



# Mac OS X Server

Print Service Administration  
For Version 10.4 or Later

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# Contents

<b>Preface</b>	<b>7 About This Guide</b>
	7 What's New in Version 10.4
	7 What's in This Guide
	8 Using Onscreen Help
	9 The Mac OS X Server Suite
	10 Getting Documentation Updates
	11 Getting Additional Information
<b>Chapter 1</b>	<b>13 About Print Service</b>
	13 Overview of Network Printing
	14 Without Print Service
	15 With Print Service
	16 Supported Printers
	17 Supported Clients
	18 Workload Distribution Using Printer Pools
	18 Multiple Network Interface Support
	19 Security Considerations
<b>Chapter 2</b>	<b>21 Setting Up Print Service</b>
	21 Before You Begin
	21 Setup Overview
	22 Setting Up the Service
	22 Adding a Print Queue
	24 Choosing a Default LPR Queue
	25 Setting the Print Log Archive Level and Interval
	26 Advertising an LPR Queue Using Bonjour
	27 Listing an LPR Queue in Open Directory
	28 Creating a Printer Pool
	29 Starting Print Service
	29 Setting Print Quotas
	29 How Quotas Work
	30 Setting Quotas
	30 Specifying User Print Quotas

- 31 Enforcing Print Quotas for a Queue
- 31 Resetting a User's Print Quota

## Chapter 3

- 33 **Setting Up Printing for Clients**
- 33 About PPD Files
- 34 Mac OS X Clients
  - 34 Adding an IPP Print Queue in Mac OS X
  - 34 Adding an AppleTalk Print Queue in Mac OS X
  - 34 Adding an LPR Print Queue in Mac OS X
- 36 Troubleshooting
- 36 Mac OS 8 and Mac OS 9 Clients
  - 36 Setting Up an AppleTalk Queue on Mac OS 8 or 9 Clients
  - 36 Setting Up an LPR Queue on Mac OS 8 or 9 Clients
- 37 Troubleshooting
- 37 Windows Clients
  - 37 Troubleshooting
- 37 UNIX Clients

## Chapter 4

- 39 **Managing Print Service**
- 39 Managing the Service
  - 39 Checking the Status of Print Service
  - 40 Starting and Stopping Print Service
  - 40 Enabling and Disabling Cover Sheets for Print Jobs
- 41 Managing Print Queues
  - 41 Viewing Print Queue Status
  - 42 Stopping a Print Queue
  - 43 Restarting a Print Queue
  - 43 Changing Print Queue Settings
  - 44 Renaming a Print Queue
  - 44 Changing the Default LPR Print Queue
  - 45 Deleting a Print Queue
- 46 Managing Print Jobs
  - 46 Monitoring a Print Job
  - 47 Putting a Print Job on Hold
  - 48 Restarting a Print Job
  - 49 Deleting a Print Job
- 49 Managing Print Quotas
  - 49 Suspending Quotas for a Print Queue
- 50 Managing Print Logs
  - 50 Viewing Print Service and Queue Logs
  - 51 Archiving Print Service Logs

<b>Chapter 5</b>	<b>53 Solving Problems</b>
	53 Print Service Doesn't Start
	53 Clients Can't Add Queue
	53 Users Can't Print
	54 Jobs in a Server Queue Don't Print
	54 Print Queue Becomes Unavailable
<b>Glossary</b>	<b>55</b>
<b>Index</b>	<b>63</b>



# About This Guide

## Learn what's new for Mac OS X Server Print Service Administration.

Mac OS X Server version 10.4 allows you configure print service to access a printer on the network or on its USB port, and share it as a queue or class (printer pool) to client computers. This version of Print service offers a complete integration of CUPS (Common UNIX Print System) offering more security, authentication, and error feedback than in previous versions of the service. As a bonus administrators will benefit by the complete adoption of CUPS and IPP for print sharing, allowing printer sharing via IPP. Print service includes AppleTalk support and authenticated printing using IPP and SMB/CIFS.

### What's New in Version 10.4

- Complete CUPS integration with improved performance and reliability
- Server managed cover sheet option
- Queue sharing over IPP
- Management of multiple printers through one queue
- More visible CUPS log files

### What's in This Guide

Print service lets clients of the Mac OS X Server print documents in a flexible, managed printing environment over a network. You can assign your client users specific printers for their printing tasks and manage access to other printers through authentication or user quotas. You can also manage printer use more effectively by balancing the load across a pool of printers handling the same queue.

Mac OS X Server includes print service based on four common protocols:

- IPP—For printing from Macintosh, Windows, or UNIX computers. Requires CUPS.
- LPR—For printing from UNIX computers and from Macintosh computers running Mac OS 8.1 or later.
- SMB/CIFS—For printing from Windows computers.
- AppleTalk—For printing from Macintosh computer.

You can use the following Mac OS X Server applications to set up and manage print services:

- **Server Admin.** Use Server Admin to turn on and configure individual file services for each protocol
- **Workgroup Manager.** Use Workgroup Manager to create share points and set access privileges

You can also perform most setup and management tasks by typing commands at a command prompt in Terminal. For more information, see the print service chapter of the command-line administration guide.

**Note:** Because Apple frequently releases new versions and updates to its software, images shown in this book may be different from what you see on your screen.

## Using Onscreen Help

You can view instructions and other useful information from this and other documents in the server suite by using onscreen help.

On a computer running Mac OS X Server, you can access onscreen help after opening Workgroup Manager or Server Admin. From the Help menu, select one of the options:

- *Workgroup Manager Help* or *Server Admin Help* displays information about the application.
- *Mac OS X Server Help* displays the main server help page, from which you can search or browse for server information.
- *Documentation* takes you to [www.apple.com/server/documentation](http://www.apple.com/server/documentation), from which you can download server documentation.

You can also access onscreen help from the Finder or other applications on a server or on an administrator computer. (An administrator computer is a Mac OS X computer with server administration software installed on it.) Use the Help menu to open Help Viewer, and then choose Library > Mac OS X Server Help.

To see the latest server help topics, make sure the server or administrator computer is connected to the Internet while you're using Help Viewer. Help Viewer automatically retrieves and caches the latest server help topics from the Internet. When not connected to the Internet, Help Viewer displays cached help topics.



