

osg Roll: Users Guide

3.1.10 Edition

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Preface

The Rocks osg Roll uses the latest stable OSG Release to provide High Throughput Computing environment for Rocks clusters. The Rocks osg Roll builds on the very good work by the OSG team, to seamlessly install and configure the *de facto* standard grid middleware on Rocks Clusters.

Please visit the Open Science Grid site¹ to learn more about their release and the individual software components.

Notes

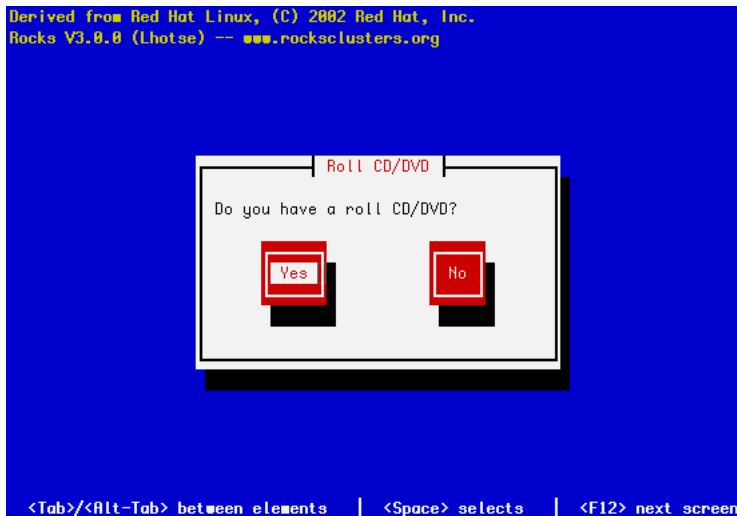
1. <https://twiki.grid.iu.edu/bin/view/Documentation/Release3/>

Chapter 1. Installing the osg Roll

1.1. Adding the Roll

The osg Roll can be installed during the Frontend installation or added to a running frontend. In either case, client nodes must be (re)installed.

The osg Roll is added to a Frontend installation in exactly the same manner as the required HPC Roll. Simply select the osg roll as you would any network- or CD-based roll. Specifically, after the HPC Roll is added the installer will once again ask if you have a Roll (see below). Select 'Yes' and insert the osg Roll.



Once the osg Roll is loaded the installer will continue installation automatically with no further user input. Other appliances can be made part of the execution pool through setting an appliance attribute and reinstalling those nodes.

1.2. Install on Running System

The osg Roll can be installed on a running system. The following assumes that roll is available in .iso form and is called "osg.iso".

```
$ su - root
# rocks add roll osg.iso
# rocks enable roll osg
# rocks create distro
# rocks run roll osg | bash
# shutdown -r now
```

Chapter 2. Customizing the OSG Roll

2.1. Customizing the OSG Roll

This section describes the default OSG configuration and some simple customizations that can be applied in Rocks with version ≥ 5.4

By default, Hadoop, Condor and WorkerClient with glexec are installed on Rocks *compute* appliances, while Gridftp and gatekeeper server on *login-0-0* host and Gridftp hadoop and bestman2 on *login-0-1* host. For Rocks 5.2 and newer, the OSG roll makes use of *attributes* to enable Hadoop, Condor and WorkerClient with glexec, Bestman2 server, Gridftp server, hdfs gridftp server, gatekeeper (CE) server to be installed on any appliance. This may be particularly useful to groups who are including the Xen roll and would like OSG servers to install on VM Container appliances.

The basic customizations that can be applied without and scripting/programming by setting global, appliance, or host attributes. Please see the commands `rocks set attr help` and `rocks list attr help`

Table 2-1. Attributes Used in OSG Roll

Attribute Name	Description
OSG_GumsServer	Set Gums server name used on any particular Appliance or Host installation. Default: rocks-gums.&Kickstart_PublicDNSDomain;
OSG_CEServer	Set Grid gatekeeper server name used on any particular Appliance or Host or gatekeeper installation. Default: rocks-ce.&Kickstart_PublicDNSDomain;
OSG_SEServer	Set bestman server name used on any particular Appliance or Host or bestaman server installation. Default: rocks-se.&Kickstart_PublicDNSDomain;
OSG_HadoopNameNode	Set Hadoop NameNode server name used on any particular Appliance or Host installation. Check for a line like this: HADOOP_NAMENODE=compute-0-0 in /etc/sysconfig/hadoop Default: compute-0-0
OSG_HadoopSecondaryNode	Set Hadoop SecondaryName server name used on any particular Appliance or Host installation. Check for a line like this: HADOOP_SECONDARY_NAMENODE=compute-0-1 in /etc/sysconfig/hadoop Default: compute-0-1
OSG_HadoopDataDir	Set Hadoop base data dir used on any particular Appliance or Host installation. Check for a line like this: HADOOP_DATADIR=/hadoop in /etc/sysconfig/hadoop Default: /hadoop
OSG_HadoopData	Set Hadoop data dir used on any particular Appliance or Host installation. Check for a line like this: HADOOP_DATA=/hadoop/data in /etc/sysconfig/hadoop Default: /hadoop/data

