

Network Monitoring Lab

Introduction

In this exercise, we will set up **LibreNMS** as our network monitoring package. The software will poll your routers and switches using SNMP and provide visibility of OSPF sessions and other useful information

Throughout these instructions we will use the names and addresses related to **campusX**. You should make sure you change any names and addresses in the examples to match your assigned group of machines.

SNMP Configuration on Network Devices

Before we configure our LibreNMS, our network monitoring software, we need to configure the SNMP community string on **all** the routers and the switches in our campus.

The IP address of the management system we will be setting up is 100.68.X.130 (replace **X** with your campus number) so we only allow that host in access-list 99. And then we will use the community called *NetManage*, and only allow members of access-list 99 access to the device. Finally, we tell the device to retain the interface index through reboots and the addition or removal of interfaces.

Here is a sample configuration:

```
access-list 99 permit 100.68.X.130
!
snmp-server community NetManage RO 99
snmp-server ifindex persist
```

If your switch or router doesn't take the *snmp-server ifindex* command, try this SNMP command instead:

```
snmp ifmib ifindex persist
```

Even though Cisco IOS is one operating system, the implementation details on different platforms can well be different. The latter format tends to be used on more modern devices, especially ethernet switches.

Before proceeding, check that all routers and switches in your campus have SNMP configured.

Setting up your NMS PC

The following sections go through the process of setting up LibreNMS on your Network Monitoring PC.

Login to your management PC

```
ssh sysadm@pcl-campusX.ws.nsrc.org
```

The password will be given in class.

NOTE: These instructions assume you are the root user. If you are not, prepend `sudo` to the shell commands (the ones that aren't at `mysql>` prompts) or temporarily become a user with root privileges with `sudo -s`.

Install MySQL database

LibreNMS stores its data in a MySQL database. We will assume that the database is running on the same machine as your network management server (this is the most common initial deployment scenario).

```
apt-get install mysql-server mysql-client
```

You will be prompted for a root password for MySQL during the installation. Use the login password you were given in class. Then we can connect to the MySQL server:

```
mysql -uroot -p
```

Input the MySQL root password to enter the MySQL command-line interface where you will get a `mysql>` prompt.

Create the **librenms** database:

```
CREATE DATABASE librenms;
GRANT ALL PRIVILEGES ON librenms.*
  TO 'librenms'@'localhost'
  IDENTIFIED BY 'abc123'
;
FLUSH PRIVILEGES;
exit
```

Here we are using "abc123" as the password for librenms to access MySQL.

NOTE: Don't use a password like this on a production server!

Install the Linux packages

Install the required software:

```
apt-get install libapache2-mod-php5 php5-cli php5-mysql php5-gd php5-snmp \
  php-pear php5-curl snmp graphviz php5-mcrypt php5-json apache2 fping \
  imagemagick whois mtr-tiny nmap python-mysqldb snmpd mysql-client \
  php-net-ipv4 php-net-ipv6 rrdtool git
```

The packages listed above are an all-inclusive list of packages that were necessary on a clean install of Ubuntu 14.04.

Install the LibreNMS software

LibreNMS is installed using software called **git**.

The initial install from github.com is called a **git clone**; subsequent updates are done through **git pull**. The command used was:

```
git config --global http.proxy http://s1.ws.nsrc.org:8123
```

but don't run this command on your PC because the initial clone can take quite a while (nearly 5 minutes on a 10Mbps connection is typical). For this workshop the instructors have set up a local mirror on the workshop webserver for you to use.

Run the following:

```
cd /opt
wget http://www.ws.nsrc.org/downloads/librenms.tar.gz
tar xzf librenms.tar.gz
```

You should now have a new directory called **/opt/librenms** which contains the software.

Set up the web server

To prepare the web interface (and adding devices shortly), you'll need to create and chown a directory as well as create an Apache vhost.