## The Mac OS X Server Suite

The Mac OS X Server documentation includes a suite of guides that explain the services and provide instructions for configuring, managing, and troubleshooting the services. All of the guides are available in PDF format from:

[www.apple.com/server/documentation/](http://www.apple.com/server/documentation/)

<b>This guide...</b>	<b>tells you how to:</b>
<i>Mac OS X Server Getting Started for Version 10.4 or Later</i>	Install Mac OS X Server and set it up for the first time.
<i>Mac OS X Server Upgrading and Migrating to Version 10.4 or Later</i>	Use data and service settings that are currently being used on earlier versions of the server.
<i>Mac OS X Server User Management for Version 10.4 or Later</i>	Create and manage users, groups, and computer lists. Set up managed preferences for Mac OS X clients.
<i>Mac OS X Server File Services Administration for Version 10.4 or Later</i>	Share selected server volumes or folders among server clients using these protocols: AFP, NFS, FTP, and SMB/CIFS.
<i>Mac OS X Server Print Service Administration for Version 10.4 or Later</i>	Host shared printers and manage their associated queues and print jobs.
<i>Mac OS X Server System Image and Software Update Administration for Version 10.4 or Later</i>	Use NetBoot and Network Install to create disk images from which Macintosh computers can start up over the network. Set up a software update server for updating client computers over the network.
<i>Mac OS X Server Mail Service Administration for Version 10.4 or Later</i>	Set up, configure, and administer mail services on the server.
<i>Mac OS X Server Web Technologies Administration for Version 10.4 or Later</i>	Set up and manage a web server, including WebDAV, WebMail, and web modules.
<i>Mac OS X Server Network Services Administration for Version 10.4 or Later</i>	Set up, configure, and administer DHCP, DNS, VPN, NTP, IP firewall, and NAT services on the server.
<i>Mac OS X Server Open Directory Administration for Version 10.4 or Later</i>	Manage directory and authentication services.
<i>Mac OS X Server QuickTime Streaming Server Administration for Version 10.4 or Later</i>	Set up and manage QuickTime streaming services.
<i>Mac OS X Server Windows Services Administration for Version 10.4 or Later</i>	Set up and manage services including PDC, BDC, file, and print for Windows computer users.

This guide...	tells you how to:
<i>Mac OS X Server Migrating from Windows NT to Version 10.4 or Later</i>	Move accounts, shared folders, and services from Windows NT servers to Mac OS X Server.
<i>Mac OS X Server Java Application Server Administration For Version 10.4 or Later</i>	Configure and administer a JBoss application server on Mac OS X Server.
<i>Mac OS X Server Command-Line Administration for Version 10.4 or Later</i>	Use commands and configuration files to perform server administration tasks in a UNIX command shell.
<i>Mac OS X Server Collaboration Services Administration for Version 10.4 or Later</i>	Set up and manage weblog, chat, and other services that facilitate interactions among users.
<i>Mac OS X Server High Availability Administration for Version 10.4 or Later</i>	Manage IP failover, link aggregation, load balancing, and other hardware and software configurations to ensure high availability of Mac OS X Server services.
<i>Mac OS X Server Xgrid Administration for Version 10.4 or Later</i>	Manage computational Xserve clusters using the Xgrid application.
<i>Mac OS X Server and Storage Glossary</i>	Interpret terms used for server and storage products.

## Getting Documentation Updates

Periodically, Apple posts new onscreen help topics, revised guides, and additional solution papers. The new help topics include updates to the latest guides.

- To view new onscreen help topics, make sure your server or administrator computer is connected to the Internet and click the Late-Breaking News link on the main Mac OS X Server help page.
- To download the latest guides and solution papers in PDF format, go to the Mac OS X Server documentation webpage: [www.apple.com/server/documentation](http://www.apple.com/server/documentation).

## Getting Additional Information

For more information, consult these resources:

*Read Me documents*—important updates and special information. Look for them on the server discs.

*Mac OS X Server website*—gateway to extensive product and technology information.  
[www.apple.com/macosx/server/](http://www.apple.com/macosx/server/)

*AppleCare Service & Support*—access to hundreds of articles from Apple’s support organization.  
[www.apple.com/support/](http://www.apple.com/support/)

*Apple customer training*—instructor-led and self-paced courses for honing your server administration skills.  
[train.apple.com/](http://train.apple.com/)

*Apple discussion groups*—a way to share questions, knowledge, and advice with other administrators.  
[discussions.info.apple.com/](http://discussions.info.apple.com/)

*Apple mailing list directory*—subscribe to mailing lists so you can communicate with other administrators using email.  
[discussions.info.apple.com/](http://discussions.info.apple.com/)



## Mac OS X Server print service helps you set up a managed printing environment on your network.

With a print server, you can share printers by setting up print queues accessible by any number of users over a network connection. When a user prints to a shared queue, the print job waits on the server until the printer is available or until established scheduling criteria are met.

Greater administrative features are available by using a Mac OS X Print server. For example, you can:

- Set page quotas for individual users on specific print queues
- Hold a job for printing at a later time
- Limit the number of pages individual users can print on specific printers
- Keep logs summarizing printer use

You can use the following applications to set up and administer print service:

- *Server Admin* to configure print service, set up shared queues, manage print jobs, and monitor the status of print jobs
- *Workgroup Manager* to set print quotas for users

The Mac OS X Server print service is built on top of the standard Mac OS X client printing architecture, which is, in turn, built on the Common UNIX Printing System (CUPS).

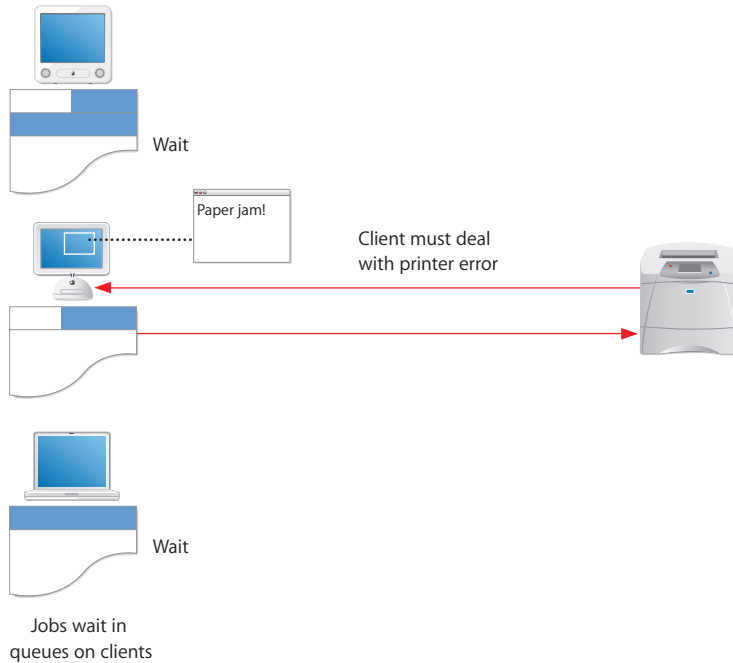
## Overview of Network Printing

It's possible to benefit from some of the advantages of shared network printing without using a server. However, a quick comparison of network printing with and without a server-based print service shows what a print service can do to make things easier for your users and for you as an administrator.

## Without Print Service

Providing shared printers to your users, even without using a server, is relatively easy: connect the printers to your network and let individual users choose the printer that best suits their needs.

When a user prints a document, the resulting print job waits in a queue on the user's computer until the printer is ready to accept the job (in common printing terminology, you say the job is "spooled to a queue").



