

7. Drucker und Spooling  
=====

Der Drucker - das unbekannte Wesen

Druckertypen:

Nadeldrucker, Thermodrucker  
Tintenstrahldrucker  
Laserdrucker, Farblaserdrucker

Druckerschnittstellen:

direkter Anschluß - nur für einen Rechner

serielle Schnittstelle (RS232) - /dev/tty01, /dev/ttya, ..  
parallele Schnittstelle - /dev/lp, /dev/lp0, /dev/lp1  
bidirektional (unidirektional)  
USB Schnittstelle - /dev/usbdev1

Netzwerkschnittstelle - Anschluß über Netzwerk, unterschiedliche  
Protokoll, für mehrere Rechner nutzbar

nmap <Druckername> gibt Auskunft über die Leistungsfähigkeit

hp2200 Laserjet

PORT	STATE	SERVICE
80/tcp	open	http
280/tcp	open	http-mgmt
515/tcp	open	printer
9100/tcp	open	jetdirect

## hp4 Laserjet

## DELL 5300

PORT	STATE	SERVICE	PORT	STATE	SERVICE
21/tcp	open	ftp	80/tcp	open	http
23/tcp	open	telnet	427/tcp	open	svrloc
80/tcp	open	http	443/tcp	open	https
280/tcp	open	http-mgmt	515/tcp	open	printer
443/tcp	open	https	631/tcp	open	ipp
515/tcp	open	printer	2000/tcp	open	callbook
631/tcp	open	ipp	5200/tcp	open	unknown
1782/tcp	open	unknown	9100/tcp	open	jetdirect
9100/tcp	open	jetdirect			

## Für uns wichtig:

http,https:	Konfigurationsschnittstelle
printer:	RFC 1179, LPD-Protocoll (BSD-Netzwerkdrucker) Spooler für Druckaufträge
ipp	RFC 3380, ipp-Protokoll - Internet Printing Protocol (CUPS) Spooler für Druckaufträge, (Konfiguration)
jetdirect:	RFC 1759, HP-Protokoll (Printer PDL) Spooler für Druckaufträge, (Konfiguration)

## Druckersprachen - für die Beschreibung der Druckaufträge

PS - Postscript (Level 1, Level 2, Level 3)

Unterschiedliche Leistungsfähigkeiten der Drucker werden  
durch PPD-Files (Postscript Printer Description) beschrieben

HP PCL 4, HP PCL 5, HP PCL 6, Kyocera Prescribe, KPDL 3, ESC/PS2, ..

- jeder Hersteller hat seine private Druckersprache

## Typen von Druck- und Drucker-Spool-Systemen

BSD (SunOS, Ultrix, DEC-UNIX, LINUX)  
System V (Solaris, HP-UX 10.x, SCO UNIX, AIX, ...)  
CUPS (LINUX, Solaris, ....)

## Bestandteile der Spoolingsysteme:

### Nutzerfrontend:

lpr, lp

### Queues:

Warteschlangen für einzelne Geräte

### Spool-Verzeichnisse:

/usr/spool/lp/..., /var/spool/lp, /var/spool/cups

### Server-Prozess, Drucker-Daemon, Scheduler:

lpd

lpsched, in.lpd, lpNet

cupsd

### Administrationstools:

lpq, lprm, lpc, lpget, lpmove, lpset, lptest, lpinfo,  
lpadmin, lpfilter, lpforms, lpshut, lpssystem, lpusers,  
lpstat, cancel, enable, accept, lpoptions, lpshelp,

### Konfigurationsdateien:

/etc/printcap

/usr/spool/lp/...

