Network Management & Monitoring
Smokeping

Exercises

0. Connect to your PC as the sysadm user and start a root shell

```
$ sudo bash
#
```

1. Install Smokeping

```
# apt-get install smokeping
```

Then point your web browser at

```
http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
```

to check that it is running.

2. Initial Configuration

```
# cd /etc/smokeping/config.d
# ls -l

-rwxr-xr-x 1 root root  578 2010-02-26 01:55 Alerts
-rwxr-xr-x 1 root root  237 2010-02-26 01:55 Database
-rwxr-xr-x 1 root root  413 2010-02-26 05:40 General
-rwxr-xr-x 1 root root  271 2010-02-26 01:55 pathnames
-rwxr-xr-x 1 root root  859 2010-02-26 01:55 Presentation
-rwxr-xr-x 1 root root  116 2010-02-26 01:55 Probes
-rwxr-xr-x 1 root root  155 2010-02-26 01:55 Slaves
-rwxr-xr-x 1 root root 8990 2010-02-26 06:30 Targets
```

The files that you'll need to change, at a minimum, are:

* Alerts
* General
* Probes
* Targets

Now open the General file (note the first capital letter)

```
# editor General
```

Change the following lines (don't leave them indented):

```
owner    = NOC
contact  = sysadmin@localhost
cgiurl   = http://localhost/cgi-bin/smokeping.cgi
mailhost = localhost
# specify this to get syslog logging
syslogfacility = local5
```

Save the file and exit. Now let's restart the Smokeping service to verify
that no mistakes have been made before going any further:

```
        # service smokeping stop
        # service smokeping start
```

Warning! The "restart" option is not reliable. Use "stop" and "start" instead.

3. Configure monitoring of devices

The majority of your time and work configuring Smokeping will be done in the
file /etc/smokeping/config.d/Targets.

For this class please do the following:

Use the default FPing probe to check:

- all the student NOC PCs
- classroom NOC
- switches
- routers

You can use the classroom Network Diagram on the classroom wiki to figure out addresses
for each item, etc.

Create some hierarchy to the Smokeping menu for your checks. For example, the Targets
file is already partially preconfigured. To start we are going to add some entries to
this file. Start with:

```
    # cd /etc/smokeping/config.d
    # editor Targets
```

You can take the section from *** Targets *** to the end of the LocalMachine and make it
look something like this. Feel free to use your own "remark", "menu" text and titles.

The ">>>>>>>>" are not in the file, this indicates start of text, then "<<<<<<<<" is end
of text:

```
>>>>>>>>

*** Targets ***

probe = FPing

## You have to edit and uncomment all what you want below this.
# Please, refer to smokeping_config man page for more info
# The given adresses aren't real to avoid DoS.

menu = Top
title = Network Latency Grapher
remark = Welcome to the SmokePing Latency Grapher for \
         the GARNET-AfNOG-KNUST-NSRC Workshop

+Local

menu = Network Monitoring and Management
```

```
title = NOC Server for Network Monitoring Class

++LocalMachine

menu = localhost
title = localhost
host = localhost

<<<<<<<


Now, below the "localhost" we start with the configuration of items for our class.
We can start simple and add just the first 4 PCs that are in Group 1 as well as an
entry for our classroom NOC machine and our three Mac Mini server boxes.

Warning! If you do not have properly functioning DNS resolution, then you will
need to use the complete Fully Qualified Domain Name (FQDN) for each machine you are
monitoring. Thus, instead of "host = pc1" you will need to specificy
"host = pc1.ws.nsrc.org"


>>>>>>>>

#
# ********* Classroom Servers **********
#

+Servers

menu = Servers
title = Network Management Servers

++noc

menu = noc
title = Workshop NOC
host = noc

++s1

menu = s1
title = s1 (Host MacMini for Student PCs)
host = s1

++s2

menu = s2
title = s2 (Host MacMini for Student PCs)
host = s2

++s3

menu = s3
title = s3 (Host MacMinit for Student PCs)
host = s3

#
# ******** Student Machines (VMs) ***********
#
```

```
+PCs

menu = Lab PCs
title = Virtual PCs Network Management

++pc1

menu = pc1
title = Virtual Machine 1
host = pc1


++pc2

menu = pc2
title = Virtual Machine 2
host = pc2


++pc3

menu = pc3
title = Virtual Machine 3
host = pc3


++pc4

menu = pc4
title = Virtual Machine 4
host = pc4

<<<<<<<<
```