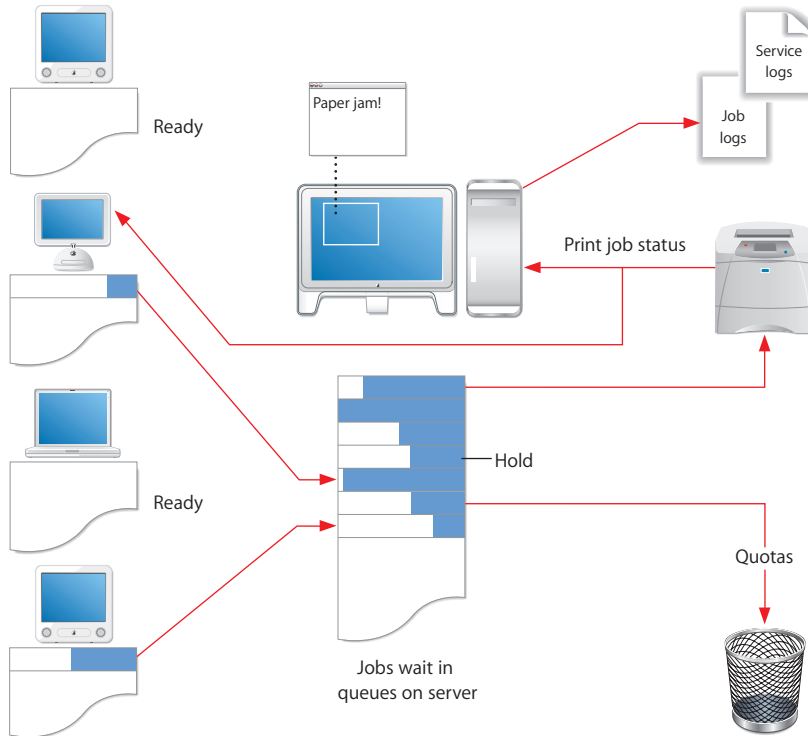
Although this way of providing access to printers is easy to set up, it has the following disadvantages:

- Users need to be sure their jobs have finished printing before they can turn off their computers or, in the case of mobile clients, disconnect their computers from the network.
- Error messages from the printer (for example, "out of paper" or "paper jam") go directly to the user currently printing.
- It is difficult for you, as administrator, to keep track of or control how many pages are printed by individual users.

## With Print Service

To take advantage of print service, you set up queues for available printers on a server. Users choose from these queues instead of choosing printers directly.

When a user prints a document, the resulting print job moves quickly from the queue on the user's computer to the queue on the server.



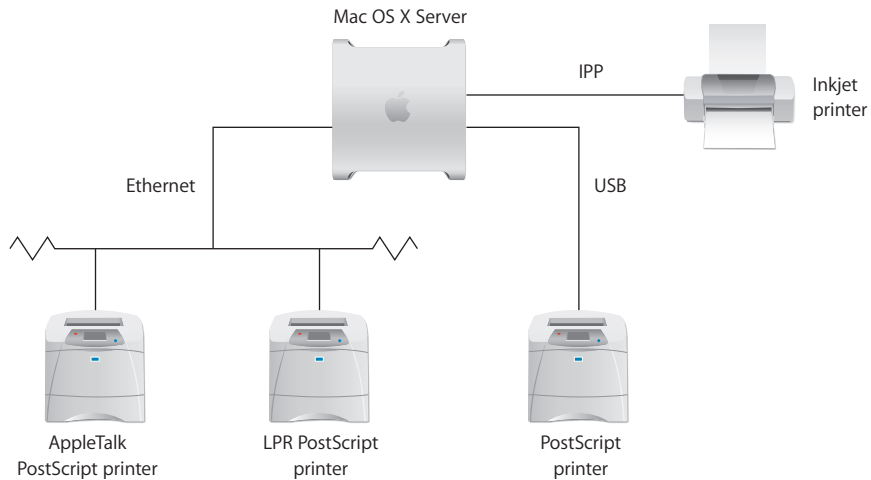
This way of providing printer access has advantages over simple network printing:

- Print jobs transfer quickly from client computers to the server's queue, so users can turn off or disconnect their computers soon after printing.
- Printer error conditions are reported on the server rather than on individual client computers.
- You can easily limit and track the number of pages individual users print on specific printers.
- You can control when and in what order individual jobs print.

## Supported Printers

Print service in Mac OS X Server supports:

- PostScript-compatible printers connected to your network that use the IPP, Line Printer Remote (LPR), AppleTalk, or SMB/CIFS
- PostScript printers connected directly to the server via the Universal Serial Bus (USB)
- Inkjet (raster) printers connected directly to the server via USB



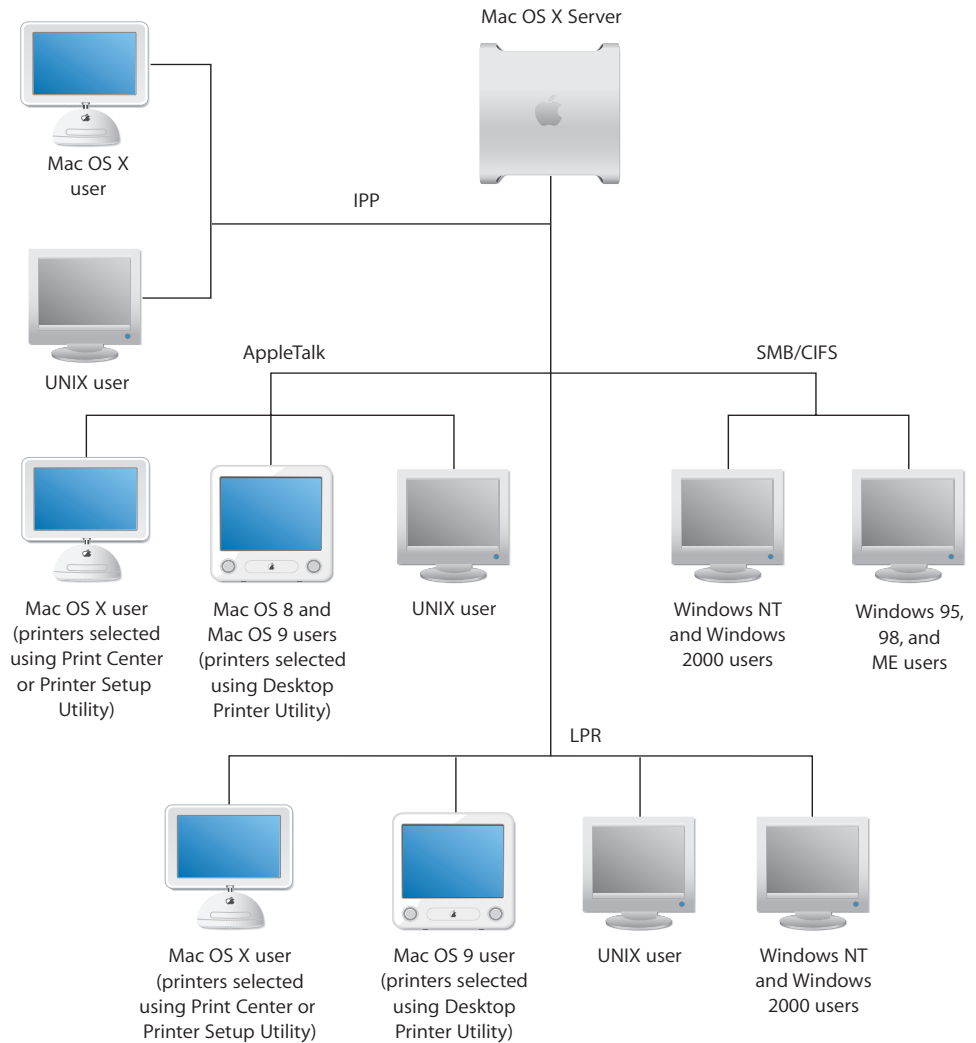
Mac OS X Server provides printer sharing through the use of print queues. Clients using LPR, AppleTalk and SMB/CIFS use only PostScript to transfer the job to the print queues on the server. IPP clients, however, format the job data according to the OEM print driver for the destination printer, either PostScript or binary.

