  - VO\_<vo-name>\_VOMS\_CA\_DN (Mandatory for glite-yaim-core > 4.0.5-7)
  - VO\_<vo-name>\_VOMSES
- **Optional service specific variables:** they can be found in `/opt/glite/yaim/examples/siteinfo/services/glite-wn:`
  - GLITE\_LOCAL\_CUSTOMIZATION\_DIR
    - This is an optional variable to define a scratch area for pool accounts via EDG\_WL\_SCRATCH.
    - More details - [here](#)
- **Default service specific variables:** they can be found in `/opt/glite/yaim/defaults/glite-wn.post:`
  - WN\_INFO\_CONFIG\_FILE
    - Location of the `glite-wn-info` utility configuration file.
    - Default value: `${GLITE_LOCATION}/etc/glite-wn-info.conf`

If the installation was successful one should run the configuration:

```
# <path-to-yaim>/yaim -c -s <path_to_file>/site-info.def -n WN -n  
<node-type-1> -n <node-type-2>
```

## Notes on configuring a Batch system

YAIM only provides WN configuration steps for the following batch system interaction:

- Torque

## Torque

On the WN you should also install the emi-torque-client metapackage

```
# yum install emi-wn emi-torque-client
# <path-to-yaim>/yaim -c -s site-info.def -n WN -n TORQUE_client
```

## Other batch systems

Configure first your batch system (LSF, SGE, Condor, etc) and only after configure the WN through yaim:

```
# <path-to-yaim>/yaim -c -s <path_to_file>/site-info.def -n WN
```

## Specific configuration details for different middleware clients present on a UI

- AMGA client:
  - [https://twiki.cern.ch/twiki/pub/EMI/AMGA/amga-manual\\_2\\_4\\_0.pdf](https://twiki.cern.ch/twiki/pub/EMI/AMGA/amga-manual_2_4_0.pdf) - Section 2.1, 3.1
- dCache-clients:
  - <http://www.dcache.org/manuals/Book-2.2/cookbook/cb-clients-fhs-comments.shtml>
- CERN DataManagement clients
  - <https://svnweb.cern.ch/trac/lcgdm/wiki/Integration/Clients>
- GFAL/lcg\_utils:
  - [https://svnweb.cern.ch/trac/lcgutil/wiki/GFALRelease\\_1\\_14\\_0](https://svnweb.cern.ch/trac/lcgutil/wiki/GFALRelease_1_14_0)
  - [https://svnweb.cern.ch/trac/lcgutil/wiki/lcg\\_util](https://svnweb.cern.ch/trac/lcgutil/wiki/lcg_util)
- GridSite clients:
  - [http://egee.cesnet.cz/cvsweb/SEC/GridSite\\_User.pdf](http://egee.cesnet.cz/cvsweb/SEC/GridSite_User.pdf)
- SAGA clients:
  - <http://hepunix.rl.ac.uk/egee/sa3-uk/sd/sagaC++SD.pdf> - Section 3
  - <http://hepunix.rl.ac.uk/egee/sa3-uk/sd/sagaC++ISN.pdf> - Section 3
- VOMS clients:
  - <https://github.com/italiangrid/voms/wiki/VOMS-clients-guide>

## User Guides & Troubleshooting Guides references

- AMGA client
  - [https://twiki.cern.ch/twiki/pub/EMI/AMGA/amga-manual\\_2\\_4\\_0.pdf](https://twiki.cern.ch/twiki/pub/EMI/AMGA/amga-manual_2_4_0.pdf) - Section 4, 5, 6, 7, 14, 15, 16, 17
- dCache client
  - User Guide :
    - <http://www.dcache.org/manuals/Book-2.2/cookbook/cb-clients-fhs-comments.shtml>
  - Other documentation:
    - <http://www.dcache.org/manuals/Book-2.2/index-fhs.shtml>

- DPM clients:
  - <https://svnweb.cern.ch/trac/lcgdm/wiki/Dpm/User/Tutorial>
- LFC clients:
  - <https://svnweb.cern.ch/trac/lcgdm/wiki/Lfc/User/Tutorial>
- GFAL/lcg\_utils:
  - <http://www.gridpp.ac.uk/deployment/users/datamanagement/howtolcg.html>
- L&B clients:
  - User Guide:
    - <http://egee.cesnet.cz/cvsweb/LB/LBUG.pdf>
  - User Troubleshooting Guide:
    - <http://egee.cesnet.cz/cvsweb/LB/LBTG.pdf>
  - API Documentation:
    - <http://egee.cesnet.cz/cvsweb/LB/LBDG.pdf>
- SAGA clients:
  - User Guides:
    - <http://hepunix.rl.ac.uk/egee/sa3-uk/sd/sagaC++SD.pdf>
    - <http://hepunix.rl.ac.uk/egee/sa3-uk/sd/sagaC++ISN.pdf>
  - Man Pages/Online Help:
    - man saga-sd
    - saga-sd --help
    - man saga-isn
    - saga-isn -help
  - API Documentation:
    - /usr/share/doc/glite-saga-adapters-cpp/html/
  - Other Documentation:
    - <http://hepunix.rl.ac.uk/egee/sa3-uk/sd/>
- VOMS clients:
  - <https://github.com/italiangrid/voms/wiki/VOMS-clients-guide>

## Service Reference Card

- EMI WN reference card - <https://twiki.cern.ch/twiki/bin/view/EMI/EMIwnSRC>