LHC COMPUTING GRID

LCG GENERIC INSTALLATION AND CONFIGURATION

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Abstract: *LCG Generic Installation Guide*

CONTENTS

1. Introduction to Manual Installation and Configuration

This document is addressed to Site Administrators in charge of LCG middleware installation and configuration.

It is a generic guide to manual installation and configuration for any supported LCG node types.

It provides a fast method to install and configure the LCG middleware on the various LCG node types (WN, UI, CE, SE ...) on the top of the following Linux distributions.

- Scientific Linux 3.0

The proposed installation and configuration method is based on the Debian *apt-get* tool and on a set of shell scripts built within the *yaim* framework [2].

The provided scripts can be used by Site Administrators with no need for in-depth knowledge of specific middleware configuration details.

Site Administrators are only requested to insert local site-specific data in a three configuration files, according to provided examples.

The resulting configuration is a *default* site configuration. Local customizations and tuning of the middleware, if needed, can then be done manually[1].

New versions of this document will be distributed synchronously with the LCG middleware releases and they will contain the current "state-of-art" of the installation and configuration procedures.

A dual document with the upgrade procedures to manually update the configuration of the nodes from the previous LCG version to the current one is also part of the release.

Since the release LCG-2_3_0, the manual installation and configuration of LCG nodes is supported by a set of scripts.

Nevertheless, the automatic configuration for some particular node types has been intentionally left not covered. This mostly happens when a particular possible configuration is not recommended or obsolete within the LCG-2 production environment (e.g. Computing Element with Open-PBS).

Two list of "supported" and "not recommended" node configurations follows.

The "supported" node types are:

- BDII

- Computing Element (Torque)

- LFC Server (mysql)

- Mon Box

- Proxy Server

- Resource Broker

---

[1]A technical reference of the configuration actions done by the *yaim* scripts, suitable to be used to learn more about LCG configuration can be found in [1]

- Classical Storage Element (SE_classic)

- DPM Storage Element (SE_dpm_mysql)

- DPM Disk server (SE_dpm_disk)

- dCache Storage Element with no pnfs dependency (SE_dcache)

- dCache Storage Element with pnfs dependency (SE_dcache_gdbm)

- User Interface

- VOBOX for VO agents

- VOMS servers (VOMS_mysql and VOMS_oracle)

- Worker Node (Torque)

For the node types above listed both installation and configuration scripts are provided.

The "deprecated" node types are:

- Worker Node (PBS)

- Computing Element (PBS)

For the node types above listed only the installation script is provided. Sites Administrators who, for any reasons, choose to go for a not recommended node type can perform the configuration according to the guidelines provided in the generic technical configuration reference [1].

In the following sections the simple steps needed to have a site installed are described.

If you want a deeper introduduction to the installation and configuration of the specific systems (DPM, LFC, dCache...), you should visit page `http://goc.grid.sinica.edu.tw/gocwiki/SystemsConfigGuides`

2. OS INSTALLATION

The current version of the LCG Middleware runs on *Scientific Linux 3* (SL3).
We strongly recommend all the LCG production sites to switch as soon as possible at least their service nodes to the SL3 operating system.
In that order we give here a link to the web page with all the needed information is the following:

```
http://www.scientificlinux.org
```

The site where the sources, and the images (iso) to create the CDs can be found is

```
ftp://ftp.scientificlinux.org/linux/scientific/30x/iso/
```

3. JAVA INSTALLATION

You should install java sdk 1.4.2 on your system before installing the middleware. Download it from SUN java web site (1.4.2 is required - `http://java.sun.com/j2se/1.4.2/download.html`). You should absolutely install the J2SDK 1.4.2 rpm package (if you do not install it in RPM format you'll not be able to install the middleware), on the sun java web page follow the link RPM in a self extracting file. Then follow instructions provided by SUN.

Set in your site-info.def (YAIM configuration file) the variable JAVA_LOCATION to your java installation directory.

4. NODE SYNCHRONIZATION

A general requirement for the LCG nodes is that they are synchronized. This requirement may be fulfilled in several ways. If your nodes run under AFS most likely they are 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 it.

4.1. NTP SOFTWARE INSTALLATION

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

4.2. NTP CONFIGURATION

- 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
```

5. CONFIGURATION TOOL: YAIM

From now on we will refer to the node to be installed as the *target node*

In order to work with the *yaim* installation and configuration tool *yaim* must be installed on the target node.

In order to download *yaim*:

- Log to target node as 'root'

- Install *yaim*

    - find the latest version at `http://www.cern.ch/grid-deployment/gis/yaim/`

    - Yaim version numbers correspond to the version of LCG they are intended to configure. Use the latest patch release you can find for your version of the middleware.

    - download it using wget

        ```
        > wget http://www.cern.ch/grid-deployment/gis/yaim/lcg-yaim-x.x.x-x.noarch.rpm
        ```

    - install using

        ```
        > rpm -ivh lcg-yaim-x.x.x-x.noarch.rpm
        ```

6. SITE CONFIGURATION FILE

All the configuration values relevant to sites have to be configured in a site configuration file using key-value pairs.

The site configuration file is shared among all the different node types. So we suggest to edit it once and keep it in a safe place in order not to have to edit it again for each installation.

Modifications possibly occurring in the specification of the site configuration file will be published with this document.

An up-to-date example of site configuration file is anyway provided in the file */opt/lcg/yaim/examples/site-info.def*

6.1. SPECIFICATION OF THE SITE CONFIGURATION FILE

The general syntax of the file is a sequence of *bash-like* assignments of variables (<variable>=<value>). "Comment" characters "#" can be used within the file.

WARNING: The Site Configuration File is sourced by the configuration scripts. Therefore there must be no spaces around the equal sign.

Example of wrong configuration:

```
SITE_NAME = my-site
```

Example of correct configuration:

```
SITE_NAME=my-site
```

A good syntax test for your Site Configuration file (e.g. *my-site-info.def*) is to try and source it manually, running the command

```
> source my-site-info.def
```

and checking that no error messages are produced.

The complete specification of the configurable variables follows.

We strongly recommend that, if you have not clear the meaning of a configuration variable, you just report to us and try and stick to values provided in the examples.

Maybe instead, though you understand the meaning, you are in doubts about the values to be configured into some of the variables above listed.

This may happen, for instance, if you are running a very small site and you are not configuring the whole set of nodes, and therefore you have to refer to some "public" service (e.g. RB, BDII ...).

In this case, if you have a reference site, please ask them for indications. Otherwise, send a message to the "lcg-rollout@cclrclsv.rl.ac.uk" mailing list.

However, if you need to configure a limited set of nodes, maybe you can skip the configuration of some of the variables below. In that case, you might find useful the table 6.1. where the list of variables needed for the configuration of a single node is shown.

APEL_DB_PASSWORD : database password for apel.

BATCH_LOG_DIR : Your batch system log directory.

BDII_FCR : Set the URL of the Freedom of Choice for Rescources URL.

BDII_HOST : BDII Hostname.

BDII_HTTP_URL : URL pointing to the BDII configuration file.

BDII_REGIONS : List of node types publishing information on the bdii. For each item listed in the BDII_REGIONS variable you need to create a set of new variables as follows:

> **BDII_<REGION>_URL :** URL of the information producer (e.g.: BDII_CE_URL="URL of the CE information producer", BDII_SE_URL="URL of the SE information producer".

CA_REPOSITORY : APT repository with Certification Authorities (use the one in the example).

CE_BATCH_SYS : Implementation of site batch system. Available values are "torque", "lsf", "pbs", "condor" etc.

CE_CPU_MODEL : Model of the CPU used by the WN (WN specification). This parameter is a string whose domain is not defined yet in the GLUE Schema. The value used for Pentium III is "PIII".

CE_CPU_SPEED : Clock frequency in Mhz (WN specification).

CE_CPU_VENDOR : Vendor of the CPU. used by the WN (WN specification). This parameter is a string whose domain is not defined yet in the GLUE Schema. The value used for Intel is "intel".

CE_DATADIR Set this if you have a shared temporary storage area for WNs

CE_HOST : Computing Element Hostname.

CE_INBOUNDIP : TRUE if inbound connectivity is enabled at your site, FALSE otherwise (WN specification).

CE_MINPHYSMEM : RAM size in kblocks (WN specification).

CE_MINVIRTMEM : Virtual Memory size in kblocks (WN specification).

CE_OS : Operating System name (WN specification).

CE_OS_RELEASE : Operating System release (WN specification).

CE_OUTBOUNDIP : TRUE if outbound connectivity is enabled at your site, FALSE otherwise (WN specification).

CE_RUNTIMEENV : List of software tags supported by the site. The list can include VO-specific software tags. In order to assure backward compatibility it should include the entry 'LCG-2', the current middleware version and the list of previous middleware tags.

CE_SF00 : Performance index of your fabric in SpecFloat 2000 (WN specification). For some examples of Spec values see http://www.specbench.org/osg/cpu2000/results/cint2000.html.

CE_SI00 : Performance index of your fabric in SpecInt 2000 (WN specification). For some examples of Spec values see http://www.specbench.org/osg/cpu2000/results/cint2000.html.

CE_SMPSIZE : Number of cpus in an SMP box (WN specification).

CLASSIC_HOST : The name of your SE_classic host.

CLASSIC_STORAGE_DIR : The root storage directory on CLASSIC_HOST.

CRON_DIR : Yaim writes all cron jobs to this directory. Change it if you want to turn off Yaim's management of cron.

DCACHE_ADMIN : Host name of the server node which manages the pool of nodes.

DCACHE_POOLS : List of pool nodes managed by the DCACHE_ADMIN server node.

DCACHE_PORT_RANGE : DCACHE Port Range. This variable is optional and the default value is "20000,25000" .

DPMDATA : Directory where the data is stored (absolute path, e.g./storage).

DPMFSIZE : The maximum file size managed (e.g.200M).

DPMMGR : db user account for the DPM.

DPMPOOL : .

DPMPOOL_NODES : Space separated list of DPM pool hostname:/path entries".

DPMUSER_PWD : Password of the db user account.

DPM_HOST : Host name of the DPM host, used also as a default DPM for the lcg-stdout-mon .

DPM_PORT_RANGE : Optional variable for the port range with default value "20000,25000".

EDG_WL_SCRATCH : Optional scratch directory for jobs.

EDG_WL_SCRATCH : Optional scratch directory for jobs.

FTS_SERVER_URL : URL of the File Transfer Service server.

FUNCTIONS_DIR : The directory where yaim will find its functions.

GLOBUS_TCP_PORT_RANGE : Port range for Globus IO.

GRIDICE_SERVER_HOST : GridIce server host name (usually run on the MON node).

GRIDMAP_AUTH : List of ldap servers in edg-mkgridmap.conf which authenticate users.

GRID_TRUSTED_BROKERS : List of the DNs of the Resource Brokers host certificates which are trusted by the Proxy node (ex: /O=Grid/O=CERN/OU=cern.ch/CN=host/testbed013.cern.ch).

GROUPS_CONF : Path to the groups.conf file which contains information on mapping VOMS groups and roles to local groups. An example of this configuration file is given in /opt/lcg/yaim/examples/groups.conf.

GSSKLOG : yes or no, indicating whether the site provides an AFS authentication server which maps gsi credentials into Kerberos tokens .

GSSKLOG_SERVER : If GSSKLOG is yes, the name of the AFS authentication server host.

INSTALL_ROOT : Installation root - change if using the re-locatable distribution.

JAVA_LOCATION : Path to Java VM installation. It can be used in order to run a different version of java installed locally.

JOB_MANAGER : The name of the job manager used by the gatekeeper.

LCG_REPOSITORY : APT repository with LCG middleware (use the one in the example).

LFC_CENTRAL : A list of VOs for which the LFC should be configured as a central catalogue.

LFC_DB_PASSWORD : db password for LFC user.

LFC_HOST : Set this if you are building an LFC_HOST, not if you're just using clients.

LFC_LOCAL : Normally the LFC will support all VOs in the VOS variable. If you want to limit this list, add the ones you need to LFC_LOCAL. For each item listed in the VOS variable you need to create a set of new variables as follows:

> **VO_<VO-NAME>_QUEUES :** The queues that the VO can use on the CE.
>
> **VO_<VO-NAME>_SE :** Default SE used by the VO. WARNING: VO-NAME must be in capital cases.
>
> **VO_<VO-NAME>_SGM :** ldap directory with VO software managers list. WARNING: VO-NAME must be in capital cases.
>
> **VO_<VO-NAME>_STORAGE_DIR :** Mount point on the Storage Element for the VO. WARNING: VO-NAME must be in capital cases.
>
> **VO_<VO-NAME>_SW_DIR :** Area on the WN for the installation of the experiment software. If on the WNs a predefined shared area has been mounted where VO managers can pre-install software, then these variable should point to this area. If instead there is not a shared area and each job must install the software, then this variables should contain a dot (.).Anyway the mounting of shared areas, as well as the local installation of VO software is not managed by *yaim* and should be handled locally by Site Administrators. WARNING: VO-NAME must be in capital cases.

VO_<VO-NAME>_USERS : ldap directory with VO users list. WARNING: VO-NAME must be in capital cases.

VO_<VO-NAME>_VOMSES : List of entries for the vomses files for this VO. Multiple values can be given if enclosed in single quotes.

VO_<VO-NAME>_VOMS_EXTRA_MAPS : Add any further arbitrary maps you need in edg-mkgridmap.conf - see example site-info.def in yaim .

VO_<VO-NAME>_VOMS_POOL_PATH : If necessary, append this to the VOMS_SERVER URL for the pool account list .

VO_<VO-NAME>_VOMS_SERVERS : A list of VOMS servers for the VO.

MON_HOST : MON Box Hostname.

MYSQL_PASSWORD : mysql password for the accounting info collector.

MY_DOMAIN : site's domain name.

OUTPUT_STORAGE : Default Output directory for the jobs.

PX_HOST : PX hostname.

QUEUES : The name of the queues for the CE. These are by default set as the VO names.

RB_HOST : Resource Broker Hostname.

RB_RLS : The RB now uses the DLI by default; set VOs here which should use RLS.

REG_HOST : RGMA Registry hostname.

RESET_DCACHE_CONFIGURATION : Set this to yes if you want YAIM to configure dCache for you - if unset (or 'no') yaim will only configure the grid front-end to dCache.

SE_ARCH defaults to multidisk - can be disk, tape, multidisk, other - populates GlueSEArchitecture

SE_LIST : A list of hostnames of the SEs available at your site.

SITE_EMAIL : The e-mail address as published by the information system.

SITE_LAT : Site latitude.

SITE_LOC : "City, Country".

SITE_LONG : Site longitude.

SITE_NAME : Your GIIS.

SITE_SUPPORT_SITE : Support entry point ; Unique Id for the site in the GOC DB and information system.

SITE_TIER : Site tier.

SITE_WEB : Site site.

TORQUE_SERVER : Set this if your torque server is on a different host from the CE. It is ingored for other batch systems.

USERS_CONF : Path to the file containing a list of Linux users (pool accounts) to be created. This file should be created by the Site Administrator, which contains a plain list of the users and IDs. An example of this configuration file is given in /opt/lcg/yaim/examples/users.conf.

VOBOX_HOST : VOBOX hostname.

VOBOX_PORT : The port the VOBOX gsisshd listens on.

VOS : List of supported VOs.

VO_SW_DIR : Directory for installation of experiment software.

WN_LIST : Path to the list of Worker Nodes. The list of Worker Nodes is a file to be created by the Site Administrator, which contains a plain list of the batch nodes. An example of this configuration file is given in /opt/lcg/yaim/examples/wn-list.conf.

YAIM_VERSION The version of yaim for which this config file is valid

In case you are not configuring a whole site, but you are interested only in some particular nodes, you might find useful the table 6.1., with the correspondance between nodes and needed variables.

7. RPM INSTALLATION TOOL:APT-GET

Please before you proceed further MAKE SURE that Java is installed in your system (see 3.).

- Download the latest version of the *apt* tool (If it is not already installed) [2]

    - apt rpm for Scientific Linux

        ```
        > wget ftp://ftp.scientificlinux.org/linux/scientific/30x/i386/SL/RPMS/apt-XXX.i386.rpm
        ```

- Install *apt*

    - Scientific Linux

        ```
        > rpm -ivh apt-XXX.i386.rpm
        ```

- Configure *apt*
  In order to perform the Middleware and CA installation with the methods described in this guide, you just need to configure in the Site Configuration File (see 6.1.) the variable

    - LCG_REPOSITORY
    - CA_REPOSITORY

  as follows:

  SL3:

  ```
  LCG_REPOSITORY="rpm http://grid-deployment.web.cern.ch/grid-deployment/gis apt/LCG-2_7_0/sl3/en/i386 lcg_sl3
  ```

   Please note that for the dependencies of the middleware to be met, you'll have to make sure that apt can find and download your OS rpms. This typically means you'll have to install an rpm called 'apt-sourceslist', or else create an appropriate file in your */etc/apt/sources.list.d* directory.

7.1. NOTES ON USING RHEL3 COMPATIBLE DISTRIBUTIONS OTHER THAN CERN SCIENTIFIC LINUX

If you are not using SLC3 but another OS binary compatible distribution is highly recommended that you configure apt-get in order to give priority, during the installation, to packages listed within your distribution.
   In order to have all the known dependencies possibly solved by apt-get you should have at least the following lists in your */etc/apt/sources.list.d/*:

- lcg.list

---

[2]The *apt* tool could be already installed according to the distribution of OS in use at your site

- lcg-ca.list

- your-os.list

The first two are distributed by the 'apt-sourceslist' rpm, the third one is your local one.

Since the deployment team is based at CERN and it uses the local installation, it is still possible that with this bare configuration, some dependencies, though dealt with, cannot be solved because the binary compatible distribution you use does not provide the entire set of packages which CERN SL3 does.

If you prefer not to handle these issues manually you could add in the */etc/apt/sources.list.d/* another list (e.g. cern.list)

