# 10.4.4 CUPS Facts

CUPS (Common Unix Print System) provides a common printing interface across a local network, masking differences among the printing systems on each computer.

CUPS is widely deployed by nearly every current Linux distribution to manage printing.

This lesson covers the following topics:

- About CUPS
- CUPS components
- How CUPS processes print jobs
- cupsd parameters
- CUPS command line tools

## About CUPS

CUPS is the software you use to print from applications like word processors, email readers, photo editors, and web browsers. It converts the page descriptions produced by your application (such as where to put a paragraph or where to draw a line) into something your printer can understand and then sends the information to the printer for printing.

Since every printer manufacturer does things differently, printing can be very complicated. CUPS does its best to hide this from you and your application so that you can concentrate on printing and less on how to print. Generally, the only time you need to know anything about your printer is when you use it for the first time, and even then CUPS can often figure things out on its own.

The first time you print to a printer, CUPS creates a queue to keep track of the current status of the printer (everything OK, out of paper, etc.) and any pages you have printed. Most of the time the queue points to a printer connected directly to your computer by means of a USB port. However, it can also point to a printer on your network, a printer on the Internet, or multiple printers depending on the configuration. Regardless of where the queue points, it will look like any other printer to you and your applications.

Every time you print something, CUPS creates a job which contains the queue you are sending the print to, the name of the document you are printing, and the page descriptions. Job are numbered (queue-1, queue-2, and so forth) so you can monitor the job as it is printed or cancel it if you see a mistake. When CUPS gets a job for printing, it determines the best programs (filters, printer drivers, port monitors, and backends) to convert the pages into a printable format and then runs them to actually print the job.

When the print job is completely printed, CUPS removes the job from the queue and moves on to any other jobs you have submitted. You can also be notified when the job is finished, or if there are any errors during printing, in several different ways.

## CUPS Components

The CUPS service is provided by the cupsd daemon. CUPS employs the following components:

| Component | Description |
|---|---|
| Scheduler | The CUPS scheduler is a specialized web server created by the cupsd daemon that handles Internet Printing Protocol (IPP) print requests on IP port **631**. The scheduler can process print requests that originate from the local computer system or from remote systems over the network. The scheduler also provides a web-based administration interface that is used to manage all of the components in the CUPS system. |
| Filters | CUPS filters convert print jobs from the default Printer Description Language (PDL) into languages used and understood by specific printers. By default, Linux creates print jobs using Adobe's PostScript PDL. However, many printers are not PostScript compatible. CUPS filters convert print jobs into a PDL supported by the printer. Filters are located at **/usr/lib/cups/filter**. |
| Backend | A CUPS backend provides the interface between the scheduler and the printer hardware. CUPS supports several types of backends including:<br>- Parallel<br>- Serial<br>- USB<br>When the cupsd daemon starts, it queries each backend to identify all printers attached to the computer. The backends provide the cupsd daemon with printer information including make, model, and capabilities for each connected printer. Backends are located at **/usr/lib/cups/backend**. |
| Postscript Printer Descriptions (PPD) | The Postscript Printer Descriptions (PPD) are files that the cupsd daemon uses to determine printer capabilities. These files are located at **/etc/cups/ppd**. |
| Spool | |

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| | A CUPS spool is a directory on the print server that holds print jobs while waiting for the printer to become available. When, an application generates a print job and sends it to the cupsd daemon, the daemon saves the job in the spooling directory. Print queue and filter information from the print job are saved in **/var/spool/cups**. The file is named **c**, concatenated with a print job number assigned by the daemon. The document to be printed is also saved in **/var/spool/cups**. This file is named **d** concatenated with the same print job number. |
| Client | CUPS clients send files to the print server. The client's *cupsd* daemon automatically listens for broadcasts from CUPS servers, and can connect to those servers over a network connection. |
| Server | CUPS servers broadcast the availability of their printers on the network. The cupsd daemon runs on the server and handles both network and local print functions. |

## How CUPS Processes Print Jobs

The following are the steps CUPS uses when processing print jobs:

1. The client sends the print job to the cupsd daemon on the server.
2. The daemon creates the files and places them in the queue.
3. Print jobs pass through the filters and are converted to the appropriate PDL.
4. The backend sends the print job to the printer.
5. The backend notifies the cupsd daemon when the job is completed, and the job is removed from the queue.

