Campus Network Design Workshop

Measuring Delay with Smokeping

UNIVERSITY OF OREGON

NSRC
Network Startup Resource Center

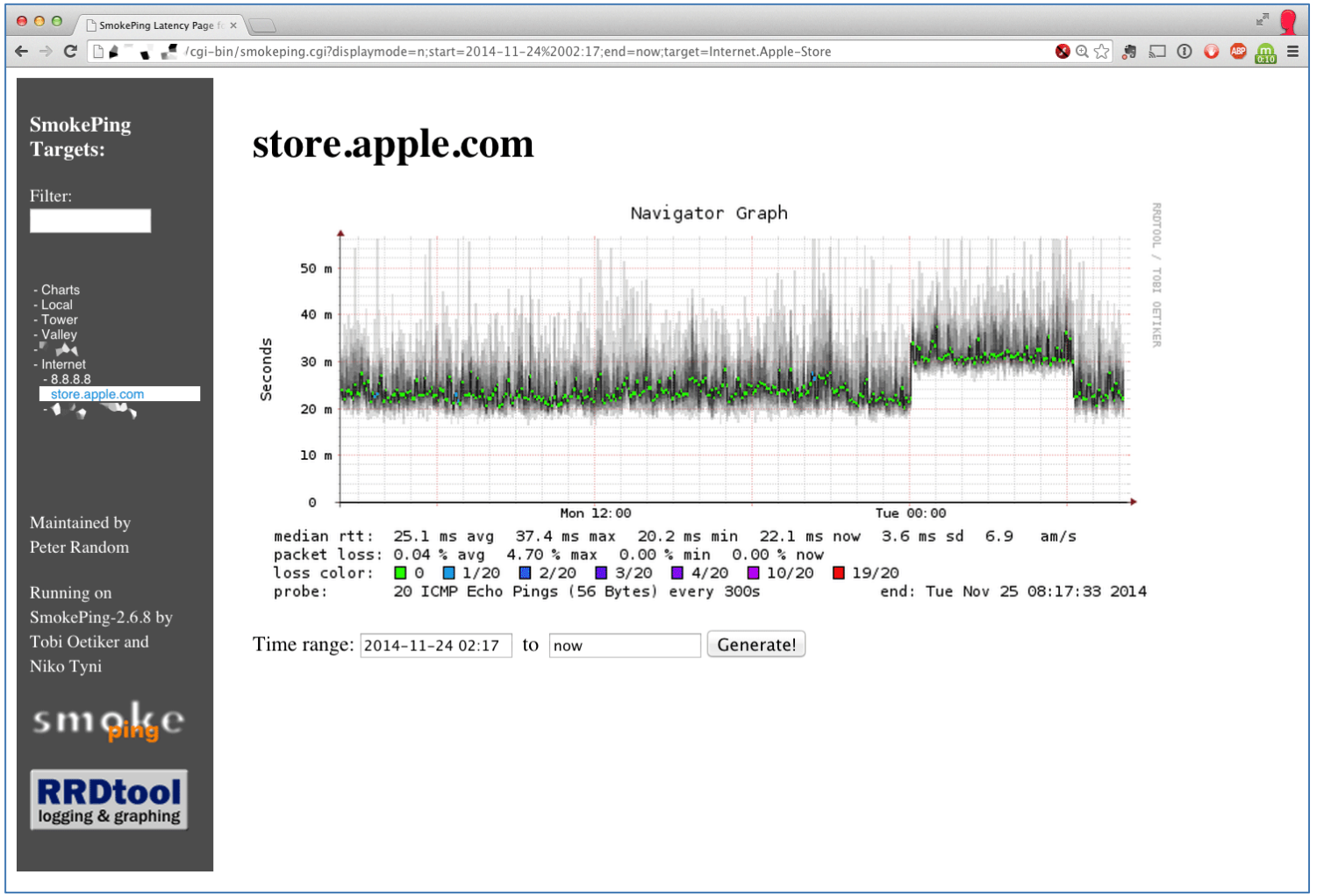
Introduction

- SmokePing keeps track of your network latency
- Best of breed latency visualization.
- Interactive graph explorer.
- Wide range of latency measurement plugins.
- Master/Slave System for distributed measurement.
- Highly configurable alerting system.
- Live Latency Charts with the most 'interesting' graphs.
- Free and OpenSource Software written in Perl written by Tobi Oetiker, the creator of MRTG and RRDtool

Technical Introduction

- Based on RRDTool (the same author)
- Measures ICMP delay & status of services like:
  - HTTP, DNS, SMTP, SSH, LDAP, and more
- Define ranges on statistics and generate alarms
- Written in Perl for portability
- Easy to install – harder to configure

