ESP Print Pro 4.4
Software Administrators Manual

ESP–002–20030522

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About This Guide

The ESP Print Pro Software Administrators Manual explains how to install and configure the ESP Print Pro software on your systems. This guide assumes that you know how to perform basic system administration tasks on your systems.

Organization of This Guide

This guide is organized into the following sections:

- Chapter 1, "Overview of ESP Print Pro", introduces ESP Print Pro.
- Chapter 2, "Installing ESP Print Pro", shows how to install the ESP Print Pro software on your system.
- Chapter 3, "Printer Management", describes how to manage print queues from the command–line and GUI interfaces.
- Chapter 4, "Printer Classes", covers what printer classes are and how to manage them.
- Chapter 5, "Printing System Configuration", shows you how to configure your print servers using the configuration and certificate wizards.
- Chapter 6, "Client Setup", shows how to configure client machines for printing.
- Appendix A, "Software License Agreement", provides the software license agreements for ESP Print Pro, CUPS, and GNU Ghostscript.
- Appendix B, "Common Network Settings", describes the typical network settings and configuration steps required for network printers and print servers.
- Appendix C, "Configuration File Reference", lists the configuration files and directives used by ESP Print Pro.
- Appendix D, "List of Files", lists the files and directories used by ESP Print Pro.

How to Use This Guide

If you are new to the ESP Print Pro software, you will probably want to read Chapters 1, 2, and 3. Additionally, Appendix B provides a good resource for network printers and print servers.

Notation Conventions

Various font and syntax conventions are used in this guide. Examples and their meanings and uses are explained below:

Example	Description
`lpstat` `lpstat(1)`	The names of commands; the first mention of a command or function in a chapter is followed by a manual page section number.
/var */usr/share/cups/data/testprint.ps*	File and directory names.
`Request ID is Printer-123`	Screen output.
`lp -d printer filename ENTER`	Literal user input; special keys like **ENTER** are in ALL CAPS.
12.3	Numbers in the text are written using the period (.) to indicate the decimal point.

Abbreviations

The following abbreviations are used throughout this manual:

kb
> Kilobytes, or 1024 bytes

Mb
> Megabytes, or 1048576 bytes

Gb
> Gigabytes, or 1073741824 bytes

Other References

CUPS Interface Design Description
> A description of the interfaces in the CUPS software.

CUPS Software Programmers Manual
> A programmer guide for interfacing with and/or extending the CUPS software.

ESP Print Pro Software Users Manual
> An end−user guide for using the ESP Print Pro software.

Chapter 1
Overview of ESP Print Pro

This chapter provides an overview of how ESP Print Pro works.

The Printing Problem

For years *the printing problem* has plagued UNIX. Unlike Microsoft® Windows® or Mac OS, UNIX has no standard interface or system in place for supporting printers. Among the solutions currently available, the Berkeley and System V printing systems are the most prevalent.

These printing systems support line printers (text only) or PostScript printers (text and graphics), and with some coaxing they can be made to support a full range of printers and file formats. However, because each varient of the UNIX operating system uses a different printing system than the next, developing printer drivers for a wide range of printers and operating systems is extremely difficult. That combined with the limited volume of customers for each UNIX varient has forced most printer vendors to give up supporting UNIX entirely.

ESP Print Pro is designed to eliminate *the printing problem*. One common printing system can be used by all UNIX varients to support the printing needs of users. Printer vendors can use its modular filter interface to develop a single driver program that supports a wide range of file formats with little or no effort. Since ESP Print Pro provides both the System V and Berkeley printing commands, users (and applications) can reap the benefits of this new technology with no changes.

The Technology

ESP Print Pro is based upon an emerging Internet standard called the Internet Printing Protocol. IPP has been embraced by dozens of printer and printer server manufacturers and is supported by Microsoft Windows 2000.

IPP defines a standard protocol for printing as well as managing print jobs and printer options like media size, resolution, and so forth. Like all IP–based protocols, IPP can be used locally or over the Internet to printers hundreds or thousands of miles away. Unlike other protocols, however, IPP also supports access control, authentication, and encryption, making it a much more capable and secure printing solution than older ones.

IPP is layered on top of the Hyper–Text Transport Protocol ("HTTP") which is the basis of Web servers on the Internet. This allows users to view documentation, check status information on a printer or server, and manage their printers, classes, and jobs using their Web browser.

ESP Print Pro provides a complete IPP/1.1 based printing system that provides Basic, Digest, and local certificate authentication and user, domain, or IP–based access control. 128–bit SSL and TLS encryption can also be enabled and used with ESP Print Pro.

Jobs

Each file or set of files that is submitted for printing is called a *job*. Jobs are identified by a unique number starting at 1 and are assigned to a particular destination, usually a printer. Jobs can also have options associated with them such as media size, number of copies, and priority.

Classes

ESP Print Pro supports collections of printers known as *classes*. Jobs sent to a class are forwarded to the next available printer in the class. A special type of class called an *implicit class* is also supported by ESP Print Pro. Implicit classes are created automatically on client machines when more than one server supports a particular printer. This allows the client machines to use any server for a particular printer transparently to the user, providing both load–balancing and failsafe operation.

Filters

Filters allow a user or application to print many types of files without extra effort. Print jobs sent to a ESP Print Pro server are filtered before sending them to a printer. Some filters convert job files to different formats that the printer can understand. Others perform page selection and ordering tasks.

ESP Print Pro provides filters for printing many types of image files, HP–GL/2 files, PDF files, and text files. ESP Print Pro also supplies PostScript and image file Raster Image Processor ("RIP") filters that convert PostScript or image files into bitmaps that can be sent to a raster printer.

Backends

Backends perform the most important task of all – they send the filtered print data to the printer.

ESP Print Pro provides backends for printing over parallel, serial, and USB ports, and over the network via the IPP, JetDirect (AppSocket), and Line Printer Daemon ("LPD") protocols. Additional backends are available in network service packages such as the SMB backend included with the popular SAMBA software.

Backends are also used to determine the available devices. On startup each backend is asked for a list of devices it supports, and any information that is available. This allows the parallel backend to tell ESP Print Pro that an EPSON Stylus Color 600 printer is attached to parallel port 1, for example.

Printer Drivers

Printer drivers in ESP Print Pro consist of one or more filters specific to a printer. ESP Print Pro includes thousands of printer drivers optimized for your printers.

Networking

Printers and classes on the local system are automatically shared with other systems on the network – the administrator of a server does not need to configure the client machines! This allows you to setup one system to print to a printer. This system can then be used as a print server or spool host for all other systems. Users may then select a local printer by name or a remote printer using "name@server".

<div align="right">

Chapter 2
Installing ESP Print Pro

</div>

This chapter describes how to install the ESP Print Pro software and license for your system. If your system configuration differs from the examples given in this chapter you may wish to consult the documentation that came with the system.

Software Organization

On MacOS X and Microsoft Windows, the ESP Print Pro software is provided in a single "base" package with all files. For all other operating systems, it is organized into a "base" software distribution that includes all of the printing tools, documentation, and server software, a "SAMBA" software distribution that includes printer drivers for Windows clients, and several "driver" distributions that provide printer drivers for various printers.

The base software must be loaded on all systems using ESP Print Pro. The base software is licensed for both the server and any client machines that communicate with the server.

The "SAMBA" driver software should only be loaded on a server that is running the SAMBA software and will be supporting clients running one of the Windows operating systems.

The printer drivers should only be loaded on a server or standalone machine and are used to communicate directly with the printers on your system. **Client machines cannot use the printer drivers, as they are licensed for the server system.**

Software Requirements

ESP Print Pro can only be used on systems running:

- AIX 4.3 or higher
- Compaq Tru64® UNIX 4.0 or higher
- Digital UNIX® 4.0 or higher
- HP–UX 10.20 or higher
- IRIX® 5.3 or higher
- Linux 2.0 or higher
- MacOS X 10.2 or higher
- Microsoft Windows® NT 4.0, 2000, or XP (client functionality only)
- Red Hat Linux 5.2 or higher
- Solaris® 2.5 (SunOS 5.5) or higher

If you are uncertain about the operating system version on your system, type the following command at a shell prompt:

```
uname -r ENTER
```

Disk Space Requirements

The ESP Print Pro base software requires a minimum of 22Mb of disk space. Additional space is required for the printer drivers, for a total of about 50Mb for all printer drivers. You can determine the amount of free disk space using the df(1) command:

```
df -k ENTER
```

The software is installed in the following directories:

- */etc/cups* – Configuration files for the ESP Print Pro server.
- */etc/software* – Software distribution information, system identification, and software licensing.
- */usr/bin* – User commands.
- */usr/include/cups* – CUPS API header files.
- */usr/lib* – CUPS API DSOs (*/usr/lib32* for IRIX 6.5.x).
- */usr/lib/cups* – Platform–dependent backends, daemons, filters, and printer drivers.
- */var/log/cups* – Server log files.
- */usr/sbin* – Administrator commands.
- */usr/share/cups* – Platform–independent data files.
- */usr/share/doc/cups* – Documentation files.
- */usr/share/man*, */usr/share/catman*, */usr/man* – Man pages.
- */var/spool/cups* – Print job files.

Temporary Disk Space Requirements

Additional disk space may be used during printing for temporary storage; temporary files are normally created in */var/tmp* for user programs and */var/spool/cups/tmp* for print filters and printer drivers, however this can be overridden by setting the TMPDIR environment variable for user programs, or by setting the TempDir directive in the */etc/cups/cupsd.conf* file for print filters and printer drivers.

The PostScript® Raster Image Processor (RIP) used for non−PostScript printers may create a page swap file if the size of the page image exceeds the RIP cache; the default size of the RIP cache is 8Mb. The actual amount of disk space used varies depending on the size and resolution of the print job and can be estimated with one of the following formulas:

- Black & White Printers:

  *bytes = page−width * page−height * resolution * resolution*

- Color Printers:

  *bytes = page−width * page−height * resolution * resolution * 4*

The Image RIP used for printing image files may require additional temporary disk space during printing as well. The amount of disk space used is based on the image size (*not* the page size as for the PostScript RIP) and can be estimated using one of the following formulas:

- Black & White Printers:

  *bytes = image−width * image−height*

- Color Printers:

  *bytes = image−width * image−height * 4*

Diskless Client Support

The portable packages handle installations on diskless clients that mount */usr* as a read−only NFS directory. This works since the appropriate executables reside under the */usr* directory. Other types of diskless client configurations are not supported.

Before You Begin

You must be logged onto your system as an administrative user, usually "root" on Linux and UNIX−based systems, to install the software.

> **Note:**
>
> When installing on a Linux or UNIX−based system, ESP Print Pro replaces the existing printing system installed on your system with the Common UNIX Printing System. When installing using the portable packages, the original printing system software is backed up automatically and is restored if you remove ESP Print Pro from your system using the commands shown later in this chapter. This backup functionality is only available with the portable packages. When installing on a Mac OS X system, ESP Print Pro does not replace the existing printing system but uses the Common UNIX Printing System that comes with Mac OS X.

Loading Software From CD−ROM

To install the ESP Print Pro software from CD−ROM, insert the CD−ROM into your CD−ROM drive and login to an administrative account, e.g. "root", on your system.

Mounting the CD−ROM

Some operating systems automatically mount the CD−ROM media when it is inserted in the CD−ROM drive. If your system does not do this, run one of the following commands to mount the CD−ROM:

- AIX

```
mkdir /cdrom ENTER
mount /dev/cd0 /cdrom ENTER
```
- Compaq Tru64 UNIX, Digital UNIX, OSF/1

```
mkdir /cdrom ENTER
mount -o ro,rrip -t cdfs /dev/rz4a /cdrom ENTER
```
- HP−UX

```
mkdir /cdrom ENTER
mount -o ro,cdcase -F cdfs /dev/dsk/c1t2d0 /cdrom ENTER
```
- Linux, Red Hat

```
mount /mnt/cdrom ENTER
```

Installing ESP Print Pro Using the Portable Packages

On MacOS X, double−click on the *Install* icon to start the portable software installation program. Otherwise, type one of the following commands to run the software installation script:

- AIX, Compaq Tru64 UNIX, Digital UNIX, HP−UX, OSF/1

```
/cdrom/install.sh ENTER
```
- IRIX

```
/CDROM/install.sh ENTER
```
- Linux, Red Hat

```
/mnt/cdrom/install.sh ENTER
```
- Solaris

```
/cdrom/esp/install.sh ENTER
```

The installation script asks you a few questions and then installs the desired software on your system. If you are running the installation script from an X11 display, a graphical setup wizard will appear.

Installing Using the IRIX Software Manager (swmgr)

IRIX software packages are provided in the */CDROM/dist* directory. Double−click on the CD−ROM icon to install software from the CD−ROM or run the software manager from the command−line:

```
cd /CDROM ENTER
swmgr -f dist ENTER
```

Installing Using the Red Hat Package Manager (RPM)

RPM packages for ESP Print Pro are provided in the */mnt/cdrom/RPMS* directory. The `rpm(8)` command supplied with Red Hat Linux can be used to install them:

```
rpm -i /mnt/cdrom/RPMS/*.rpm ENTER
```

Graphical RPM installation programs can also be used.

Installing Using the Solaris Software Management Tool (swmtool)

Solaris software packages are provided in the */cdrom/esp/solaris/intel/5.8* and */cdrom/esp/solaris/sparc/5.8* directories. Run the `swmtool(1m)` command to install software from the CD−ROM:

```
swmtool -d /cdrom/esp/solaris/intel/5.8 ENTER
swmtool -d /cdrom/esp/solaris/sparc/5.8 ENTER
```

Getting Software Licenses

ESP Print Pro must be licensed on each system that talks directly to a printer. You get your software license from Easy Software Products or the reseller that sold the software to you. The ESP invoice number or enable code provided with your software can also be used to request the software license on−line at:

http://www.easysw.com/myesp.php

Once you have your software license, follow the instructions included with the license to add it to your system.

Making a Backup of Your Software Licenses

Since many newer computers do not provide hardware serial number information, it is extremely important to make a backup of your software licenses. To do so, copy the files in the `/etc/software` directory using the following command:

```
tar cvf esp_backup_file /etc/software ENTER
```

Should you ever re−install the operating system or build a new boot disk for your computer, simply restore the files in the `/etc/software` directory to re−license your ESP Print Pro software using the following command:

```
tar xvf esp_backup_file ENTER
```

> **Note:**
>
> Copying the files using the `cp` command will not work since the `cp` command does not preserve all of the file information.

Managing Your Software Licenses

You can manage your software licenses using the `esplm` and `esplicense` commands. The `esplm` command provides a graphical license management interface while the `esplicense` command provides a command−line interface. The `esplm` command is available in the *ESP* folder under *Applications* in the MacOS X finder window.

Licenses record the product code, customer number, system number and expiration date of your software. Double−click on the *License Manager* icon in the MacOS X finder window or type one of the following commands to list your software license information:

```
/usr/sbin/esplicense list ENTER
/usr/sbin/esplm ENTER
```

Getting Software Updates From the Internet

Software updates can be obtained from the Internet using a World Wide Web ("WWW") browser such as *Netscape Navigator* 4.0 or higher from the following URL:

> http://www.easysw.com/printpro/software.php

Installation instructions are provided online for your convenience.

Upgrading the ESP Print Pro Software

Software upgrades or patches are available free of charge from our web site for the same major release of ESP Print Pro (4.0, 4.1, 4.2, 4.3, etc.)

If you installed the portable packages, simply re−install the software to upgrade your system to the latest version of the software. Make sure to update both the base software and printer drivers you need.

For the vendor distributions, follow the instructions included with your operating system for upgrading software packages.

Removing the ESP Print Pro Software

Should you ever need to remove the ESP Print Pro software, the portable packages provide `.remove` scripts in the `/etc/software` directory that will remove ESP Print Pro and restore the original files that were overwritten, if any. For example, if you have the ESP Print Pro base software and the HP printer drivers loaded type:

```
/etc/software/printpro-hp.remove ENTER
/etc/software/printpro.remove ENTER
```

to remove the ESP Print Pro software and printer drivers.

For MacOS X, simply click on the *Uninstall* icon to start the uninstall wizard and select the components you wish to uninstall.

For the vendor distributions, follow the instructions included with your operating system for removing software packages.

Chapter 3
Printer Management

This chapter describes how to add your first printer and how to manage your printers.

The Basics

Each printer queue has a name associated with it; the printer name can up to 127 printable characters except the space, "/", and "@". Case is not significant, e.g. "PRINTER", "Printer", and "printer" are considered to be the same name.

Printer queues also usually have a PostScript Printer Description ("PPD") file associated with them. PPD files describe the capabilities of each printer, the page sizes supported, etc., and are used for PostScript and non−PostScript printers. ESP Print Pro includes PPD files for thousands of printers. You can see a list of the currently−installed PPD files using the `lpinfo(1m)` command:

```
lpinfo -m ENTER
raw Raw Queue
bgcb_210.ppd.gz Birmy PowerRIP Win/NT (Canon BJC210)
bgcb_240.ppd.gz Birmy PowerRIP Win/NT (Canon BJC240)
bgcb_600.ppd.gz Birmy PowerRIP Win/NT (Canon BJC600)
bgcb_610.ppd.gz Birmy PowerRIP Win/NT (Canon BJC610)
bgcb4100.ppd.gz Birmy PowerRIP Win/NT (Canon BJC4100)
bgcb4200.ppd.gz Birmy PowerRIP Win/NT (Canon BJC4200)
bgcb4550.ppd.gz Birmy PowerRIP Win/NT (Canon BJC4550)
...
```

Finally, printer queues also have a device associated with them. The device can be a parallel port, a network

interface, and so forth. Devices within ESP Print Pro use Uniform Resource Identifiers ("URIs") which are a more general form of Uniform Resource Locators ("URLs") that are used in your web browser. For example, the first parallel port in Linux usually uses a device URI of `parallel:/dev/lp0`.

You can see a complete list of supported devices by running the `lpinfo` command:

```
lpinfo -v ENTER
network socket
network http
network ipp
network lpd
direct parallel:/dev/lp0
serial serial:/dev/ttyS1?baud=115200
serial serial:/dev/ttyS2?baud=115200
direct usb://EPSON/Stylus%20C80
network smb
```

The `-v` option specifies that you want a list of available devices. The first word in each line is the type of device (direct, file, network, or serial) and is followed by the device URI or method name for that device. Local devices generally have device URIs of the form `method:/directory/filename` while network devices use the more familiar `method://server` or `method://server/path` format.

Adding Your First Printer

ESP Print Pro provides three methods for adding printers: a command–line program called `lpadmin(1m)`, a WWW interface, and graphical interface. The `lpadmin` command allows you to perform most printer administration tasks from the command–line and is located in */usr/sbin*. The WWW interface is located at:

> http://localhost:631/admin

and steps you through printer configuration. The graphical interface is called the Printer Manager (`printers(1m)`) and is started by double–clicking on the *Printer Manager* icon or running the following command from a shell prompt:

> **/usr/sbin/printers** *ENTER*

If you don't like command–line interfaces, try the graphical or WWW interfaces instead.

Adding Your First Printer from the Command–Line

Run the `lpadmin` command with the `-p` option to add a printer to ESP Print Pro:

> **/usr/sbin/lpadmin -p** *printer* **-E -v** *device* **-m** *ppd ENTER*

For a HP DeskJet 660C printer connected to the parallel port this would look like:

> **/usr/sbin/lpadmin -p DeskJet -E -v parallel:/dev/lp0 -m en/espdj660.ppd.gz** *ENTER*

Similarly, a HP LaserJet 4 printer using a JetDirect network interface at IP address 11.22.33.44 would be added with the command:

> **/usr/sbin/lpadmin -p LaserJet -E -v socket://11.22.33.44 **
> **-m en/esplsjt4.ppd.gz** *ENTER*

As you can see, `en/espdj660.ppd.gz` and `en/esplsjt4.ppd.gz` are the PPD files for the HP DeskJet and HP LaserJet drivers included with ESP Print Pro. You'll find a complete list of PPD files and the printers they will work with on–line at:

```
http://localhost:631/drivers/index.html
http://www.easysw.com/printpro/printers.php
```

Adding Your First Printer Using the Graphical Interface

ESP Print Pro includes a graphical Printer Manager (Figure 3.1) called `printers` which allows you to view, add, modify, and delete printer queues and printer classes on your system.

Type the following command to start the Printer Manager:

/usr/sbin/printers ENTER
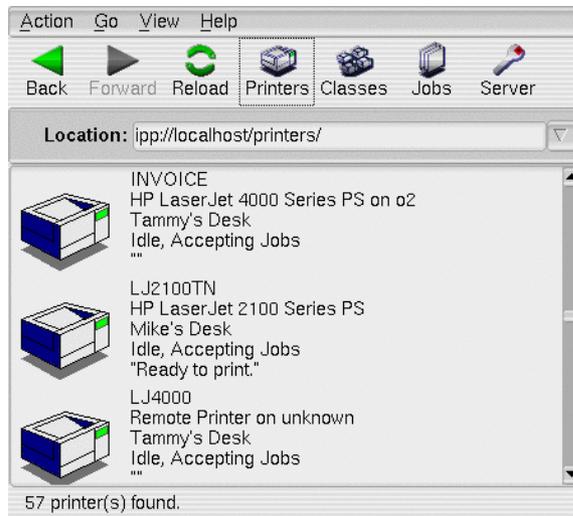
Figure 3.1: The ESP Print Pro Printer Manager.

To add a printer to the system, choose *Add...* from the *Action* menu. This will start the ESP Print Pro Printer Wizard (Figure 2.)

Figure 3.2: The Printer Wizard Welcome Page.

The Welcome Screen

The welcome screen is the first thing you will see when adding a printer. To proceed with printer installation simply click on the *Next* button.
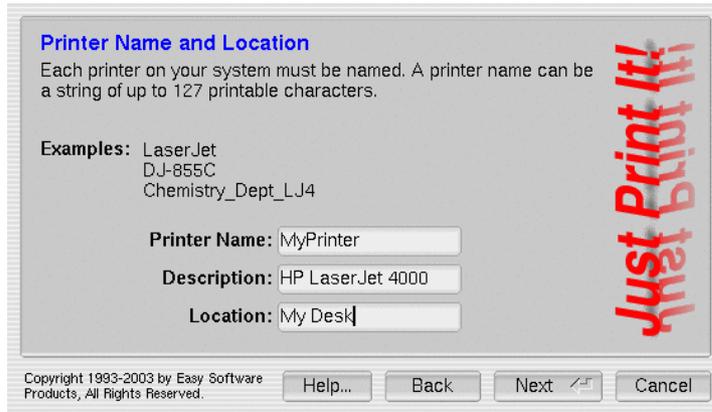
Figure 3.3: The Printer Wizard Name Page.

Setting the Printer Name and Location

The printer name uniquely identifies a printer on your workstation. Type the name of the printer on the keyboard and press **ENTER**. The printer name can be up to 127 letters, numbers, and underscores.

