

# **Server Administration Guide**

Benthic Boundary Layer Project  
Kilo Nalu Observatory  
Hawaii Ocean Observing System  
Pacific Islands Ocean Observing System

Dec 2, 2011

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# 1. Server Administration Guide

## 1.1. Overview

The Kilo Nalu shore station server and the BBL campus server are the systems that collect data from instrument data streams using the RBNB DataTurbine software. They are configured to accept the following connections in run-level 5:

- RBNB - DataTurbine streaming server on TCP port 3333
- HTTP - Tomcat WebDAV interface for the DataTurbine on TCP port 8080 (LAN or SSH tunnel only)
- NTP - Network Time Protocol daemon on UDP port 5168
- SSH - command line system administration on TCP port 22
- VNC - Virtual Network Computing server on port 5901 (LAN or SSH tunnel only)

### 1.1.1. Hardware Administration

#### 1.1.1.1. Hardware description

The shore station server is a Penguin Computing Relion 1650 server with dual quad-core E5405 Xeon 2.0 GHz CPUs, 8 GB of RAM, and 1TB of disk storage. The server was purchased in May 2008 and was under next-day, on-site warranty for three years. It has dual Gigabit ethernet NICs, a Base Management Card for remote chassis administration, dual 650W PSUs, and an Adaptec 3405 PCIe RAID controller with 128MB of cache. There are 3 500GB 7200 RPM SATA2 drives in the RAID array.

The BBL campus server is a Dell PowerEdge 2950 server with dual dual-core 5060 Xeon 3.2 GHz CPUs, 8 GB of RAM, and 6x73GB of disk storage on a PERC/5i controller. The server was purchased in June 2006 and was under next-day, on-site warranty for three years. It has dual Gigabit ethernet NICs, dual 600W PSUs. It has an external 8TB iStoragePro iR4MIS RAID5 array purchased in 2010 with 4 Hitachi 2TB Deskstar disks and an Areca ARC-1680x PCIe SAS/SATA RAID controller.

#### 1.1.1.2. RAID arrays

On the shore station server, the RAID array is a standard RAID level 5 configuration that exports one logical device. There is room for one more 500GB disk in the server since we only ordered three to cut costs.

The BBL campus server originally used a 2TB RAID5 array on an Infortrend chassis. It provided the main data storage area, and was backed up via the 8TB array. Due to reduction in staff system administration time, and after having trouble connecting to this array, the enclosure was shut down. Data are currently being spooled to the 8TB array without reliable backup.

### 1.1.2. Operating System Administration

The shore server is currently running CentOS 5.4 32-bit (to then match the RHEL 5.4 32-bit BBL server installation). The BBL server has since been changed to the RHEL 5.4 64-bit OS. The following items need to be addressed for general management or for a system reinstall.

#### 1.1.2.1. Filesystem

The shore server main filesystem is `/dev/sda` and is formatted as ext3 and uses LVM for the `/var` and `/data` partitions. The main volume group is `vg01`, which contains two logical volumes, `var` and `data`, each of which are 385GB in size. The system partitions are shown below:

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda2	4.8G	1.9G	2.6G	43%	/
/dev/sda8	113G	8.1G	99G	8%	/home
/dev/sda6	19G	3.1G	15G	18%	/usr
/dev/sda1	99M	27M	68M	29%	/boot
tmpfs	4.0G	0	4.0G	0%	/dev/shm
/dev/mapper/vg01-var	385G	72G	294G	20%	/var
/dev/mapper/vg01-data	385G	16G	350G	5%	/data

The /data/kilonalu directory has been created and made writable to the kilonalu group.

The BBL campus server main filesystem is /dev/sda and is formatted as ext3 and uses LVM for the / , /var , /usr , /tmp , /home partitions. The main volume group is VolGroup\_ID\_32736, with logical volumes of varying size. The system partitions are shown below:

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/mapper/VolGroup_ID_32736-LogVol11	9.5G	7.3G	1.7G	82%	/
/dev/mapper/VolGroup_ID_32736-LogVol14	50G	33G	15G	70%	/var
/dev/mapper/VolGroup_ID_32736-LogVol15	18G	6.8G	11G	41%	/usr
/dev/mapper/VolGroup_ID_32736-LogVol12	3.9G	140M	3.6G	4%	/tmp
/dev/mapper/VolGroup_ID_32736-LogVolHome	44G	33G	9.2G	78%	/home
/dev/sda3	190M	32M	149M	18%	/boot
tmpfs	5.9G	0	5.9G	0%	/dev/shm
/dev/sdb1	5.4T	1.3T	3.9T	26%	/backup

The /data/kilonalu directory has been created and made writable to the kilonalu group.

### 1.1.2.2. User accounts and groups

Other than the standard system accounts, both a kilonalu user and a kilonalu group have been created and are used to run non-root processes associated with data management applications such as the DataTurbine. Other accounts include cjones, ross, mamc, jeff, pawlak, and brian, which are all part of the kilonalu group. These four users are also added to the wheel group, and this group has been added to the /etc/sudoers file with ALL=[ALL] permissions.

