



Linux Network Services: Common Unix Printing System

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Lesson Overview

Common Unix Printing System (CUPS) is a Unix-based service that allows a computer to function as a print server and provides print capabilities to users of various computer systems.

In this lesson, you will explore options for networked printing, history of CUPS, configuration settings, and related options.

This lesson is important to learn because reliable printing capability is very important to businesses and organizations, especially when employees use multiple computers systems and software that are not always fully compatible with each other.



Objective

You should know what will be expected of you when you complete this lesson. These expectations are presented as objectives. Objectives are short statements of expectations that tell you what you must be able to do, perform, learn, or adjust after reviewing the lesson.

Lesson Objective:

Given a need for a networked printer, a student will be able to formulate a plan to host a networked print server and will demonstrate the procedures for installing and configuring a print server as per industry standards.



Lesson Outline

In this lesson, you will explore:

- ❖ Networked Printing
 - Options for printing
 - History of CUPS
- ❖ Installation & Configuration
 - Installation of CUPS
 - Configuration Options
 - Security
 - Web Interface

Select **PLAY** below for a video introducing CUPS.



View Video
VideoLesson3CUPSIntro(C4L3S4).mp4

Lesson Requirements

In this lesson, you will be using a Fedora Linux distro (Redhat) to install and configure a CUPS print server.

You will need to download, install, and configure Fedora in a virtual machine or on bare metal to follow along in the examples provided. You may find the links on the right to be helpful.

Helpful Links

- [Download Fedora](#)
- [Install Fedora](#)
- [Download Virtual Box](#)
- [Virtual Box Manual](#)
- [Install Fedora on Vbox](#)

Why Network Printing?

You have completed your first month as a system administrator at XYZ General Hospital. Your CIO schedules an appointment for you to speak with him about several cost-saving measures he wishes to implement company wide. One of these projects is to evaluate the number of printers being used around the hospital and consolidate printers to save on toner and ink costs.

Over the next week, you take an inventory of all departments and printers. You find there are 320 different makes and models of printers in use throughout the hospital. Additionally, some printers are accessed off-site and are fully accessed from the Internet.

After a quick conversation with purchasing department, you find they are unable to standardize on a single printer vendor because of the different types of toner and ink cartridges needed. This variety has added significant costs to the hospital because it is much less expensive to purchase bulk supplies than individual quantities. You take this information back to the CIO, and he tells you to reduce the quantity of printers by 90% and standardize on five makes and models of printers.

Required Reading

- [Network printing](#)
- [HIPA for IT Pros](#)

Why Network Printing?

The CIO also directs you to send anyone having a problem with these changes to him. Otherwise, you have free reign. He suggests you look into setting up a print server and using networked printing to centralized printers on each floor and wing. You remind him there are specialized areas like radiology that require specific printers for their equipment. He agrees, and exempts these printers from the cost-cutting.

The above scenario is an example of why network printing is needed in many organizations. You could also look at a smaller scenario of a home user. Many members of a family may use laptops and desktop computers on a single network. It may not be practical for Mary to be physically connected to the same printer as Bobby, while Dad is trying to print the taxes and Mom is printing a real-estate listing for a client. Network printing allows many users on different machines to share a common printer.

Microsoft windows allows you to share a printer connected to a single machine by right clicking on the printer and making it “shared.” In this scenario the printer is available to all, with the rights and privileges of printing. But, it is not as scalable and does not have the same processing capability as a printer connected to a Unix or Linux-based machine.

Required Reading

- [IT Policy Example](#)
- [Print sharing at home](#)

LPD Network Printing

Another option for network printing is to use Line Printer Daemon (LPD). The LPD protocol listens for a TCP/IP connection on port 515. The data is sent in ASCII (unencrypted text) and is preceded by a text request code. Line Printer Daemons are used by many networked print server boxes (standalone single purpose print servers).

Most LPD installations do not restrict data from individuals, enforce passwords, and by default, they do not allow encrypted data. This means that material sent to the printers is open to interception and “snooping.”

Installations such as the hospital described in the introduction to this lesson need to consider the potential for security breaches carefully before using the LPD protocol.