The location is a textual string that describes the location of the printer. It can be any string up to 127 characters and is displayed in the Printer Manager's printer list. The location field is meant entirely for user consumption – you'll specify the connection to the printer next.
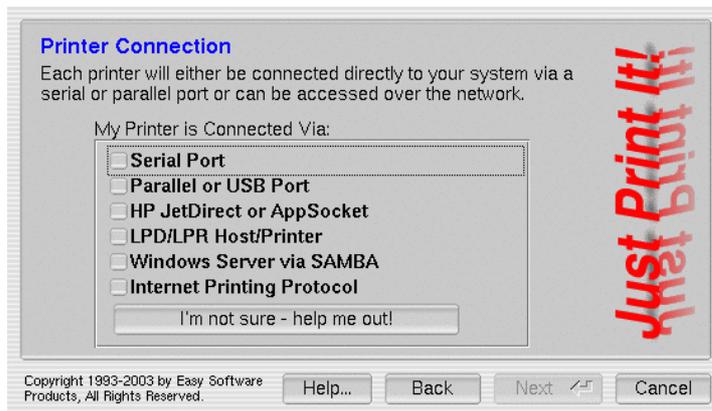
Figure 3.4: The Printer Wizard Connection Page.

Choosing the Printer Connection

After you enter a name for your printer you will next be asked about how the printer is connected to the system (Figure 3.4). Choose the button that corresponds to your printer's connection and click on the *Next* button.

If you have a network printer and are unsure about the type of connection to use, see Appendix B, "Common Network Settings". Printers on Microsoft Windows connections require the SAMBA software which is described in detail in Chapter 5, "Printing System Management".

Adding Your First Printer Using the Graphical Interface
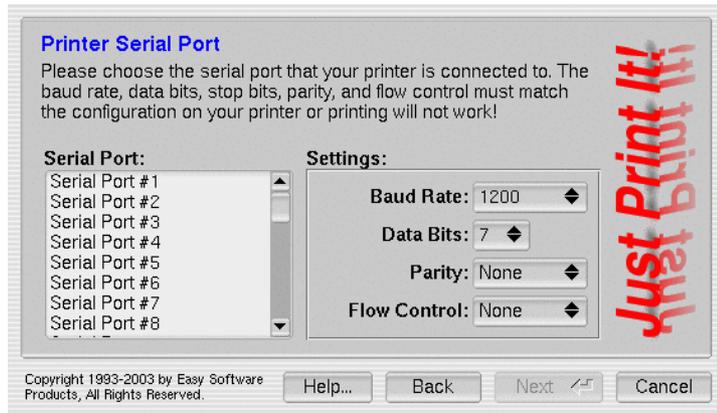
Figure 3.5: The Printer Wizard Serial Port Selection Page.

Choosing a Serial Port

The serial port selection page appears if you choose *Serial Port* on the connection page. To select a serial port move the mouse pointer over the desired serial port in the list and click the left mouse button.

Once you have selected the serial port, choose the baud rate, data bits, parity, and flow control necessary for your printer; these values should be documented in your printer's user manual.

Click on the *Next* button to proceed.
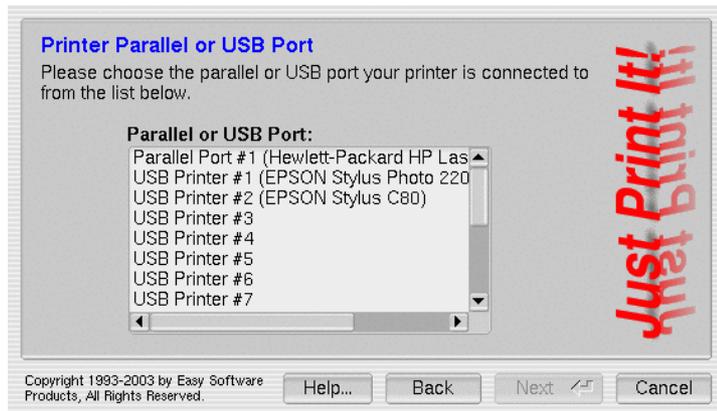
Figure 3.6: The Printer Wizard Parallel Port Selection Page.

Choosing a Parallel or USB Port

The parallel or USB port selection page appears if you choose *Parallel or USB Port* on the connection page. Move the mouse pointer over the desired port in the list and click the left mouse button to select it.

Click on the *Next* button to proceed.
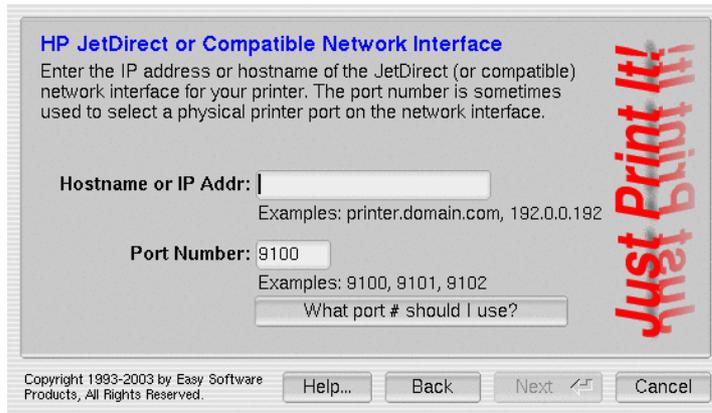
Figure 3.7: The Printer Wizard JetDirect Configuration Page.

Choosing a JetDirect Interface

The JetDirect configuration page appears if you choose *JetDirect or compatible* on the connection page. Enter the IP address (or hostname) and port number (usually 9100) of the JetDirect interface. If you are unsure about the current IP address of a JetDirect interface, you may print a test/configuration page on the printer or press the *Test* button on JetDirect print servers to see the current IP address and network settings. Consult Appendix B, "Common Network Settings" for the proper port number assignments for compatible network interfaces.

Click on the *Next* button to proceed.
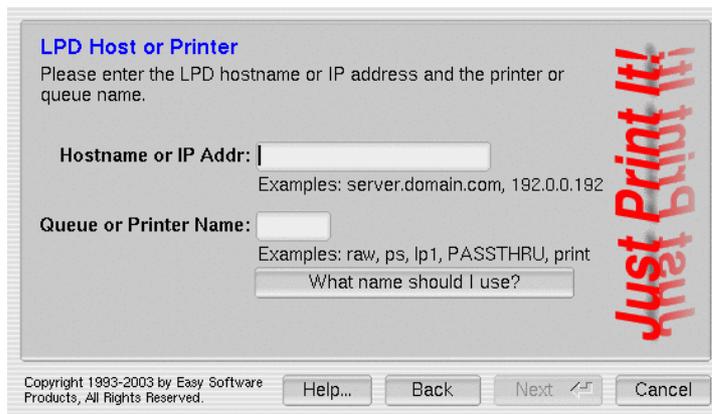
Figure 3.8: The Printer Wizard LPD Printer Selection Page.

Choosing a LPD Host or Printer

The LPD printer selection page appears if you choose *LPD/LPR Host/Printer* on the connection screen. Enter the IP address (or hostname) and queue name. Consult Appendix B, "Common Network Settings" if you are unsure about the proper queue name to use.

Click on the *Next* button to proceed.

> **Hint:**
>
> Microsoft Windows NT, 2000, and XP provide an LPD service under the name *TCP/IP Printing Services*. To enable LPD printing on NT, open the *Services*

control panel, select the *TCP/IP Printing Services* service, and click on the *Start* button. Any shared printer will then be available via the LPD protocol using the share name for the queue name.
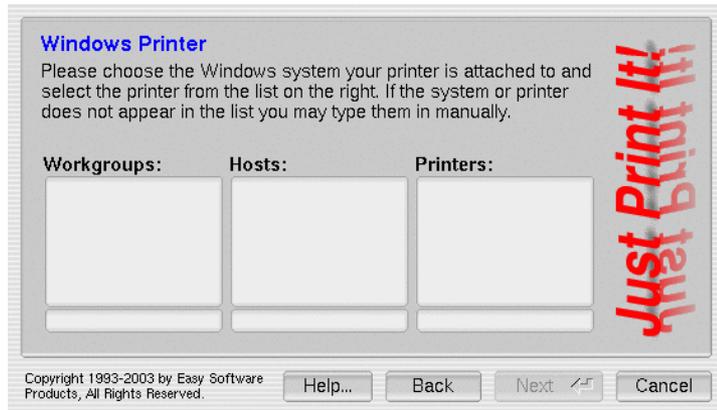
Figure 3.9: The Printer Wizard Microsoft Windows Printer Selection Page.

Choosing a Microsoft Windows Printer

The Microsoft Windows printer selection page appears if you choose *Windows 95/98/NT Server via SAMBA* on the connection page. To select the host for your printer, start by clicking on the workgroup for the system, and then on the corresponding system shown in the list of hosts. When you choose a host, the list of available printers will be displayed on the right. Click on the desired printer to finish selecting your printer.

If your workgroup, server, or shared printer does not appear in the lists, enter the correct names in the text fields below the lists.

Click on the *Next* button to proceed.

Hint:

When printing to a shared printer on a Microsoft Windows NT, 2000, or XP server, use the LPD protocol instead. The LPD protocol does not require a hard−coded username and password and will correctly log the name of the printing user on the Windows server.
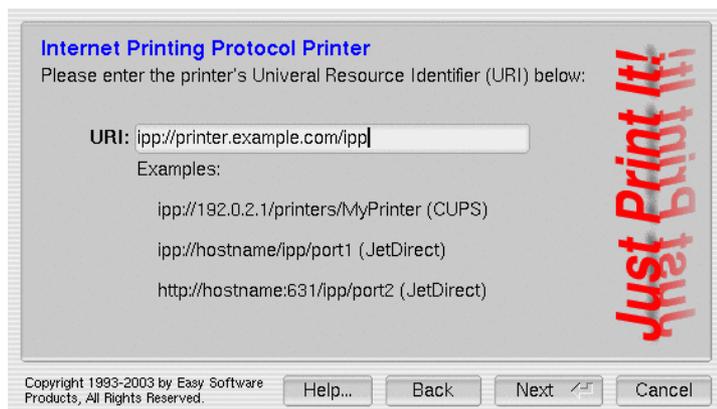
Figure 3.10: The Printer Wizard Internet Printing Protocol Configuration Page.

Choosing an IPP Printer

The IPP printer selection page appears if you choose *Internet Printing Protocol* on the connection screen. Enter the URI for the printer or host in the *URI* field. Consult Appendix B, "Common Network Settings" if you are unsure about the proper URI to use.

Click on the *Next* button to proceed.
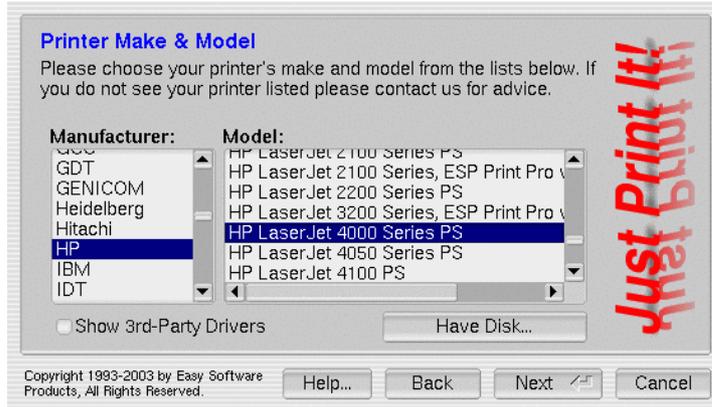
Figure 3.11: The Printer Wizard Printer Driver Selection Page.

Choosing a Printer Driver

The printer driver selection page appears after you have chosen the connection for your printer. To choose a printer driver start by clicking on the printer's manufacturer from the list on the left side of this screen. If you do not see your manufacturer listed you may need to scroll the list downward by dragging the bar on the right side of the list.

Once you have selected the manufacturer, the complete list of printers will be shown in the righthand list. Choose your printer from the list (scrolling the list as necessary) by clicking the left mouse button.

If you do not see your printer listed and have a PostScript printer, insert the driver CD−ROM that came with your printer and click on the *Have Disk* button to select a PostScript Printer Description ("PPD") file for your printer from the CD−ROM.

Click on the *Next* button to add the printer.

Configuring the Printer Options

After you have added a printer to the system, configure the default printing options by clicking on the *Configure Printer* button (Figure 3.12). The printer option dialog also allows you to configure any hardware options, such as a duplexer, that are installed in the printer.
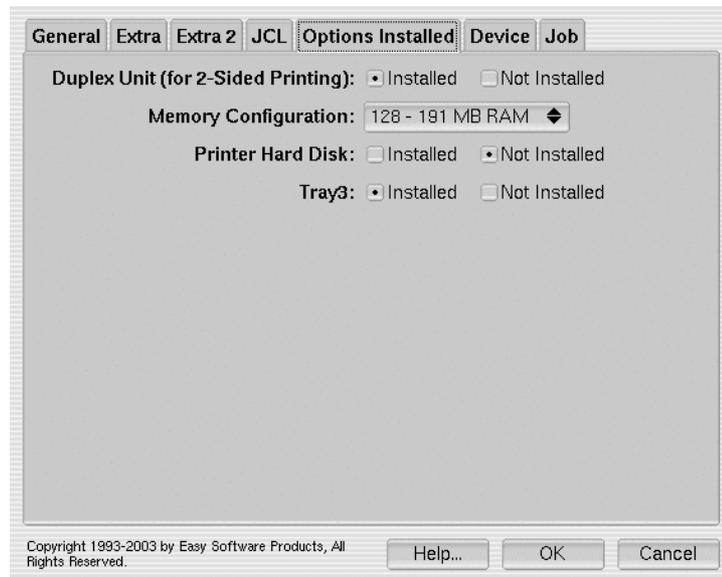
Figure 3.12: The Printer Options Panel.

Sending a Test Page

Click on the *Print Test Page* button to send a test page to the printer. The test page should look like Figure 3.13.
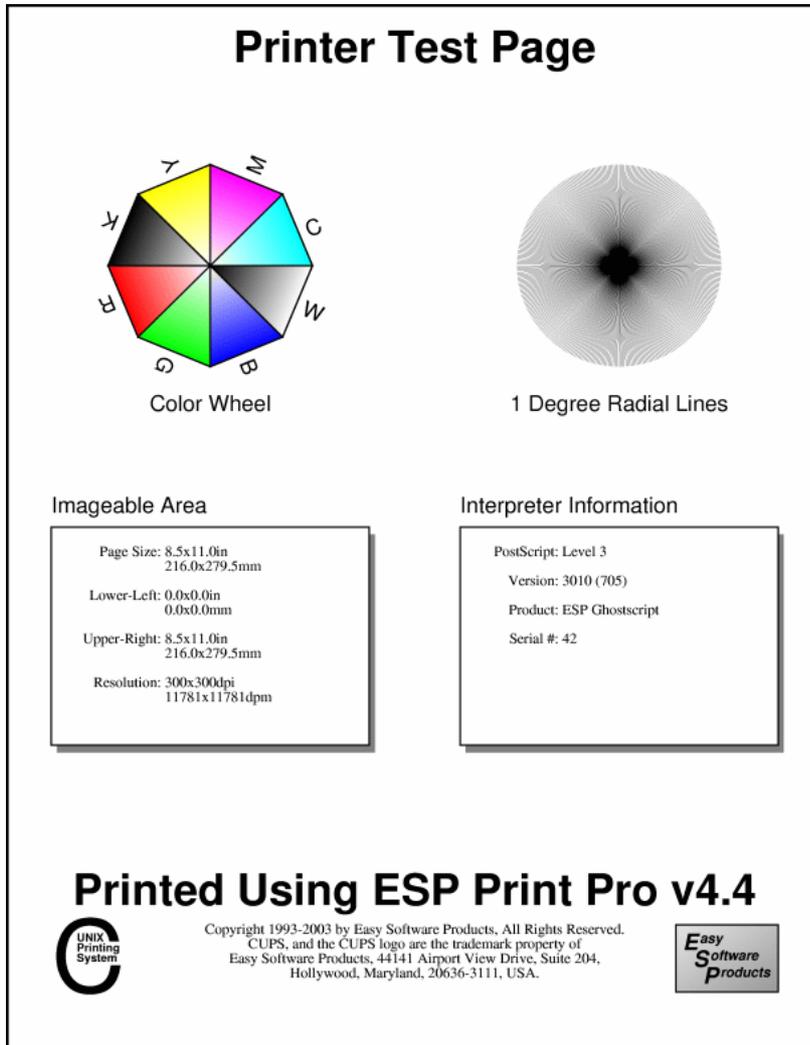
Figure 3.13: Printer Test Page.

Adding Another Printer

Click on the *Add Another Printer* button to add another printer to your system.

Adding Your First Printer from the Web

The ESP Print Pro web server provides a user–friendly "wizard" interface for adding your printers. Rather than figuring out which device URI and PPD file to use, you can instead click on the appropriate listings and fill in some simple information. Enter the following URL in your web browser to begin:

    http://localhost:631/admin

Click on the *Add Printer* button to add a printer.

> **Note:**
>
> If you use Microsoft Internet Explorer on MacOS X as your web browser, use the following URL instead:
>
>   http://127.0.0.1:631/admin
>
> This is required because the Microsoft web browser is unable to resolve the localhost address.

Managing Printers from the Command–Line

The `lpadmin` command enables you to perform most printer administration tasks from the command–line. You'll find `lpadmin` in the */usr/sbin* directory.

Adding and Modifying Printers

Run the `lpadmin` command with the −p option to add or modify a printer:

    /usr/sbin/lpadmin -p printer options ENTER

The *options* arguments can be any of the following:

−c class
Adds the named printer to printer class *class*. If the class does not exist then it is created.

−i interface
Copies the named *interface* script to the printer. Interface scripts are used by System V printer drivers. Since all filtering is disabled when using an interface script, scripts generally should not be used unless there is no other driver for a printer.

−m model
Specifies a standard printer driver which is usually a PPD file. PPD's are usually stored under the */usr/share/cups/model/* directory structure. A list of all available models can be displayed using the `lpinfo` command with the −m option. A list of printer drivers included with ESP Print Pro can be found on–line at:

        http://localhost:631/drivers/index.html
        http://www.easysw.com/printpro/printers.php

−r class

> Removes the named printer from printer class *class. If the resulting class becomes empty then it is removed.*

−v device−uri

> Sets the device for communicating with the printer. If a job is currently printing on the named printer then the job will be restarted and sent to the new device.

−D info

> Provides a textual description of the printer, e.g. "John's Personal Printer".

−E

> Enables the printer and accepts job. This option is equivalent to running the `enable(1)` and `accept(1m)` commands on the printer.

−L location

> Provides a textual location for the printer, e.g. "Computer Lab 5".

−P ppd−file

> Specifies a local PPD file for the printer driver.

Deleting Printers

Run the `lpadmin` command with the `−x` option to delete a printer:

    /usr/sbin/lpadmin -x printer ENTER

Setting the Default Printer

Run the `lpadmin` command with the `−d` option to set a default printer:

    /usr/sbin/lpadmin -d printer ENTER

The default printer can be overridden by the user using the `lpoptions(1)` command.

Starting and Stopping Printers

The `enable` and `disable` commands start and stop printer queues, respectively:

    /usr/bin/enable printer ENTER
    /usr/bin/disable printer ENTER

Printers that are disabled may still accept jobs for printing, but won't actually print any files until they are restarted. This is useful if the printer malfunctions and you need time to correct the problem. Any queued jobs are printed after the printer is enabled (started).

Accepting and Rejecting Print Jobs

The `accept` and `reject` commands accept and reject print jobs for the named printer, respectively:

    /usr/sbin/accept printer ENTER
    /usr/sbin/reject printer ENTER

As noted above, a printer can be stopped but still accept new print jobs. A printer can also be rejecting new print jobs while it finishes those that have been queued. This is useful for when you must perform maintenance on the printer and will not have it available to users for a long period of time.

Setting Quotas on a Printer

ESP Print Pro supports page and size−based quotas for each printer. The quotas are tracked individually for each user, but a single set of limits applies to all users for a partiuclar printer. For example, you can limit every user to 5 pages per day on an expensive printer, but you cannot limit every user except Johnny.

The *job−k−limit*, *job−page−limit*, and *job−quota−peiod* options determine whether and how quotas are enforced for a printer. The *job−quota−period* option determines the time interval for quota tracking. The interval is expressed in seconds, so a day is 86,400, a week is 604,800 and a month is 2,592,000 seconds. The *job−k−limit* option specifies the job size limit in killobytes. The *job−page−limit* option specifies the number of pages limit.

For quotas to be enforced, the period and at least one of the limits must be set to a non−zero value. The following options will enable quotas:

```
/usr/sbin/lpadmin -p printer -o job-quota-period=604800 \
    -o job-k-limit=1024 ENTER
/usr/sbin/lpadmin -p printer -o job-quota-period=604800 \
    -o job-page-limit=100 ENTER
```

Or, you can combine all three options on the same line.

Restricting User Access to a Printer

The −u option of the `lpadmin` command controls which users can print to a printer. The default configuration allows all users to print to a printer:

```
/usr/sbin/lpadmin -p printer -u allow:all ENTER
```

ESP Print Pro supports allow and deny lists so that you can specify a list of users who are allowed to print or not allowed to print. Along with your list of users, you can specify whether they are allowed or not allowed to use the printer:

```
/usr/sbin/lpadmin -p printer -u allow:peter,paul,mary ENTER
```

This command allows peter, paul, and mary to print to the named printer, but all other users cannot print. The command:

```
/usr/sbin/lpadmin -p printer -u deny:peter,paul,mary ENTER
```

has the opposite effect. All users except peter, paul, and mary will be able to print to the named printer.

> **Note:**
>
> The *allow* and *deny* options are not cummulative. That is, you must provide the complete list of users to allow or deny each time.
>
> Also, ESP Print Pro only maintains one list of users – the list can allow or deny users from printing. If you specify an allow list and then specify a deny list, the deny list will replace the allow list – only one list is active at any time.

Managing Printers from the Printer Manager

After starting the Printer Manager as described earlier, simply click on the printer's icon and choose *Modify...* from the *Action* menu to modify an existing printer. The ESP Print Pro Printer Wizard window will appear, allowing you to change the configuration of your printer.

To delete a printer choose *Delete...* from the *Action* menu.

Managing Printers from the Web

The Web interface is located at:

> `http://localhost:631/admin`

From there you can perform all printer management tasks with a few simple mouse clicks.

> **Note:**
>
> If you use Microsoft Internet Explorer on MacOS X as your web browser, use the following URL instead:
>
> > `http://127.0.0.1:631/admin`
>
> This is required because the Microsoft web browser is unable to resolve the localhost address.

Chapter 4
Printer Classes

This chapter describes what printer classes are and how to manage them.

The Basics

ESP Print Pro provides collections of printers called *printer classes*. Jobs sent to a class are forwarded to the first available printer in the class. Classes can themselves be members of other classes, so it is possible for you to define very large, distributed printer classes for high−availability printing.

ESP Print Pro also supports *implicit classes*. Implicit classes work just like printer classes, but they are created automatically based upon the available printers and classes on the network. This allows you to setup multiple print servers with identical printer configurations and have the client machines send their print jobs to the first available server. If one or more servers go down, the jobs are automatically redirected to the servers that are running, providing fail−safe printing.