## cupsd Parameters

The cupsd daemon is configured using the **/etc/cups/cupsd.conf** file. The following are common parameters in **/etc/cups/cupsd.conf**:

| Command | Function | Example |
|---|---|---|
| **LogLevel** | Specifies the error severity level to be logged. You can specify:<br>▪ **none** for no logging.<br>▪ **error** to log errors only.<br>▪ **warn** to log errors and warnings.<br>▪ **info** to log errors, warnings, and print requests (default).<br>▪ **debug** to log most cupsd messages.<br>▪ **debug2** to log all cupsd messages. | LogLevel warn |
| **Listen** | Specifies the network addresses the server uses when listening for print jobs. | **Listen 192.168.10.1:631** listens for print jobs sent to 192.168.10.1:631.<br>**Listen *:631** listens for print jobs sent to any address.<br>**Listen localhost:631** listens only for print jobs from the local computer. |
| **MaxCopies** | Limits the number of copies of a document that can be printed for a single print job. The default is 100. | MaxCopies 50 |
| **MaxJobsPerUser** | Limits the number of active print jobs for a single user. The default is 0, meaning no restriction. | MaxJobsPerUser 100 |
| **User** | Specifies the user who the cupsd process will run as. The default is lp. | User lp |
| **Group** | Specifies which group cupsd will run as. The default is lp. | Group lp |
| **MaxClients** | Limits the number of concurrent client connections to the CUPS server. The default is 100. | MaxClients 50 |
| **Browsing** | Enables server broadcasts. The default is On. | Browsing On |
| **BrowseAddress** | Specifies the address CUPS servers use to broadcast servers. This must be set for broadcasts to work. The default is no setting. Check this first if CUPS clients do not receive broadcasts. | BrowseAddress 192.168.2.255:631<br>BrowseAddress printserver.mynetwork.com:631 |
| **BrowseInterval** | Sets the time in seconds between broadcasts. The default is 30 seconds. If this is set above 60, printers might timeout and disappear from the printer list. | BrowseInterval 30 |
| **BrowseOrder** | Specifies whether the server allows or denies print jobs by default, then | **BrowseOrder allow,deny** denies by default, |

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| | specifies the order in which the BrowseAllow and BrowseDeny parameters are checked. | then checks the BrowseAllow parameter, and then the BrowseDeny parameter.<br>**BrowseOrder deny,allow** allows by default, then checks the BrowseDeny parameter, and then the BrowseAllow parameter. |
| **BrowseAllow** | Specifies computers and networks that can send print jobs. | **BrowseAllow all** accepts all print jobs.<br>**BrowseAllow 192.168.1.0/255.255.255.0** allows print jobs from the 192.168.1.0 domain with a subnet of 255.255.255.0.<br>**BrowseAllow *.mynetwork.com** allows print jobs from all computers on the domain. |
| **BrowseDeny** | Specifies computers that cannot send print jobs. | **BrowseDeny all** rejects all print jobs. Other options are identical to **BrowseAllow**. |

## CUPS Command Line Tools

You can use the following command line tools to manage CUPS printers and print jobs:

| Command | Function | Examples |
|---|---|---|
| **cupsctl** | Configures the **/etc/cups/cupsd.conf** file. When used with no options, the command displays current settings. Options include:<br>▪ **--remote-admin** enables remote administration of the server.<br>▪ **--share-printers** enables the sharing of local printers with other computers.<br>▪ **--remote-printers** enables the display of remote printers shared via CUPS.<br>Use **--no** in front of a command to disable an option. | **cupsctl** displays the settings of the cupsd.conf file.<br>**cupsctl --remote-admin** enables remote administration of the server.<br>**cupsctl --no-share-printers** will prevent the sharing of local printers. |
| **lp** | Sends a file to be printed to a CUPS printer. The syntax is **lp -d *printer_name filename***. The following options are supported by the lp command:<br>▪ **-n *x*** prints *x* copies of the document.<br>▪ **-m** emails a confirmation message when the job is finished printing.<br>▪ **-q *x*** sets the priority of the print job to *x*.<br>▪ **-o landscape** prints the document in landscape format.<br>▪ **-o sides=2** prints the document on both sides of the paper for printers that support duplexing. | **lp -d HPLJ5 mydocument** sends the file named mydocument to the printer named HPLJ5. |
| **cupsaccept** | Enables a printer's print queue. | **cupsaccept printer7** enables the print queue for printer7. |
| **cupsreject** | Disables a printer's print queue.<br>This does not clear the print queue. The printer itself will continue processing queued print jobs, but cupsd will not allow any new jobs to enter the queue. | **cupsreject printer7** disables the print queue for printer7. |
| **cupsdisable** | Keeps a printer from printing. Jobs are still added to the queue, and are printed when the printer is re-enabled. | **cupsdisable printer7** keeps printer7 from printing the jobs in its queue. |
| **cupsenable** | Activates a disabled printer. | **cupsenable printer7** activates printer7 and allows it to print jobs in its queue. |
| **cancel** | Cancels print jobs. Options include the following:<br>▪ **-P** specifies a printer.<br>▪ **-U** specifies an alternative username. | **cancel HPLJ5-11** cancels print job 11 on the default printer.<br>**cancel -P printer7 printer7-11** cancels print job 11 on printer7.<br>**cancel -P printer7 -U jsmith** cancels all print jobs for the user jsmith on printer7. |

When using CUPS:

- Most Linux distributions install CUPS by default; however, if CUPS is not installed, use **yum, zypper**, or **apt-get** to install the CUPS package.
- Use the init script or the systemctl command to restart CUPS after making configuration changes.
- To access the web-based CUPS administration utility, go to **http://localhost:631** or **http://127.0.0.1:631**.

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