Graphing and Trending in Nagios

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v0.6

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Agenda

- What is the problem?
- What should a trending system do?
- What are the parts?
- What options are available?
- What issues need to be considered?

Background

Nagios Experience

- Small Nagios installations with 40-80 hosts and 500-2000 services
- Small businesses with 10-20 servers and 20-40 workstations
- Continuous build environments with 30+ virtual machines
- Power, water, septic, and weather monitoring on an island in Maine
- Databases and ticketing system for pop singer

Day Job

- Design optimization and supply chain optimization

Context

- Budget: low
- Costs: time is not free
- Training: ok for expert to setup, not ok for expert to operate
- Hack Factor: rather high

What are the options?

- nagiosgraph
  1.4.4 2011-01-16
  http://nagiosgraph.sourceforge.net/

- nagiosgrapher
  1.7.1 2008-12-18

- n2rrd/rrd2graph
  1.4.4 2011-08-16
  http://n2rrd-wiki.diglinks.com/display/n2rrd/Addon

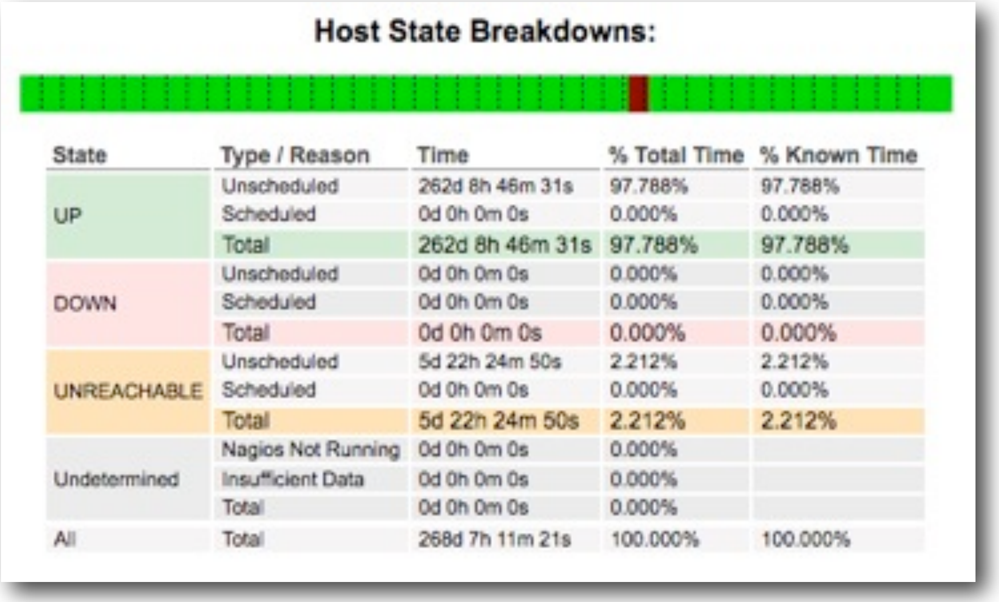
- pnp4nagios
  0.6.15 2011-09-14
  http://pnp4nagios.sourceforge.net/

- cacti
  0.8.7g 2010-07-09
  http://www.cacti.net/

- mrtg
  2.17.1 2011-02-18
  http://oss.oetiker.ch/mrtg/

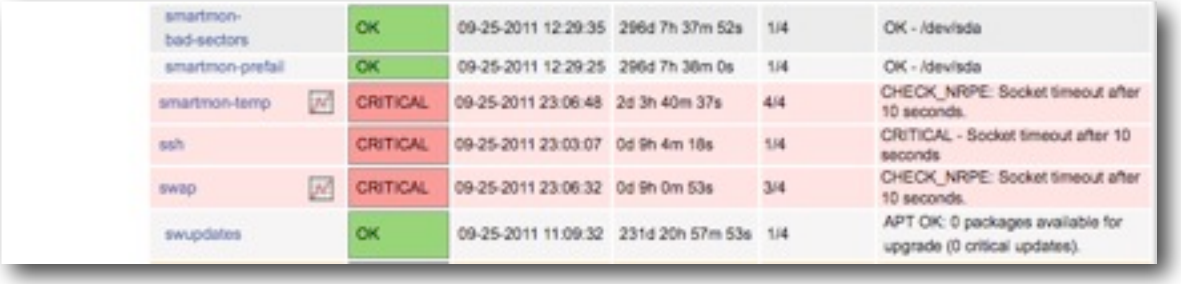
What is the problem?

- Nagios indicates current status
- Nagios Core trending consists only of states and notifications
- Nagios Core does not provide performance trending

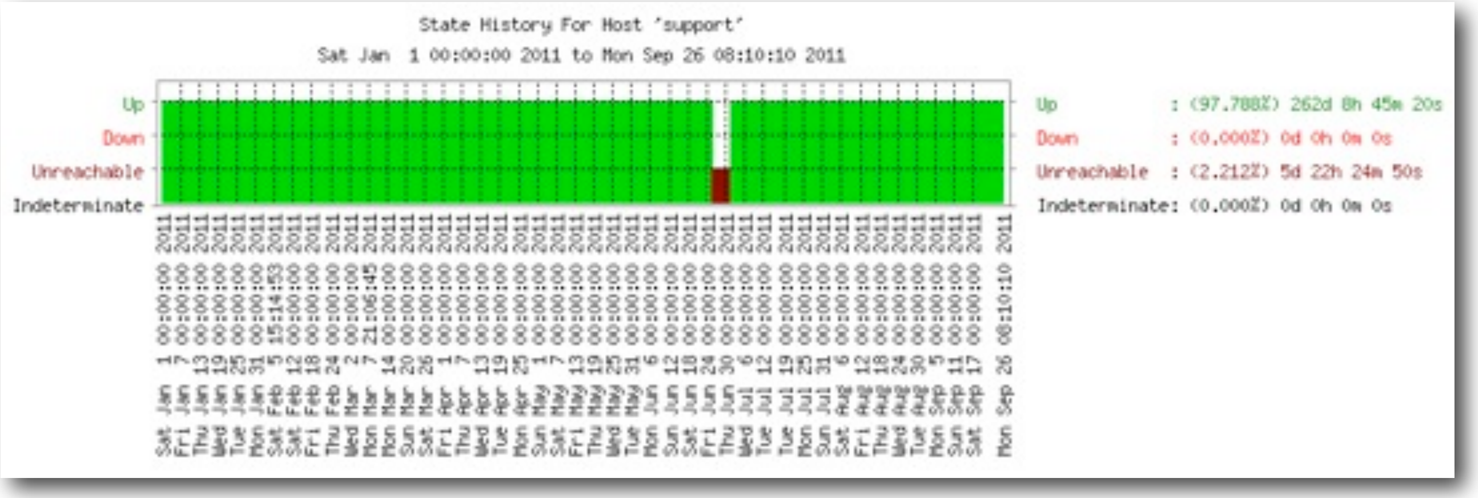


Host State Breakdowns:

State	Type / Reason	Time	% Total Time	% Known Time
UP	Unscheduled	262d 8h 46m 31s	97.788%	97.788%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	262d 8h 46m 31s	97.788%	97.788%
DOWN	Unscheduled	0d 0h 0m 0s	0.000%	0.000%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	0d 0h 0m 0s	0.000%	0.000%
UNREACHABLE	Unscheduled	5d 22h 24m 50s	2.212%	2.212%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	5d 22h 24m 50s	2.212%	2.212%
Undetermined	Nagios Not Running	0d 0h 0m 0s	0.000%	
	Insufficient Data	0d 0h 0m 0s	0.000%	
	Total	0d 0h 0m 0s	0.000%	
All	Total	268d 7h 11m 21s	100.000%	100.000%



smartmon-bad-sectors	OK	09-25-2011 12:29:35	296d 7h 37m 52s	1/4	OK - /dev/sda
smartmon-prefail	OK	09-25-2011 12:29:25	296d 7h 38m 0s	1/4	OK - /dev/sda
smartmon-temp	CRITICAL	09-25-2011 23:06:48	2d 3h 40m 37s	4/4	CHECK_NRPE: Socket timeout after 10 seconds.
ssh	CRITICAL	09-25-2011 23:03:07	0d 9h 4m 18s	1/4	CRITICAL - Socket timeout after 10 seconds
swap	CRITICAL	09-25-2011 23:06:32	0d 9h 0m 53s	3/4	CHECK_NRPE: Socket timeout after 10 seconds.
swupdates	OK	09-25-2011 11:09:32	231d 20h 57m 53s	1/4	APT OK: 0 packages available for upgrade (0 critical updates).



State History For Host 'support'
Sat Jan 1 00:00:00 2011 to Mon Sep 26 08:10:10 2011

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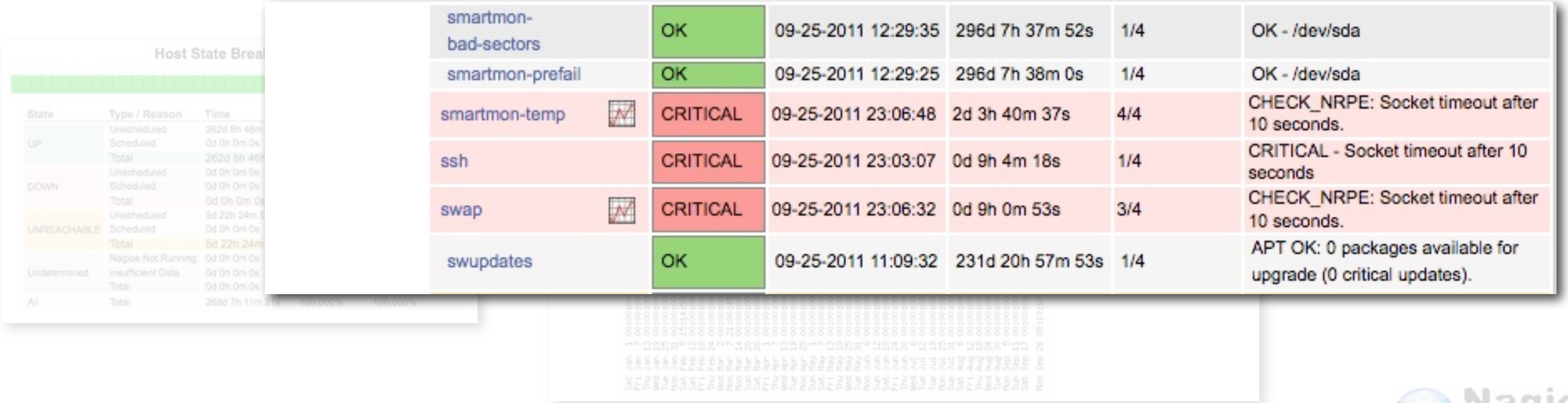

Host State Brea

State	Type / Reason	Time		
UP	Unscheduled	262d 8h 46m		
	Scheduled	0d 0h 0m 0s		
	Total	262d 8h 46		
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	Scheduled	0d 0h 0m 0s		
	Total	0d 0h 0m 0s		
UNREACHABLE	Unscheduled	5d 22h 24m 5		
	Scheduled	0d 0h 0m 0s		
	Total	5d 22h 24m		
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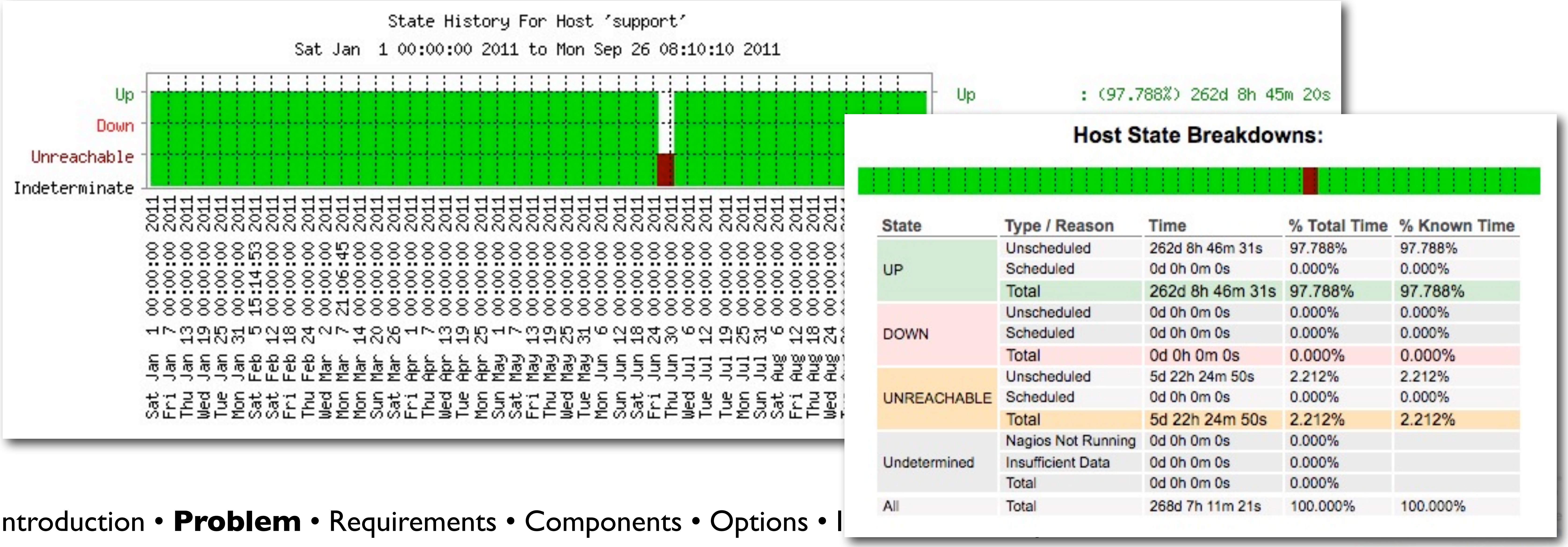

State History For Host 'support'

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Up : (97.788%) 262d 8h 45m 20s

Host State Breakdowns:

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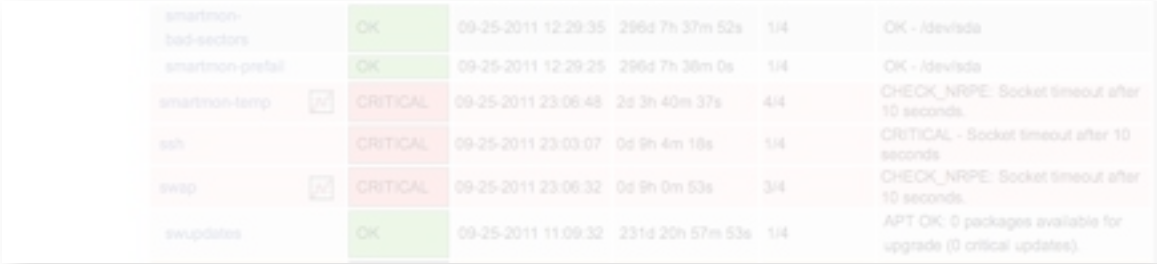

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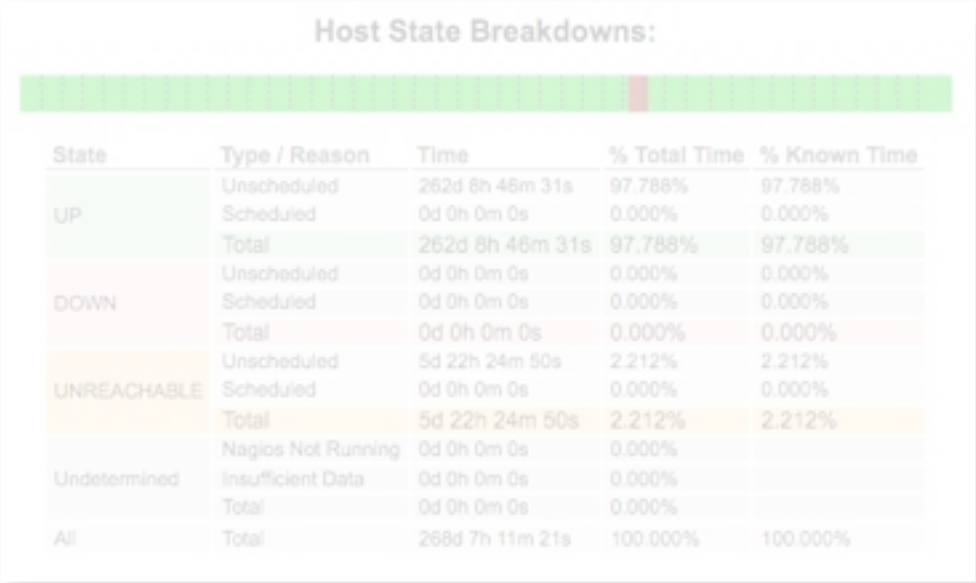

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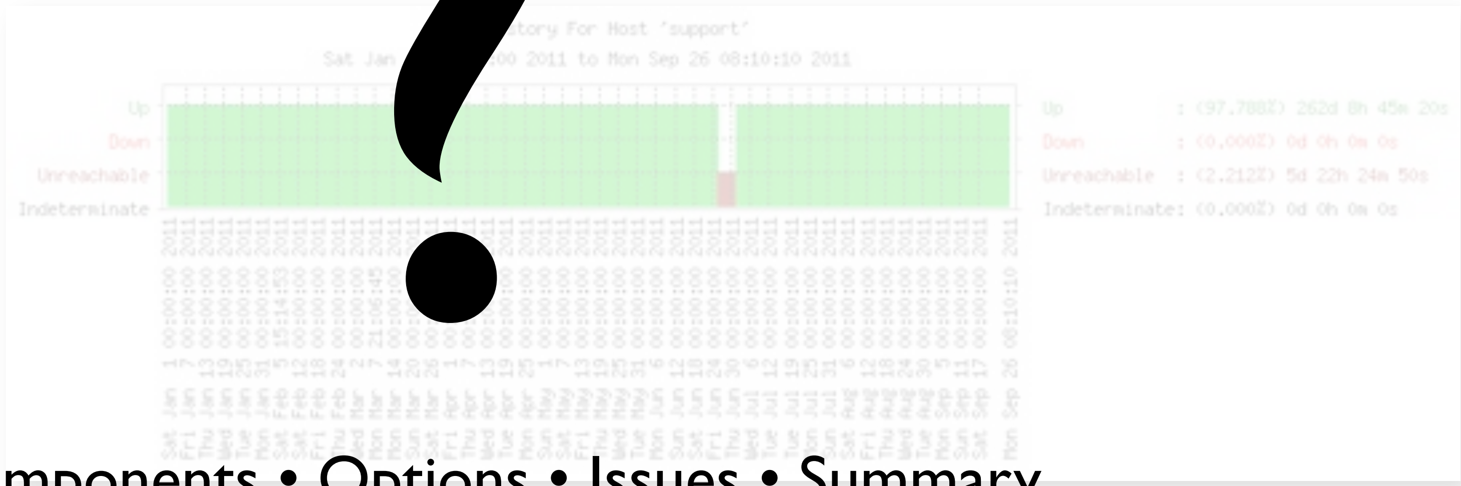


Why is this a problem?

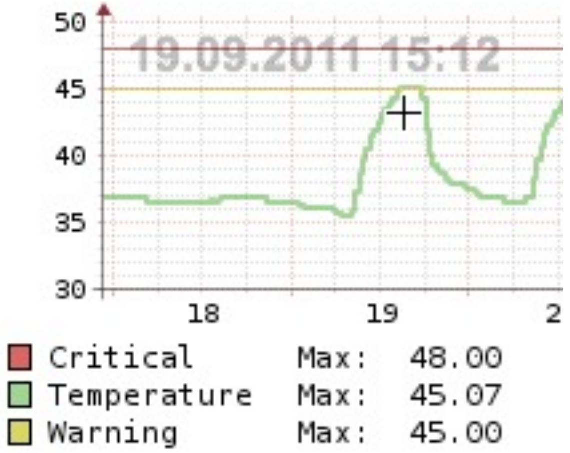
- How do you figure out which notifications matter?
- How do you know what the thresholds should be?
- What is happening between notifications?
- What caused the known disasters?
- How to predict the unanticipated disasters?

Show me some examples...

- Why do the temperature alarms go off each day?
  UPS temperature monitoring
- How close do we come to exceeding thresholds?
  Software license use
- How can we understand dynamic environments?
  Cross-platform distributed build/test environment

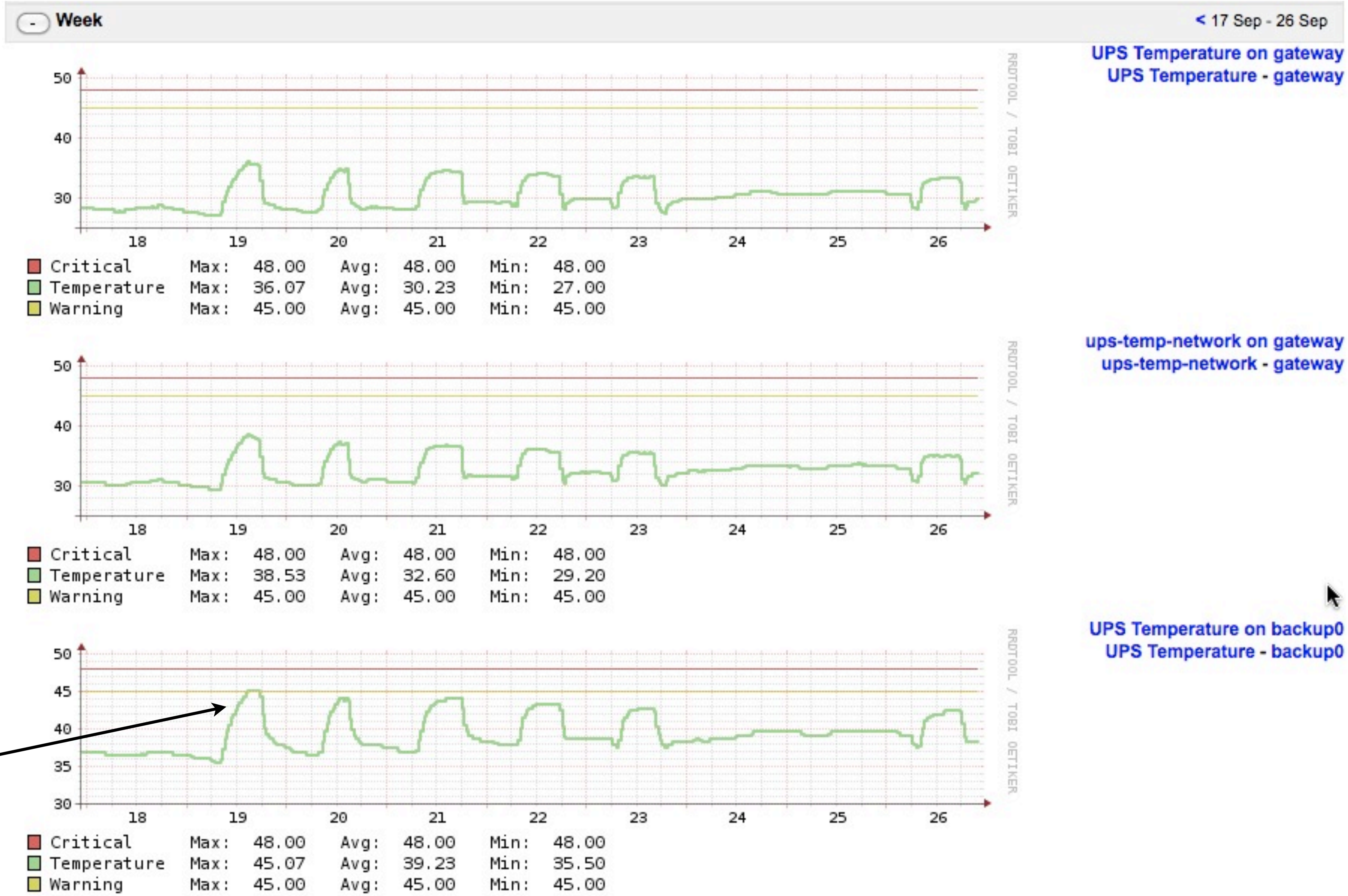
Temperature Cycles

19 M
20 T
21 W
22 Th
23 F
24 S
25 Su



🟥 Critical	Max:	48.00
🟩 Temperature	Max:	45.07
🟨 Warning	Max:	45.00

This exception tipped us off



UPS Temperature on gateway
UPS Temperature - gateway

🟥 Critical	Max:	48.00	Avg:	48.00	Min:	48.00
🟩 Temperature	Max:	36.07	Avg:	30.23	Min:	27.00
🟨 Warning	Max:	45.00	Avg:	45.00	Min:	45.00

ups-temp-network on gateway
ups-temp-network - gateway

🟥 Critical	Max:	48.00	Avg:	48.00	Min:	48.00
🟩 Temperature	Max:	38.53	Avg:	32.60	Min:	29.20
🟨 Warning	Max:	45.00	Avg:	45.00	Min:	45.00