Managing Printer Classes from the Command−Line

Run the `lpadmin` command with the `-p` and `-c` options to add a printer to a class:

```
/usr/sbin/lpadmin -p printer -c class ENTER
```

The *class* is created automatically if it doesn't exist. To remove a printer from a class use the `-r` option:

```
/usr/sbin/lpadmin -p printer -r class ENTER
```

To remove the entire class just use the −x option:

```
/usr/sbin/lpadmin -x class ENTER
```

Managing Printer Classes from the Printer Manager

The Printer Manager provides a Class Wizard window for managing printer classes (Figure 4.1). Double click on the *Printer Manager* icon or type the following command to start the Printer Manager:

```
/usr/sbin/printers ENTER
```

Then click on the *Classes* button in the tool bar and choose *Add...* from the *Action* menu. The Class Wizard (Figure 4.1) will then appear.
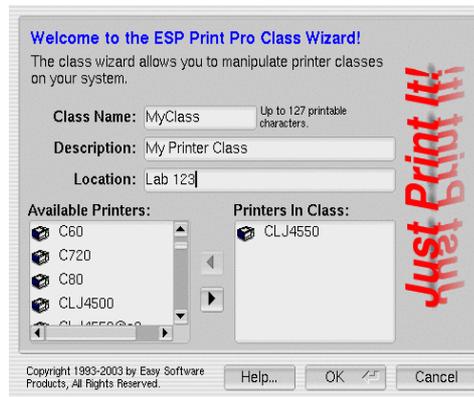
Figure 4.1: The ESP Print Pro Class Wizard

Class Name

The class name can up to 127 printable characters except the space, "/", and "@". Case is not significant, e.g. "CLASS", "Class", and "class" are considered to be the same name.

Class Description

The class description is a textual description of what the class represents, e.g. "All the LaserJets in Lab 2".

Class Location

The class location is a textual description of where the printers in the class are located, e.g. "Lab 2".

Adding and Removing Printers in a Class

At the bottom of the Class Wizard window are two lists. The printers in the list on the right are the printers that are part of the class.

Click on a printer icon and click on the right arrow button to add printers in the lefthand list to the class. Similarly, click on the printer in the righthand list and click on the left arrow button to remove printers from the class.

Commiting Your Changes to the Class

Click on the *OK* button to commit your changes to the class. To leave everything as it was, click on the *Cancel* button.

Modifying Printer Classes

Click on the class you would like to change and choose *Modify...* from the *Action* menu to modify a printer class using the Class Wizard.

Deleting Printer Classes

Click on the class you would like to delete and choose *Delete...* from the *Action* menu to delete it.

Managing Printer Classes from the Web Interface

The Web interface is located at:

> http://localhost:631/admin

The *Add Class* and *Modify Class* interfaces provide a list of available printers; click on the printers of interest to add them to the class.

> **Note:**
>
> If you use Microsoft Internet Explorer on MacOS X as your web browser, use the following URL instead:
>
> > http://127.0.0.1:631/admin
>
> This is required because the Microsoft web browser is unable to resolve the localhost address.

Implicit Classes

A noted earlier, implicit classes are created automatically from the available network printers and classes. To disable this functionality, set the ImplicitClasses directive to Off in the cupsd.conf file, or use the *Configuration Wizard* by clicking on the *Server* button in the *Printer Manager*. You will find more information on doing this in Chapter 5, "Printing System Management".

Commiting Your Changes to the Class

Chapter 5
Printing System Management

This chapter shows how you can configure the ESP Print Pro server.

The Basics

Several text files are used to configure ESP Print Pro. All of the server configuration files are located in the *etc/cups* directory:

> *classes.conf*
>> This file contains information on each printer class. Normally you manipulate this file using the Printer Manager GUI, `lpadmin` command, or the Web interface.
>
> *client.conf*
>> This file provides the default server name and encryption settings for client machines. See Chapter 6, "Client Setup" for more information.
>
> *cupsd.conf*
>> This file controls how the ESP Print Pro server (*/usr/sbin/cupsd*) operates and is normally manipulated using the Printer Manager GUI.

mime.convs

> This file contains a list of standard file conversion filters and their costs. You normally do not edit this file.

mime.types

> This file contains a list of standard file formats and how to recognize them. You normally do not edit this file.

printers.conf

> This file contains information on each printer. Normally you manipulate this file using the Printer Manager GUI, `lpadmin` command, or the Web Interface.

If you are interested in changing these files by hand, see for more information.

The Configuration Wizard

The Configuration Wizard is accessible from the Printer Manager window by clicking on the *Server* button or choosing *Server* from the *Go* menu (Figure 5.1.)
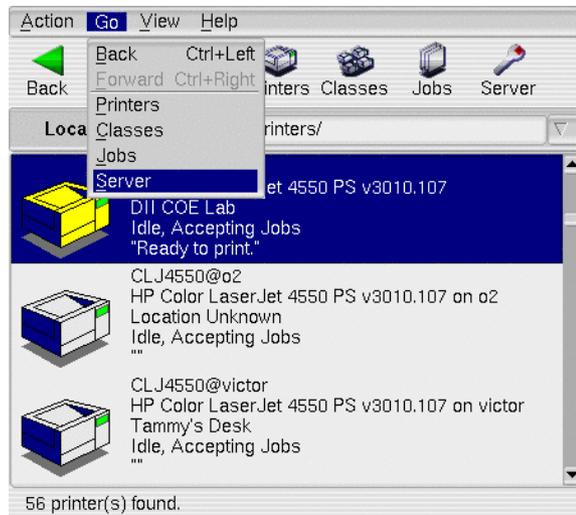
Figure 5.1: Starting the Configuration Wizard from the Printer Manager.

If you are not logged in as the root user or are configuring a remote server, a password dialog will appear requesting the username and password to use for the administration request. Unless your username is a valid administrative user, change the username field to `root` and enter the root password.

Once authenticated, the Configuration Wizard window will appear (Figure 5.2.)
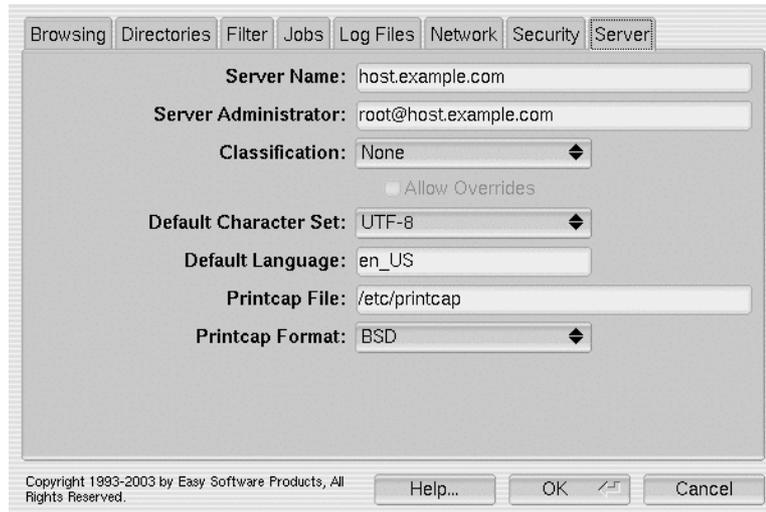
Figure 5.2: The Configuration Wizard window.

The window consists of several tabs that provide access to various configuration options supported by the ESP Print Pro server. Click on the tab to show those options.

The Browsing Tab

The Browsing tab (Figure 5.3) allows you to configure the printer browsing features in ESP Print Pro. Printer browsing allows your server to automatically share its printers with client machines and other servers.

The options in the *Browsing* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.1.

Table 5.1: Browsing Configuration Directives

Control	Directive(s)
Browsing	`Browsing` `BrowseProtocols`
Browse Port	`BrowsePort`
Browse Interval	`BrowseInterval`
Browse Timeout	`BrowseTimeout`
Browse Addresses	`BrowseAddress` `BrowseAllow` `BrowseDeny` `BrowsePoll` `BrowseRelay`
Browse Order	`BrowseOrder`
Browse Options	`BrowseShortNames` `HideImplicitMembers` `ImplicitAnyClasses` `ImplicitClasses`
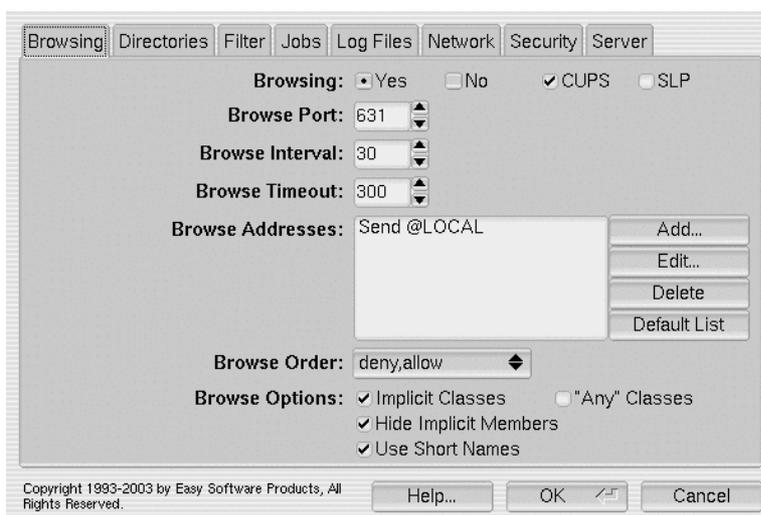
Figure 5.3: The Browsing Tab.

Browsing

The *Browsing* controls determine whether browsing information is received or sent. Click on *Yes* to turn browsing on and *No* to turn browsing off. The *CUPS* and *SLP* check boxes control which protocols to use.

The CUPS browsing protocol is a UDP broadcast–based browsing service that is suitable for most small networks. Each server broadcasts a small (typically about 80 bytes) packet of information describing each local printer on the server at regular intervals. Clients then see these printers and provide them to each user. CUPS browsing is usually only available on the server's subnet but can be relayed to other subnets fairly easily.

The Service Location Protocol ("SLP") is a UDP multicast–based directory service that is better suited to larger corporate networks. A server advertises each printer as a separate printing service using the SLPv2 IPP printer template. Clients then do an active search for printers via SLP at regular intervals to determine which printers are available on the network. SLP browsing works best when you have one or more SLP Directory Agents ("DAs") on your network to consolidate the list of services that are available on the network.

The default client and server configuration uses CUPS browsing. If you wish to use SLP browsing, it must be enabled on each server and client separately.

Browse Port

The *Browse Port* control determines which UDP port to use when sending or receiving CUPS browsing information. The port number must be the same on all systems that wish to share or use printers on a server.

The default port number is the IPP port 631.

Browse Interval

The *Browse Interval* control determines how often printer information is sent from servers and how often servers are polled by clients. This value should be no greater than 1/2 of the timeout value described next for reliable operation.

The default interval is 30 seconds.

Browse Timeout

The *Browse Timeout* control determines how long shared printers are shown on clients before they timeout. When a client has not seen a shared printer on the network for the specified timeout period, the shared printer is then removed from the list of available printers shown to users. The timeout must be at least twice the interval value described previously for reliable operation.

The default timeout is 300 seconds.

Browse Addresses

The *Browse Addresses* list shows the CUPS protocol browsing address. The default setting is to send printer information to the "all interfaces" broadcast address 255.255.255.255.

Click on the *Add...* button to add new browse addresses, *Edit...* to edit an address, and *Delete* to delete an address.

Click on the *Default List* button to restore the list to the default browse address (Send 255.255.255.255).
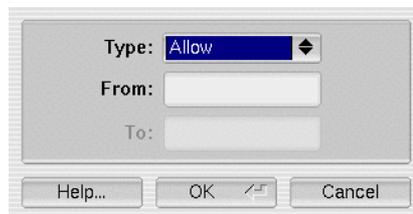
Figure 5.4: The Browse Address Allow Dialog.

Allowing Browsing Information from Specific Addresses or Names

CUPS browsing can allow printer information from specific addresses or names with the BrowseAllow directive. This enables you to ignore or listen to specific servers or networks. To add a new *Allow* line to the *Browse Addresses* list, click on the *Add...* button. When the dialog appears (Figure 5.4), choose the *Allow* type to specify that browsing information from the specified address or name should be used.

The *From* field can contain a specific IP address (11.22.33.44), a class–based network number (11.22.33 or 11.22.33.*), or a CIDR network number (11.22.33.0/24).

The *From* field can also contain a hostname (foo.bar.com) or domain name (*.bar.com). Name–based access control also requires that the hostname lookup option be enabled – see the *Network* tab for this option.

Finally, the *From* field can contain any of the following special names:

- all – Allows printer information from all hosts.
- none – Does not allow printer information from any hosts.
- @LOCAL – Allows printer information from all local network interfaces.
- @IF(name) – Allows printer information from hosts on the specified network interface.
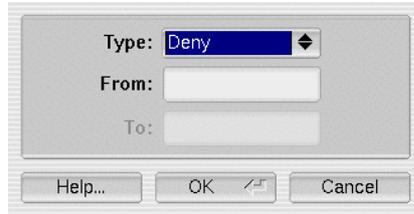
Figure 5.5: The Browse Address Deny Dialog.

Denying Browsing Information from Specific Addresses or Names

CUPS browsing can deny printer information from specific addresses or names with the `BrowseDeny` directive. This enables you to ignore or listen to specific servers or networks. To add a new *Deny* line to the *Browse Addresses* list, click on the *Add...* button. When the dialog appears (Figure 5.5), choose the *Deny* type to specify that browsing information from the specified address or name should be used.

The *From* field can contain a specific IP address (`11.22.33.44`), a class–based network number (`11.22.33` or `11.22.33.*`), or a CIDR network number (`11.22.33.0/24`).

The *From* field can also contain a hostname (`foo.bar.com`) or domain name (`*.bar.com`). Name–based access control also requires that the hostname lookup option be enabled – see the *Network* tab for this option.

Finally, the *From* field can contain any of the following special names:

- `all` – Denies printer information from all hosts.
- `none` – Does not deny printer information from any hosts.
- `@LOCAL` – Denies printer information from all local network interfaces.
- `@IF(name)` – Denies printer information from hosts on the specified network interface.
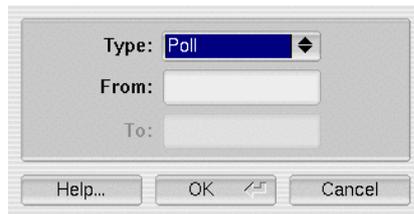
Figure 5.6: The Browse Address Poll Dialog.

Polling a Server

When a print server is on a different subnet than the client, CUPS browsing information sent from the server will usually not be visible to the client. To work around this problem, the *Poll* type (Figure 5.6) allows a client to access printers on a remote server automatically.

The *From* field contains the hostname or IP address of the server you wish to poll.

The *Poll* type can be combined with the *Relay* type described next to relay browsing information from a remote server to all clients on the local subnet.

Figure 5.7: The Browse Address Relay Dialog.

Relaying Browsing Information Between Networks

CUPS browsing provides a relay or repeater mechanism that enables you to relay browsing information from one network to another. For example, if server A on subnet A (`11.22.33.*`) provides printing services for a corporate network, and machine B on subnet B (`11.22.44.*`) acts as a gateway between subnets A and B, machine B can be setup to relay browsing information from subnet A to subnet B. Similarly, client C on subnet B could poll server A and relay the browsing information to subnet B. The *Relay* type (Figure 5.7) provides support for relaying or repeating browsing information between networks.

The *From* address provides an address or name that is used to match the source of the browse packets. For the first example, the *From* address on machine B would be `11.22.33.*`. In the second example, the *From* address on client C would be the localhost address (`127.0.0.1`) since polled printers are broadcast to the local loopback interface.

The *To* address provides the UDP broadcast address for the browsing packets. For the first example, the *To* address on machine B would be `11.22.44.255`. For the second example, the *To* address on client C could be `11.22.44.255` or `255.255.255.255` – the latter would send the browsing packets to all network interfaces known to client C instead of just subnet B.

The *To* address can also contain the special names `@LOCAL` or `@IF(name)`. The `@LOCAL` name specifies that printer information should be relayed to all local network interfaces except dial–up and other point–to–point connections. The `@IF(name)` name specifies that printer information should be send to the named network interface.
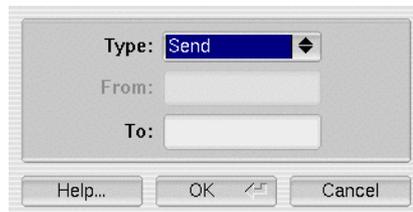
Figure 5.8: The Browse Address Send Dialog.

Sending Browsing Packets

The *Send* type (Figure 5.8) enables you to configure the send addresses for all browsing information. The *To* address provides the UDP broadcast address for the browsing packets. The default configuration sends CUPS browsing packets to the "all interfaces" broadcast address, `255.255.255.255`. If your server also provides a dial–up or other WAN or Internet connection as well as a local network interface, you probably will want to change this to the broadcast address for your LAN.

The *To* address can also contain the special names `@LOCAL` or `@IF(name)`. The `@LOCAL` name specifies that printer information should be relayed to all local network interfaces except dial–up and other point–to–point connections. The `@IF(name)` name specifies that printer information should be send to the

named network interface.

Browse Order

The *Browse Order* control specifies the default access control for CUPS browsing packets. Set this to *Deny,Allow* to ignore browsing packets by default, or *Allow,Deny* to use browsing packets by default.

Browse Options

The *Browse Options* check boxes specify how to manage remote printers. The *Implicit Classes* check box determines whether implicit classes are created automatically. Implicit classes are collections of remote printers with the same name. When two or more remote printers are seen with the same name, e.g. LaserJet@server1 and LaserJet@server2, an implicit class is automatically created that joins the queues into a single virtual queue, e.g. LaserJet. Jobs sent to this virtual queue are forwarded to the next available server in the implicit class, providing automatic fault–tolerance and load–balancing between the available servers.

The *Hide Implicit Members* check box determines whether the member printers of an implicit class are hidden from the user. In the previous example, an implicit class named LaserJet was created for the printers LaserJet@server1 and LaserJet@server2, for a total of three queues. When the *Hide Implicit Members* box is checked, the LaserJet@server1 and LaserJet@server2 queues will be hidden from the user – only the LaserJet queue will be visible, pointing to both of the (hidden) queues on the two servers.

The *Use Short Names* check box determines if remote printers will use a "short name" whenever possible. For example, if you have a server with a printer named LaserJet, the client can name the local queue either LaserJet or LaserJet@server. If the *Use Short Names* box is checked, the server will use the short name (LaserJet) unless there is already a local queue of that name or there is more than one remote printer with the same name (e.g. LaserJet@server1, LaserJet@server2).

The *"Any" Classes* check box determines whether the server will create implicit classes containing a mix of local and remote printers. For example, if a client has a local printer called "LaserJet" and a server has a printer called "LaserJet@server", an implicit class called "AnyLaserJet" will be created if the *"Any" Classes* box is checked.
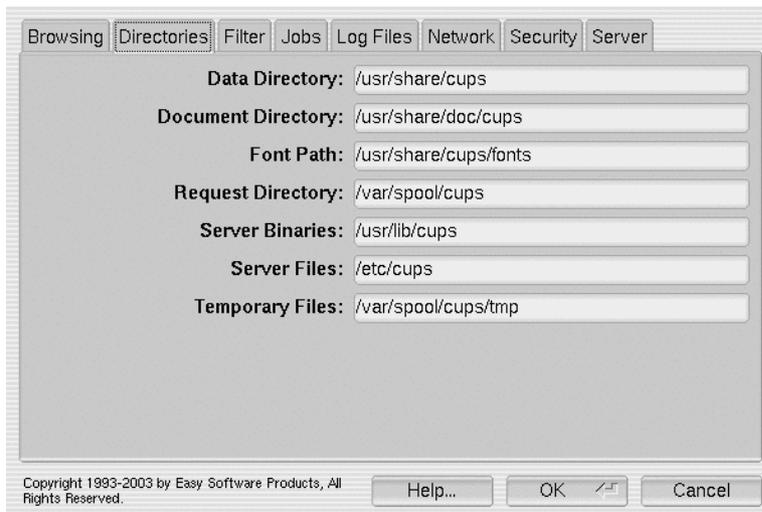
Figure 5.9: The Directories Tab.

The Browsing Tab

The Directories Tab

The *Directories* tab (Figure 5.9) determines the location of various files on your system. The options in the *Directories* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.2.

Table 5.2: Directory Configuration Directives

Control	Directive(s)
Data Directory	`DataDir`
Document Directory	`DocumentRoot`
Font Path	`FontPath`
Request Directory	`RequestRoot`
Server Binaries	`ServerBin`
Server Files	`ServerRoot`
Temporary Files	`TempDir`

The *Data Directory* field contains the directory which holds the data files used by the printing system. The default value is */usr/share/cups*.

The *Document Directory* field contains the location of HTML, PDF, and image files for the software documentation and web interface content. The default value is */usr/share/doc/cups*.

The *Font Path* field contains a list of directories that are searched when looking for fonts to use for printing. Directories are separated using the colon (:) character. The default value is */usr/share/cups/fonts*.

The *Request Directory* field contains the directory that contains the print job and request files sent by clients to the server. The default value is */var/spool/cups*.

The *Server Binaries* field contains the directory where the filters, printer drivers, backends, background programs, and CGI programs are located. The default value is */usr/lib/cups* or */usr/libexec/cups* depending on the operating system.

The *Server Files* field contains the directory where the *cupsd.conf* and other server configuration files can be found. The default value is */etc/cups*.

The *Temporary Files* field contains the directory the scheduler uses to hold temporary files for printing. The default value is */var/spool/cups/tmp*.
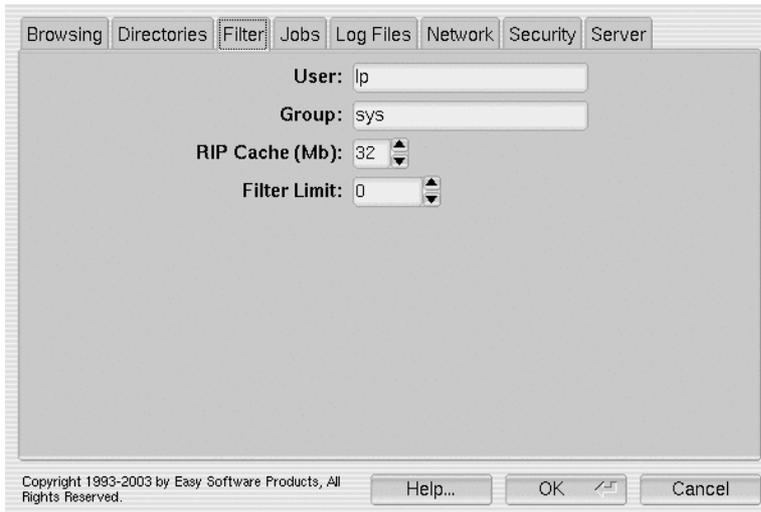
Figure 5.10: The Filter Tab.

