APRICOT 2010

Kuala Lumpur, Malaysia

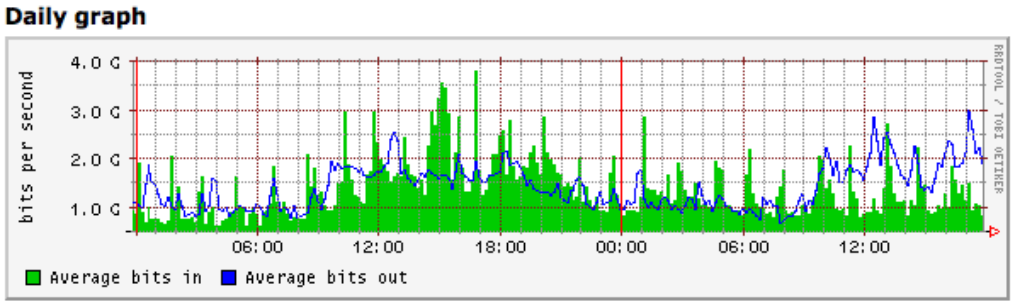
MRTG and RRDTool

Multi Router Traffic Grapher (MRTG)

The Multi Router Traffic Grapher (MRTG) is a tool to monitor the traffic load on network-links.

- MRTG generates HTML pages containing PNG images which provide an almost live visual representation of this traffic. Check http://oss.oetiker.ch/mrtg/ for more information.
- From the mrtg pages:

  "You have a router, you want to know what it does all day long? Then MRTG is for you. It will monitor SNMP network devices and draw pretty pictures showing how much traffic has passed through each interface."



MRTG continued

- MRTG has been the most common network traffic measurement tool for all Service Providers during this millenium.
- MRTG uses simple SNMP queries on a regular interval to generate graphs.
- External readers for MRTG graphs can create other interpretation of data.
- MRTG software can be used not only to measure network traffic on interfaces, but also build graphs of anything that has an equivalent SNMP MIB - like CPU load, disk availability, temperature, etc...
- Data sources can be anything that provides a counter or gauge value – not necessarily SNMP.
  - For example, graphing round trip times.

MRTG issues

- MRTG generates each graph every 5 minutes. This can create considerable overhead if you are graphing for many devices (100's of routers with multiple interfaces for instance…).
  - Example: 500 routers, 2 interfaces each = 1000 graphs to generate. Potential CPU overhead.
- Very few customizable graphing options.
- MRTG management itself can be tedious work

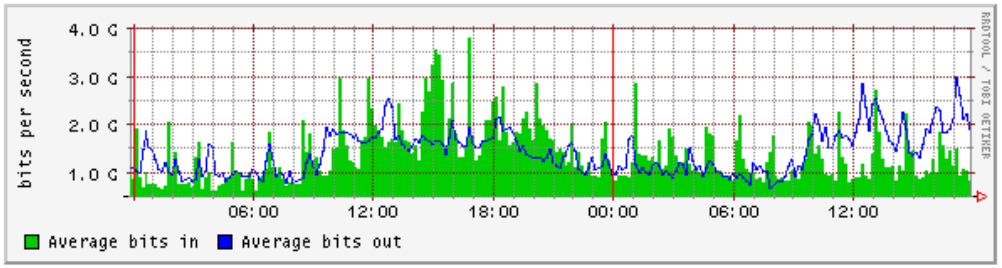
  (see next slide…)

Running MRTG

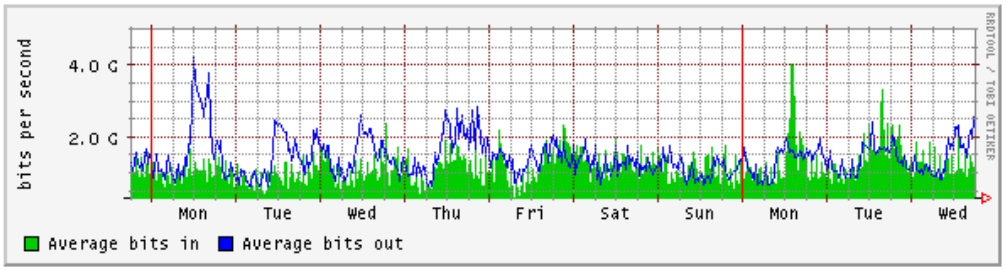
- Install or compile required packages
  - `apt-get install mrtg`
- Make cfg files for router interfaces with `cfgmaker`
- Create html pages from the cfg files with `indexmaker`
- Trigger MRTG periodically from `cron` or run it in daemon mode