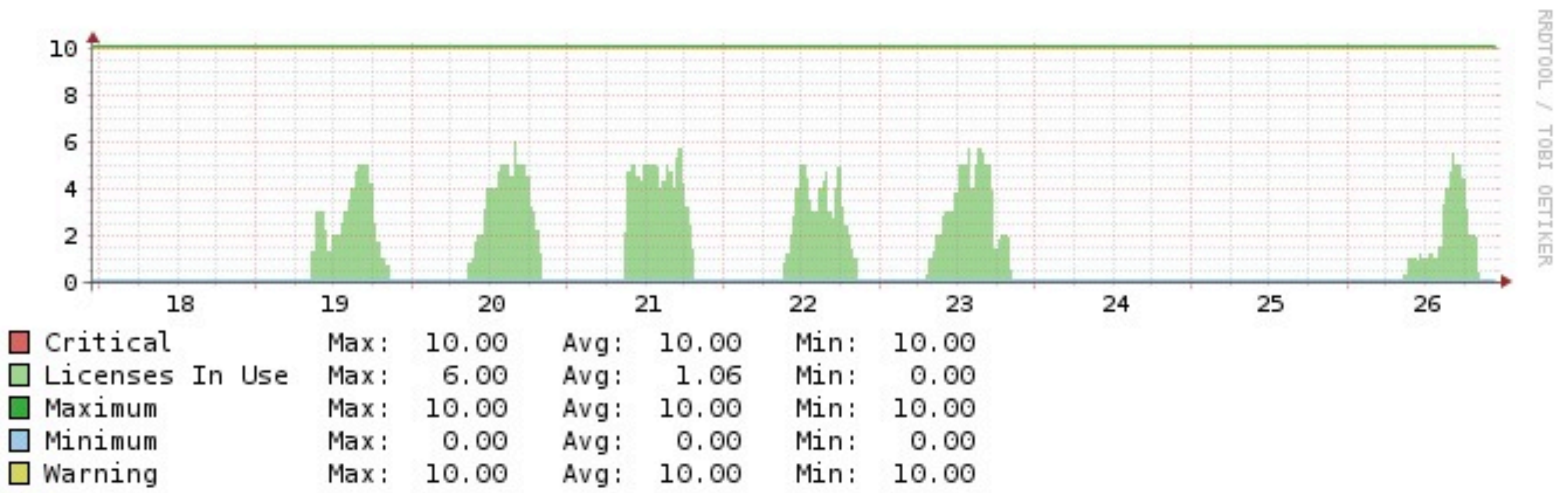
UPS Temperature on backup0
UPS Temperature - backup0

🟥 Critical	Max:	48.00	Avg:	48.00	Min:	48.00
🟩 Temperature	Max:	45.07	Avg:	39.23	Min:	35.50
🟨 Warning	Max:	45.00	Avg:	45.00	Min:	45.00

Under the Thresholds

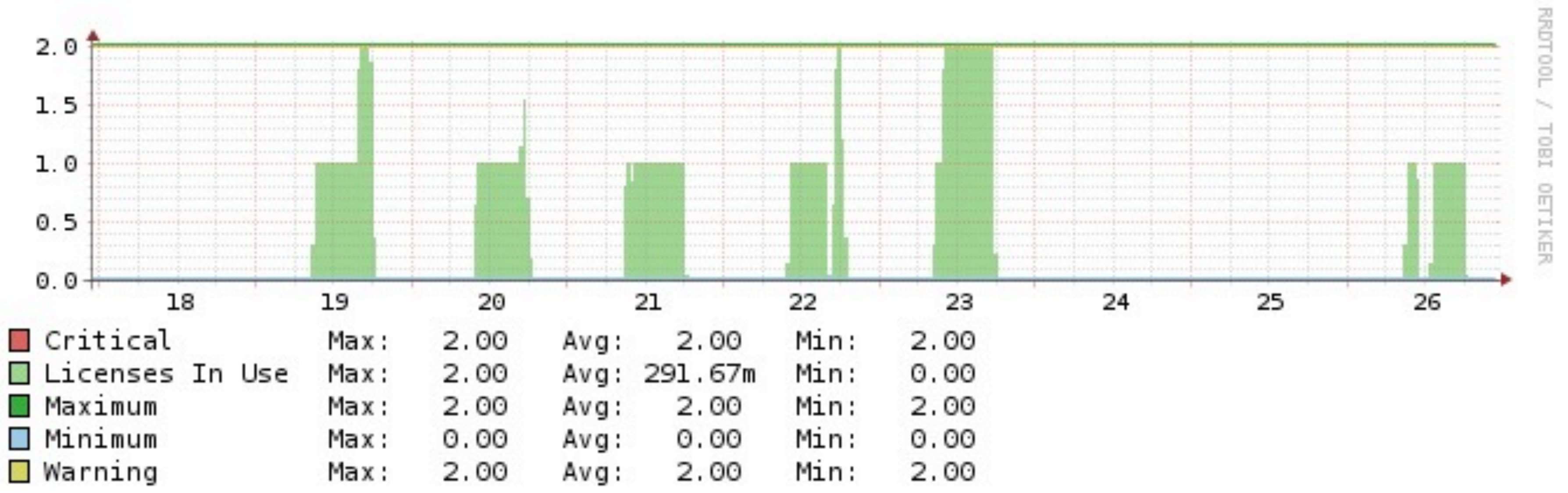
What is happening when we are not being notified?

lic-solidworks on globalflyer
lic-solidworks - globalflyer



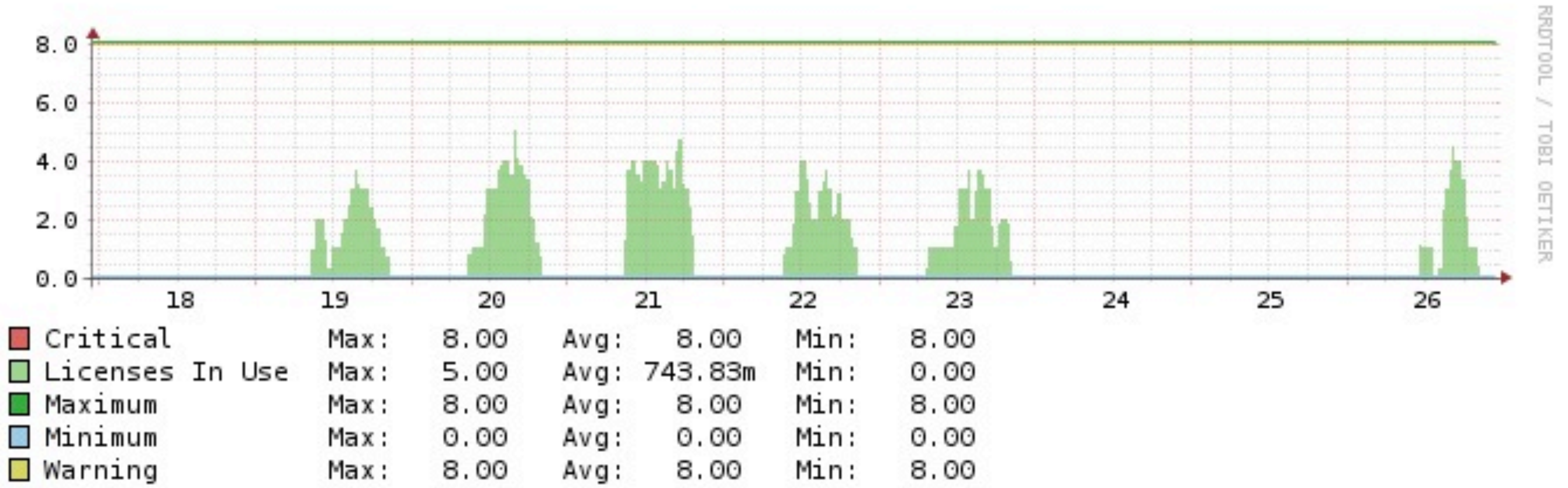
🟥 Critical	Max:	10.00	Avg:	10.00	Min:	10.00
🟩 Licenses In Use	Max:	6.00	Avg:	1.06	Min:	0.00
🟩 Maximum	Max:	10.00	Avg:	10.00	Min:	10.00
🟦 Minimum	Max:	0.00	Avg:	0.00	Min:	0.00
🟨 Warning	Max:	10.00	Avg:	10.00	Min:	10.00

lic-swofficeprem on globalflyer
lic-swofficeprem - globalflyer



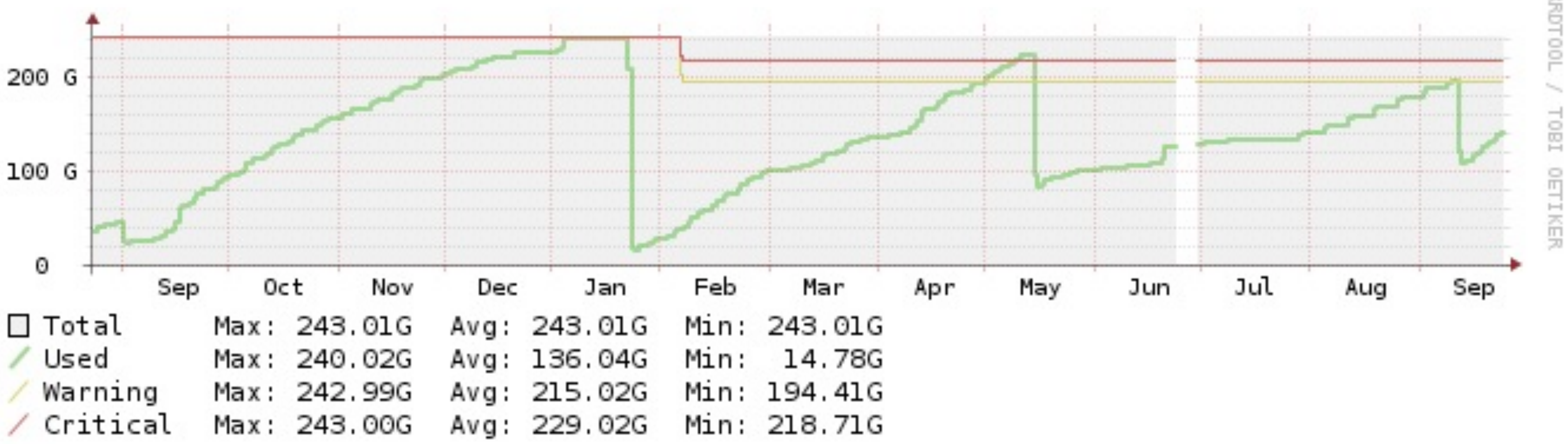
🟥 Critical	Max:	2.00	Avg:	2.00	Min:	2.00
🟩 Licenses In Use	Max:	2.00	Avg:	291.67m	Min:	0.00
🟩 Maximum	Max:	2.00	Avg:	2.00	Min:	2.00
🟦 Minimum	Max:	0.00	Avg:	0.00	Min:	0.00
🟨 Warning	Max:	2.00	Avg:	2.00	Min:	2.00

lic-swofficepro on globalflyer
lic-swofficepro - globalflyer



🟥 Critical	Max:	8.00	Avg:	8.00	Min:	8.00
🟩 Licenses In Use	Max:	5.00	Avg:	743.83m	Min:	0.00
🟩 Maximum	Max:	8.00	Avg:	8.00	Min:	8.00
🟦 Minimum	Max:	0.00	Avg:	0.00	Min:	0.00
🟨 Warning	Max:	8.00	Avg:	8.00	Min:	8.00

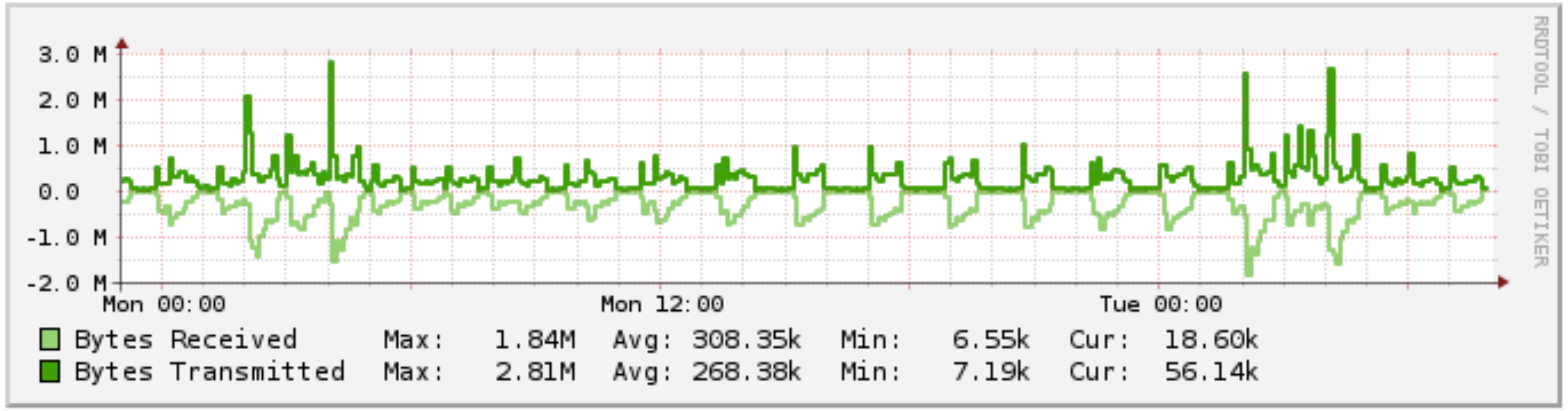
Changing Thresholds



Video Disk Usage on pvr
Video Disk Usage - pvr

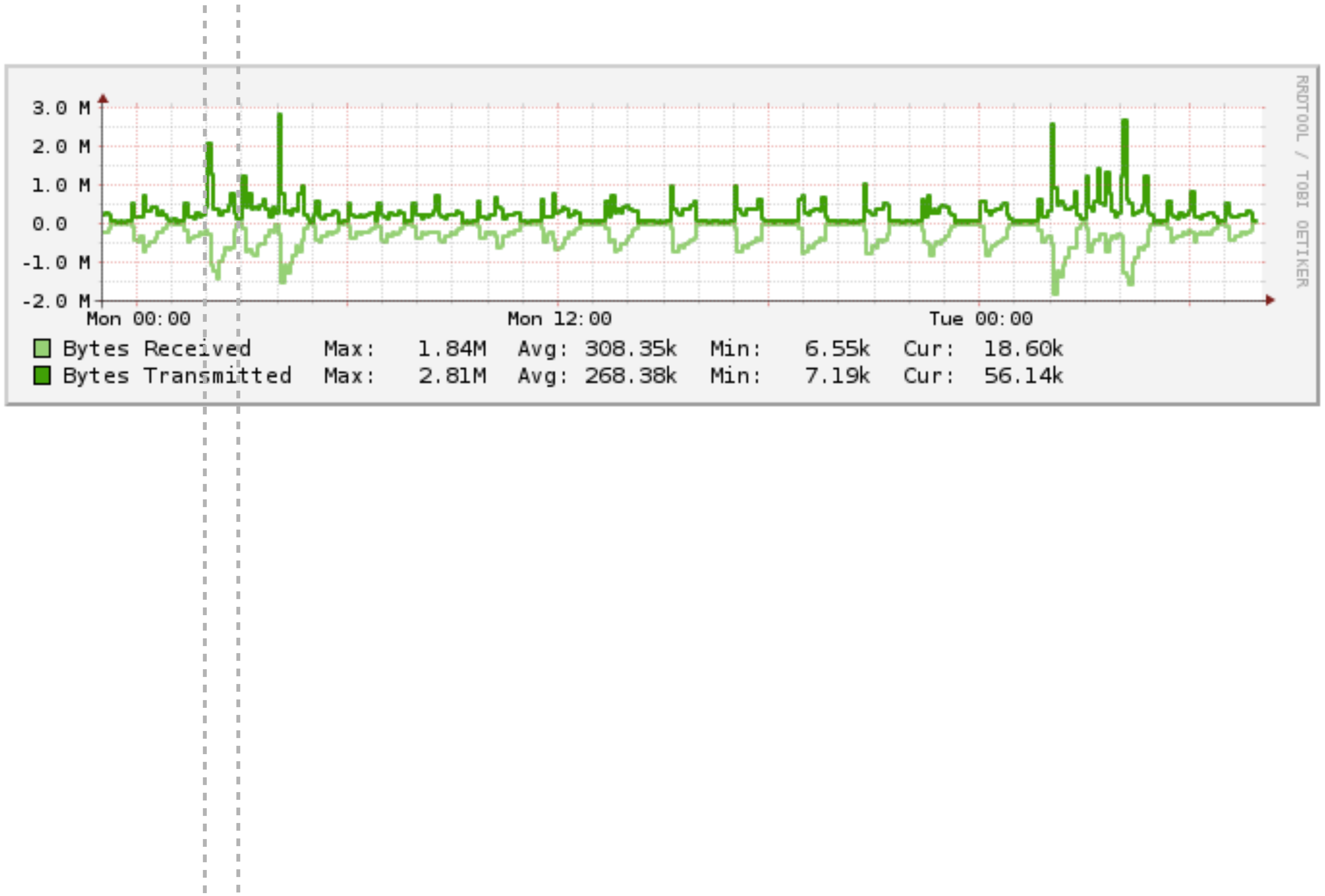
Track the changes to the requirements, not just the changes to the data.

Dynamic Targets



data0

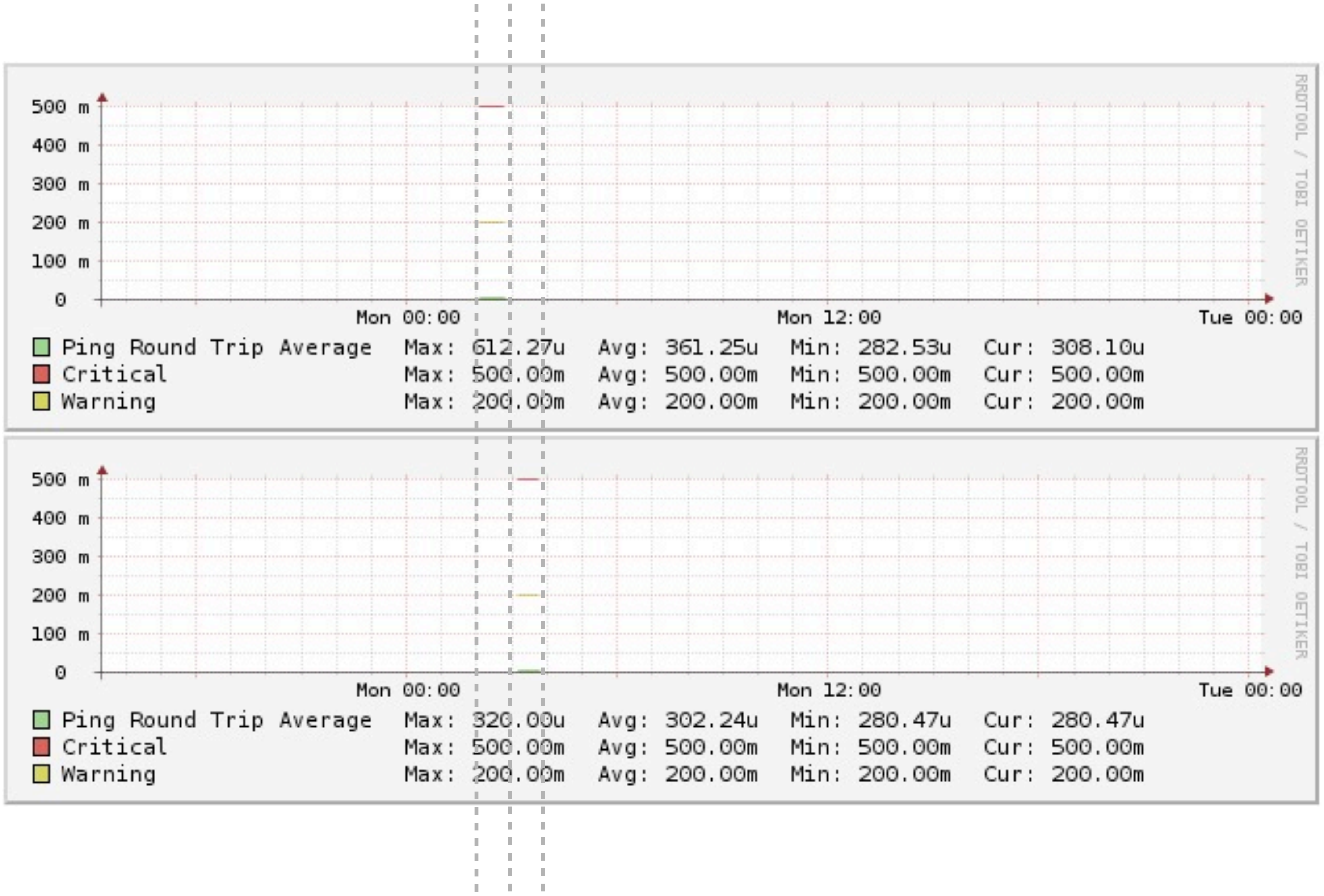
Dynamic Targets



data0

What is the source of the traffic spike in this interval?