OK. Let's see if we can get Smokeping to stop and start with the changes we have made, so far. Save and exit from the Targets file. Now try doing:

```
# service smokeping stop
# service smokeping start
```

If you see error messages, then read them closely and try to correct the problem in the Targets file. In addition, Smokeping is now sending log message to the file /var/log/messages. You can view what Smokeping is saying by typing:

```
# tail /var/log/messages
```

If you want to see all smokeping related messages in the file /var/log/message you can do this:

```
# grep smokeping /var/log/messages
```

If there are no errors you can view the results of your changes by going to:

```
http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
```

When you are read you can edit the Targets file again and continue to add machines. At the bottom of the file you can add the next group of PCs:

```
>>>>>>>>

++pc5

menu = pc5
title = Virtual Machine 5
host = pc5


++pc6

menu = pc6
title = Virtual Machine 6
host = pc6


++pc7

menu = pc7
title = Virtual Machine 7
host = pc7


++pc8

menu = pc8
title = Virtual Machine 8
host = pc8

<<<<<<<<
```

Add as many PCs as you want, then Save and exit from the Targets file and verify that the changes you have made are working:

```
    # service smokeping stop
    # service smokeping start
```

You can continue to view the updated results of your changes on the Smokeping web page. It may take up to 5 minutes before graphs beging to appear.

```
    http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
```

4. Configure monitoring of routers and switches

Once you have configured as many PCs as you want to configure, then it's time to add in some entries for the classroom routers and switch(es).

```
    # cd /etc/smokeping/config.d        (just to be sure :-))
    # editor Targets
```

Go to the bottom of the file and add in some entries for routers and switches:

```
>>>>>>>>

#
```

```
# ********** Classroom Backbone Switch *********
#

+Switches

menu = Switches
title = Switches Network Management

++sw

menu = sw
title = Backbone Switch
host = sw

#
# ********** Virtual Routers: Cisco 7200 images *********
#

+Routers

menu = Routers
title = Virtual and Physical Routers Network Management

++gw

menu = rtr
title = Gateway Router
host = rtr

++router1

menu = router1
title = Virtual Router 1
host = rtr1

++router2

menu = router2
title = Virtual Router 2
host = rtr2

++router3

menu = router3
title = Virtual Router 3
host = rtr3

<<<<<<<<
```

If you wish you can continue and add in entries for routers 4 to 6, or to 9.
When you are ready Save and Exit from the Targets file and verify your work:

```
    # service smokeping stop
    # service smokeping start
```

If you want you might consider adding the Wireless Access Points:

```
    # editor Targets
```

```
>>>>>>>>

++ap1

menu = ap1
title = Wireless Access Point 1
host = ap1

++ap2

menu = ap2
title = Wireless Access Point 2
host = ap2

<<<<<<<<
```

5. Add new probes to Smokeping

The current entry in the Probes file is fine, but if you wish to use additional Smokeping checks you can add them in here and you can specify their default behavior. You can do this, as well, in the Targets file if you wish.

To add a probe to check for HTTP latency as well as DNS lookup latency add the following to the end of the Probes file:

```
    # editor Probes


>>>>>>>>

+ EchoPingHttp

+ DNS
binary = /usr/bin/dig
pings = 5
step = 180
lookup = www.nsrc.org

<<<<<<<<
```

The DNS probe will look up the IP address of www.nsrc.org using any other open DNS server you specify in the Targets file. You will see this a bit futher on. Now Save and exit from the file and verify that your changes are working:

```
    # service smokeping stop
    # service smokeping start
```

6. add HTTP latency checks for the classroom PCs

Edit the Targets file again and go to the end of the file:

```
    # editor Targets
```

At the end of the file add:

```
>>>>>>>>

#
# Web server response
#

+HTTP

menu = HTTP Response
title = HTTP Response Student PCs

++pc1

menu = pc1
title = pc1 HTTP response time
probe = EchoPingHttp
host = pc1

++pc2

menu = pc2
title = pc2 HTTP response time
probe = EchoPingHttp
host = pc2

++pc3

menu = pc3
title = pc3 HTTP response time
probe = EchoPingHttp
host = pc3

++pc4

menu = pc4
title = pc1 HTTP response time
probe = EchoPingHttp
host = pc4

<<<<<<<<
```

You could actually just use the "probe = EchoPingHttp" statement once for pc1, and then this would be the default probe until another "probe = " statement is seen in the Targets file.