Printer

Print Server Option

The most current protocol for printing is CUPS, or Common Unix Print System. CUPS was developed in 1997 by Michael Sweet from Easy Software Products. CUPS allows any Unix based computer (such as Linux and OS/X) to act as a print server. CUPS consists of a print spooler, a scheduler, and a filter that converts the data sent to the server to the format required by the individual printer.

Finally, there is a backend system that sends this converted data to the individual printer. CUPS is free software and is released under the GNU Lesser General Public License, Version 2. This means that past and future releases are free from royalties and subscription fees allowing a low cost of total ownership.

Additional features of CUPS include a web-based interface for configuring the software, connecting and configuring printers, and managing schedules and users. The CUPS software also interfaces with SMB (Server Message Block) for a seamless interface to Microsoft Windows clients. Apple's OS/X also interfaces seamlessly with CUPS, as it is the default print service installed with all OS/X machines.

In 2007, Apple Inc. hired the chief developer for CUPS and purchased the CUPS source code. The licensing has not changed; it is still publicly available with source code. Configuration of CUPS is easy. It is done via web browser or via the editing of text files.

Required Reading

- [Intro to CUPS](#)

Installing CUPS (Base Package)

Depending on the distribution of Linux you have, CUPS is installed in one of two ways. If you are on an Ubuntu or Debian-based installation, you would type:

```
apt-get install cups [enter]
```

If you are working on a Fedora or RedHat based system you would type:

```
yum install cups [enter]
```

For both installations, there are a number of dependencies you will need to allow the system to install. It is also likely for both types of distributions that CUPS was already installed when you first installed the distribution. Once CUPS is successfully installed, make sure you have updated your distribution to the latest files by typing:

```
apt-get update [enter]  
apt-get upgrade [enter]
```

for Ubuntu or Debian installs or for Fedora and Redhat installations:

```
yum upgrade [enter]
```

Select **PLAY** below for a video on CUPS:

View Video
VideoLesson3CUPSInstall(C4L3S10).mp4



Required Reading

- [Install CUPS to Ubuntu](#)
- [Install CUPS to Fedora](#)

CUPS Configuration

After installing CUPS, you need to configure it to serve the printers of your choice, allow the access you need, and run on the schedules you desire.

Using command line options from remote terminals to configure CUPS is probably the best approach and will be taught in this lesson. Web interfaces and GUIs are also available but for server configurations, you will find it most effective to use an editor such as Vi.

Once CUPS is installed, you will find the configuration files in `/etc/cups`. To access this directory, open a terminal window and type:

```
cd /etc/cups [enter]
```

Once you are in that directory, type:

```
ls -l [enter]
```

to view the contents.

cupsd.conf

The `/etc/cups/cupsd.conf` file contains configuration sign ("#") character at the beginning of a line.

Since the server configuration file consists of platform-specific configuration for each operating system:

- AIX, IRIX, Linux, Solaris:

```
/etc/init.d/cups restart
```

- HP-UX:

```
/sbin/init.d/cups restart
```

- MacOS X:

```
sudo launchctl unload /System/Library/LaunchDaemons/org.cups.cupsd.plist
sudo launchctl load /System/Library/LaunchDaemons/org.cups.cupsd.plist
```

You can also edit this file from the CUPS web interface.

Graphic from cups.org

Purpose of Configuration Files

Each of the configuration files is a text file you can edit through Vi or any line editor. Each of these files has a specific function:

| File | Function |
|---------------|--|
| cupsd.conf | The basic CUPS configuration file |
| classes.conf | CUPS printers can be organized into different groups or classes in this file |
| client.conf | Sets the default CUPS server |
| printers.conf | Changes from the CUPS Web-based tool are written to this file. |
| | |

Step 1: Archive Existing Files

Remove all existing configuration files before you begin configuring a network service. For safety's sake, do not delete the existing files. Instead, create an archive file that may be used to restore the system in case your changes create problems. Follow these instructions to get your directory ready for the new configurations:

Open a terminal window. If you need to connect to the server via ssh, do so. At the command prompt type:

```
cd /etc/cups  
sudo tar cvzf ~/backup-of-cups_directory.tar.bz2 /etc/cups  
sudo rm *.conf  
sudo /etc/init.d/cups stop  
ls -l /etc/cups
```

Your configuration files should all be gone.

At this point, your prior CUPS configuration is archived, and you have stopped the server to make sure the configuration changes you make are your own. You are now ready for a clean start.