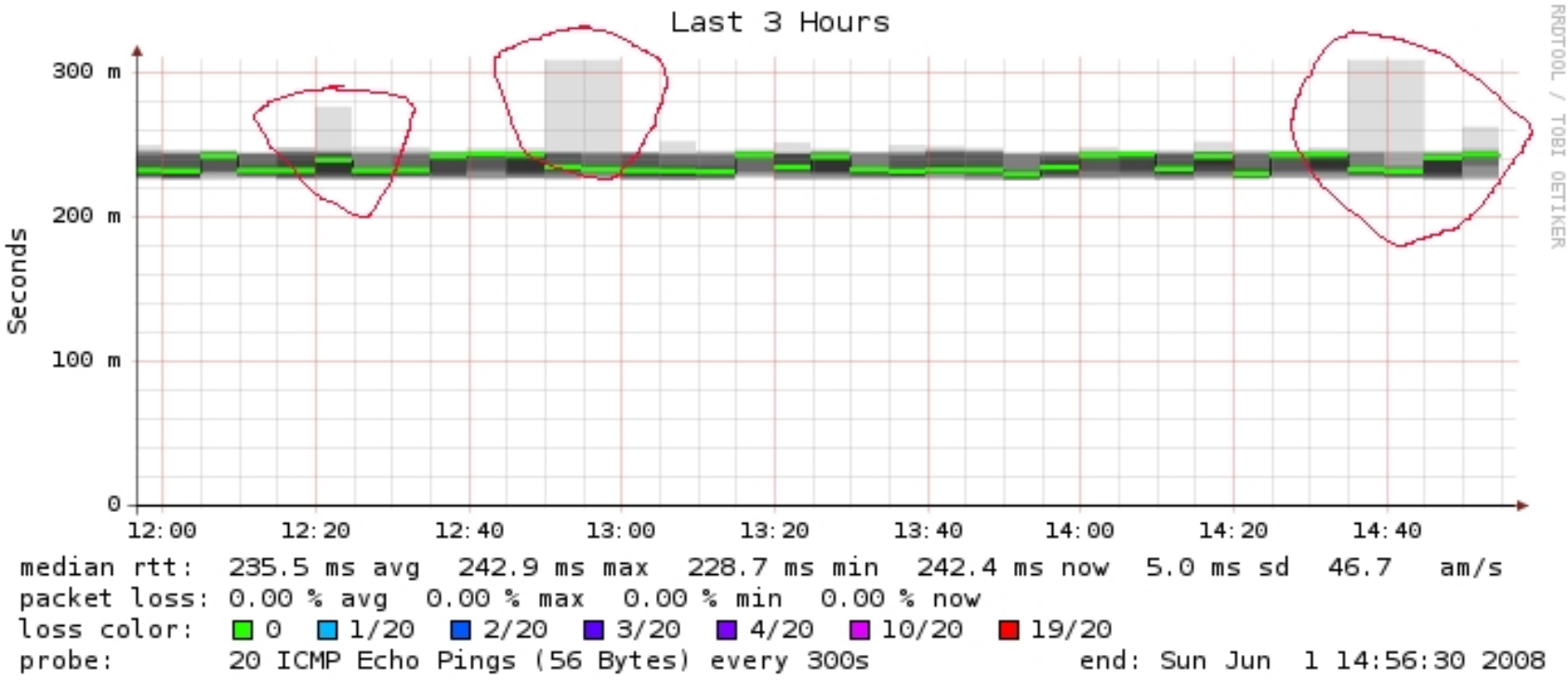
The Smoke & The Pings



How to Read Smokeping Graphs

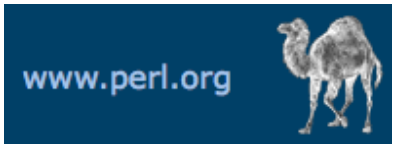
- Smokeping sends multiples tests (pings), makes note of RTT, orders these and selects the median.
- The different values of RTT are shown graphically as lighter and darker shades of grey (the “smoke”). This conveys the idea of variable round trip times or *jitter*.
- The number of lost packets (if any) changes the colour of the horizontal line across the graph.

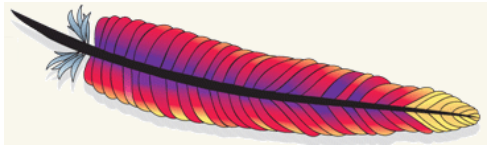
Example: African Network Operators Group



What Makes It Tick

- The following packages:
  - rrdtool http://oss.oetiker.ch/rrdtool/
  - fping http://www.fping.com/
  - Echoping http://echoping.sourceforge.net/
  - speedyCGI http://www.daemoninc.com/SpeedyCGI/
  - Apache http://httpd.apache.org/
  - Perl http://www.perl.org/





Smokeping Installation

- Debian/Ubuntu:

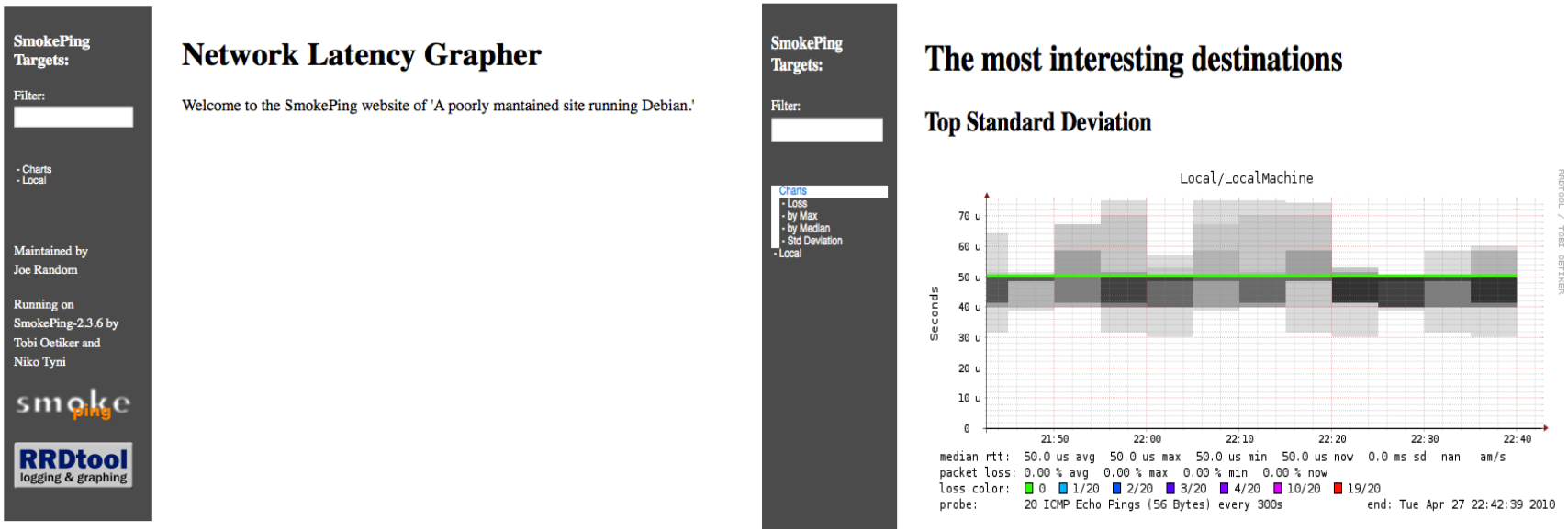
```
apt-get install smokeping
```

- Configure **/etc/smokeping/config.d/***
- Change Smokeping's appearance here:
  - **/etc/smokeping/basepage.html**
- Restart the service:

```
service smokeping {start|stop|restart|reload}
```