MRTG graphs

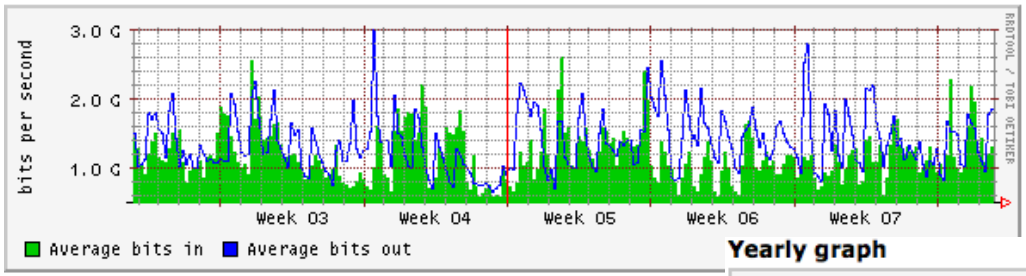
Daily graph



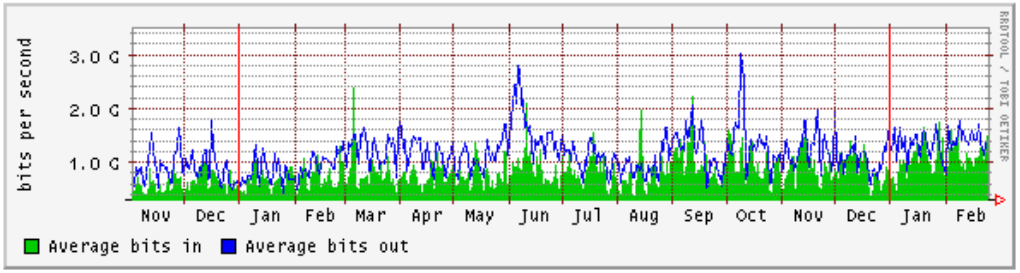
Weekly graph



Monthly graph



Yearly graph



Round Robin Database Tool: RRDTool

- Round Robin Database for time series data storage
- Command line based
- From the author of MRTG
- Made to be faster and more flexible than using MRTG alone
- Includes CGI and Graphing tools, plus APIs:

```
rrdgraph, rrdcreate, rrdtool
```

- Solves the Historical Trends and Simple Interface problems

Define Data Sources (Inputs)

When you invoke `rrdtool` you specify options, such as these on the command line:

```
DS:speed:COUNTER:600:U:U
DS:fuel:GAUGE:600:U:U
```

- DS = Data Source
- speed, fuel = "variable" names
- COUNTER, GAUGE = variable type
- 600 = heart beat – UNKNOWN returned for interval if nothing received after this amount of time
- U:U = limits on minimum and maximum variable values (U means unknown and any value is permitted)

Define Archives (Outputs)

```
RRA:AVERAGE:0.5:1:24
RRA:AVERAGE:0.5:6:10
```

- RRA = Round Robin Archive
- AVERAGE = consolidation function
- 0.5 = up to 50% of consolidated points may be UNKNOWN

- 1:24 = this RRA keeps each sample (average over one 5 minute primary sample), 24 times (which is 2 hours worth)

- 6:10 = one RRA keeps an average over every six 5 minute primary samples (30 minutes), 10 times (which is 5 hours worth)