Main Configuration File: Access

You should decide which users may access the server, the locations from which they are allowed to connect, and the levels of access allowed. Additionally, you need to determine what activities are logged by the server, the maximum size of logs, and the ports on which the server will listen.

The first file we want to explore is the “cupsd.conf” file because it is the main configuration file.

Once you create or open the cupsd.conf file in Vi, do not close it until you are told to do so. If you need to stop temporarily and then return to the file later, be sure to type:

:w

in Vi so that if your system has a problem and you decide to reboot, you will not lose your work.

Saving the contents of Vi before closing is a good habit. Use it frequently to lower the risk of losing data.

Required Reading

- [CUPSD config file](#)

Global Options for CUPS

The first section of the `cupsd.conf` file contains the global options. In these options, you can decide how to handle system logs, log details, admin users, and listening server ports.

If you work in the healthcare or education industry with student or patient records, you must protect private information according to HIPA (Health Insurance Privacy Act) and FERPA (Federal Educational Privacy Act) rules.

In a hospital setting, users will be mobile and rely on network access for information. Network data will likely pass through a firewall installed on a separate machine, and traffic may be routed to the internal network using a VPN (Virtual Private Network). If this is not the case, the first thing I would do is close the hole in the firewall and setup a VPN for authorized users.

Let's configure the various sections.



Step 2: Configure Global Options

Follow these directions to begin configuring the CUPS server:

| Instructions | Command |
|---|---|
| Open terminal window | |
| Go to directory | <code>/etc/cups</code> |
| Double check the CUPS server is not operating. Enter password if required. | <code>sudo /etc/init.d/cups stop</code> |
| | <code>sudo ifconfig</code> |
| Find the section for “eth0” or whatever your main network card is and locate the inet addresss line (inet addr) | |

Record the address of your main network card. You will need this information later. Computers trying to connect to your computer will use the address of your network adapter to gain access. For the purpose of our examples, I am using 192.168.2.225. If you have another address substitute it whenever you see that address or network segment (192.168.2).

Step 2: Global Options (Contd)

| Instructions | Commands |
|---|---|
| [Contd from previous . .] | sudo vi cupsd.conf |
| Change to insert mode | I |
| Enter the following and then press [escape] | #Global Options AccessLog syslog AccessLogLevel actions LogLevel warn MaxLogSize 0 SystemGroup lpadmin DefaultAuthType Basic Listen 192.168.2.0/24:631 Listen /var/run/cups/cups.sock |

Explaining Step 2

Your entries in this section begin with a section header. All lines beginning with the pound (#) sign are comments.

AccessLog syslog

Means you are using the standard system log utility for logging all actions

AccessLogLevel actions

Means you are logging all actions that CUPS takes including configuration changes, print jobs submitted, and all error messages

MaxLogSize 0

Indicates you are allowing the system to control the log size. CUPS will not control the log size.

SystemGroup lpadmin

Indicates that users within the lpadmin group (**/etc/group**) will be authorized to perform administrative functions on the CUPS server

Explaining Step 2 (Contd)

DefaultAuthType basic

Functions that need authentication will require a user name and password from the server's user and password files. You will need all admin users to have an account on the server.

Listen 192.168.2.0/24:631

Directs the server to listen on the interface attached to the 192.168.2.* network and listen on TCP/IP port 631, which is the default CUPS port. Do not change the port number unless you want to change all the clients to listen on a separate port. You are changing a standard if you change this port.

Listen /var/run/cups/cups.sock

Is also listening for a local "socket" connect on the file /var/run/cups/cups.sock. Many *nix utilities do not use a network connect but instead, they connect via code to a socket (or plugin).

Once you have these global configuration options entered, you can begin configuring the server.

Required Reading

- [Authentication Types](#)

Step 3: Set Browsing Settings

To set the browse settings of your print server, follow these directions (we are assuming you have not exited Vi after setting the global settings but have exited the insert mode):

| Instructions | Commands |
|--|--|
| Go to the last line of the file using your cursor. Enter insert mode | |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] | #Browsing section Browsing On BrowseOrder allow,deny BrowseAllow 192.168.2 BrowseLocalProtocols CUPS dnssd smb BrowseAddress @LOCAL |
| Save your Vi file. Do not exit Vi. | :w |

Explaining Step 3

Let's look at what each line does. The first line begins with a # sign and is just a comment to identify the sections.