### 1.1.2.3. Firewall

The internal iptables firewall is set to allow certain services. The pertinent firewall rules are listed below.

The shore station's current configuration is:

```
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 123 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 123 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 80 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 8080 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 22 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 3333 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 33333 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 5168 -j ACCEPT
-A RH-Firewall-1-INPUT -j REJECT --reject-with icmp-host-prohibited
```

The BBL campus server's current configuration is:

```
-A RH-Firewall-1-INPUT -p icmp --icmp-type any -j ACCEPT
-A RH-Firewall-1-INPUT -p 50 -j ACCEPT
-A RH-Firewall-1-INPUT -p 51 -j ACCEPT
-A RH-Firewall-1-INPUT -p udp --dport 5353 -d 224.0.0.251 -j ACCEPT
-A RH-Firewall-1-INPUT -p udp -m udp --dport 631 -j ACCEPT
-A RH-Firewall-1-INPUT -p tcp -m tcp --dport 631 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state ESTABLISHED,RELATED -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 22 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 443 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 80 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 1194 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 1194 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 5000 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 5000 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 3306 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 3333 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 33333 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m udp -p udp --dport 5168 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 7766 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 8000 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 8080 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 8888 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 9000 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 9090 -j ACCEPT
-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 9997 -j ACCEPT
-A RH-Firewall-1-INPUT -j REJECT --reject-with icmp-host-prohibited
```

#### 1.1.2.4. Networking

The shore server's two Gigabit ethernet interfaces are `eth0` and `eth1`. The server's IP address on `eth0` is set to `192.168.100.60`, and has an WAN accessible address of `168.105.160.139` assigned. There is no IP assigned to `eth1`. Because there is no DNS server running on the internal Kilo Nalu network, there is no FQDN assigned to the server, however it's internal hostname is `kilonalu`. The subnet mask is set to `255.255.255.0`, and the gateway address is `192.168.100.1`.

The BBL campus server's two Gigabit ethernet interfaces are `eth0` and `eth1`. The server's IP address on `eth0` is set to `192.168.103.50`, and has an WAN accessible address of `128.171.104.26` assigned. There is no IP assigned to `eth1`. It's FQDN is `bbl.ancl.hawaii.edu`. The subnet mask is set to `255.255.255.0`, and the gateway address is `192.168.100.1`.

#### 1.1.2.5. Backup

Due to budget constraints, an external backup system was not been installed on the shore server, and so a system meltdown would require a full reinstallation and reconfiguration of the server and the third party software installed on it. However, data files that are placed in the `/data` directory are mirrored to the BBL server on campus. See the section on Rsync Configuration.

For the campus server, backup was provided by the 8TB external RAID array. However, due to reduction in staffing and trouble with the existing Infortrend array, data are now being stored on the 8TB array without reliable backup.

### 1.1.2.6. Remote Management Card

The shore server remote management card is configured on IP 192.168.100.63 and will respond to IPMI commands to control the server chassis in the event there is a problem communicating with the server via SSH, etc. The management username and password is set to admin/[ask for password]. Use ipmitool from another system to control the server.

### 1.1.2.7. System updates

Since these are a standard RHEL-type system, updates are handled using the yum system. To check for outstanding updates, as the root user use:

```
# yum -v check-update
```

To update the operating system packages, as the root user use:

```
# yum -v update
```

Kernel and other critical library updates that require a system reboot should be updated when system downtime has been scheduled. The BBL server had a subscription to the RHEL Network for system updates, but will need to be re-purchased (~ \$50) to continue updates. The shore station used CENT OS, and updates were free.

## 1.1.3. Software Administration

The servers have certain pieces of software installed to enable the management of the data streams and files. Each software package needs to be configured appropriately. The following sections describe each of the required software packages.

### 1.1.3.1. DataTurbine Installation and Configuration

The RBNB DataTurbine software runs on Mac OS X, Windows, and Linux, and can be downloaded from <http://code.google.com/p/dataturbine>. The current version is 3.2b4. From a VNC desktop or the system console desktop, double click on the downloaded .jar file to install it. During the installation, choose /usr/local/RBNB/[version] as the installation directory. Change the ownership of the installation directory using:

```
# chown -R kilonalu:kilonalu /usr/local/RBNB
```

Likewise, when reinstalling or upgrading the DataTurbine software, change the 'current' symbolic link found in /usr/local/RBNB to point to the new installation. For instance:

```
# cd /usr/local/RBNB; ln -s V3.2B4 current
```

References to the location of the RBNB DataTurbine software should only use /usr/local/RBNB/current to avoid problems when the software is updated.

The DataTurbine software relies on two other directories. The /var/lib/rbnb directory has been created to store the RBNB ring buffer files, and /var/log/rbnb has been created to store the RBNB system log and the log files for each of the source drivers. These must be made writable by the kilonalu group.