When Mac OS X Server receives the print job, it either sends the PostScript print job to the queue of a networked (or directly connected) PostScript printer, or converts the PostScript print job into PDF (using the ps2pdf converter) for output to an inkjet (raster) printer directly connected to the server via USB.



## Supported Clients

Any computer using the IPP, LPR, AppleTalk, or SMB/CIFS protocol can print to queues shared through the Mac OS X print service.



Macintosh computers can communicate with printers using IPP, AppleTalk or LPR. Windows computers use IPP, LPR, and SMB/CIFS. UNIX computers use IPP or LPR. For more information on printing from a specific kind of client computer, see Chapter 3, “Setting Up Printing for Clients,” on page 33.

## Workload Distribution Using Printer Pools

Each print service queue you set up is assigned to a single printer. The Common UNIX Printing System (CUPS) supports a special queue called a printer class or printer *pool*, which is essentially a queue with more than one printer assigned to it.

A printer pool offers a number of advantages over single-printer queues in high-volume or high-availability printing environments:

- Print jobs are assigned to the next available printer in the pool, so you can have as many jobs printing simultaneously as you have printers assigned to the pool.
- If a printer assigned to the pool becomes unavailable for any reason, the other printers in the pool continue to print waiting jobs.

You can set up a printer pool using Settings > Create Pool in the Printer Service in Mac OS X Server 10.4. After creating the pool, you can add and manage the resulting pool queue in print service as you would any other queue.

### Things to consider when creating a printer pool

The purpose of a printer pool is not to compete with each printer's queue but to replace it. A good practice is not to share a printer individually when it's also shared in a pool.

It is also good strategy to group printers of like make and model together to ensure the each printer in the pool has the same printing capabilities. For instance it would defeat the purpose of a printer pool if all but one printer were capable of printing color.

**Important:** The capabilities of the printers in a printer pool are typically defined by the first printer added to the pool list. Jobs given to lesser capable printers in the pool may be rejected by the assigned printer and fail.

You can also create a printer pool using commands in Terminal. For more information, see the chapter on print service in the command-line administration guide.

## Multiple Network Interface Support

In Mac OS X Server, print service automatically operates across all interfaces for which TCP/IP-based printing protocols are configured. These include CUPS/IPP, LPR, and SMB/CIFS.

Similarly, print service automatically operates across all interfaces for which AppleTalk is enabled. Refer to the file services administration guide for more information on AppleTalk set up and limitations.

## Security Considerations

AppleTalk and LPR printer queues do not support authentication. Print service relies on the client to provide user information. Although standard Macintosh and Windows clients provide accurate information, a clever user could potentially modify the client to submit false information and thereby avoid print quotas.

Windows service does support authentication, requiring users to log in before using SMB/CIFS printers.

Basic and Digest (MD5) authentication is built into CUPS software on which print service relies and supports a print job submission method called Internet Printing Protocol (IPP).



This chapter shows how to set up print queues and change print service settings using Server Admin.

## Before You Begin

Before you set up print service, note which protocols your clients use for printing. Print service supports AppleTalk, LPR, and SMB/CIFS protocols.

## Setup Overview

Here is an overview of the steps for setting up print service:

### **Step 1: Create queues for your printers**

Create queues for your printers on the server using Server Admin. Users see these queues as printers. See “Adding a Print Queue” on page 22.

### **Step 2: (Optional) Adjust general service settings**

Use Server Admin to specify the default LPR queue and set print service log options. See “Choosing a Default LPR Queue” on page 24 and “Setting the Print Log Archive Level and Interval” on page 25.

### **Step 3: Start print service**

Use Server Admin to start print service on the server and make the queues available to clients. See “Starting Print Service” on page 29.

### **Step 4: (Optional) Set print quotas**

If you want to limit the number of pages users can print, set print quotas for user accounts and enforce quotas on print queues. See “Setting Print Quotas” on page 29.

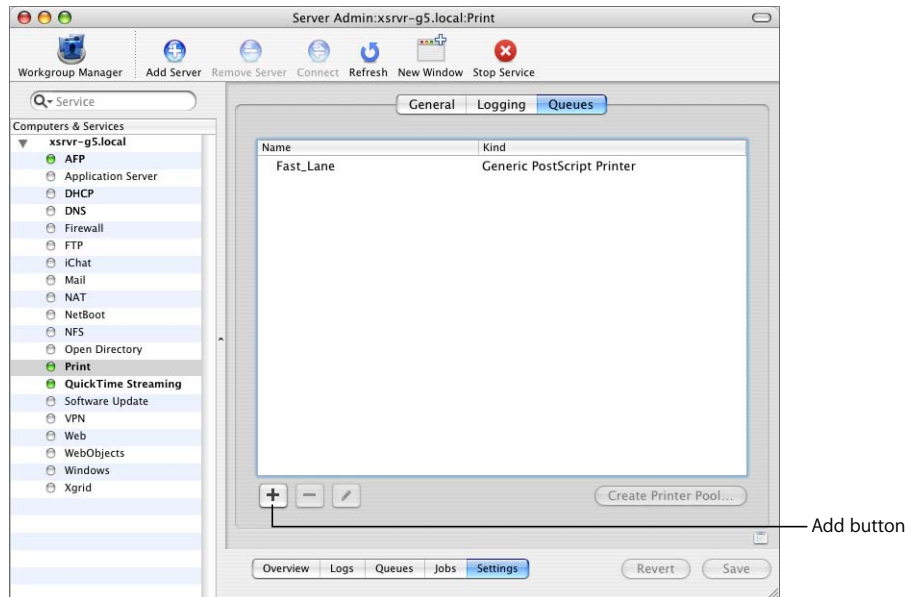
### **Step 5: Set up client computers**

Add, or show your users how to add, your server’s queues to the printing setups on their computers. See Chapter 3, “Setting Up Printing for Clients,” on page 33.

## Setting Up the Service

### Adding a Print Queue

You can share any printer that has a queue set up for it on the server. You create queues for shared printers on the server using Server Admin.



#### To create a shared print queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings.
- 3 Click Queues.
- 4 Click the Add (+) button (below the list).

If you don't see the Queues button, you might already be looking at queue settings. Click the Back button (the left-pointing arrow in the upper right).

- 5 Choose the protocol used by the printer from the pop-up menu.
  - a For an AppleTalk printer, select the printer in the list and click OK.
  - b For an LPR printer, type the printer IP address or DNS name and click OK.  
If you don't want to use the printer's default queue, first deselect "Use default queue on server" and type a queue name.
  - c For an Open Directory printer, select the printer in the list and click OK.

