

LPI 108.3 - Manage printers and printing

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ASIX M01-ISO 108 Essential System Services

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Manage printers and printing

Description

Key concepts:

- ❑ Basic CUPS configuration (for local and remote printers).
- ❑ Manage user print queues.
- ❑ Troubleshoot general printing problems.
- ❑ Add and remove jobs from configured printer queues.

Commands and files:

- ❑ CUPS configuration files, tools and utilities
- ❑ `/etc/cups/`
- ❑ lpd legacy interface (`lpr`, `lprm`, `lpq`)

Manage printers and printing

Two of the most common Linux printing systems, the Common UNIX Printing System (CUPS) and the LPD Printing System, with emphasis on the setup and configuration of CUPS. A printer is most often used as a shared resource on the network. The printing service is a central service that accepts print requests from multiple users, queues each print job for the actual printing, tracks the status of every print job, and notifies users of printer and print job status.

CUPS

CUPS is an open source printing system developed by Apple Inc. and available for many operating systems such as Windows, Linux, and OS X. CUPS is the standard for printing services on Linux. CUPS implements the Internet Printing Protocol (IPP) to send jobs from clients to print servers; IPP is a network protocol for managing remote printing.

The printer can be connected directly to the computer, or it could be on the network.

Here is a very simplified outline of how a file is printed in Linux using CUPS:

1. A user submits a file to be printed.

2. The CUPS daemon, `cupsd`, then spools the print job. This print job is given a job number by CUPS, along with information about which print queue holds the job as well as the name of the document to print.
3. CUPS utilizes filters that are installed on the system to generate a formatted file that the printer can use.
4. CUPS then sends the re-formatted file to the printer for printing.

Files and configurations:

- `/etc/cups/`
- `/etc/cups/cupsd.conf`
- `/etc/cups/printers.conf`
- `/etc/cups/classes.conf`
- `[/etc/printcap]` legacy `lpd`

The `/etc/cups` directory contains the configuration files for CUPS. The key configuration files for CUPS are as follows

<code>cupsd.conf</code>	Server configuration file
<code>printers.conf</code>	Configuration file for individual printers
<code>classes.conf</code>	Configuration file for printer classes (groups of printers)
<code>snmp.conf</code>	Configuration file to regulate remote browse access
<code>ppd/</code>	Directory for printer drivers for the printers configured on the server
<code>ssl/</code>	Directory for SSL encryption keys for remote access

```
[root@localhost pue]# ls /etc/cups
classes.conf  cups-browsed.conf  cupsd.conf.default  cups-files.conf.default  ppd
snmp.conf      ssl                subscriptions.conf.0
client.conf    cupsd.conf         cups-files.conf     lpoptions
printers.conf  snmp.conf.default  subscriptions.conf
```

```
root@localhost pue]# systemctl status cups
● cups.service - CUPS Scheduler
   Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2021-11-09 13:58:43 CET; 6h ago
     Docs: man:cupsd(8)
  Main PID: 998 (cupsd)
    Status: "Scheduler is running..."
     Tasks: 1 (limit: 23548)
    Memory: 4.4M
    CGroup: /system.slice/cups.service
            └─998 /usr/sbin/cupsd -l

nov 09 13:58:43 localhost.localdomain systemd[1]: Starting CUPS Scheduler...
nov 09 13:58:43 localhost.localdomain systemd[1]: Started CUPS Scheduler.
```

The `/etc/cups/cupsd.conf` file is used for configuring the CUPS server. Some of the commonly used directives in this file are as follows:

- Allow**
Allow access from the specified hostnames/addresses
- Listen**
Listen to the specified hostname/address
- AccessLog**
Access log file name
- AuthType**
Authentication type; valid values are: None (default value), Basic or Digest

DataDir

Directory for the data files

DefaultCharSet

Default charset for text

DefaultLanguage

Default language to be used for web and text content (e.g., If the default language is English, then a web page with Japanese characters though displayed correctly in the web browser, may have junk characters in the printed version.)

Deny

Deny access to the specified hostnames/addresses

MaxCopies

Maximum number of copies that a user can print per job (default is 9999)

Browsing

Enables or disables browsing for locating remote printers (enabled by default)

BrowseOrder

Specify the order of access control (Deny,Allow or Allow,Deny)

BrowseAllow

Allow incoming printer information packets from the specified hostnames/addresses

BrowsePort

Port to listen to for printer information packets

A default configuration file is provided with the CUPS package. By default, this configuration file will allow local access to its printers and show printers shared on the network. A typical `/etc/cups/cupsd.conf` file will contain directives similar to the following:

```
SystemGroup admin

# Default authentication type
DefaultAuthType Basic

# Restrict access to the server...
<Location />
    Order deny,allow
</Location>

# Restrict access to configuration files...
<Location /admin/conf>
    AuthType None
    # Require user @SYSTEM
    Order deny,allow
</Location>

# Listen for connections from the local machine.
Listen localhost:631
Listen /var/run/cups/cups.sock

# Show shared printers on the local network.
Browsing On
BrowseOrder allow,deny
BrowseAllow all

# Log general information in error_log
LogLevel info

# MaxClients: controls the maximum number of simultaneous clients that
# will be handled. Defaults to 100.
MaxClients 100
```

```

DataDir /usr/share/cups
DefaultCharset utf-8
DefaultLanguage en

# 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>

  # 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>

```

Example allow/deny directive

```

Order Allow,Deny
Allow netdevgroup.com
Deny uk.netdevgroup.com

```

The [/etc/cups/printers.conf](#) file is used by the cupsd daemon to store the list of available local printers. This is a plain text file, which can be updated using the web interface or the lpadmin command. A sample printers.conf file would look like the following:

```

<DefaultPrinter Office-ES800>
DeviceURI parallel:/dev/lp0
Location Epson Stylus 800
State Idle
Accepting Yes
JobSheets none none
QuotaPeriod 0
PageLimit 0
KLimit 0
</Printer>

```

The [/etc/cups/classes.conf](#) file is used by the cupsd daemon to store the list of available local classes. Print classes are a set of printers that have been assigned a single name, so when a print job is sent to a print class, it will be printed by the first printer available in that class.