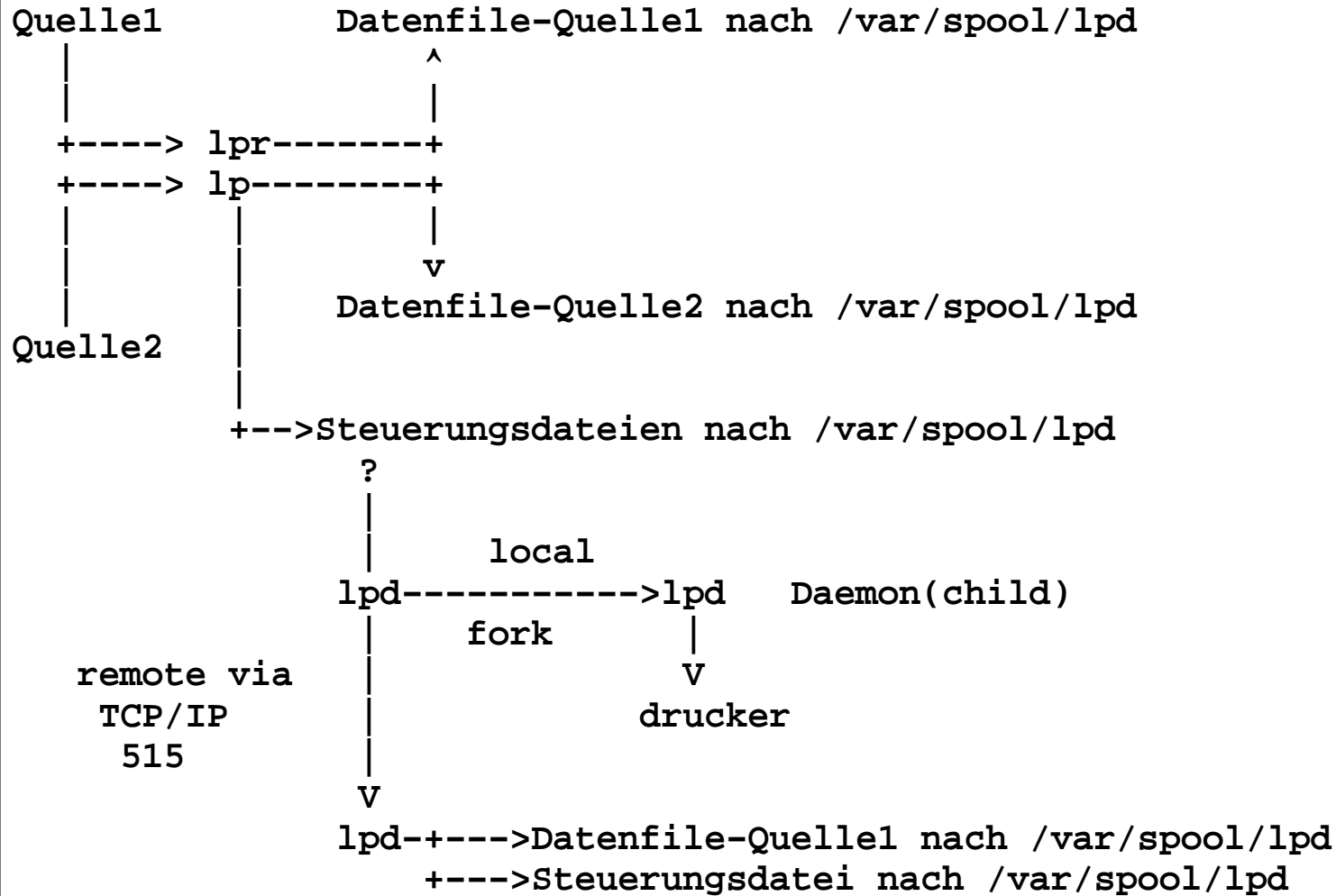
/etc/hosts.lpd

/etc/hosts.equiv

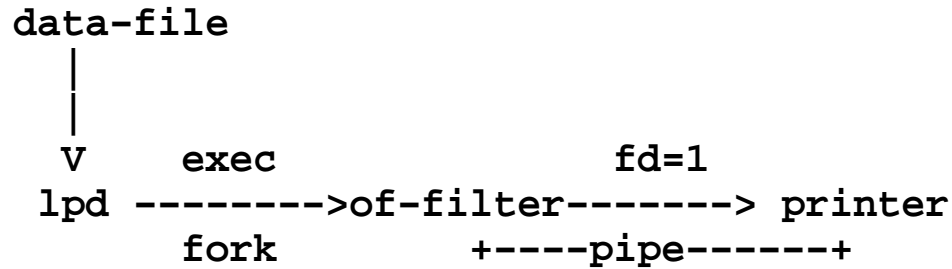
/etc/cups/

BSD-System  
-----

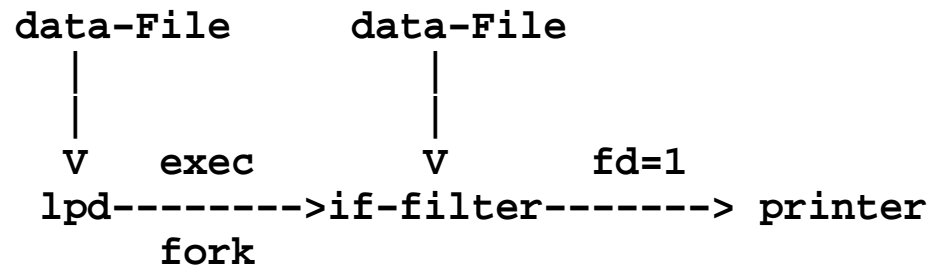
Funktionsweise:



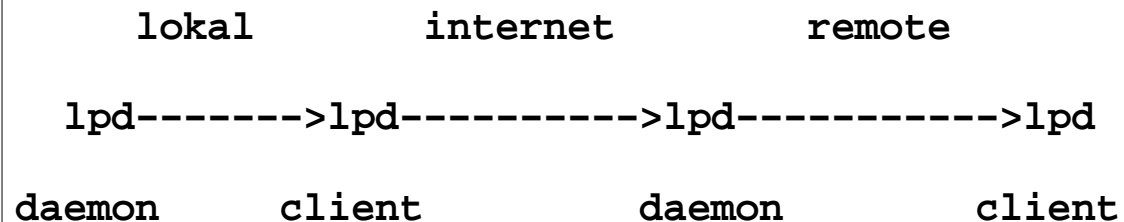
of-Filter (einmal pro Druckauftrag)  
-----



if-Filter (einmal pro Datenfile)  
-----



Remote-Drucker



**Steuerungsdatei:**

```
/etc/printcap
```

```
#
lp|ps|lps|lj_with_ps|ll|lj_as_lp:\
    :lp=/dev/ttya:br#19200:\
    :ms=-parenb,cs8,-cstopb,ixon:\
    :sh:sf:rw:\
    :sd=/usr/spool/lpd:\
    :af=/var/adm/psacct:\
    :lf=/var/adm/pslog:\
    :if=/home/local/bin/psif:
#Remote Drucker an emu
duplo:\
    :lp=:rm=emu:rp=lp:sd=/usr/spool/lpd:\
    :lf=/usr/adm/lpd-errs:
```

**Bedeutung:**

```
lp - Druckername
br - Baudrate
ms - Einstellungen der seriellen Schnittstelle
sh - unterdrücke Kopfseite
sf - unterdrücke Formfeeds
rw - read/write Open
lo - Lockdatei
sd - Spoolverzeichnis
mx - Maximale Länge der Druckdatei (0 = unendlich) in Blocks
af - Accountfile
    1.00 chekov:torres Fri Jun 13 17:16:12 1997
    2.00 chekov:torres Fri Jun 13 17:19:33 1997
    1.00 chekov:tsitirid Mon Jun 16 14:51:42 1997
```

```
lf - Fehlerdatei
    parent is alive: Error 0
    parent execs p_filter: Error 0
    child is alive: Error 0
    parent is alive: Error 0
    parent execs p_filter: Error 0
    child just before its end: Error 0
    psif just before exit: Error 0
if - Inputfilter
of - Outputfilter
rm - Remotemaschine
rp - Remotedrucker
pl - Seitenlänge
pw - Seitenbreite
```

```
/etc/hosts.lpd
```

```
/etc/hosts.equiv
```

```
<hostname> [<username>]
```

```
<hostname> [<username>]
```

Nur die diesen Dateien aufgeführten Rechner/Nutzer können remote auf den aktuellen Host drucken!!!

