Netzwerkmanagement mit Linux und Open Source Werkzeugen

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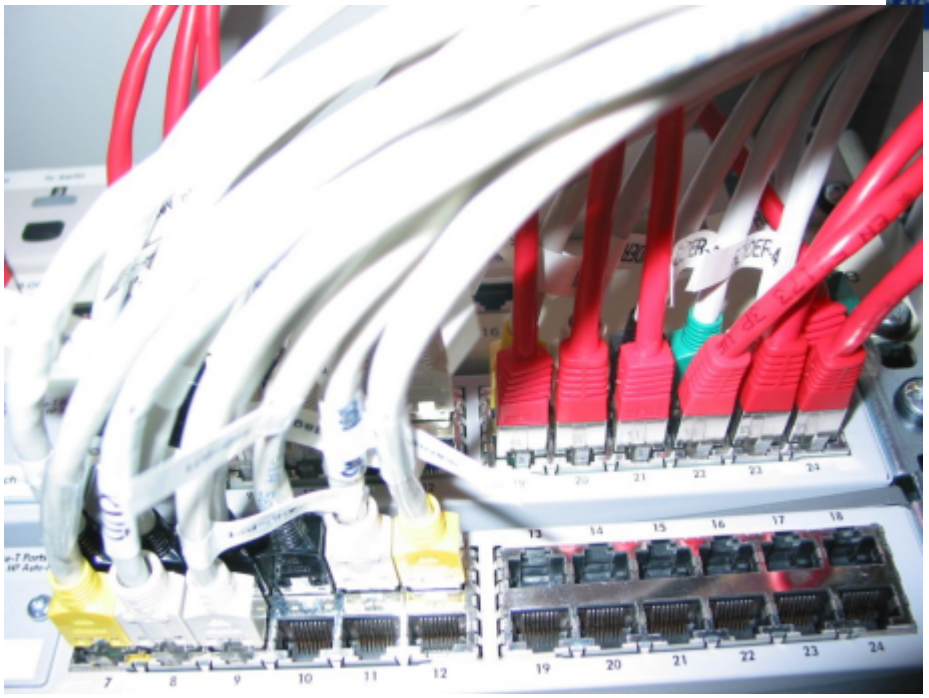
berlinux 2004

22. Oktober 2004, Berlin

Agenda

- Netzwerküberwachung / Netzwerkmanagement
- Nagios
- MRTG
- Ethereal
- ntop



- Andere Werkzeuge
- Fazit

Wozu Netzwerküberwachung?

- Status Quo von Netzwerk, Rechnern und Diensten
- Frühzeitige Warnungen, evtl. noch vor Ausfällen
- Entlastung der Administratoren durch automatische Überwachung
- Analyse von Unregelmäßigkeiten (Einbrüche, Fehlkonfigurationen, Hard-/Softwaredefekten, ...)
- Erkennen von langfristigen Trends

Netzwerküberwachung und Geschäftsziele

- Gewährleistung des reibungslosen und kontinuierlichen Betriebs des IT-Systems
- Verantwortliche sollten Probleme vor den Anwendern / Kunden erkennen können
- Kontrolle von SLA‘s (Service Level Agreements)
- Rechtzeitig Engpässe in der Infrastruktur erkennen und beheben

Was kann / sollte man überwachen?

- Raumüberwachung (Temperatur, Feuchte, etc.)
- Computerhardware
- Peripherie (Drucker, TK, ...)
- Betriebssystem (RAM, Plattenplatz, Performance, ...)
- Middleware / Datenbanken
- Infrastrukturdienste (Routing, DNS, DHCP, ...)
- Anwendungen / Dienste

Nagios - Allgemeines

Nagios®

- Erste Releases als NetSaint (1999-2002)
- Namenskollision mit Security-Scanner NetSaint
- 2002 mit Version 1.0b6 in Nagios umbenannt (network + hagios, griechisch für heilig)
- Aktuelles Release: Nagios 1.2 (2.0 angekündigt)
- Logo und Name geschützt (Autor: Ethan Galstad)
- Lizenz: GNU GPL 2
- Homepage: http://www.nagios.org

Nagios - Features

Nagios®

- Überwachungssystem für Server und Dienste
- Entwickelt für Linux und läuft auf Unix-Systemen
- Beliebige Zielplattformen überwachbar
- Flexible Benachrichtigungsfunktionen
- Plugin-Architektur
- Webinterface zur Präsentation und Bedienung

Nagios - Einschränkungen

- Keine vordefinierten Service Checks
- Konfiguration nicht webbasiert und schlecht skalierbar
- Relativ umfangreiche Konfigurationsdateien
- Konfigurationshilfen verfügbar (NagMIN, Nagat, NaWui)

Nagios – Daemon/Framework

Nagios®

- **Webinterface, Logdateien (automatisch rotiert)**
- **Konfiguration über Textdateien**
- **Scheduling (Zustand überwachter Objekte prüfen)**
  - Host erreichbar (ping)?
  - Plugin starten
  - Rückgabe des Plugins auswerten
  - Andere Datenquellen auswerten
- **Benachrichtigung (nach Host, Service, Kontakt, Zeit, ...) über Skripte per EMail, SMS, Pager, Instant Messaging, ...**
- **Zustandsinformationen werden persistent gehalten**
  - Textdateien (empfohlen)
  - MySQL, PostgreSQL (Fehler in Datenbankschnittstellen)

Nagios – Plugins

- **Service Checks als Plugins realisiert**
- **Einfache Erweiterbarkeit**
- **Ausführbares Script oder Binärdatei**
- **Seperates Projekt: nagios-plugins**
- **Kommunikation mit dem Daemon über**
  - Exitcodes (OK, Warning, Critical, Unknown)
  - Kurze Textmeldungen (z.B. „HTTP CRITICAL: HTTP/1.1 500 Error WebObjects“ oder „DISK WARNING - [36907832 kB (9%) free on /dev/sda8]“)