Create and chown the `rrd` directory and create the `logs` directory:

```
cd /opt/librenms mkdir rrd logs chown www-data:www-data logs/ rrd/
```

Create `/etc/apache2/sites-available/librenms.conf` containing the following:

```
<VirtualHost *:80>
    DocumentRoot /opt/librenms/html/
    ServerName librenms.campusX.ws.nsrc.org
    CustomLog /opt/librenms/logs/access_log combined
    ErrorLog /opt/librenms/logs/error_log
    AllowEncodedSlashes
    NoDecode
    <Directory "/opt/librenms/html/">
        Require all granted
        AllowOverride All
        Options FollowSymLinks MultiViews
    </Directory>
</VirtualHost>
```

Change **X** in `librenms.campus**X**.ws.nsrc.org` to correspond to your management PC name. For example:

```
pcl-campus1.ws.nsrc.org => librenms.campus1.ws.nsrc.org
```

On Ubuntu 14.04, `mcrypt` is not enabled on install. Run the following to enable it:

```
php5enmod mcrypt
```

Now enable the vhost and restart Apache

```
a2ensite librenms a2enmod rewrite service apache2 restart
```

Configuring the LibreNMS software

We need to configure MySQL password details in the LibreNMS software:

```
cd /opt/librenms
cp config.php.default config.php
editor config.php
```

Change the values to the right of the equal sign for lines beginning with `$config[db_]` to match your database information as setup above.

```
$config['db_host'] = "localhost";
$config['db_user'] = "librenms";
$config['db_pass'] = "abc123";
$config['db_name'] = "librenms";
```

Change the value of `$config['snmp']['community']` from `public` to `NetManage`:

```
$config['snmp']['community'] = "NetManage";
```

Save the changes!

Initialise the database

Initiate the **librenms** database with the following command:

```
php build-base.php
```

Create admin user

Create the admin user - priv should be 10

```
php adduser.php `<name>` `<pass>` 10
```

Substitute your desired username and password -- and leave the angled brackets off. We suggest you use **sysadm** and the class password.

Add your routers

LibreNMS uses hostnames when it monitors devices. Normally we'd add our routers to the DNS but for this workshop we'll just add our ISP routers to the /etc/hosts file. Edit /etc/hosts and add entries for your devices. For example, if you have been allocated 100.68.X.0/24, then your entries would look like:

```
100.68.X.1    bdr1-campusX
100.68.X.2    core1-campusX
172.2X.10.2   dist1-b1-campusX
172.2X.10.3   edge1-b1-campusX
172.2X.10.4   edge2-b1-campusX
172.2X.20.2   dist1-b2-campusX
172.2X.20.3   edge1-b2-campusX
172.2X.20.4   edge2-b2-campusX
```

Make sure you change 'X' to match your campus group

Save the changes and check that you can ping the routers using these names.

Now we can add the devices to LibreNMS:

```
php addhost.php bdr1-campusX NetManage v2c
php addhost.php core1-campusX NetManage v2c
etc....
```

This assumes you haven't made SNMP community changes -- if you have, replace `NetManage` with your community. It also assumes SNMP v2c.

Test poller

Discover the newly added hosts and poll them for the first time: do this at the command line so you can see if it is working properly.

```
cd /opt/librenms
php discovery.php -h all && php poller.php -h all
```

Create cronjob

Create the cronjob which will run periodic tasks required by librenms

```
cp librenms.cron /etc/cron.d/librenms
```

Daily Updates

LibreNMS performs daily updates by default. At 00:15 system time every day, a `git pull --no-edit --quiet` is performed. You can override this default by editing your `config.php` file. Remove the comment (the `#` mark) on the line:

```
#$config['update'] = 0;
```

so that it looks like this:

```
$config['update'] = 0;
```

Install complete

That's it! You now should be able to log in to <http://librenms.campusX.ws.nsrc.org/>. Please note that we have not covered HTTPS setup in this example, so your LibreNMS install is not secure by default. Please do not expose it to the public Internet unless you have configured HTTPS and taken appropriate web server hardening steps.

You should use your instance of LibreNMS to monitor your routers and switches during the workshop - you'll be able to see information about your OSPF sessions once they're working

NOTE: These instructions are based on the official LibreNMS installation notes at:

[http://docs.librenms.org/Installation/Installation-\(Debian-Ubuntu\)/](http://docs.librenms.org/Installation/Installation-(Debian-Ubuntu)/)

and have been tested on a fresh install of Ubuntu 14.04.