Smokeping Installation

- You will find Smokeping running here:
  - http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi



Configuration

- Smokeping configuration files in Ubuntu:

```
/etc/smokeping/config.d/Alerts
/etc/smokeping/config.d/Database
/etc/smokeping/config.d/General
/etc/smokeping/config.d/pathnames
/etc/smokeping/config.d/Presentation
/etc/smokeping/config.d/Probes
/etc/smokeping/config.d/Slaves
/etc/smokeping/config.d/Targets
```

- Generally we spend most of our time in Alerts, General, Probes and Targets.

Configuration: General

- To be updated:
  - owner → NOC
  - contact → sysadm@pcN.ws.nsrc.org
  - cgiurl → http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
  - mailhost → localhost
  - syslogfacility → local5

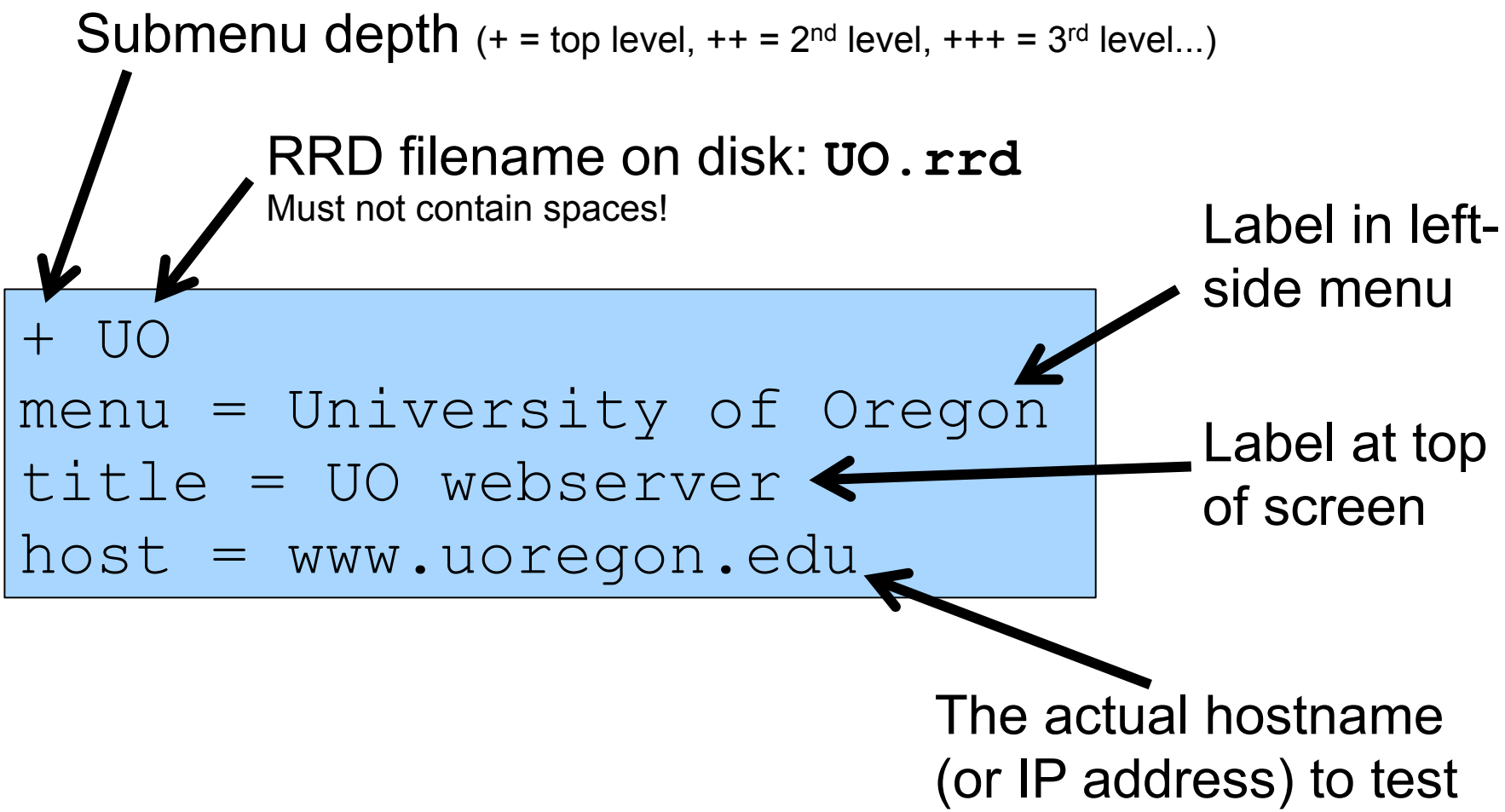
```
*** General ***

owner    = NOC
contact  = sysadm@pcN.ws.nsrc.org
mailhost = localhost
# NOTE: do not put the Image Cache below cgi-bin
# since all files under cgi-bin will be executed ... this is not
# good for images.
cgiurl   = http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
# specify this to get syslog logging
syslogfacility = local5
# each probe is now run in its own process
# disable this to revert to the old behaviour
# concurrentprobes = no

@include /etc/smokeping/config.d/pathnames
```