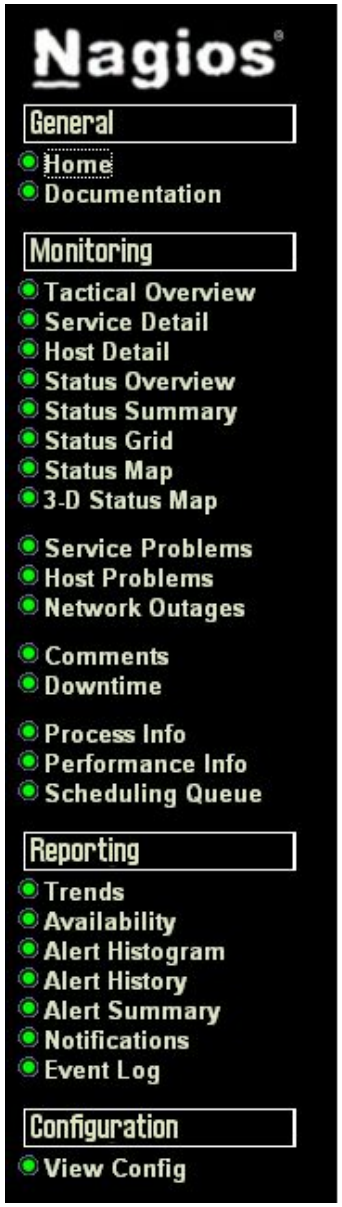
Nagios – Verfügbare Plugins

Nagios®

- **Linux / Unix**
  - Status von Prozessen
  - Verschiedene Server (NFS, Datenbank, Mail, Samba)
  - Syslog
  - CPU/Speicher/Swap Auslastung
  - Festplattenbelegung
- **Windows**
  - Status von Diensten und Prozessen
  - Uptime
  - Daten des Performance Monitors
  - CPU/Speicher Auslastung
  - Festplattenbelegung
- **„Clientzugriff“ (SSH, FTP, PING, DNS, HTTP(S), SMTP, LDAP, MySQL, Oracle, generisch auf TCP/UDP Ports, ...)**

Nagios – Start

Nagios®



Nagios®

Version 1.2

February 02, 2004

New Installations:

If you have just installed Nagios®, read the documentation for instructions on getting everything up and running.

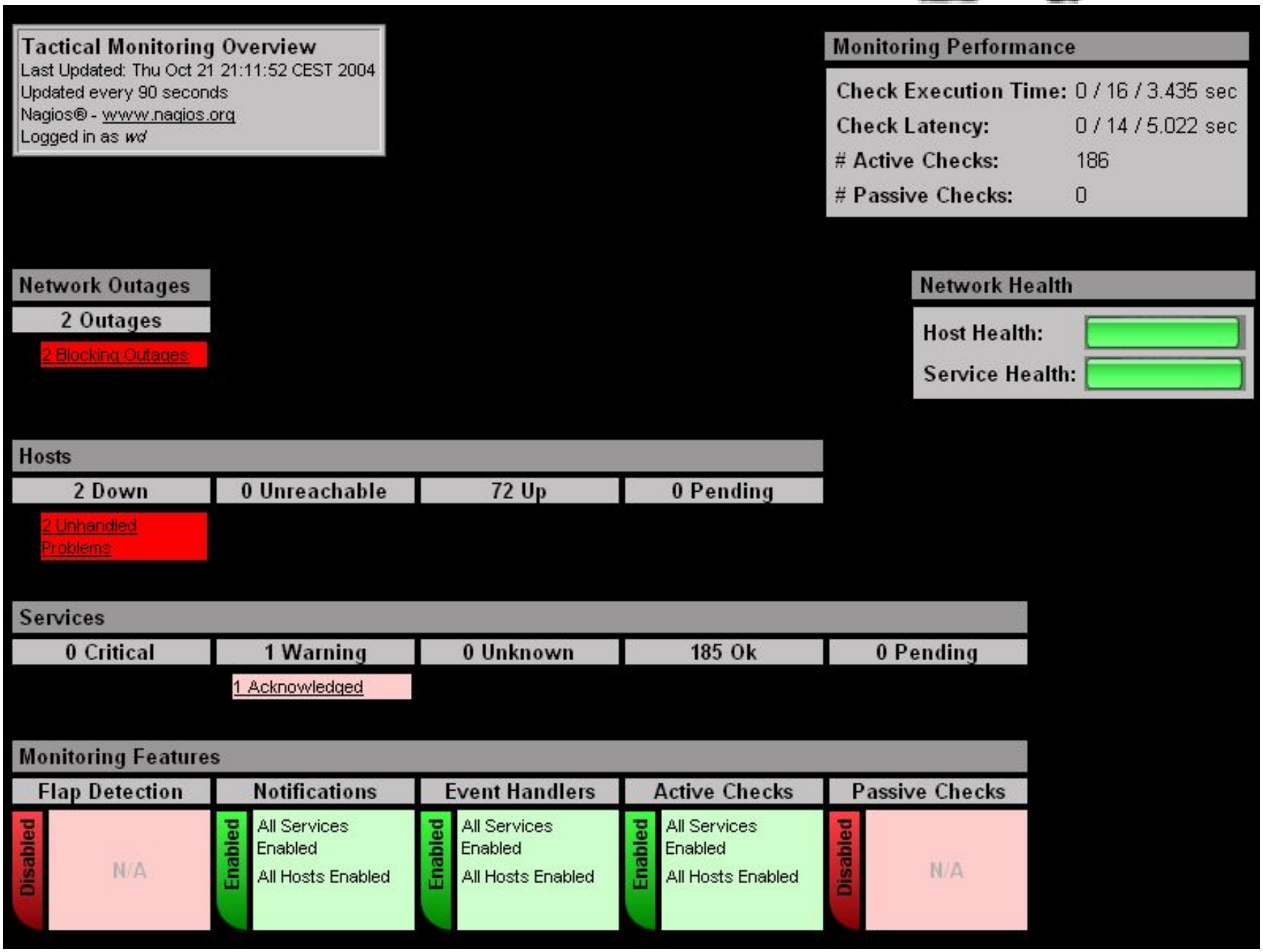
Click here for a brief overview of new features that have been added in this release.

For More Information:

Visit the Nagios homepage at http://www.nagios.org for information on bug fixes, upgrades, support, etc.

MONITORED BY Nagios NETWORK MONITOR

Nagios – Tactical Overview



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Nagios – Status Details

Nagios®

Current Network Status
Last Updated: Thu Oct 21 21:19:35 CEST 2004
Updated every 90 seconds
Nagios® - www.nagios.org
Logged in as *wd*

View History For all hosts
View Notifications For All Hosts
View Host Status Detail For All Hosts

Host Status Totals

Up	Down	Unreachable	Pending
72	2	0	0

All Problems	All Types
2	74

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
185	1	0	0	0

All Problems	All Types
1	186

Service Status Details For All Hosts

Host	Service	Status	Last Check	Duration	Attempt	Status Information
EuroPa-pf1	https-Zertifikat	OK	21-10-2004 21:17:37	1d 13h 51m 3s	1/3	Certificate will expire on 05/18/2006 14:1.
	https-proxy	OK	21-10-2004 21:18:32	1d 13h 53m 23s	1/3	HTTP ok: HTTP/1.1 200 OK - 0.612 second response time
	ssh	OK	21-10-2004 21:17:22	1d 13h 51m 53s	1/3	SSH ok - OpenSSH_3.9p1 (protocol 2.0)
EuroPa-pf2	https-proxy	OK	21-10-2004 21:18:27	1d 13h 50m 53s	1/3	HTTP ok: HTTP/1.1 401 Authorization Required - 0.489 second response time
EuroPa-sun	WebObjects (AdminTool)	OK	21-10-2004 21:18:37	1d 13h 52m 33s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.638 second response time
	WebObjects (AdminTool-Training)	OK	21-10-2004 21:18:37	1d 13h 51m 23s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.557 second response time
	WebObjects (DataCapture)	OK	21-10-2004 21:18:37	0d 19h 19m 33s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.565 second response time
	WebObjects (DataCapture-Training)	OK	21-10-2004 21:18:37	0d 19h 19m 33s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.590 second response time
	WebObjects (FormBuilder)	OK	21-10-2004 21:19:22	1d 13h 50m 58s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.529 second response time
	WebObjects (FormBuilder-Training)	OK	21-10-2004 21:18:37	1d 13h 50m 53s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.584 second response time
	WebObjects (RecruitmentTool)	OK	21-10-2004 21:18:51	1d 13h 52m 23s	1/3	HTTP ok: HTTP/1.1 200 Apple - 0.691 second response time