Browsing ON

Directs the server to search the network

BrowseOrder allow,deny

A security setting that denies all browse requests except those specifically allowed by the BrowseAllow line that follows

BrowseAllow 192.168.2

Tells the server to allow browsing from all machines on the local network but not allow browsing from remote addresses

BrowseLocalProtocols CUPS dnssd smb

Tells the server how to advertise any printers attached to the server machine to others on the network. CUPS is the CUPS protocol, dnssd is a DNS service discovery, and smb allows Microsoft Windows machines to discover the printers

BrowseAddress @LOCAL

Will broadcast printer information to all local interfaces

Once we have defined the browse settings we must begin to grant access to specific services and locations on the server.

One of the most important security rules on any server is to deny all access and then grant access to specific services when required.

In our example we are going to do exactly that.

Step 4: Securing the Server

Follow these directions to secure your server (we are assuming you have not exited Vi from setting the global settings but have exited the insert mode):

| Instructions | Commands |
|--|---|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] | # Restrict access to the server... <Location /> Order allow,deny Allow @LOCAL </Location> |
| Save your Vi file. Do not exit Vi | :w |

Explaining Step 4

This section has secured the full server. If we follow it line-by-line, the first line is a comment line because it is preceded by the # sign.

<Location />

Tells the server that this section is defining access to the root (/) directory. "/" is your root directory and defines the entire server. You should NEVER grant unlimited access to this location

Order allow,deny

Denies access to everyone with the exception of those specifically allowed

Allow @LOCAL

Allows access to those users connecting from your local network. They cannot do anything administrative from this location, they can just access the browser

</Location>

tells the server that this is the end of the definitions for this directory

Step 5: Securing the Admin Pages

The next section we have to define access levels to are the admin pages. Please follow these directions to set that area (we are assuming you have not exited vi from setting the global settings but have exited the insert mode):

| Instructions | Commands |
|--|--|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] | # Restrict access to the admin pages... <Location /admin> AuthType Default Require user @lpadmin Order allow,deny Allow @LOCAL </Location> |
| Save your Vi file. Do not exit Vi | :w |

Explaining Step 5

As with the prior section, put a comment at the beginning of your code so that someone looking at this file in the future can follow what was being set.

Then set a location for /admin. Then require a user of @lpadmin.

@lpadmin indicates that this user must be part of the lpadmin group. As soon as the server is directed to require a user, authentication is required.

The AuthType Default line tells the server to use the default authentication which was set in the global options as **Basic**.

As always, use the Order directive to deny access unless it is specifically granted.

Allow @LOCAL

Allows access to those users connecting from your local network. They cannot do anything administrative from this location, they can only access the browser.

```
# Restrict access to the admin pages...
<Location /admin>
  AuthType Default
  Require user @lpadmin
  Order allow,deny
  Allow @LOCAL
</Location>
```

Step 6: Securing the Admin Pages

Admin/config pages control system and printer configuration and will be examined next. Follow these directions to define your settings. (We are assuming you have not exited Vi from setting the global settings but have exited the insert mode.)

| Instructions | Commands |
|---|--|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] | # Restrict access to configuration files... <Location /admin/conf> AuthType Default Require user @SYSTEM Order allow,deny Allow @LOCAL </Location> |
| Save your Vi file. Do not exit Vi | :w |

Explaining Step 6

As with the prior section, put a comment at the beginning of your code so that someone looking at this file in the future can follow what was being set.

Then set a location for /admin. Then require a user of @lpadmin.

@lpadmin indicates that this user must be part of the lpadmin group. As soon as the server is directed to require a user, authentication is required.

As always, use the Order directive to deny access unless it is specifically granted.

Allow @LOCAL

Allows access to those users connecting from your local network. They cannot do anything administrative from this location, they can only access the browser.

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

Step 7: Set Basic Printer Policies

At this point, you have specifically allowed access to certain functions and denied everything else. The instructions below begin to set printer and administrative specific policies.

| Instructions | Commands |
|---|--|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| <p>Enter the following, then press [Escape]</p> <p>Note: the text in red is a single line. Allow it to wrap to the next line, but do not use the [Enter] key until the line ends.</p> | <pre># 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 CUPS-Get- Document> Require user @OWNER @SYSTEM Order deny,allow </Limit></pre> |
| Save your Vi file. Do not exit Vi | :w |

Explaining Step 7

The functions we are limiting are self-explanatory and are basic print spooler related commands.

