

## **Rocks Cluster Installation Memo**

Hiroyuki Mishima, DDS, Ph.D., Research Fellow, and Jun Ni, Ph.D. Associate Professor  
Medical Imaging HPC & Informatics Lab  
Department of Radiology, College of Medicine, University of Iowa  
Iowa City, IA 52242, USA  
<http://www.uiowa.edu/mihpclub/facilityHPCT.html>

Contact: Dr. Jun Ni, at [jun-ni@uiowa.edu](mailto:jun-ni@uiowa.edu)

### **Installation**

#### **1.1 Preparation**

Download CD/DVD images from <http://www.rocksclusters.org/>. The DVD image contains all "Rolls", while CD images have several disks. If each node has DVD drive, it is recommended to install Rocks in DVD image. Otherwise, people can use CD images to install each image one by one, although it takes time.

System requirements are given in the followings.

1. For a master node (called frontend node), Rocks requires more than 1MB memory, while for compute node, Rocks requires more than 512MB.
2. Rocks needs two network interfaces (cards) on the frontend node. One is for internet and other is for internal connection. For compute node, it requires to have one network interface to be connected to an internal switch.
3. A static IP address should be applied and prepared before installation. At UI, people can contact university domain service group at ITS.
4. Make sure one has enough power supply and an efficient cooling system for the whole cluster in full operation.

#### **1.2 Frontend Node Installation**

Basic installation on a frontend node is referenced clearly by Rocks User Guide, which is available on Rocks' Web site at (<http://www.rocksclusters.org/rocks-documentation/4.3/>).

Notes:

1. FQDN (official domain name like foo.bar.uiowa.edu) and global IP address (like 128.255.124.38) can be set only during installation and they are tedious to change lately after installation because these are configured in many places within the cluster system and must be consistent.
2. All rolls (additional packages for Rocks) should be installed. Because not only "required" rolls but also other rolls including the Ganglia and SGE (Sun Grid Engine) are installed during primary installation.

The followings are examples for Medical Imaging HPC & Informatics Lab:

```
Net mask: 255.255.252.0
Default gateway: 128.255.124.1
DNS servers: 128.255.64.5, 128.255.1.3, 128.255.64.11
```

### 1.3 Compute Node Installation

After people install the frontend node, it is time to install compute nodes. You can install whole nodes rank by rank, or you can install a rank of compute nodes.

To configure frontend's display setting, run

```
system-config-display
```

and choose appropriate options

```
Run
startx
```

to start X window system.

Open terminal from a menu by right-click. To enable function key input, change the terminal preference.

```
Run
insert-ethers
```

Select "compute nodes". Naming scheme of compute nodes is

```
"Compute-<RackNumber>-<RankNumber>."
```

You can use any rack number by running, for example,

```
insert-ethers -rack 5
```

Then, you turn on a compute-node computer, and insert the Kernel/Boot Roll CD or the install DVD.

Automatically, the compute node is detected and installed. If not, check BIOS boot setting in the compute node. Make sure the BIOS boot has CD or DVD boot first. It is recommended to check each node of compute to see this function before installation.

When you failed to install Rocks on a compute node to your cluster, or a compute node makes hardware trouble and needed to be removed, then run

```
insert-ethers -replace "compute-X -X "
```

and select “compute” and hit F10 key. You can see compute node information in the database by running

```
dbreport hosts
```

## 2 Cluster Setup Initiations

You can use `vi` (conventional editor) or `nano` (pico-like screen editor), or others to edit text file in Linux system. You need to edit root-restricted files (most of system configuration file), with `sudo` command.

### 2.1 Create User Accounts

After you login into the frontend node using root account, you can conduct administrative work

To make an user account

```
useradd UserName
```

To initiate a password for a new account and enable the account

```
passwd UserName
```

To login in an individual compute node without password

```
ssh-agent $SHELL and ssh-add
```

If you need to make “wheel” group for restrict **sudoable** users

```
usermod -G wheel UserName
```

To edit sudo configuration

```
visudo (special vi to edit sudo configuration files).
```

Now, accounts in wheel group can use sudo command like

```
sudo vi FileRestrictedToEdit
```

To distribute account information to whole the cluster

```
rocks-user-sync
```

### 2.2 “Soft” shut down

If necessary, one can operate “soft” shout down by login on a compute node without password, run

```
ssh-agent $SHELL and ssh-add
```

To shutdown only compute nodes, run

```
/opt/rocks/bin/cluster-fork /usr/sbin/shutdown -h now
```

and wait for a while. Most of cases, the power of compute node are shut down automatically.

To shutdown the frontend node, run

```
/usr/sbin/shutdown -h now.
```

## 2.3 Internet Security

### 2.3.1 Restrict SSH root login

To prohibit sshd login using root account directly, edit

```
/etc/ssh/sshd-config file and change
```

“PermitRootLogin Yes” into “PermitRootLogin No”.

To enable changing, restart sshd by running

```
sudo /sbin/service sshd restart
```

To restrict sshd connection from outside university (uiowa.edu),

```
/etc/hosts.deny should be  
all: all
```

And,

```
/etc/hosts.allow should be:  
all: .local
```

```
sshd: .uiowa.edu
```

“all: .local” is required to allow NFS connection from compute nodes!

Restarting inetd is not necessary.

### 2.3.2 Restrict su command

### 2.3.3

To prohibit non-wheel user to “su”, run

```
sudo vi /etc/pam.d/su
```

Obey “uncomment the following line to require a user to be in the “wheel” group.

## 2.4 Setting for the Ganglia Cluster Monitor

The following is an example of `/etc/gmetad.conf` to let Cluster2 recognize Cluster 1 and Cluster 3

Let Cluster 2 recognized by Cluster 1 and Cluster 3. Cluster 1 and Cluster3 are also required to be setup in the same way. For example, in our lab medical imaging computational grid, we have

```
gridname "Medical Imaging Computational"

data_source "MiHi Grid1" mihplab01.radiology.uiowa.edu:8649
data_source "MiHi Grid2" localhost:8649
data_source "MiHi Grid3" mihplab03.radiology.uiowa.edu:8649

trusted_hosts mihplab01.radiology.uiowa.edu
trusted_hosts mihplab03.radiology.uiowa.edu
```

To enable changing, run

```
sudo /sbin/service gmetad restart
```

## 2.5 Allow Public Access to the Web Server

Edit `/etc/syscon_g/iptables` and obey “# Uncomment the lines below to activate web access to the Cluster”. To enable the change, run

```
sudo /sbin/service iptables restart
```

## 3 Further Information

The detailed Rocks Users Guide can be found at [http://www.rocksclusters.org/wordpress/?page\\_id=4](http://www.rocksclusters.org/wordpress/?page_id=4)

These are must-read documentations.

Email discussion list search at [http://www.rocksclusters.org/wordpress/?page\\_id=4](http://www.rocksclusters.org/wordpress/?page_id=4).

This very useful high-traffic mailing list contains many useful questions and answers. Probably you may find the answers without submitting questions into the mailing list.