Dynamic Targets



vm15

```
🟩 Ping Round Trip Average   Max: 612.27u   Avg: 361.25u   Min: 282.53u   Cur: 308.10u
🟥 Critical                  Max: 500.00m   Avg: 500.00m   Min: 500.00m   Cur: 500.00m
🟨 Warning                   Max: 200.00m   Avg: 200.00m   Min: 200.00m   Cur: 200.00m
```

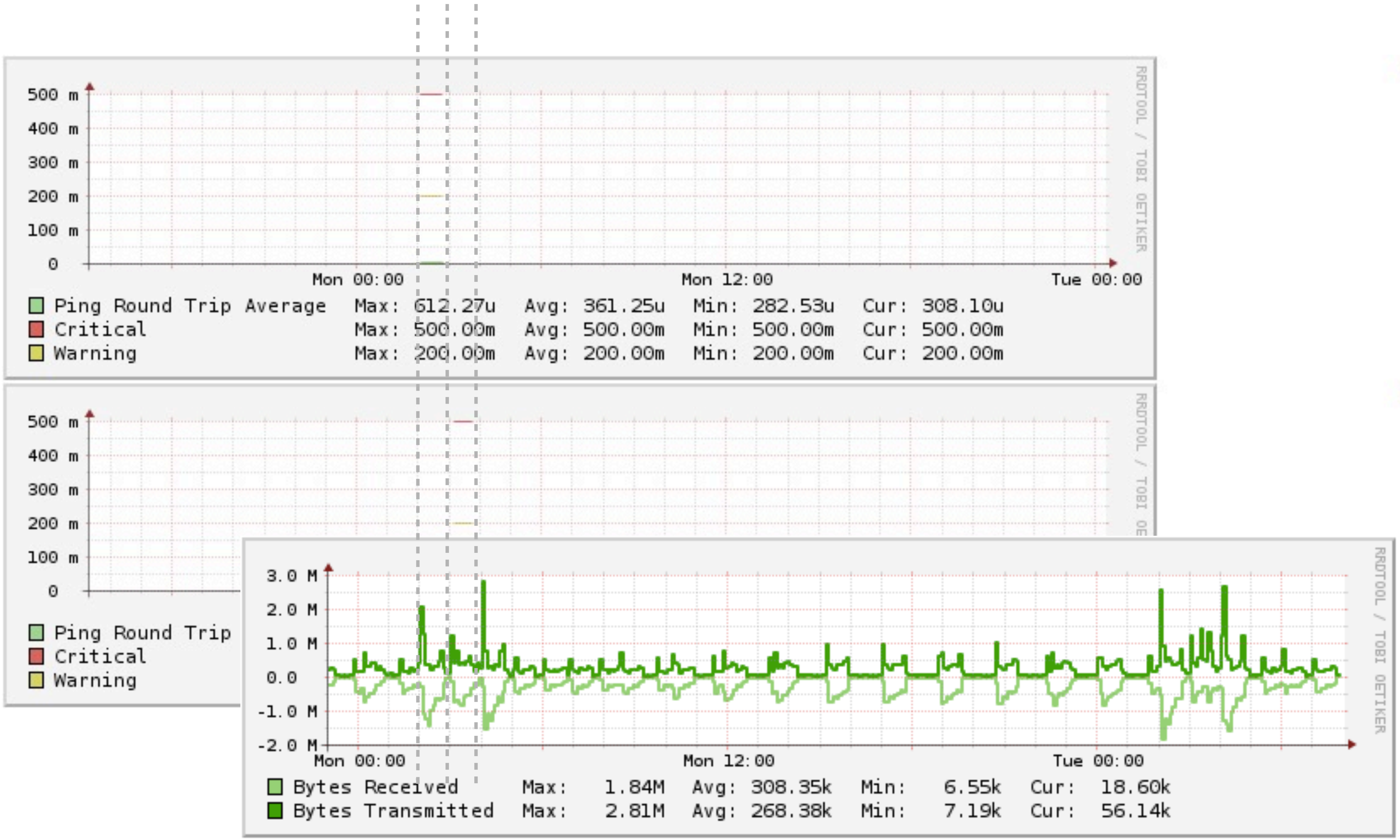
vm16

```
🟩 Ping Round Trip Average   Max: 320.00u   Avg: 302.24u   Min: 280.47u   Cur: 280.47u
🟥 Critical                  Max: 500.00m   Avg: 500.00m   Min: 500.00m   Cur: 500.00m
🟨 Warning                   Max: 200.00m   Avg: 200.00m   Min: 200.00m   Cur: 200.00m
```

vm15 is active here

vm16 is active here

Dynamic Targets



vm15

vm16

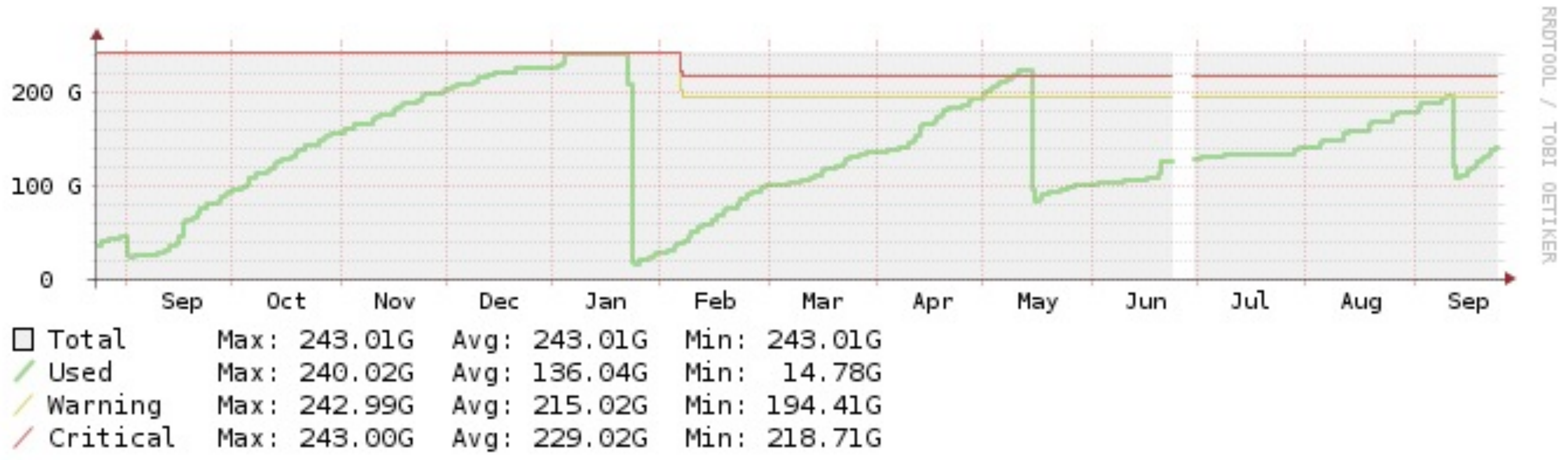
data0

Trending is not just drawing graphs

- Catch problems before they become disasters
- Provide context for discovering patterns
- Data correlation and comparison

So what should a performance trending system do?

Display thresholds as well as performance data

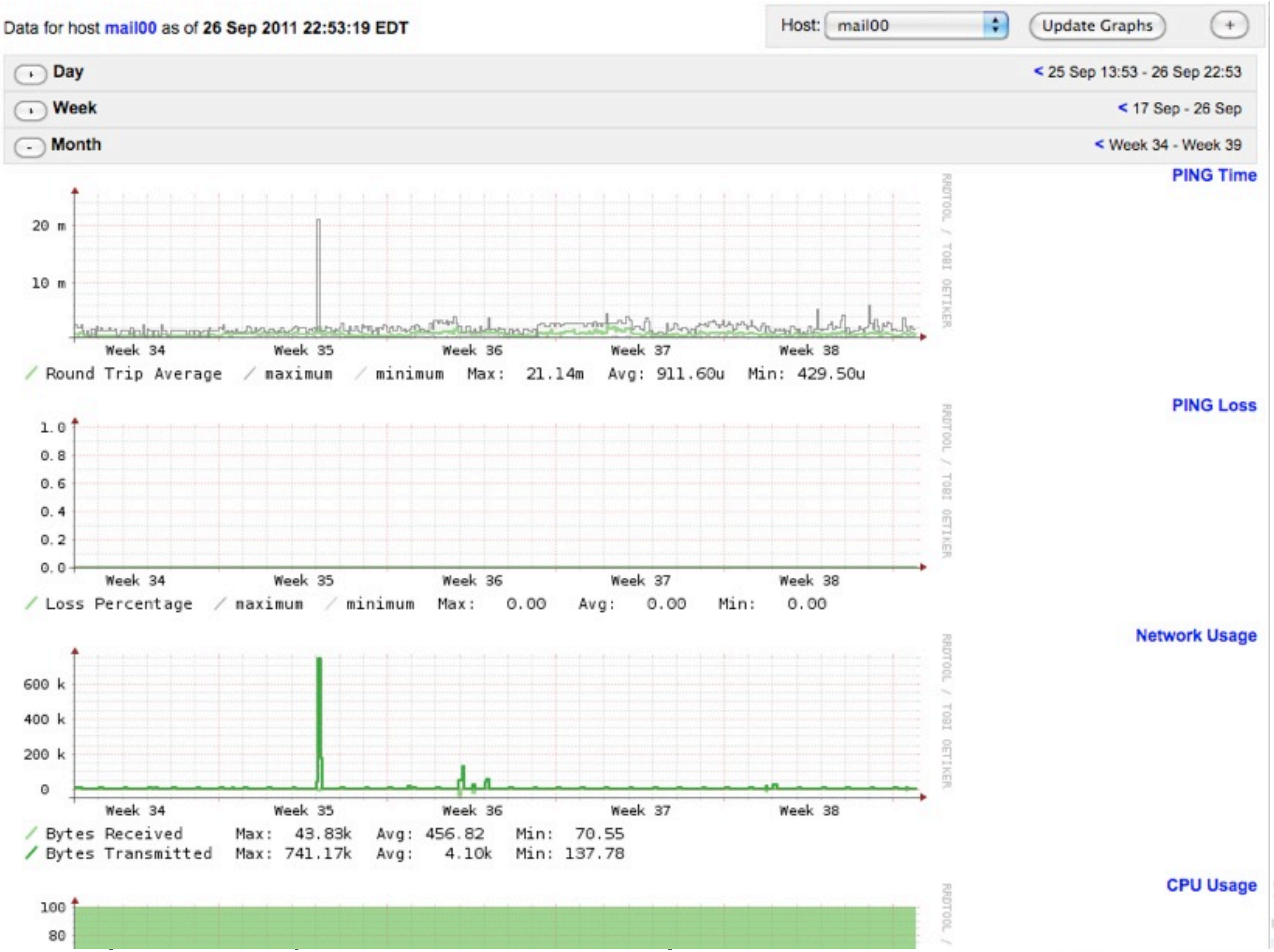


```
□ Total      Max: 243.01G  Avg: 243.01G  Min: 243.01G
/ Used       Max: 240.02G  Avg: 136.04G  Min:  14.78G
/ Warning    Max: 242.99G  Avg: 215.02G  Min: 194.41G
/ Critical   Max: 243.00G  Avg: 229.02G  Min: 218.71G
```

Video Disk Usage on pvr
Video Disk Usage - pvr

So what should a performance trending system do?

Display all services for a specified host



Data for host mail00 as of 26 Sep 2011 22:53:19 EDT

Host: mail00 Update Graphs +

Day < 25 Sep 13:53 - 26 Sep 22:53

Week < 17 Sep - 26 Sep

Month < Week 34 - Week 39

PING Time

```
Round Trip Average   maximum   minimum   Max:  21.14m   Avg: 911.60u   Min: 429.50u
```

PING Loss

```
Loss Percentage   maximum   minimum   Max:   0.00   Avg:   0.00   Min:   0.00
```

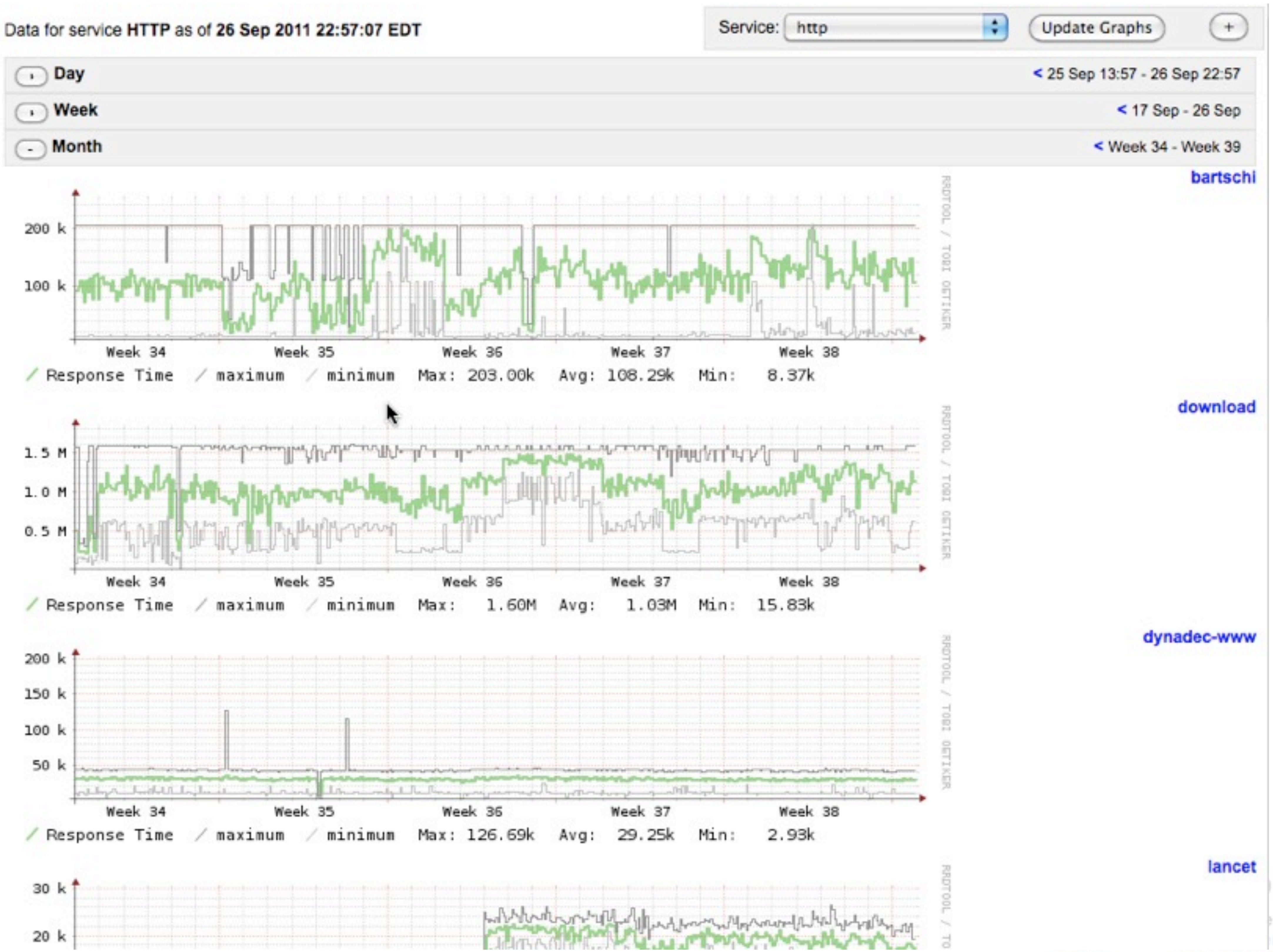
Network Usage

```
Bytes Received      Max:  43.83k   Avg: 456.82   Min:  70.55
Bytes Transmitted   Max: 741.17k   Avg:   4.10k  Min: 137.78
```

CPU Usage

So what should a performance trending system do?

Display all hosts that have a specified service



Data for service **HTTP** as of **26 Sep 2011 22:57:07 EDT**

Service: http | Update Graphs | +

- Day — < 25 Sep 13:57 - 26 Sep 22:57
- Week — < 17 Sep - 26 Sep
- Month — < Week 34 - Week 39

bartschi

Response Time / maximum / minimum Max: 203.00k Avg: 108.29k Min: 8.37k

download

Response Time / maximum / minimum Max: 1.60M Avg: 1.03M Min: 15.83k

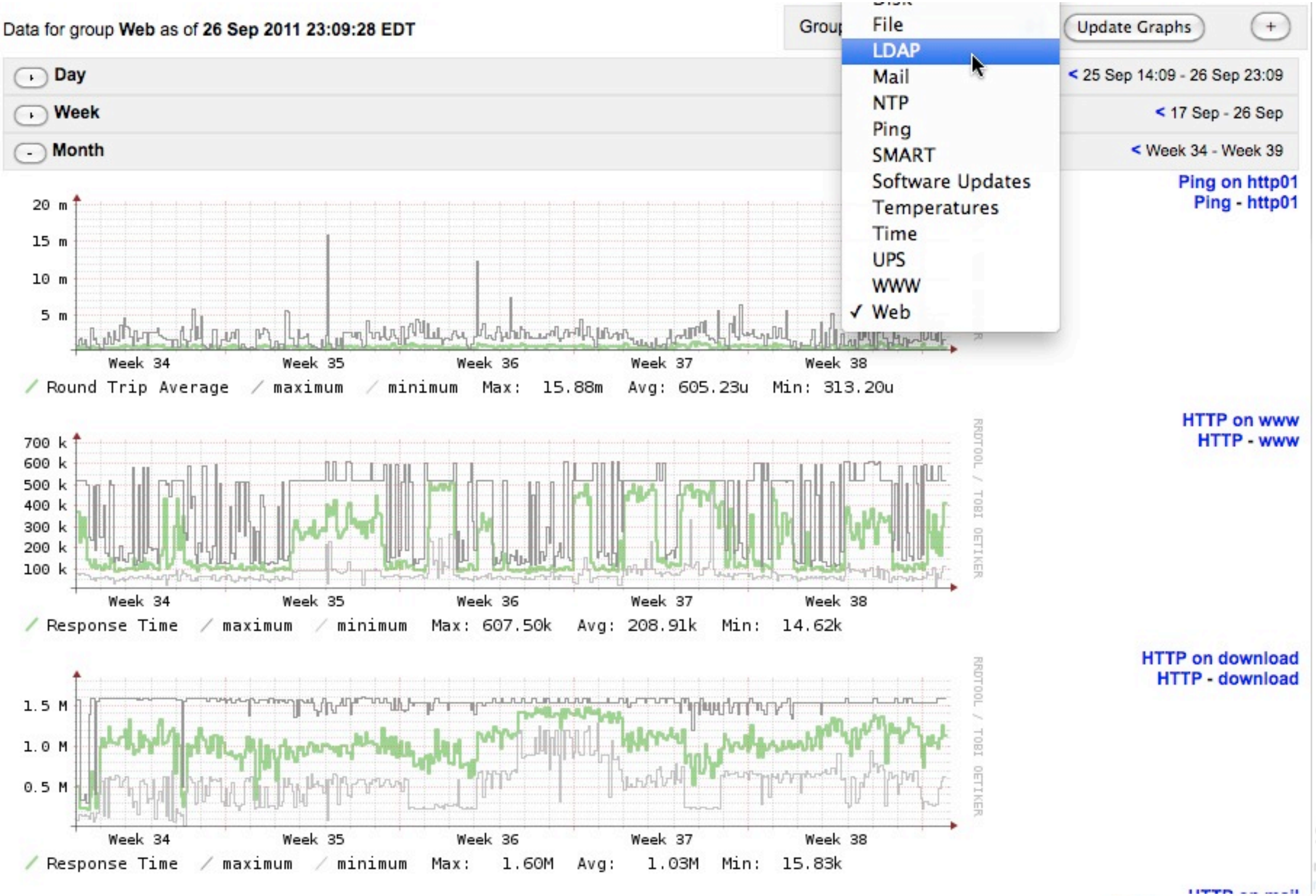
dynadec-www

Response Time / maximum / minimum Max: 126.69k Avg: 29.25k Min: 2.93k

lancet

So what should a performance trending system do?

Display arbitrary groups of host/ service data



Data for group **Web** as of **26 Sep 2011 23:09:28 EDT**

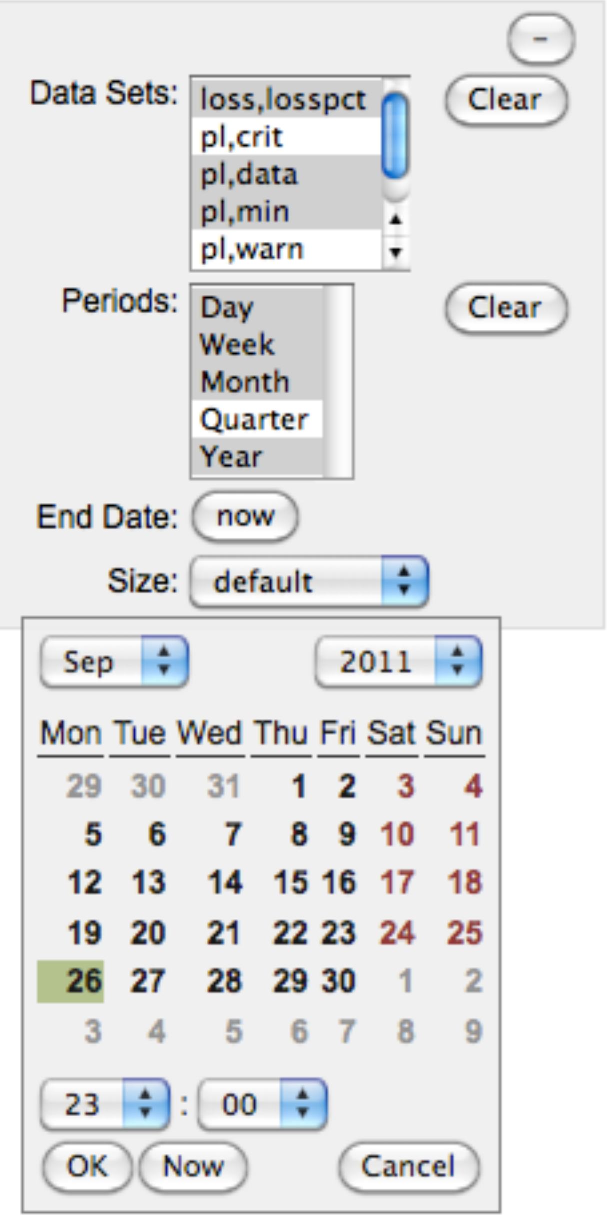
Round Trip Average / maximum / minimum Max: 15.88m Avg: 605.23u Min: 313.20u

Response Time / maximum / minimum Max: 607.50k Avg: 208.91k Min: 14.62k

Response Time / maximum / minimum Max: 1.60M Avg: 1.03M Min: 15.83k

So what should a performance trending system do?

Provide interactive queries as well as canned reports



Data Sets: loss,losspct
pl,crit
pl,data
pl,min
pl,warn

Periods: Day
Week
Month
Quarter
Year

End Date: now

Size: default

Sep 2011

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2
3	4	5	6	7	8	9

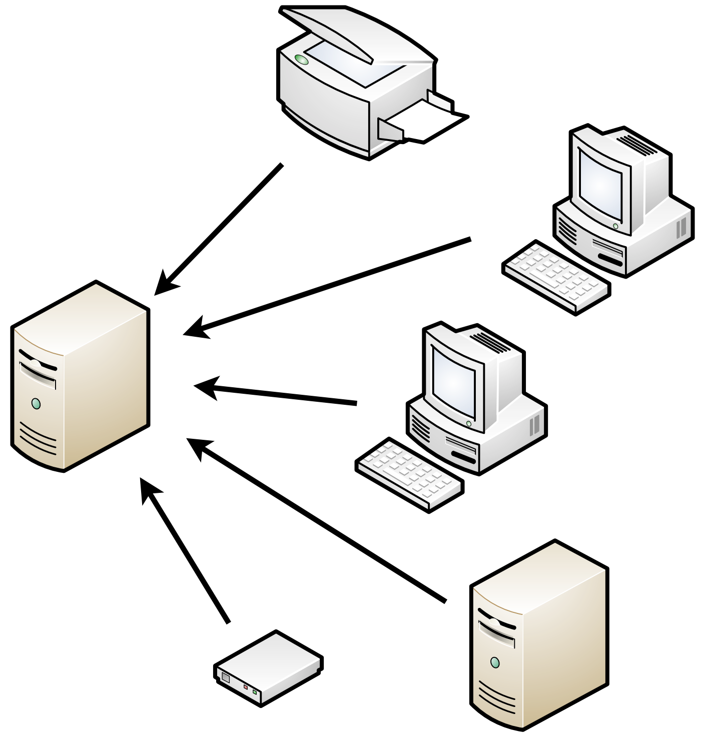
23 : 00

So what should a performance trending system do?

