



Capacity Management / William Preston

Capacity Management supports optimum and cost effective provision of IT services by helping to match IT resources and business demands. The speech shows how Nagios can be used to deliver valid figures for Capacity Planning and Performance Management.



Capacity Management / William Preston

**Do we need a bigger/faster server/network?
(delete as appropriate)**



Contents

- **Introduction**
- **What?**
- **Why?**
- **How?**



Introduction

■ Foreword

■ Target audience

- ▶ Nagios Users
- ▶ SMEs
- ▶ Windows/Linux x86
- ▶ IT Managers



What? Overview

■ Terminology

developed out of UK government project in the 80's

- ▶ Business CM

how will we be affected by future business plans?

- ▶ Service CM

do the services we provide meet our current requirements?

- ▶ Resource CM

how much of our resources are we using?



What? Requirements

■ Capacity Database

stores our measurements

■ Configuration Database

stores our limits



Why? overview

why do we want it?

- **Current Status**
- **Tuning**
- **Forecasting**



Why? Current Status

- need to know what we have
- need to know what we don't have



Why? forecasting

- **Resource distribution**
- **“What If” questions**
- **Purchasing/Budgeting**
- **Efficiency/Tuning**
- **Targets**
- **Looks good**



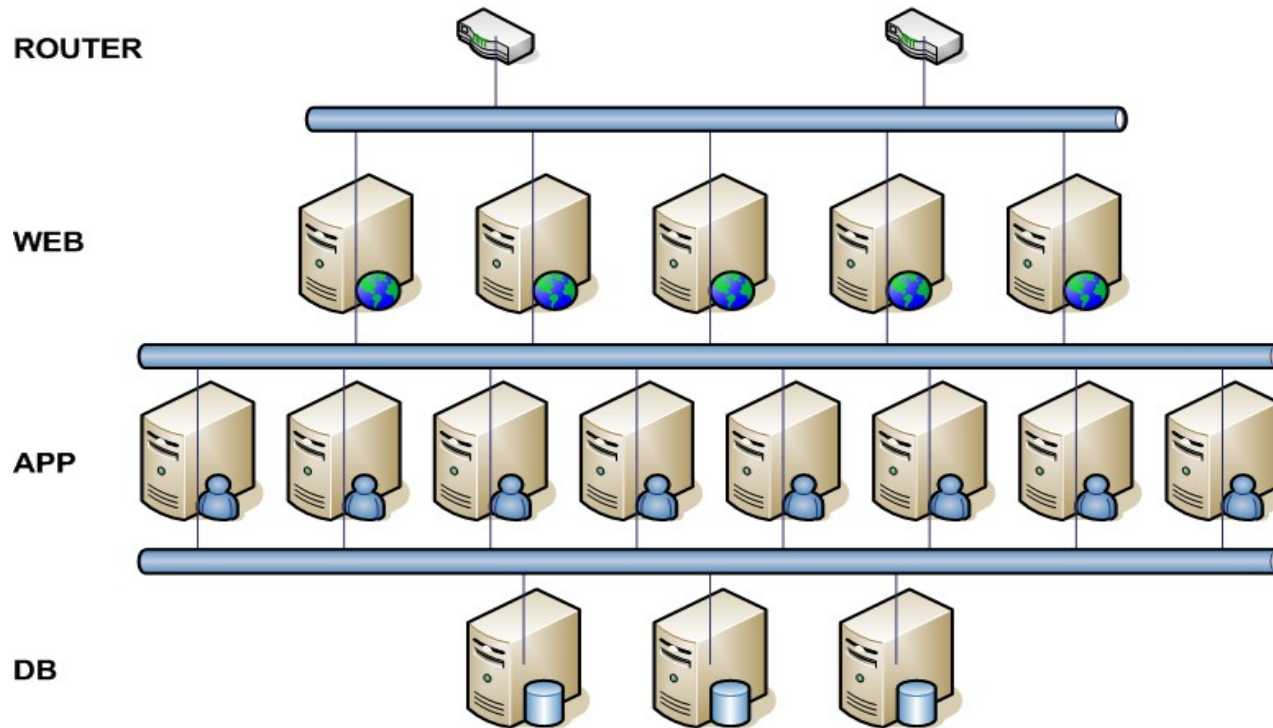


How? Overview

- **Implementation**
- **Current status**
- **Forecasting**

Implementation

Network Plan





Implementation

- **Capacity Database**
- **Configuration Database**
- **Calculation Engine**
- **Report Generator**