You can add more PC entries if you wish, or you could consider checking the latency on remote machines - these are likely to be more interesting. Machines such as your own publicly accessible servers are a good choice, or, perhaps other web servers you use often (Google, Yahoo, Government pages, stores, etc.?).

Once you are done, save and exit from the Targets file and verify your work:

```
# service smokeping stop
# service smokeping start
```

7. Add DNS latency checks

At the end of the Targets file we are going to add some entries to verify the latency from our location to remote recursive DNS servers to look up an entry for nsrc.org. You would likely substitue an important address for your institution in the Probes file instead. In addition, you can change the address you are looking up inside the Targets file as well. For more information see:

    http://oss.oetiker.ch/smokeping/probe/DNS.en.html

and

    http://oss.oetiker.ch/smokeping/probe/index.en.html

Now edit the Targets file again. Be sure to go to the end of the file:

```
    # cd /etc/smokeping/config.d            (just to be sure...)
    # editor Targets
```

At the end of the file add:

```
>>>>>>>>

#
# Sample DNS probe
#

+DNS

probe = DNS
menu = DNS Latency
title = DNS Latency Probes

++LocalDNS1
menu = 10.10.0.250
title =  DNS Delay for local DNS Server on noc.ws.nsrc.org
host = noc.ws.nsrc.org

++GoogleA
menu = 8.8.8.8
title = DNS Latency for google-public-dns-a.google.com
host = google-public-dns-a.google.com

++GoogleB

menu = 8.8.8.4
title = DNS Latency for google-public-dns-b.google.com
host = google-public-dns-b.google.com

++OpenDNSA

menu = 208.67.222.222
title = DNS Latency for resolver1.opendns.com
host = resolver1.opendns.com

++OpenDNSB

menu = 208.67.220.220
title = DNS Latency for resolver2.opendns.com
```

```
host = resolver2.opendns.com

<<<<<<<<
```

Now save the Targets file and exit and verify your work:

```
    # service smokeping stop
    # service smokeping start
```

Look at additional Smokeping probes and consider implementing some of them if they are useful to your ogranization:

```
        http://oss.oetiker.ch/smokeping/probe/index.en.html
```

8. MultiHost graphing

Once you have defined a group of hosts under a single probe type in your /etc/smokeping/config.d/Targets file, then you can create a single graph that will show you the results of all smokeping tests for all hosts that you define. This has the advantage of letting you quickly compare, for example, a group of hosts that you are monitoring with the FPing probe.

The MultiHost graph function in Smokeping is extremely picky - pay close attention!

To create a MultiHost graph first edit the file Targets:

```
    # editor Targets
```

Find the end of your initial PC definitions. It should be just before you started to configure your routers and switches. That section starts with:

```
>>>>>>>>

#
# ********** Classroom Backbone Switch *********
#

<<<<<<<<
```

So, just _before_ this we'll create two MultiHost entries. One will be for PCs number 1-12, or all the PCs in groups 1 to 3, and the other will be for PCs number 13-24, or all the PCs in groups 4 to 7.

Warning! If you have not already configured PCs 1 to 24, then do not configure any entries with PCs that are not yet defined.

Now add the two MultiHost entries. They look like this:

```
>>>>>>>>

++MultihostHTTPGroups1-3
```

```
menu = MultihostHTTPGroups1-3
title = Combined HTTP Results
host = /HTTP/pc1 /HTTP/pc2 /HTTP/pc3 /HTTP/pc4 /HTTP/pc5 /HTTP/pc6 \
       /HTTP/pc7 /HTTP/pc8 /HTTP/pc9 /HTTP/pc10 /HTTP/pc11 /HTTP/pc12

++MultihostHTTPGroups4-6

menu = MultihostHTTPGroups4-6
title = Combined HTTP Results
host = /HTTP/pc13 /HTTP/pc14 /HTTP/pc15 /HTTP/pc16 /HTTP/pc17 /HTTP/pc18 \
       /HTTP/pc19 /HTTP/pc20 /HTTP/pc21 /HTTP/pc22 /HTTP/pc23 /HTTP/pc24

<<<<<<<<
```

Save and exit from the Targets file. Now attempt to restart Smokeping:

```
    # service smokeping stop
    # service smokeping start
```

If this fails you almost certainly have an error in the entries. If you cannot figure out what t
is (remember to try "tail /var/log/messages" first!) ask your instructor for some help.