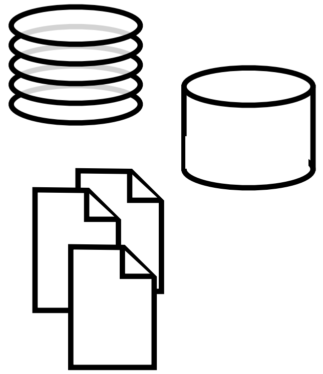
- Display thresholds as well as performance data
- Display all services for a specified host
- Display all hosts with a specified service
- Display arbitrary groups of host/service data
- Provide interactive queries as well as canned reports
- Compare data from any host/service with any other host/service
- Compare data from any two periods of time
- Provide export of data for analysis

- Easy to use
- Easy on the eyes
- Easy to configure

Graphing and Trending in Nagios

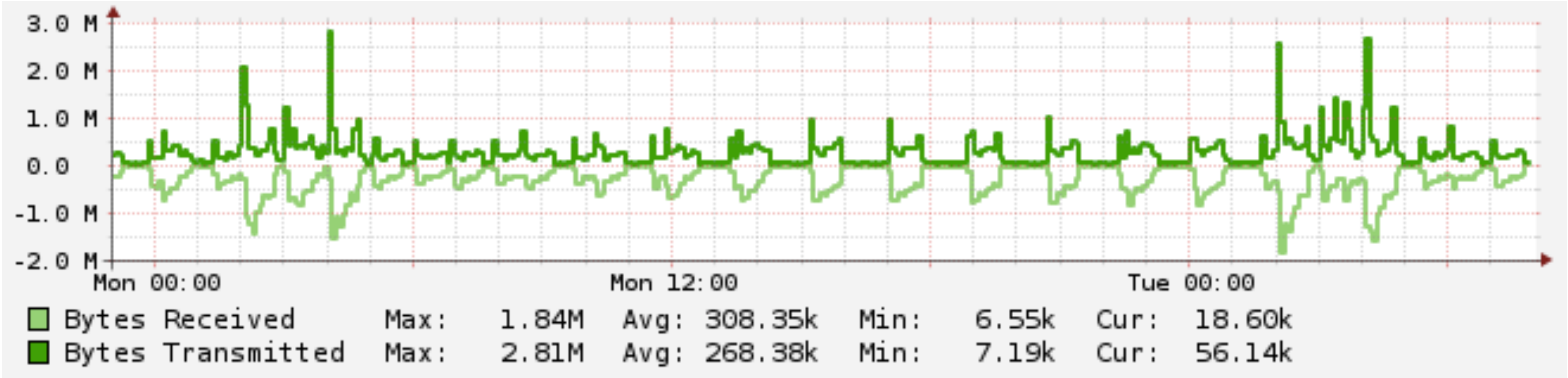


- Data Collection

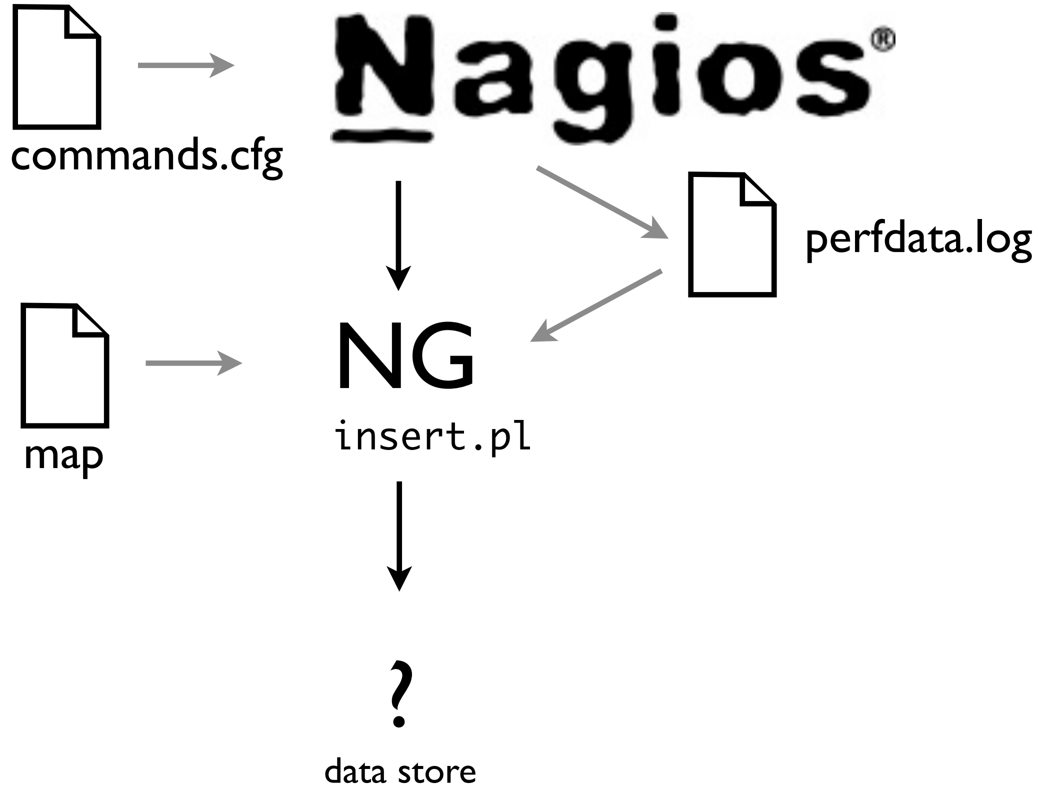


- Data Storage

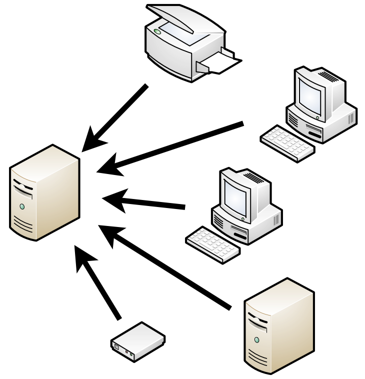
- Data Display



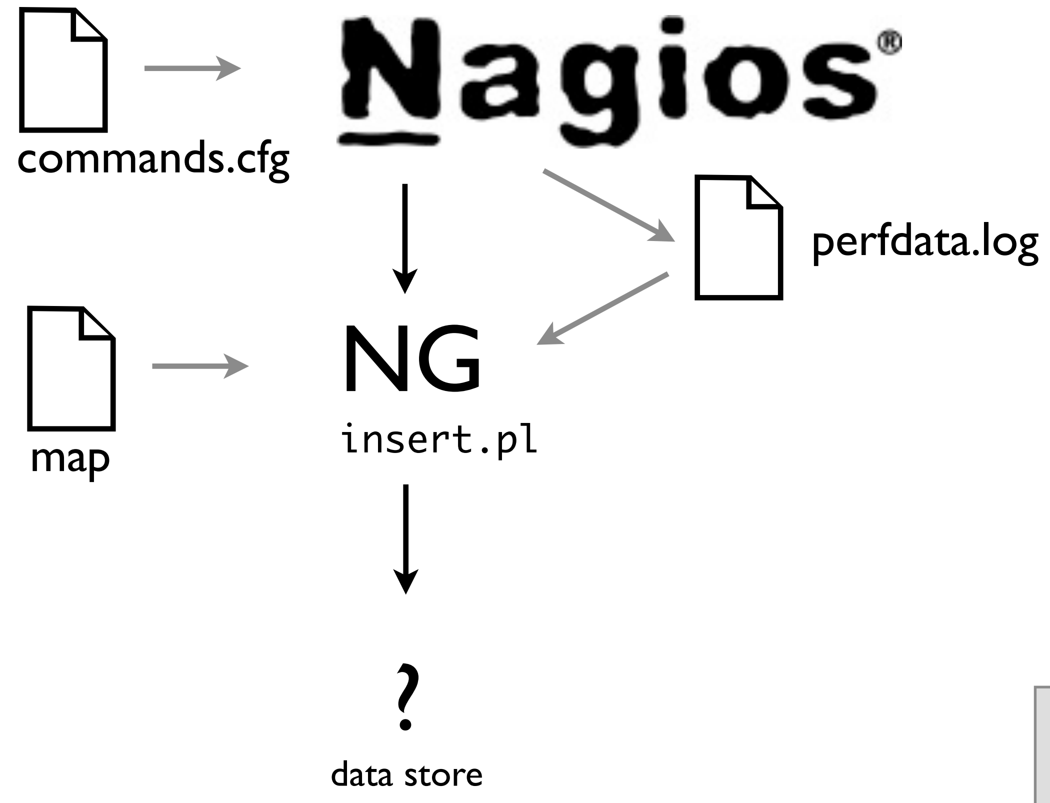
Data Collection



- How to do it in Nagios?
  - Immediate
  - Batch
  - Shared library
  - External process



Data Collection


commands.cfg

Nagios

NG

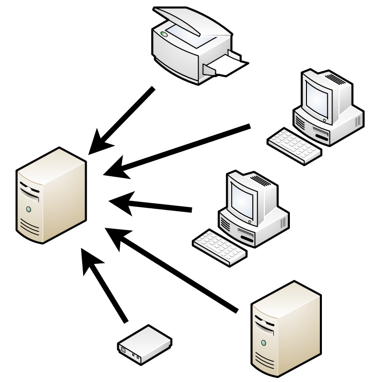
insert.pl

map

perfdata.log

?

data store



map

```
# Service type: ping
#   output:PING OK - Packet loss = 0%, RTA = 0.00 ms
/output:PING.*?(\d+)%.+?([.\d]+)\sms/
and push @s, [ 'pingloss',
               [ 'losspct', GAUGE, $1 ]]
and push @s, [ 'pingrta',
               [ 'rta', GAUGE, $2/1000 ]];
```

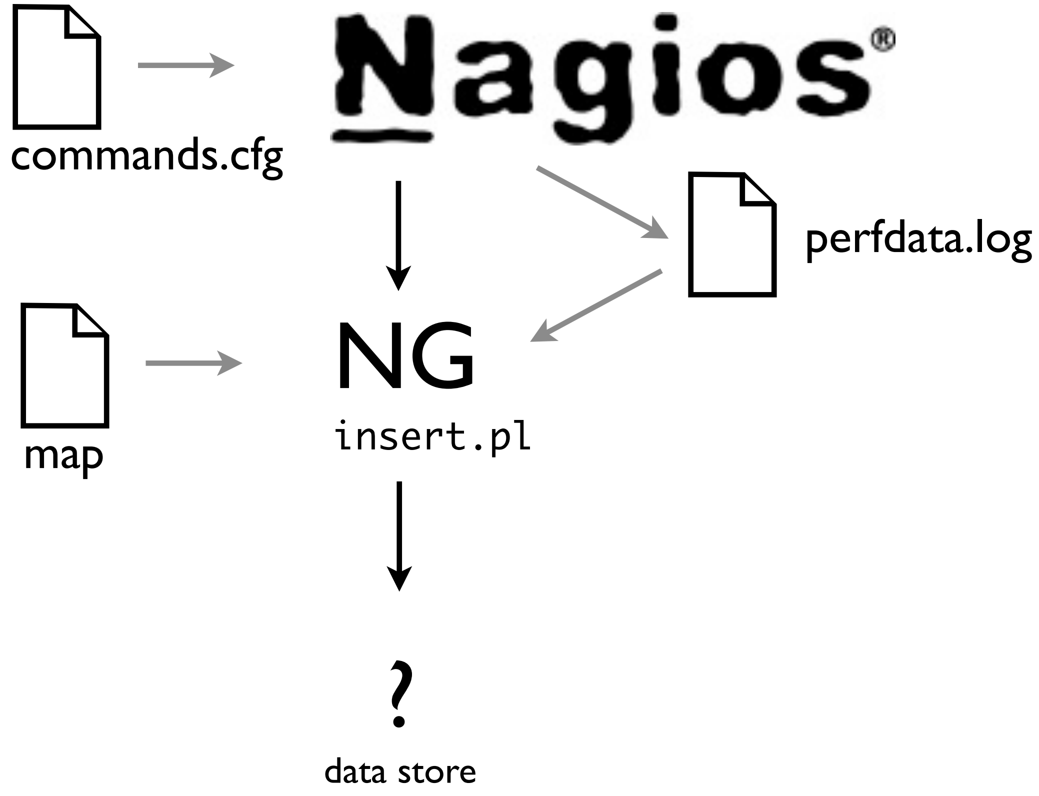
perfdata.log

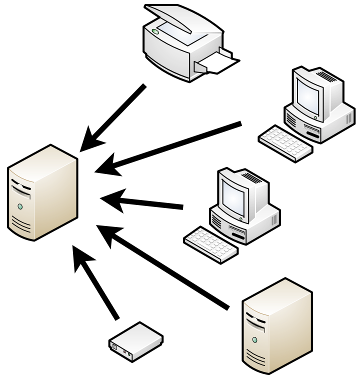
```
1317218378||yarg||mailq||OK: mailq reports queue is empty||unsent=0;5;20;0
1317218379||http01||ups-temp||OK - Internal Temperature: 36.9 C||temperature=36.9;45;48
1317218379||power3||ups-temp||OK - Internal Temperature: 42.7 C||temperature=42.7;45;48
```

commands.cfg

```
process_performance_data=1
service_perfdata_file=/var/nagios/perfdata.log
service_perfdata_file_template=$LASTSERVICECHECK$||$HOSTNAME$||$SERVICEDESC$||$SERVICEOUTPUT$||$SERVICEPERFDATA$
service_perfdata_file_mode=a
service_perfdata_file_processing_interval=30
service_perfdata_file_processing_command=process-service-perfdata
```

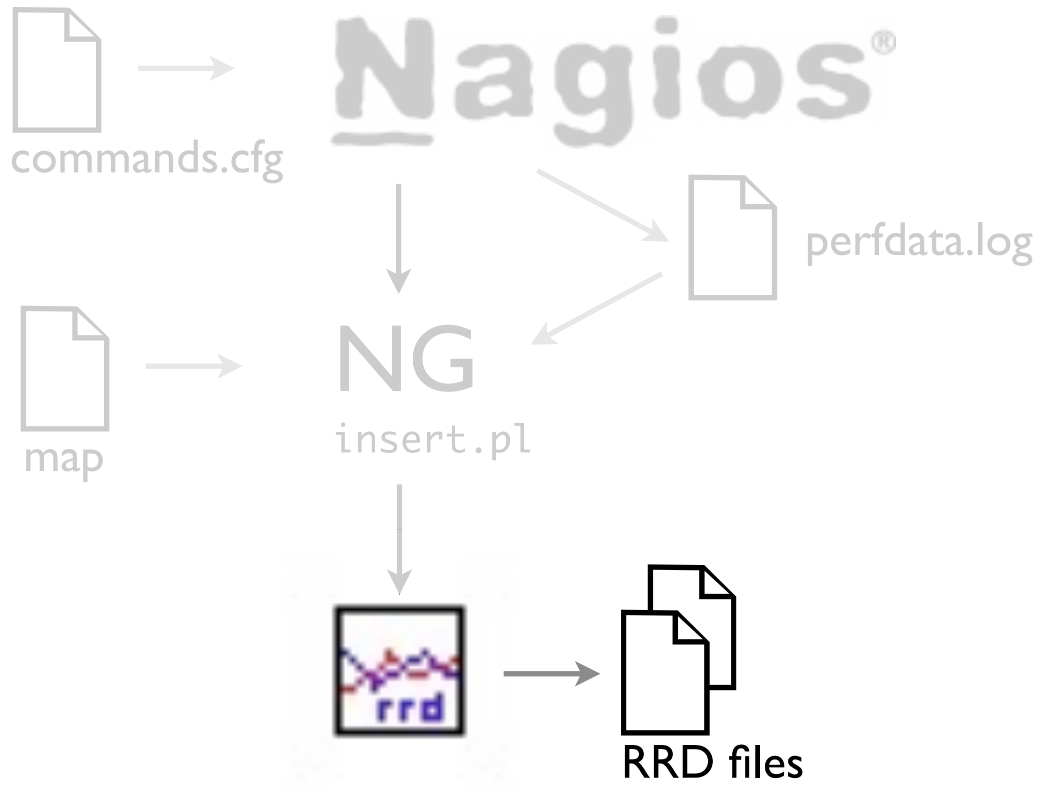
Data Collection





- How to do it in Nagios?
  - Immediate
  - Batch
  - Shared library
  - External process
- Issues
  - Performance data
  - Plugin output
  - Data from plugins or data from Nagios itself
  - Sampling interval
  - Sampling precision
  - Is Nagios the best tool for data collection?

Data Storage



- How to do it?
  - Round-Robin Database (rrdtool)
  - SQL Database (mySQL)
  - JavaDB

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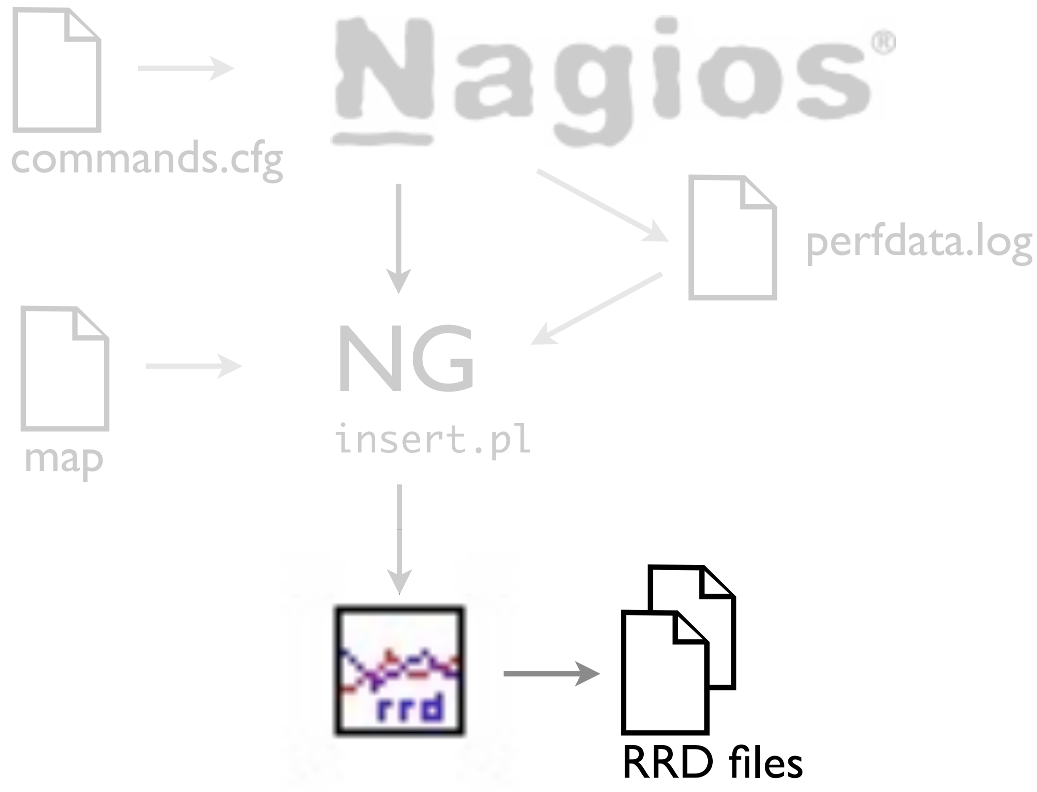
Data Storage



rrdtool update

```
DS:inOctets:COUNTER:120:0:4294967296
RRA:AVERAGE:.5:1:43200
RRA:AVERAGE:.5:5:105120
RRA:AVERAGE:.5:10:105120
```

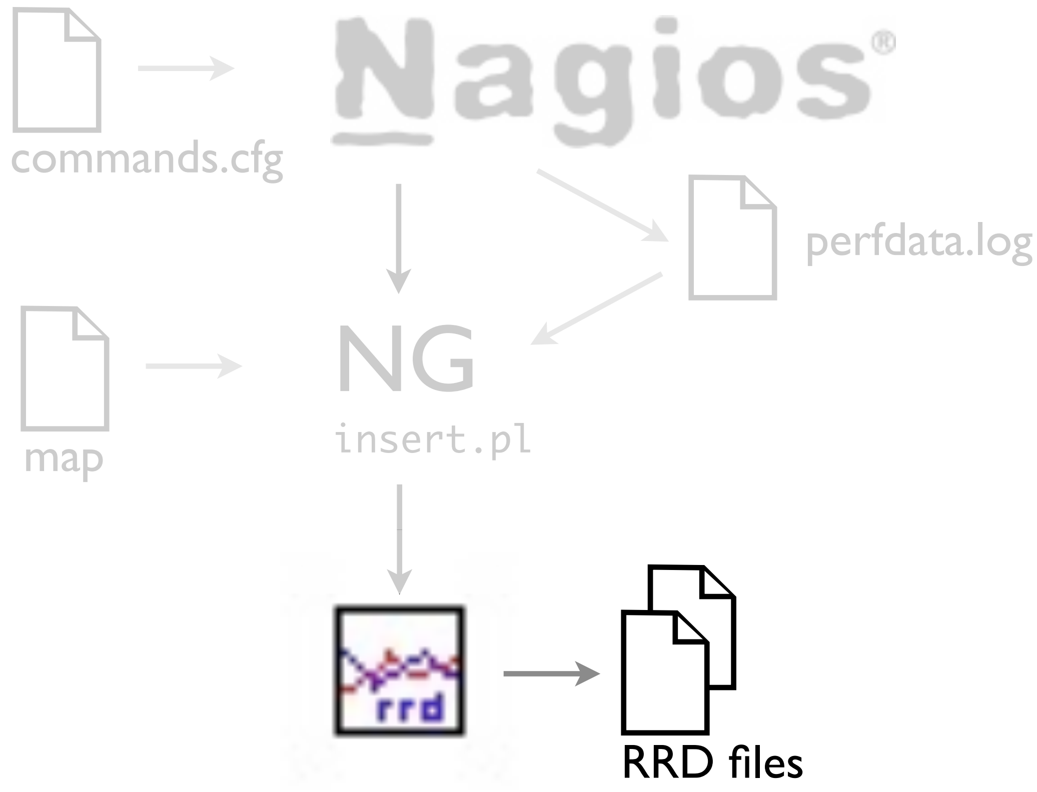
ls -l /var/nagiosgraph/rrd/*

```
/var/nagiosgraph/rrd/www:
total 72
-rw-rw-r-- 1 nagios nagios 24120 2011-09-28 10:00 http___http.rrd
-rw-rw-r-- 1 nagios nagios 24120 2011-09-28 10:00 http___http.rrd_max
-rw-rw-r-- 1 nagios nagios 24120 2011-09-28 10:00 http___http.rrd_min
```

rrdtool dump servicedesc___ds.rrd

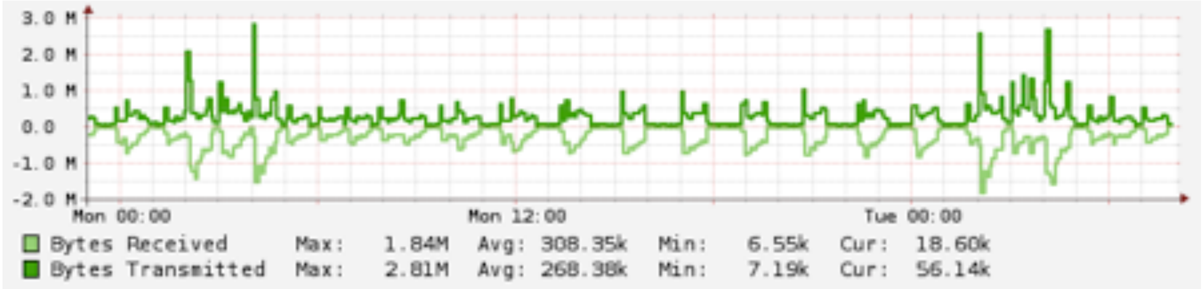
```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE rrd SYSTEM "http://oss.oetiker.ch/rrdtool/rrdtool.dtd">
<!-- Round Robin Database Dump -->
<rrd>
     <version>0003</version>
     <step>300</step> <!-- Seconds -->
     <lastupdate>1317218410</lastupdate> <!-- 2011-09-28 10:00:10 EDT -->
...
</rrd>
```

