% Netdot exercise
% Network Management Topics

Introduction

The Network Documentation Tool (Netdot) is an open source tool designed to help network administrators collect, organize and maintain network documentation. Netdot is actively developed at the University of Oregon.

Goals

In these exercises we will install Netdot and demonstrate some of its most important features.

Notes

* Commands preceded with "$" imply that you should execute the command as a general user - not as root.
* Commands preceded with "#" imply that you should be working as root.
* Commands with more specific command lines (e.g. "RTR-GW>" or "mysql>") imply that you are executing commands on remote equipment, or within another program.

Installation

<!-- This bit when installing from scratch

Package Dependencies

Some packages are available in Ubuntu. We'll install those first (you will probably want to copy/paste the following):

```
$ sudo apt-get -y install apache2 libapache2-mod-perl2 rrdtool librrds-perl \
graphviz libmodule-build-perl libcgi-pm-perl libclass-dbi-perl \
libclass-dbi-abstractsearch-perl libapache2-request-perl libhtml-mason-perl \
libapache-session-perl liburi-perl libsql-translator-perl libsnmp-info-perl \
libnetaddr-ip-perl liblog-dispatch-perl liblog-log4perl-perl \
libparallel-forkmanager-perl libauthen-radius-perl  libtest-simple-perl \
libtime-local-perl libfile-spec-perl libnet-dns-perl  libcarp-assert-perl \
libdigest-sha-perl libssl-dev dnssec-tools libsocket6-perl libxml-simple-perl \
mysql-server libdbix-datasource-perl
```

(If you had not installed mysql-server, you'll be asked for a DBA password. Use the password that you used to log in to the PC).

Download the latest Netdot package:

First check if it's available in your classroom's NOC server:

```
$ cd /usr/local/src
$ sudo wget http://noc.ws.nsrc.org/downloads/netdot-0.9.10.tar.gz
```

If not, try from the official site:

```
$ sudo wget --no-check-certificate \
https://netdot.uoregon.edu/pub/dists/netdot-0.9.10.tar.gz
```

Unpack the tarball:

```
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$ sudo tar xzvf netdot-0.9.10.tar.gz
$ cd netdot-0.9.10
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```

Install remaining dependencies:

```
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$ sudo make installdeps-apt-get
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

When you see the following dialog:

```
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Setting up libbind-confparser-perl (0.95-3) ...
 would you like to continue and install all modules through CPAN [y/n]? [y]
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

Press <ENTER>

When you see:

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Would you like me to configure as much as possible automatically? [yes]
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

Press <ENTER>

Installation of the remaining PERL modules will take a fairly long time (you may want to consider getting some coffee...).

Verify that we have all the necessary dependencies:

```
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$ make testdeps
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

Initialize the site configuration:

```
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$ sudo cp etc/Default.conf etc/Site.conf
$ sudo editor etc/Site.conf
```

  Find and change the following values:

```
NETDOTNAME => 'pcX.ws.nsrc.org',
DB_DBA_PASSWORD => '(the password you used when installing mysql)',
DEFAULT_SNMPCOMMUNITIES  =>  ['NetManage', 'public'],
NMS_DEVICE => 'localhost',
DEFAULT_DNSDOMAIN  => 'ws.nsrc.org',
DEVICE_NAMING_METHOD_ORDER => [ 'sysname', 'snmp_target' ],
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

Save and exit from the file

Install the application and initialize the database

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
$ sudo make install APACHEUSER=www-data APACHEGROUP=www-data
$ sudo make installdb
$ sudo ln -s /usr/local/netdot/etc/netdot_apache2_local.conf \
/etc/apache2/conf.d/
$ sudo service apache2 graceful
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

Install the cron jobs for automated tasks

~~~~~~
$ sudo cp netdot.cron /etc/cron.d/netdot
~~~~~~

Operation

Log into the web interface

In your browser, go to:

~~~~~~
http://pcX.ws.nsrc.org/netdot
~~~~~~

Log in with admin/admin

Changing default passwords

Netdot comes with three default user accounts. You should change the default
passwords on those.

Go to the "Contacts" tab, then search for "Admin". You should see the details
for the Admin user. Click on [edit], and find the Password field. Type the
password you used to log in to your PC, then click on the "Update" button.

Repeat the same steps for the other default users:

* operator
* guest

Discovering devices

If you have not done so yet, configure SNMP on your PC and your router.

* See Appendix A for instructions on configuring the Linux SNMP agent
* See Appendix B for instructions on configuring SNMP on a Cisco router

Now back to Netdot. Let's create a file with all the devices in the lab network
that respond to SNMP:

~~~~~~
$ editor /home/sysadm/discoverme.txt

Copy and paste the following list:

```
gw.ws.nsrc.org NetManage
sw.ws.nsrc.org NetManage
rtr1.ws.nsrc.org NetManage
rtr2.ws.nsrc.org NetManage
rtr3.ws.nsrc.org NetManage
rtr4.ws.nsrc.org NetManage
rtr5.ws.nsrc.org NetManage
rtr6.ws.nsrc.org NetManage
pc1.ws.nsrc.org NetManage
pc2.ws.nsrc.org NetManage
pc3.ws.nsrc.org NetManage
pc4.ws.nsrc.org NetManage
pc5.ws.nsrc.org NetManage
pc6.ws.nsrc.org NetManage
pc7.ws.nsrc.org NetManage
pc8.ws.nsrc.org NetManage
pc9.ws.nsrc.org NetManage
pc10.ws.nsrc.org NetManage
```
~~~~~~