Druckerdaemon starten:

```
/usr/lib/lpd in /etc/rc.local
```



**Spooling-Dateien:**

in /usr/spool/lpd werden vom lpr-Kommando erzeugt

**Beispiel:**

```
lpr -plp abc xyz:
```

dfA344bellus	entspricht abc
dfB344bellus	entspricht xyz
cfA344bellus	Steuerdatei

**Aufbau der Steuerdatei:**

Hbellus	- Host
Pbell	- Login-Name des Nutzers
Jabc	- Auftragsname
Cbellus	- Klassenbezeichnung
Lbell	
fdfA344bellus	- Name der Datei
UdfA344bellus	- Name der zu löschenden Datei
Nabc	- Originalname
fdfB344bellus	
UdfB344bellus	
Nxyz	
Lbell	

## Absenden eines Druckjobs

-----

### 1. lpr - Senden eines Druckjobs an den Drucker

```
lpr [-Pprinter] [-#copies] [-Cclass] [-Jjob]
    [-Ttitle] [-i [indent]] [-1234font] [-wcols]
    [-r] [-m] [-h] [-s] [-filter-option]
    [filename ... ]
```

### 2. lp - Senden eines Druckjobs an den Drucker

```
lp [-cmsw] [-ddest] [-nnumber] [-ooption] [-ttitle]
   filename...
```

## Verwaltungskommandos

-----

### lpq - Anzeigen der Druckerqueue

```
lpq [-Pprinter] [-l] [+interval] ] [job# ...]
    [username ...]
```

### lprm - Streichen eines Jobs aus der Druckerqueue

```
lprm [-Pprinter] [-] [job # ...] [username ... ]
```

**lpc** - Lineprinter Steuerungskommando (für Superuser)

```
lpc [ command [ parameter... ] ]
```

Subkommandos:

```
? [command]...
```

```
help [command]...
```

```
abort [all| [printer...]]
```

```
clean [all| [printer...]]
```

```
disable [all| [printer...]]
```

```
down [all| [printer...]] [message]
```

```
enable [all| [printer...]]
```

```
exit
```

```
quit Exit from lpc.
```

```
restart [all| [printer...]]
```

```
start [all| [printer...]]
```

```
status [all| [printer...]]
```

```
stop [all| [printer...]]
```

```
stop [all| [printer...]]
```

```
topq printer [job#...] [user...]
```

```
up [all| [printer...]]
```