The Filter Tab

The *Filter* tab (Figure 5.10) contains the print filter options. The *User* and *Group* options are also used when running CGI programs for the web interface.The options in the *Filter* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.3.

Table 5.3: Filter Configuration Directives

Control	Directive(s)
User	User
Group	Group
RIP Cache (Mb)	RIPCache
Filter Limit	FilterLimit

The *User* field contains the name of the user that all filter programs and printer drivers are run under. This can be the name of any unpriviledged user. The default value depends on the operating system and is usually `lp`.

> **Note:**
>
> Do not set the *User* field to `root`. Doing so will increase the chances that a malicious user could gain priviledged access to your system.

The *Group* field contains the name of the group that all filter programs and printers drivers run under. The default group name is `admin`, `sys`, `system`, or `root` depending on your operating system.

The *RIP Cache (Mb)* control specifies the maximum amount of memory each filter should use. The default value is 8Mb.

The *Filter Limit* control specifies the maximum cost of all filters that are running at any given time. This enables you to limit the number of print jobs that print simultaneously based on the complexity of the filtering required. A typical PostScript printer needs a filter limit of 100, while most non−PostScript printers require a

limit of 250. A limit of 0 (the default) specifies that jobs should be printed immediately without regard to the number of jobs that are already printing.
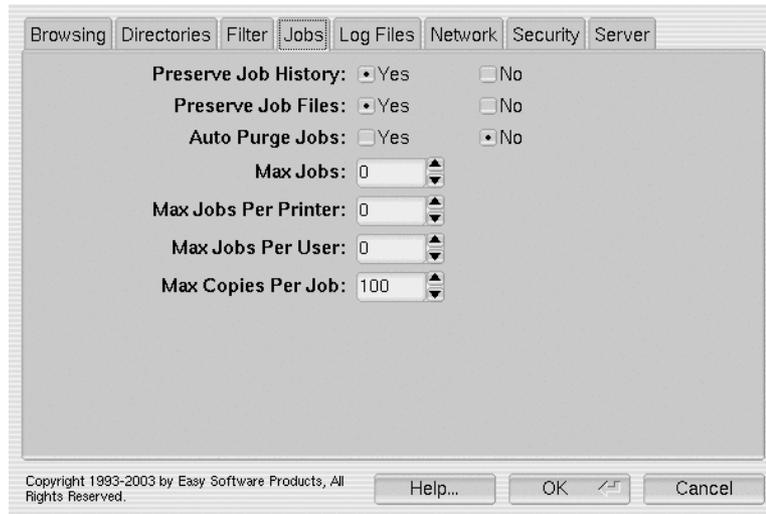
Figure 5.11: The Jobs Tab.

The Jobs Tab

The *Jobs* tab contains various history and limit options for jobs. The options in the *Jobs* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.4.

Table 5.4: Jobs Configuration Directives

Control	Directive(s)
Preserve Job History	`PreserveJobHistory`
Preserve Job Files	`PreserveJobFiles`
Auto Purge Jobs	`AutoPurgeJobs`
Max Jobs	`MaxJobs`
Max Jobs Per Printer	`MaxJobsPerPrinter`
Max Jobs Per User	`MaxJobsPerUser`

The *Preserve Job History* option determines whether a history of completed print jobs is kept. This is necessary for doing some kinds of printer accounting and enforcement of printer quotas. The default setting is *Yes*.

The *Preserve Job Files* option determines whether the print files in a job are retained after the job completes. Retained jobs can be reprinted at a later time by restarting the job. The default setting is *No*.

The *Auto Purge Jobs* option determines whether the job history and files are automatically purged when they are no longer needed for enforcement of printer quotas. The default setting is *No*.

The *Max Jobs* option determines the maximum number of print jobs that will be allowed by the server, including completed print jobs if job history is enabled. The default setting is 0 for an unlimited number of jobs.

The *Max Jobs Per Printer* option determines the maximum number of pending and active print jobs that will be allowed for any particular printer. This option is useful for limiting the backlog of print jobs on printers. The default setting is 0 for an unlimited number of jobs per printer.

The *Max Jobs Per User* option determines the maximum number of pending and active print jobs that will be allowed for any particular user. The default setting is 0 for an unlimited number of jobs per user.
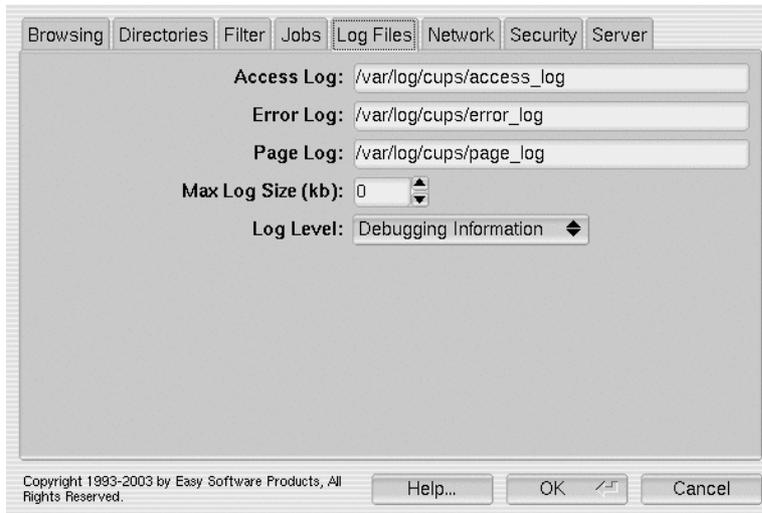
Figure 5.12: The Log Files Tab.

The Log Files Tab

The *Log Files* tab contains options for the log files created by the ESP Print Pro server. The options in the *Log Files* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.5.

Table 5.5: Log Files Configuration Directives

Control	Directive(s)
Access Log	AccessLog
Error Log	ErrorLog
Page Log	PageLog
Max Log Size	MaxLogSize
Log Level	LogLevel

The *Access Log* field contains the name of the HTTP access log file that is stored in "common log format". The field can contain any valid filename or the string syslog which will log all server accesses to the operating system log files. The default value is */var/log/cups/access_log*.

The *Error Log* field contains the name of the error log file that contains text messages from the server, filters, printer drivers, and backends. The field can contain any valid filename or the string syslog which will log all messages to the operating system log files. The default value is */var/log/cups/error_log*.

The *Page Log* field contains the name of the page log file that contains an entry for each page that is printed. The field can contain any valid filename or the string syslog which will log all pages to the operating system log files. The default value is */var/log/cups/page_log*.

The *Max Log Size (Mb)* control determines the maximum size of each log file in megabytes. The default value is 0Mb for no limit.

The *Log Level* chooser determines the type of messages that are stored in the error log file. The default setting is *General Information* which provides general information messages along with any error messages. If you experience difficulties with the ESP Print Pro software, you will usually be asked to choose the *Debuggging Information* log level which provides additional information that can be used to diagnose problems in the software.
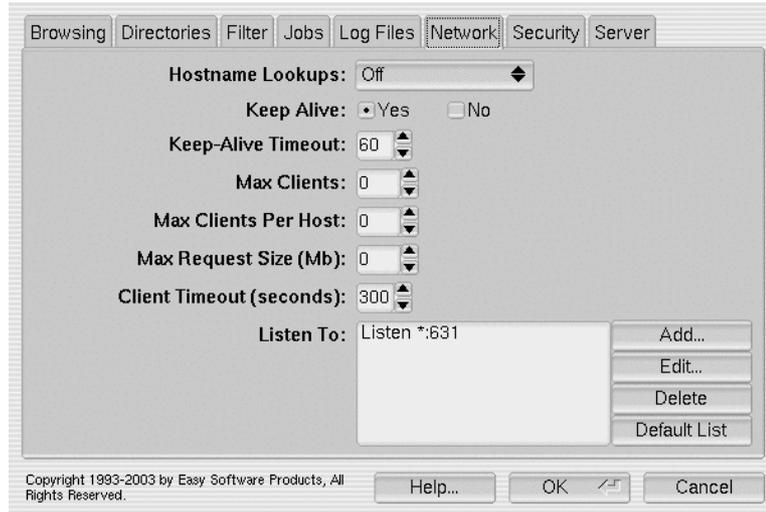
Figure 5.13: The Network Tab.

The Network Tab

The *Network* tab (Figure 5.13) contains all of the networking options, including which network ports to listen to. The options in the *Network* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.6.

Table 5.6: Network Configuration Directives

Control	Directive(s)
Hostname Lookups	`HostNameLookups`
Keep Alive	`KeepAlive`
Keep–Alive Timeout	`KeepAliveTimeout`
Max Clients	`MaxClients`
Max Request Size (Mb)	`LimitRequestBody`
Client Timeout (seconds)	`Timeout`
Listen To	`Listen Port SSLListen SSLPort`

The *Hostname Lookups* chooser determines if the server does hostname lookups on the client addresses. Hostname lookups are only required if you want to limit access by domain or host names. The default setting is *Off.*

The *Keep Alive* setting determines whether the server will keep client connections open for more than one request. The default setting is *Yes.*

The *Keep–Alive Timeout* control determines the number of seconds that the server will keep client connections open with no activity. The default value is 60 seconds.

The *Max Clients* control determines the maximum number of clients that can connect to the server at any given time. The default value is 0 which will set the maximum number of clients to one third of the available file descriptors.

The *Max Request Size (Mb)* control determines the maximum size of each print file and request that will be accepted by the server. The default value is 0 which allows files of any size to be printed.

The *Client Timeout (seconds)* control determines the amount of time that the server will wait for a client to complete a request. If no data is received from the client or sent to the client in this time, then the connection to the client will be closed. The default timeout is 300 seconds.

The *Listen To* list shows all of the addresses and ports the server will listen for new connections. The default is to listen to all addresses (*) on the IPP port (631). Click on the *Add...* button to add a new address and port, or the *Edit...* button to edit an existing entry in the list. After clicking on either button the *Listen* dialog (Figure 5.14) is displayed.
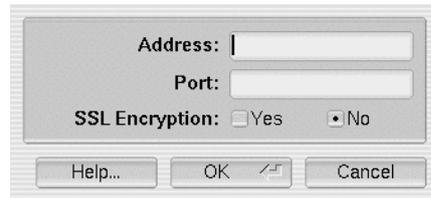
Figure 5.14: The Listen Dialog.

The *Address* field contains the listening address and can be the asterisk (*) to listen on all interfaces or an IP address of a specific network interface. For example, the localhost interface has an IP address of 127.0.0.1.

The *Port* field contains the listening port and can be any number from 1 to 65535. Normally, however, you will only use ports 80 (HTTP), 443 (HTTPS), or 631 (IPP).

> **Note:**
>
> Always check your server to make sure that you are not specifying a port number that is already in use. Port 631 can always be used for ESP Print Pro since it should be the only IPP server on a system. However, ports 80 and 443 are normally used by web servers like Apache to provide local web services, so if you already have a web server on your system be sure to choose different numbers.

The *SSL Encryption* settings (SSLListen and SSLPort) determines if the server will encrypt client connections. Unless you also change the client configuration to always use encryption, do not enable SSL encryption on port 631. See the "Using Encryption" section later in this chapter for more details

Figure 5.15: The Security Tab.

The Security Tab

The *Security* tab (Figure 5.15) contains all of the security options, including the access control lists (ACL) and encryption files. The options in the *Security* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.6.

Table 5.6: Security Configuration Directives

Control	Directive(s)
Remote Root User	RemoteRoot
System Group	SystemGroup
Encryption Certificate	ServerCertificate
Encryption Key	ServerKey
Locations	Allow AuthClass AuthGroupName AuthType Deny Encryption Location Order Require Satisfy

The *Remote Root User* defines the user name that is assigned to remote requests that use a username of root without authentication. This prevents a malicious user from cancelling every users' print jobs from a remote machine, for example. To disable this security feature, set the user name to root. The default value is remroot.

The *System Group* field defines the group name for users that are allowed to perform administrative tasks. The default group name is sys, system, or root depending on your operating system.

The *Encryption Certificate* field defines the name of the encryption certificate file for your server. This can be a certificate file generated using the espca program provided with ESP Print Pro or a certificate you received from a commercial certificate authority. See the "Using Encryption" section later in this chapter for more details. The default value is */etc/cups/ssl/server.crt*.

The *Encryption Key* field defines the name of the encryption key file for your server. This can be a key file generated using the espca program provided with ESP Print Pro or a key you received from a commercial certificate authority. The default value is */etc/cups/ssl/server.key*.

The *Locations* list shows the access controls on various HTTP locations on the server. Click on the *Add..* button to add a new location or *Edit...* to edit an existing location. Clicking on either button displays the location dialog (Figure 5.16).
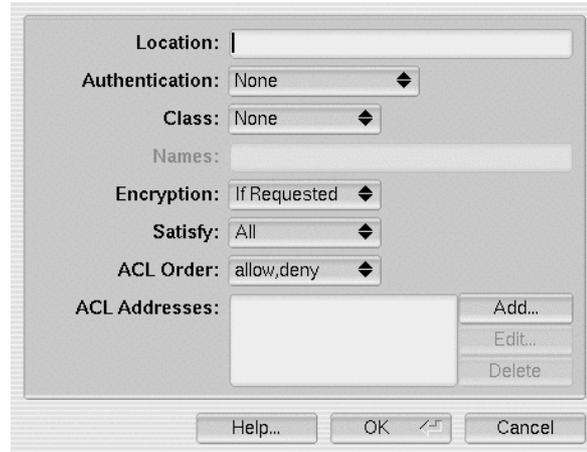
Figure 5.16: The Location Dialog.

The location dialog window defines the authentication, encryption, and access control list for a particular location on the server. The *Location* field contains the virtual path on the server, such as */admin* for administrative operations. This path can also refer to printers, classes, or jobs – see the "Printing System Security" section later in this chapter for more information.

The *Authentication* chooser sets the type of authentication to use: *None*, *Basic*, or *Digest*. This directive is called `AuthType` and the default value is *None*.

The *Class* chooser sets the class of authentication to use: *None*, *User*, *Group*, or *System Group*. This directive is called `AuthClass` and the default value is *None*.

The *Names* field contains a list of required user or group names separated by spaces. Users that do not have one of the specified user names (for the *User* class of authentication) or are not members of one of the specified group names (for the *Group* class of authentication) will not be allowed access even if they provide a valid username and password to the server. This directive is called `AuthGroupName`.

The *Encryption* chooser selects the required level of encryption for the location: *Never*, *IfRequested*, or *Required*. For example, if you want to allow remote access to the */admin* location, you'll probably want to change the *Encryption* option to *Required* so that passwords are encrypted over the network connection. This directive is called `Encryption` and the default value is *IfRequested*.

> **Note:**
>
> The *Encryption* option applies to IPP applications that support the HTTP Upgrade protocol. All CUPS and ESP Print Pro applications support this protocol, however most web browsers do not. For this reason, you will likely need to assign a dedicated port number (usually port 443) to listen for SSL (encrypted) connections if you wish to do remote adminstration tasks using a web browser. See the previous section on "The Network Tab" for more information on listening to secure ports.

The *Satisfy* chooser determines if any or all of the authentication and access control requirements must be met to allow access. The value of *All* requires that all conditions be met before a user is allowed to access the server at the specified location. The *Any* value changes the server behavior so that access is granted if the user is correctly authenticated *or* the access control conditions are satisfied. This directive is called <u>Satisfy</u> and the default value is *All*.

The *ACL Order* chooser determines whether the default behavior is to allow access (*allow,deny*) or reject access (*deny,allow.*) The default is to reject access (*deny,allow.*) This directive is called <u>Order</u> and the default is to reject access (*deny,allow*).

The *ACL Addresses* list shows the access control rules for the specified location. Each line either allows (*Allow ...*) or denies (*Deny ...*) access to the server. These directives are called <u>Allow</u> and <u>Deny</u>. Click on the *Add...* button to add a new entry to the list or the *Edit...* button to edit an existing entry. Clicking on either button displays the *ACL* dialog window (Figure 5.17).

Figure 5.17: The Allow ACL Dialog.

To allow access from a specific IP address, enter the IP address in the *From* field.

Similarly, to allow access from a specific IP network, enter the network address in the *From* field. For class–based network addresses, you can enter the significant network numbers (`11.22.33`) or use the asterisk (*) as a wildcard (`11.22.33.*`). For CIDR network numbers, use the slash notation with either the number of significant bits or the netmask (`11.22.33/24` or `11.22.33.0/255.255.255.0`.)

The *From* field can also contain a hostname (`foo.bar.com`) or a domain name (`*.bar.com`.) If you use name–based access control, always remember to turn on *Hostname Lookups* in "The Network Tab".

Finally, the *From* field can contain any of the following special names:

- `all` – Allows access from all hosts.
- `none` – Does not allow access from any hosts.
- `@LOCAL` – Allow access from all local network interfaces.
- `@IF(name)` – Allows access from hosts on the specified network interface.
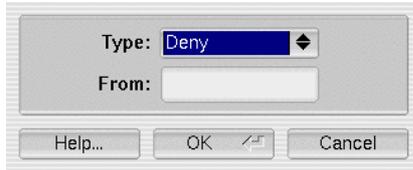
Figure 5.18: The Deny ACL Dialog.

To deny access, simply change the *Type* chooser to the *Deny* value (Figure 5.18.)
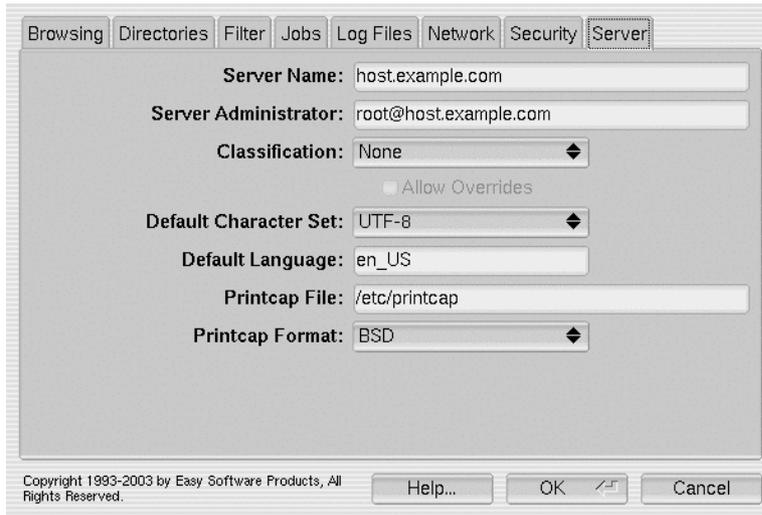
Figure 5.19: The Server Tab.

The Server Tab

The *Server* tab (Figure 5.19) defines the server name, administrator, classification, and other important values. The options in the *Server* tab correspond to the *cupsd.conf* configuration directives shown in Table 5.7.

Table 5.7: Server Configuration Directives

Control	Directive(s)
Server Name	`ServerName`
Server Administrator	`ServerAdmin`
Classification	`Classification` `ClassifyOverride`
Default Character Set	`DefaultCharset`
Default Language	`DefaultLanguage`
Printcap File	`Printcap`
Printcap Format	`PrintcapFormat`

The *Server Name* field contains the name of the server that is reported to clients when they connect. The default value is the hostname of your system.

The *Server Administrator* field contains the email address of the administrator for the system. Currently this field is unused, but will be used as the return address for email notifications and other server−generated output in future releases of ESP Print Pro. The default value is the root user at the local server name.

The *Classification* chooser determines the default classification labelling that is applied to print jobs. The default value of *None* disables classification labelling. If the *Allow Overrides* box is checked, users will be able to change the job classifcation by setting the banner pages and/or disable one of the banner pages as desired. Otherwise, both the leading and trailing banner pages will be locked to the classification that is set on the server.

The *Default Character Set* chooser sets the default character set that is used when printing text and formatting messages on the server. The default value is *UTF−8* which is an ASCII−compatible 8−bit encoding for Unicode text.

The *Default Language* field sets the default language to use when translating messages and web pages on the server. Currently ESP Print Pro supports German (`de`), English (`en`), Spanish (`es`), French (`fr`), and Italian (`it`). Any trailing country code (e.g. the `_US` in the `en_US` in Figure 5.19) is ignored.

The *Printcap File* field specifies the name of the printcap file on your system. This file will be automatically updated to contain a current list of available printers whenever local or remote printers are added or deleted from the system. Use the default value of */etc/printcap* to simulate the old Berkeley (lpr) printing system, */etc/printers.conf* to simulate the Solaris printing system, or the empty string to disable the generation of this file.

The *Printcap Format* chooser selects the printcap file format to be used. Select the default value of *BSD* to simulate the Berkeley printing system or *Solaris* to simulate the Solaris printing system.

Printing System Security

ESP Print Pro provides support for address, certificate, and password (Basic and Digest) based authentication and access control.

Certificate and password authentication provide ways to limit access to individual people or groups.

Address based access control allows you to limit access to specific systems, networks, or domains. While this does not provide authentication, it does allow you to limit the potential users of your system efficiently.

ESP Print Pro maintains a list of locations that have access control and/or authentication enabled. Locations are specified by using the Configuration Wizard described previously of adding <u>Location</u> directive to the *cupsd.conf* file by hand:

```
<Location /resource>
AuthClass ...
AuthGroupName ...
AuthType ...

Order ...
Allow from ...
Deny from ...
</Location>
```

Locations generally follow the directory structure of the <u>DocumentRoot</u> directory, however ESP Print Pro does have several virtual locations for administration, classes, jobs, and printers. Table 5.8 shows these locations:

Table 5.8: Virtual Locations on the Server.

Location	Description
/admin	The path for all administration operations.
/admin/conf	The path for access to the ESP Print Pro configuration files.
/classes	The path for all classes.
/classes/name	The resource for class name.
/jobs	The path for all jobs.
/jobs/id	The resource for job id.
/printers	The path for all printers.
/printers/name	The path for printer name.
/printers/name.ppd	The PPD file path for printer name.

Authentication Using Certificates

ESP Print Pro supports a local certificate–based authentication scheme that can be used in place of `Basic` or `Digest` authentication by clients connecting through the `localhost` interface. Certificate authentication is not supported or allowed from clients on any other interface.

Certificates are 128–bit random numbers that refer to an internal authentication record in the server. A client connecting via the `localhost` interface sends a request with an authorization header of:

```
Authorization: Local 0123456789ABCDEF0123456789ABCDEF
```

The server then looks up the local certificate and authenticates using the username associated with it.

Certificates are generated by the server automatically and stored in the */etc/cups/certs* directory using the process ID of the CGI program started by the server. Certificate files are only readable by the User and Group defined in the *cupsd.conf* file. When the CGI program ends the certificate is removed and invalidated automatically.

The special file */etc/cups/certs/0* defines the *root certificate* which can be used by any client running as the super–user or another user that is part of the group defined by the SystemGroup directive. The root certificate is automatically regenerated once every 5 minutes.

Using Basic Authentication

Basic authentication uses UNIX users and passwords to authenticate access to resources such as printers and classes, and to limit access to administrative functions.