Data Storage

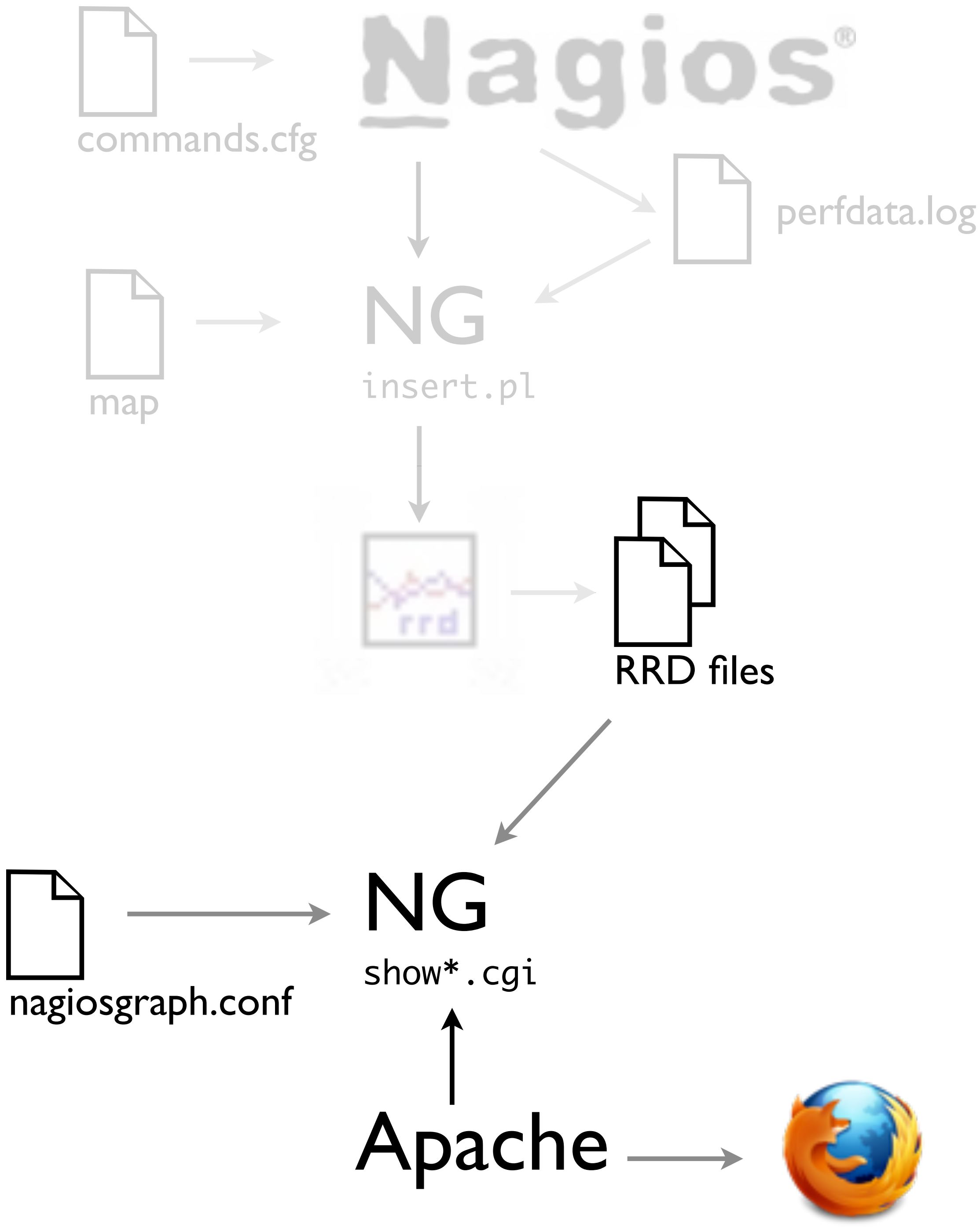


- How to do it?
  - Round-Robin Database (rrdtool)
  - SQL Database (mySQL)
  - JavaDB
- Issues
  - Schema definition
  - Storage space limitations
  - Storage space pruning
  - Redundancy
  - Backups

Data Display



- How to do it?
  - CGI (PERL+rrdtool)
  - PHP (PHP+PERL+rrdtool)
  - JavaScript
  - Google Charts



commands.cfg

Nagios

perfdata.log

map

NG

insert.pl

RRD files

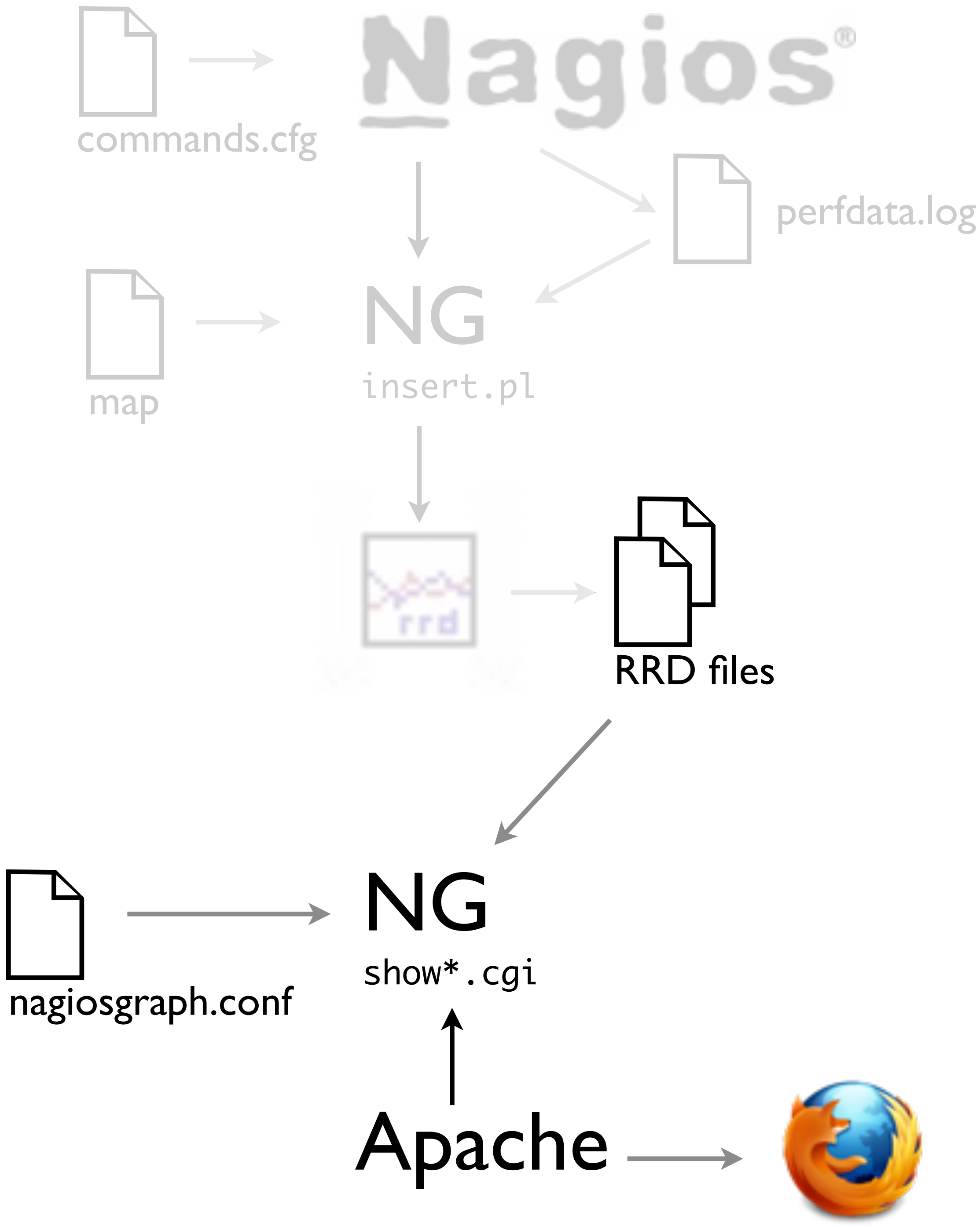
nagiosgraph.conf

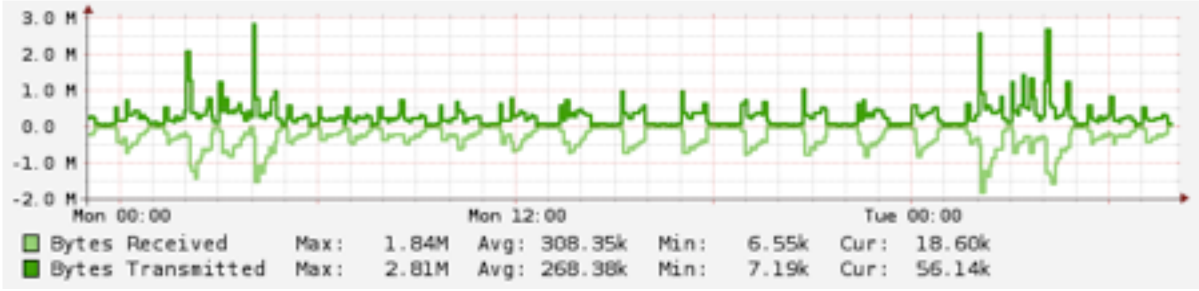
NG

show*.cgi

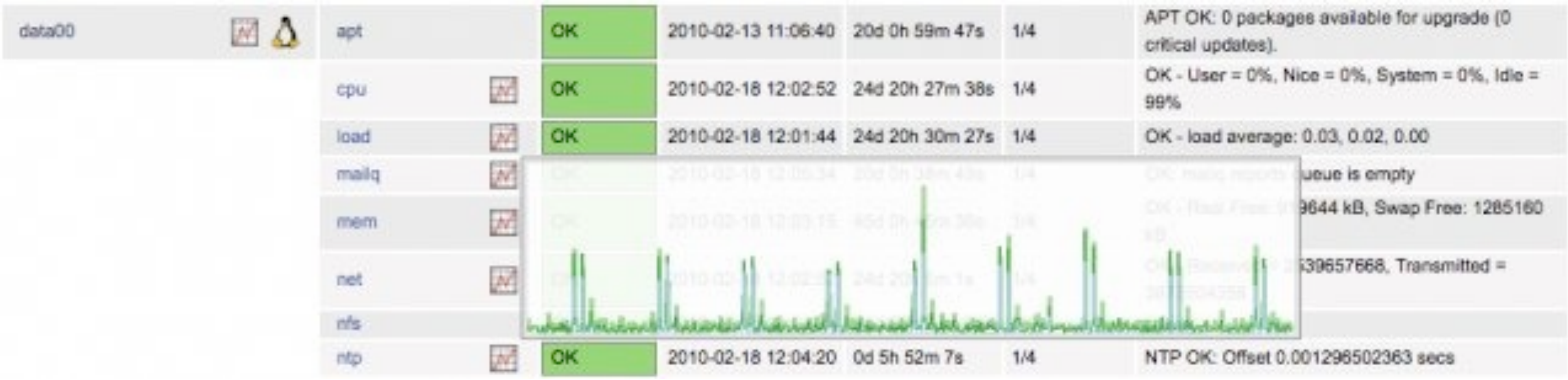
Apache

Data Display

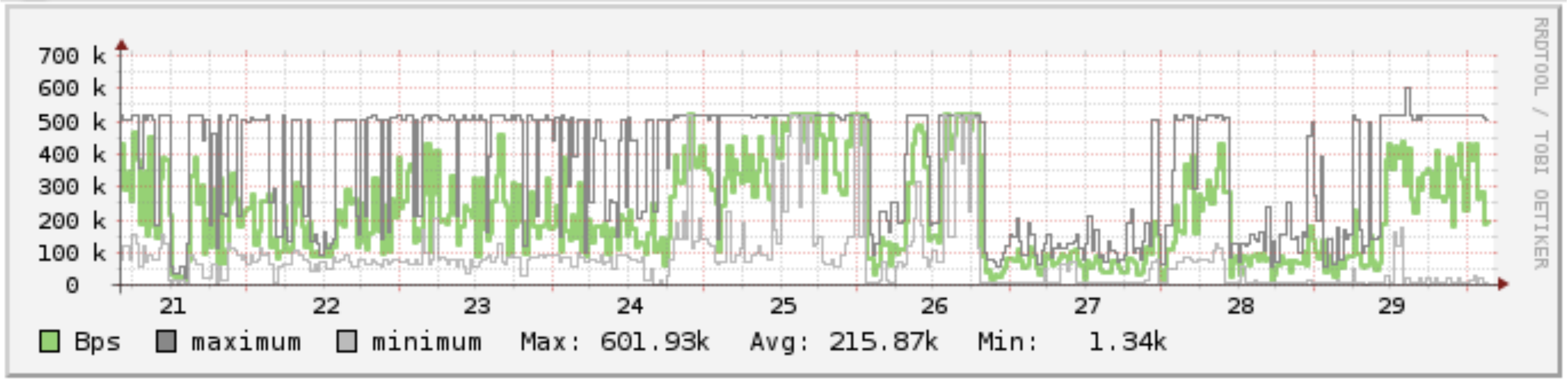




```
🟩 Bytes Received     Max:   1.84M  Avg: 308.35k  Min:   6.55k  Cur:  18.60k
🟩 Bytes Transmitted  Max:   2.81M  Avg: 268.38k  Min:   7.19k  Cur:  56.14k
```

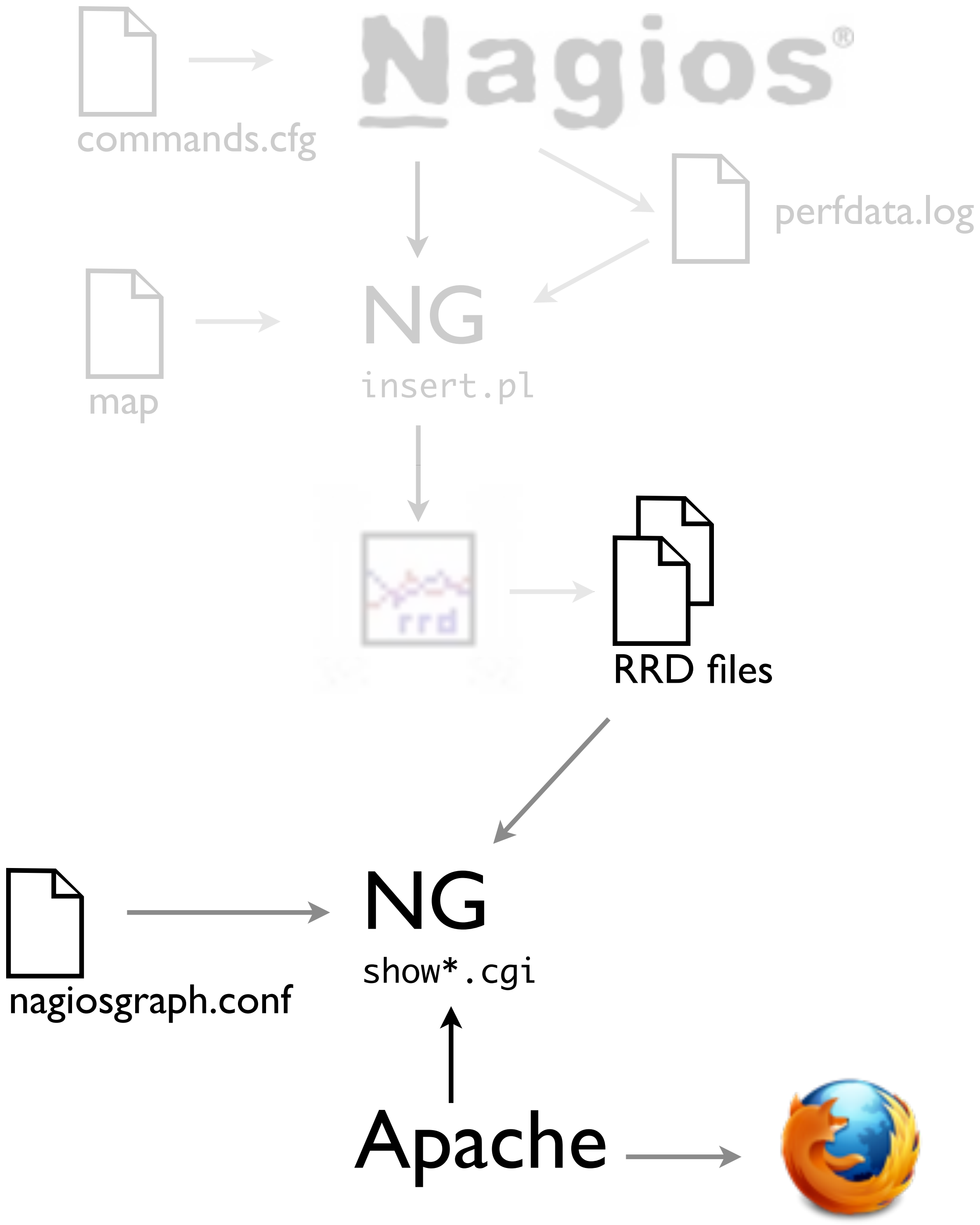


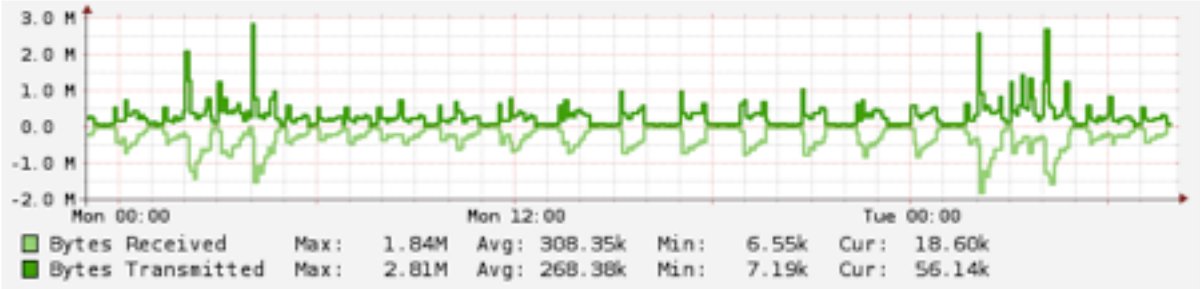
data00	apt	OK	2010-02-13 11:06:40	20d 0h 59m 47s	1/4	APT OK: 0 packages available for upgrade (0 critical updates).
	cpu	OK	2010-02-18 12:02:52	24d 20h 27m 38s	1/4	OK - User = 0%, Nice = 0%, System = 0%, Idle = 99%
	load	OK	2010-02-18 12:01:44	24d 20h 30m 27s	1/4	OK - load average: 0.03, 0.02, 0.00
	mailq	OK	2010-02-18 12:05:34	[illegible]	1/4	OK: mailq reports queue is empty
	mem	OK	2010-02-18 12:03:15	[illegible]	1/4	OK - Real Free: [illegible]9644 kB, Swap Free: 1285160 kB
	net	OK	[illegible]	[illegible]	1/4	OK: Received = [illegible]539657668, Transmitted = [illegible]
	nfs					
	ntp	OK	2010-02-18 12:04:20	0d 5h 52m 7s	1/4	NTP OK: Offset 0.001296502363 secs



```
🟩 Bps  ■ maximum  □ minimum  Max: 601.93k  Avg: 215.87k  Min:  1.34k
```

Data Display

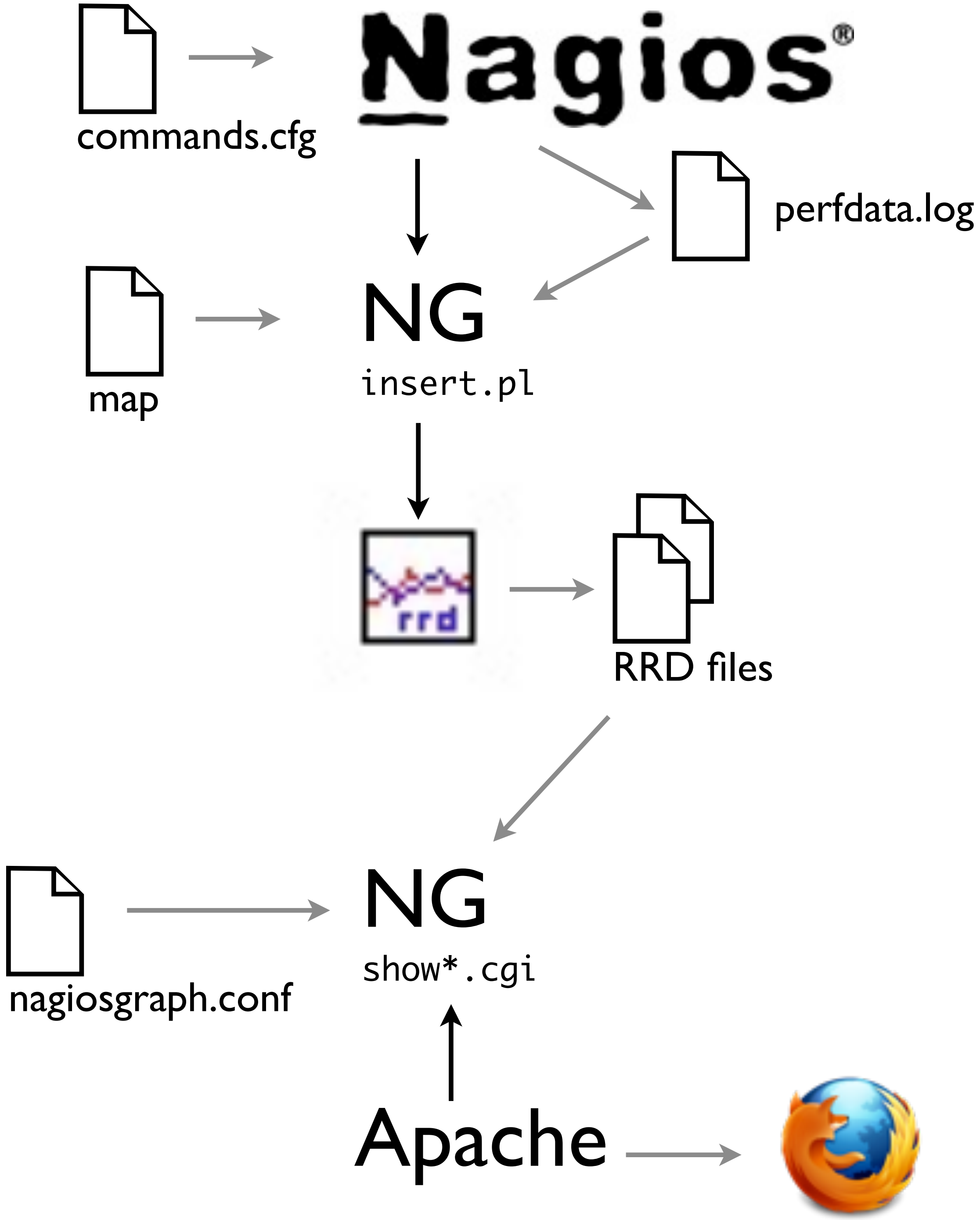




- How to do it?
  - CGI (PERL+rrdtool)
  - PHP (PHP+PERL+rrdtool)
  - JavaScript
  - Google Charts

- Issues
  - Today, yesterday, last week, last month, last year
  - Single host/service/source
  - Combinations of hosts/services/sources
  - Canned reports
  - Interactive queries

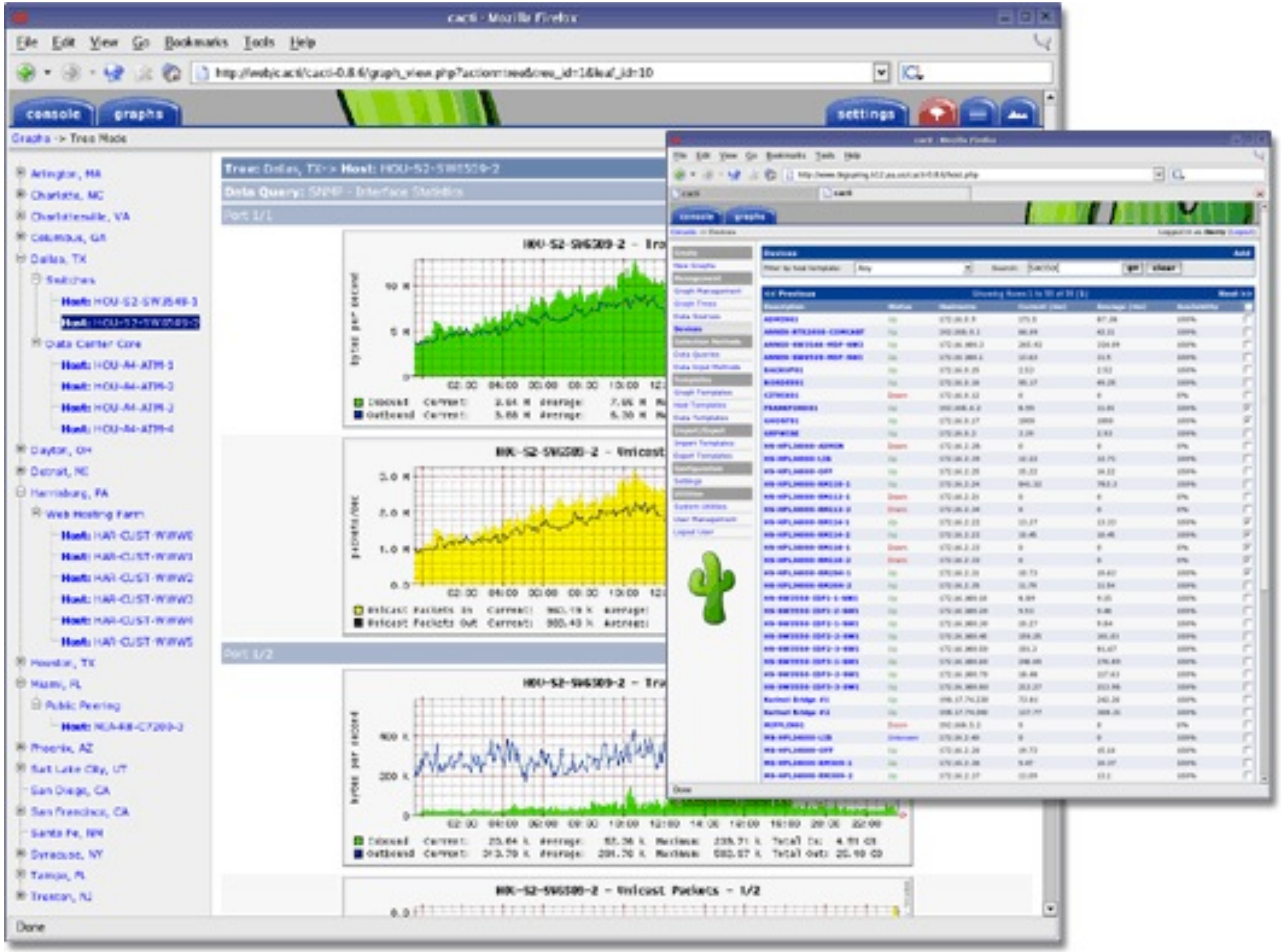
What are the options?