- 6 In the Queues pane, double-click the queue you have just added.
- 7 In the General pane, type the queue name you want clients to see in the Sharing Name field.

Make sure the name is compatible with any naming restrictions imposed by your clients. For example, some LPR clients do not support names that contain spaces, and some Windows clients restrict names to 12 characters.

Queue names shared via LPR or SMB/CIFS should not contain characters other than A–Z, a–z, 0–9, and \_ (underscore).

AppleTalk queue names cannot be longer than 32 bytes (which may be fewer than 32 typed characters). Note that the queue name is encoded according to the language used on the server and may not be readable on client computers using another language.

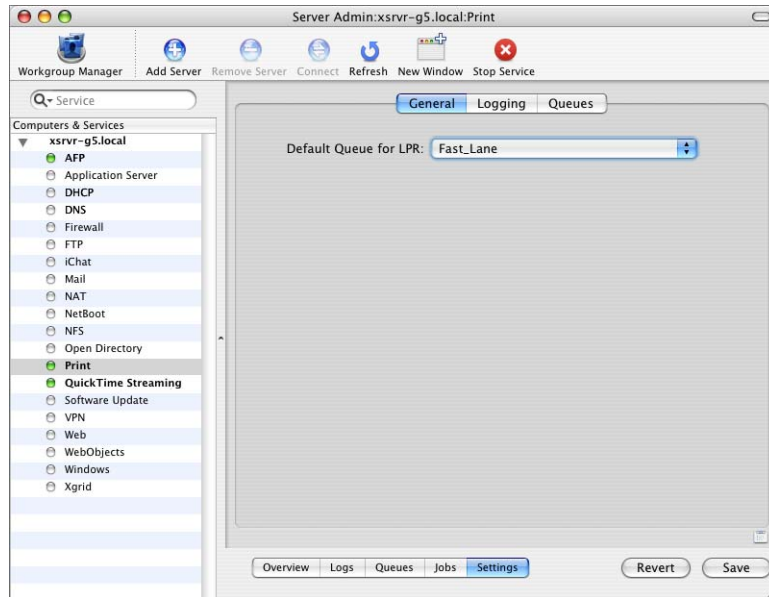
**Note:** Changing the Sharing Name also changes the queue name that appears in Printer Setup Utility on the server.

- 8 Select the protocols used for printing by your client computers.  
If you select “SMB”, make sure you start Windows services.
- 9 Select “Enforce quotas for this queue” if you want to enforce the print quotas you establish for users in Workgroup Manager.
- 10 Select a cover sheet you would like the printer to create by selecting a title from the pop-up menu. If you don’t want the server to create a cover sheet for each job printed, select “none”.
- 11 Click Save, then click the Back button (in the upper left).

## Choosing a Default LPR Queue

You can use print service General settings in Server Admin to specify a default LPR queue for the server.

Setting a default LPR queue makes it easier for clients to print without knowing the names of the queues on the server.



### To set the default LPR queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click General.
- 3 Choose the default queue from the pop-up menu.
- 4 Click Save.

If the queue you want to use is not in the list, it might not currently be shared using LPR.

A user can add this default LPR queue to his or her computer's printer list without knowing the queue's name by choosing "Use default queue on server" when adding the printer.

### From the Command Line

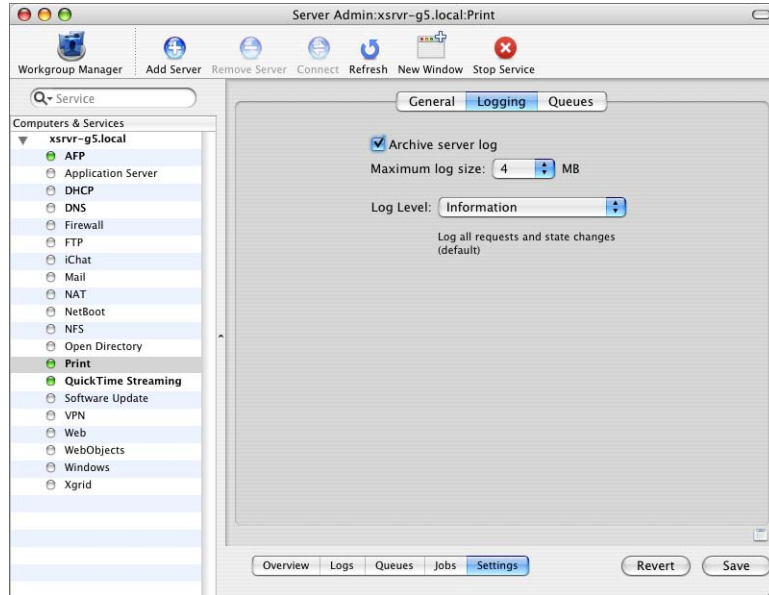
You can also set the default LPR queue using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.



## Setting the Print Log Archive Level and Interval

Print service keeps a general service log and individual logs for each shared queue. When a log is archived, new events are recorded in a new, empty log file.

You can use the Logging settings for print service in Server Admin to specify the level of logging and how often the logs are archived.



### To set the log archive intervals:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Logging.
- 3 Select "Archive server log."
- 4 To set the level of event reporting in the logs, make a selection from the Log Level pop-up menu.
- 5 Select a maximum log size you want the archive to grow to before it is archived by the server. Use the Max log size pop-up menu to select the size of the archive file. If you don't want to archive the server logs, deselect the checkbox next to "Archive server log."
- 6 Click Save.

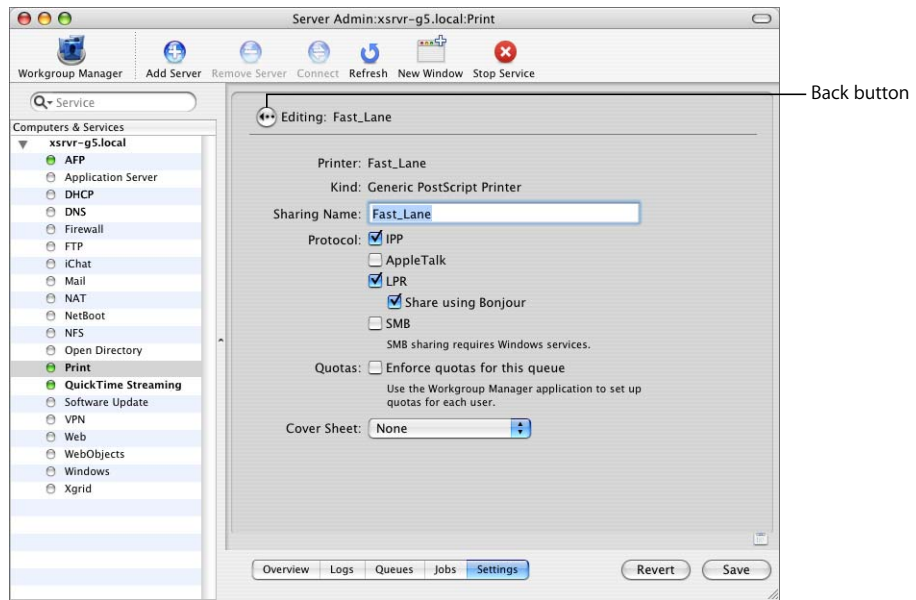
Both current and archived logs are in `/Library/Logs/PrintService/`.

