

# Table of Contents

<b>Joining a POSIX-based cluster to the Xrootd service.....</b>	<b>1</b>
Installation.....	1
Integrating with GUMS, SCAS, or Argus.....	2
Operating xrootd.....	2
Port usage:.....	2
Testing the install.....	2

# Joining a POSIX-based cluster to the Xrootd service.

This document covers joining a POSIX-based filesystem (Lustre, GPFS, NFS, etc) the USCMS Xrootd service based on the redirector xrootd.unl.edu. We have also integrated HDFS and dCache into Xrootd, but those are covered on other pages; if you have another file system you'd like to use, please let us know.

## Installation

First, install the OSG software repository. For SL6:

```
rpm -Uhv http://repo.grid.iu.edu/osg-el6-release-latest.rpm
```

For SL5:

```
rpm -Uhv http://repo.grid.iu.edu/osg-el5-release-latest.rpm
```

Then, install Xrootd using yum. Two notes before doing this:

- This will add the `xrootd` user if it does not already exist - ROCKS users might want to create this user beforehand.
- This will install certificates into `/etc/grid-security/certificates`. If you want to handle certificates on your own, doing the following will satisfy the dependency:

```
yum install empty-ca-certs
```

For the installation, you should actually use the `cms-xrootd` meta-RPM:

```
yum install xerces-c-3.0.1 # It is in the epel repo
yum install cms-xrootd --disablerepo=* --enablerepo=osg-testing,osg-contrib
yum install lcmsaps-plugins-verify-proxy.x86_64 lcmsaps-plugins-tracking-groupid.x86_64
```

The version of `cms-xrootd` should be at least 1.0, and the version of `xrootd` should be at least 3.2.2.

Copy the template config file, `/etc/xrootd/xrootd.sample.posix.cfg` to `/etc/xrootd/xrootd-clustered.cfg`.

If your CMS namespace is not truly trivial (i.e., if the CMS top-level directory in Lustre/GPFS is not `/store`), copy your site's `storage.xml` to `/etc/xrootd/storage.xml`. If you are unsure of what this means, please contact your site's CMS representative. Uncomment and update the following line in `xrootd.cfg`:

```
#oss.namelib /usr/lib64/libXrdCmsTfc.so file:/etc/xrootd/storage.xml?protocol=direct
```

You need to update the protocol you use; most Lustre/GPFS sites will use `protocol=posix` or `protocol=direct`.

Finally, create a copy of the host certs to be xrootd service certs:

```
mkdir -p /etc/grid-security/xrd
cp /etc/grid-security/hostcert.pem /etc/grid-security/xrd/xrdcert.pem
cp /etc/grid-security/hostkey.pem /etc/grid-security/xrd/xrdkey.pem
chown xrootd: -R /etc/grid-security/xrd
chmod 400 /etc/grid-security/xrd/xrdkey.pem # Yes, 400 is required
```

## Integrating with GUMS, SCAS, or Argus

In order to integrate xrootd with GUMS (v1.3 or higher), Argus, or SCAS, install the following RPM:

```
yum install xrootd-lcmaps
wget http://repository.egi.eu/sw/production/umd/2/s15/x86_64/updates/lcmaps-plugins-c-pep-1.2.2-1
wget http://repository.egi.eu/sw/production/umd/2/s15/x86_64/base/argus-pep-api-c-2.1.0-3.s15.x86_64.rpm
yum localinstall argus-pep-api-c-2.1.0-3.s15.x86_64.rpm lcmaps-plugins-c-pep-1.2.2-1.el5.x86_64.rpm
```

This will bring in several dependencies, including Globus libraries, from the OSG. These do not appear to conflict with gLite installs of these libraries, but please be careful.

Next, copy/paste the following line from `/etc/xrootd/lcmaps.cfg` into `/etc/xrootd/xrootd-clustered.cfg`:

```
# sec.protocol /usr/lib64 gsi -certdir:/etc/grid-security/certificates -cert:/etc/grid-security/xrootd
```

Uncomment the line in `xrootd-clustered.cfg`, of course.

For GUMS or SCAS, update the `/etc/xrootd/lcmaps.cfg` provided in the RPM so the endpoint properly references your server's XACML endpoint. For Argus, use the attached `lcmaps.cfg`.

Change the path on `lcmaps.cfg` file (from `path = /usr/lib64/modules` to `path = /usr/lib64/lcmaps` )

If this is a brand new host, you may need to run `fetch-crl` to update CRLs before starting Xrootd.

## Operating xrootd

There are two init services, `xrootd` and `cmsd`, which must both be working for the site to participate in the xrootd service:

```
service xrootd start
service cmsd start
```

Everything is controlled by a proper init script (available commands are start, stop, restart, status, and condrestart).

Log files are kept in `/var/log/xrootd/{cmsd,xrootd}.log`, and are auto-rotated.

After startup, the `xrootd` and `cmsd` daemons drop privilege to the `xrootd` user.

### Port usage:

The following information is probably needed for sites with strict firewalls:

- The `xrootd` server listens on TCP port 1094.
- The `cmsd` server needs outgoing TCP port 1213 to `xrootd-itb.unl.edu`.
- Usage statistics are sent to `xrootd.unl.edu` on UDP ports 9930 and 9931.

## Testing the install.

The newly installed server can be tested directly using:

```
xrdcp xroot://local_hostname.example.com//store/foo/bar /tmp/bar
```

## PosixXrootd < Main < TWiki

You will need a grid certificate installed in your user account for the above to work

You can then see if your server is participating properly in the xrootd service by checking:

```
xrdcp root://xrootd-itb.unl.edu//store/foo/bar /tmp/bar2
```

where `/store/foo/bar` is unique to your site

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This topic: [Main > PosixXrootd](#)

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