- nagiosgraph
  1.4.4 2011-01-16
  http://nagiosgraph.sourceforge.net/
- nagiosgrapher
  1.7.1 2008-12-18
- n2rrd/rrd2graph
  1.4.4 2011-08-16
  http://n2rrd-wiki.diglinks.com/display/n2rrd/Addon
- pnp4nagios
  0.6.15 2011-09-14
  http://pnp4nagios.sourceforge.net/
- cacti
  0.8.7g 2010-07-09
  http://www.cacti.net/
- mrtg
  2.17.1 2011-02-18
  http://oss.oetiker.ch/mrtg/

cacti

- Standalone system
- Data collection and/or display
- Browsing
- Querying
- Zoom



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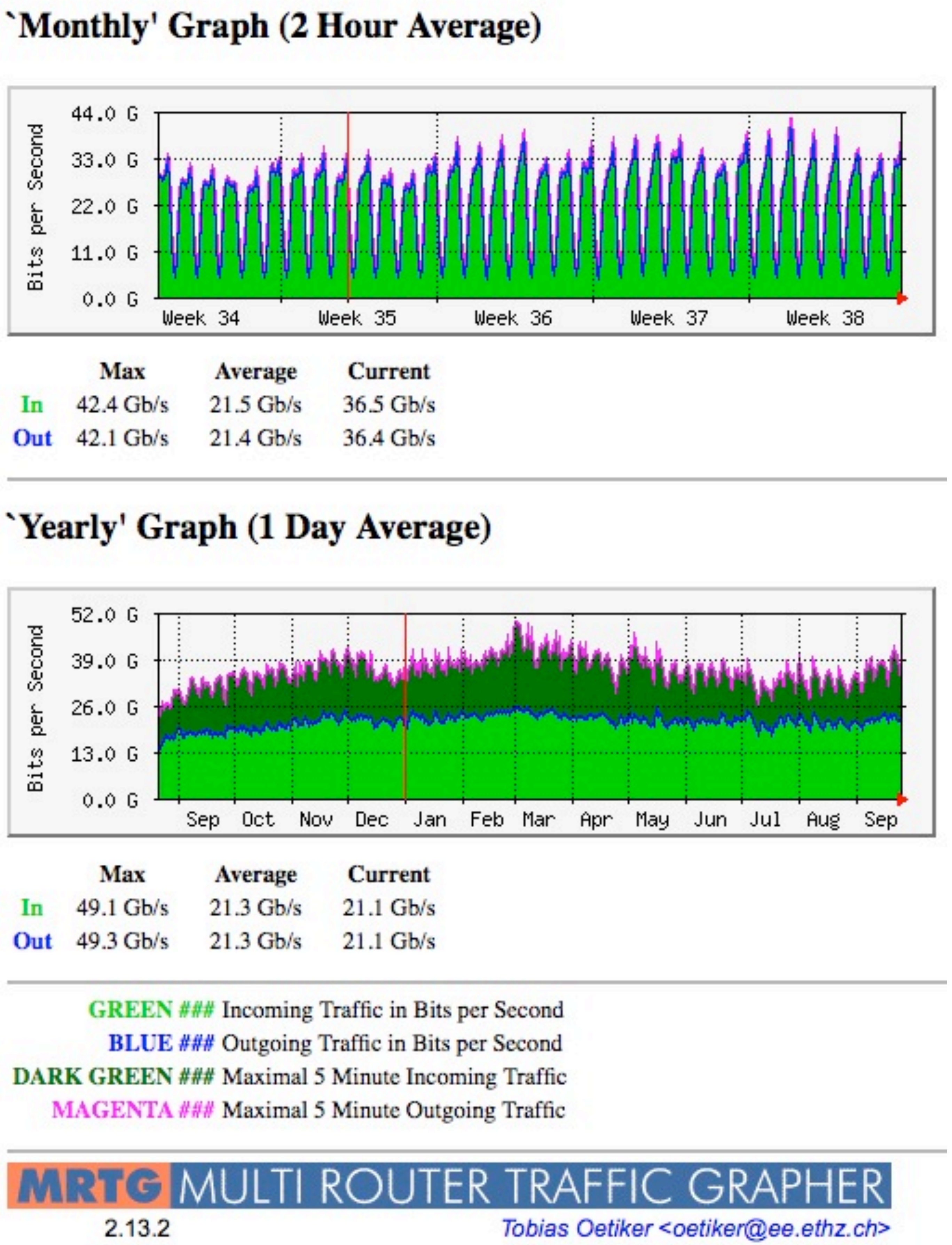
mrtg

- Standalone system designed for SNMP
- Data collection and/or display



`Monthly' Graph (2 Hour Average)

	Max	Average	Current
In	42.4 Gb/s	21.5 Gb/s	36.5 Gb/s
Out	42.1 Gb/s	21.4 Gb/s	36.4 Gb/s

`Yearly' Graph (1 Day Average)

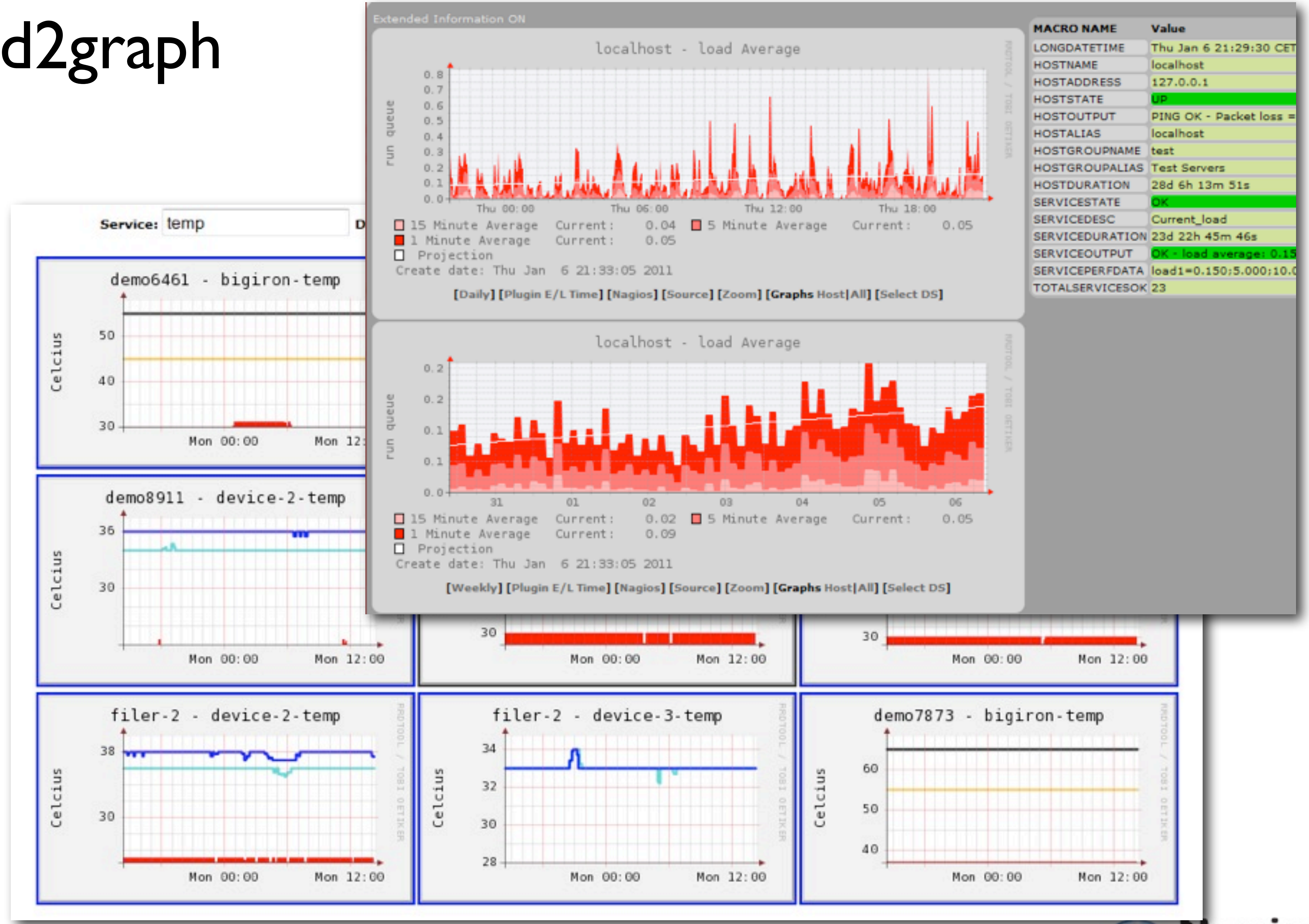
	Max	Average	Current
In	49.1 Gb/s	21.3 Gb/s	21.1 Gb/s
Out	49.3 Gb/s	21.3 Gb/s	21.1 Gb/s

GREEN ### Incoming Traffic in Bits per Second
BLUE ### Outgoing Traffic in Bits per Second
DARK GREEN ### Maximal 5 Minute Incoming Traffic
MAGENTA ### Maximal 5 Minute Outgoing Traffic

MRTG MULTI ROUTER TRAFFIC GRAPHER
2.13.2
Tobias Oetiker <oetiker@ee.ethz.ch>

n2rrd and rrd2graph

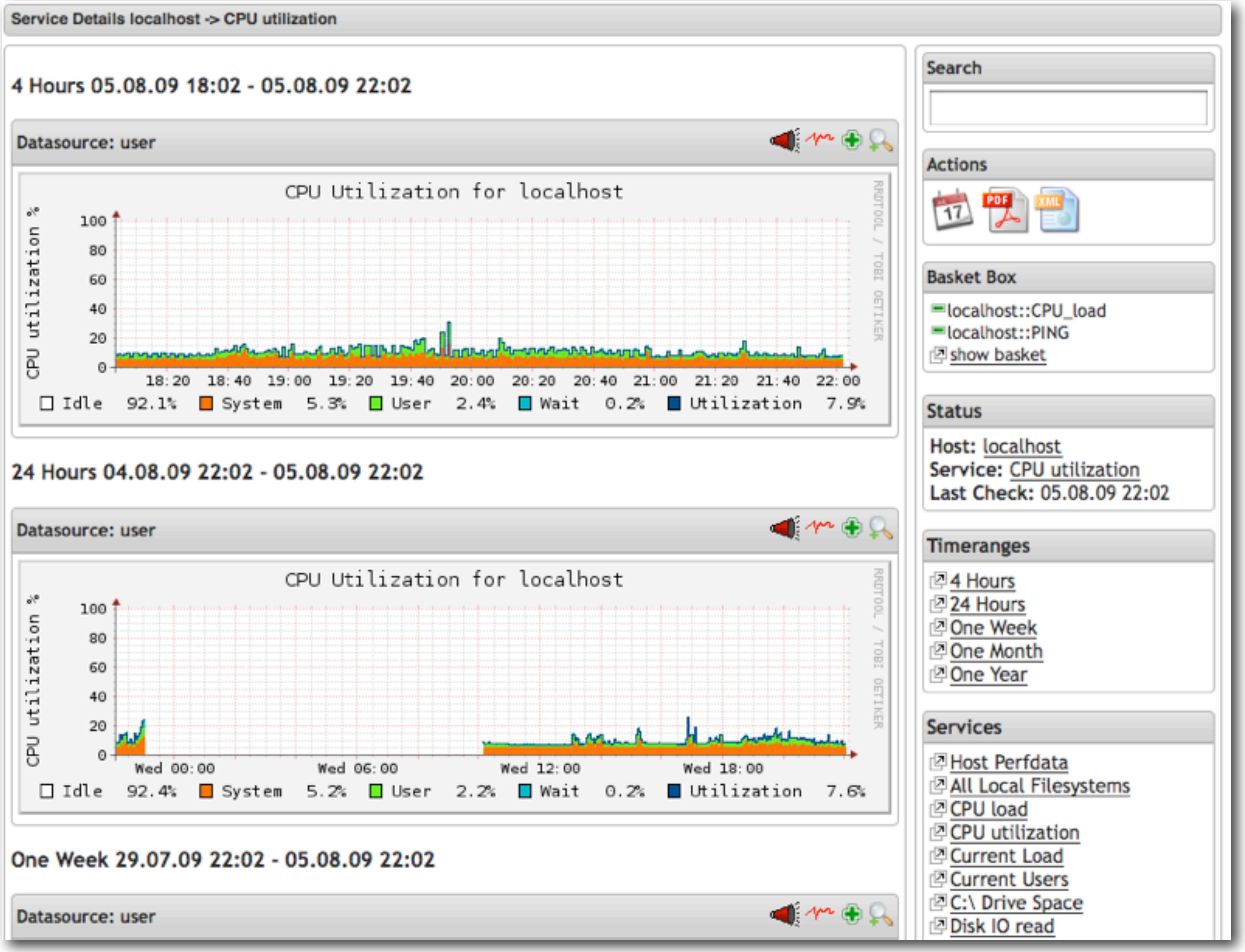
- Data collection (n2rrd)
- Data display (rrd2graph)
- Template-based RRA
- Template-based graphs
- All services per host
- Arbitrary grouping
- Interactive selection of data
- Zoom (in new context)
- Export graphs as PDF, PNG, EPS, SVG
- rrdtool, PERL


Extended Information ON
localhost - load Average
run queue
Thu 00:00
Thu 06:00
Thu 12:00
Thu 18:00
15 Minute Average Current: 0.04
5 Minute Average Current: 0.05
1 Minute Average Current: 0.05
Projection
Create date: Thu Jan 6 21:33:05 2011
[Daily] [Plugin E/L Time] [Nagios] [Source] [Zoom] [Graphs Host|All] [Select DS]
localhost - load Average
15 Minute Average Current: 0.02
5 Minute Average Current: 0.05
1 Minute Average Current: 0.09
Projection
Create date: Thu Jan 6 21:33:05 2011
[Weekly] [Plugin E/L Time] [Nagios] [Source] [Zoom] [Graphs Host|All] [Select DS]
Service: temp
demo6461 - bigiron-temp
demo8911 - device-2-temp
filer-2 - device-2-temp
filer-2 - device-3-temp
demo7873 - bigiron-temp
Celcius
Mon 00:00
Mon 12:00

MACRO NAME	Value
LONGDATETIME	Thu Jan 6 21:29:30 CET
HOSTNAME	localhost
HOSTADDRESS	127.0.0.1
HOSTSTATE	UP
HOSTOUTPUT	PING OK - Packet loss =
HOSTALIAS	localhost
HOSTGROUPNAME	test
HOSTGROUPALIAS	Test Servers
HOSTDURATION	28d 6h 13m 51s
SERVICESTATE	OK
SERVICEDESC	Current_load
SERVICEDURATION	23d 22h 45m 46s
SERVICEOUTPUT	OK - load average: 0.15
SERVICEPERFDATA	load1=0.150;5.000;10.0
TOTALSERVICESOK	23

pnp4nagios

- Data collection and display
- Template-based graphs
- All services per host
- Arbitrary grouping
- Arbitrary time interval
- Zoom (in new context)
- Mouseover thumbnail graphs
- Export data as CSV
- Export graphs as PDF, PNG
- rrdtool, C, PHP, PERL, jQuery



Service Details localhost -> CPU utilization

4 Hours 05.08.09 18:02 - 05.08.09 22:02

Datasource: user

□ Idle 92.1% 🟧 System 5.3% 🟩 User 2.4% 🟦 Wait 0.2% ■ Utilization 7.9%

24 Hours 04.08.09 22:02 - 05.08.09 22:02

Datasource: user

□ Idle 92.4% 🟧 System 5.2% 🟩 User 2.2% 🟦 Wait 0.2% ■ Utilization 7.6%

One Week 29.07.09 22:02 - 05.08.09 22:02

Datasource: user

Search

Actions

Basket Box

- localhost::CPU_load
- localhost::PING
- show basket

Status

Host: localhost
Service: CPU utilization
Last Check: 05.08.09 22:02

Timeranges

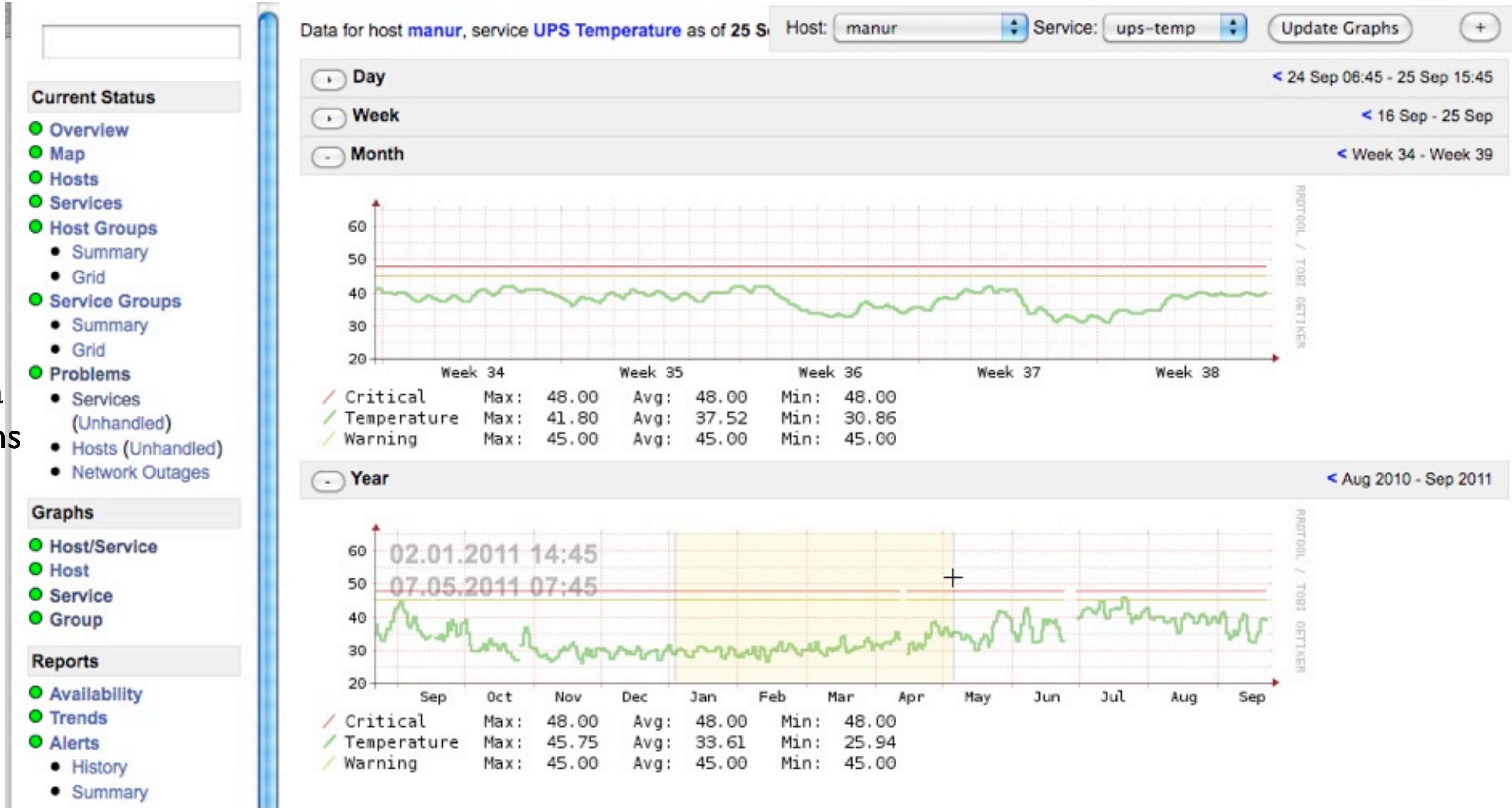
- 4 Hours
- 24 Hours
- One Week
- One Month
- One Year

Services

- Host Perfdata
- All Local Filesystems
- CPU load
- CPU utilization
- Current Load
- Current Users
- C:\ Drive Space
- Disk IO read

nagiosgraph

- Data collection and display
- Parameter-based RRA
- Parameter-based graphing
- All services per host
- All hosts per service
- Arbitrary grouping
- Arbitrary time interval
- Zoom (in place)
- Interactive selection of data
- Mouseover thumbnail graphs
- Export data as CSV, XML
- rrdtool, PERL, JavaScript