> **Note:**
>
> Basic authentication sends the username and password Base64 encoded from the client to the server, so it offers no protection against eavesdropping. This means that a malicious user can monitor network packets and discover valid users and passwords that could result in a serious compromise in network security. We highly recommend that you use Basic authentication only in conjunction with encryption when allowing access from remote machines.

The ESP Print Pro implementation of Basic authentication does not allow access through user accounts without a password. If you try to authenticate using an account without a password, your access will be immediately blocked.

Once a valid username and password is authenticated by ESP Print Pro, any additional group membership requirements are checked.

> **Note:**
>
> The root user is considered by ESP Print Pro to be a member of every group.

Use the `AuthType` directive to enable Basic authentication:

```
AuthType Basic
```

Using Digest Authentication

Digest authentication uses users and passwords defined in the */etc/cups/passwd.md5* file to authenticate access to resources such as printers and classes, and to limit access to administrative functions.

> **Note:**
>
> Unlike Basic authentication, Digest passes the MD5 sum (basically a complicated checksum) of the username and password instead of the strings themselves. Also, Digest authentication does not use the UNIX password file, so if an attacker does discover the original password it is less likely to result in a serious security problem so long as you use a different UNIX password than the corresponding Digest password.
>
> The current ESP Print Pro implementation of Digest authentication uses the client's hostname or IP address for the "nonce" value. The nonce value is an additional string added to the username and password to make guessing the password more difficult. The server checks that the nonce value matches the client's hostname or address and rejects the MD5 sum if it doesn't. Future versions of ESP Print Pro will support Digest "session" authentication which adds the request data to the MD5 sum, providing even better authentication and security.
>
> Digest authentication does not guarantee that an attacker cannot gain unauthorized access, but it is safer than Basic authentication and should be used in place of Basic authentication if encryption is not used. **Support for Digest authentication in web browsers is not yet universally available.**

The `lppasswd(1)` command is used to add, change, or remove accounts from the *passwd.md5* file. To add a user to the default system group, type:

```
lppasswd -a user ENTER
Password: (password) ENTER [password is not echoed]
Password again: (password) ENTER [password is not echoed]
```

Once added, a user can change his/her password by typing:

```
lppasswd ENTER
Old password: (password) ENTER [password is not echoed]
Password: (password) ENTER [password is not echoed]
Password again: (password) ENTER [password is not echoed]
```

To remove a user from the password file, type:

```
lppasswd -x user ENTER
```

Once a valid username and password is authenticated by ESP Print Pro, any additional group membership requirements are checked.

> **Note:**
>
> The root user is considered by ESP Print Pro to be a member of every group.

Use the `AuthType` directive to enable Digest authentication:

```
AuthType Digest
```

System and Group Authentication

The <u>AuthClass</u> directive controls the level of authentication to perform. `System` and `Group` authentication extend the normal user–based authentication to require membership in a UNIX group. For `System` authentication each user must belong to the `sys`, `system`, or `root` group; the actual group depends on the operating system.

For `Group` authentication each user must belong to the group(s) named by the <u>AuthGroupName</u> directive:

```
<Location /path>
AuthType Digest
AuthClass Group
AuthGroupName mygroup
</Location>
```

When using Digest authentication you need to create user accounts with the named group using the `-g` option:

```
lppasswd -g mygroup -a user ENTER
Password: (password) ENTER [password is not echoed]
Password again: (password) ENTER [password is not echoed]
```

Similarly, users must use the −g option when changing their password:

```
lppasswd −g mygroup ENTER
Old password: (password) ENTER [password is not echoed]
Password: (password) ENTER [password is not echoed]
Password again: (password) ENTER [password is not echoed]
```

Using Encryption

ESP Print Pro supports SSL/2.0, SSL/3.0, and TLS/1.0 encryption using keys as large as 128−bits. Encryption support is provided via the OpenSSL library and is linked into the CUPS API and server provided with ESP Print Pro.

ESP Print Pro provides support for dedicated (https) and "upgrade" (TLS) encryption of sessions. The "HTTP Upgrade" method is described in RFC 2817; basically, the client can be secure or unsecure, and the client or server initiates an upgrade to a secure connection via some new HTTP fields and status codes. The HTTP Upgrade method is new and no browsers we know of support it yet. Stick with "https" for web browsers.

> **Warning:**
>
> CLIENTS CURRENTLY TRUST ALL CERTIFICATES FROM SERVERS. This makes the ESP Print Pro client applications vulnerable to "man in the middle" attacks, so we don't recommend using this to do remote administration over WANs at this time.
>
> Future versions of ESP Print Pro will keep track of server certificates and provide a callback/confirmation interface for accepting new certificates and warning when a certificate has changed.

To enable encryption you need a certificate file and a key file. The key file is generated by you using the espca or openssl programs.

The certificate file can be generated on your own or by requesting a certificate from a Certificate Authority ("CA"). Certificate files that you generate on your own are often called unsigned or self−signed certificates, and more colloquially "snake−oil" certificates. Certificate files that you get from a CA have been signed by that company which provides a certain amount of authenticity to your certificate.

> **Note:**
>
> While self−signed certificates are not technically any more insecure than a signed certificate, they will require the user to go through a certificate acceptance dialog in a Web browser, so they are more vulnerable to man−in−the−middle attacks since the user is expecting the dialog to come up to accept the certificate. We recommend that you get a signed certificate for any server that provides services over a WAN or the Internet.

Generating a Self−Signed Certificate

Before you can use encryption on the server you need to create a server certificate and private key. The Certificate Wizard program (Figure 5.20) provides a GUI interface for creating your own self−signed server

certificates:

```
/usr/sbin/espca ENTER
```

Choose *Generate a Self–Signed Certificate* and click on the *Next* button to step through the wizard that will generate the required encryption files.

Figure 5.20: Generating a Self–Signed Certificate Using the Certificate Wizard

Requesting and Installing a Signed Certificate

Signed certificates offer a way to validate the identity of the server you are talking to. Each certificate is signed by a well–known company known as a Certificate Authority ("CA"); each CA is registered with your browser software so that it can trust the certificate your server provides. Table 5.9 shows a list of several commercial certificate authorities.

Table 5.9: Commercial Certificate Authorities

Company	Country	URL
128i Ltd.	New Zealand	http://www.128i.com/
BelSign NV/SA	Belgium	http://www.belsign.be/
CertiSign Certificadora	Brazil	http://www.certisign.com.br/
Certplus SA	France	http://www.certplus.com/
Deutsches Forschungnetz	Germany	http://www.pca.dfn.de/dfnpca/certify/ssl/
Entrust.net Ltd.	Canada	http://www.entrust.net/
Equifax Inc.	USA	http://www.equifaxsecure.com/ebusinessid/
GlobalSign NV/SA	Belgium	http://www.GlobalSign.net/
IKS GmbH	Germany	http://www.iks.jena.de/produkte/ca/
NetLock Kft.	Hungary	http://www.netlock.net/
NLsign B.V.	Netherlands	http://www.nlsign.nl/
TC TrustCenter	Germany	http://www.trustcenter.de/html/Produkte/
Thawte Consulting	USA	http://www.thawte.com/certs/server/TC_Server/855.htmrequest.html
Verisign, Inc.	USA	http://www.verisign.com/guide/apache/

The Certificate Wizard (Figure 5.21) can also be used to create a certificate request for your server:

```
/usr/sbin/espca ENTER
```

Figure 5.21: Generating a Certificate Request Using the Certificate Wizard

Choose *Generate a Signed Certificate Request* and click on the *Next* button to step through the wizard that will generate the required encryption files. When complete, the certificate request will be in the file */etc/cups/server.csr* as well as in the text box on the closing pane shown in Figure 5.22.
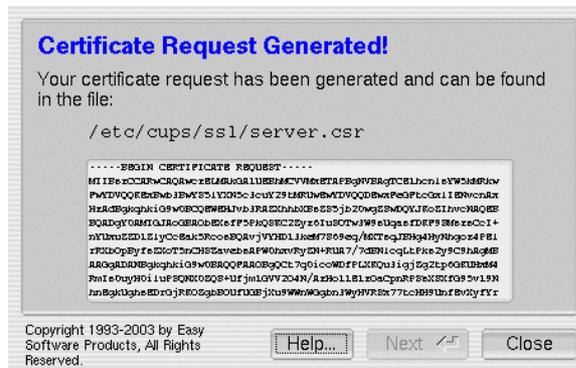
Figure 5.22: The Completed Certificate Request.

Send this certificate request to your CA, requesting a certificate that is compatible with either the Stronghold, ApacheSSL, or ModSSL varients of the Apache web server software. When you receive your certificate file from the CA, copy it to */etc/cups/ssl/server.crt* and make sure the permissions only allow the root user to access the file:

```
cp certificate-filename /etc/cups/ssl/server.crt ENTER
chmod 0600 /etc/cups/ssl/server.crt ENTER
```

Printing to Windows Servers

ESP Print Pro can print to Windows servers in one of two ways. The first way uses the LPD protocol on the ESP Print Pro system and the "TCP/IP Printing Services" on the Windows system. You can find out more about this configuration in "Chapter 3, Printer Management".

The second way is through the Microsoft Server Message Block ("SMB") protocol. Support for this protocol is provided with the free SAMBA software package. You can download SAMBA from:

http://www.samba.org

Run the following commands to configure ESP Print Pro to use SAMBA:

```
ln -s `which smbspool` /usr/lib/cups/backend/smb ENTER
/etc/software/init.d/cups restart ENTER
```

The `smbspool(1)` program is provided with SAMBA starting with SAMBA 2.0.6. Once you have made the link you can configure your printers with one of the following device URIs:

```
smb://workgroup/server/sharename
smb://server/sharename
smb://user:pass@workgroup/server/sharename
smb://user:pass@server/sharename
```

The `workgroup` name need only be specified if your system is using a different workgroup. The `user:pass` strings are required when printing to Windows NT and 2000 servers or to shares with passwords enabled under Windows 95, 98, or Me.

<div align="right">

Chapter 6
Client Setup

</div>

This chapter discusses several ways to configure ESP Print Pro clients for printing.

The Basics

A client is any machine that sends print jobs to another machine for final printing. Clients can also be servers if they communicate directly with any printers of their own.

ESP Print Pro supports several methods of configuring client machines:

- Manual configuration of print queues.
- Specifying a single server for printing.
- Automatic configuration of print queues.
- Specifying multiple servers for printing.
- Relaying printers to other clients.

The client configuration methods shown in this chapter require that the ESP Print Pro "base" software is installed on each client. The base software provides all of the printing commands and support files needed by clients, but none of the printer drivers. Consult Chapter 2, "Installing ESP Print Pro" for a description of installing the base software on client machines.

Manual Configuration of Print Queues

The most tedious method of configuring client machines is to configure each remote queue by hand using the

`lpadmin` command:

```
lpadmin -p printer -E -v ipp://server/printers/printer ENTER
```

The `printer` name is the name of the printer on the server machine. The `server` name is the hostname or IP address of the server machine. Repeat the `lpadmin` command for each remote printer you wish to use.

> **Note:**
>
> Manual configuration of print queues is not recommended for large numbers of client machines because of the administration nightmare it creates. For busy networks, consider subnetting groups of clients and polling and relaying printer information instead.

Specifying a Single Server for Printing

ESP Print Pro can be configured to run without a local spooler and send all jobs to a single server. However, if that server goes down then all printing will be disabled. Use this configuration only as absolutely needed.

The default server is normally "localhost". To override the default server create a file named */etc/cups/client.conf* and add a line reading:

```
ServerName server
```

to the file. The *server* name can be the hostname or IP address of the default server.

The default server can also be customized on a per−user basis. To set a user−specific server create a file named *~/.cupsrc* and add a line reading:

```
ServerName server
```

to the file. As before the *server* name can be the hostname or IP address of the default server.

Automatic Configuration of Print Queues

ESP Print Pro supports automatic client configuration of printers on the same subnet. To configure printers on the same subnet, *do nothing*. Each client should see the available printers within 30 seconds automatically. The printer and class lists are updated automatically as printers and servers are added or removed.

If you want to see printers on other subnets as well, use the `BrowsePoll` directive as described next.

> **Note:**
>
> The `BrowseAddress` directive enables broadcast traffic from your server. The default configuration braodcasts printer information every 30 seconds. Although this printer information does not use much bandwidth, typically about 80 bytes per printer, it can add up with large numbers of servers and printers.
>
> Use the `BrowseInterval` and `BrowseTimeout` directives to tune the amount of data that is added to your network load. In addition, subnets can be used to minimize the amount of traffic that is carried by the "backbone" of your large network.

Specifying Multiple Servers for Printing

If you have ESP Print Pro servers on different subnets, then you should configure ESP Print Pro to poll those servers. Polling provides the benefits of automatic configuration without significant configuration on the clients, and multiple clients on the same subnet can share the same configuration information.

Polling is enabled by specifying one or more `BrowsePoll` directives in the */etc/cups/cupsd.conf* file. For information on making these changes, see Chapter 5, "Printing System Management".

Multiple `BrowsePoll` lines can be used to poll multiple ESP Print Pro servers. To limit the amount of polling you do from client machines, you can have only one of the clients do the polling and relay that information to the others on the same subnet (described next).

Relaying Printers to Other Clients

When you have clients and servers spread across multiple subnets, the polling method is inefficient. ESP Print Pro provides a `BrowseRelay` directive that enables a single client to relay (broadcast) the polled printer information to the local subnet.

For example, Server A and Server B are on subnet 1 and subnet 2, while the clients are on subnet 3. To provide printers to all of the clients in subnet 3, client C will be configured with the following directives in */etc/cups/cupsd.conf*:

```
# Poll the two servers
BrowsePoll ServerA
BrowsePoll ServerB

# Relay the printers to the local subnet
BrowseRelay 127.0.0.1 192.168.3.255
```

The `BrowseRelay` line specifies a source address and mask. Any browse packets coming from a matching

address wil be sent to the given broadcast address. In this case, we want the packets from the local machine (127.0.0.1) relayed to the other clients.

As printers are found using polling, they are relayed from client C to the rest of the clients through a broadcast on subnet 3. The rest of the clients can use the standard *cupsd.conf* configuration.
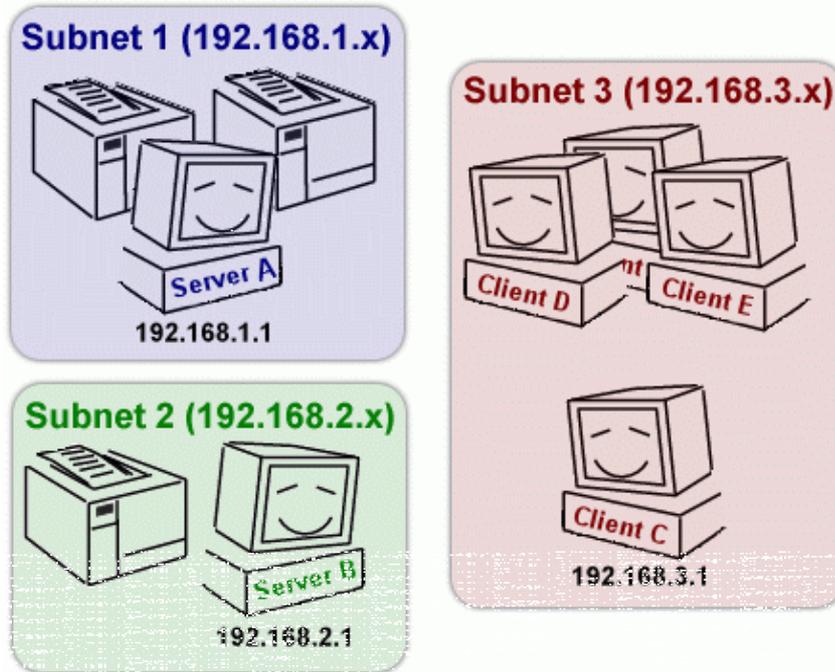
Figure 6.1: A Typical Corporate Network with Multiple Subnets.

The `BrowseRelay` directive can also be used to relay browsing packets from one network interface to another. For example, if client C in the previous example had network interfaces attaches to both subnet 1 and subnet 2, it could use the `BrowseRelay` directive exclusively:

```
# Relay the printers from subnet 1 and 2 to subnet 3
BrowseRelay 192.168.1 192.168.3.255
BrowseRelay 192.168.2 192.168.3.255
```

Load Balancing and Failsafe Operation

When using server polling or broadcasting, ESP Print Pro clients can automatically merge identical printers on multiple servers into a single *implicit class* queue. Clients assume that printers with the same name on multiple servers are in fact the same printer or type of printer being served by multiple machines.

If you have two printers, LaserJet@ServerA and LaserJet@ServerB, a third implicit class called *LaserJet* will be created automatically on the client that refers to both printers. If the client also has a local printer with the name LaserJet then an implicit class named *AnyLaserJet* will be created instead.

The client will alternate between servers and automatically stop sending jobs to a server if it goes down, providing a load–balancing effect and fail–safe operation with automatic switchover.

> **Note:**
>
> Note that implicit classes (<u>ImplicitClasses</u>) are enabled by default.

Printing from LPD Clients

ESP Print Pro supports limited functionality for LPD−based clients. With LPD you can print files to specific printers, list the queue status, and so forth. However, the automatic client configuration and printer options are not supported by the LPD protocol, so you must manually configure each client for the printers it needs to access.

The `cups-lpd(1m)` program provides support for LPD clients. To enable LPD support on your server, edit the */etc/inetd.conf* file and add a line reading:

```
printer stream tcp nowait lp /usr/lib/cups/daemon/cups-lpd cups-lpd
```

Once you have added this line, send the HUP signal to the `inetd(1m)` process or reboot the system:

```
killall -HUP inetd ENTER [IRIX and some versions of Linux]
kill -HUP pid ENTER
reboot ENTER
```

If you are using the newer `xinetd(8)` daemon, add the following lines to the */etc/xinetd.conf* file, or create a file called */etc/xinetd.d/cups−lpd* containing the following text:

```
service printer
{
    socket_type = stream
    protocol = tcp
    wait = no
    user = lp
    server = /usr/lib/cups/daemon/cups-lpd
}
```

The `xinetd` program will automatically read the new configuration file.

Printing from Mac OS Clients

ESP Print Pro does not provide Mac OS support directly. However, there are several free and commercial software packages that do.

Columbia Appletalk Package (CAP)

Because the CAP LaserWriter server (`lwsrv(1m)`) does not support specification of PPD files, we do not recommend that you use CAP with ESP Print Pro. However, you can run the `lpsrv` program for limited printing with the command:

```
lwsrv −n "Name" −p printer −a /usr/lib/adicts −f /usr/lib/LW+Fonts ENTER
```

`Name` is the name you want to use when sharing the printer and `printer` is the name of the ESP Print Pro print queue.

XINET KA/Spool

To use your system as a print server for Mac OS clients, configure each printer using a `papserver(1m)` in the */usr/adm/appletalk/services* file, specifying the corresponding PPD file in the */etc/cups/ppd* directory for each printer. For a printer named `MyPrinter` the entry would look like:

```
/usr/etc/appletalk/papserver -I -L -P /etc/cups/ppd/MyPrinter.ppd \
"Printer Description" MyPrinter ENTER
```

> **Note:**
>
> Enter the text above on a single line without the backslash (\) character.

Netatalk

To use your system as a print server for Mac OS clients, configure each printer in the *papd.conf* file, specifying the corresponding PPD file in the */etc/cups/ppd* directory for each printer. For a printer named `MyPrinter` the entry would look like:

```
Printer Name@Zone Name:\
:pr=|/usr/bin/lp -d MyPrinter:\
:op=daemon:\
:pd=/etc/cups/ppd/MyPrinter.ppd:
```

Printing from Windows Clients

While ESP Print Pro does not provide Windows support directly, the free SAMBA software package does. SAMBA version 2.0.6 is the first release of SAMBA that supports ESP Print Pro. You can download SAMBA from:

```
http://www.samba.org
```

Configuring SAMBA for Printing

To configure SAMBA for ESP Print Pro, edit the *smb.conf* file and replace the existing printing commands and options with the lines:

```
printing = cups
printcap name = cups
```

If you are using SAMBA 2.2 or higher, add the following section as well to the *smb.conf* file:

```
[global]
   load printers = yes
   printing = cups
   printcap name = cups

[printers]
   comment = All Printers
   path = /var/spool/samba
   browseable = no
   public = yes
```

```
    guest ok = yes
    writable = no
    printable = yes
    printer admin = root

[print$]
    comment = Printer Drivers
    path = /etc/samba/drivers
    browseable = yes
    guest ok = no
    read only = yes
    write list = root
```

This configuration assumes a FHS–compliant installation of SAMBA; adjust the [printers] and [print$] share paths accordingly on your system as needed. That is, the directory for your printer drivers can be anywhere on the system; just make sure it is writable by the users specified by the `write list` directive plus readable and executable by all users. Also, make sure that you have SAMBA passwords defined for each user in the `write list` using SAMBA's `smbpasswd(1)` command. Otherwise you will not be able to authenticate.

Exporting SAMBA Printer Drivers

Starting with SAMBA 2.2, ESP Print Pro can export printer drivers to Windows clients. Please note that you will need the `smbclient` and `rpcclient` commands from SAMBA to continue. To export the driver for a printer, start the Printer Manager with the following command:

```
    /usr/sbin/printers ENTER
```

Then select the printer you wish to export by clicking on it once.

Finally, choose *Export...* from the *Action* menu to export the printer drivers for that printer to SAMBA. When asked for a username and password, use the root username and password unless you have enabled administrative access to other users specified in the `write list` directive of the *smb.conf* file.

Appendix A
Software License Agreements

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Version 2, June 1991

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Appendix B
Common Network Settings

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This appendix covers many of the popular TCP/IP network interfaces and printer servers available on the market today.

Configuring a Network Interface

When you first install a network printer or print server on your LAN, you need to set the Internet Protocol ("IP") address. On most higher–end "workgroup" printers, you can set the address through the printer control panel. However, in most cases you will want to assign the addresses remotely from your workstation. This makes administration a bit easier and avoids assigning duplicate addresses accidentally.

To setup your printer or print server for remote address assignment, you'll need the Ethernet Media Access Control ("MAC") address, also sometimes called a node address, and the IP address you want to use for the device. The Ethernet MAC address can often be found on the printer test page or bottom of the print server.

Configuring the IP Address Using ARP

The easiest way to set the IP address of a network device is to use the `arp(1m)` command. The `arp` sends an Address Resolution Protocol ("ARP") packet to the specified Ethernet MAC address, setting the network device's IP address:

```
arp -s ip-address ethernet-address ENTER
arp -s host.domain.com 08:00:69:00:12:34 ENTER
arp -s 192.0.2.2 08:00:69:00:12:34 ENTER
```

Configuring the IP Address Using RARP

The most flexible way to remotely assign IP addresses under UNIX is through the Reverse Address Resolution Protocol ("RARP"). RARP allows a network device to request an IP address using its Ethernet MAC address, and one or more RARP servers on the network will respond with an ARP packet with the IP address the device can use.