**cancel** - Cancelln eines Druckerjobs

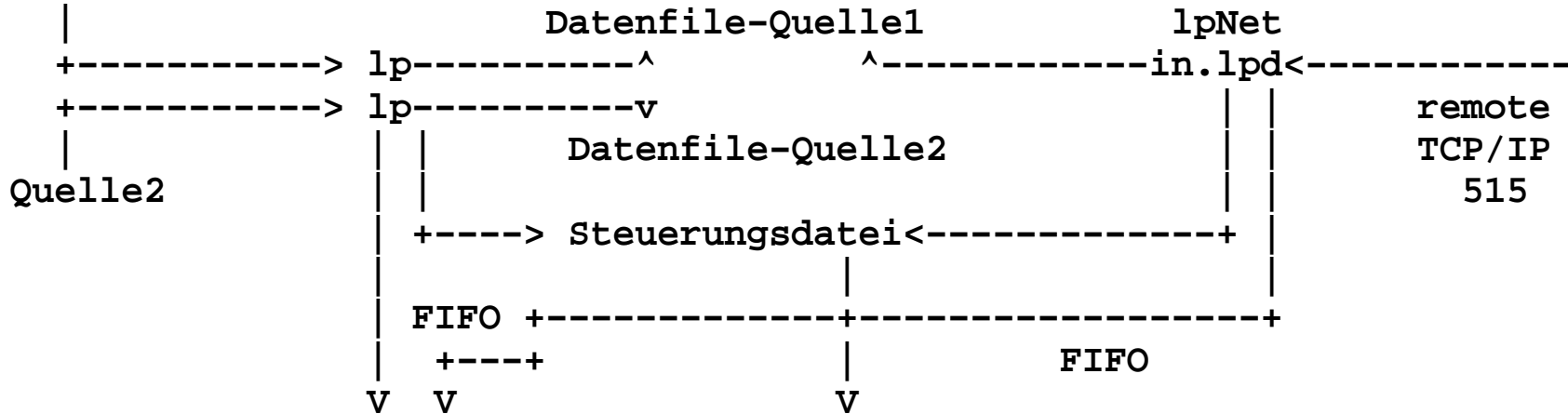
```
cancel [ ids ] [ printers ]
```

System V

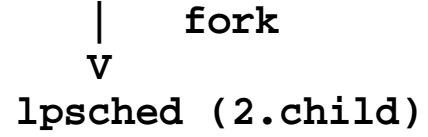
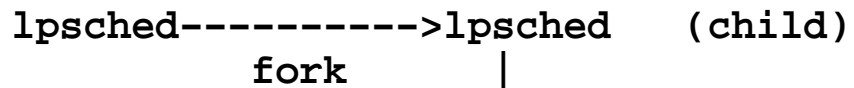
-----

Funktionsweise:

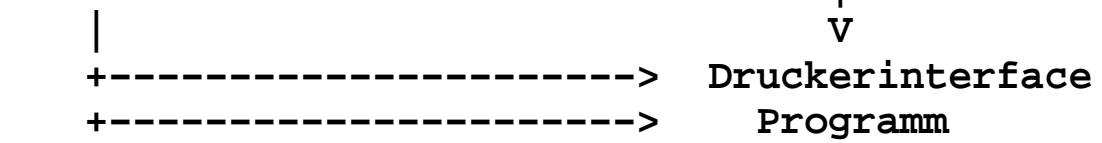
Quelle1



remote  
TCP/IP  
515



Datenfile1



Datenfile2

Drucker

## Konfigurations-Verzeichnisse:

## /var/spool/lp:

```
SCHEDLOCK - File, Lockfile für lpsched
admins    - Directory
            lp - Direct. für ADM-Directories
                classes -Klassen
                forms   -Formate
                interfaces-Interfaces
                printers -Drucker
                qstatus  -Queue-Status
bin       - Directory für Binaries
default  - Defaultprinter, File
fifos    - Directory, für Pipes
logs     - Directory für logs
model    - Directory für Druckertypen
requests - Directory für Anforderungen
system   - Directory für Druckerstatusfiles
temp     - Directory
users    - File
```

## /var/lp

```
ipp-listener - ipp-Informationen
logs         - Logfiles
ppd         - ppd-Files
```

Konfigurationsfile: (BSD-like)

```
/etc/printers.conf
```

```
#  
#   If you hand edit this file, comments and structure may change.  
#   The preferred method of modifying this file is through the use of  
#   lpset(1M)  
#  
flip:\  
    :bsdaddr=paprika,flip,Solaris:\  
    :description=Haus 4 1.Etage (begrenzter Zugriff):  
lpemu:\  
    :bsdaddr=fink,lpemu,Solaris:\  
    :description=Doppelseitendrucker in 3.2.11:  
lpbeat:\  
    :bsdaddr=fink,lpbeat,Solaris:\  
    :description=Doppelseitendrucker Haus 3 Raum 310:  
_default:\  
    :use=lpbeat:
```

## Kommandos

-----

## Nutzer:

lp - Starten eines Druckauftrages

```
lp [-c] [-m] [-p] [-s] [-w] [-d dest]
  [-f form-name [-d any]] [-H special-handling]
  [-n number] [-o option] [-P page-list]
  [-q priority-level] [-S character-set [-d any]]
  [-S print-wheel [-d any]] [-t title]
  [-T content-type [-r]] [-y mode-list]
  [ file... ]
```

cancel - Abbrechen eines Druckauftrages

```
cancel JOB-ID
```

lpstat - Status abfragen

```
lpstat [-aListe] [-cListe] [-oListe] [-pListe]
        [-uListe] [-vListe] [-d] [-s] [-t] [-r]
```