Nagios – Host Groups

Nagios®

DMZ der iAS in Berlin (DMZbln)

Host	Status	Services	Actions
bgpd	UP	1 OK	
extFW	UP	1 OK	
fax	UP	2 OK	
hp-switch-02	UP	2 OK	
ias-ipb	UP	1 OK	
ias1	UP	1 OK	
intFW	UP	2 OK	
mail	UP	1 OK	
proxy	UP	3 OK	
sw_dmz	UP	1 OK	
vpn-berlin	UP	1 OK	
web	UP	2 OK	

Drucker im LAN der iAS in Berlin (Intranet-Berlin-Drucker)

Host	Status	Services	Actions
epson	UP	1 OK	
hp-black	UP	1 OK	
hp-color	UP	1 OK	
hp-lj2300	UP	1 OK	

Raids im LAN der iAS in Berlin (Intranet-Berlin-raids)

Host	Status	Services	Actions
raid-bn	UP	1 OK	
raid-bne	UP	1 OK	

Server im LAN der iAS in Berlin (Intranet-Berlin-server)

Host	Status	Services	Actions
cvs-berlin	UP	2 OK	
dc-berlin	UP	1 OK	
fs-berlin	UP	3 OK 1 WARNING	
intFW	UP	2 OK	

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Nagios – Status Map

Nagios®

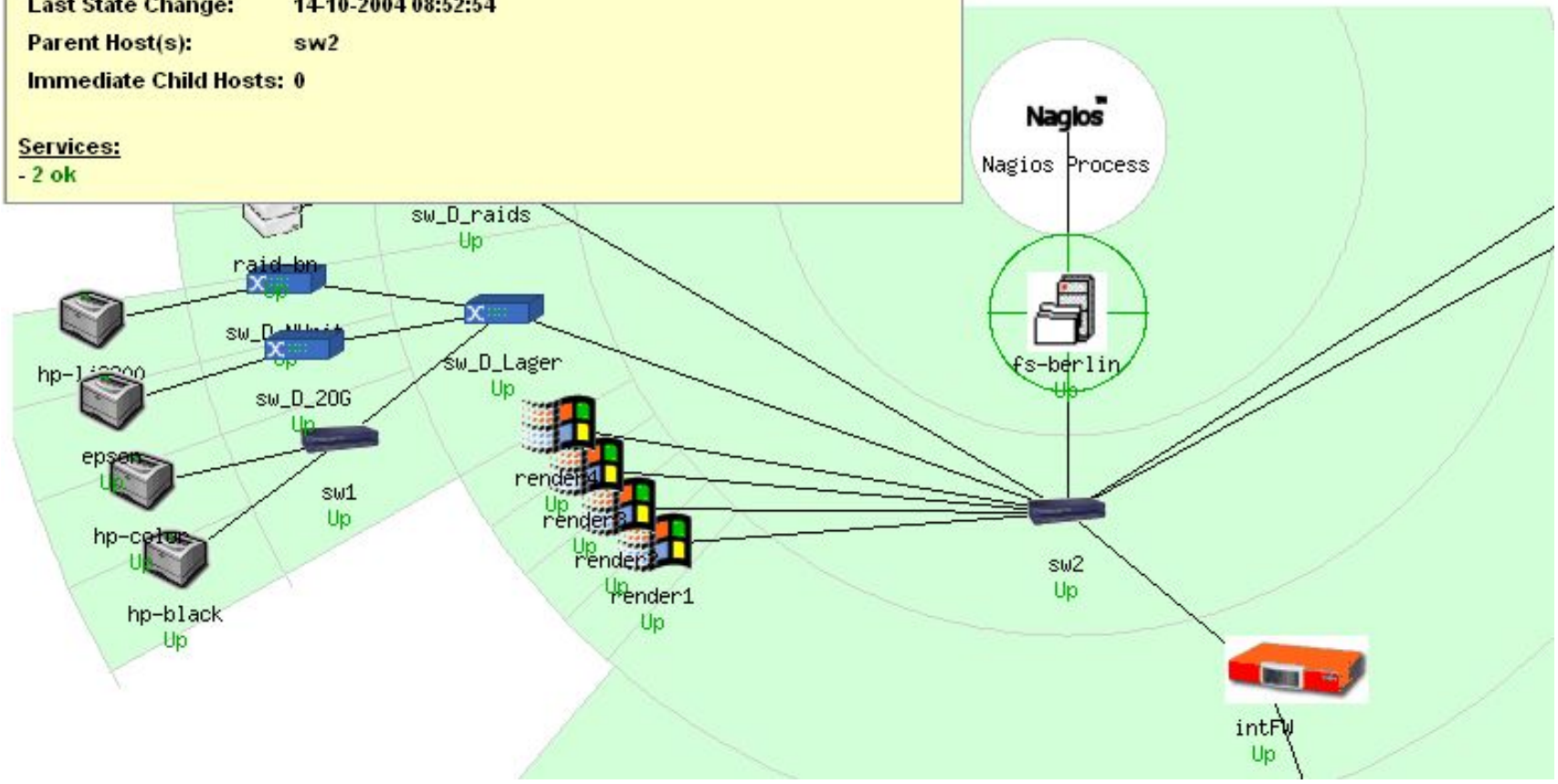
Render Slave

Name:	**render4**
Alias:	**render4.brainmedia.de**
Address:	**192.168.101.34**
State:	**Up**
Status Information:	**FPING OK - 192.168.101.34 (loss=0.000000%, rta=0.270000 ms)**
State Duration:	**7d 12h 39m 55s**
Last Status Check:	**20-10-2004 21:18:27**
Last State Change:	**14-10-2004 08:52:54**
Parent Host(s):	**sw2**
Immediate Child Hosts:	**0**

Services:
- 2 ok

od:
Marked Up)
ers:
AS in Berlin
LAN der iAS in Berlin
echner LAN der iAS in Berlin
AN der iAS in Berlin
pups:

Scaling factor:
0.0
Layer mode:
Include
Exclude
Update



Nagios – Reports

Nagios®

Host State Breakdowns:

State	Type / Reason	Time	% Total Time	% Known Time
UP	Unscheduled	6d 23h 42m 49s	99.830%	99.830%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	**6d 23h 42m 49s**	**99.830%**	**99.830%**
DOWN	Unscheduled	0d 0h 17m 11s	0.170%	0.170%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	**0d 0h 17m 11s**	**0.170%**	**0.170%**
UNREACHABLE	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%**
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	7d 0h 0m 0s	100.000%	100.000%

State Breakdowns For Host Services:

Service	% Time OK	% Time Warning	% Time Unknown	% Time Critical	% Time Undetermined
KKS-AdminTool	99.859% (99.859%)	0.000% (0.000%)	0.000% (0.000%)	0.141% (0.141%)	0.000%
KKS-DataCapture	99.808% (99.808%)	0.000% (0.000%)	0.000% (0.000%)	0.192% (0.192%)	0.000%
KKS-ExportTool	99.808% (99.808%)	0.000% (0.000%)	0.000% (0.000%)	0.192% (0.192%)	0.000%
KKS-FormBuilder	99.884% (99.884%)	0.000% (0.000%)	0.000% (0.000%)	0.116% (0.116%)	0.000%
STP-AdminTool	99.883% (99.883%)	0.000% (0.000%)	0.000% (0.000%)	0.117% (0.117%)	0.000%
STP-DataCapture	99.808% (99.808%)	0.000% (0.000%)	0.000% (0.000%)	0.192% (0.192%)	0.000%
STP-ExportTool	99.854% (99.854%)	0.000% (0.000%)	0.000% (0.000%)	0.146% (0.146%)	0.000%
STP-FormBuilder	99.859% (99.859%)	0.000% (0.000%)	0.000% (0.000%)	0.141% (0.141%)	0.000%
https-Zertifikat	99.797% (99.797%)	0.000% (0.000%)	0.000% (0.000%)	0.203% (0.203%)	0.000%

Nagios – Erweiterte Features

- **Aktive Servicetests (auf einem externen Host wird ein aktiver Test ausgeführt)**
  - Per SSH
  - Per NRPE (Nagios Remote Plugin Executor)
- **Passive Servicetests (externer Host liefert über NSCA-Client Daten an Nagios)**
  - Per NSCA (Nagios Service Check Acceptor)
- **Redundantes Monitoring (zweiter Slave-Nagios überwacht parallel und übernimmt die Benachrichtigung wenn Master down ist)**
- **Failover-Monitoring (Slave überwacht nur Master und beginnt mit kompletter Überwachung wenn Master down ist)**

MRTG - Allgemeines

- MRTG (Multi Router Traffic Grapher)
- Autor: Tobias Oetiker
- Erste Version 1994 als Perl-Skript, heute geschwindigkeitsrelevante Teile in C
- Aktuelle Version: MRTG 2.10.15
- Lizenz: GNU GPL 2
- Homepage: http://www.mrtg.org

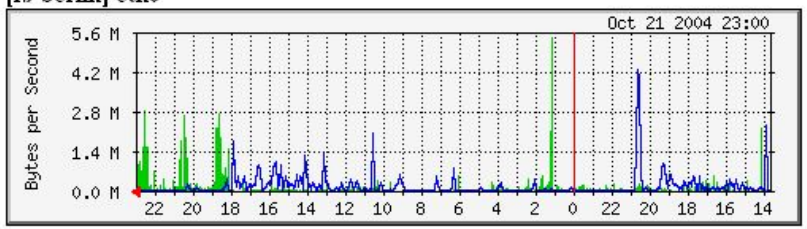
MRTG - Features

- Überwacht Auslastung des Netzwerkes
- Fragt Daten von Rechnern, Routern und Switches über SNMP ab
- Daten in übersichtlichen Graphiken darstellen und in Webseiten einpacken
- Zusätzlich: andere Daten wie Festplattenausnutzung und CPU-Belastung abfragen
- Benötigt (neben Perl und C-Compiler): GD-, Libpng- und Zlib-Bibliothek
- Läuft unter Linux, Unix und Windows
- Kann RRD-Tool als Datenbasis benutzen

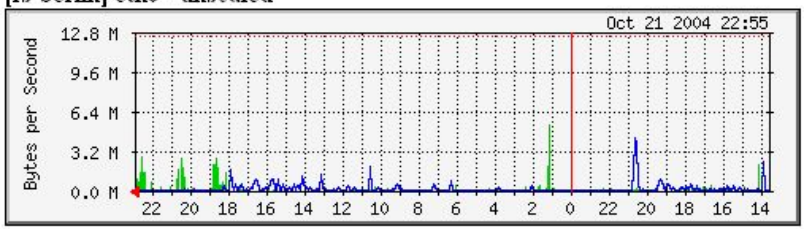
MRTG – Überblick Server

MRTG
MULTI ROUTER TRAFFIC GRAPHER

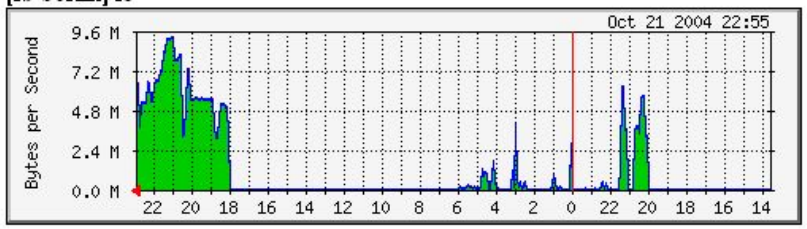
[fs-berlin] eth0



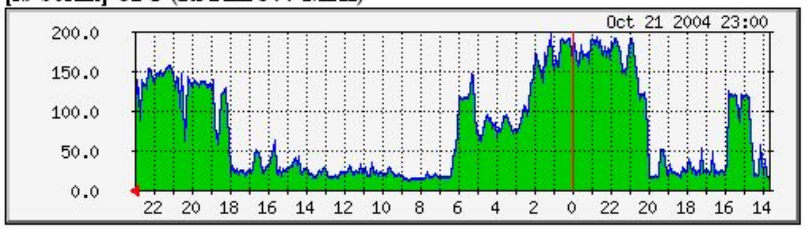
[fs-berlin] eth0 - unscaled



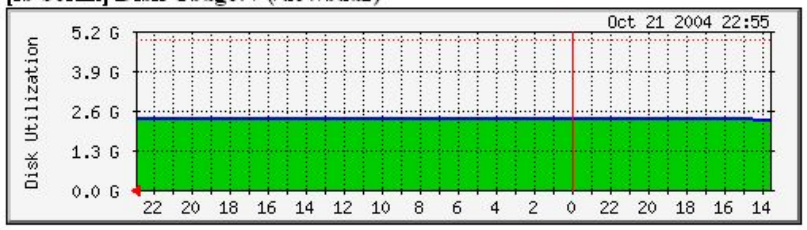
[fs-berlin] lo



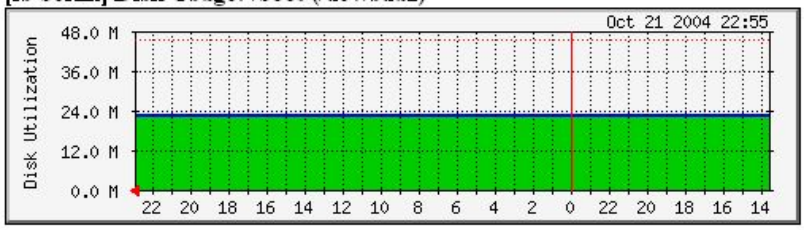
[fs-berlin] CPU (2x PIII 500 MHz)