In this case, the user required is either the print job owner, or a system administrator as defined by the System user in the global settings section.

Once we have set the access requirements for the basic print spooler functions, we then configure the administrative functions.

```
# 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 CUPS-Get-
  Document>
  Require user @OWNER @SYSTEM
  Order deny.allow
</Limit>
```

Step 8: Set Admin Functions

At this point, you have specifically allowed access to certain functions and denied everything else. The instructions below begin to set printer and administrative specific policies.

| Instructions | Commands |
|--|--|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] Note: the text in red is a single line. Allow it to wrap to the next line, but do not use the [Enter] key until the line ends. | # 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 CUPS-Get-Devices> AuthType Default Require user @SYSTEM Order deny,allow </Limit> |
| Save your Vi file. Do not exit Vi | :w |

Explaining Step 8

This section tells the server that users who wish to access administrative functions listed on the Limit line must first log in (or authenticate), and the user must be a member of the SYSTEM group that was set in the global settings.

Users that do not authenticate, or users who authenticate and are not members of this group will not be allowed to access these functions.

```
# 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
CUPS-Get-Devices>
  AuthType Default
  Require user @SYSTEM
  Order deny,allow
</Limit>
```

Step 9: Set Printer Function Policies

Follow the directions below to set printer function policies. (We are assuming Vi is still open.)

| Instructions | Commands |
|--|--|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] Note: the text in red is a single line. Allow it to wrap to the next line, but do not use the [Enter] key until the line ends. | <pre># 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></pre> |
| Save your Vi file. Do not exit Vi | :w |

Explaining Step 9

This section restricts access to printer specific functions such as pausing and restoring printers to the SYSTEM group and requires the user to authenticate.

If you replaced @SYSTEM with @lpadmin the change would force users to be part of the lpadmin group in /etc/group.

By using different groups, you can allow users to administer different aspects of the print server.

For example if you have local power-users, you may want to give them the right to start and stop a printer, change job priorities, or cancel print jobs. You may not want to give these rights to all users.

```
# 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>
```

Step 10: Printer Job Control Functions

Follow the directions below to set printer function policies. (We are assuming Vi is still open.)

| Instructions | Commands |
|--|---|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] | # 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> |
| Save your Vi file. Do not exit Vi | :w |

This section restricts access to the printer job control functions to the SYSTEM group, or the print job owner (user sending print job) and requires the user to authenticate.

If you replaced @SYSTEM with @lpadmin, the change would force users to be a part of the lpadmin group in /etc/group.

Step 10b: Set a “Catch-All” Policy

Follow the directions below to deny access to all policies that have not been set. (We are assuming Vi is still open.)

| Instructions | Commands |
|--|--|
| Go to the last line of the file using your cursor. Enter insert mode | A |
| Go to a new line | [Enter] |
| Enter the following, then press [Escape] | <Limit All> Order deny,allow </Limit> </Policy> |
| Save your Vi file. Do not exit Vi | :w |

We now turn everything else off because we have not allowed it. Finally, use the **</Policy>** stance to close the policy section, and then complete our main configuration by setting the “authenticated” user policies.

Step 11: Set Authenticated User Policies

Follow the directions below to deny access to all policies that have not been set. (We are assuming Vi is still open.)

| Instructions | Commands |
|---|----------|
| Go to the last line of the file using your cursor. Enter insert mode. | A |
| Go to a new line. | [Enter] |
| In Vi, enter the following code (presented on the next 2 pages), then press [Escape]. | |
| Save your Vi file. Do not exit Vi. | :w |

Remember limit lines are actually one line. Do not press [Enter] anywhere in the lines; they may wrap on their own.