## Deamonen:

lpsched

lpNet

**Administration:**

```
accept - Spoolen erlauben, Druckerwarteschlange freigeben
        accept Queue
reject - Spoolen verbieten. Druckerwarteschlange sperren
        reject [-r "Grund"] Queue
enable - Drucker freigeben
        enable Drucker
disable - Drucker sperren
        disable [-r "Grund"] Drucker
lpfilter- Filtermanipulation
lpmove  - Verschieben von Druckaufträgen
        lpmove Auftrags-ID Neuer_Drucker
        lpmove Alter_Drucker Neuer_Drucker
lpshut  - Scheduler stoppen
lpadmin - Drucker und Druckerqueue verwalten
        lpadmin [-p log.Drucker]
                [-e vorhandener Drucker]
                [-i Schnittstellenprogramm]
                [-v Gerätepfad]
                [-m Model]
                [-c Geräteklasse]
                [-u Nutzer]

        lpadmin -x Drucker - löschen
        lpadmin -pPS -r Druckerklasse -
                Drucker aus Druckerklasse
        lpadmin -plaser -v/dev/lp -mcolorlaserjet
                Einrichten des Druckers plaser
```



`lpusers` - Prioritäten für Nutzer festlegen  
`lpusers [-q Priorität] [-u user]`

`lpstat` - Status anzeigen

- `-t` - Ausgabe aller Statusinformationen
- `-d` - Default Drucker
- `-r` - Status des Schedulers
- `-s` - Zusammenfassung der Statusinformationen (wichtige)
- `-v` - Druckergeräte
- `-a` - Drucker mit accept-Freigaben
- `-p` - Druckerstatus enable



## Konfigurationsfiles für CUPS:

Directory: /etc/cups

## Files:

classes.conf - Druckerklassenkonfigurationsfile

```
# Class configuration file for CUPS v1.3.9
```

```
# Written by cupsd on 2009-09-21 16:01
```