Attribute Name	Description
OSG_HadoopCheckPointDirs	Set Hadoop check point dirs used on any particular Appliance or Host installation. Check for a line like this: HADOOP_CHECKPOINT_DIRS=/home/hadoop,/scratch/hadoop in /etc/sysconfig/hadoop Default: /home/hadoop,/scratch/hadoop
OSG_HadoopCheckPointPeriod	Set Hadoop check point period used on any particular Appliance or Host installation. Check for a line like this: HADOOP_CHECKPOINT_PERIOD=600 in /etc/sysconfig/hadoop Default: 600
OSG_HadoopUpdateFstab	Set Hadoop for update fstab used on any particular Appliance or Host installation. Check for a line like this: HADOOP_UPDATE_FSTAB=1 in /etc/sysconfig/hadoop Default: 1
OSG_GlobusPortRange	Set Globus Port Range used on any particular Appliance or Host installation. This entry is used for setting iptable firewall on grid servers. Default: 20000:25000
OSG_GlobusTcpPortRange	Set Globus TCP Port Range used on any particular Appliance or Host installation. This entry is used for setting GLOBUS_TCP_PORT_RANGE on grid servers. (note change : by , compared with OSG_GlobusPortRange) Default: 20000,25000
OSG_GlobusTcpSourceRange	Set Globus TCP Source Range used on any particular Appliance or Host installation. This entry is used for setting GLOBUS_TCP_SOURCE_RANGE on grid servers. (note change : by , compared with OSG_GlobusPortRange) Default: 20000,25000
OSG_SRMlocalPathListAllowed	Set localPathListAllowed used on any particular Appliance or Host installation of bestman server. Check for a line like this: localPathListAllowed=/mnt/hadoop;/data/se in /etc/bestman2/conf/bestman2.rc Default: /mnt/hadoop;/data/se
OSG_SRMsupportedProtocolList	Set supportedProtocolList used on any particular Appliance or Host installation of bestman server. This is the default gridftp server. Check for a line like this: gsiftp://rocks-ce.&Kickstart_PublicDNSDomain;;2811 in /etc/bestman2/conf/bestman2.rc Default: gsiftp://rocks-ce.&Kickstart_PublicDNSDomain;;2811
OSG_Client	Enable/Disable OSG worker node Client Installation on any particular Appliance or Host. Install includes glexec. Default: true (on compute appliance)
OSG_CE	Enable/Disable osg-ce-condor Installation on any particular Appliance or Host. Default: true (on login-0-0)

Attribute Name	Description
OSG_SE	Enable/Disable bestman-server Installation on any particular Appliance or Host. Default: true (on login-0-1)
OSG_GRIDFTP	Enable/Disable standalone gridftp server Installation on any particular Appliance or Host. Default: true (on login-0-0)
OSG_GFTP_HDFS	Enable/Disable hadoop gridftp server Installation on any particular Appliance or Host. Default: true (on login-0-1)
OSG_StoredCertsDir	Set Base Dir where grid certs are stored for Appliance or Host installation. During installation of CE or SE hostcert.pem and hostkey.pem are copied to /root. Default: /root/certs
OSG_Condor_Client	Enable/Disable Condor Client Installation on any particular Appliance or Host. Default: true (on compute appliance)
OSG_Condor_Master	Redefine the Condor Master that nodes use. Default: public frontend name
OSG_Condor_Network	Define which network interface is used for Condor traffic. Default: frontends are set to public, clients are set to private.
OSG_Condor_Daemons	Define which Condor execution daemons are installed. Default: [MASTER (global)], [MASTER, SCHEDD, COLLECTOR, NEGOTIATOR (frontends)], [MASTER, SCHEDD (login appliance)], [MASTER, STARTD (compute appliance)]
OSG_Condor_PortLow	Lower Port range that Condor will use to communicate among daemons. Removal of this Attribute will result in removal of the LOWPORT entry in 01_rocks_condor_config.local after syncing the configuration. Default: 40000
OSG_Condor_PortHigh	Upper Port range that Condor will use to communicate among daemons. Removal of this Attribute will result in removal of the HIGHPORT entry in 01_rocks_condor_config.local after syncing the configuration. Default: 50000
OSG_Condor_HostAllow	Comma separates list of allowed readers/writers for Condor. Translates to HOSTALLOW directive in Condor Configuration file. Default: + rocks-ce
OSG_Condor_PasswordAuth	Use a shared pool password, instead of host-based authentication. Default: no.
OSG_Condor_EnableMPI	Configure a local scheduler for MPI Universe Support. Default: no