Configuration: Targets

- Where we spend most of our time configuring Smokeping.
- Web menu hierarchy defined by “+”, “++”, etc.
- Each new probe statement resets the default probe in use.
- Probes have defaults set in the Probes config file. These can be overridden in Targets.

```
*** Targets ***

probe = FPing

menu = Top
title = Network Latency Grapher

+ UO
menu = University of Oregon
title = UO webserver
host = www.uoregon.edu

+ NSRC
menu = NSRC
title = Network Startup Resource Center
host = www.nsrc.org

++ HTTP
menu = HTTP
probe = EchoPingHttp

+++ www
menu = NSRC web
host = www.nsrc.org

++ DNS
menu = DNS
probe = DNS

+++ dns
menu = NSRC DNS
host = www.nsrc.org
```

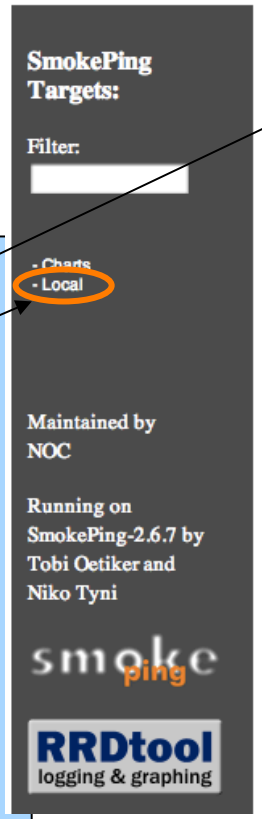
Target Entry



Configuration: Targets Example

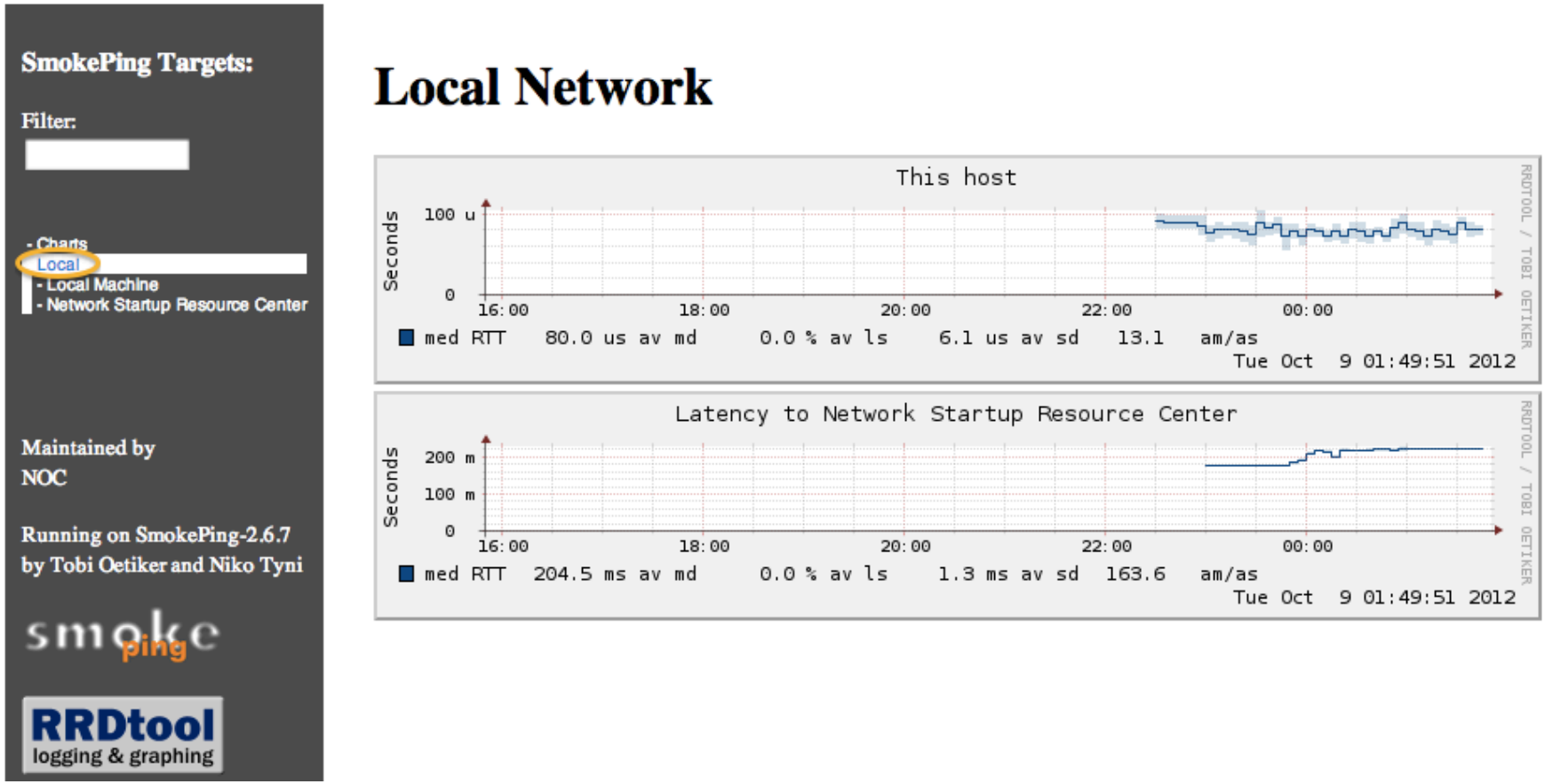
Targets file below produces the following default SmokePing page:

```
*** Targets ***

probe = FPing

menu = Top
title = Network Latency Grapher
remark = SmokePing Latency Monitoring \
         Network Monitoring and Management Workshop

+ Local

menu = Local
title = Local Network

++ LocalMachine

menu = Local Machine
title = This host
host = localhost

++ NSRC

menu = Network Startup Resource Center
title = Latency to Network Startup Resource Center
host = nsrc.org
```