printers.conf - Konfigurationsfile für lokale Drucker (mitte)

```
# Printer configuration file for CUPS v1.3.9
```

```
# Written by cupsd on 2009-09-21 16:01
```

```
<DefaultPrinter nante>
```

```
Info Dell-LinuxPool
```

```
Location 3.212
```

```
DeviceURI socket://nante:9100
```

```
State Idle
```

```
StateTime 1253541675
```

```
Accepting Yes
```

```
Shared Yes
```

```
JobSheets none none
```

```
QuotaPeriod 0
```

```
PageLimit 0
```

```
KLimit 0
```

```
OpPolicy default
```

```
ErrorPolicy stop-printer
```

```
</Printer>
```

```
client.conf      - Client-Konfigurationsfile (CUPSD als Client, alex)

#   Sample client configuration file for the Common UNIX Printing System
#   (CUPS).
#####
# This is the CUPS client configuration file.  This file is used to      #
# define client-specific parameters, such as the default server or      #
# default encryption settings.                                         #
#                                                                       #
# Put this file on /etc/cups/client.conf (system use) or                #
# ~/.cups/client.conf (personal use).                                   #
#                                                                       #
# more information in the manual page client.conf(5)
#####
# Encryption: directive specifies the default encryption settings for
# the client.
#
# Possible values:
#   IfRequested
#   Never
#   Required
#   Always
Encryption IfRequested
#Encryption Never
#Encryption Required
#Encryption Always
#ServerName /domain/socket
#ServerName foo.bar.com:8631
ServerName mitte.informatik.hu-berlin.de
```

```
cupsd.conf      - CUPSD-Konfigurationsfile Server (Zugriffsrechte)

# "$Id: cupsd.conf.in 7199 2008-01-08 00:16:30Z mike $"
# Sample configuration file for the Common UNIX Printing System (CUPS)
# scheduler. See "man cupsd.conf" for a complete description of this
# file.
# Log general information in error_log - change "info" to "debug" for
# troubleshooting...
LogLevel info
# Administrator user group...
SystemGroup sys root
# Only listen for connections from the local machine.
Listen *:631
Listen localhost:631
Listen /var/run/cups/cups.sock
# Show shared printers on the local network.
Browsing On
BrowseOrder allow,deny
BrowseAllow all
BrowseAddress @LOCAL
# Default authentication type, when authentication is required...
DefaultAuthType Basic
# Restrict access to the server...
<Location />
    Allow @LOCAL
    Order allow,deny
    Allow 127.0.0.2
    Allow From 141.20.28.20
</Location>
```

```
# Restrict access to the admin pages...
<Location /admin>
    Encryption Required
    Order allow,deny
</Location>
# Restrict access to configuration files...
<Location /admin/conf>
    AuthType Default
    Require user @SYSTEM
    Order allow,deny
</Location>

# Set the default printer/job policies...
<Policy default>
    # Job-related operations must be done by the owner or
    #   an administrator...
    <Limit Send-Document Send-URI Hold-Job Release-Job
        Restart-Job Purge-Jobs Set-Job-Attributes Create-Job-Subscription
        Renew-Subscription Cancel-Subscription Get-Notifications
        Reprocess-Job Cancel-Current-Job Suspend-Current-Job Resume-Job
        CUPS-Move-Job>
        Require user @OWNER @SYSTEM
        Order deny,allow
    </Limit>
    # All administration operations require an
    #   administrator to authenticate...
    <Limit CUPS-Add-Modify-Printer CUPS-Delete-Printer
        CUPS-Add-Modify-Class CUPS-Delete-Class CUPS-Set-Default>
        AuthType Default
        Require user @SYSTEM
```

```
    Order deny,allow
</Limit>
# All printer operations require a printer operator
#   to authenticate...
<Limit Pause-Printer Resume-Printer Enable-Printer
    Disable-Printer Pause-Printer-After-Current-Job
    Hold-New-Jobs Release-Held-New-Jobs Deactivate-Printer
    Activate-Printer Restart-Printer Shutdown-Printer
    Startup-Printer Promote-Job Schedule-Job-After
    CUPS-Accept-Jobs CUPS-Reject-Jobs>
    AuthType Default
    Require user @SYSTEM
    Order deny,allow
</Limit>
# Only the owner or an administrator can cancel or
#   authenticate a job...
<Limit Cancel-Job CUPS-Authenticate-Job>
    Require user @OWNER @SYSTEM
    Order deny,allow
</Limit>
<Limit All>
    Order deny,allow
</Limit>
</Policy>

DefaultPolicy default
# easy is a very relaxed policy
<Policy easy>
    # Job-related operations must be done by the
    #   owner or an administrator...
```

```
<Limit All>
    Satisfy any
    Order allow,deny
</Limit>
</Policy>
# paranoid is a very restricted policy
<Policy paranoid>
    # Job-related operations must be done by the owner
    <Limit Send-Document Send-URI Hold-Job Release-Job Restart-Job
        Purge-Jobs Set-Job-Attributes Create-Job-Subscription
        Renew-Subscription Cancel-Subscription Get-Notifications
        Reprocess-Job Cancel-Current-Job Suspend-Current-Job
        Resume-Job CUPS-Move-Job>
        Require user @OWNER
        Allow from 127.0.0.0/8
        Order deny,allow
    </Limit>
    # All administration operations require an administrator
    #     to authenticate...
    <Limit CUPS-Add-Modify-Printer CUPS-Delete-Printer
        CUPS-Add-Modify-Class CUPS-Delete-Class CUPS-Set-Default>
        AuthType Default
        Require user @SYSTEM
        Allow from 127.0.0.0/8
        Order deny,allow
    </Limit>
    # All printer operations require a printer operator
    #     to authenticate...
    <Limit Pause-Printer Resume-Printer Enable-Printer Disable-Printer
        Pause-Printer-After-Current-Job Hold-New-Jobs
```



```
Release-Held-New-Jobs Deactivate-Printer Activate-Printer
Restart-Printer Shutdown-Printer Startup-Printer Promote-Job
Schedule-Job-After CUPS-Accept-Jobs CUPS-Reject-Jobs>
AuthType Default
Require user @SYSTEM
Allow from 127.0.0.0/8
Order deny,allow
</Limit>
# Only the owner or an administrator can cancel or authenticate
# a job...
<Limit Cancel-Job CUPS-Authenticate-Job>
    Require user @OWNER
    Allow from 127.0.0.0/8
    Order deny,allow
</Limit>
<Limit All>
    Require user @OWNER @SYSTEM
    Allow from 127.0.0.0/8
    Order deny,allow
</Limit>
</Policy>
#
# End of "$Id: cupsd.conf.in 7199 2008-01-08 00:16:30Z mike $".
```