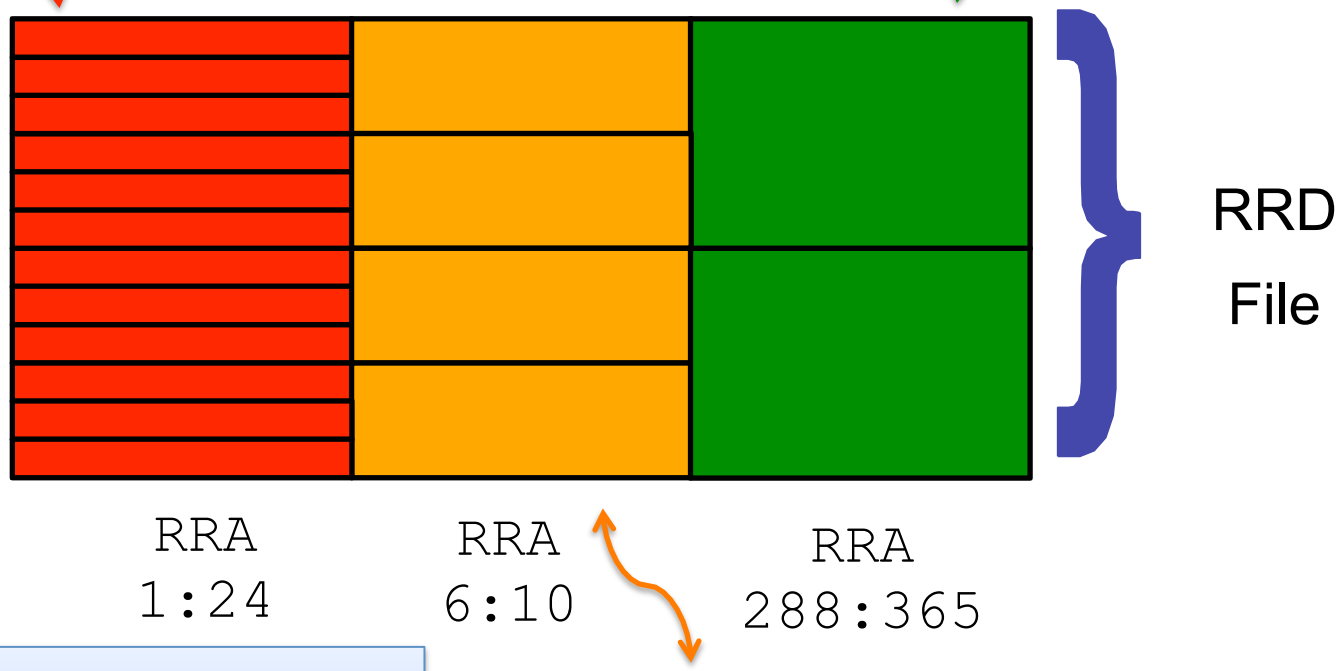
- All depends on original step size which defaults to 5 minutes, i.e. "`rrdcreate --step 300`"

Was that clear?

RRDtool database format

Recent data stored once every 5 minutes for the past 2 hours

Old data averaged to one entry per day for the last 365 days (288:365)



`--step 300`

(5 minute input step size)

Medium length data averaged to one entry per half hour for the last 5 hours (6:10)

Increasing data granularity

What if you want to keep 5-minute data for an entire year?

How should you specify this?

➔ `RRA:AVERAGE:0.5:1:105120`

Where did “105120” come from?

- 300 seconds = 5 minutes
- 525600 minutes/year or,
- 525600/5 = 105120 “300 second intervals” in one year