Attribute Name	Description
OSG_Condor_EnableAMAZON_EC2	Configure a local scheduler for AMAZON_EC2 Support. Default: no
OSG_Condor_EnableT3GRID_SUBMIT	Configure a local grid submitter for interactive nodes (I use to called CRAB submit). Default: no
OSG_Condor_EnableT3GRID_CMSSW	Configure a local compute nodes for CMS jobs. Default: yes

2.2. Examples of Hadoop Configuration

The following are short examples of how to customize Hadoop using Rocks commands.

- Change default Hadoop Node Name on all compute Appliances: `rocks set appliance attr compute OSG_HadoopNameNode value=hadoop-0-0`
- Change default Hadoop Secondary Name on all compute Appliances: `rocks set appliance attr compute OSG_HadoopSecondaryNode value=hadoop-0-1`
- Change default Hadoop Data Dir on all compute Appliances, for example two data disks: `rocks set appliance attr compute OSG_HadoopData value="/hadoop/data,/hadoop2/data"`

2.3. How to set new Gums server

The following are short examples of how to customize gums server using Rocks commands.

- Change default Gums server Name on all compute Appliances: `rocks set appliance attr compute OSG_GumsServer value="cms-gums.my.edu."`
- Change default Gums server Name on a host: `rocks set host attr se-0-0 OSG_GumsServer value="cms-gums.my.edu."`
- Change default Gums server Name global: `rocks set attr OSG_GumsServer value="cms-gums.myglobal.edu."`

2.4. How to set Default Gridftp server used for Bestman

The following are short examples of how to customize default gridftp server using Rocks commands.

- Change default Gridftp server Name global: `rocks set attr OSG_SRMsupportedProtocolList value="gsiftp://mygridftp.my.edu:2811"`

2.5. Examples of Condor Configuration

The following are short examples of how to customize Condor using Rocks commands.

- Enable Condor Client on all VM-Containers Appliances: `rocks add appliance attr vm-container OSG_Condor_Client true`
- Disable Condor on particular node: `rocks set host attr compute-0-0 OSG_Condor_Client false`
- Define a New Condor Master: `rocks set attr OSG_Condor_Master central-master.my.edu`
- Enable MPI/Dedicated Scheduler: `rocks set attr OSG_Condor_EnableMPI true.`

Actively-running Condor daemons must be reconfigured for this attribute to take affect. This can be achieved dynamically on compute and frontend appliances using `rocks sync host osg condor frontend compute.`

Reinstalled nodes will build the correct configuration.

2.6. Reconfiguring Condor after Installation

The configuration of Condor is done during the install, the resulting configuration files are located in `/etc/condor/config.d/`. To reconfigure Condor on a node, make appropriate attribute using the commands above and then run

```
# rocks sync host osg condor <hostname>
```

This will rewrite the `01_rocks_condor_config.local` on the file and then calls the Condor command `/usr/sbin/condor_reconfig`



To view the contents of the `01_rocks_condor_config.local` before making changes, use `rocks report host osg condor config <hostname>`

To find information about administrating and using Condor Pools please see the original Condor manual at Condor manuals¹ or locally².

2.7. Programatically changing the Contents of 01_rocks_condor_config.local

Condor configuration is localized into `/etc/condor/config.d/01_rocks_condor_config.local`. This file is generated programatically from the output of `rocks report host osg condor config <hostname>`.

The command `rocks report host osg condor config` is defined by the OSG roll and is written in Python. This report command is extensible through Rocks command plugins.

To see a sample Condor plugin, view the file in location

`/opt/rocks/lib/python2.4/site-packages/rocks/commands/report/host/osg/condor/config/plugin_sample.py` which is reproduced here.

```
# $Id$
import rocks.commands

class Plugin(rocks.commands.Plugin):

    def provides(self):
        return 'sample'

    def run(self, argv):
        # Argv contains the hostname and the in memory key-value store
        # that is eventually written to
        # /etc/condor/config.d/01_rocks_condor_config.local
        # plugins can add/change/remove keys from the store

        # 1. Get the hostname and the key-value store, which
        #    is a python dictionary
        host, kvstore = argv

        # The following would add CONDOR_SAMPLE=Sample Plugin
        # the key = value dictionary (kvstore) that is written out
        #
        # Example 1. Read an attribute from the database and set
        # the values
        value = self.db.getHostAttr(host, 'Condor_HostAllow')
        kvstore['CONDOR_SAMPLE'] = value

        # Example 2. Set the key CONDOR_SAMPLE to the hostname
        kvstore['CONDOR_SAMPLE'] = host

        # Example 3. Remove a key from the dictionary
        if 'CONDOR_SAMPLE' in kvstore:
            del kvstore['CONDOR_SAMPLE']

RollName = "condor"
```