RARP should be used when you have to manage many printers or print servers, or when you have a network device that does not remember its IP address after a power cycle. If you just have a single printer or print server, the `arp` command is the way to go.

Some UNIX operating systems use a program called `rarpd(1m)` to manage RARP. Others, like Linux, support this protocol in the kernel. For systems that provide the `rarpd` program you will need to start it before RARP lookups will work:

```
rarpd ENTER
```

Under IRIX you can enable this functionality by default using:

```
chkconfig rarpd on ENTER
```

Both the `rarpd` program and kernel RARP support read a list of Ethernet and IP addresses from the file */etc/ethers*. Each line contains the Ethernet address (colon delimited) followed by an IP address or hostname like:

```
08:00:69:00:12:34 myprinter.mydomain.com
08:00:69:00:12:34 192.0.2.2
```

Add a line to this file and cycle the power on the printer or print server to set its address.

Configuring the IP Address Using BOOTP

The BOOTP protocol is used when you need to provide additional information such as the location of a configuration file to the network interface. Using the standard `bootpd(1m)` program supplied with UNIX you simply need to add a line to the */etc/bootptab* file; for IRIX:

```
myprinter 08:00:69:00:12:34 192.0.2.2 myprinter.boot
```

Newer versions of `bootpd` use a different format:

```
myprinter:ha=080069001234:ip=192.0.2.2:t144=myprinter.boot
```

The *myprinter.boot* file resides in the */usr/local/boot* directory by default. If you do not need to provide a boot file you may leave the last part of the line blank.

> **Note:**
>
> Some versions of UNIX do not enable the BOOTP service by default. The */etc/inetd.conf* usually contains a line for the BOOTP service that can be uncommented if needed.

Verifying the Printer Connection

To test that the IP address has been successfully assigned and that the printer is properly connected to your LAN, type:

```
ping ip-address ENTER
```

If the connection is working properly you will see something like:

```
ping myprinter ENTER
PING myprinter (192.0.2.2): 56 data bytes
64 bytes from 192.0.2.2: icmp_seq=0 ttl=15 time=5 ms
64 bytes from 192.0.2.2: icmp_seq=1 ttl=15 time=3 ms
64 bytes from 192.0.2.2: icmp_seq=2 ttl=15 time=3 ms
64 bytes from 192.0.2.2: icmp_seq=3 ttl=15 time=3 ms
```

If not, verify that the printer or print server is connected to the LAN, it is powered on, the LAN cabling is good, and the IP address is set correctly. You can usually see the current IP address and network status by printing a configuration or test page on the device.

Common Network Interface Settings

Once you have set the IP address you can access the printer or print server using the `ipp`, `lpd`, or `socket` backends. The following is a list of common network interfaces and printer servers and the settings you should use with ESP Print Pro:

Model/Manufacturer	Type of Connection	Queue/Port/URI
Apple LaserWriter	LPD/LPR Host/Printer	PASSTHRU
Axis w/o IPP (see directions)	HP JetDirect or AppSocket	9100 9101 9102
Axis w/IPP	Internet Printing Protocol	ipp://*address*/LPT1 ipp://*address*/LPT2 ipp://*address*/COM1
Castelle LANpress^{TM}	LPD/LPR Host/Printer	pr1 pr2 pr3
DPI NETPrint	LPD/LPR Host/Printer	pr1 pr2 pr3
EFI® Fiery RIP	LPD/LPR Host/Printer	print
EPSON® Multiprotocol Ethernet Interface Board	HP JetDirect or AppSocket	socket://*address*
Extended System ExtendNET	LPD/LPR Host/Printer	pr1 pr2 pr3
Hewlett Packard JetDirect w/o IPP	HP JetDirect or AppSocket	9100 9101 9102
Hewlett Packard JetDirect w/IPP	Internet Printing Protocol	ipp://*address*/ipp ipp://*address*/ipp/port1 ipp://*address*/ipp/port2 ipp://*address*/ipp/port3
Intel® NetportExpress XL, PRO/100	LPD/LPR Host/Printer	LPT1_PASSTHRU LPT2_PASSTHRU COM1_PASSTHRU
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XEROX® 4512 NIC	LPD/LPR Host/Printer	PORT1

| XEROX® XNIC | LPD/LPR Host/Printer | PASSTHRU |
| XEROX® (most others) | HP JetDirect or AppSocket | 5503 |

Configuring Axis Print Servers

The Axis print servers can be configured using ARP, RARP, or BOOTP. However, on models that do not provide IPP support an additional step must be performed to configure the TCP/IP portion of the print server for use with ESP Print Pro.

Each print server contains a configuration file named *config* that contains a list of network parameters used by the server. To modify this file you must first download it from the print server using the `ftp(1)` program:

```
ftp ip-address ENTER
Connected to ip-address.
220 Axis NPS ### FTP Printer Server V#.## MON DD YEAR ready.
ftp> user root ENTER
331 User name ok, need password
Password: pass ENTER (this is not echoed)
230 User logged in
ftp> get config ENTER
local: config remote: config
200 PORT command successful.
150 Opening data connection for config (192,0,2,2),
(mode ascii).
226 Transfer complete.
##### bytes received in #.## seconds (##### Kbytes/s)
ftp> quit ENTER
221 Goodbye.
```

Next, edit the file with your favorite text editor and locate the lines beginning with:

```
RTN_OPT.      : YES
RTEL_PR1.     : 0
RTEL_PR2.     : 0
RTEL_PR3.     : 0
RTEL_PR4.     : 0
RTEL_PR5.     : 0
RTEL_PR6.     : 0
RTEL_PR7.     : 0
RTEL_PR8.     : 0
```

Change the `RTN_OPT` line to read:

```
RTN_OPT.      : NO
```

This disables the Reverse TELNET protocol and enables the standard TELNET protocol on the print server. Next, assign a port number for each parallel and serial port on the server as follows:

```
RTEL_PR1.    : 9100
RTEL_PR2.    : 9101
RTEL_PR3.    : 9102
RTEL_PR4.    : 9103
RTEL_PR5.    : 9104
RTEL_PR6.    : 9105
RTEL_PR7.    : 9106
RTEL_PR8.    : 9107
```

This essentially makes the Axis print server look like a Hewlett Packard JetDirect EX print server. Save the file and then upload the new *config* file using the `ftp` command:

```
ftp ip-address ENTER
Connected to ip-address.
220 Axis NPS ### FTP Printer Server V#.## MON DD YEAR ready.
ftp> user root ENTER
331 User name ok, need password
Password: pass ENTER (this is not echoed)
230 User logged in
ftp> put config CONFIG ENTER
local: config remote: CONFIG
200 PORT command successful.
150 Opening data connection for config (192,0,2,2), (mode ascii).
226 Transfer complete.
##### bytes received in #.## seconds (##### Kbytes/s)
ftp> get hardreset ENTER
local: hardreset remote: hardreset
200 PORT command successful.
421 Axis NPS ### hard reset, closing connection.
ftp> quit ENTER
221 Goodbye.
```

Your Axis print server is now ready for use!

This appendix describes the ESP Print Pro configuration files.

The Basics

Several text files are used to configure ESP Print Pro. All of the server configuration files are located in the
/etc/cups directory:

> *classes.conf*
>> This file contains information on each printer class. Normally you manipulate this file using
>> the `lpadmin` command or the Web interface.
>
> *client.conf*
>> This file provides the default server name for client machines. See
>> for more information.
>
> *cupsd.conf*
>> This file controls how the ESP Print Pro server (*/usr/sbin/cupsd*) operates and is normally
>> edited by hand.

mime.convs

> This file contains a list of standard file conversion filters and their costs. You normally do not edit this file.

mime.types

> This file contains a list of standard file formats and how to recognize them. You normally do not edit this file.

printers.conf

> This file contains information on each printer. Normally you manipulate this file using the `lpadmin` command or the Web Interface.

Once you have made a change to a configuration file you need to restart the ESP Print Pro server by sending it a `HUP` signal or using the supplied initialization script. The ESP Print Pro distributions install the script in the *init.d* directory with the name *cups*. The location varies based upon the operating system:

```
/etc/software/init.d/cups restart ENTER
/etc/rc.d/init.d/cups restart ENTER
/etc/init.d/cups restart ENTER
/sbin/init.d/cups restart ENTER
```

Changing the Server Configuration

The */etc/cups/cupsd.conf* file contains configuration *directives* that control how the server functions. Each directive is listed on a line by itself followed by its value. Comments are introduced using the number sign ("#") character at the beginning of a line.

Since the server configuration file consists of plain text, you can use your favorite text editor to make changes to it.

Server Directives

The *cupsd.conf* file contains many directives that determine how the server operates:

- AccessLog
- Allow
- AuthClass
- AuthGroupName
- AuthType
- AutoPurgeJobs
- BrowseAddress
- BrowseAllow
- BrowseDeny
- BrowseInterval
- BrowseOrder
- BrowsePoll
- BrowsePort
- BrowseProtocols
- BrowseRelay
- BrowseShortNames
- BrowseTimeout
- Browsing
- Classification
- ClassifyOverride
- ConfigFilePerm
- DataDir
- DefaultCharset
- DefaultLanguage
- Deny
- Deny
- DocumentRoot

- Encryption
- ErrorLog
- FileDevice
- FilterLimit
- FontPath
- Group
- HideImplicitMembers
- HostNameLookups
- ImplicitClasses
- ImplicitAnyClasses
- Include
- KeepAliveTimeout
- KeepAlive
- Limit
- LimitExcept
- LimitRequestBody
- Listen
- Location
- LogFilePerm
- LogLevel
- MaxClients
- MaxClientsPerHost
- MaxCopies
- MaxJobs
- MaxJobsPerPrinter
- MaxJobsPerUser
- MaxLogSize
- MaxRequestSize
- Order

- PageLog
- Port
- PreserveJobFiles
- PreserveJobHistory
- Printcap
- PrintcapFormat
- RemoteRoot
- RequestRoot
- Require
- RIPCache
- RunAsUser
- Satisfy
- ServerAdmin
- ServerBin
- ServerCertificate
- ServerKey
- ServerName
- ServerRoot
- SSLListen
- SSLPort
- SystemGroup
- TempDir
- Timeout
- User

AccessLog

Examples

```
AccessLog /var/log/cups/access_log
AccessLog /var/log/cups/access_log-%s
AccessLog syslog
```

Description

The `AccessLog` directive sets the name of the access log file. If the filename is not absolute then it is assumed to be relative to the <u>ServerRoot</u> directory. The access log file is stored in "common log format" and can be used by any web access reporting tool to generate a report on CUPS server activity.

The server name can be included in the filename by using `%s` in the name.

The special name "syslog" can be used to send the access information to the system log instead of a plain file.

The default access log file is */var/log/cups/access_log*. You can change this directive under the *<u>Log Files Tab</u>* GUI.

Allow

Examples

```
Allow from All
Allow from None
Allow from *.domain.com
Allow from .domain.com
Allow from host.domain.com
Allow from nnn.*
Allow from nnn.nnn.*
Allow from nnn.nnn.nnn.*
Allow from nnn.nnn.nnn.nnn
Allow from nnn.nnn.nnn.nnn/mm
Allow from nnn.nnn.nnn.nnn/mmm.mmm.mmm.mmm
Allow from @LOCAL
Allow from @IF(name)
```

Description

The `Allow` directive specifies a hostname, IP address, or network that is allowed access to the server. `Allow` directives are cummulative, so multiple `Allow` directives can be used to allow access for multiple hosts or networks. The `/mm` notation specifies a CIDR netmask:

mm	netmask	mm	netmask
0	0.0.0.0	8	255.0.0.0
1	128.0.0.0	16	255.255.0.0
2	192.0.0.0	24	255.255.255.0
...	...	32	255.255.255.255

The `@LOCAL` name will allow access from all local interfaces. The `@IF(name)` name will allow access from the named interface.

The `Allow` directive must appear inside a <u>Location</u> directive. You can change these directives under the *Security* Tab GUI.

AuthClass

Examples

```
AuthClass Anonymous
AuthClass User
AuthClass System
AuthClass Group
```

Description

The `AuthClass` directive defines what level of authentication is required:

- `Anonymous` – No authentication should be performed (default.)
- `User` – A valid username and password is required.
- `System` – A valid username and password is required, and the username must belong to the "sys" group; this can be changed using the <u>SystemGroup</u> directive.
- `Group` – A valid username and password is required, and the username must belong to the group named by the <u>AuthGroupName</u> directive.

The `AuthClass` directive must appear inside a <u>Location</u> directive. You can change these directives under the *Security* Tab GUI.

AuthGroupName

Examples

```
AuthGroupName mygroup
AuthGroupName lp
```

Description

The `AuthGroupName` directive sets the group to use for `Group` authentication.

The `AuthGroupName` directive must appear inside a <u>Location</u> directive. You can change these directives under the *Security* Tab GUI.

AuthType

Examples

```
AuthType None
AuthType Basic
AuthType Digest
```

Description

The `AuthType` directive defines the type of authentication to perform:

- `None` – No authentication should be performed (default.)
- `Basic` – Basic authentication should be performed using the UNIX password and group files.
- `Digest` – Digest authentication should be performed using the *ictc/cups/passwd.md5* file.

When using `Basic` or `Digest` authentication, clients connecting through the `localhost` interface can also authenticate using certificates.

The `AuthType` directive must appear inside a `Location` directive. You can change these directives under the *Security* Tab GUI.

AutoPurgeJobs

Examples

```
AutoPurgeJobs Yes
AutoPurgeJobs No
```

Description

The `AutoPurgeJobs` directive specifies whether or not to purge completed jobs once they are no longer required for quotas. This option has no effect if quotas are not enabled. The default setting is `No`. You can change this directive under the *Jobs* Tab GUI.

BrowseAddress

Examples

```
BrowseAddress 255.255.255.255:631
BrowseAddress 192.0.2.255:631
BrowseAddress host.domain.com:631
BrowseAddress @LOCAL
BrowseAddress @IF(name)
```

Description

The `BrowseAddress` directive specifies an address to send browsing information to. Multiple `BrowseAddress` directives can be specified to send browsing information to different networks or systems.

The `@LOCAL` name will broadcast printer information to all local interfaces. The `@IF(name)` name will broadcast to the named interface.

The default address is `255.255.255.255:631` which will broadcast the information to all networks the server is connected to.

> **Note:**
>
> If you are using HP−UX 10.20 and a subnet that is not 24, 16, or 8 bits, printer browsing (and in fact all broadcast reception) will not work. This problem appears to be fixed in HP−UX 11.0.

You can change this directive under the *Browsing* Tab GUI.

BrowseAllow

Examples

```
BrowseAllow from all
BrowseAllow from none
BrowseAllow from 192.0.2
BrowseAllow from 192.0.2.0/24
BrowseAllow from 192.0.2.0/255.255.255.0
BrowseAllow from *.domain.com
BrowseAllow from @LOCAL
BrowseAllow from @IF(name)
```

Description

The `BrowseAllow` directive specifies a system or network to accept browse packets from. The default is to accept browse packets from all hosts.

Host and domain name matching require that you enable the `HostNameLookups` directive.

IP address matching supports exact matches, partial addresses that match networks using netmasks of 255.0.0.0, 255.255.0.0, and 255.255.255.0, or network addresses using the specified netmask or bit count.

The `@LOCAL` name will allow browse data from all local interfaces. The `@IF(name)` name will allow browse data from the named interface.

You can change this directive under the *Browsing* Tab GUI.

BrowseDeny

Examples

```
BrowseDeny from all
BrowseDeny from none
BrowseDeny from 192.0.2
BrowseDeny from 192.0.2.0/24
BrowseDeny from 192.0.2.0/255.255.255.0
BrowseDeny from *.domain.com
BrowseDeny from @LOCAL
BrowseDeny from @IF(name)
```

Description

The `BrowseDeny` directive specifies a system or network to reject browse packets from. The default is to deny browse packets from no hosts.

Host and domain name matching require that you enable the <u>HostNameLookups</u> directive.

IP address matching supports exact matches, partial addresses that match networks using netmasks of 255.0.0.0, 255.255.0.0, and 255.255.255.0, or network addresses using the specified netmask or bit count.

The `@LOCAL` name will block browse data from all local interfaces. The `@IF(name)` name will block browse data from the named interface.

You can change this directive under the *Browsing* Tab GUI.

BrowseOrder

Examples

```
BrowseOrder allow,deny
BrowseOrder deny,allow
```

Description

The `BrowseOrder` directive specifies the order of allow/deny processing. The default order is `deny,allow`:

- `allow,deny` – Browse packets are accepted unless specifically denied.
- `deny,allow` – Browse packets are rejected unless specifically allowed.

You can change this directive under the *Browsing* Tab GUI.

BrowseInterval

Examples

```
BrowseInterval 0
BrowseInterval 30
```

Description

The `BrowseInterval` directive specifies the maximum amount of time between browsing updates. Specifying a value of 0 seconds disables outgoing browse updates but allows a server to receive printer information from other hosts.

The `BrowseInterval` value should always be less than the `BrowseTimeout` value. Otherwise printers and classes will disappear from client systems between updates.

You can change this directive under the *Browsing* Tab GUI.

BrowsePoll

Examples

```
BrowsePoll 192.0.2.2:631
BrowsePoll host.domain.com:631
```

Description

The `BrowsePoll` directive polls a server for available printers once every <u>`BrowseInterval`</u> seconds. Multiple `BrowsePoll` directives can be specified to poll multiple servers.

If `BrowseInterval` is set to 0 then the server is polled once every 30 seconds.

You can change this directive under the *Browsing* <u>Tab</u> GUI.

BrowsePort

Examples

```
BrowsePort 631
BrowsePort 9999
```

Description

The `BrowsePort` directive specifies the UDP port number used for browse packets. The default port number is 631.

> **Note:**
>
> You must set the `BrowsePort` to the same value on all of the systems that you want to see.

You can change this directive under the *Browsing* <u>Tab</u> GUI.

BrowseProtocols

Examples

```
BrowseProtocols CUPS
BrowseProtocols SLP
BrowseProtocols CUPS SLP
BrowseProtocols all
```

Description

The `BrowseProtocols` directive specifies the protocols to use when collecting and distributing shared printers on the local network. The default protocol is `CUPS`, which is a broadcast–based protocol.

> **Note:**
>
> When using the `SLP` protocol, you must have at least one Directory Agent (DA) server on your network. Otherwise the CUPS scheduler (`cupsd`) will not respond to client requests for several seconds while polling the network.

You can change this directive under the *Browsing* Tab GUI.

BrowseRelay

Examples

```
BrowseRelay 193.0.2.1 192.0.2.255
BrowseRelay 193.0.2.0/255.255.255.0 192.0.2.255
BrowseRelay 193.0.2.0/24 192.0.2.255
BrowseRelay *.domain.com 192.0.2.255
BrowseRelay host.domain.com 192.0.2.255
```

Description

The `BrowseRelay` directive specifies source and destination addresses for relaying browsing information from one host or network to another. Multiple `BrowseRelay` directives can be specified as needed.

`BrowseRelay` is typically used on systems that bridge multiple subnets using one or more network interfaces. It can also be used to relay printer information from polled servers with the line:

```
BrowseRelay 127.0.0.1 255.255.255.255
```

This effectively provides access to printers on a WAN for all clients on the LAN(s).

You can change this directive under the *Browsing* Tab GUI.

BrowseShortNames

Examples

```
BrowseShortNames Yes
BrowseShortNames No
```

Description

The `BrowseShortNames` directive specifies whether or not short names are used for remote printers when possible. Short names are just the remote printer name, without the server ("printer"). If more than one remote printer is detected with the same name, the printers will have long names ("printer@server1", "printer@server2".)

The default value for this option is `Yes`. You can change this directive under the _Browsing_ Tab GUI.

BrowseTimeout

Examples

```
BrowseTimeout 300
BrowseTimeout 60
```

Description

The `BrowseTimeout` directive sets the timeout for printer or class information that is received in browse packets. Once a printer or class times out it is removed from the list of available destinations.

The `BrowseTimeout` value should always be greater than the `BrowseInterval` value. Otherwise printers and classes will disappear from client systems between updates.

You can change this directive under the _Browsing_ Tab GUI.

Browsing

Examples

```
Browsing On
Browsing Off
```

Description

The `Browsing` directive controls whether or not network printer browsing is enabled. The default setting is `On`.

> **Note:**
>
> If you are using HP−UX 10.20 and a subnet that is not 24, 16, or 8 bits, printer browsing (and in fact all broadcast reception) will not work. This problem appears to be fixed in HP−UX 11.0.

You can change this directive under the *Browsing* Tab GUI.

Classification

Examples

```
Classification
Classification classified
Classification confidential
Classification secret
Classification topsecret
Classification unclassified
```

Description

The `Classification` directive sets the classification level on the server. When this option is set, at least one of the banner pages is forced to the classification level, and the classification is placed on each page of output. The default is no classification level. You can change this directive under the *Server* Tab GUI.

ClassifyOverride

Examples

```
ClassifyOverride Yes
ClassifyOverride No
```

Description

The `ClassifyOverride` directive specifies whether users can override the default classification level on the server. When the server classification is set, users can change the classification using the `job-sheets` option and can choose to only print one security banner before or after the job. If the `job-sheets` option is set to `none` then the server default classification is used.

The default is to not allow classification overrides. You can change this directive under the *Server* Tab GUI.

ConfigFilePerm

Examples

```
ConfigFilePerm 0644
ConfigFilePerm 0600
```

Description

The `ConfigFilePerm` directive specifies the permissions to use when writing configuration files. The default is 0600.

DataDir

Examples

```
DataDir /usr/share/cups
```

Description

The `DataDir` directive sets the directory to use for data files. You can change this directive under the *Directories* Tab GUI.

DefaultCharset

Examples

```
DefaultCharset utf-8
DefaultCharset iso-8859-1
DefaultCharset windows-1251
```

Description

The `DefaultCharset` directive sets the default character set to use for client connections. The default character set is `utf-8` but is overridden by the character set for the language specified by the client or the `DefaultLanguage` directive. You can change these directives under the *Server* Tab GUI.

DefaultLanguage

Examples

```
DefaultLanguage de
DefaultLanguage en
DefaultLanguage es
DefaultLanguage fr
DefaultLanguage it
```

Description

The `DefaultLanguage` directive specifies the default language to use for client connections. Setting the default language also sets the default character set if a language localization file exists for it. The default language is "en" for English. You can change this directive under the *Server* Tab GUI.

Deny

Examples

```
Deny from All
Deny from None
Deny from *.domain.com
Deny from .domain.com
Deny from host.domain.com
Deny from nnn.*
Deny from nnn.nnn.*
Deny from nnn.nnn.nnn.*
Deny from nnn.nnn.nnn.nnn
Deny from nnn.nnn.nnn.nnn/mm
Deny from nnn.nnn.nnn.nnn/mmmm.mmmm.mmmm.mmmm
Deny from @LOCAL
Deny from @IF(name)
```

Description

The `Deny` directive specifies a hostname, IP address, or network that is allowed access to the server. `Deny` directives are cummulative, so multiple `Deny` directives can be used to allow access for multiple hosts or networks. The `/mm` notation specifies a CIDR netmask:

mm	netmask	mm	netmask
0	0.0.0.0	8	255.0.0.0
1	128.0.0.0	16	255.255.0.0
2	192.0.0.0	24	255.255.255.0
...	...	32	255.255.255.255

The `@LOCAL` name will deny access from all local interfaces. The `@IF(name)` name will deny access from the named interface.