printers.conf - Definition der Drucker

```
ssl                - Directory, SSL-Files

mime.types         - Mime-Type Beschreibung

# Format of Lines:
#  super/type rules
application/pdf    pdf string(0,%PDF)
application/postscript ai eps ps string(0,%!) string(0,<04>%!) \
  contains(0,128,<1B>%-12345X) + \
  (contains(0,4096,"LANGUAGE=POSTSCRIPT") \
  contains(0,4096,"LANGUAGE = Postscript") \
  contains(0,4096,"LANGUAGE = PostScript") \
  contains(0,4096,"LANGUAGE = POSTSCRIPT") \
  (contains(0,4096,<0a>%!) + \
  !contains(0,4096,"ENTER LANGUAGE"))
#application/x-dvi      dvi string(0,<F702>)
application/mozilla-ps ps (string(0,%!) + \
  contains(30,200,"Creator: Mozilla PostScript"))
application/netscape-ps ps (string(0,%!) + \
  contains(30,200,"Creator: Mozilla (NetScape)"))
image/gif          gif string(0,GIF87a) string(0,GIF89a)
image/png          png string(0,<89>PNG)
application/x-cshell csh printable(0,1024) + string(0,#!) +\
  (contains(2,80,/csh) contains(2,80,/tcsh))
application/x-perl  pl printable(0,1024) + string(0,#!) +\
  contains(2,80,/perl)
application/x-shell sh printable(0,1024) + string(0,#!) +\
  (contains(2,80,/bash) contains(2,80,/ksh)\
  contains(2,80,/sh) contains(2,80,/zsh))
```

pstoraster.convs - PS-Konvertierung

```
application/vnd.cups-postscript \
application/vnd.cups-raster 100 pstoraster
```

command.types - neue Konvertierungen

```
# Define the new application/vnd.cups-command filetype...
application/vnd.cups-command string(0,'#CUPS-COMMAND')
#
# End of "$Id: command.types,v 1.1.78.1 2007/12/23 easysw Exp $".
#
```

mime.convs - mime-Type Konvertierungen

snmp.conf - snmp-Konfiguration SNMPv1

```
# Sample SNMP configuration file for CUPS. See "man cups-smnp.conf"
# for a complete description of this file.
Address @LOCAL
Community public
#
```

ppd - Directory für PPD-Files

**Serverprogramme:**

- `cupsd` - Scheduler
- `cups-deviced` - CUPS-Device-daemon: pollt die backends  
(von `cupsd` gestartet)
- `cups-driverd` - zeigt bzw. listet PPD-Files  
`cupd-driverd cat <ppd-name>`  
`cups-driverd list <reques-id> <limit> <options>`
- `cups-lpd` - Kommunikation mit `lpd`-Clients
- `cups-polld` - Abfrage von Remote-Servers über IPP

**Administration:****Kommandos:**

lpstat - Queue-Status abfragen

lpstat -t

lpstat -a

accept - Drucker freigeben

reject - Drucker sperren

lpmove - Druckjob verschieben zu einem anderen Ziel

lpinfo - Informationen über verfügbare Drucker und Treiber ausgeben

lpinfo -v - Protokolle

lpinfo -m - Druckertreiber

lpinfo -h mitte:631 -v

lpadmin - Administrationstool

lpadmin -pnante -D"Laserjet Linuxpool" -L"Raum III.212" \

-vsocket://141.20.21.157:515 -mlaserjet.ppd

Alles geht über <http://localhost:631/>