Implementation: Capacity Database

- **Extract from NDO DB**
- **Use RRD files**
- **Use log files**



Implementation: Configuration Database

- Use an existing Inventory System
- Build our own



Implementation: Configuration Database

- **Use an existing Inventory System**

- **Build our own**
 - ▶ `check_hwinfo`

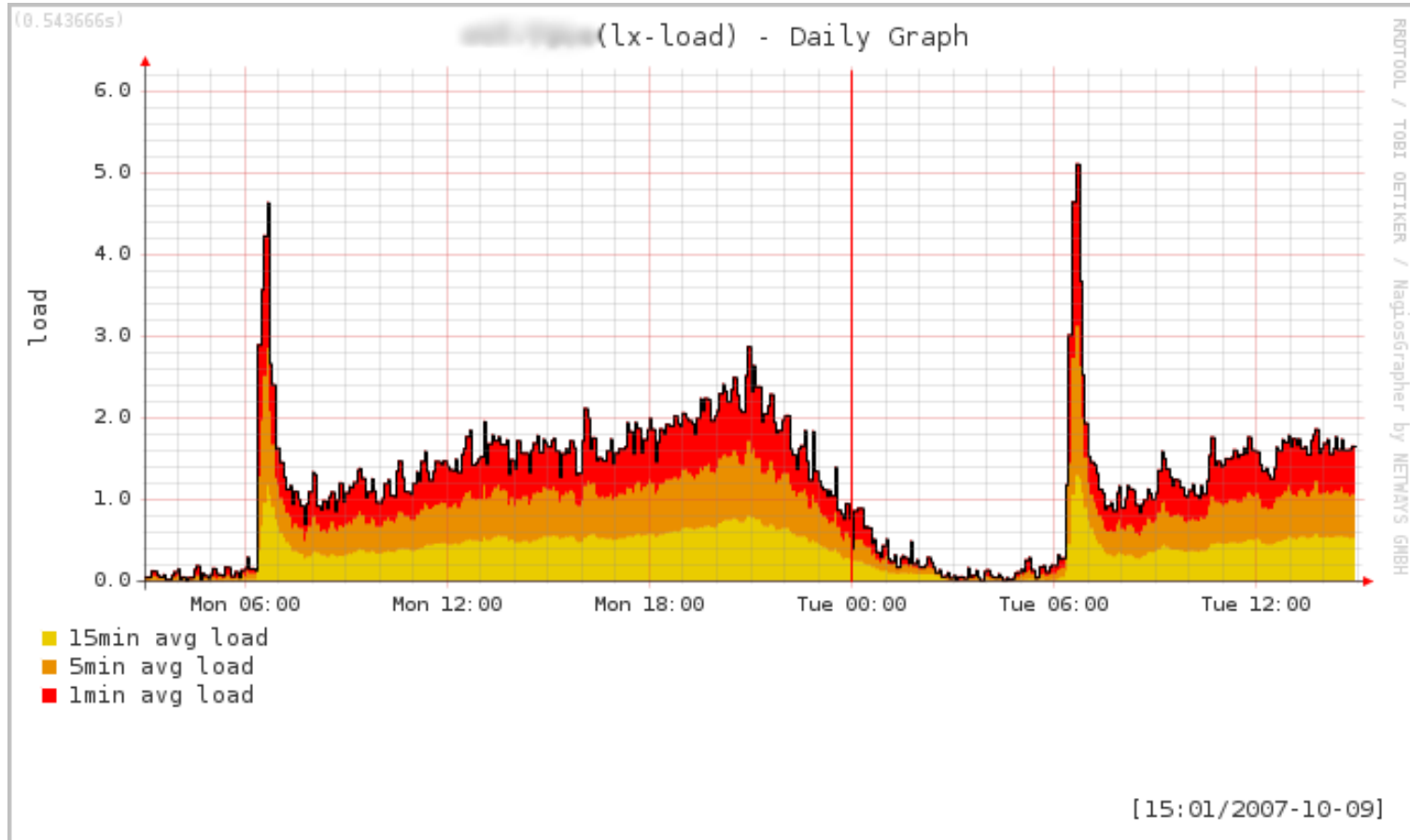


Current status

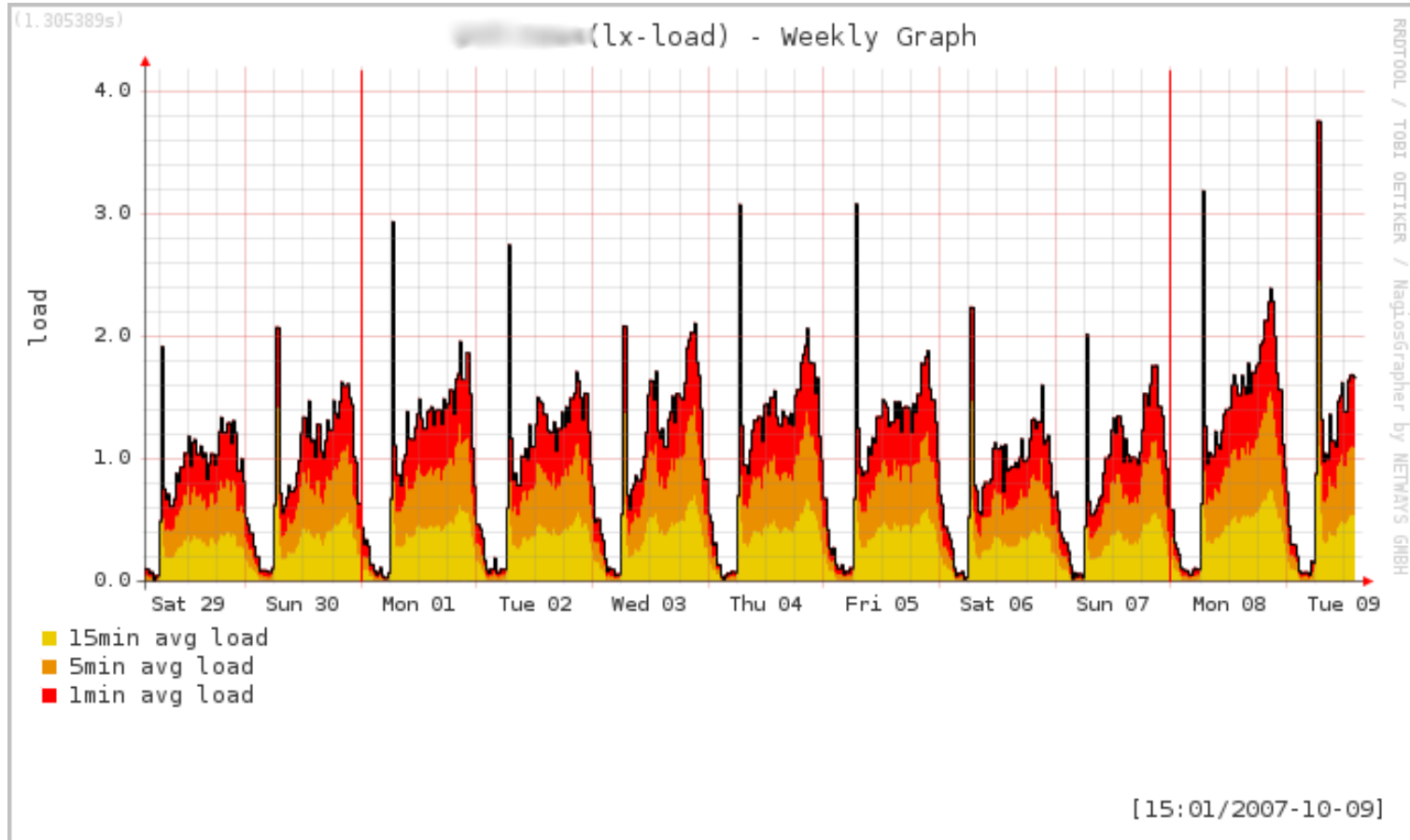
- **AVERAGE vs. MAXIMUM**
- **Normalising**
- **Hostgroups**
- **Clustering**