Data for host manur, service UPS Temperature as of 25 S

Host: manur Service: ups-temp

```
Critical     Max:  48.00   Avg:  48.00   Min:  48.00
Temperature  Max:  41.80   Avg:  37.52   Min:  30.86
Warning      Max:  45.00   Avg:  45.00   Min:  45.00
```

```
Critical     Max:  48.00   Avg:  48.00   Min:  48.00
Temperature  Max:  45.75   Avg:  33.61   Min:  25.94
Warning      Max:  45.00   Avg:  45.00   Min:  45.00
```

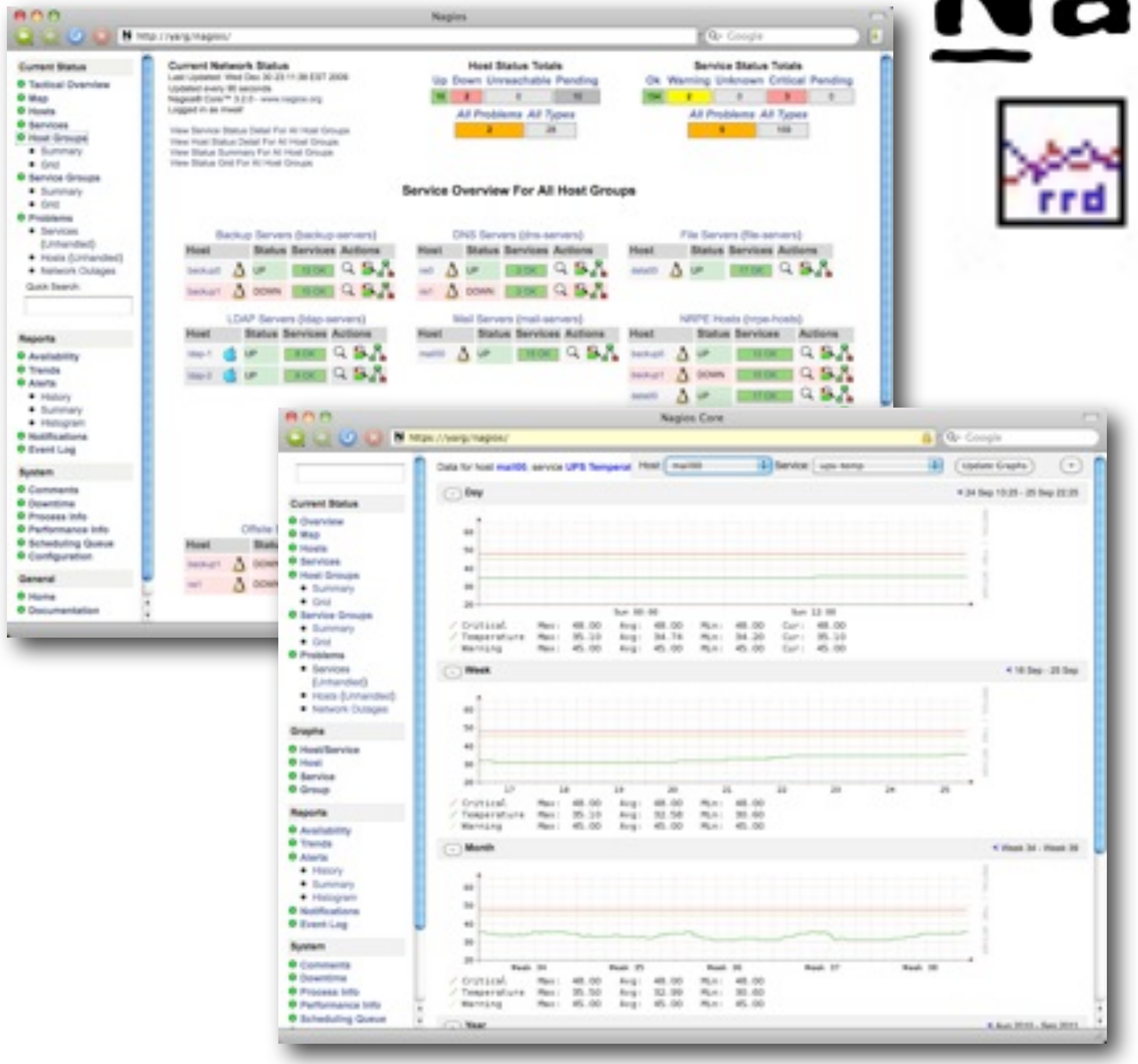
Issues

- Is Nagios the right tool for collecting performance data?
- Which add-on/system should I use?
- Performance data versus plugin output
- Seeing both the forest and the trees
- How much data to collect? How much to save?
- Getting the RRA parameters right
- Dealing with rigid schemas
- What format to save the data? (mysql, rrdtool)
- Automatic provisioning/discovery/configuration
- Transient hosts/services
- Data freshness

Is Nagios the right tool?

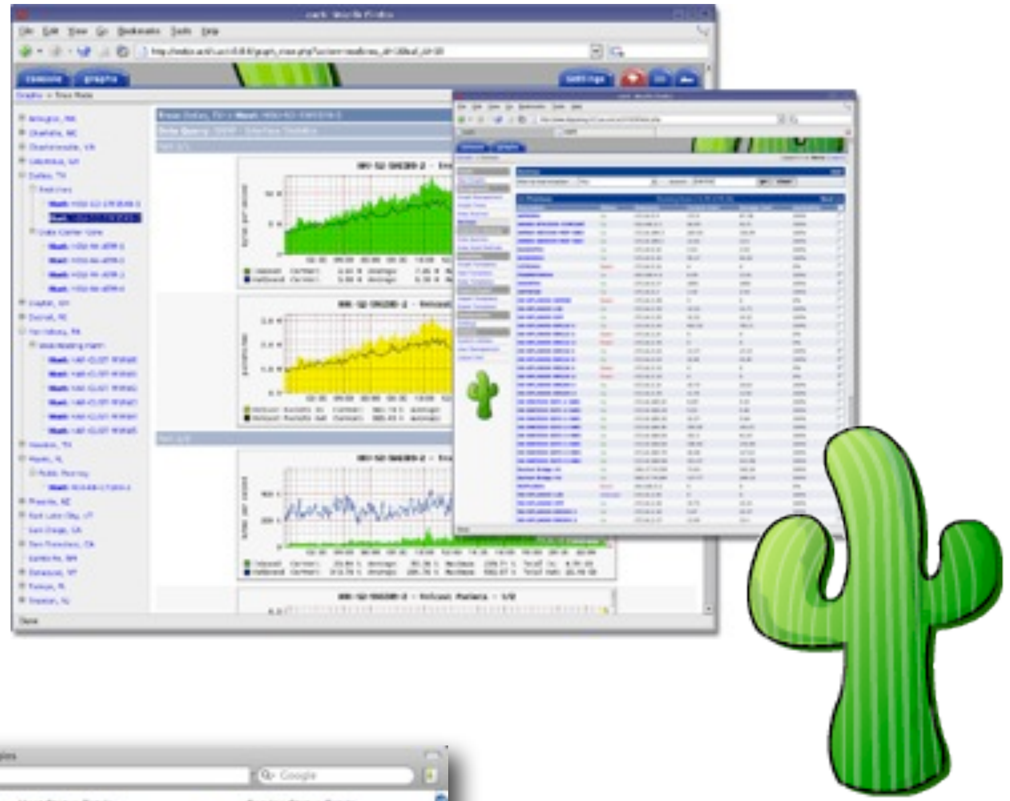
- Nagios checks have access to performance data, so why not?
- No need to install additional software
- Confounding of state and performance data
- Does Nagios collect data often enough?
- What happens to the data when Nagios cannot collect it?

Which system(s) should I use?



Collection: **nagiosgraph**
Storage: **rrdtool**
Glue: **nagiosgraph**
Display: **nagiosgraph**

Collection: **pnp4nagios**
Storage: **rrdtool**
Glue: **pnp4nagios**
Display: **pnp4nagios**



Collection: **cacti**
Storage: **rrdtool**
Glue: **cacti**
Display: **cacti**

Collection: **Nagios**
Storage: **rrdtool**
Glue: **n2rrd**
Display: **cacti**

Which add-on(s) should I use?

	n2rrd	rrd2graph	pnp4nagios	nagiosgraph	cacti	mrtg
configuration	templates	templates	templates	parameters	templates	templates
dependencies	rrdtool, PERL	rrdtool, PERL	rrdtool, PERL, PHP, jQuery	rrdtool, PERL	?	?
storage	rrdtool		rrdtool	rrdtool	rrdtool	rrdtool
collection	immediate, batch		immediate, batch, shared library	immediate, batch	SNMP	SNMP
display		cgi	php + cgi	cgi	cgi	html
zooming		separate window	separate window	in-place	separate window	
graph mouseovers			yes	yes		
coordinate mouseovers				yes		
arbitrary groups			yes	yes		
search		yes			yes	
browse			yes	yes	yes	

Please try this at home!

Performance Data

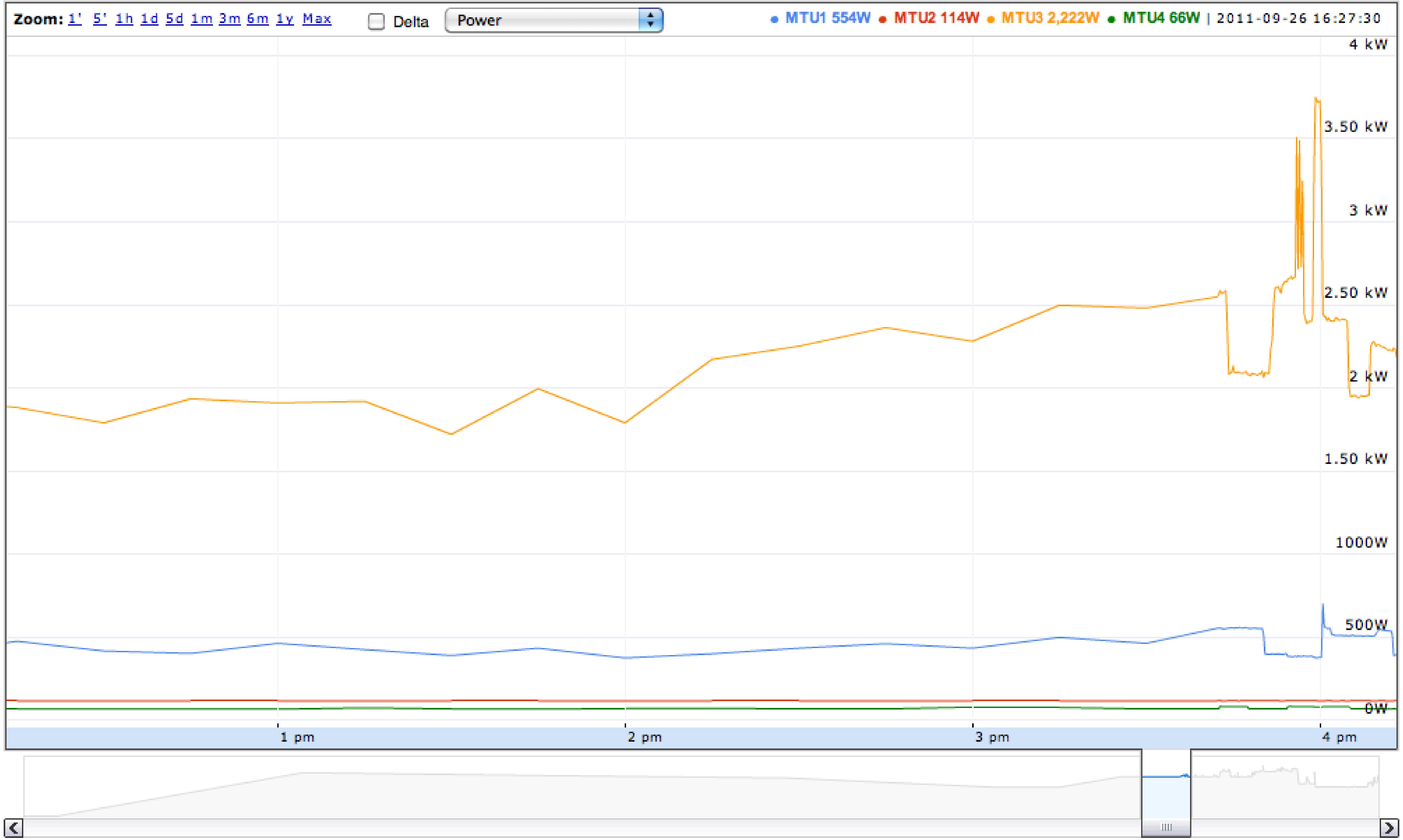
name = value[units];[warn];[crit];[min];[max]

where units is one of:

	unitless
s,us,ms	time
%	percentage
B,KB,MB,GB,TB,PB	bytes
c	counter

Beware of the bug in Nagios 3.3.1 !

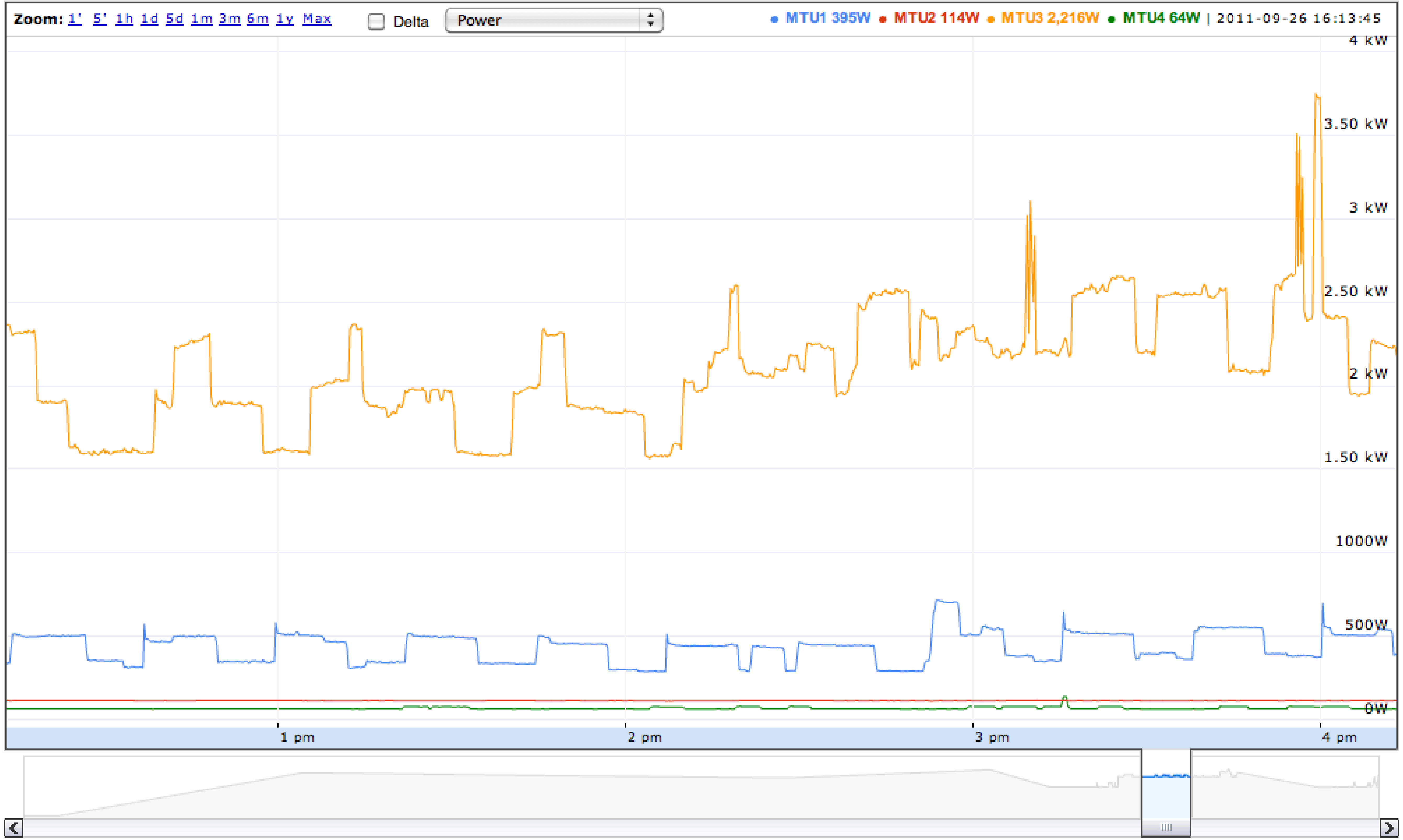
How to see the forest and the trees?


Zoom: 1' 5' 1h 1d 5d 1m 3m 6m 1y Max
□ Delta
Power
● MTU1 554W ● MTU2 114W ● MTU3 2,222W ● MTU4 66W | 2011-09-26 16:27:30
4 kW
3.50 kW
3 kW
2.50 kW
2 kW
1.50 kW
1000W
500W
0W
1 pm
2 pm
3 pm
4 pm

Introduction • Problem • Requirements • Components • Options • **Issues** • Summary

Nagios World Conference North America

How to see the forest and the trees?


Zoom: 1' 5' 1h 1d 5d 1m 3m 6m 1y Max
□ Delta
Power
● MTU1 395W ● MTU2 114W ● MTU3 2,216W ● MTU4 64W | 2011-09-26 16:13:45
4 kW
3.50 kW
3 kW
2.50 kW
2 kW
1.50 kW
1000W
500W
0W
1 pm
2 pm
3 pm
4 pm

Nagios World Conference North America

How to see the forest and the trees?

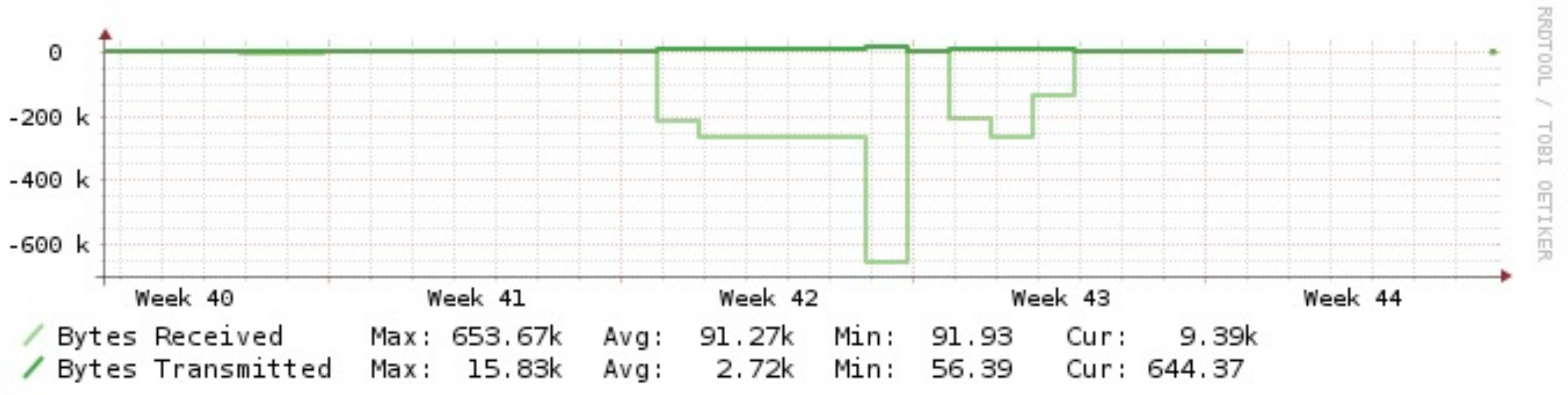
- You never know what you'll need until long after you can save it

How to see the forest and the trees?

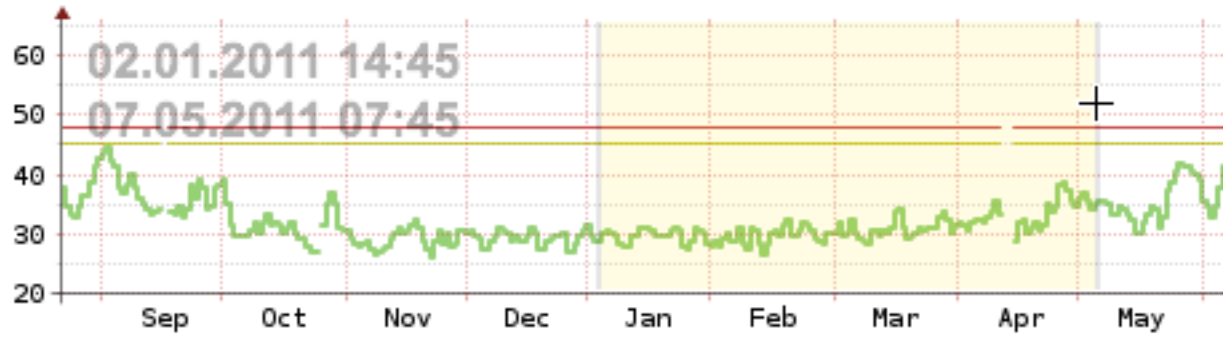
- You never know what you'll need until long after you can save it
- With rrdtool, the further back you go, the more you lose

How to see the forest and the trees?

- You never know what you’ll need until long after you can save it
- With rrdtool, the further back you go, the more you lose



Archaeology



Zooming

How much to collect and save?

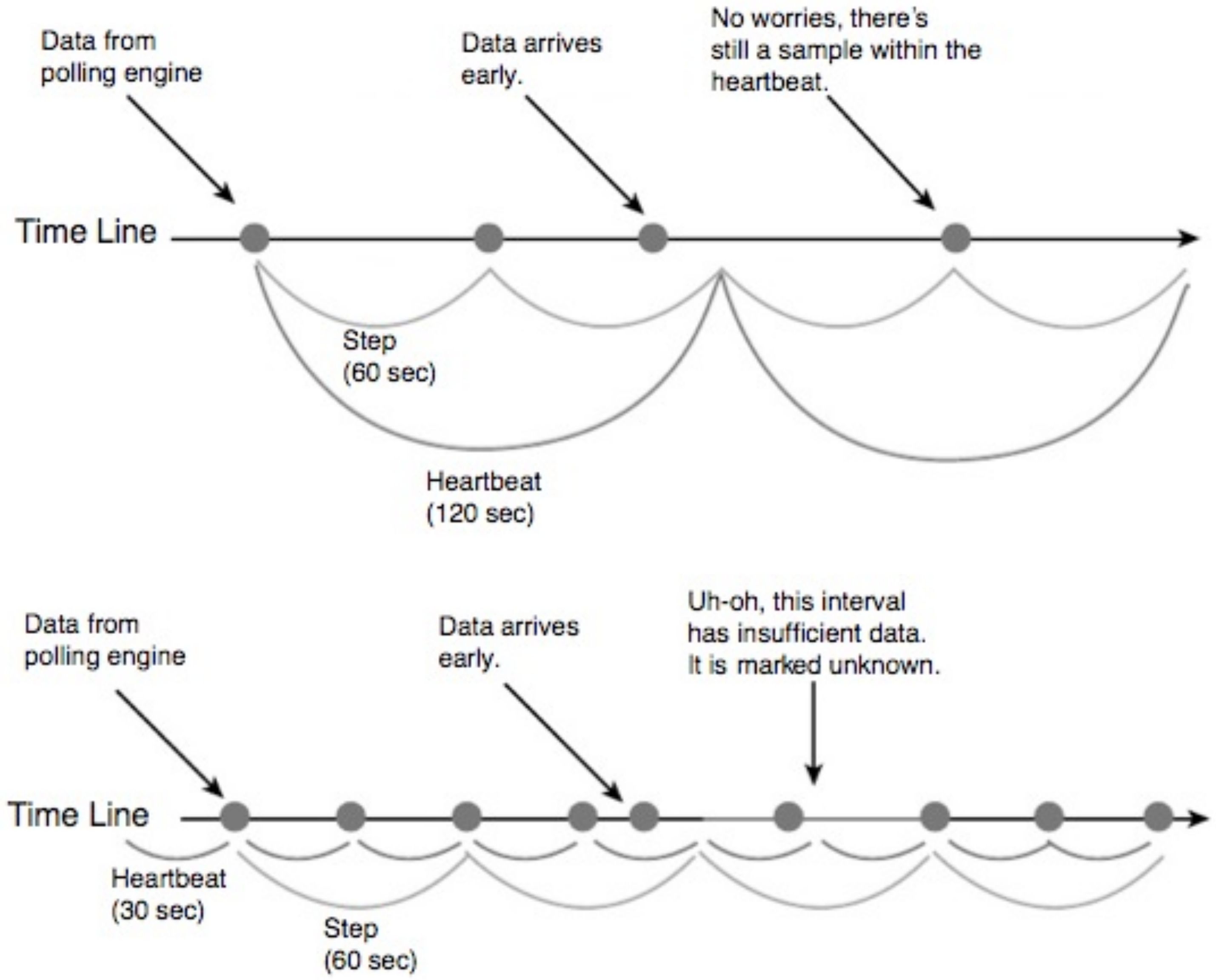
- Collect the source data, not the derivative data
- Collect everything - you can stop collecting later
- Collect often - let profiling dictate when to collect less often
- Save everything - you can throw it away later
- Using RRD ensures that your system scales by host/service, not time

Getting the RRA parameters right

```
DS:NAME:TYPE:HEARTBEAT:MIN:MAX
RRA:CONSOLIDATION_METHOD:XFF:PDPs:CDPs
```

```
DS:inOctets:COUNTER:120:0:4294967296
RRA:AVERAGE:.5:1:43200
RRA:AVERAGE:.5:5:105120
RRA:AVERAGE:.5:10:105120
```

XFF: x files factor
PDP: primary data point
CDP: consolidated data point



Building a Monitoring Infrastructure with Nagios, David Josephson, 2007

Rigid Schemas

- Put one data source in each RRD file, plus associated thresholds
- Use consistent service names
- Use service description based on plugin, not platform
- Keep the specifics of the schema in the glue layer
- Schemas are not just an issue with rrdtool

So where are we?

