MRTG / RRDTool

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SNMP

- A query - response system
- Little network traffic initiated by agent
- Regular SNMP has primitive security system
- SNMPv2 was to have real security but working group fragmented.
- SNMPv3 now ready - very extensible, used much in enterprise management tools
- Uses database defined in MIB
- Can have ”Vendor/ Enterprise" extensions to MIB
- SMI defines structure of MIB
- SMI defines data structure using ASN.1 (Abstract Syntax Notation)

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 a LIVE visual representation of this traffic. Check http://www.stat.ee.ethz.ch/mrtg/ to see what it does.
- MRTG has been the most common network traffic measurement tool for all Service Providers
- MRTG uses simple SNMP queries on a regular interval to generate graphs

MRTG…

- 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, Heat etc.
- MRTG can be extended to work with RRDTool

MRTG - Issues

- MRTG generates each graph (we are generating 582 graphs!) every 5 minutes, creating a lot of overhead.
- It also has very few customizable graphing options.
- Disk space is always an issue.
- MRTG management itself can be tedious work.

Running MRTG

- Get the required packages
- Compile and install the packages
- Make cfg files for router interfaces with cfgmaker
- Create html pages with indexmaker
- Trigger MRTG periodically from Cron or run it in daemon mode

RRDtool

- Round Robin Database for time series data storage
- Command line based
- From the author of MRTG
- Made to be faster and more flexible
- Includes CGI and Graphing tools, plus APIs
- Solves the Historical Trends and Simple Interface problems

Define Data Sources (Inputs)

- `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)

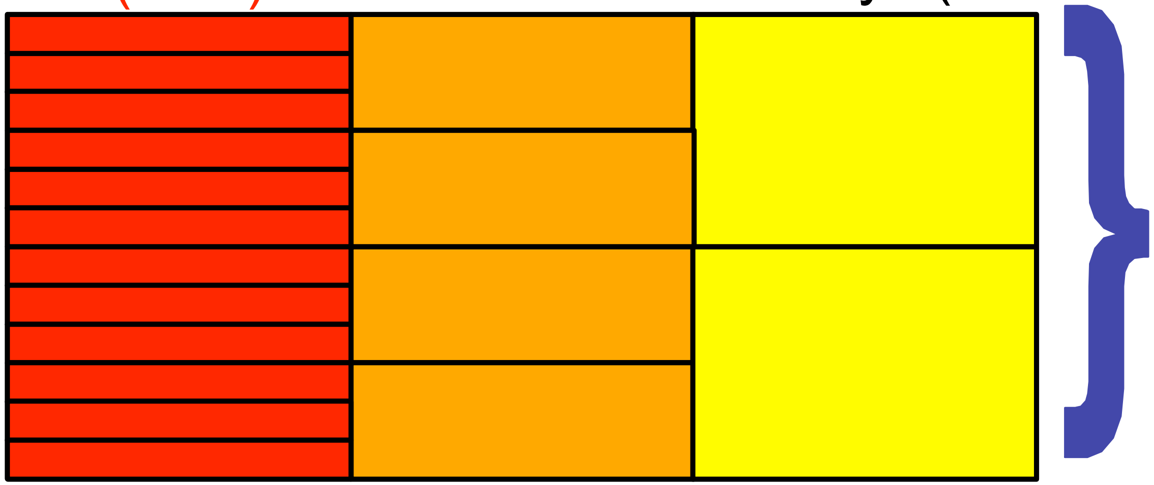
Define Archives (Outputs)

- `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)
- **Clear as mud!**
  - all depends on original step size which defaults to 5 minutes

RRDtool Database Format

Recent data stored once every 5 minutes for the past 2 hours (1:24)

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



`--step 300`

(5 minute input step size)