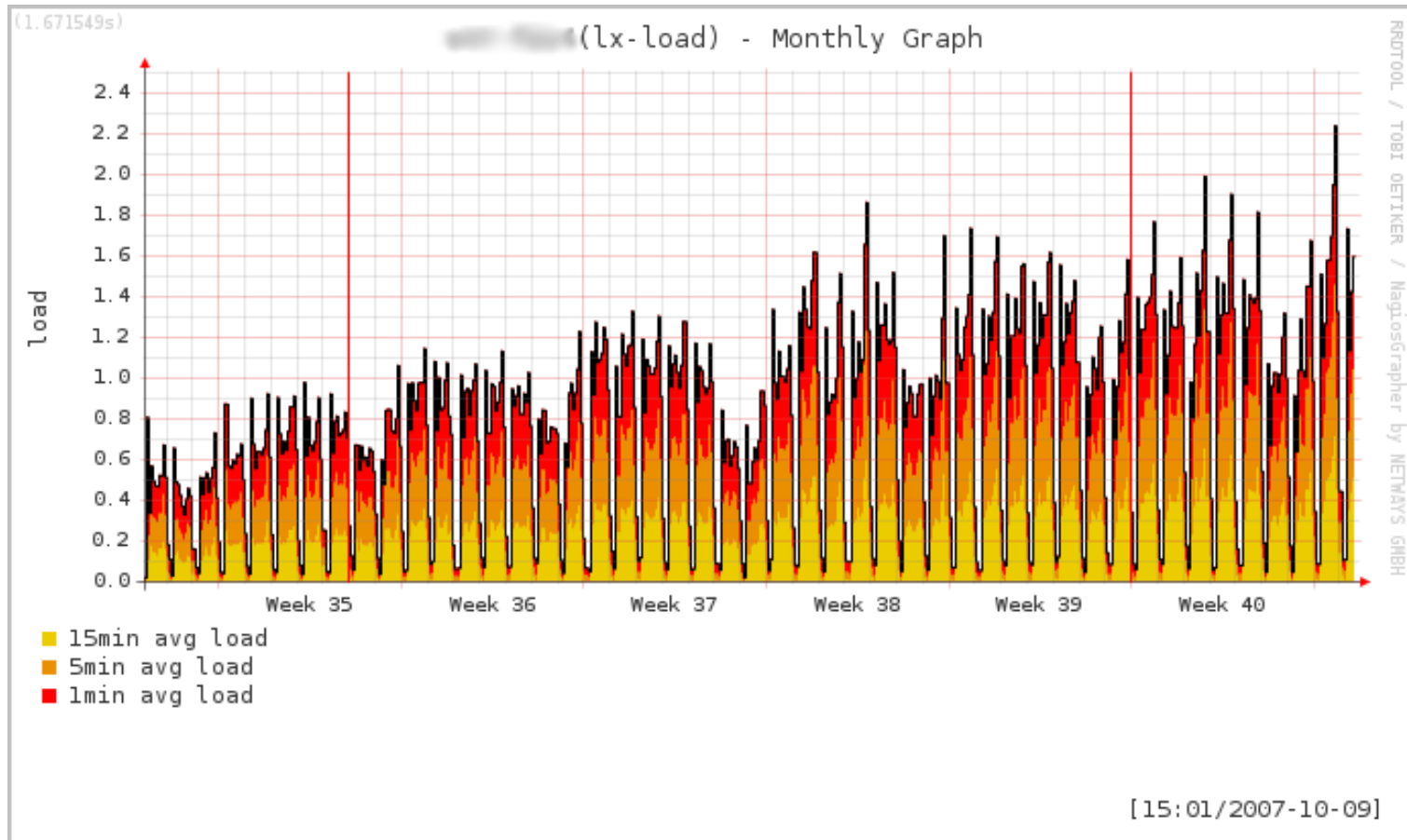
Load (daily)