If things work and you want to add a MultiHost entry for your DNS servers, then edit the file Ta
but go to the very end of the file and add:

```
>>>>>>>>

#
# Multihost Graph of all DNS latency checks
#

++MultiHostDNS

menu = MultiHost DNS
title = Consolidated DNS Responses
host = /DNS/LocalDNS1 /DNS/GoogleA /DNS/GoogleB /DNS/OpenDNSA /DNS/OpenDNSB \
       /DNS/DNSAdvantageA /DNS/DNSAdvantageB
<<<<<<<<
```

And, as always, save and exit from the file Targets and test your new configuration.

9. Send Smokeping alerts

If you wish to receive an email when an alert condition is met on one of the
Smokeping checks first do this:

```
    # cd /etc/smokeping/config.d
    # editor Alerts
```

Update the top of the file where it says:

```
        *** Alerts ***
        to = alertee@address.somewhere
        from = smokealert@company.xy
```

to include a proper "to" and "from" field for your server. Something like:

```
        *** Alerts ***
        to = sysadm@localhost
        from = smokeping-alert@localhost
```

Now you must update your device entries to include a line that reads:

```
    alerts = alertName1, alertName2, etc, etc...
```

For instance, the alerts named, "startloss", "bigloss", and "rttdetect" have already been defined in the file Alerts:

To read about Smokeping alerts and what they are detecting, how to create your own, etc. see:

```
    http://oss.oetiker.ch/smokeping/doc/smokeping_config.en.html
```

and at the bottom of the page is a section titled, "*** Alerts ***"

To place some alert detection on some of your hosts open the file Targets:

```
    # editor Targets
```

and go near the start of the file where we defined our PCs. Just under the "host =" line add another line that looks like this:

```
    alerts = startloss,bigloss,rttdetect
```

So, for example, the pc1 entry would not look like this:

```
>>>>>>>>

++pc1

menu = pc1
title = Virtual Machine 1
host = pc1
alerts = startloss,bigloss,rttdetect

<<<<<<<<
```

If you want to add an alerts option to other hosts go ahead. Once you are done save and exit from the Targets file and then verify that your configuration works:

```
    # service smokeping stop
    # service smokeping start
```

If any of the hosts that have the "alerts = " option set meet the conditions to set off the alert, then an email will arrive to the sysadm user's mailbox on the Smokeping server machine (localhost). It's not likely that an alert will be set off for most machines. To check you can read the email for the sysadm user by using an email client like "mutt" -

```
    # apt-get install mutt
    # mutt
```

Say yes to mailbox creation when prompted, then see if you have email from the smokeping-alerts@localhost user.

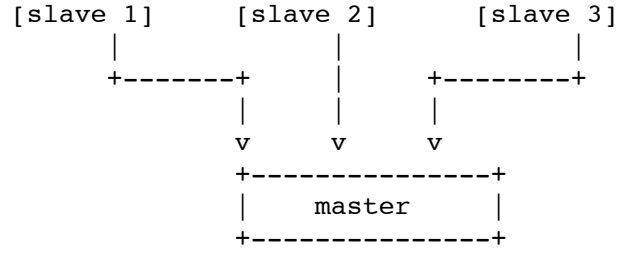
10. Slave instances - Informational Only

This is a description only for informational purposes in case you wish
to attempt this type of configuration once the workshop is over.

The idea behind this is that you can run multiple smokeping instances
at multiple locations that are monitoring the same hosts and/or services
as your master instance. The slaves will send their results to the
master server and you will see these results side-by-side with your
local results. This allows you to view how users outside your network
see your services and hosts.

This can be a powerful tool for resolving service and host issues that
may be difficult to troubleshoot if you only have local data.

Graphically this looks this:



You can see example of this data here:

http://oss.oetiker.ch/smokeping-demo/

Look at the various graph groups and notice that many of the graphs
have multiple lines with the color code chart listing items such as
"median RTT from mipsrv01" - These are not MultiHost graphs, but rather
graphs with data from external smokeping servers.

To configure a smokeping master/slave server you can see the documentation
here:

    http://oss.oetiker.ch/smokeping/doc/smokeping_master_slave.en.html

In addition, a sample set of steps for configuring this is available in
the file sample-smokeping-master-slave.txt which should be lisetd as an
additional reference at the bottom of the Agenda page on your classroom wiki.