### From the Command Line

You can also set the archival interval using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

## Advertising an LPR Queue Using Bonjour

You can make it easier for your users to find shared LPR queues by advertising them using Bonjour.



### To advertise a queue using Bonjour:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Queues.
- 3 Double-click the queue you want to advertise.
- 4 Under LPR in the Protocol section, select "Share using Bonjour."
- 5 Click Save, then click the Back button (in the upper left).

## Listing an LPR Queue in Open Directory

You can make it easier for your users to find shared LPR queues by listing them in Open Directory. If you include the PostScript Printer Description (PPD) printer model name in the directory, users don't need to worry about which printer model to choose.

### To list a queue in Open Directory:

- 1 If you haven't already, create the queue.
- 2 Open Workgroup Manager.
- 3 If you don't see the Inspector buttons, choose Workgroup Manager > Preferences and select "Show All Records tab and inspector."
- 4 If necessary, switch to the correct directory domain.
- 5 Click the All Records button (it looks like a bull's-eye, next to the Users, Groups, and Computers buttons).
- 6 Choose Printers from the pop-up menu below the All Records button and click New Record.
- 7 Double-click "untitled\_1" next to RecordName attribute, type the name you want your users to see when they're browsing for the printer, and press Return.
- 8 Click New Attribute and choose PrinterLPRHost from the Attribute Name pop-up menu.
- 9 Click in the Text field, type the IP address or DNS name of the server that hosts the queue, and click OK.
- 10 If the queue you are listing is not the default LPR queue on the server, click New Attribute, choose PrinterLPRQueue from the pop-up menu, type the queue name in the Text field, and click OK.
- 11 To specify the printer model (optional), click New Attribute, choose Printer Type from the pop-up menu, type the model name, and click OK.  
*Important:* Make sure the model name you type exactly matches the value of the \*ModelName attribute in the PPD file. To confirm the value of this attribute, try either of the following:
- 12 Open Printer Setup Utility, click Add, choose IP Printing from the pop-up menu, choose the manufacturer from the Printer Model pop-up menu, and find the name in the resulting list.
- 13 Make a copy of the PPD file, use the `gunzip` command in Terminal to decompress it, then open it in TextEdit or another text editor and search for "\*ModelName." You can find the PPD files in `/Library/Printer/PPDs/Contents/Resources/en.lproj`.
- 14 Click Save.

## Creating a Printer Pool

You can use Server Admin to create a printer pool.

### To create a printer pool:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Queues.
- 3 Create two or more print queues.

For more information on creating a print queue see “Adding a Print Queue” on page 22.

**Important:** Pooled printers should be of like make and model to ensure that the printer will provide consistent output to the user. Users may lose some printer functionality when more fully featured printers are pooled with printers having fewer features.

- 4 Select two or more printers from the queues list. The Create Pool button will highlight.
- 5 Click the Create Pool button.
- 6 Enter a name to identify the print pool. This becomes the sharing name by which users will identify the print pool.
- 7 Click OK.
- 8 Select the protocols used for printing by your client computers.  
If you select “SMB”, make sure you start Windows services.
- 9 Select “Enforce quotas for this queue” if you want to enforce the print quotas you establish for users in Workgroup Manager.
- 10 Select a cover sheet you would like the printer to create by selecting a title from the pop-up menu. If you don’t want the server to create a coversheet for each job printed, select “none”.
- 11 Click Save, then click the Back button (in the upper left).

## Starting Print Service

You can use Server Admin to start print service.

After you start the service, it will restart automatically any time the server is restarted.

### To start print service:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Start Service.

### From the Command Line

You can also start print service by using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

## Setting Print Quotas

You can establish print quotas to control the number of pages each of your users prints on your various printers.

### How Quotas Work

A print quota is the total number of pages that can be printed during a specified time period. When a user has printed the specified number of pages, he or she cannot print again until the quota period ends and the quota is automatically renewed (or until you explicitly renew the quota, which you can do at any time).

For each user, you set either a single quota that covers all the printers they use or individual quotas for each printer.

In the case of a single quota, every page printed counts against a user's quota, regardless of the printer used.

In the case of per-queue quotas, you can vary the quota from printer to printer, or choose not to enforce quotas on some printers while restricting the use of others.

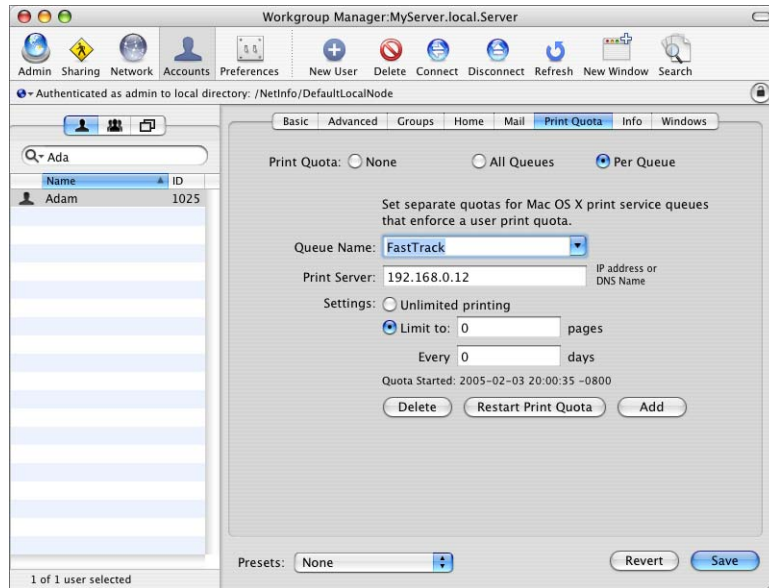
## Setting Quotas

There are two parts to establishing print quotas:

- Specifying the quota and time period for each user using Workgroup Manager
- Setting print service to enforce quotas for individual queues using Server Admin

## Specifying User Print Quotas

You can use Workgroup Manager to specify print quotas for individual users.



### To set a user's quota:

- 1 Open Workgroup Manager, click Accounts, and select the user.
- 2 Click Print Quota.
- 3 To set one quota for all queues, select All Queues, then type the number of pages and the number of days after which the quota is reset.

To set a quota for a particular queue, select Per Queue, choose the queue from the pop-up menu, and type the quota and quota period.

If the queue is not in the list, click Add and change "untitled" to the queue name. Then choose the queue from the pop-up menu, type the IP address or DNS name of the server hosting the queue, and type the user's page quota and quota period.

- 4 Click Save.

The quotas are not enforced until you turn on quota enforcement for specific queues in print service using Server Admin. See "Enforcing Print Quotas for a Queue" on page 31.

## Enforcing Print Quotas for a Queue

To enforce print quotas defined for users in Workgroup Manager, you turn on quota enforcement for print queues in print service using Server Admin. Users are not subject to print quotas you set for them in Workgroup Manager until you also turn on quota enforcement for specific print queues in print service.

**Important:** When you enforce a print quota on a queue, users won't be able to print to the queue unless they have a valid, unexpired quota defined for them in Workgroup Manager.