Load (weekly)

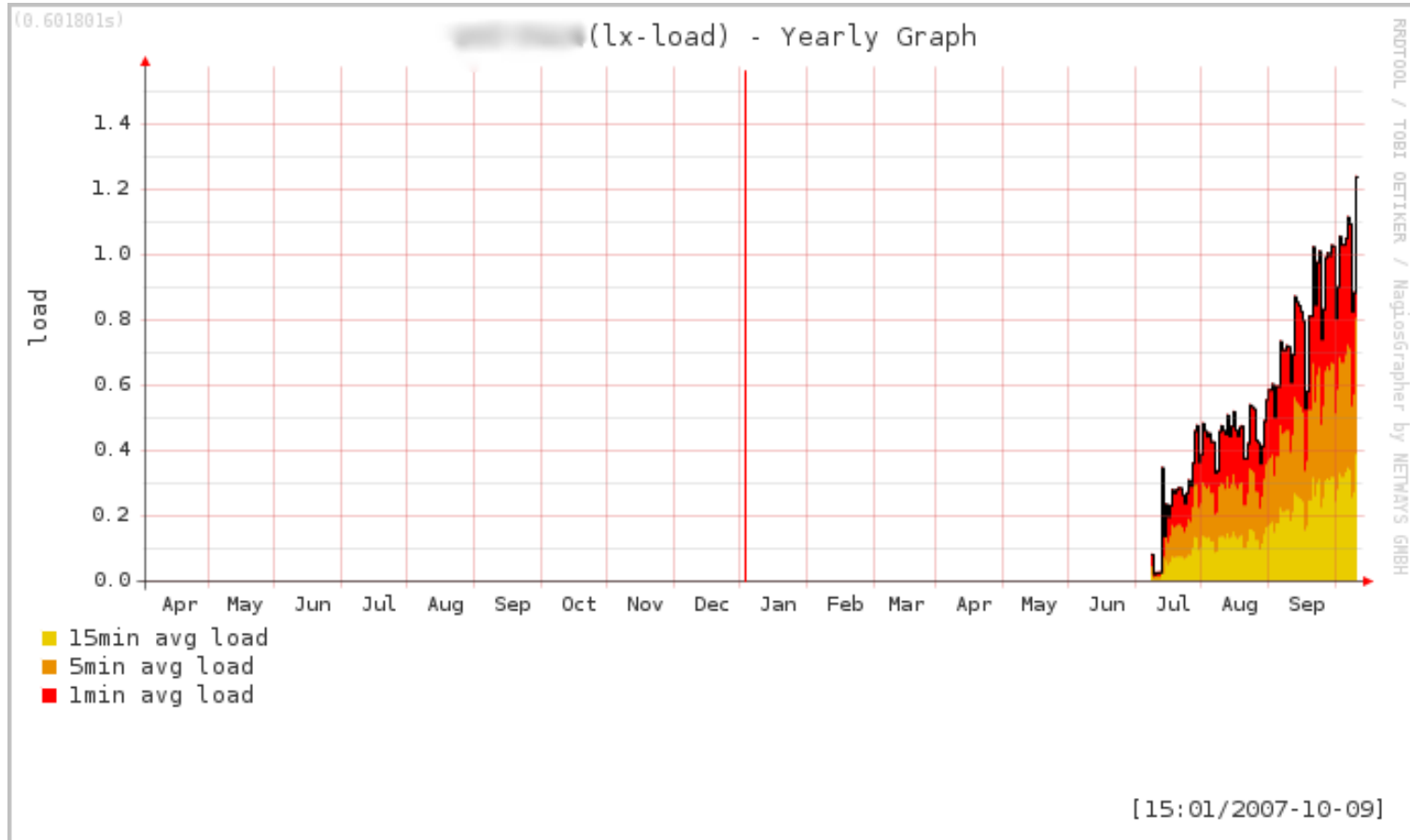


Load (monthly)





Load (yearly)





Forecasting

■ Inputs

- ▶ Business Plan
- ▶ Seasonal Factors
- ▶ Planned Events

■ Model

- ▶ developers application model
- ▶ historical load testing
- ▶ Current load testing
- ▶ trend analysis