```
pc11.ws.nsrc.org NetManage
pc12.ws.nsrc.org NetManage
pc13.ws.nsrc.org NetManage
pc14.ws.nsrc.org NetManage
pc15.ws.nsrc.org NetManage
pc16.ws.nsrc.org NetManage
pc17.ws.nsrc.org NetManage
pc18.ws.nsrc.org NetManage
pc19.ws.nsrc.org NetManage
pc20.ws.nsrc.org NetManage
pc21.ws.nsrc.org NetManage
pc22.ws.nsrc.org NetManage
pc23.ws.nsrc.org NetManage
pc24.ws.nsrc.org NetManage
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

Now, tell Netdot to discover those devices:

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
# cd /usr/local/netdot
# bin/updatedevices.pl -E /home/sysadm/discoverme.txt -IAF
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

When that is done, go to the web interface and navigate to

    Management -> Devices

In the search box, type "*", and hit ENTER

You should see discovered devices in that list. Go to the link for your group's router (e.g. rtrX.ws.nsrc.org)

* Navigate to all the tabs: Basic, Interfaces, Modules, IP Info, etc. Netdot allows you to augment the information gathered from the device with details entered manually.

* In the ARP section, you should see one entry with a timestamp. Click on that entry. You should see a table associating IP addresses with MAC addresses. This is the ARP table discovered from rtr1. You should see your PC's IP address and MAC address.

(We will explain in the class why the virtual PCs are not auto-discovered)

Finding a computer in your network

* Obtain the MAC address from your laptop (or desktop)
* In the Netdot web interface, go to Management -> Devices
* Type (or paste) your MAC address and hit ENTER

Netdot will show you which devices were seeing that MAC address the last time that it discovered the network.

Managing IP address space

Go to Management -> Address Space

You should see a list of private IP blocks (from RFC-1918). These come pre-installed in Netdot.

Click on 10.10.0.0/8

You will see a list of discovered IP blocks, which are marked as "Subnets". These were found in routers.

* Click on 10.10.1.0/24.

* Click on [edit]
* In the Description field, type "Group 1 PCs"
* Click "Save"

Create a container to include all the group subnets

In the section called "Address Space Tasks" on top, click on the "[new]"
button and enter the following:

* IP/Prefix: 10.10.0.0/16
* Owner: click on [new].
* In the new "Entity" window, enter:
  * Name: NSRC Lab
  * Insert button, then [close]
* Used by: (leave blank)
* Status: Container
* Description: NSRC lab student networks
* Save button

You should now see the new Container page. It shows a graphical representation
of the /16 block. All the existing subnets are shown in red. The green space
represents unused or available address space.

* On the top of the graph there is a section called "Zoom: set one row equal to"
  Select /24 from the drop-down menu. Each row now represents a /24 block
* Click on [tree view] to see a tree graph view of the IP hierarchy

Polling devices

Periodically you will want to connect again to your routers and switches to
fetch their routing tables, forwarding tables etc. Run the command which
does this:

~~~
# /usr/local/netdot/bin/updatedevices.pl -DIFAT
~~~

* -D: poll all devices already in the database
* -I: get device info (e.g. sysName)
* -F: get switch forwarding tables
* -A: get router ARP tables
* -T: re-calculate the topology

To avoid having to run this by hand, you can install a crontab which will
do it automatically at set times of day. Have a look at the contents of the
file `/usr/local/src/netdot-0.9.10/netdot.cron`. On a production system
you would copy this file into the directly `/etc/cron.d/` and it would run
periodically.

More information

[Official Netdot Website](http://netdot.uoregon.edu)

Appendix A

Install and configure an SNMP agent on your Linux PC

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$ sudo apt-get install snmp snmpd
~~~~~~

Configure the agent. First, make a copy of the distributed config file:

~~~~~~
$ sudo mv /etc/snmp/snmpd.conf /etc/snmp/snmpd.conf.dist
~~~~~~

~~~~~~

And create a new simple configuration:

~~~~~~
$ sudo editor /etc/snmp/snmpd.conf

  And add the following lines:

syslocation My University
syscontact Network Services (nethelp@mydomain.com)
sysservices 72
rocommunity NetManage
~~~~~~

And then restart the daemon:

~~~~~~
$ sudo service snmpd restart
~~~~~~

Test it:

~~~~~~
$ snmpwalk -v2c -c NetManage localhost system
~~~~~~

You should get some system information

\pagebreak

Appendix B

Configuring SNMP on your Cisco router

Connect to the router. Substitute X for your group number:

(your instructor will provide the username and password)

~~~~~~
$ ssh <username>@rtrX.ws.nsrc.org
~~~~~~

If SSH is not configured on the router, you may need to use telnet:

~~~~~~
$ telnet rtrX.ws.nsrc.org
~~~~~~

* Note: Never use telnet on a production network!

Then configure SNMP like this:

~~~~~~
configure terminal
snmp-server community NetManage
end
write memory
exit
~~~~~~

Now test it:
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```
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$ snmpwalk -v2c -c NetManage rtrX.ws.nsrc.org system
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```