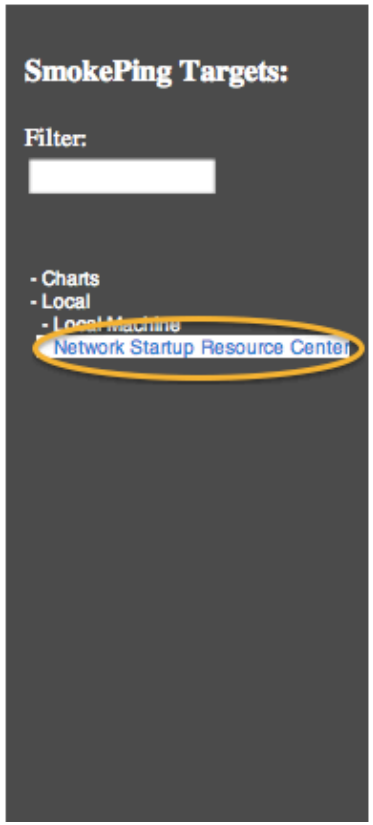
Configuration: Targets Example

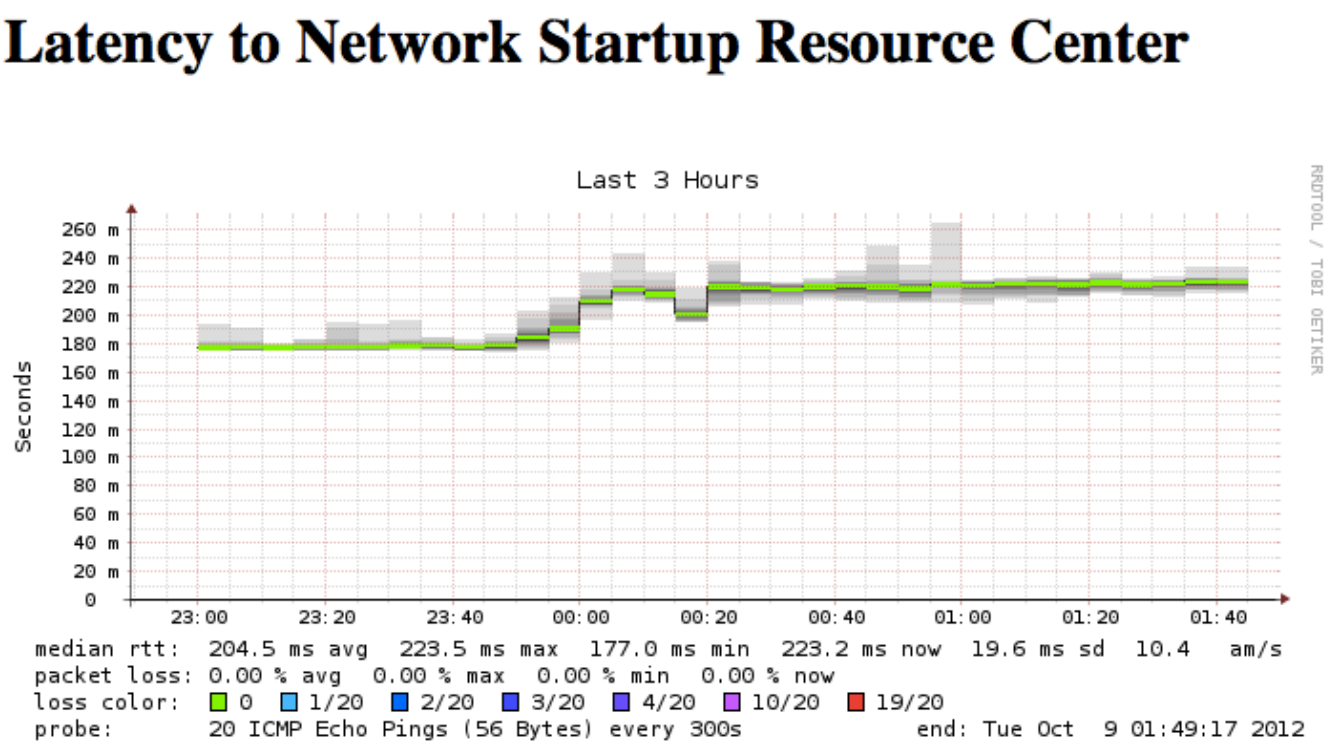
Clicking on "Local" in the previous slide gives us:



Configuration: Targets Example

Clicking "Network Startup Resource Center" in the previous slides gives us:





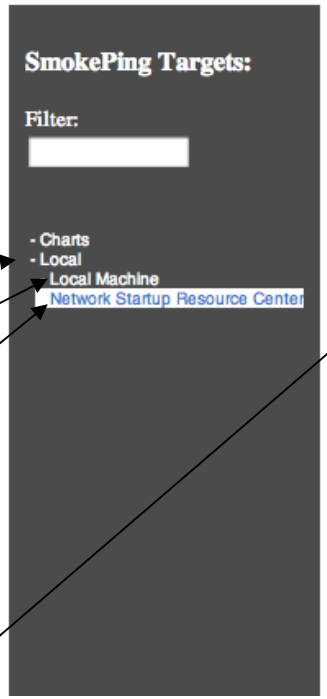
Hierarchy in Targets File → Web UI

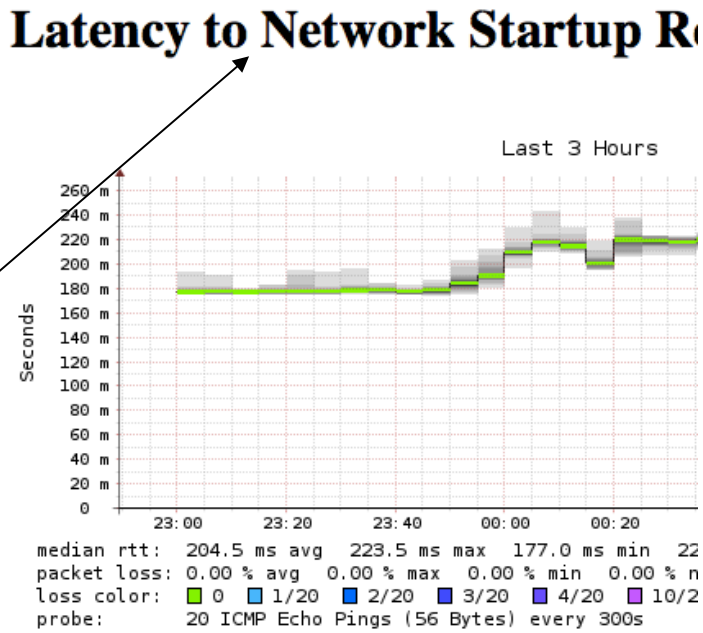
```
*** Targets ***

probe = FPing

menu = Top
title = Network Latency Grapher
remark = SmokePing Latency Monitor… \
         Network Monitoring and Mana…

+ Local

menu = Local
title = Local Network

++ LocalMachine

menu = Local Machine
title = This host
host = localhost

++ NSRC

menu = Network Startup Resource Center
title = Latency to Network Startup Re…
host = nsrc.org
```

1st level

2nd level

2nd level





+ Local → /var/lib/smokeping/Local

++ LocalMachine → /var/lib/smokeping/Local/LocalMachine.rrd

++ NSRC → /var/lib/smokeping/Local/NSRC.rrd

Configuration: Alerts

- Very flexible. Create your own type of alert.
- Send alerts to ticket queues (RT using rt-mailgate, for instance)
- Complex to understand. Read the Alerts section of the Smokeping docs:
  - http://oss.oetiker.ch/smokeping/doc/smokeping_config.en.html

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

+someloss
type = loss
# in percent
pattern = >0%,*12*,>0%,*12*,>0%
comment = loss 3 times in a row over 12 samples
```

This could go to a ticketing queue instead.

Target

```
++ LocalMachine
menu = localhost
title = This host
host = localhost
alerts = startloss,someloss,bigloss,rttdetect
```

Configuration: Probes

- Smokeping is installed with a number of additional probes. They must, however, be specified here – including their default behaviors.

```
*** Probes ***

+ FPing
binary = /usr/sbin/fping

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

+ EchoPingHttp
binary = /usr/bin/echoping
ignore_cache = yes
pings = 5
url = /

+ EchoPingHttps
binary = /usr/bin/echoping
pings = 5
url = /

+ EchoPingSmtp
binary = /usr/bin/echoping
forks = 5
```

Use the DNS probe to verify that your services are available and responding as expected.

We use ”nsrc.org” as a sample hostname to lookup, to verify that the DNS works.

Note: Initial Probes file only has FPing defined.

Default Probe: fping

- Probing for delay and jitter (ping)
- Entry belongs in the Targets file

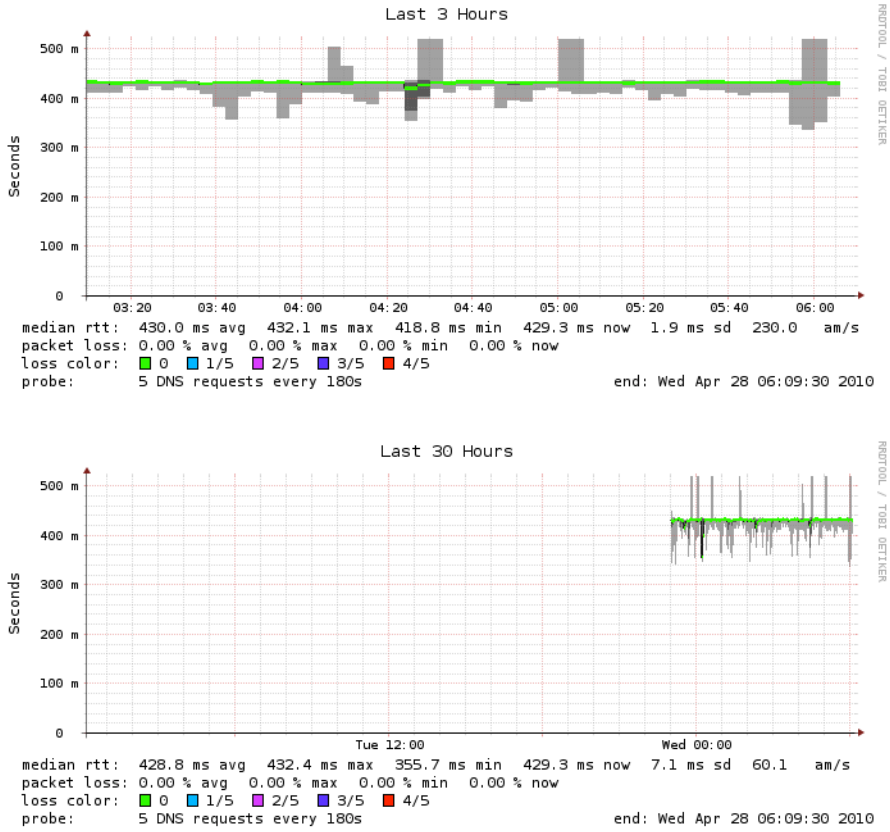
```
Network Latency

probe = FPing
...
++ LocalMachine
menu = localhost
title = This host
host = localhost
```

Probe: DNS Check

In /etc/smokeping/config.d/Targets:

DNS Latency