The CUPS [Web Interface](#) is the easiest way to configure and manage local and network printers and can be accessed through any web browser using the URL: <http://localhost:631>.



The lpadmin command

The command line alternative to the CUPS Web Interface program for adding CUPS printers and classes is the [lpadmin](#) command.

Examples to create/enable, make default and delete testprinter:

```
# lpadmin -p testprinter -E -v parallel:/dev/lp
# lpadmin -d testprinter
# lpadmin -x testprinter

$ lpoptions -d ENVY-4510
$ lpstat -p -d

$ sudo lpadmin -p FRONT-DESK -o printer-is-shared=true
$ sudo lpadmin -p FRONT-DESK -u allow:carol,frank,grace
$ sudo lpadmin -p FRONT-DESK -u deny:@sales,@marketing
$ sudo lpadmin -p FRONT-DESK -o printer-error-policy=abort-job
```

CUPS scheduler

The scheduler for CUPS is cupsd and by default, it runs as a daemon. It implements all the operations and attributes specified by IPP. The scheduler runs as a single-threaded server process and uses other processes for printing, monitoring, and providing web interfaces.

The scheduler stores job files in the [/var/spool/cups](#) directory. Every print job scheduled will have one control file containing IPP message data and one or more data files.

Some of the key options of cupsd are:

-c config_file

- Use the specified configuration file instead of the default (/etc/cups/cupsd.conf)
- f Run as a foreground process
- F Run as a foreground process but detach from the controlling terminal
- t Verify the syntax of the configuration file

CUPS printing queues

Print queues manage the scheduling of print jobs on a specific printer. The queues can be added in CUPS by either using the `lpadmin` command or by using the CUPS Web Interface. The queues can be of the following types:

- Locally-connected printer.
- Networked IPP (CUPS) – Refers to the queue of another CUPS printer server on the network.
- Networked UNIX LPD – Refers to the queue of an LPD server on the network.
- Networked Windows (SMB) – Refers to the queue of a Windows-based print server on the network.
- Networked Novell – Refers to the queue of a printer connected to the Novell Netware server on the network.
- Networked JetDirect – Refers to the queue of a network-connected Hewlett-Packard printer that prints data received on a TCP/IP port.

Manage queues:

- `cupsenable`
- `cupsdisable`
- `cupsaccept`
- `cupsreject`

```
# lpadmin -p news -h localhost -v /dev/npp0
# cupsenable sales_dept
# cupsaccept sales_dept
# cupsreject news
```

Troubleshooting

The first thing to do when an error occurs in the CUPS service is to review the log files in the `/var/log/cups` directory. The different log files that are created:

Access Log – The `access_log` file contains the list of HTTP resources accessed by the clients or through any web browser. It uses a log format, which is identical to that used by web servers.

Page Log – The `page_log` file contains the accounting data for print jobs. This file will show information such as the printer name, user name, job number, date and time, current page number, and the number of copies.

Error Log – The `error_log` file contains error and warning messages from the scheduler. The data captured in this file depends on the setting of the `LogLevel` directive in the `cupsd.conf` file.

LPD Line Printer Daemon

The BSD LPD (Line Printer Daemon) originated from the Berkeley flavor of UNIX and is the standard printing system on several UNIX flavors. CUPS supports LPD as well as IPP.

The `lpd` daemon, which is typically started at boot time, handles the spooling of jobs. The `lpd` daemon uses the `/etc/printcap` (print capabilities) file to discover the list of available printers.

- `/usr/sbin/lpd`
- `lpr`
- `lprm`
- `lpq`
- `lpc`

The `lpr` command (line printer) is used to send print jobs to the printer. If a file name is specified, then it will be sent to the printer; otherwise, the data from standard input will be sent to the printer.

```
$ lpr info.txt
$ lpr -P floor1 info.txt
$ lpr -# 3 info.txt
```

```
$ lprm
$ lprm -a all
$ lprm -P floor1 3
$ lprm -
```

```
$ lpq
$ lpq -P colorpr
$ lpq a
```

The `lpd` commands, such as `lpr`, `lprm`, and `lpq`, are supported in newer printing systems such as CUPS and allow users to send jobs to the printers and control the print queues using the command line.

Example Exercises

1. Which is the CUPS daemon file configuration?
2. Which is the CUPS printers file description?
3. Which is the LPD printers file configuration?
4. Which is the CUPS spool directory?
5. Which is the URL to access the CUPS admin web interface?
6. List the cups printers
7. Which two commands enable a printer and make it ready to accept jobs?
8. How to remove a printer?
9. Which command can be used to set the default printer?
10. Which LPD command removes all the jobs?
11. Which LPD command sends a file to print?
12. Which LPD command show all the print jobs?
13. Realitza els exercicis indicats a: [108.4 Manage printers and printing](#)
14. Realitza els exercicis del Question-Topics 108.4