### To enforce quotas for a print queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings.
- 3 On the Queues pane, select a queue and click the Edit button (below the list).
- 4 Select "Enforce quotas for this queue."
- 5 Click Save, then click the Back button (in the upper left).

### From the Command Line

You can also set quota enforcement for a queue using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

## Resetting a User's Print Quota

You can restart a user's quota period or change the user's page quota at any time using Workgroup Manager.

### To reset quotas for a print queue:

- 1 Open Workgroup Manager and select the user in the user list.
- 2 Click the Print tab and select All Queues or Per Queue.
- 3 To restart the quota period, click Reset Print Quota.

To see when the current period started, look just above the button.

To change the number of pages allowed during the current quota period, type a new value in the "Limit to" field.

**Note:** If you extend or shorten the duration of a user's print quota, the Print service restarts the quota's period.

- 4 Click Save.

**Note:** When you send a print job to a queue, CUPS checks the quota balance before it sends a page to the printer. If there are no more pages left in the quota, CUPS cancels the rest of the print job. Therefore, the print service may accept a job, but prints only part of it because the user used up the quota. For example, if Joe prints a 10-page document, but has only 5 pages left in his quota, the print service accepts the job, but prints only the first 5 pages and cancels the remainder of the job. When the quota period renews or you assign additional pages to Joe, he can reprint the entire job or just the last 5 pages.



This chapter shows how to set up client computers to use the printers offered by your print service.

The Mac OS X Server print service supports four basic classes of clients:

- Mac OS X clients
- Mac OS 9 and Mac OS 8 clients
- Windows clients
- UNIX clients

## About PPD Files

A PostScript Printer Description (PPD) file contains specialized information about a particular printer model. Your users need the PPD file to take advantage of a printer's special features and capabilities. Without the right PPD, they won't be able to do things such as choose from multiple paper trays, use special paper sizes, or print on both sides of the page.

Mac OS X and Mac OS X Server come with PPD files already installed for most popular printers. (To see what's available, open Printer Setup Utility, click Add, choose IP Printing from the pop-up menu, and choose a vendor from the Printer Model pop-up menu.) If you can't find a PPD for the printer you want to use, contact the manufacturer for a PPD installer for that particular model. As a last resort, try using the Generic PPD, which should allow basic printing on most printers.

The proper PPD file must be chosen on the client computer when the print queue is added.

## Mac OS X Clients

To use queues offered by a server, Mac OS X users need to add the queues to their printer lists using Printer Setup Utility just as they would add any other printer. Mac OS X supports AppleTalk and LPR printers.

### Adding an IPP Print Queue in Mac OS X

Print service queues that you share via IPP automatically appear in the client's Default Browser list in Printer Setup Utility. Shared IPP queues also automatically appear in the print dialog of all Mac OS X applications.

There are two important advantages to using IPP queues over AppleTalk, SMB/CIFS, or LPR PostScript queues:

- Once the job has been spooled to the server print queue, you can monitor the progress of the job, and even delete the job from the server using Printer Setup Utility.
- When printing to an IPP queue for a non-PostScript printer, you can use the printer's native driver (if installed on your Mac OS X computer) to take advantage of all the printer's features. This option is not available to clients printing to non-PostScript printers shared via AppleTalk, LPR, or SMB/CIFS.

### Adding an AppleTalk Print Queue in Mac OS X

You can use the Print Setup Utility to add print queues to a computer's printer list. This application is usually located in /Applications/Utilities.

#### To add an AppleTalk print queue:

- 1 Open Printer Setup Utility on the client computer and click Add.
- 2 Click Default Browser.
- 3 Select a print queue from the list.
- 4 Choose the printer type from the Print Using pop-up menu. If you're not sure of the type, Generic PostScript Printer works for most printing needs.
- 5 Click Add.

### Adding an LPR Print Queue in Mac OS X

You can use the Printer Setup Utility to add an LPR print queue to a computer's printer list. Printer Setup Utility is usually located in /Applications/Utilities.

The way you add an LPR printer depends on whether the printer is:

- Shared by IP address or DNS name only
- Advertised via Bonjour
- Listed in Open Directory

**To add an LPR print queue by IP address or DNS name:**

- 1 Open Printer Setup Utility and click Add.
- 2 Choose Internet Printing Protocol – IPP from the Protocol pop-up menu.
- 3 Enter the server’s DNS name or IP address (not the printer’s name or address) in the Address field.

To use the server’s default queue, leave the Queue field blank.

If you have not set up a default LPR queue on the server, or if you want to use a different queue, type a queue name in the Queue field.

- 4 Choose the printer type from the Print Using pop-up menu. If you’re not sure of the type, Generic PostScript Printer works for most printing needs.
- 5 Click Add.

If you set up your server to advertise LPR print queues using Bonjour or Open Directory, a client can browse for an LPR queue instead of having to know the address of the server and the name of the queue when adding a printer.

**To add an LPR print queue that is advertised via Bonjour:**

- 1 Open Printer Setup Utility and click Add.
- 2 Click Default Browser.
- 3 Select the print queue from the list.
- 4 Choose the printer type from the Print Using pop-up menu. If you’re not sure of the type, Generic PostScript Printer works for basic printing needs.
- 5 Click Add.

For help advertising a printer using Bonjour, see “Advertising an LPR Queue Using Bonjour” on page 26.

**To add an LPR print queue that is listed in Open Directory:**

- 1 Open Printer Setup Utility and click Add.
- 2 Click Default Browser.
- 3 Select the print queue from the list.
- 4 Choose the printer type from the Print Using pop-up menu. If you’re not sure of the type, Generic PostScript Printer works for basic printing needs.
- 5 Click Add.

For help listing a printer in Open Directory, see “Listing an LPR Queue in Open Directory” on page 27.

## Troubleshooting

If a Mac OS X client is having trouble printing, see Chapter 5, “Solving Problems,” on page 53.

## Mac OS 8 and Mac OS 9 Clients

To use shared queues on a server, Mac OS 8 and Mac OS 9 users need to add the queues just as they would add any other printer, using the Chooser for AppleTalk printers or the Desktop Printer Utility for LPR printers.

The Desktop Printer Utility is usually located in the Apple Extras/LaserWriter Software or in /Applications/Utilities.

### Setting Up an AppleTalk Queue on Mac OS 8 or 9 Clients

On a computer running Mac OS 8 or Mac OS 9, you use the Chooser to set up an AppleTalk queue.

#### To add an AppleTalk print queue:

- 1 Open the Chooser.
- 2 Select the LaserWriter 8 icon or the icon for your printer’s model.  
The LaserWriter 8 icon works well in most cases. Use a printer-specific icon, if available, to take advantage of special features that might be offered by that printer.
- 3 Select the queue from the list on the right and click Create.
- 4 When the dialog appears, select the PPD for the printer.
- 5 Close the Chooser.

### Setting Up an LPR Queue on Mac OS 8 or 9 Clients

Use the Desktop Printer Utility to set up LPR printers on a computer running Mac OS 8 or Mac OS 9.