```
### List of available apt repositories available from linuxsoft.cern.ch
### suitable for your system.
###
### See http://cern.ch/linux/updates/ for a list of other repositories and mirrors.
### 09.06.2004
###


# THE default
rpm http://linuxsoft.cern.ch  cern/slc30X/i386/apt  os updates extras
rpm-src http://linuxsoft.cern.ch  cern/slc30X/i386/apt  os updates extras
```

Then you have to configure your apt-get *preferences* in order to give priority to your Os and not to CERN SLC3.

A */etc/apt/preferences* file like the following one will give priority to your Os in any case except when the package that you need is not present in your-os repository :

```
Package: swig
Pin: release o=grid-deployment.web.cern.ch
Pin-Priority: 990
Package: *
Pin: release o=your-os.your-domain.org
Pin-Priority: 980
Package: *
Pin: release o=linux.cern.ch
Pin-Priority: 970
```

The Pin-Priority will give the priority to your-os repository. For the swig package the swig that we distribute is the one to use, if you are doing a mirror of our apt repository change the preferences according to your mirror hostname.

If you are not using apt to install, you can pull the packages directly from SLC3's repository using wget. The address is `http://linuxsoft.cern.ch/cern/slc305/i386/apt/`.

8. MIDDLEWARE INSTALLATION

In order to install the node with the desired middleware packages run the command

```
> /opt/lcg/yaim/scripts/install_node <site-configuration-file> <meta-package> [ <meta-package> ... ]
```

The complete list of the available meta-packages available with this release is provided in 8.1.(SL3)

For example, in order to install a CE with Torque, after the configuration of the *site-info.def* file is done, you have to run:

```
> /opt/lcg/yaim/scripts/install_node site-info.def lcg-CE_torque
```

WARNING: There is a known installation conflict between the 'torque-clients' rpm and the 'postfix' mail server (Savannah. bug #5509).
In order to workaround the problem you can either uninstall postfix or remove the file */usr/share/man/man8/qmgr.8.gz* from the target node.

The "bare-middleware" versions of the WN and CE meta-packages are provided in case you have an existing LRMS;

```
> /opt/lcg/yaim/scripts/install_node site-info.def lcg-CE
```

You can install multiple node types on one machine

```
> /opt/lcg/yaim/scripts/install_node site-info.def <meta-package> <meta-package> ...
```

8.1. META-PACKAGES-SL3

In the following table the list of SL3 meta-packages is provided.

9. CERTIFICATION AUTHORITIES

The installation of the up-to-date version of the Certification Authorities (CA) is automatically done by the Middleware Installation described in 8.
Anyway, as the list and structure of Certification Authorities (CA) accepted by the LCG project can change independently of the middleware releases, the rpm list related to the CAs certificates and URLs has been decoupled from the standard LCG release procedure. You should consult the page

```
http://grid-deployment.web.cern.ch/grid-deployment/lcg2CAlist.html
```

in order to ascertain what the version number of the latest set of CA rpms is. In order to upgrade the CA list of your node to the latest version, you can simply run on the node the command:

```
> apt-get update && apt-get -y install lcg-CA
```

In order to keep the CA configuration up-to-date on your node we strongly recommend Site Administrators to program a periodic upgrade procedure of the CA on the installed node (e.g. running the above command via a daily cron job).

10. HOST CERTIFICATES

CE, LFC, MON, PROXY, RB, SE and VOBOX nodes require the host certificate/key files before you start their installation.

Contact your national Certification Authority (CA) to understand how to obtain a host certificate if you do not have one already.

Instruction to obtain a CA list can be found in

`http://grid-deployment.web.cern.ch/grid-deployment/lcg2CAlist.html`

From the CA list so obtained you should choose a CA close to you.

Once you have obtained a valid certificate, i.e. a file

- *hostcert.pem*
  containing the machine public key and a file

- *hostkey.pem*
  containing the machine private key

make sure to place the two files in the target node into the directory and check the access right hostkey.pem only readable by root and the certificate readable by everybody.

  /etc/grid-security

11. MIDDLEWARE CONFIGURATION

The general procedure to configure the middleware packages that have been installed on the node via the procedure described in 8., is to run the command:

```
> /opt/lcg/yaim/scripts/configure_node <site-configuration-file> <node-type> [ <node-type> ... ]
```

For example, in order to configure the WN with Torque you had installed before, after the configuration of the *site-info.def* file is done, you have to run:

```
> /opt/lcg/yaim/scripts/configure_node site-info.def WN_torque
```

In the following paragraph a reference to all the available configuration scripts is given.

11.1. AVAILABLE NODE TYPES

In this paragraph a reference to all the available configuration scripts is given.
For those items in the list tagged with an asterisk (*), there are some particularities in the configuration procedure or extra configuration details to be considered, which are described in a following dedicated section.
For all the unmarked node types, the general configuration procedure is the one above described.

11.2. INSTALLING MULTIPLE NODE TYPES ON ONE MACHINE

You can use yaim to install more than one node type on a single machine. In this case, you should install *all* the relevant software first, and then run the configure script. For example, to install a combined RB and BDII, you should do the following;