Simple Forecasting

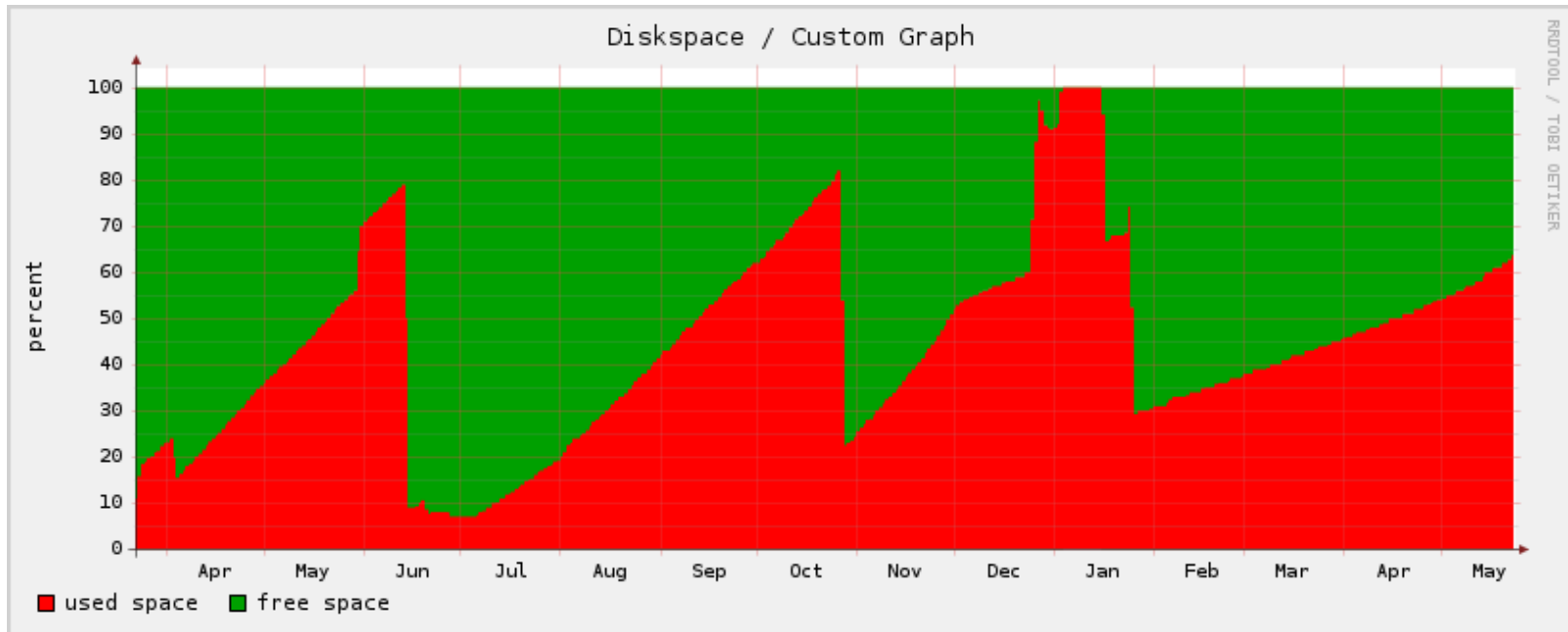
■ Query NDO with SQL

■ Use the RRD

- ▶ Coloured pencil best-guess Method
- ▶ Straight-Line extrapolation Method
- ▶ Exponential extrapolation Method
- ▶ Holt-Winters Method