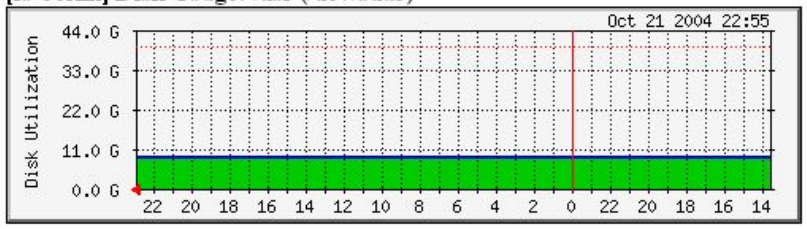
[fs-berlin] Disk Usage: / (/dev/sda2)



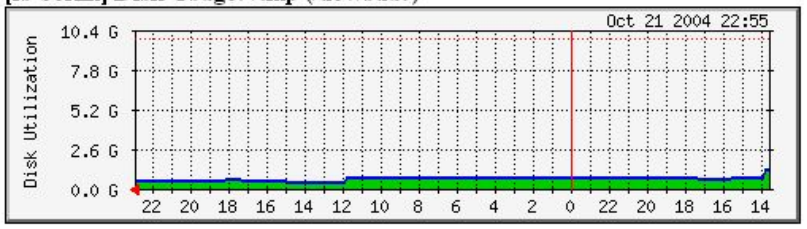
[fs-berlin] Disk Usage: /boot (/dev/sda1)



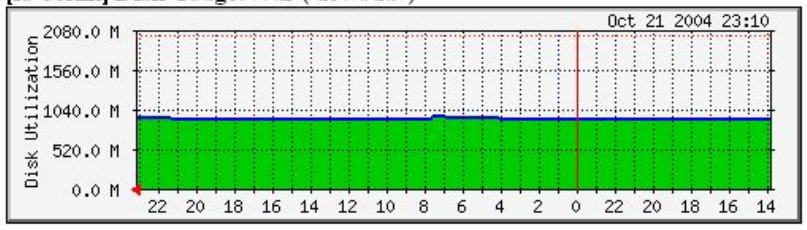
[fs-berlin] Disk Usage: /usr (/dev/sda5)



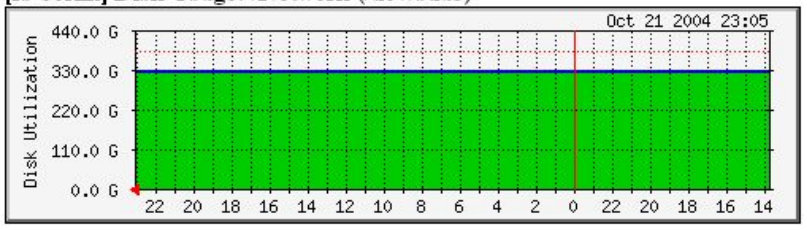
[fs-berlin] Disk Usage: /tmp (/dev/sda6)



[fs-berlin] Disk Usage: /var (/dev/sda7)



[fs-berlin] Disk Usage: /Network (/dev/sda8)



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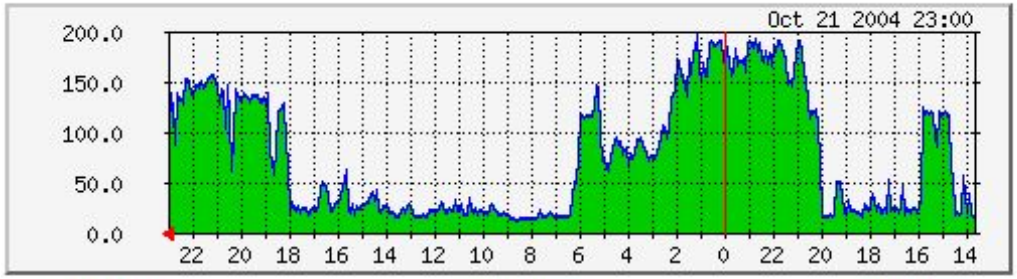
MRTG – CPU-Auslastung

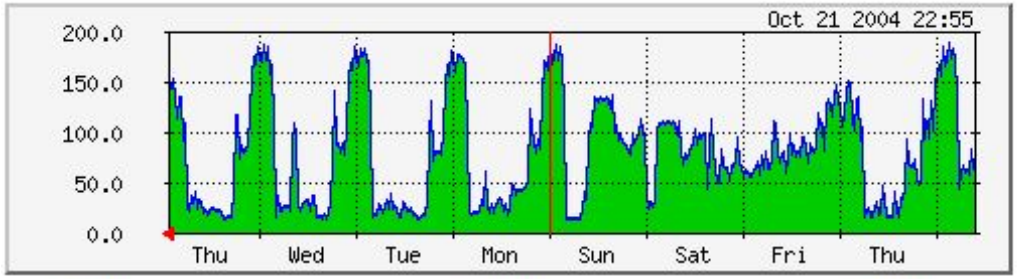
The statistics were last updated **Thursday, 21 October 2004 at 23:00**, at which time **'fs-berlin'** had been up for **11 days, 5:50:26**.

'Daily' Graph (5 Minute Average)



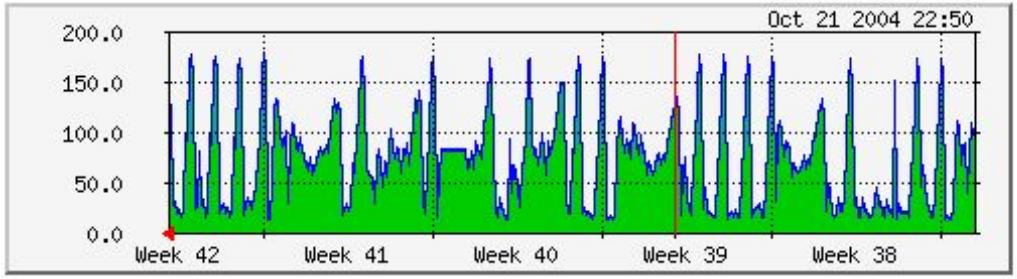
Max CPU Usage 196.0 % (98.0%) Average CPU Usage 78.0 % (39.0%) Current CPU Usage 103.0 % (51.5%)

'Weekly' Graph (30 Minute Average)