```
++ DNS
probe = DNS
menu = External DNS Check
title = DNS Latency

+++ GoogleA
menu = 8.8.8.8
Title = DNS Latency GoogleA
host = google-public-dns-
     a.google.com
```



More Types of Probes

- More information available here:
  - http://oss.oetiker.ch/smokeping/probe/index.en.html

- A few more probes...

DNS	CiscoRTTMonDNS	Radius
HTTP(S)	CiscoRTTMonTcpCon	IOS
LDAP	Tacacs	FPing6
Whois	WebProxyFilter	Etc.
SMTP	WWW-Cache	

Configuration: Pathnames

- Normally you should not need to update this file:

```
sendmail = /usr/sbin/sendmail
imgcache = /var/cache/smokeping/images
imgurl   = ../smokeping/images
datadir  = /var/lib/smokeping
piddir  = /var/run/smokeping
smokemail = /etc/smokeping/smokemail
tmail = /etc/smokeping/tmail6
```

Configuration: Presentation

If you wish to customize Smokeping's look and feel you can edit the file

/etc/smokeping/basepage.html

```
*** Presentation ***

template = /etc/smokeping/basepage.html
charset  = utf-8

+ charts

menu = Charts
title = The most interesting destinations

++ stddev
sorter = StdDev(entries=>4)
title = Top Standard Deviation
menu = Std Deviation
format = Standard Deviation %f

++ max
sorter = Max(entries=>5)
title = Top Max Roundtrip Time
menu = by Max
format = Max Roundtrip Time %f seconds
```

Configuration: Database

- Defines how RRDtool will save data in Round Robin Archives (RRAs)
- By default each step is 300 seconds (5 minutes).
- You cannot trivially change the step setting once data has been collected.
- Find details on each column in the database section of the online docs:
  - http://oss.oetiker.ch/smokeping/doc/smokeping_config.en.html

```
*** Database ***

step     = 300
pings    = 20

# consfn mrhb steps total

AVERAGE  0.5   1  1008
AVERAGE  0.5  12  4320
    MIN  0.5  12  4320
    MAX  0.5  12  4320
AVERAGE  0.5 144   720
    MAX  0.5 144   720
    MIN  0.5 144   720
```

consfn: Consolidation function

mrhb: Percent of consolidated steps that must be known to warrant an entry.

steps: How many steps to consolidate for each entry in the RRA.

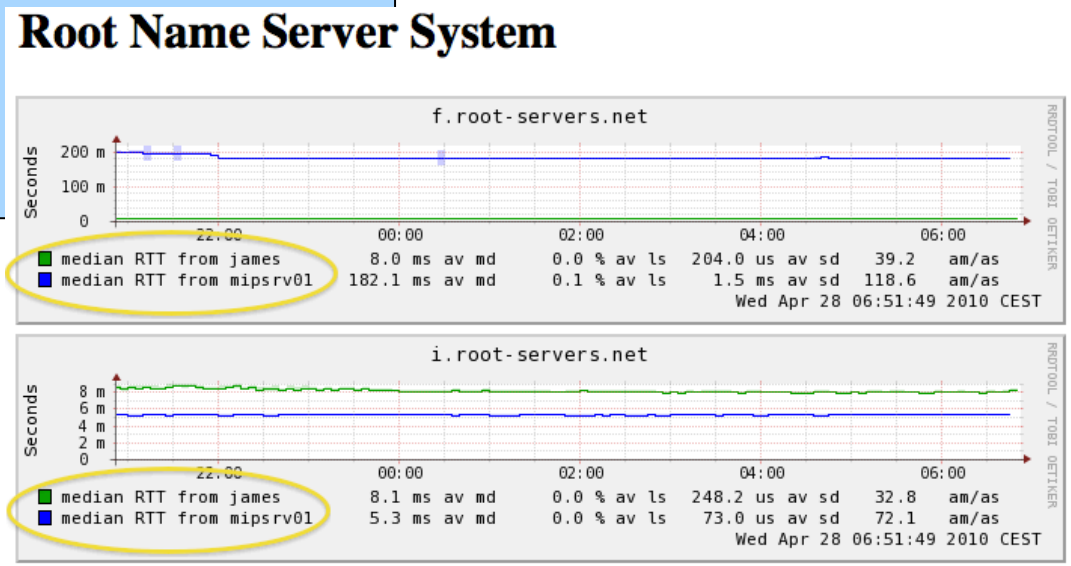
total: Total number of rows to keep in the RRA. Use rows and steps to determine time data will be saved.

12 steps = 12 x 300 sec = 1 hour
4320 rows = 4320 hours = **180 days**

Configuration: Slaves

- Smokeping slave servers allow for multi-viewpoint monitoring and graphing of the same services, machines or links. Details here:
  - http://oss.oetiker.ch/smokeping/doc/smokeping_master_slave.en.html

```
*** Slaves ***
secrets=/etc/smokeping/smokeping_secrets
#+boomer
#display_name=boomer
#color=0000ff