```
> /opt/lcg/yaim/scripts/install_node site-info.def RB BDII
> /opt/lcg/yaim/scripts/configure_node site-info.def RB BDII
```

All node-types must be given as arguments to the same invocation of configure_node - do *not* run this command once for each node type. Note that combinations known *not* to work are the CE/RB, RB/SE, CE/BDII.

12. NODE-SPECIFIC EXTRA CONFIGURATION STEPS

In this section we list configuration steps actually needed to complete the configuration of the desired node but not supported by the automatic configuration scripts.
If a given node does not appear in that section it means that its configuration is complete

12.1. CE_TORQUE

WARNING: in the CE configuration context (and also in the 'torque' LRMS one), a file with a a list of managed nodes needs to be compiled. An example of this configuration file is given in */opt/lcg/yaim/examples/wn-list.conf*
Then the file path needs to be pointed by the variable *WN_LIST* in the Site Configuration File (see 6.1.).
   The Maui scheduler configuration provided with the script is currently very basic.
More advanced configuration examples, to be implemented manually by Site Administrators can be found in [6]

12.2. THE RELOCATABLE DISTRIBUTION

Introduction

We are now supplying a tarred distribution of the middleware which can be used to install a UI or a WN. It can be used on Debian as well as SL3. You can untar the distribution somewhere on a local disk, or replicate it across a number of nodes via a network share. You can also use this distribution to install a UI without root privileges - there is a quick guide to doing this here [5].
   Once you have the middleware directory available, you must edit the site-info.def file as usual, putting the location of the middleware into the variable INSTALL_ROOT.
   If you are sharing the distribution to a number of nodes, commonly WNs, then they should all mount the tree at INSTALL_ROOT. You should configure the middleware on one node (remember you'll need to mount with appropriate privileges) and then it should work for all the others if you set up your batch system and the CA certificates in the usual way. If you'd rather have the CAs on your share, the yaim function install_certs_userland may be of interest. You may want to mount your share *ro* after the configuration has been done.

dependencies

The middleware in the relocatable distribution has certain dependencies.
   We've made this software available as a second tar file which you can download and untar *under $EDG_LOCATION*. This means that if you untarred the main distribution under /opt/LCG, you must untar the supplementary files under /opt/LCG/edg.
   If you have administrative access to the nodes, you could alternatively use the TAR dependencies rpm.

```
> /opt/lcg/yaim/scripts/install_node site-info.def lcg-TAR
```

   For Debian, here is a list of packages which are required for the tarball to work

```
perl-modules python2.2 libexpat1 libx11-6 libglib2.0-0 libldap2 libstdc++2.10-glibc2.2 tcl8.3-
libxml2 termcap-compat libssl0.9.7 tcsh rpm rsync cpp gawk openssl wget
```

To configure a UI or WN

Run the configure_node script, adding the type of node as an argument;

```
> /opt/lcg/yaim/scripts/configure_node site-info.def [ TAR_WN | TAR_UI ]
```

Note that the script will not configure any LRMS. If you're configuring torque for the first time, you may find the config_users and config_torque_client yaim functions useful. These can be invoked like this

```
${INSTALL_ROOT}/lcg/yaim/scripts/run_function site-info.def config_users
${INSTALL_ROOT}/lcg/yaim/scripts/run_function site-info.def config_torque_client
```

Installing a UI as a non-root user

You can find a quick guide to this here [5].

If you don't have root access, you can use the supplementary tarball mentioned above to ensure that the dependencies of the middleware are satisfied. The middleware requires java (see 3.), which you can install in your home directory if it's not already available. Please make sure you set the JAVA_LOCATION variable in your site-info.def. You'll probably want to alter the OUTPUT_STORAGE variable there too, as it's set to /tmp/jobOutput by default and it may be better pointing at your home directory somewhere.

Once the software is all unpacked, you should run

```
> $INSTALL_ROOT/lcg/yaim/scripts/configure_node site-info.def TAR_UI
```

to configure it.

Finally, you'll have to set up some way of sourcing the environment necessary to run the grid software. A script will be available under $INSTALL_ROOT/etc/profile.d for this purpose. Source *grid_env.sh* or *grid_env.csh* depending upon your choice of shell.

Installing a UI this way puts all the CA certificates under $INSTALL_ROOT/etc/grid-security and adds a user cron job to download the crls. However, please note that you'll need to keep the CA certificates up to date yourself. You can do this by running

```
> /opt/lcg/yaim/scripts/run_function site-info.def install_certs_userland
```

Further information

In [3] there is more information on using this form of the distribution. You should check this reference if you'd like to customise the relocatable distribution.

This distribution is used at CERN to make its lxplus system available as a UI. You can take a look at the docs for this too [4].

Getting the software

You can download the tar file for each operating system from

```
http://grid-deployment.web.cern.ch/grid-deployment/download/relocatable/LCG-2_7_0-sl3.tar.gz
```

You can download supplementary tar files for the userland installation from

```
http://grid-deployment.web.cern.ch/grid-deployment/download/relocatable/LCG-2_7_0-userdeps-sl3.tar.gz
```

12.3. SE-DPM

There are several extra configuration steps to perform in order to configure a dpm SE, mostly dealing with the backend systems.

All information to be retrieved in

```
http://goc.grid.sinica.edu.tw/gocwiki/How_to_install_the_Disk_Pool_Manager_%28DPM%29
```

12.4. LFC

There are several extra configuration steps to perform in order to configure a Lcg File Catalog, mostly dealing with the backend systems.

All information to be retrieved in