Users/Roll Developers can add their own plugins for the "report host condor config" command to overwrite, add, and/or delete key,value pairs that are written into `/etc/condor/config.d/01_rocks_condor_config.local`.

In the above code sample, the Condor report command driver passes the hostname and the dictionary of already defined key,value pairs (kvstore in the sample code). The sample code shows several different examples of changing the key 'CONDOR_SAMPLE'.

Plugins are written in Python, are called in random order, and must be named "plugin_<name>.py".

Plugins also enable any desired configurations to be properly applied with the command `rocks sync host osg condor config`.

Notes

1. <http://www.cs.wisc.edu/condor/manual>
2. condor-Manual

Chapter 3. Using the osg Roll

3.1. Example Install bestman server + gridftp hadoop

Bestman can be installed as follow.

```
$ su - root
#
#set public interface
#
#rocks set host interface ip se-0-0 iface=eth1 ip=1.2.3.4
#rocks set host interface name se-0-0 iface=eth1 name=rocks-se
#rocks set host interface subnet se-0-0 eth1 public
#rocks set host attr se-0-0 primary_net public
#rocks add host route se-0-0 0.0.0.0 1.2.3.1 netmask=0.0.0.0
#rocks add host attr se-0-0 OSG_SE value=true
#rocks add host attr se-0-0 OSG_GFTP_HDFS value=true

#
# reinstall
#
#shoot-node se-0-0

#
# post install
#
#cp hostcert.pem and hostkey.pem to /root/.
#/root/install_se_cert.sh
#chkconfig bestman2 on
#chkconfig globus-gridftp-server on
```

3.2. Example for setting hostproxy on wn nodes

Hostproxy requires access the whole cluster, you need to set a pair key or just reuse the frontend node. Also the certs used to proxy by default are located in /etc/grid-security (hostcert.pem,hostkey.pem).

```
#
#in frontend cp pair keys to ce-0-0
#
$ su - root
#scp -p .ssh/id_rsa ce-0-0:~/.ssh/.
#scp -p .ssh/id_rsa.pub ce-0-0:~/.ssh/.
#ssh ce-0-0

#
# in ce-0-0
#
#yum install hostproxy
```

```
#cd /opt/hostproxy

#
# set list of worker nodes
#
#rocks report host attr attr=OSG_Client | grep true | sed s/:\ true/.local/g >> host_dist.nodes

#
# set cron to renew proxys
#
#cp update-hostproxy.cron /etc/cron.d/.

#
# or run manually
#
#/opt/hostproxy/host_dist
```

3.3. How to Update OSG packages

OSG can be updated creating a local mirror as follow.

```
$ su - root
#cd /export/rocks/install
#rocks create mirror http://repo.grid.iu.edu/3.0/el5/osg-release/x86_64 rollname=osg-updates version
##this creates an iso file osg-updates-5.5.1-0.x86_64.disk1.iso

#rocks remove roll osg-updates
#rocks add roll osg-updates-5.5.1-0.x86_64.disk1.iso
#rocks enable roll osg-updates
#rocks create distro

#in SE for example
yum update bestman-server
```

3.4. Using a pool password to secure Condor Communications

The default Rocks configuration is to use host-based authentication. This is a good and simple choice for a cluster with a private network. With the Rocks 5.4 version of the Condor Roll, it is straightforward to set up a "Pool Password" that utilizes a shared secret among pool members. This is especially useful when allowing remote systems to report directly to the Condor collector on your cluster. The EC2 Roll can utilize a pool password for a higher security.

The following, straightforward will create, copy and enable a system-wide shared-secret pool password.

1. Create a pool password. Use `rocks create osgcondor password`

2. Enable pool password security. Use `rocks set attr OSG_Condor_Password yes`
3. Reconfigure Condor Daemons and copy new pool password. Use `rocks sync host osgcondor syncpassword=yes localhost compute`

Chapter 4. Copyrights

4.1. Your title here

This product includes software developed ...

The software contained in this distribution is released under the academic license agreement which requires to acknowledge the use of the software that results in any published work.