rrdtool command line examples

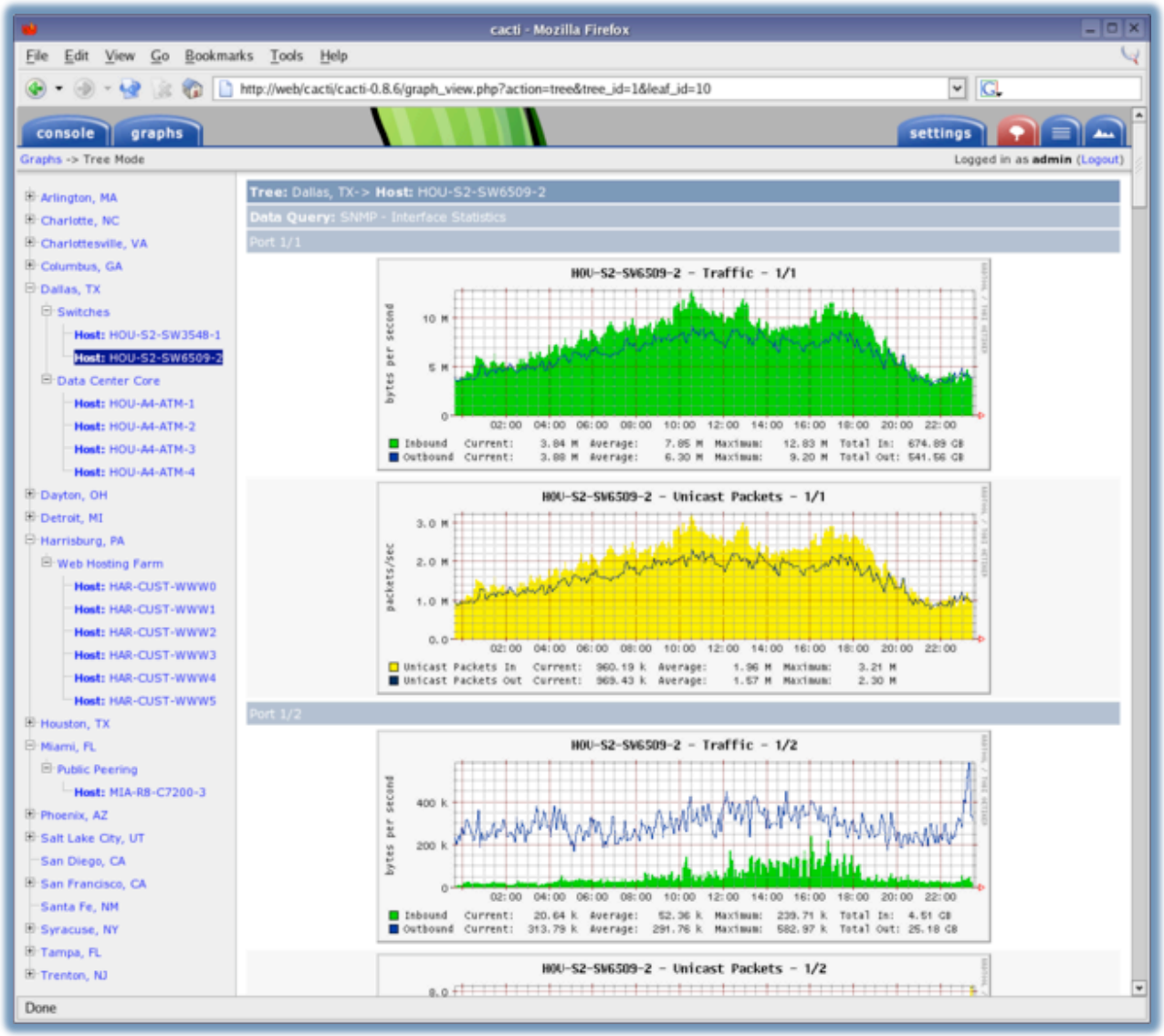
- `rrdtool create /var/nagios/rrd/host0_load.rrd -s 600 DS:1MIN-Load:GAUGE:1200:0:100 DS:5MIN-Load:GAUGE:1200:0:100 DS:15MIN-Load:GAUGE:1200:0:100 RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800`

- `rrdtool create /var/nagios/rrd/host0_disk_usage.rrd -s 600 DS:root:GAUGE:1200:0:U DS:home:GAUGE:1200:0:U DS:usr:GAUGE:1200:0:U DS:var:GAUGE:1200:0:U RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800`

- `rrdtool create /var/nagios/rrd/apricot-INTL_Ping.rrd -s 300 DS:ping:GAUGE:600:0:U RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800`

- `rrdtool create /var/nagios/rrd/host0_total.rrd -s 300 DS:IN:COUNTER:1200:0:U DS:OUT:COUNTER:600:0:U RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800`

Cacti using rrdtool for graphs



RRDTool in the background

- Graphs and stores data for tools we use such as:
  - Cacti
  - Nagios
  - Smokeping
  - and many more network monitoring packages

RRDTool Ubuntu installation

- # apt-get install rrdtool
- # apt-get install librrdp-perl
- # apt-get install librrds-perl

- Add in your MRTG Configuration file
  - /etc/mrtg/router.mrtg
- LogFormat: rrdtool
- Run mrtg
- Go see in /var/www/mrtg

References

- MRTG:
  http://oss.oetiker.ch/mrtg/
- RRDTool:
  http://oss.oetiker.ch/rrdtool/
- "`man rrdtool`" – a good read!
- Excellent RRDTool introduction:
  http://oss.oetiker.ch/rrdtool/tut/rrd-beginners.en.html
  - Make Tobis' day: http://tobi.oetiker.ch/wish/
  - **Smokeping** http://oss.oetiker.ch/smokeping/
  - **Cacti** http://www.cacti.net/
  - **Nagios** http://www.nagios.org/