The `Deny` directive must appear inside a <u>Location</u> directive.

You can change these directives under the *Security* Tab GUI.

DocumentRoot

Examples

```
DocumentRoot /usr/share/doc/cups
DocumentRoot /foo/bar/doc/cups
```

Description

The `DocumentRoot` directive specifies the location of web content for the HTTP server in CUPS. If an absolute path is not specified then it is assumed to be relative to the <u>ServerRoot</u> directory. The default directory is */usr/share/doc/cups.*

Documents are first looked up in a sub–directory for the primary language requested by the client (e.g. */usr/share/doc/cups/fr/...*) and then directly under the `DocumentRoot` directory (e.g. */usr/share/doc/cups/...*), so it is possible to localize the web content by providing subdirectories for each language needed.

You can change this directive under the *Directories* Tab GUI.

Encryption

Examples

```
Encryption Never
Encryption IfRequested
Encryption Required
Encryption Always
```

Description

The `Encryption` directive must appear instead a <u>Location</u> section and specifies the encryption settings for that location. The default setting is `IfRequested` for all locations. You can change these directives under the *Security* Tab GUI.

ErrorLog

Examples

```
ErrorLog /var/log/cups/error_log
ErrorLog /var/log/cups/error_log-%s
ErrorLog syslog
```

Description

The `ErrorLog` directive sets the name of the error log file. If the filename is not absolute then it is assumed to be relative to the <u>ServerRoot</u> directory. The default error log file is */var/log/cups/error_log*.

The server name can be included in the filename by using `%s` in the name.

The special name "syslog" can be used to send the error information to the system log instead of a plain file. You can change this directive under the *Log Files* <u>Tab</u> GUI.

FileDevice

Examples

```
FileDevice Yes
FileDevice No
```

Description

The `FileDevice` directive determines whether the scheduler allows new printers to be added using device URIs of the form `file:/filename`. File devices are most often used to test new printer drivers and do no support raw file printing.

The default setting is `No`.

> **Note:**
>
> File devices are managed by the scheduler. Since the scheduler normally runs as the root user, file devices can be used to overwrite system files and potentially gain unauthorized access to the system. If you must create printers using file devices, we recommend that you set the `FileDevice` directive to `Yes` for only as long as you need to add the printers to the system, and then reset the directive to `No`.

FilterLimit

Examples

```
FilterLimit 0
FilterLimit 200
FilterLimit 1000
```

Description

The `FilterLimit` directive sets the maximum cost of all running job filters. It can be used to limit the number of filter programs that are run on a server to minimize disk, memory, and CPU resource problems. A limit of 0 disables filter limiting.

An average print to a non−PostScript printer needs a filter limit of about 200. A PostScript printer needs about half that (100). Setting the limit below these thresholds will effectively limit the scheduler to printing a single job at any time.

The default limit is 0. You can change this directive under the *Filter* Tab GUI.

FontPath

Examples

```
FontPath /foo/bar/fonts
FontPath /usr/share/cups/fonts:/foo/bar/fonts
```

Description

The `FontPath` directive specifies the font path to use when searching for fonts. The default font path is `/usr/share/cups/fonts`. You can change this directive under the *Directories* Tab GUI.

Group

Examples

```
Group sys
Group system
Group root
```

Description

The `Group` directive specifies the UNIX group that filter and CGI programs run as. The default group is `sys`, `system`, or `root` depending on the operating system. You can change this directive under the *Filter Tab* GUI.

HideImplicitMembers

Examples

```
HideImplicitMembers Yes
HideImplicitMembers No
```

Description

The `HideImplicitMembers` directive controls whether the individual printers in an implicit class are shown to the user. The default is `No`.

`ImplicitClasses` must be enabled for this directive to have any effect. You can change this directive under the *Browsing* Tab GUI.

HostNameLookups

Examples

```
HostNameLookups On
HostNameLookups Off
HostNameLookups Double
```

Description

The `HostNameLookups` directive controls whether or not CUPS looks up the hostname for connecting clients. The `Double` setting causes CUPS to verify that the hostname resolved from the address matches one of the addresses returned for that hostname. `Double` lookups also prevent clients with unregistered addresses from connecting to your server. The default is `Off` to avoid the potential server performance problems with hostname lookups. Set this option to `On` or `Double` only if absolutely required. You can change this directive under the *Network* Tab GUI.

ImplicitClasses

Examples

```
ImplicitClasses On
ImplicitClasses Off
```

Description

The `ImplicitClasses` directive controls whether implicit classes are created based upon the available network printers and classes. The default setting is `On` but is automatically turned `Off` if Browsing is turned `Off`. You can change the `ImplicitClasses` directive under the *Browsing* Tab GUI.

ImplicitAnyClasses

Examples

```
ImplicitAnyClasses On
ImplicitAnyClasses Off
```

Description

The `ImplicitAnyClasses` directive controls whether implicit classes for local and remote printers are created with the name `AnyPrinter`. The default setting is `Off`.

<u>ImplicitClasses</u> must be enabled for this directive to have any effect.

You can change these directives under the *Browsing* <u>Tab</u> GUI.

Include

Examples

```
Include filename
Include /foo/bar/filename
```

Description

The `Include` directive includes the named file in the `cupsd.conf` file. If no leading path is provided, the file is assumed to be relative to the <u>ServerRoot</u> directory.

KeepAlive

Examples

```
KeepAlive On
KeepAlive Off
```

Description

The `KeepAlive` directive controls whether or not to support persistent HTTP connections. The default is `On`.

HTTP/1.1 clients automatically support persistent connections, while HTTP/1.0 clients must specifically request them using the `Keep-Alive` attribute in the `Connection:` field of each request. You can change this directive under the *Network* Tab GUI.

KeepAliveTimeout

Examples

```
KeepAliveTimeout 60
KeepAliveTimeout 30
```

Description

The `KeepAliveTimeout` directive controls how long a persistent HTTP connection will remain open after the last request. The default is 60 seconds. You can change this directive under the *Network* Tab GUI.

Limit

Examples

```
<Limit GET POST>
...
</Limit>

<Limit ALL>
...
</Limit>
```

Description

The `Limit` directive groups access control directives for specific types of HTTP requests and must appear inside a <u>Location</u> section. Access can be limited for individual request types (DELETE, GET, HEAD, OPTIONS, POST, PUT, and TRACE) or for all request types (ALL). The request type names are case−sensitive for compatibility with Apache.

LimitExcept

Examples

```
<LimitExcept GET POST>
...
</LimitExcept>
```

Description

The `LimitExcept` directive groups access control directives for specific types of HTTP requests and must appear inside a <u>Location</u> section. Unlike the <u>Limit</u> directive, `LimitExcept` restricts access for all requests *except* those listed on the `LimitExcept` line.

LimitRequestBody

Examples

```
LimitRequestBody 10485760
LimitRequestBody 10m
LimitRequestBody 0
```

Description

The `LimitRequestBody` directive controls the maximum size of print files, IPP requests, and HTML form data in HTTP POST requests. The default limit is 0 which disables the limit check.

Also see the identical <u>MaxRequestSize</u> directive. You can change these directives under the *Network* Tab GUI.

Listen

Examples

```
Listen 127.0.0.1:631
Listen 192.0.2.1:631
```

Description

The `Listen` directive specifies a network address and port to listen for connections. Multiple `Listen` directives can be provided to listen on multiple addresses.

The `Listen` directive is similar to the <u>Port</u> directive but allows you to restrict access to specific interfaces or networks. You can change the `Listen` directive under the *Network* Tab GUI.

Location

___

Examples

```
<Location />
...
</Location>

<Location /admin>
...
</Location>

<Location /printers>
...
</Location>

<Location /printers/name>
...
</Location>

<Location /classes>
...
</Location>

<Location /classes/name>
...
</Location>
```

Description

The Location directive specifies access control and authentication options for the specified HTTP resource or path. The Allow, AuthClass, AuthGroupName, AuthType, Deny, Encryption, Limit, LimitExcept, Order, Require, and Satisfy directives may all appear inside a location. You can change this directive under the _Security_ Tab GUI. More information can be found under the section "Printing System Security".

Note that more specific resources override the less specific ones. So the directives inside the /printers/name location will override ones from /printers. Directives inside /printers will override ones from /. None of the directives are inherited.

Locations on the Server.

Location	Description
/	The path for all get operations (get–printers, get–jobs, etc.)
/admin	The path for all administration operations (add–printer, delete–printer, start–printer, etc.)
/admin/conf	The path for access to the ESP Print Pro configuration files (cupsd.conf, client.conf, etc.)
/classes	The path for all classes
/classes/name	The resource for class name
/jobs	The path for all jobs (hold–job, release–job, etc.)
/jobs/id	The resource for job id
/printers	The path for all printers
/printers/name	The path for printer name
/printers/name.ppd	The PPD file path for printer name

LogFilePerm

Examples

```
LogFilePerm 0644
LogFilePerm 0600
```

Description

The LogFilePerm directive specifies the permissions to use when writing configuration files. The default is 0644.

LogLevel

Examples

```
LogLevel none
LogLevel emerg
LogLevel alert
LogLevel crit
LogLevel error
LogLevel warn
LogLevel notice
LogLevel info
LogLevel debug
LogLevel debug2
```

Description

The `LogLevel` directive specifies the level of logging for the `ErrorLog` file. The following values are recognized (each level logs everything under the preceding levels):

- `none` – Log nothing.
- `emerg` – Log emergency conditions that prevent the server from running.
- `alert` – Log alerts that must be handled immediately.
- `crit` – Log critical errors that don't prevent the server from running.
- `error` – Log general errors.
- `warn` – Log errors and warnings.
- `notice` – Log temporary error conditions.
- `info` – Log all requests and state changes (default).
- `debug` – Log basic debugging information.
- `debug2` – Log all debugging information.

You can change this directive under the *Log Files* Tab GUI.

MaxClients

Examples

```
MaxClients 100
MaxClients 1024
```

Description

The MaxClients directive controls the maximum number of simultaneous clients that will be allowed by the server. The default is 100 clients. You can change this directive under the *Network* Tab of the configuration GUI.

> **Note:**
>
> Since each print job requires a file descriptor for the status pipe, the CUPS server internally limits the MaxClients value to 1/3 of the available file descriptors to avoid possible problems when printing large numbers of jobs.

MaxClientsPerHost

Examples

```
MaxClientsPerHost 0
MaxClientsPerHost 10
```

Description

The MaxClientsPerHost directive controls the maximum number of simultaneous clients that will be allowed from a single host by the server. The default is 10 or 1/10th the MaxClients value, whichever is greater. A value of 0 uses the automatic setting based on the MaxClients value.

This directive provides a small measure of protection against Denial of Service attacks from a single host.

You can change this directive under the *Network* Tab in the configuration GUI.

MaxCopies

Examples

```
MaxCopies 100
MaxCopies 65535
```

Description

The `MaxCopies` directive controls the maximum number of copies that a user can print of a job. The default is 100 copies.

> **Note:**
>
> Most HP PCL laser printers internally limit the number of copies to 100.

MaxJobs

Examples

```
MaxJobs 100
MaxJobs 9999
MaxJobs 0
```

Description

The `MaxJobs` directive controls the maximum number of jobs that are kept in memory. Once the number of jobs reaches the limit, the oldest completed job is automatically purged from the system to make room for the new one. If all of the known jobs are still pending or active then the new job will be rejected.

Setting the maximum size to 0 disables this functionality. The default setting is 0. You can change this directive under the *Jobs* Tab GUI.

MaxJobsPerPrinter

Examples

```
MaxJobsPerPrinter 100
MaxJobsPerPrinter 9999
MaxJobsPerPrinter 0
```

Description

The `MaxJobsPerPrinter` directive controls the maximum number of active jobs that are allowed for each printer or class. Once a printer or class reaches the limit, new jobs will be rejected until one of the active jobs is completed, stopped, aborted, or cancelled.

Setting the maximum to 0 disables this functionality. The default setting is 0. You can change this directive under the *Jobs* Tab GUI.

MaxJobsPerUser

Examples

```
MaxJobsPerUser 100
MaxJobsPerUser 9999
MaxJobsPerUser 0
```

Description

The `MaxJobsPerUser` directive controls the maximum number of active jobs that are allowed for each user. Once a user reaches the limit, new jobs will be rejected until one of the active jobs is completed, stopped, aborted, or cancelled.

Setting the maximum to 0 disables this functionality. The default setting is 0. You can change this directive under the *Jobs* Tab GUI.

MaxLogSize

Examples

```
MaxLogSize 1048576
MaxLogSize 1m
MaxLogSize 0
```

Description

The `MaxLogSize` directive controls the maximum size of each log file. Once a log file reaches or exceeds the maximum size it is closed and renamed to *filename.O*. This allows you to rotate the logs automatically. The default size is 1048576 bytes (1MB).

Setting the maximum size to 0 disables log rotation. You can change this directive under the *Log Files* Tab GUI.

MaxRequestSize

Examples

```
MaxRequestSize 10485760
MaxRequestSize 10m
MaxRequestSize 0
```

Description

The `MaxRequestSize` directive controls the maximum size of print files, IPP requests, and HTML form data in HTTP POST requests. The default limit is 0 which disables the limit check.

Also see the identical `LimitRequestBody` directive. You can change these directives under the *Network Tab* GUI.

Order

Examples

```
Order Allow,Deny
Order Deny,Allow
```

Description

The `Order` directive defines the default access control. The following values are supported:

- `Allow,Deny` – Allow requests from all systems *except* for those listed in a `Deny` directive.
- `Deny,Allow` – Allow requests only from those listed in an `Allow` directive.

The `Order` directive must appear inside a <u>Location</u> directive. You can change these directives under the *Security* Tab GUI.

PageLog

Examples

```
PageLog /var/log/cups/page_log
PageLog /var/log/cups/page_log-%s
PageLog syslog
```

Description

The `PageLog` directive sets the name of the page log file. If the filename is not absolute then it is assumed to be relative to the <u>ServerRoot</u> directory. The default page log file is */var/log/cups/page_log*.

The server name can be included in the filename by using `%s` in the name.

The special name "syslog" can be used to send the page information to the system log instead of a plain file. You can change this directive under the *Log Files* Tab GUI.

Port

Examples

```
Port 631
Port 80
```

Description

The `Port` directive specifies a port to listen on. Multiple `Port` lines can be specified to listen on multiple ports. The `Port` directive is equivalent to `"Listen *:nnn"`. The default port is 631. You can change this directive under the *Network* Tab GUI.

PreserveJobHistory

Examples

```
PreserveJobHistory On
PreserveJobHistory Off
```

Description

The `PreserveJobHistory` directive controls whether the history of completed, cancelled, or aborted print jobs is stored on disk.

A value of `On` (the default) preserves job information until the administrator purges it with the `cancel` command.

A value of `Off` removes the job information as soon as each job is completed, cancelled, or aborted. You can change this directive under the *Jobs* Tab GUI.

PreserveJobFiles

Examples

```
PreserveJobFiles On
PreserveJobFiles Off
```

Description

The `PreserveJobFiles` directive controls whether the document files of completed, cancelled, or aborted print jobs are stored on disk.

A value of `On` preserves job files until the administrator purges them with the `cancel` command. Jobs can be restarted (and reprinted) as desired until they are purged.

A value of `Off` (the default) removes the job files as soon as each job is completed, cancelled, or aborted. You can change this directive under the *Jobs* Tab GUI.

Printcap

Examples

```
Printcap
Printcap /etc/printcap
Printcap /etc/printers.conf
```

Description

The `Printcap` directive controls whether or not a printcap file is automatically generated and updated with a list of available printers. If specified with no value, then no printcap file will be generated. The default is to generate a file named */etc/printcap.*

When a filename is specified (e.g. */etc/printcap*), the printcap file is written whenever a printer is added or removed. The printcap file can then be used by applications that are hardcoded to look at the printcap file for the available printers.

You can change this directive under the *Server* Tab GUI.

PrintcapFormat

Examples

```
PrintcapFormat BSD
PrintcapFormat Solaris
```

Description

The `PrintcapFormat` directive controls the output format of the printcap file. The default is to generate a BSD printcap file. You can change this directive under the *Server* Tab GUI.

RemoteRoot

Examples

```
RemoteRoot remroot
RemoteRoot root
```

Description

The `RemoteRoot` directive sets the username for unauthenticated root requests from remote hosts. The default username is *remroot*. Setting `RemoteRoot` to *root* effectively disables this security mechanism.

You can change this directive under the *Security* Tab GUI.

RequestRoot

Examples

```
RequestRoot /var/spool/cups
RequestRoot /foo/bar/spool/cups
```

Description

The RequestRoot directive sets the directory for incoming IPP requests and HTML forms. If an absolute path is not provided then it is assumed to be relative to the ServerRoot directory. The default request directory is */var/spool/cups*. You can change this directive under the *Directories* Tab GUI.

Require

Examples

```
Require group foo bar
Require user john mary
Require valid-user
```

Description

The Require directive specifies that authentication is required for the resource. The group keyword specifies that the authenticated user must be a member of one or more of the named groups that follow.

The user keyboard specifies that the authenticated user must be one of the named users that follow.

The valid-user keyword specifies that any authenticated user may access the resource.

The default is to do no authentication. This directive must appear inside a Location directive. You can change these directives under the *Security* Tab GUI.

RIPCache

Examples

```
RIPCache 8m
RIPCache 1g
RIPCache 2048k
```

Description

The `RIPCache` directive sets the size of the memory cache used by Raster Image Processor ("RIP") filters such as `imagetoraster` and `pstoraster`. The size can be suffixed with a "k" for kilobytes, "m" for megabytes, or "g" for gigabytes. The default cache size is "8m", or 8 megabytes.

You can change this directive under the *Filter* Tab GUI.

RunAsUser

Examples

```
RunAsUser Yes
RunAsUser No
```

Description

The `RunAsUser` directive controls whether the scheduler runs as the unpriviledged user account (usually `lp`). The default is `No` which leaves the scheduler running as the `root` user.

Note: Running as a non–priviledged user may prevent LPD and locally connected printers from working due to permission problems. The `lpd` backend will automatically use a non–priviledged mode that is not 100% compliant with RFC 1179. The `parallel`, `serial`, and `usb` backends will need write access to the corresponding device files.

Satisfy

Examples

```
Satisfy all
Satisfy any
```

Description

The `Satisfy` directive specifies whether all conditions must be satisfied to allow access to the resource. If set to `all`, then all authentication and access control conditions must be satified to allow access.

Setting `Satisfy` to `any` allows a user to gain access if the authentication or access control requirements are satisfied. For example, you might require authentication for remote access, but allow local access without authentication.

The default is `all`. This directive must appear inside a <u>Location</u> directive. You can change these directives under the *Security* Tab GUI.

ServerAdmin

Examples

```
ServerAdmin user@host
ServerAdmin root@foo.bar.com
```

Description

The `ServerAdmin` directive identifies the email address for the administrator on the system. By default the administrator email address is `root@server`, where `server` is the server name. You can change this directive under the *Server* Tab GUI.

ServerBin

Examples

```
ServerBin /usr/lib/cups
ServerBin /foo/bar/lib/cups
```

Description

The `ServerBin` directive sets the directory for server–run executables. If an absolute path is not provided then it is assumed to be relative to the <u>ServerRoot</u> directory. The default executable directory is */usr/lib/cups* or */usr/lib32/cups* (IRIX 6.5). You can change this directive under the <u>*Directories*</u> Tab GUI.

ServerCertificate

Examples

```
ServerCertificate /etc/cups/ssl/server.crt
```

Description

The `ServerCertificate` directive specifies the location of the SSL certificate file used by the server when negotiating encrypted connections. The certificate must not be encrypted (password protected) since the scheduler normally runs in the background and will be unable to ask for a password.

The default certificate file is */etc/cups/ssl/server.crt*. You can change this directive under the <u>*Security*</u> Tab GUI.

ServerKey

Examples

```
ServerKey /etc/cups/ssl/server.key
```

Description

The `ServerKey` directive specifies the location of the SSL private key file used by the server when negotiating encrypted connections.

The default key file is */etc/cups/ssl/server.crt*. You can change this directive under the *Security* Tab GUI.

ServerName

Examples

```
ServerName foo.domain.com
ServerName myserver.domain.com
```

Description

The `ServerName` directive specifies the hostname that is reported to clients. By default the server name is the hostname. You can change this directive under the *Server* Tab GUI.

ServerRoot

Examples

```
ServerRoot /etc/cups
ServerRoot /foo/bar/cups
```

Description

The `ServerRoot` directive specifies the absolute path to the server configuration and state files. It is also used to resolve relative paths in the *cupsd.conf* file. The default server directory is */etc/cups*. You can change this directive under the *Directories* Tab GUI.

SSLListen

Examples

```
SSLListen 127.0.0.1:443
SSLListen 192.0.2.1:443
```

Description

The `SSLListen` directive specifies a network address and port to listen for secure connections. Multiple `SSLListen` directives can be provided to listen on multiple addresses.

The `SSLListen` directive is similar to the SSLPort directive but allows you to restrict access to specific interfaces or networks. You can change the `SSLListen` directive under the *Network* Tab GUI.

SSLPort

Examples

```
SSLPort 443
```

Description

The `SSLPort` directive specifies a port to listen on for secure connections. Multiple `SSLPort` lines can be specified to listen on multiple ports. You can change this directive under the *Network* Tab GUI.

SystemGroup

Examples

```
SystemGroup sys
SystemGroup system
SystemGroup root
```

Description

The `SystemGroup` directive specifies the system administration group for `System` authentication.

You can change this directive under the *Security* Tab GUI. More information can be found under section "Printing System Security".

TempDir

Examples

```
TempDir /var/tmp
TempDir /foo/bar/tmp
```

Description

The `TempDir` directive specifies an absolute path for the directory to use for temporary files. The default directory is */var/tmp*.

Temporary directories must be world−writable and should have the "sticky" permission bit enabled so that other users cannot delete filter temporary files. The following commands will create an appropriate temporary directory called */foo/bar/tmp*:

```
mkdir /foo/bar/tmp ENTER
chmod a+rwxt /foo/bar/tmp ENTER
```

You can change this directive under the *Directories* Tab GUI.

Timeout

Examples

```
Timeout 300
Timeout 90
```

Description

The `Timeout` directive controls the amount of time to wait before an active HTTP or IPP request times out. The default timeout is 300 seconds. You can change this directive under the *Network* Tab GUI.

User

Examples

```
User lp
User guest
```

Description

The `User` directive specifies the UNIX user that filter and CGI programs run as. The default user is `lp`. You can change this directive under the *Filter* **Tab** GUI.

Changing the Client Configuration

The CUPS client application (`lp`, `lpr`, and so forth) use the */etc/cups/client.conf* file for default settings. The client application also look in the user's home directory for a file called *.cupsrc.* Each directive is listed on a line by itself followed by its value. Comments are introduced using the number sign ("#") character at the beginning of a line.