```
http://goc.grid.sinica.edu.tw/gocwiki/How_to_set_up_an_LFC_service
```

12.5. VOBOX

Site admins must ensure that the experiment software installation area is accessible (i.e. mounted) from the VOBOX.

In the VOBOX installation it is crucial to have the $MYPROXY_SERVER env variable (PX_HOST in the yaim site-info.def) set to the CERN myproxy server (myproxy.cern.ch). Even if you have a private myproxy server in your site, configure the VOBOX to point to the CERN one.

The site administrator must communicate the name of the VOBOX to the myproxy.cern.ch service administrator (email both hep-project-grid-cern-testbed-managers@cern.ch and support-eis@cern.ch) so that it is included in the list of authorized renewers. If this is not done, the renewal agent of the VOBOX will not work.

13. FIREWALLS

No automatic firewall configuration is provided by this version of the configuration scripts.

If your LCG nodes are behind a firewall, you will have to ask your network manager to open a few "holes" to allow external access to some LCG service nodes.

A complete map of which port has to be accessible for each service node can be found at the URL `http://lcgdeploy.cvs.cern.ch/cgi-bin/lcgdeploy.cgi/lcg2/docs/lcg-port-table.pdf`.

The mentioned reference is strongly "component-oriented" and it might result difficult to apply for Site Administrator not very confident with which particular sub-systems are actually running on a given node type.

For further information about firewall configuration mapped on the different node types see the dedicated guide in [1]

14. CONTACTS

For questions and suggestions dealing with this document please contact the address
<support-lcg-manual-install@cern.ch>

REFERENCES

[1] G. Diez-Andino, K. Oliver, A. Retico, and A. Usai. Lcg configuration reference, 2004. `http://www.cern.ch/grid-deployment/gis/lcg-GCR/index.html`.

[2] L. Field and L. Poncet. The new manual install, 2004. `http://agenda.cern.ch/askArchive.php?base=agenda&categ=a044377&id=a044377s11t3/transparencies`
Presentation given at the *LCG Workshop on Operational Issues*, Cern, Nov 2.

[3] O. Keeble. Lcg 2 tar distribution, 2004. `http://grid-deployment.web.cern.ch/grid-deployment/documentation/Tar-Dist-Use/`.

[4] O. Keeble. Using lxplus as a ui, 2004. `http://www.cern.ch/grid-deployment/documentation/UI-lxplus/`.

[5] O. Keeble. How to quickly set up a ui without root privileges, 2005. `http://grid-deployment.web.cern.ch/grid-deployment/documentation/quickUI/`.

[6] S. Lemaitre and S. Traylen. Maui-cookbook, 2004. `http://grid-deployment.web.cern.ch/grid-deployment/documentation/Maui-Cookbook.pdf`.

CHANGE HISTORY

Table 1: Variables used per node

BDII	BATCH_LOG_DIR, BDII_FCR, BDII_HOST, BDII_HTTP_URL, BDII_REGIONS, BDII_<REGION>_ CE_BATCH_SYS, CE_HOST, CRON_DIR, GRIDICE_SERVER_HOST, INSTALL_ROOT, MON_HOST, MY_DOM SITE_NAME, USERS_CONF, VOS,
CE	APEL_DB_PASSWORD, BATCH_LOG_DIR, BDII_FCR, BDII_HOST, BDII_HTTP_URL, BDII_REGIO BDII_<REGION>_URL, CE_BATCH_SYS, CE_CPU_MODEL, CE_CPU_SPEED, CE_CPU_VENDOR, CE_H CE_INBOUNDIP, CE_MINPHYSMEM, CE_MINVIRTMEM, CE_OS, CE_OS_RELEASE, CE_OUTBOUN CE_RUNTIMEENV, CE_SF00, CE_SI00, CE_SMPSIZE, CLASSIC_HOST, CLASSIC_STORAGE_ CRON_DIR, DCACHE_ADMIN, DPMDATA, DPM_HOST, EDG_WL_SCRATCH, GLOBUS_TCP_PORT_RAI GRIDICE_SERVER_HOST, GRIDMAP_AUTH, GRID_TRUSTED_BROKERS, GROUPS_CONF, GSSKI GSSKLOG_SERVER, INSTALL_ROOT, JAVA_LOCATION, JOB_MANAGER, LFC_CENTRAL, LFC_HOST, LFC_LOC MON_HOST, MY_DOMAIN, PX_HOST, QUEUES, RB_HOST, REG_HOST, SE_LIST, SITE_EMAIL, SITE_ SITE_LOC, SITE_LONG, SITE_NAME, SITE_SUPPORT_SITE, SITE_TIER, SITE_WEB, TORQUE_SER USERS_CONF, VOBOX_HOST, VOBOX_PORT, VOS, VO_<VO-NAME>_QUEUES, VO_<VO-NAME>_SE, VO_< NAME>_SGM, VO_<VO-NAME>_STORAGE_DIR, VO_<VO-NAME>_SW_DIR, VO_<VO-NAME>_USERS, VO_< NAME>_VOMS_POOL_PATH, VO_<VO-NAME>_VOMS_SERVERS, VO_SW_DIR,