The DataTurbine is configured to startup in run levels 3 and 5. The following script is placed in /etc/init.d/rbnb and linked appropriately:

```

#!/bin/bash
# chkconfig: 345 98 98

if [ ! "${RBNB_HOME}" ]; then RBNB_HOME=/usr/local/RBNB/current; fi
RBNB_LOG='/var/log/rbnb/rbnb.log'
RBNB_PIDFILE='/var/run/rbnb.pid'
RBNB_ARCHIVE_LOC='/var/lib/rbnb'
RBNB_USER='kilonalu';
RBNB_SERVER='192.168.100.60';
RBNB_PORT='3333';
RBNB_MEM='2048' # Amount of memory in MB for the JVM running RBNB to use
RBNB_NAME='KNShoreStaionDataTurbine';
BBL_HOME='/usr/local/bbl/trunk';
start() {
    mkdir -p ${RBNB_ARCHIVE_LOC}; cd ${RBNB_ARCHIVE_LOC}
    su - ${RBNB_USER} -c "java -Xms${RBNB_MEM}M -Xmx${RBNB_MEM}M -jar ${RBNB_HOME}/bin/rbnb.jar
-F -H ${RBNB_ARCHIVE_LOC} -a ${RBNB_SERVER}:${RBNB_PORT} -n ${RBNB_NAME} > ${RBNB_LOG} 2>&1 &"
    RBNB_PID=$(ps -ef | grep rbnb | grep java | tr -s " " " " | cut -d" " -f2)
    echo $RBNB_PID > ${RBNB_PIDFILE}
    su - ${RBNB_USER} -c "cd ${RBNB_HOME}/bin; ./Start_Webserver.sh"
}
stop() {
    if [ -f ${RBNB_PIDFILE} ]; then
        kill -15 `cat ${RBNB_PIDFILE}`; rm -f ${RBNB_PIDFILE}
    fi
    su - ${RBNB_USER} -c "cd ${RBNB_HOME}/bin; ./Stop_Webserver.sh"
}
case "$1" in
    'start')
        echo "Starting the RBNB server"
        start
        ;;
    'stop')
        echo "Stopping the RBNB server"
        stop
        ;;
    'restart')
        echo "Restarting the RBNB server"
        stop
        start
        ;;
    *)
        echo "Usage: $0 {start|stop|restart} "
        ;;
esac

```

### 1.1.3.2. DataTurbine WebDAV Configuration

The DataTurbine WebDAV interface needs to be configured and started in order for Source and Sink applications to access the data streams over HTTP in addition to the TCP port 3333 interface. To do so, change the `/usr/local/RBNB/current/apache-tomcat-6.0.18/conf/server.xml` file to listen on port 8080 rather than port 80:

```

<Connector port="8080" protocol="HTTP/1.1"
    connectionTimeout="20000" redirectPort="443" />

```

Also modify the `/usr/local/RBNB/current/apache-tomcat-6.0.18/webapps/RBNB/WEB-INF/web.xml` file to enable WebDAV write access to the server. In the `<servlet>` container, add:

```
<init-param>
  <param-name>readonly</param-name>
  <param-value>false</param-value>
</init-param>
```

Once these changes are made, as the kilonalu user start the Tomcat server provided with the RBNB software:

```
$ cd /usr/local/RBNB/current/bin
$ ./Start_Webserver.sh
```

To stop the WebDAV interface:

```
$ cd /usr/local/RBNB/current/bin
$ ./Stop_Webserver.sh
```

The WebDAV interface is also configured to start automatically during the RBNB service startup script.

### 1.1.3.3. BBL software installation

The BBL software is maintained in a [Subversion](https://bbl.ancl.hawaii.edu/projects/bbl) repository at <https://bbl.ancl.hawaii.edu/projects/bbl>. On the each server, the software is installed in the `/usr/local/bbl` directory. To install this software, issue the following commands as root:

```
# cd /usr/local
# svn checkout https://bbl.ancl.hawaii.edu/projects/bbl
# chown -R kilonalu:kilonalu bbl
```

To update the code, become the kilonalu user and issue:

```
$ cd /usr/local/bbl/trunk
$ svn update
$ ant compile
```

This will compile any newly changed Java-based driver code. Drivers that have changed code will need to be restarted on the command line as described in the [Kilo Nalu Realtime Operations Guide](#).

### 1.1.3.4. VNC Configuration

A VNC server is configured to start upon server reboot under the kilonalu user. The service configuration file in `/etc/sysconfig/vncservers` is as follows:

```
VNCSERVERS="1:kilonalu"
VNCSERVERARGS[1]="-geometry 1280x720 -nohttpd -localhost -alwaysshared"
```

### 1.1.3.5. Rsync Configuration

Data files that are placed in the `/data` directory are mirrored to the BBL server on campus using `rsync`. The mirroring is handled by the kilonalu user via a shell script at `/home/kilonalu/mirror_kn_files.sh`. This file contains:

```
rsync -avt /data/kilonalu bbl.ancl.hawaii.edu:/data/raw
```