Max CPU Usage 188.0 % (94.0%) Average CPU Usage 80.0 % (40.0%) Current CPU Usage 142.0 % (71.0%)

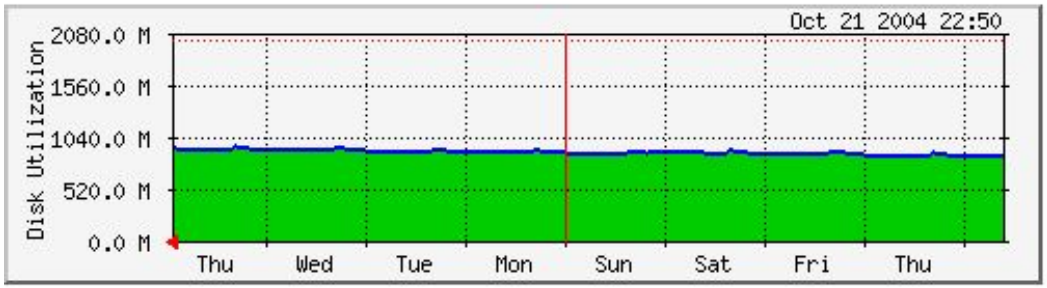
'Monthly' Graph (2 Hour Average)



MRTG – Dateisystemauslastung

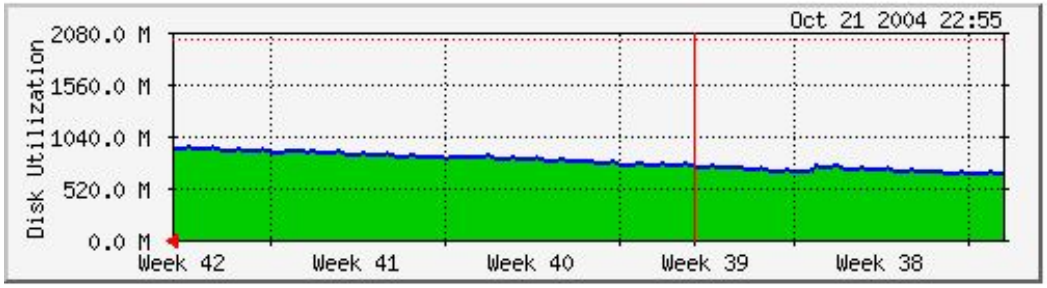
MRTG
MULTI ROUTER TRAFFIC GRAPHER

`Weekly' Graph (30 Minute Average)



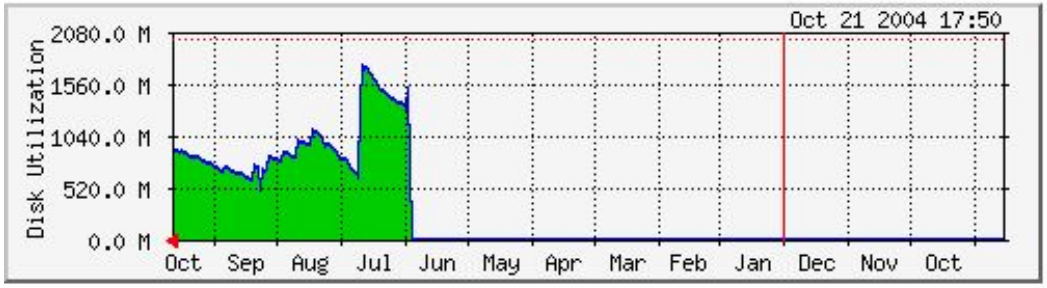
Max size 958.2 M B (47.6%) Average size 900.6 M B (44.7%) Current size 936.2 M B (46.5%)

`Monthly' Graph (2 Hour Average)



Max size 951.4 M B (47.2%) Average size 796.4 M B (39.5%) Current size 935.9 M B (46.4%)

`Yearly' Graph (1 Day Average)



Max size 1765.3 M B (87.6%) Average size 966.1 M B (47.9%) Current size 925.6 M B (45.9%)

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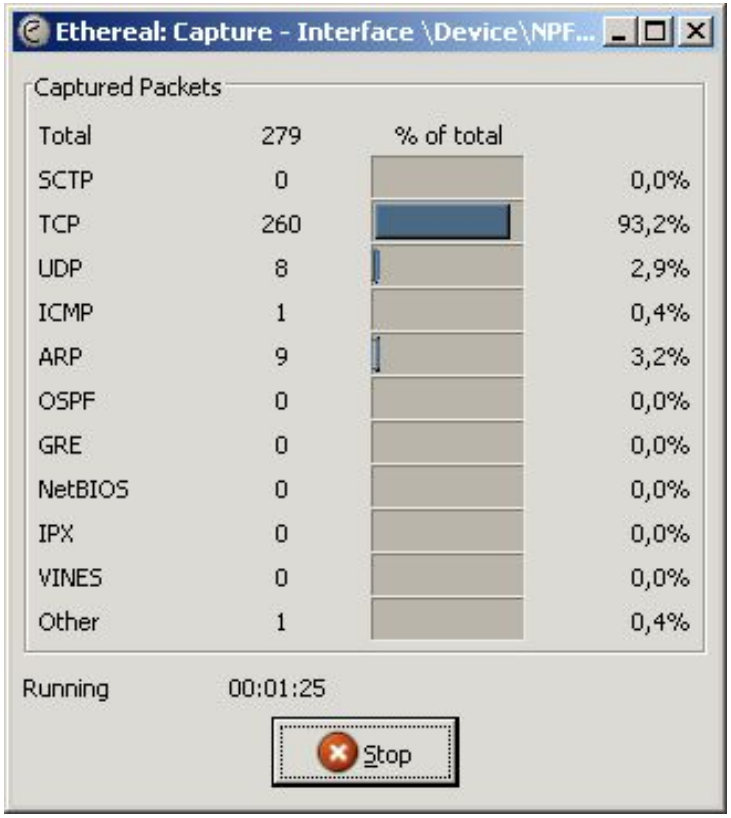
Ethereal - Allgemeines