VOBOX	BATCH_LOG_DIR, BDII_HOST, CE_BATCH_SYS, CE_CPU_MODEL, CE_CPU_SPEED, CE_CPU_VENI CE_HOST, CE_INBOUNDIP, CE_MINPHYSMEM, CE_MINVIRTMEM, CE_OS, CE_OS_RELEASE, CE_OUTBOUN CE_RUNTIMEENV, CE_SF00, CE_SI00, CE_SMPSIZE, CLASSIC_HOST, CLASSIC_STORAGE_DIR, CRON_ DCACHE_ADMIN, DPMDATA, DPM_HOST, EDG_WL_SCRATCH, FTS_SERVER_URL, GLOBUS_TCP_PORT_RAI GRIDICE_SERVER_HOST, GRIDMAP_AUTH, GRID_TRUSTED_BROKERS, GROUPS_CONF, GSSKI GSSKLOG_SERVER, INSTALL_ROOT, JAVA_LOCATION, JOB_MANAGER, LFC_CENTRAL, LFC_HOST, LFC_LOC MON_HOST, MY_DOMAIN, OUTPUT_STORAGE, PX_HOST, QUEUES, RB_HOST, REG_HOST, SE_LIST, SITE_EM SITE_LAT, SITE_LOC, SITE_LONG, SITE_NAME, SITE_SUPPORT_SITE, SITE_TIER, SITE_WEB, TORQUE_SER USERS_CONF, VOBOX_HOST, VOBOX_PORT, VOS, VO_<VO-NAME>_QUEUES, VO_<VO-NAME>_SE, VO_< NAME>_SGM, VO_<VO-NAME>_STORAGE_DIR, VO_<VO-NAME>_SW_DIR, VO_<VO-NAME>_USERS, VO_< NAME>_VOMS_POOL_PATH, VO_<VO-NAME>_VOMS_SERVERS, VO_SW_DIR,
SE_classic	BATCH_LOG_DIR, BDII_HOST, CE_BATCH_SYS, CE_CPU_MODEL, CE_CPU_SPEED, CE_CPU_VENI CE_HOST, CE_INBOUNDIP, CE_MINPHYSMEM, CE_MINVIRTMEM, CE_OS, CE_OS_RELEASE, CE_OUTBOUN CE_RUNTIMEENV, CE_SF00, CE_SI00, CE_SMPSIZE, CLASSIC_HOST, CLASSIC_STORAGE_DIR, CRON_ DCACHE_ADMIN, DPMDATA, DPM_HOST, GLOBUS_TCP_PORT_RANGE, GRIDICE_SERVER_H GRIDMAP_AUTH, GRID_TRUSTED_BROKERS, GROUPS_CONF, INSTALL_ROOT, JAVA_LOCATION, JOB_MANA(LFC_CENTRAL, LFC_HOST, LFC_LOCAL, MON_HOST, MY_DOMAIN, PX_HOST, QUEUES, RB_HOST, REG_H SE_LIST, SITE_EMAIL, SITE_LAT, SITE_LOC, SITE_LONG, SITE_NAME, SITE_SUPPORT_SITE, SITE_T SITE_WEB, TORQUE_SERVER, USERS_CONF, VOBOX_HOST, VOBOX_PORT, VOS, VO_<VO-NAME>_QUE VO_<VO-NAME>_SE, VO_<VO-NAME>_SGM, VO_<VO-NAME>_STORAGE_DIR, VO_<VO-NAME>_SW_ VO_<VO-NAME>_USERS, VO_<VO-NAME>_VOMS_POOL_PATH, VO_<VO-NAME>_VOMS_SERV VO_SW_DIR,
SE_dpm_mysql	BDII_HOST, CE_BATCH_SYS, CE_CPU_MODEL, CE_CPU_SPEED, CE_CPU_VENDOR, CE_HOST, CE_INBOUN CE_MINPHYSMEM, CE_MINVIRTMEM, CE_OS, CE_OS_RELEASE, CE_OUTBOUNDIP, CE_RUNTIMEENV, CE_S CE_SI00, CE_SMPSIZE, CLASSIC_HOST, CLASSIC_STORAGE_DIR, CRON_DIR, DCACHE_ADMIN, DPMD DPMFSIZE, DPMMGR, DPMPOOL, DPMPOOL_NODES, DPMUSER_PWD, DPM_HOST, EDG_WL_SCRAT GLOBUS_TCP_PORT_RANGE, GRIDICE_SERVER_HOST, GRIDMAP_AUTH, GRID_TRUSTED_BROK GROUPS_CONF, GSSKLOG, GSSKLOG_SERVER, INSTALL_ROOT, JAVA_LOCATION, JOB_MANA(LFC_CENTRAL, LFC_HOST, LFC_LOCAL, MON_HOST, MYSQL_PASSWORD, MY_DOMAIN, PX_H QUEUES, RB_HOST, REG_HOST, SE_LIST, SITE_EMAIL, SITE_LAT, SITE_LOC, SITE_LONG, SITE_NA SITE_SUPPORT_SITE, SITE_TIER, SITE_WEB, TORQUE_SERVER, USERS_CONF, VOBOX_HOST, VOBOX_PORT, VO_<VO-NAME>_QUEUES, VO_<VO-NAME>_SE, VO_<VO-NAME>_SGM, VO_<VO-NAME>_STORAGE_ VO_<VO-NAME>_SW_DIR, VO_<VO-NAME>_USERS, VO_<VO-NAME>_VOMS_POOL_PATH, VO_< NAME>_VOMS_SERVERS, VO_SW_DIR,
SE_dpm_oracle	BDII_HOST, CE_BATCH_SYS, CE_CPU_MODEL, CE_CPU_SPEED, CE_CPU_VENDOR, CE_HOST, CE_INBOUN CE_MINPHYSMEM, CE_MINVIRTMEM, CE_OS, CE_OS_RELEASE, CE_OUTBOUNDIP, CE_RUNTIMEENV, CE_S CE_SI00, CE_SMPSIZE, CLASSIC_HOST, CLASSIC_STORAGE_DIR, CRON_DIR, DCACHE_ADMIN, DPMD DPMFSIZE, DPMMGR, DPMPOOL, DPMPOOL_NODES, DPMUSER_PWD, DPM_HOST, EDG_WL_SCRAT
LCG-GIS-MI	GLOBUS_TCP_ LCG Generic Installation and Configuration GRIDMAP_AUTH, *Page 29* GRID_TRUSTED_BROK GROUPS_CONF, GSSKLOG, GSSKLOG_SERVER, INSTALL_ROOT, JAVA_LOCATION, JOB_MANA(LFC_CENTRAL, LFC_HOST, LFC_LOCAL, MON_HOST, MY_DOMAIN, PX_HOST, QUEUES, RB_HOST, REG_H SE_LIST, SITE_EMAIL, SITE_LAT, SITE_LOC, SITE_LONG, SITE_NAME, SITE_SUPPORT_SITE, SITE_T SITE_WEB, TORQUE_SERVER, USERS_CONF, VOBOX_HOST, VOBOX_PORT, VOS, VO_<VO-NAME>_QUE VO_<VO-NAME>_SE, VO_<VO-NAME>_SGM, VO_<VO-NAME>_STORAGE_DIR, VO_<VO-NAME>_SW_ VO_<VO-NAME>_USERS, VO_<VO-NAME>_VOMS_POOL_PATH, VO_<VO-NAME>_VOMS_SERV