Step 11 Code

```
<Policy authenticated>
```

```
# Job-related operations must be done by the owner or an administrator...
```

```
<Limit Create-Job Print-Job Print-URI>
```

```
AuthType Default Order deny,allow
```

```
</Limit>
```

```
<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 CUPS-Get-Document>
```

```
AuthType Default
```

```
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>
```

Step 11 Code (Contd)

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>
```

```
AuthType Default
```

```
Require user @OWNER @SYSTEM
```

```
Order deny,allow
```

```
</Limit>
```

```
<Limit All>
```

```
Order deny,allow
```

```
</Limit>
```

```
</Policy>
```

Step 12 Restart Server

These commands are all self-explanatory and are also available on the cupsd.conf documentation at:

<http://www.cups.org/documentation.php/doc-1.4/ref-cupsd-conf.html>.

You can now exit Vi. Your cupsd.conf file is now complete, and you are ready to add printers.

Once you have completed this configuration, you should be at a command prompt. Type:

sudo /etc/init.d/cups start

to restart your server. You should now be able to connect to the server from a browser from either on the machine itself, or from your local network. Try this with:

<http://192.168.2.225:631>

Step 13 Connecting & Admin Access

Once you connect, try accessing the “Administration” tab at the top of the page. You should be requested to Authenticate. Enter a wrong user name and/or password and see what happens. If you get a “Forbidden” you have things setup correctly.

Close your browser and try again using a correct user name—one that you added to the lpadmin group in /etc/groups. You should see the administrative functions of your print server.

If you click on the “Classes” tab, you will notice that groups of users are missing. If you click on the “Printers” tab you will also notice that printers have not been added.

Select **PLAY** below for a video on admin access:



View Video
VideoLesson3CUPAdminA
ccess(C4L3S40).mp4

Step 14: Creating Classes.conf

Follow the directions below to create the [classes.conf](#) file. Enter the `/etc/cups` directory.

| Instructions | Commands |
|---|--|
| Type command | <code>sudo vi /etc/classes.conf</code> |
| Enter insert mode | <code>I</code> |
| Enter the following code, then press [Escape] | <code><Class GeneralUsers> Info This is the default class Location Home State Idle StateTime 1296437015 Accepting Yes Shared Yes JobSheets none none QuotaPeriod 0 PageLimit 0 KLimit 0 OpPolicy default ErrorPolicy retry-current-job </Class></code> |
| Exit Vi | <code>:x</code> |

Step 14 Explanation

| | |
|---------------------------------------|--|
| <Class GeneralUsers> | Define a new class named “GeneralUsers”. Note: you cannot have spaces in the class name. |
| Info This is the default class | The “Info” line is a comment line that will appear in the web interface. |
| Location Home | The “Location” line defines the users location. This is a comment line. |
| State Idle | This line defines the initial state of the printer, there are two choices: idle and stopped. |
| StateTime 1296437015 | This line defines the time since the last change of state of the queue in seconds. |
| Accepting Yes | Is the queue accepting jobs? |
| Shared Yes | Is this queue shared? |
| JobSheets none none | Is there a cover sheet put in each job? |
| QuotaPeriod o PageLimit o | Quota’s and page limits are shut off with o’s. |
| KLimit o | The group does not have a size limit on print jobs. |
| OpPolicy default | What policies from the cupsd.conf is used for this class? |
| ErrorPolicy retry-current-job | What happens if the job errors? In this case we will re-try it. |
| </Class> | Then we will close the class. |

Additional classes (such as classes for Guest users) can be added at the end of this file. All classes must have a class name and finish with the </Class>. Our final challenge is configure a printer.

Step 15 Configuring Printers

The easiest way to configure printers.conf is through the browser interface. You may configure printers using a text file, but once your CUPS server is setup and working properly, the browser interface makes your life easier.

In my example, I have a printer connected directly to the network with a static IP address. It is an HP LaserJet 4050 and is located on a direct print server at: 192.168.2.5.