RRD File

`RRA 1:24`

`RRA 6:10`

`RRA 288:365`

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

Muddyyy

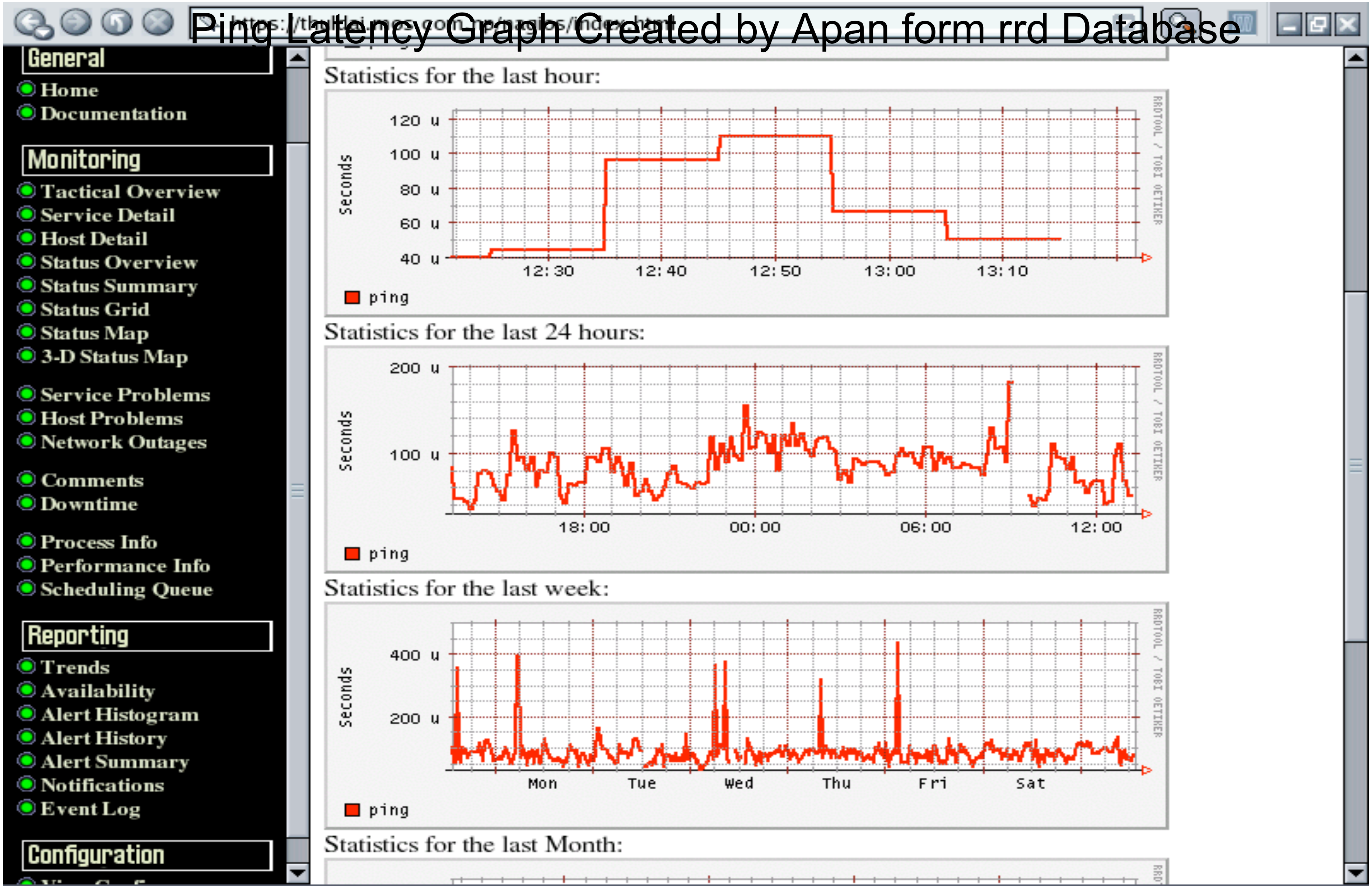
-
  ```
  rrdtool create /var/nagios/rrd/host0_load.rrd -s 600 DS:1MIN-Load:GAUGE:1200:0:100 DS:5MIN-Load:GAUGE:1200:0:100 DS:15MIN-Load:GAUGE:1200:0:100 RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800
  ```

-
  ```
  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
  ```

Ping Latency Graph Created by Apan form rrd Database



Statistics for the last hour:

Statistics for the last 24 hours:

Statistics for the last week:

Statistics for the last Month:

Labs

MRTG

- In Ubuntu / Debian
  - Apt-get install mrtg
  - Configuration
    - /etc/mrtg/<device.mrtg>
    - Global directory : /var/www/mrtg/
    - Run MRTG against the configuration file from cron.

cfgmaker

- Uses snmpwalk and creates a mrtg configuration file

-
  ```
  /usr/bin/cfgmaker
  --output=/etc/mrtg/router.mrtg
  --global 'workdir: /var/www/mrtg'
  --global 'options[_]: growright,bits'
  san0g@gw
  ```

sample

```
#Title[leased]: a 128K leased line
#PageTop[leased]: <H1>Our 128K link to
   the outside world</H1>
#Target[leased]: 1:public@router.localnet
#MaxBytes[leased]: 16000
```

Creating HTML with indexmaker

-
  ```
  /usr/bin/indexmaker
  --output=/var/www/mrtg/device.html
  /etc/mrtg/device.mrtg
  ```

  If your mrtg configuration file is well commented, the html is nice and detailed.

Lab instructions

- Separate paper

RRDTool

- #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