Table 2: meta-packages available for SL3

Node Type	meta-package Name	meta-package Description
BDII	lcg-BDII	BDII
Computing Element (middleware only)	lcg-CE	It does not include any LRMS
Computing Element (with Torque)	lcg-CE_torque	It includes the 'Torque' LRMS
LCG File Catalog (mysql)	lcg-LFC_mysql	LCG File Catalog
LCG File Catalog (oracle)	lcg-LFC_oracle	LCG File Catalog
MON-Box	lcg-MON	RGMA-based monitoring system collector server
Proxy	lcg-PX	Proxy Server
Resource Broker	lcg-RB	Resource Broker
Classic Storage Element	lcg-SE_classic	Storage Element on local disk
dCache Storage Element	lcg-SE_dcache	Storage Element interfaced to dCache without pnfs dependency
dCache Storage Element	lcg-SE_dcache_gdbm	Storage Element interfaced to dCache with dependency on pnfs (gdbm)
DPM Storage Element (mysql)	lcg-SE_dpm_mysql	Storage Element with SRM interface
DPM Storage Element (Oracle)	lcg-SE_dpm_oracle	Storage Element with SRM interface
DPM disk	lcg-SE_dpm_disk	Disk server for a DPM SE
Dependencies for the re-locatable distribution	lcg-TAR	This package can be used to satisfy the dependencies of the relocatable distro
User Interface	lcg-UI	User Interface
VO agent box	lcg-VOBOX	Agents and Daemons ©
Worker Node (middleware only)	lcg-WN	It does not include any LRMS
Worker Node (with Torque client)	lcg-WN_torque	It includes the 'Torque' LRMS

Table 3: Available Node Types

Node Type	Node Type	Node Description
BDII	BDII	A top level BDII
Computing Element (middleware only)	CE	It does not configure any LRMS
Computing Element (with Torque) *	CE_torque	It configures also the 'Torque' LRMS client and server (see 12.1. for details)
LCG File Catalog server *	LFC_mysql	Set up a mysql based LFC server (see 12.4. for details)
MON-Box	MON	RGMA-based monitoring system collector server
Proxy	PX	Proxy Server
Resource Broker	RB	Resource Broker
Classic Storage Element	SE_classic	Storage Element on local disk
Disk Pool Manager (mysql) *	SE_dpm_mysql	Storage Element with SRM interface and mysql backend (see 12.3. for details)
Disk Pool Manager disk *	SE_dpm_disk	Disk server for SE_dpm
dCache Storage Element	SE_dcache	Storage Element interfaced with dCache
Re-locatable distribution *	TAR_UI or TAR_WN	It can be used to set up a Worker Node or a UI (see 12.2. for details)
User Interface	UI	User Interface
VO agent box	VOBOX	Machine to run VO agents
Worker Node (middleware only)	WN	It does not configure any LRMS
Worker Node (with Torque client)	WN_torque	It configures also the 'Torque' LRMS client

Table 4: Change History

version	date	description
v2.5.0-1	17/Jul/05	Removing Rh 7.3 support completely.
v2.3.0-2	10/Jan/05	6.1.: CA_WGET variable added in site configuration file.
v2.3.0-3	2/Feb/05	Bibliography: Link to Generic Configuration Reference changed.
"	"	12.1., 6.1.: Details added on WN and users lists.
"	"	script "configure_torque". no more available: removed from the list.
v2.3.0-4	16/Feb/05	Configure apt to find your OS rpms.
v2.3.0-5	22/Feb/05	Remove apt prefs stuff, mention multiple nodes on one box.
v2.3.0-6	03/Mar/05	Better lcg-CA update advice.
v2.3.1-1	03/Mar/05	LCG-2_3_1 locations
v2.3.4-0	01/Apr/05	LCG-2_4_4 locations
v2.3.4-1	08/Apr/05	external variables section inserted
v2.3.4-2	31/May/05	4.: fix in firewall configuration
"	"	11.: verbatim line fixed
v2.5.0-0	20/Jun/05	6.1.: New variables added
"	"	11.1.: New nodes added (dpm)
"	"	12.3.: paragraph added
"	"	12.4.: paragraph added
v2.5.0-1	28/Jun/05	7.: note on apt-get preferences added
v2.6.0-1	23/Sep/05	10.: host certificates needed on the VOBOX
v2.7.0-0	11/Jan/06	6.1.: new variables GROUPS_CONF RB_RLS BATCH_LOG_DIR CLASSIC_HOST CLASSIC_STORAGE_DIR DPMPOOL_NODES SE_LIST BDII_FCR_URL VO_XXX_VOMSES added.
v2.7.0-1	10/Feb/06	11.1.: all the forbidden combinations added