To follow these examples you will need to change the type of printer and the IP address or location to match your own environment. Please follow these directions on the next page:

Select **PLAY** below for a video on configuring printers:



View Video
VideoLesson3CUPSConfigPrint
ers(C4L3S43).mp4

Step 15 Instructions

1. Open an Internet browser. If you are using Virtual Box, open the browser in Virtual Box. If you are using a server elsewhere on your network, use any machine on your local network, or a browser on the server itself. The most important requirement is that your browser must be able to access the IP address of your local machine.
2. On the address bar of the browser type: **https://192.168.2.225:631** (Note: Change this to the IP address of your server).
3. Select the **Administration** tab and authenticate.
4. Select **Printers** tab and authenticate if needed.
5. Verify that you have not already added the printer.
6. Select **Administration** and select **Add Printer**. The system will search for local printers first.
7. Select the appropriate form of printer (I will select LPD/LPR host).
8. Select **Continue**.
9. Enter the address of the printer and the queue, if it has one. If it has no queue, enter the address. In my case, for the printer at 192.168.2.5, I entered **lpd://192.168.2.5**
10. Select **Continue**.

Step 15 Instructions (Contd)

11. Enter the name (no spaces), the description, and the location of the printer. The name is required, but the other two are optional but nice to add.
12. Select **Share this printer** and then select **Continue**.
13. Select the make of the printer, in my case **HP** and select **Continue**.
14. Locate your printer model, and if possible use the one that includes “recommended” in the name. Select this model and press **Continue**.
15. Select the installed options if prompted.
16. Check the **scale** option – most installations like **Nearest size and scale**.
17. Select **Set default options**.
18. Your printer is added and you will be taken to the printer status screen.
19. Administer your printer from the status screen.
20. You can also select the **Administration** tab to return to your administrative dashboard screen.

Printer.conf file

In the /etc/cups directory, type:

ls -l

You now have a printers.conf file.

To view all the entries the browser made, type

sudo vi printers.conf

Do not change or delete this file with the print server running, as it can delete or alter jobs currently being sent to the printer. If you wish to look at each line in the printer file, compare it to the description on the CUPS documentation at <http://www.cups.org/documentation.php/doc-1.4/ref-printers-conf.html>.

If you add a second printer, you will add a second printer section to this file. This file will be altered depending on what the printer is doing.

Required Reading

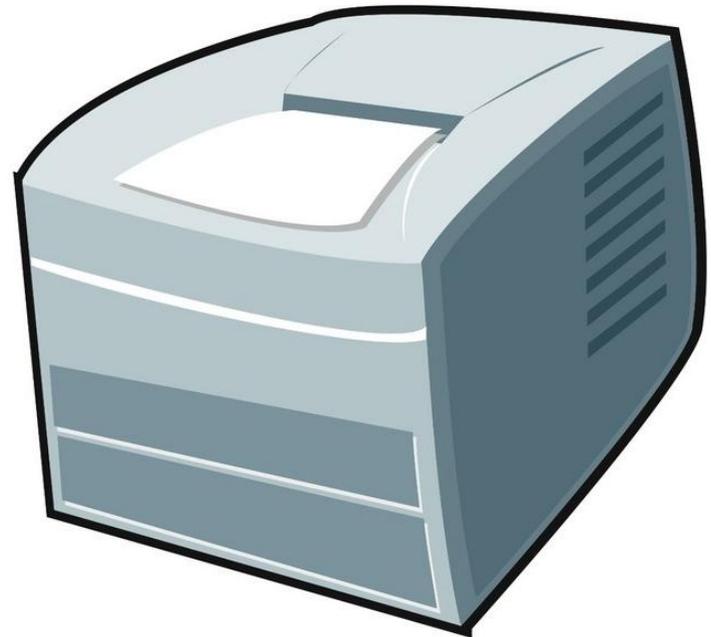
- [Printers.conf file](#)

Step 16: Assign Printer to Class

1. Select **Administration** and then **Manage Classes**.
2. Select **GeneralUsers** class and modify the class from the Administration dropdown.
3. Assign your printer as a member of the class.
4. Assign users to that specific printer, or deny users from that printer.
5. Verify your printer works by sending a test page to the printer from a few different machines.

If you want to allow an external user to print to the server you can either forward a port to 631 or preferably you can use a VPN (Virtual Private Network) connection.

Congratulations your print server is setup.



Lesson Summary

Configuring a CUPS server is simple, yet it has a number of security levels available.

Make sure you begin by shutting down the server and removing all unnecessary users. Add your `cupsd.conf` file and deny access to everything except the specific levels you wish to allow. Add the `classes.conf` file to set groups of users.

Restart your server with the new configuration. Add the printers locally or from the network. Set your access levels using the browser—go into class, and add the printer to the class.

If you want to have additional classes pointing to the default printer with different access levels you are able to do so. Then you can assign specific users or groups of users to the classes.

Remember, anytime you put an `@` sign in front of a name, it translates to the name of the group from `/etc/groups`.

Additional Resources:

- [Classes.conf](#)
- [Cupsd.confd](#)