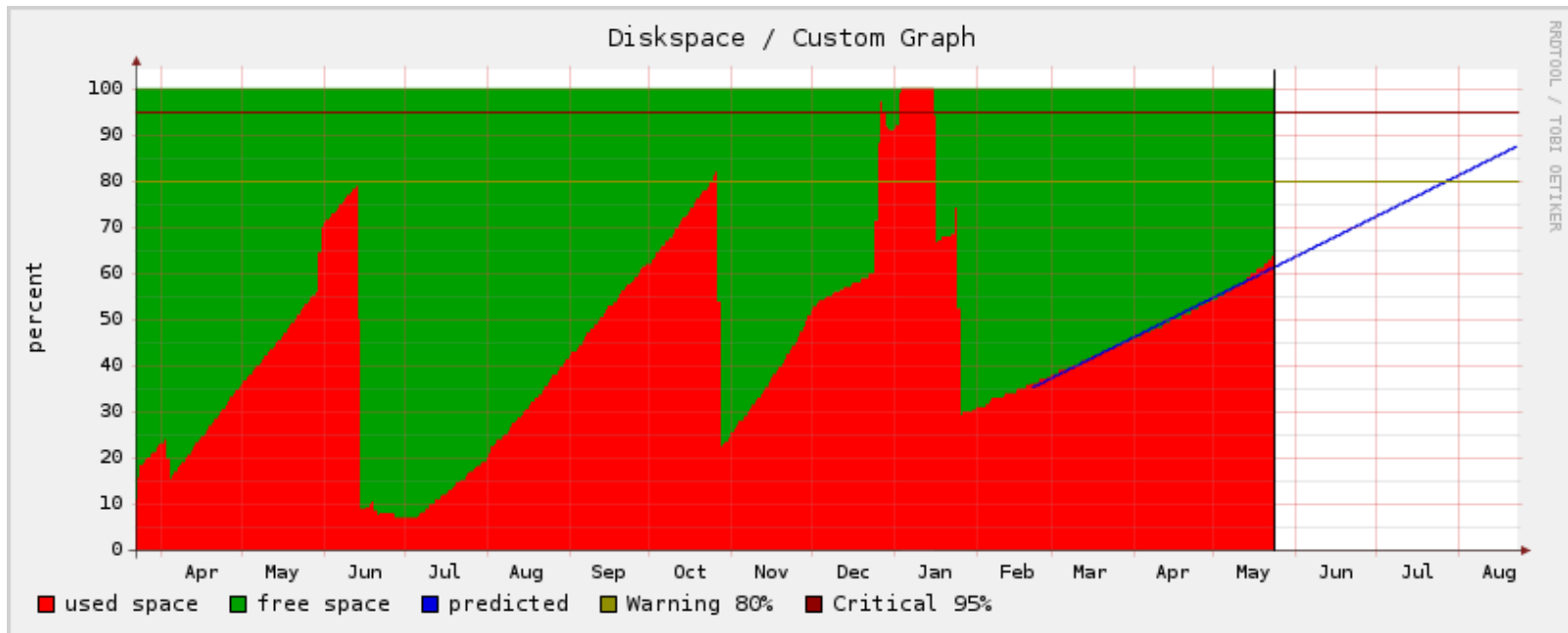


Actual Data



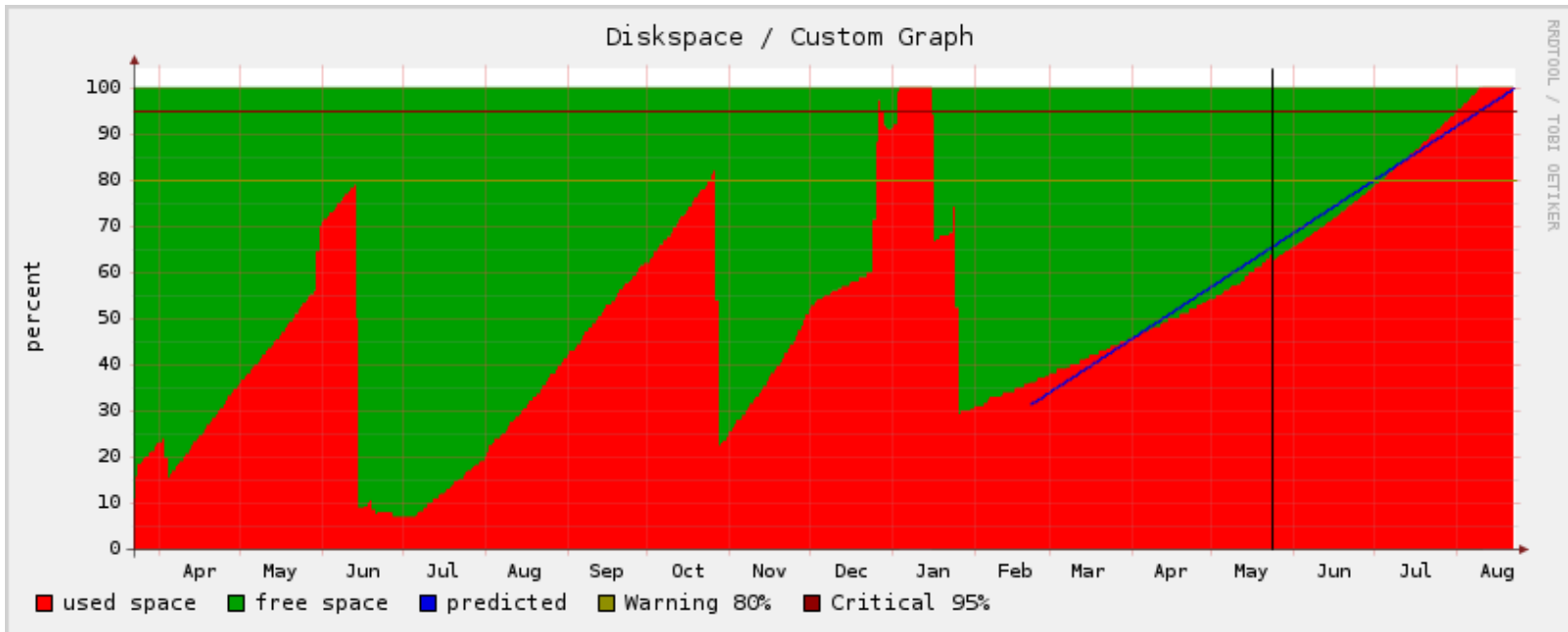


Straight Line



```
export NOW=$(date +%s); rrdtool graph test.png -r -l 0 -u 100 -t "Diskspace / Custom Graph" -v percent -w 720 -h 250 \
-s $NOW-1year -e $NOW \
DEF:RTA=test.rrd:RTA:AVERAGE DEF:lastq=test.rrd:RTA:AVERAGE:start=$NOW-3months:end=$NOW \
CDEF:free=RTA CDEF:used=100,RTA,- VDEF:lsl=lastq,LSLSLOPE VDEF:lsint=lastq,LSLINT \
AREA:used#ff0000:"used space" STACK:free#00a000:"free space" \
CDEF:lastql=100,lastq,- CDEF:myline=lastql,POP,lsl,-1,*,COUNT,*,100,lsint,-,+ \
LINE1:lastql#ff0000 LINE1:myline#0000df:"predicted" \
HRRULE:80#8f8f00:"Warning 80%" HRRULE:95#8f0000:"Critical 95%" VRULE:$NOW#000000:"Today"
```

Exponential





Generating reports

■ Status

broken down according to hostgroups

STATUS as of 01.11.2007

Hostgroup CPU used CPU free MEM used MEM free DISK used DISK free NET used NET free

WEB	30	70	48	52	13	87	8	92
APP	83	17	73	27	19	81	11	89
DB	45	55	85	15	21	79	6	94



Generating reports

■ Status

further broken down according to hosts

<u>Hostgroup</u>	<u>CPU used</u>	<u>CPU free</u>	<u>MEM used</u>	<u>MEM free</u>	<u>DISK used</u>
WEB1	30	70	48	52	13
WEB2	31	69	49	51	19
WEB3	45	55	57	43	21
WEB4	38	62			
WEB5	33	67			



Generating reports

■ Projected Trends

DISK used DISK free NET used NET free

14	86	9	91
21	79	12	88
23	77	7	93



Final thoughts

- **Downtime**
- **Migration**
- **Timescale**
- **Worth the effort?**



References / Further info

- **OGC, *Best Practice for Service Delivery*, The Stationery Office, 2001**
- **Martha S. Hays, *Bringing ITIL to Life: Automating IT Capacity management*, SAS Institute**
- **RRDtool (oss.oetiker.ch/rrdtool)**
- **www.NagiosExchange.org**
- **www.spec.org**