Since the client configuration file consists of plain text, you can use your favorite text editor to make changes to it.

Client Directives

The *client.conf* file contains many directives that determine how the client behaves:

- Encryption
- ServerName

Encryption

Examples

```
Encryption Never
Encryption IfRequested
Encryption Required
Encryption Always
```

Description

The `Encryption` directive specifies the default encryption settings for the client. The default setting is *IfRequested.*

ServerName

Examples

```
ServerName foo.bar.com
ServerName 11.22.33.44
```

Description

The ServerName directive specifies sets the remote server that is to be used for all client operations. That is, it redirects all client requests to the remote server. The default is to use the local server ("*localhost*").

Changing the Printer Configuration

The CUPS scheduler (cupsd) uses the */etc/cups/printers.conf* file to store the list of available printers. This file contains only locally defined printers, but not remote printers that are created automatically. Each directive is listed on a line by itself followed by its value. Comments are introduced using the number sign ("#") character at the beginning of a line.

Since the printer configuration file consists of plain text, you can use your favorite text editor to make changes to it.

Printer Directives

The *printers.conf* file contains many directives that determine how the printer behaves:

- Accepting
- AllowUser
- DefaultPrinter
- DenyUser
- DeviceURI
- Info
- JobSheets
- KLimit
- Location
- PageLimit
- Printer
- QuotaPeriod
- State
- StateMessage

Accepting

Examples

```
Accepting yes

Accepting no
```

Description

The Accepting directive defines the initial Boolean value for the *printer–is–accepting–job* attribute which can be set by the accept and reject commands.

This directive must appear inside a Printer or DefaultPrinter directive.

AllowUser

Examples

```
        AllowUser foo_user
        AllowUser bar_user
```

Description

The `AllowUser` directive adds a username to the *requesting−user−name−allowed* attribute which can be set by the `lpadmin -u` command.

This directive must appear inside a <ins>Printer</ins> or <ins>DefaultPrinter</ins> directive.

DefaultPrinter

Examples

```
        <DefaultPrinter name/>
        ...
        </Printer>
```

Description

The `DefaultPrinter` directive begins a printer definition for the default server destination. It can be added by the `lpadmin` command or if already defined, set as default by the `lpoptions -d` command.

DenyUser

Examples

```
DenyUser foo_user
DenyUser bar_user
```

Description

The DenyUser directive adds a username to the *requesting–user–name–allowed* attribute which can be set by the lpadmin -u command.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

DeviceURI

Examples

```
DeviceURI socket://foo.bar.com:9100
```

Description

The DeviceURI directive defines the value of the *device–uri–attribute* attribute which can be set by the lpadmin -v command.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

Info

Examples

```
Info My Printer
```

Description

The `Info` directive defines the string for the *printer–info* attribute which can be set by the `lpadmin -D` command.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

JobSheets

Examples

```
JobSheets none,standard
```

Description

The `JobSheets` directive specifies the default banner pages to print before and after a print job. In the above example, only a *standard* banner will print after each job.

The `lpoptions -o job-sheets=` command can be used to set banners. For example, the following command would produce the same results of a *standard* banner at the end of each print job for the default printer.

lpoptions −o job−sheets=none,standard

If only one banner file is specified, it will be printed before the files in the job. If a second banner file is specified, it is printed after the files in the job.

The available banner pages depend on the local system configuration; CUPS includes the following banner files:

- `none` – Do not produce a banner page.
- `classified` – A banner page with a "classified" label at the top and bottom.
- `confidential` – A banner page with a "confidential" label at the top and bottom.
- `secret` – A banner page with a "secret" label at the top and bottom.
- `standard` – A banner page with no label at the top and bottom.
- `topsecret` – A banner page with a "top secret" label at the top and bottom.
- `unclassified` – A banner page with an "unclassified" label at the top and bottom.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

KLimit

Examples

```
KLimit 1234
```

Description

The `KLimit` directive defines the value of the *job-k-limit* attribute which can be set by the `lpadmin -o job-k-limit=` command.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

Location

Examples

```
Location Building 3321
```

Description

The `Location` directive defines the string for the *printer-location* attribute which can be set by the `lpadmin -L` command.

> **Note:**
>
> Do not confuse this `Location` directive with the one for cupsd.conf. They are completely different.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

PageLimit

Examples

```
PageLimit 1234
```

Description

The `PageLimit` directive defines the value of the *job–page–limit* attribute which can be set by the `lpadmin -o job-page-limit=` command.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

Printer

Examples

```
<Printer name/>
...
</Printer>
```

Description

The `Printer` directive begins a printer definition. It can be added by the `lpadmin` command.

QuotaPeriod

Examples

```
QuotaPeriod 604800
```

Description

The `QuotaPeriod` directive defines the value of the *job-quota-period* attribute which can be set by the `lpadmin -o job-quota-period=` command.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

State

Examples

```
State stopped
```

Description

The `State` directive defines the initial value of the *printer-state* attribute. The strings *idle* and *stopped* correspond to the IPP enumeration values.

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

StateMessage

Examples

```
StateMessage Ready to print.
```

Description

The `StateMessage` directive defines the initial string for the *printer–state–message* attribute. The following are some example messages:

- Connected to *host_name*...
- Connecting to *printer_queue* on port *port_number*...
- Network host *host_name* is busy; will retry in 30 seconds...
- Printer busy; will retry in 10 seconds...
- Printer is busy; retrying print job...
- Print file accepted – job ID *id_number*.
- Ready to print.
- Waiting for job to complete

This directive must appear inside a <u>Printer</u> or <u>DefaultPrinter</u> directive.

Changing the Classes Configuration

The CUPS scheduler (cupsd) uses the */etc/cups/classes.conf* file to store the list of available classes. This file contains only locally defined classes, but not remote or implicit classes that are created automatically. Each directive is listed on a line by itself followed by its value. Comments are introduced using the number sign ("#") character at the beginning of a line.

Since the classes configuration file consists of plain text, you can use your favorite text editor to make changes to it.

Classes Directives

The *classes.conf* file contains many directives that determine how the classes behaves:

- Accepting
- AllowUser
- Class
- DefaultClass
- DenyUser
- Info
- JobSheets
- KLimit
- Location
- PageLimit
- Printer
- QuotaPeriod
- State
- StateMessage

Accepting

Examples

```
Accepting yes

Accepting no
```

Description

The `Accepting` directive defines the initial Boolean value for the *printer−is−accepting−job* attribute which can be set by the `accept` and `reject` commands.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

AllowUser

Examples

```
AllowUser foo_user
AllowUser bar_user
```

Description

The `AllowUser` directive adds a username to the *requesting–user–name–allowed* attribute which can be set by the `lpadmin -u` command.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

Class

Examples

```
<Class name/>
...
</Class>
```

Description

The `Class` directive begins a class definition. It can be added by the `lpadmin -c` command.

DefaultClass

Examples

```
<DefaultClass name/>
...
</DefaultClass>
```

Description

The `DefaultClass` directive begins a class definition for the default server destination. It can be added by the `lpadmin -c` command or if already defined, set as default by the `lpoptions -d` command.

DenyUser

Examples

```
DenyUser foo_user
DenyUser bar_user
```

Description

The `DenyUser` directive adds a username to the *requesting−user−name−allowed* attribute which can be set by the `lpadmin -u` command.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

Info

Examples

```
Info My Printer
```

Description

The `Info` directive defines the string for the *printer-info* attribute which can be set by the `lpadmin -D` command.

This directive must appear inside a <u>`Class`</u> or <u>`DefaultClass`</u> directive.

JobSheets

Examples

```
JobSheets none,standard
```

Description

The `JobSheets` directive specifies the default banner pages to print before and after a print job. In the above example, only a *standard* banner will print after each job.

The `lpoptions -o job-sheets=` command can be used to set banners. For example, the following command would produce the same results of a *standard* banner at the end of each print job for the default class.

lpoptions −o job−sheets=none,standard

If only one banner file is specified, it will be printed before the files in the job. If a second banner file is specified, it is printed after the files in the job.

The available banner pages depend on the local system configuration; CUPS includes the following banner files:

- `none` – Do not produce a banner page.
- `classified` – A banner page with a "classified" label at the top and bottom.
- `confidential` – A banner page with a "confidential" label at the top and bottom.
- `secret` – A banner page with a "secret" label at the top and bottom.
- `standard` – A banner page with no label at the top and bottom.
- `topsecret` – A banner page with a "top secret" label at the top and bottom.
- `unclassified` – A banner page with an "unclassified" label at the top and bottom.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

KLimit

Examples

```
KLimit 1234
```

Description

The `KLimit` directive defines the value of the *job−k−limit* attribute which can be set by the `lpadmin -o job-k-limit=` command.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

Location

Examples

```
Location Building 3321
```

Description

The `Location` directive defines the string for the *printer−location* attribute which can be set by the `lpadmin -L` command.

> **Note:**
>
> Do not confuse this `Location` directive with the one for cupsd.conf. They are completely different.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

PageLimit

Examples

```
PageLimit 1234
```

Description

The `PageLimit` directive defines the value of the *job-page-limit* attribute which can be set by the `lpadmin -o job-page-limit=` command.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

Printer

Examples

```
Printer foo
Printer bar
Printer foo@bar
```

Description

The `Printer` directive adds a printer to the class. It can be added by the `lpadmin -c` command.

> **Note:**
>
> Do not confuse this `Printer` directive with the one for printers.conf. They are completely different.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

QuotaPeriod

Examples

```
QuotaPeriod 604800
```

Description

The QuotaPeriod directive defines the value of the *job–quota–period* attribute which can be set by the lpadmin -o job-quota-period= command.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

State

Examples

```
State stopped
```

Description

The State directive defines the initial value of the *printer–state* attribute. The strings *idle* and *stopped* correspond to the IPP enumeration values.

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

StateMessage

Examples

```
StateMessage Ready to print.
```

Description

The `StateMessage` directive defines the initial string for the *printer–state–message* attribute. The following are some example messages:

- Connected to *host_name*...
- Connecting to *class_queue* on port *port_number*...
- Network host *host_name* is busy; will retry in 30 seconds...
- Printer busy; will retry in 10 seconds...
- Printer is busy; retrying print job...
- Print file accepted – job ID *id_number*.
- Ready to print.
- Waiting for job to complete

This directive must appear inside a <u>Class</u> or <u>DefaultClass</u> directive.

Printer Accounting

ESP Print Pro maintains a log of all accesses, errors, and pages that are printed. The log files are normally stored in the */var/log/cups* directory. You can change this by editing the */etc/cups/cupsd.conf* configuration file.

The access_log File

The *access_log* file lists each HTTP resource that is accessed by a web browser or ESP Print Pro/IPP client. Each line is in the so−called "Common Log Format" used by many web servers and web reporting tools:

```
host group user date-time \"method resource version\" status bytes

127.0.0.1 − − [20/May/1999:19:20:29 +0000] "POST /admin/ HTTP/1.1" 401 0
127.0.0.1 − mike [20/May/1999:19:20:31 +0000] "POST /admin/ HTTP/1.1" 200 0
```

The *host* field will normally only be an IP address unless you have enabled the HostNameLookups directive in the *cupsd.conf* file.

The *group* field always contains "−" in ESP Print Pro.

The *user* field is the authenticated username of the requesting user. If no username and password is supplied for the request then this field contains "−".

The *date−time* field is the date and time of the request in Greenwich Mean Time (a.k.a. ZULU) and is in the format:

```
[DD/MON/YYYY:HH:MM:SS +0000]
```

The *method* field is the HTTP method used ("GET", "PUT", "POST", etc.)

The *resource* field is the filename of the requested resource.

The *version* field is the HTTP specification version used by the client. For ESP Print Pro clients this will always be "HTTP/1.1".

The *status* field contains the HTTP result status of the request. Usually it is "200", but other HTTP status codes are possible. For example, 401 is the "unauthorized access" status in the example above.

The *bytes* field contains the number of bytes in the request. For POST requests the *bytes* field contains the number of bytes of non−IPP data that is received from the client.

The error_log File

The *error_log* file lists messages from the scheduler (errors, warnings, etc.):

```
level date-time message

I [20/May/1999:19:18:28 +0000] Job 1 queued on 'DeskJet' by 'mike'.
I [20/May/1999:19:21:02 +0000] Job 2 queued on 'DeskJet' by 'mike'.
I [20/May/1999:19:22:24 +0000] Job 2 was cancelled by 'mike'.
```

The *level* field contains the type of message:

- E – An error occurred.
- W – The server was unable to perform some action.
- I – Informational message.
- D – Debugging message.

The *date−time* field contains the date and time of when the page started printing. The format of this field is identical to the *data−time* field in the **access_log** file.

The *message* fields contains a free−form textual message.

The page_log File

The **page_log** file lists each page that is sent to a printer. Each line contains the following information:

```
printer user job-id date-time page-number num-copies job-billing

DeskJet root 2 [20/May/1999:19:21:05 +0000] 1 0 acme-123
```

The *printer* field contains the name of the printer that printed the page. If you send a job to a printer class, this field will contain the name of the printer that was assigned the job.

The *user* field contains the name of the user (the IPP `requesting-user-name` attribute) that submitted this file for printing.

The *job−id* field contains the job number of the page being printed. Job numbers are reset to 1 whenever the ESP Print Pro server is started, so don't depend on this number being unique!

The *date−time* field contains the date and time of when the page started printing. The format of this field is identical to the *data−time* field in the **access_log** file.

The *page−number* and *num−pages* fields contain the page number and number of copies being printed of that page. For printer that can not produce copies on their own, the *num−pages* field will always be 1.

The *job−billing* field contains a copy of the `job-billing` attribute provided with the IPP `create-job` or `print-job` requests or "−" if none was provided.

File Typing and Filtering

ESP Print Pro provides a MIME–based file typing and filtering mechanism to convert files to a printable format for each printer. On startup the ESP Print Pro server reads MIME database files from the */etc/cups* directory (or a directory specified by the ServerRoot directive) to build a file type and conversion database in memory. These database files are plain ASCII text and can be edited with your favorite text editor.

The *mime.types* and *mime.convs* files define the standard file types and filters that are available on the system.

mime.types

The *mime.types* file defines the known file types. Each line of the file starts with the MIME type and may be followed by one or more file type recognition rules. For example, the text/html file type is defined as:

```
text/html       html htm \
                printable(0,1024) + \
                (string(0,"<HTML>") string(0,"<!DOCTYPE"))
```

The first two rules say that any file with an extension of *.html* or *.htm* is a HTML file. The third rule says that any file whose first 1024 characters are printable text and starts with the strings <HTML> or <!DOCTYPE is a HTML file as well.

The first two rules deal solely with the name of the file being typed. This is useful when the original filename is known, however for print files the server doesn't have a filename to work with. The third rule takes care of this possibility and automatically figures out the file type based upon the contents of the file instead.

The available tests are:

- (expr) – Parenthesis for expression grouping
- + – Logical AND
- , or whitespace – Logical OR
- ! – Logical NOT
- match("pattern") – Pattern match on filename
- extension – Pattern match on "*.extension"
- ascii(offset,length) – True if bytes are valid printable ASCII (CR, NL, TAB, BS, 32–126)
- printable(offset,length) – True if bytes are printable 8–bit chars (CR, NL, TAB, BS, 32–126, 160–254)
- string(offset,"string") – True if bytes are identical to string
- contains(offset,range,"string") – True if the range of bytes contains the string
- char(offset,value) – True if byte is identical
- short(offset,value) – True if 16–bit integer is identical (network or "big–endian" byte order)
- int(offset,value) – True if 32–bit integer is identical (network or "big–endian" byte order)
- locale("string") – True if current locale matches string

All numeric values can be in decimal (123), octal (0123), or hexadecimal (0x123) as desired.

Strings can be in quotes, all by themselves, as a string of hexadecimal values, or some combination:

```
"string"
'string'
string
<737472696e67>
<7374>ring
```

As shown in the `text/html` example, rules can continue on multiple lines using the backslash (\) character. A more complex example is the `image/jpeg` rules:

```
image/jpeg          jpeg jpg jpe string(0,<FFD8FF>) &&\
                    (char(3,0xe0) char(3,0xe1) char(3,0xe2) char(3,0xe3)\
                     char(3,0xe4) char(3,0xe5) char(3,0xe6) char(3,0xe7)\
                     char(3,0xe8) char(3,0xe9) char(3,0xea) char(3,0xeb)\
                     char(3,0xec) char(3,0xed) char(3,0xee) char(3,0xef))
```

This rule states that any file with an extension of *.jpeg*, *.jpg*, or *.jpe* is a JPEG file. In addition, any file starting with the hexadecimal string <FFD8FF> (JPEG Start–Of–Image) followed by a character between and including `0xe0` and `0xef` (JPEG APPn markers) is also a JPEG file.

mime.convs

The *mime.convs* file defines all of the filter programs that are known to the system. Each line consists of:

```
source destination cost program

text/plain application/postscript 50 texttops
application/vnd.cups-postscript application/vnd.cups-raster 50 pstoraster
image/* application/vnd.cups-postscript 50 imagetops
image/* application/vnd.cups-raster 50 imagetoraster
```

The *source* field is a MIME type, optionally using a wildcard for the super–type or sub–type (e.g. "text/plain", "image/*", "*/postscript").

The *destination* field is a MIME type defined in the *mime.types* file.

The *cost* field defines a relative cost for the filtering operation from 1 to 100. The cost is used to choose between two different sets of filters when converting a file. For example, to convert from `image/jpeg` to `application/vnd.cups-raster`, you could use the `imagetops` and `pstoraster` filters for a total cost of 100, or the `imagetoraster` filter for a total cost of 50.

The *program* field defines the filter program to run; the special program "–" can be used to make two file types equivalent. The program must accept the standard filter arguments and environment variables described in the CUPS Interface Design Description and CUPS Software Programmers Manual:

```
program job user title options [filename]
```

If specified, the *filename* argument defines a file to read when filtering, otherwise the filter must read from the standard input. All filtered output must go to the standard output.

Adding Filetypes and Filters

Adding a new file type or filter is fairly straight−forward. Rather than adding the new type and filter to the *mime.types* and *mime.convs* files which are overwritten when you upgrade to a new version of ESP Print Pro, you simple need to create new files with *.types* and *.convs* extensions in the */etc/cups* directory. We recommend that you use the product or format name, e.g.:

```
myproduct.types
myproduct.convs
```

If you are providing a filter for a common file format or printer, add the company or author name:

```
acme-msword.types
acme.msword.convs
```

This will help to prevent name collisions if you install many different file types and filters.

Once you choose the names for these files, create them using your favorite text editor as described earlier in this chapter. Once you have created the files, restart the `cupsd` process as described in Chapter N, "Printing System Configuration".

Printer Drivers and PPD Files

Most ESP Print Pro printer drivers utilize one or more printer−specific filters and a PPD file for each printer model. Printer driver filters are registered via the PPD file using `cupsFilter` attributes:

```
*cupsFilter: "application/vnd.cups-raster 0 rastertohp"
```

The filter is specified using the source file type only; the destination file type is assumed to be `printer/name` − suitable for sending to the printer.

Writing Your Own Filter or Printer Driver

ESP Print Pro supports an unlimited number of file formats and filters, and can handle any printer. If you'd like to write a filter or printer driver for your favorite file format or printer, consult the CUPS Software Programmers Manual for step−by−step instructions.

This appendix lists the files and directories that are installed by ESP Print Pro.

Pathname	Description
/etc/cups/classes.conf	The printer classes configuration file for the scheduler.
/etc/cups/cupsd.conf	The scheduler configuration file.
/etc/cups/mime.convs	The list of standard file filters included with ESP Print Pro.
/etc/cups/mime.types	The list of recognized file types for ESP Print Pro.
/etc/cups/printers.conf	The printer configuration file for the scheduler.
/etc/cups/interfaces/	The location of System V interface scripts for printers.
/etc/cups/ppd/	The location of PostScript Printer Description ("PPD") files for printers.
/etc/cups/ssl/	The location of encryption files for the scheduler.
/usr/bin/cancel	The System V cancel job(s) command.
/usr/bin/disable	The System V disable printer command.
/usr/bin/enable	The System V enable printer command.

/usr/bin/lp	The System V print command.
/usr/bin/lpoptions	Sets user−defined printing options and defaults.
/usr/bin/lppasswd	Adds, changes, or removes Digest password accounts.
/usr/bin/lpq	The Berkeley status command.
/usr/bin/lpr	The Berkeley print command.
/usr/bin/lprm	The Berkeley cancel job(s) command.
/usr/bin/lpstat	The System V status command.
/usr/include/cups/	ESP Print Pro API header files.
/usr/lib32/libcups.a /usr/lib32/libcupsimage.a	Static libraries (IRIX 6.5)
/usr/lib/libcups.a /usr/lib/libcupsimage.a	Static libraries (all others)
/usr/lib/libcups.sl.2 /usr/lib/libcupsimage.sl.2	Shared libraries (HP−UX)
/usr/lib32/libcups.so.2 /usr/lib32/libcupsimage.so.2	Shared libraries (IRIX 6.5)
/usr/lib/libcups.so.2 /usr/lib/libcupsimage.so.2	Shared libraries (all others)
/usr/lib/cups/backend/	Backends for various types of printer connections.
/usr/lib/cups/cgi−bin/	CGI programs for the scheduler.
/usr/lib/cups/daemon/	Daemons for polling and LPD support.
/usr/lib/cups/filter/	Filters for various types of files.
/usr/lib/locale/	The location of language−specific message files. (System V)
/usr/lib/nls/msg/	The location of language−specific message files. (Compaq Tru64 UNIX)
/usr/share/locale/	The location of language−specific message files. (Linux, *BSD)
/usr/sbin/accept	The accept−jobs command.
/usr/sbin/cupsd	The ESP Print Pro print scheduler.
/usr/sbin/lpadmin	The System V printer administration tool.
/usr/sbin/lpc	The Berkeley printer administration tool.
/usr/sbin/lpinfo	The get−devices and get−ppds command.
/usr/sbin/lpmove	The move−jobs command.
/usr/sbin/reject	The reject−jobs command.
/usr/share/catman/a_man/ /usr/share/catman/u_man/	Man pages (IRIX)
/usr/man/	Man pages (all others)
/usr/share/cups/data/	The location of filter data files.
/usr/share/cups/data/testprint.ps	The PostScript test page file.

/usr/share/cups/fonts/	The location of PostScript fonts for the PostScript RIP.
/usr/share/cups/model/	The location of PostScript Printer Description ("PPD") files and interface scripts that may be used to setup a printer queue.
/usr/share/cups/pstoraster/	Other PostScript RIP initialization files.
/usr/share/cups/pstoraster/Fontmap	The font mapping file (converts filenames to fontnames)
/usr/share/cups/templates/	The location of HTML template files for the web interfaces.
/usr/share/doc/cups/	Documentation and web page data for the scheduler.
/var/log/cups/	The location of scheduler log files.
/var/spool/cups/	The location of print files waiting to be printed.