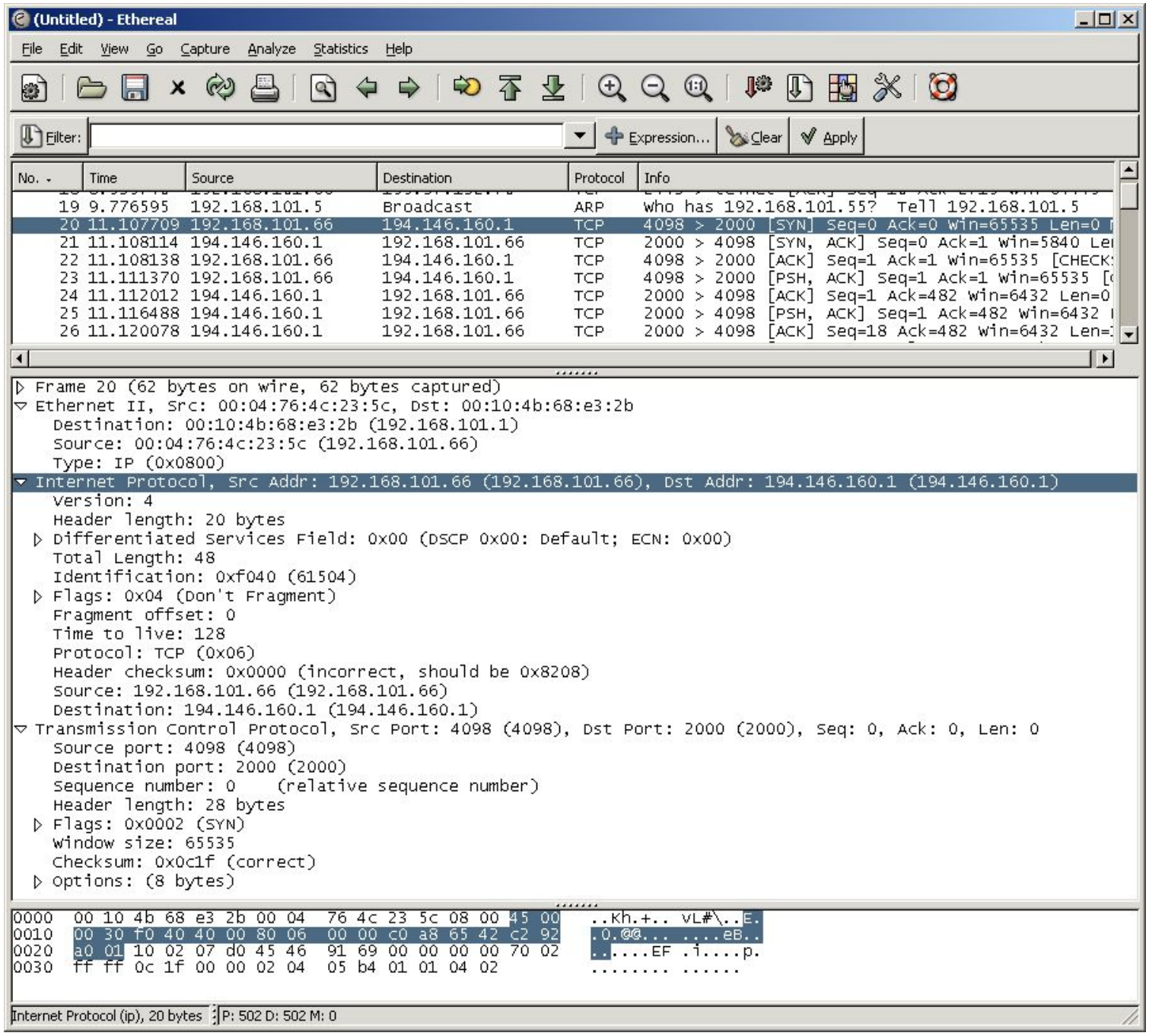
- Ethereal (Analysewerkzeug für Netzwerkpakete)
- Originalautor: Gerald Combs
- Aktuelle Version: Ethereal 0.10.17
- Lizenz: GNU GPL 2
- Homepage: http://www.ethereal.com

Ethereal - Features

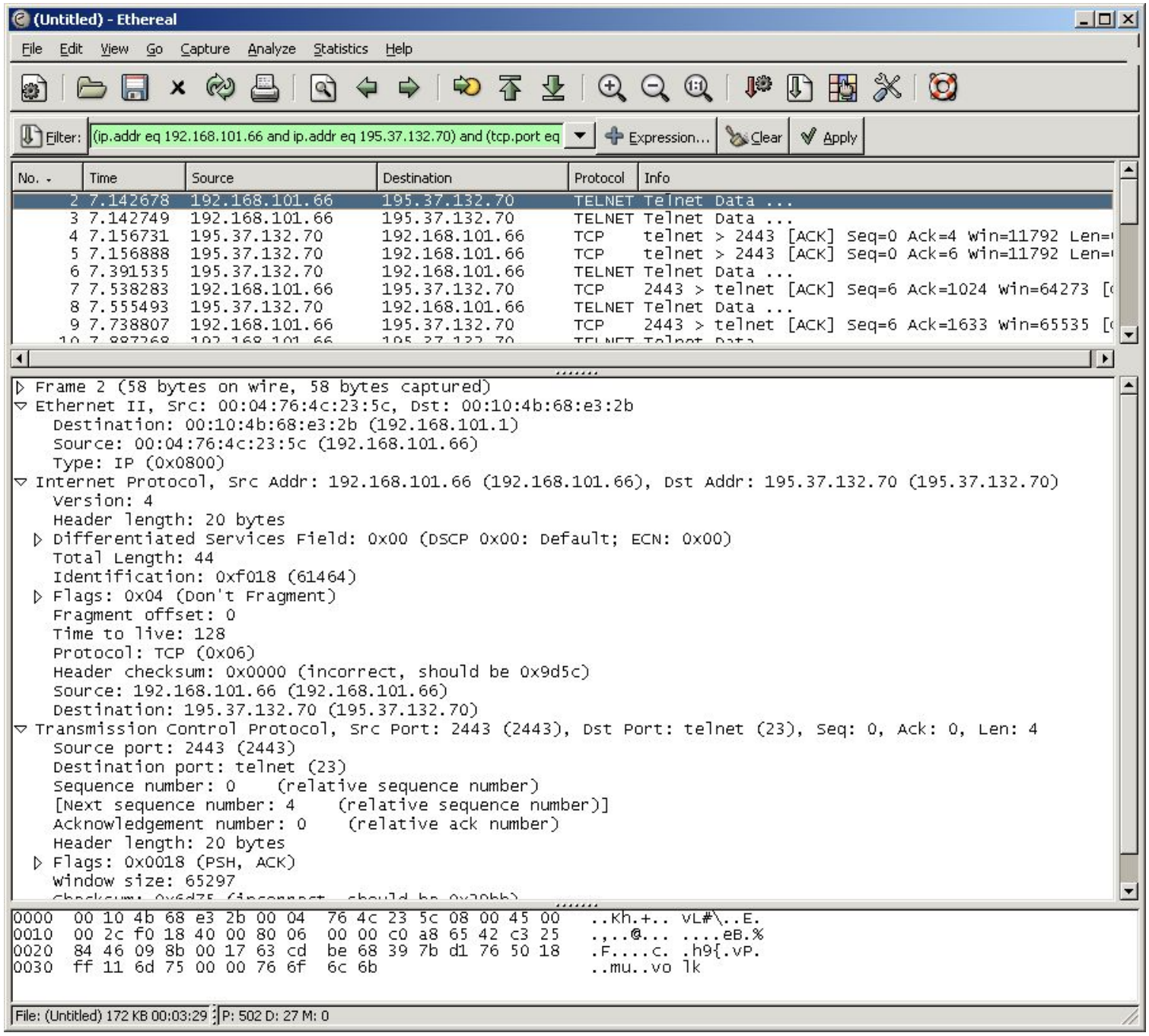
- Live-Capture-Funktion
- Einlesen von sehr vielen Capturefile-Formaten, z.B. tcpdump
- Analyse per GUI oder im Textmodus
- Umfangreiche Filter-funktionen
- „Kennt“ zur Zeit 602 Netzwerkprotokolle