There are a few free tools, and a few more not-so-free tools

So where are we?

There are a few free tools, and a few more not-so-free tools

All of the existing tools suck...

So where are we?

There are a few free tools, and a few more not-so-free tools

All of the existing tools suck...

but at least one of them is probably good enough...

So where are we?

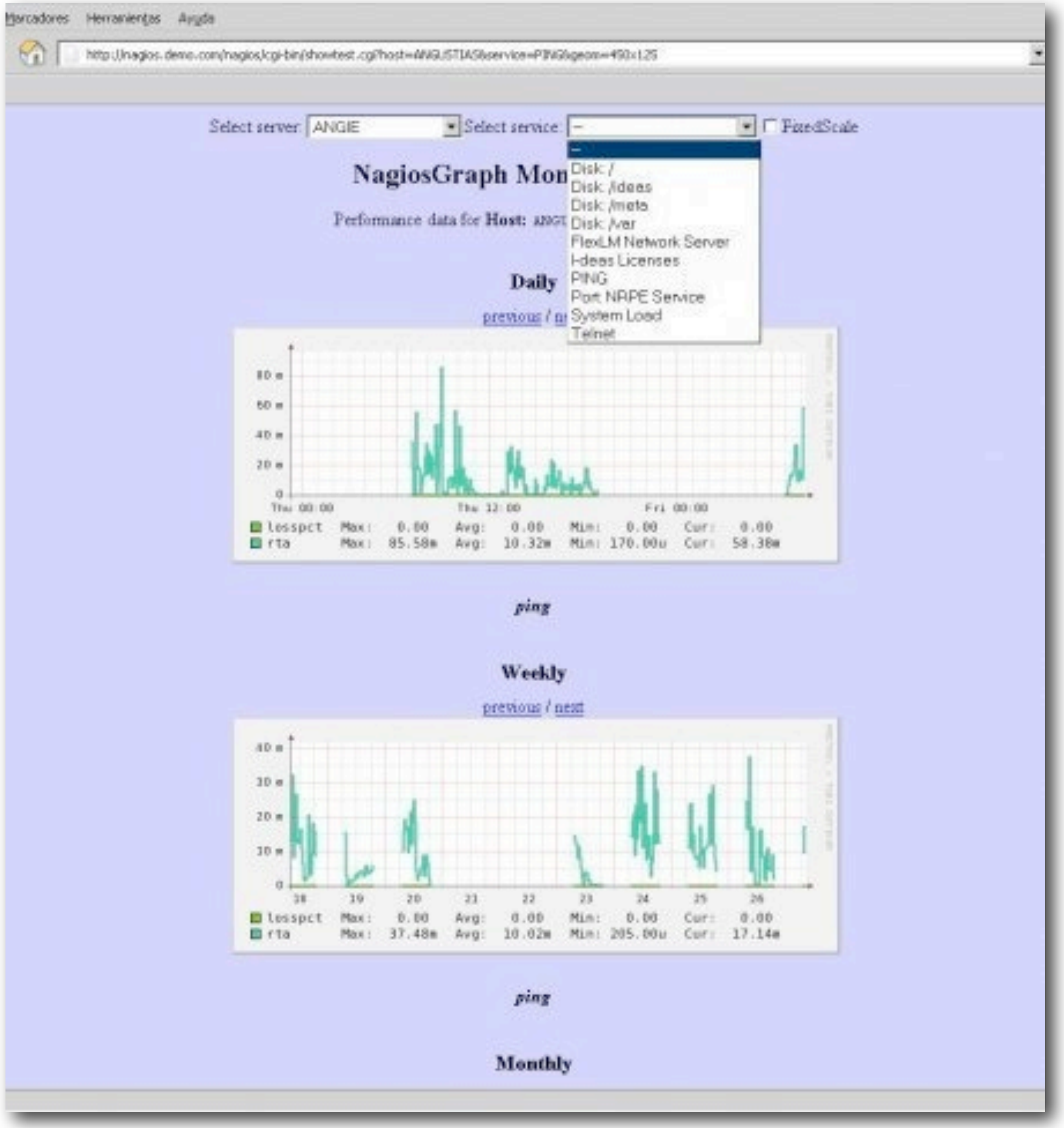
There are a few free tools, and a few more not-so-free tools

All of the existing tools suck...

but at least one of them is probably good enough...

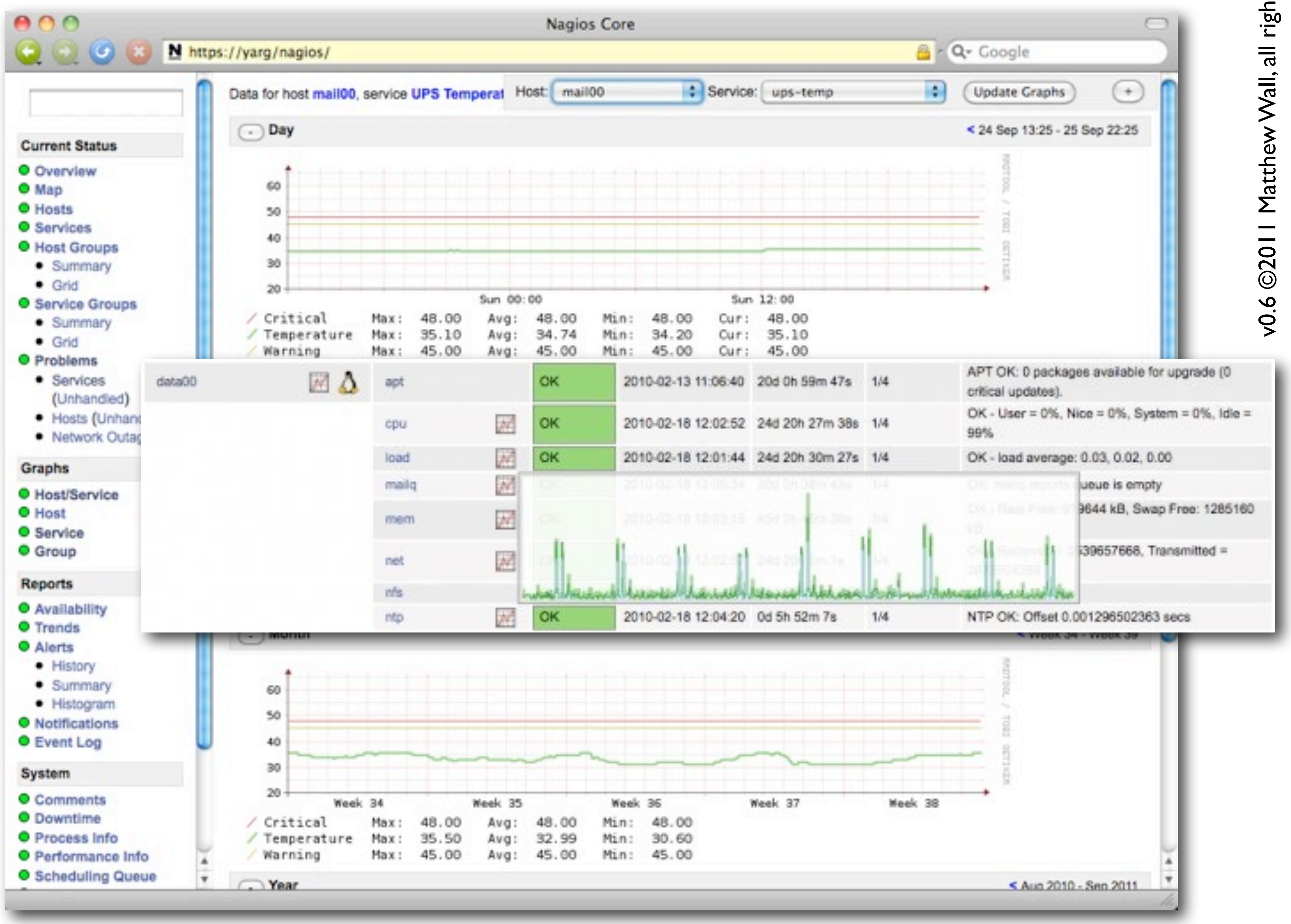
and many of them continue to progress.

nagiosgraph: then and now



```
🟩 losspct   Max:   0.00   Avg:   0.00   Min:   0.00   Cur:   0.00
🟩 rta       Max:  85.58m  Avg:  10.32m  Min: 170.00u  Cur:  58.38m
```

```
🟩 losspct   Max:   0.00   Avg:   0.00   Min:   0.00   Cur:   0.00
🟩 rta       Max:  37.48m  Avg:  10.02m  Min: 205.00u  Cur:  17.14m
```



Data for host mail00, service UPS Temperat Host: mail00 Service: ups-temp

```
/ Critical     Max:  48.00   Avg:  48.00   Min:  48.00   Cur:  48.00
/ Temperature  Max:  35.10   Avg:  34.74   Min:  34.20   Cur:  35.10
/ Warning      Max:  45.00   Avg:  45.00   Min:  45.00   Cur:  45.00
```

data00	apt	OK	2010-02-13 11:06:40	20d 0h 59m 47s	1/4	APT OK: 0 packages available for upgrade (0 critical updates).
	cpu	OK	2010-02-18 12:02:52	24d 20h 27m 38s	1/4	OK - User = 0%, Nice = 0%, System = 0%, Idle = 99%
	load	OK	2010-02-18 12:01:44	24d 20h 30m 27s	1/4	OK - load average: 0.03, 0.02, 0.00
	mailq					ueue is empty
	mem					9644 kB, Swap Free: 1285160
	net					39657668, Transmitted =
	nfs					
	ntp	OK	2010-02-18 12:04:20	0d 5h 52m 7s	1/4	NTP OK: Offset 0.001296502363 secs

```
/ Critical     Max:  48.00   Avg:  48.00   Min:  48.00
/ Temperature  Max:  35.50   Avg:  32.99   Min:  30.60
/ Warning      Max:  45.00   Avg:  45.00   Min:  45.00
```

2009

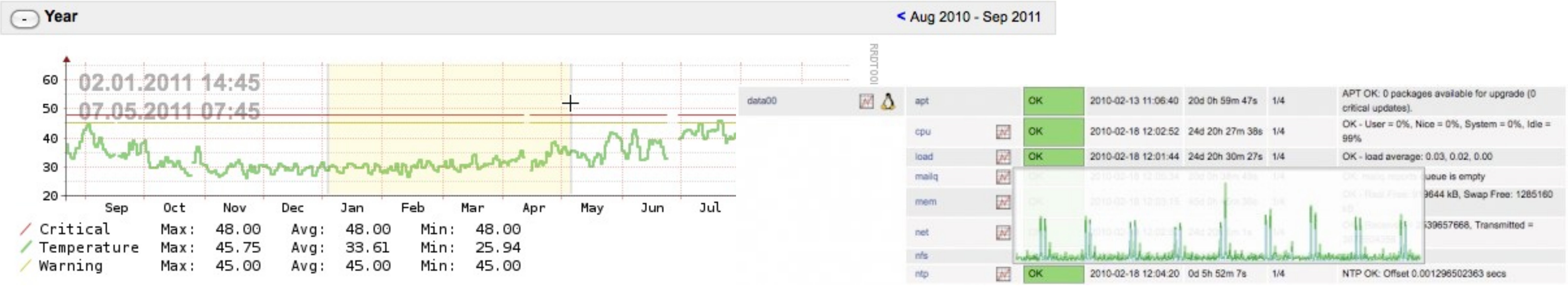
2011

Introduction • Problem • Requirements • Components • Options • Issues • **Summary**

Nagios World Conference North America

nagiosgraph: history and status

- first release was 2004 - Soren Dossing
- release 0.1 (2004-08-04) was 16KB (compressed)
- release 1.4.4 (2011-01-16) was 158KB (compressed)
- 18 project members, 2 current (Alan Brennar, Matthew Wall)
- typically 70-100 downloads per day (20 on weekends)
- packages for deb and rpm added Jan 2011
- 1259 unit tests providing 78.5% code coverage
- 155KB perl code, 44KB javascript/css, 276KB unit test code



```
Critical     Max:  48.00   Avg:  48.00   Min:  48.00
Temperature  Max:  45.75   Avg:  33.61   Min:  25.94
Warning      Max:  45.00   Avg:  45.00   Min:  45.00
```

data00	apt	OK	2010-02-13 11:06:40	20d 0h 59m 47s	1/4	APT OK: 0 packages available for upgrade (0 critical updates).
	cpu	OK	2010-02-18 12:02:52	24d 20h 27m 38s	1/4	OK - User = 0%, Nice = 0%, System = 0%, Idle = 99%
	load	OK	2010-02-18 12:01:44	24d 20h 30m 27s	1/4	OK - load average: 0.03, 0.02, 0.00
	mailq	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] queue is empty
	mem	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]9644 kB, Swap Free: 1285160 kB
	net	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]39657668, Transmitted = [illegible]
	nfs					
	ntp	OK	2010-02-18 12:04:20	0d 5h 52m 7s	1/4	NTP OK: Offset 0.001296502363 secs

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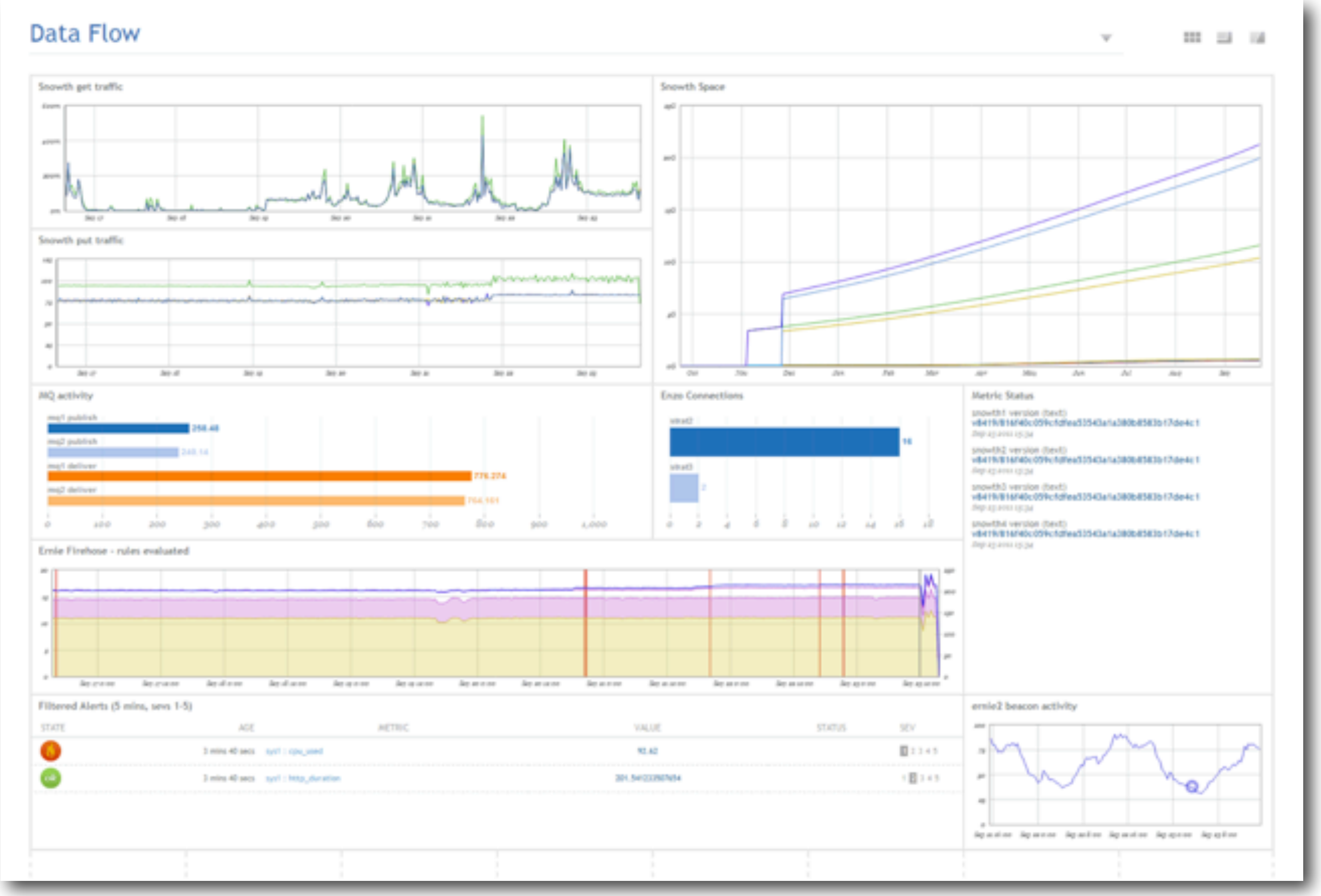
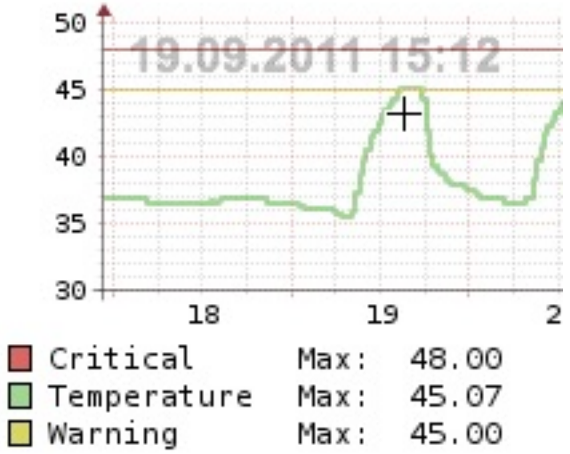
nagiosgraph: What next?

- Arbitrary combinations of data sources
- Interactive manipulation of data sources
- Management of stale data
- Export of data
- Template-based RRAs and graphs
- Better multi-byte character support
- More unit tests and code coverage

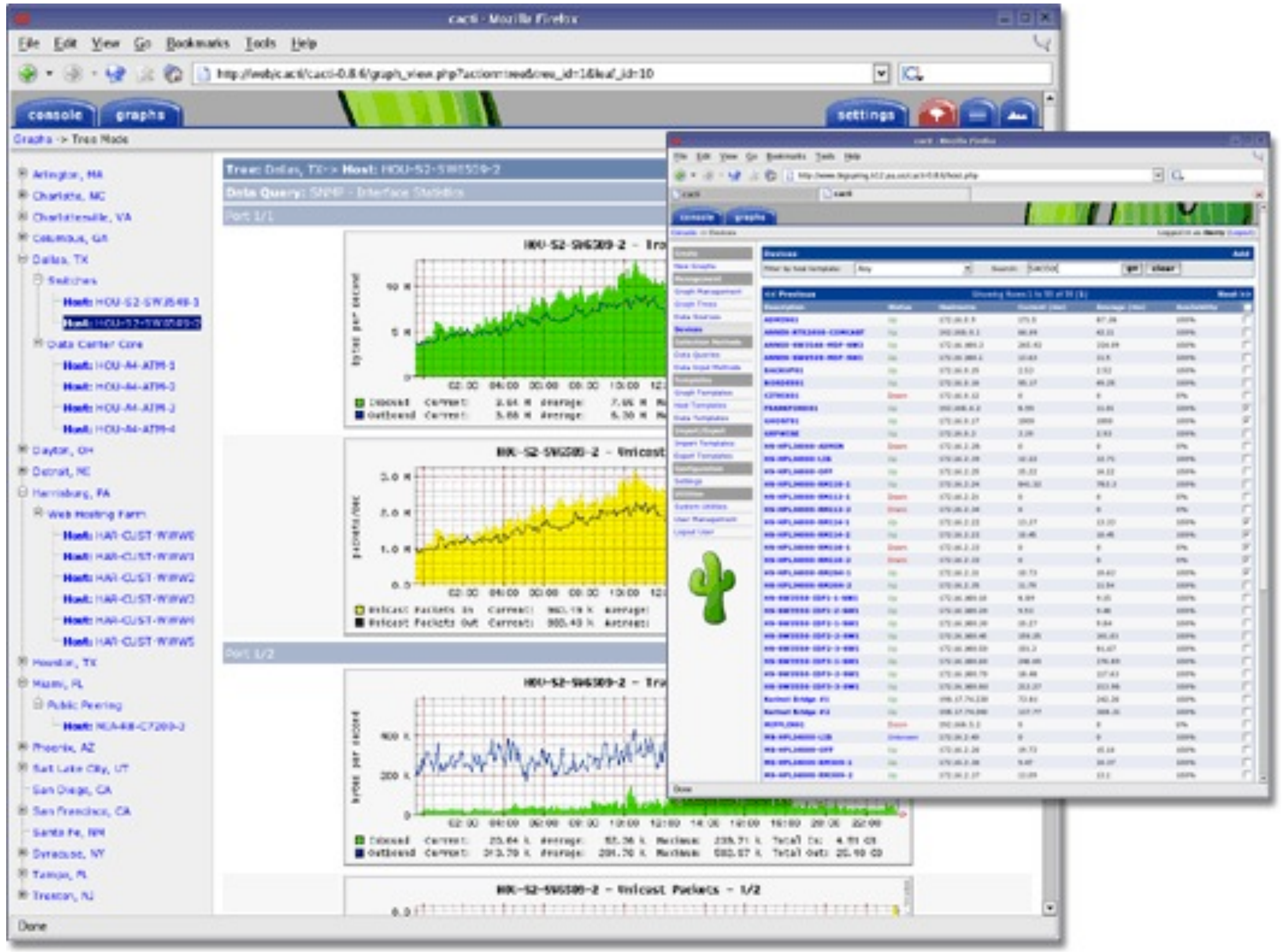
The tr/end//



Circonius Dashboard Prototype



nagiosgraph Screenshot



Cacti Screenshot

References

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  David Josephson 2007
- https://labs.omniti.com/labs/reconnoiter