#+slave2
#display_name=another
#color=00ff00
```



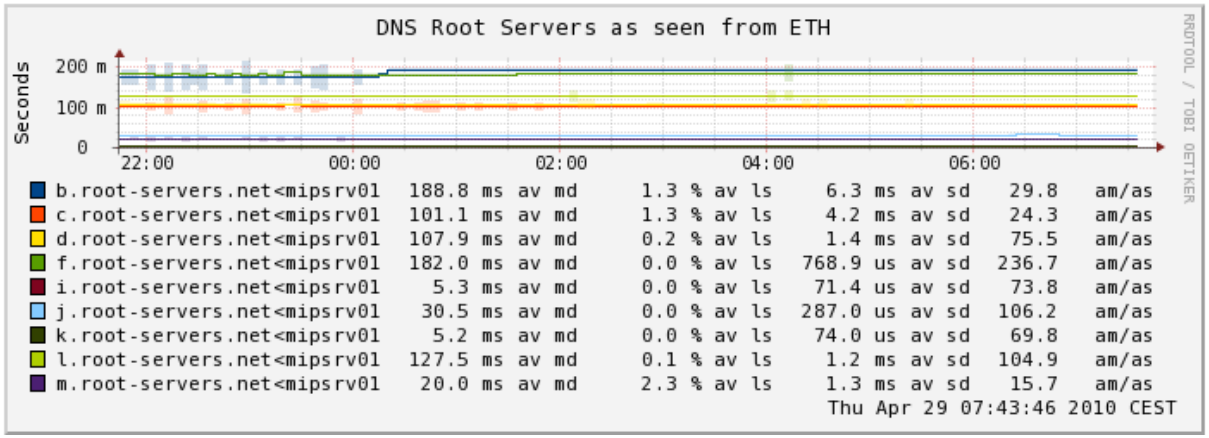
Externally monitor your network!

Multi-Host Graphing

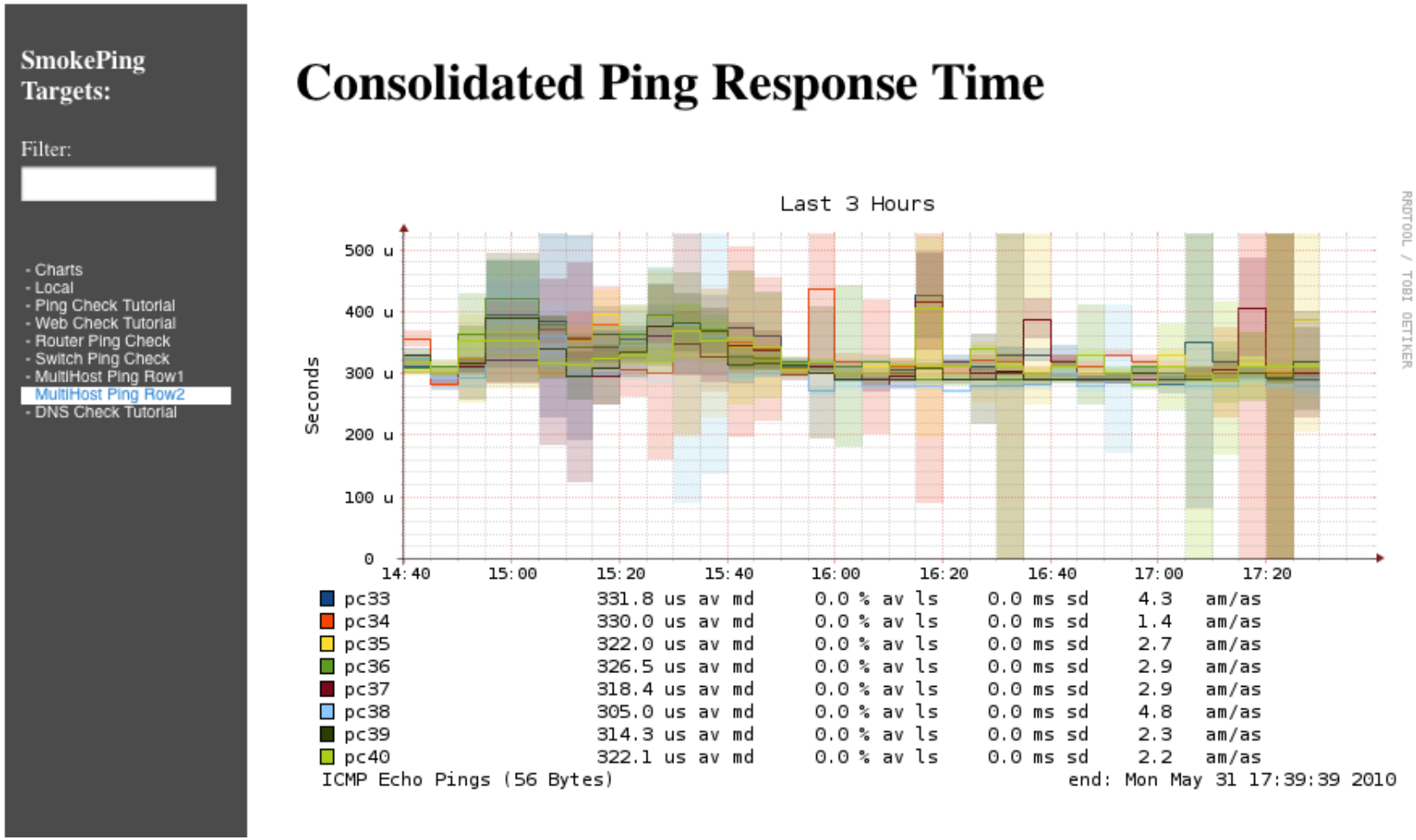
- Solve the issue of multiple hosts, one probe and missing differences in the Y axis (time):
  - http://oss.oetiker.ch/smokeping/doc/smokeping_examples.en.html

Sample configuration

```
+++MultihostRouters
menu = MutihostRouters
title = Combined Router Results
host = /Local/Routers/gw /Local/Routers/rtr1
       /Local/Routers/rtr2
```



Example: Multi-Host Graph



Smokeping Summary

- Simple but powerful network monitoring
- Monitor machines, services and link health
- Distributed instances for external views – often a paid-for service
- Easy to configure and customize, but very extensible.
- Use with Ticketing Systems to automate alerts
- Very small disk and CPU footprint

References

- **Smokeping website:**
  - http://oss.oetiker.ch/smokeping/
- **Smokeping Demo:**
  - http://oss.oetiker.ch/smokeping-demo/?target=Customers.OP
- **Good examples:**
  - http://oss.oetiker.ch/smokeping/doc/smokeping_examples.en.html

Questions?