Ethereal - Analyse



Ethereal – Analyse (Follow Stream)



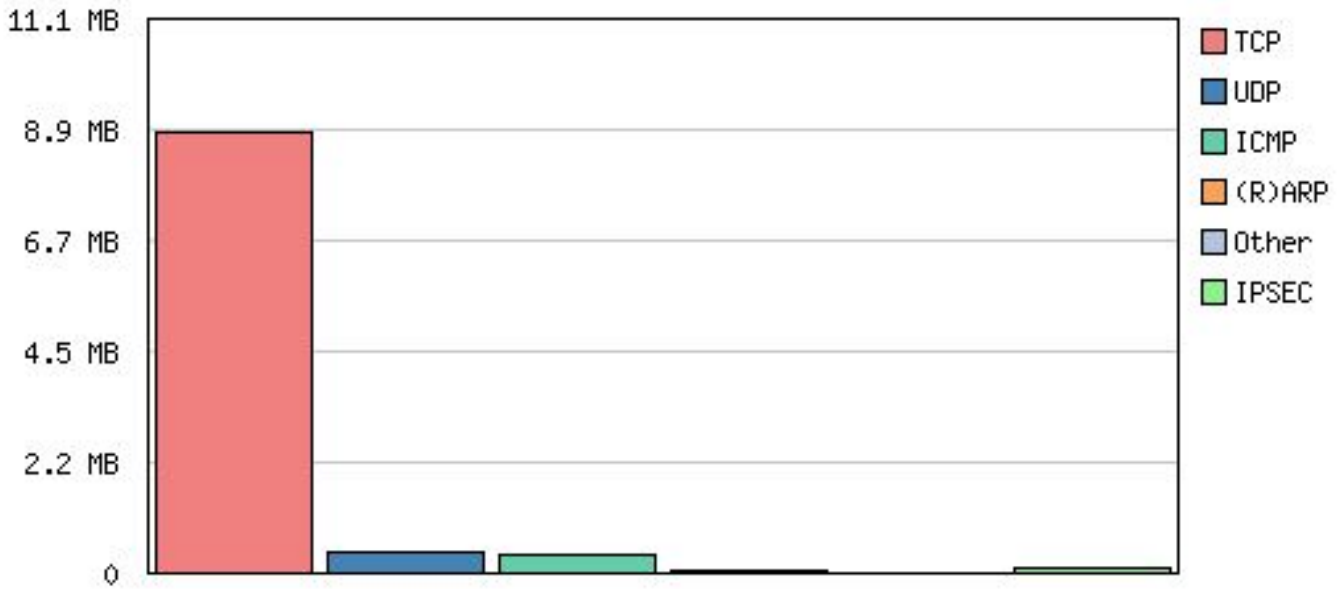
ntop - Allgemeines

- ntop (Überwacht Netzwerkauslastung)
- Autor: Luca Deri
- Aktuelle Version: ntop 3.0
- Lizenz: GNU GPL 2
- Homepage: http://www.ntop.org

ntop – Traffic-Analyse

Global Protocol Distribution

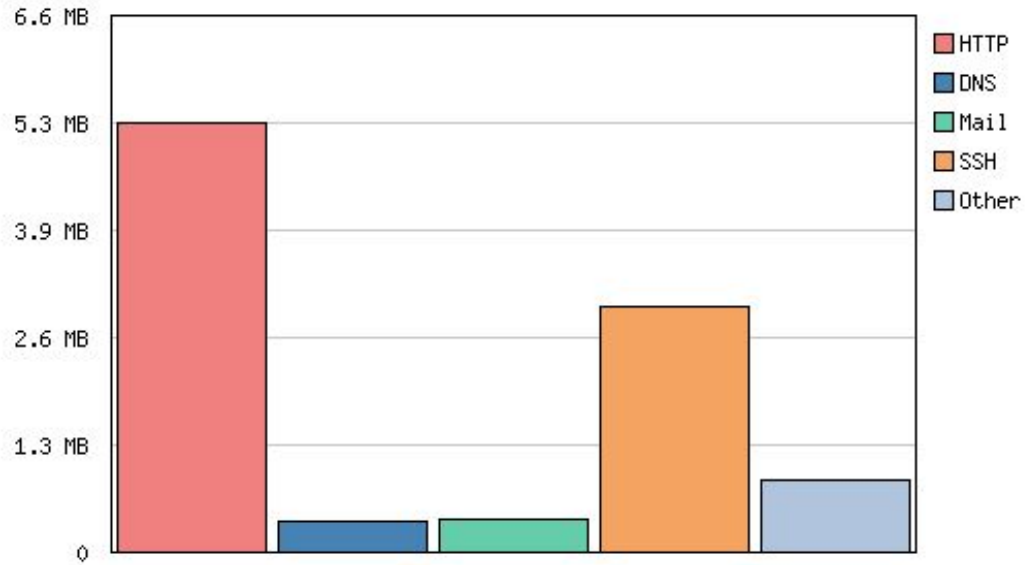
Protocol	Data	Percentage			
IP	9.9 MB	98.8%	TCP	8.9 MB	90%
			UDP	462.0 KB	4%
			ICMP	395.3 KB	3%
			IPSEC	156.1 KB	1%
(R)ARP	85.9 KB	0%			
Other	9.3 KB	0%			



ntop – Traffic-Analyse

Global TCP/UDP Protocol Distribution

TCP/UDP Protocol	Data	Percentage
FTP	10.6 KB	0%
HTTP	5.3 MB	52%
DNS	405.9 KB	3%
Telnet	16.6 KB	0%
NBios-IP	8.6 KB	0%
Mail	426.8 KB	4%
SSH	3.0 MB	30%
Messenger	0.6 KB	0%
Other TCP/UDP-based Protocols	880.3 KB	8%



Andere Werkzeuge (Sicherheit)

- Nessus (Schwachstellenscanner)

- Snort (Intrusion Detection)

- Snort Inline (Intrusion Prevention)

- Nmap (Portscanner)

Fazit

- Netzwerküberwachung und –management ist unter Linux mit Open Source Werkzeugen machbar
- Eine ganzheitliche Lösung muss / kann aus mehreren Einzelteilen bestehen
- Leistung und Konfigurationsmöglichkeiten stehen nicht hinter kommerziellen Systemen zurück
- Einheitlichkeit und Bequemlichkeit der Konfiguration ist oft deutlich schlechter und muss häufig mit externen Komponenten erledigt werden

Diskussion

Vielen Dank für das Interesse!

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