#### To add an LPR print queue:

- 1 Open the Desktop Printer Utility, select Printer (LPR), and click OK.
- 2 In the PostScript Printer Description (PPD) File section, click Change and select the PPD file for the printer. Choose Generic if you do not know the printer type.
- 3 In the LPR Printer Selection section, click Change and enter the server’s IP address or domain name in the Printer Address field.
- 4 Enter the name of the print queue on the server that is configured for sharing via LPR.  
Leave the field blank if you want to print to the default LPR queue.
- 5 Click Verify to confirm that print service is accepting jobs via LPR.

- 6 Click OK, then Create.
- 7 Type a name and choose a location for the desktop printer icon, and click Save.  
The default name is the printer's IP address, and the default location is Desktop.

### Troubleshooting

If a Mac OS 8 or 9 client is having trouble printing, see Chapter 5, "Solving Problems," on page 53.

## Windows Clients

To enable printing by Windows users who submit jobs using SMB/CIFS make sure Windows services are running and that one or more print queues are available for SMB/CIFS use.

All Windows computers—including Windows 95, Windows 98, Windows Millennium Edition (ME), and Windows XP—support SMB/CIFS for using printers on the network. Windows 2000 and Windows NT also support LPR.

**Note:** Third-party LPR drivers are available for Windows computers that do not have built-in LPR support.

### Troubleshooting

If a Windows client is having trouble printing, see Chapter 5, "Solving Problems," on page 53.

## UNIX Clients

UNIX computers support LPR for connecting to networked printers without the installation of additional software.



This chapter shows how to perform routine management tasks for print service after you have it up and running.

Typical, day-to-day management tasks include:

- Checking the status of print service
- Starting and stopping print service
- Viewing queues
- Stopping and restarting a queue
- Changing print queue settings
- Renaming a queue
- Changing the default LPR queue
- Deleting a queue
- Viewing print jobs
- Holding and releasing jobs
- Deleting jobs
- Suspending print quotas
- Viewing and managing service logs

## Managing the Service

### Checking the Status of Print Service

You can use Server Admin to monitor the Mac OS X server print service.

**To check the status of print service:**

- 1 In Server Admin, locate the name of the server you want to monitor in the Computers & Services list and select Print in the list of services under the server name.
- 2 Click Overview to see if print service is running, the time it started if it is running, and the number of queues and waiting print jobs.
- 3 Click Logs, then choose a log from the Show pop-up menu to view its contents.
- 4 Click Queues to see the status of print queues.
- 5 Click Jobs to see a list of print jobs waiting in each queue.

### From the Command Line

You can also check to see if print service is running using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

### Starting and Stopping Print Service

You can use Server Admin to start or stop print service.

#### To start or stop print service:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Start Service or Stop Service.

### From the Command Line

You can also start and stop print service using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

### Enabling and Disabling Cover Sheets for Print Jobs

You can use Server Admin to enable or disable cover sheets for print jobs.

#### To enable or disable cover sheets for print jobs:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 View the print queues list. Click the Settings button and then the Queues button.
- 3 Select the queue you want to edit. Click the edit button (the pencil icon).
- 4 In the General pane, select None in the Cover Sheet pop-up menu to disable cover sheets.
- 5 To enable cover sheets, select an appropriately titled cover sheet in the Cover Sheet pop-up menu.

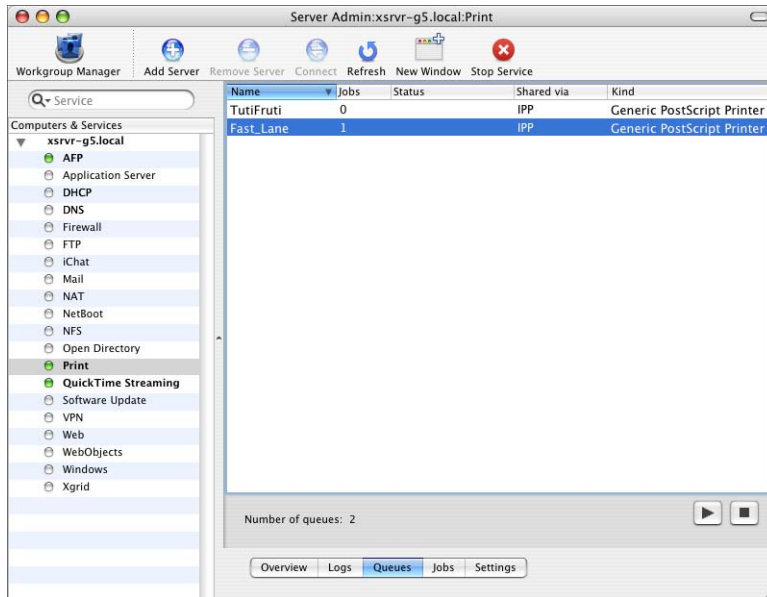


## Managing Print Queues

This section tells you how to perform day-to-day management of print queues.

### Viewing Print Queue Status

You can use Server Admin to see the current status of print queues. The Queues pane shows all the server's print queues, listing the queue name and kind of printer, how the printer is shared, the status of printing from the queue, and how many jobs are waiting.



#### To view queue status:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Queues to see a list of print queues on the server.

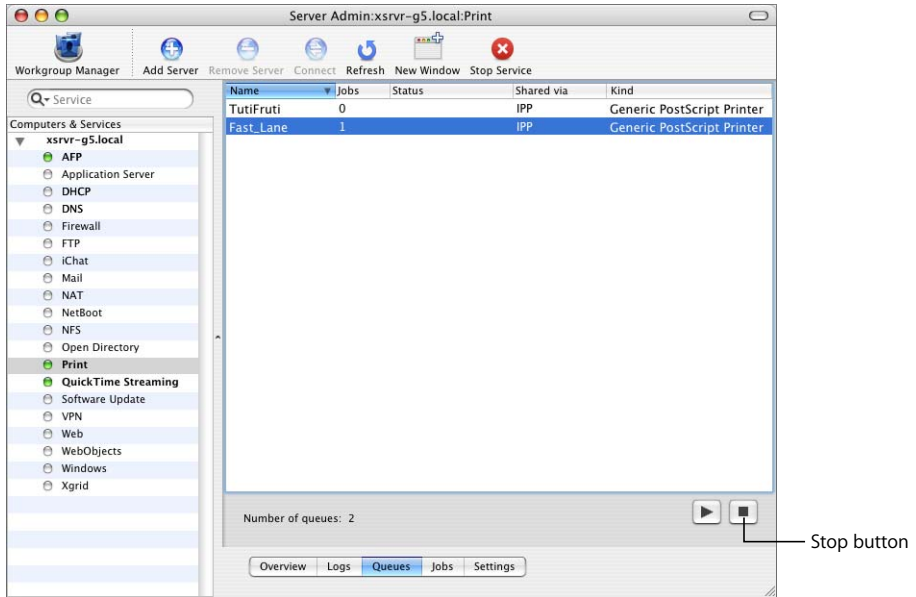
#### From the Command Line

You can also list the queues using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

## Stopping a Print Queue

To prevent waiting jobs from printing, you can use Server Admin to stop the queue that contains them.

New jobs continue to be added to the queue but do not print until you restart the queue. A job that is already printing is reprinted from the beginning when you restart the queue.

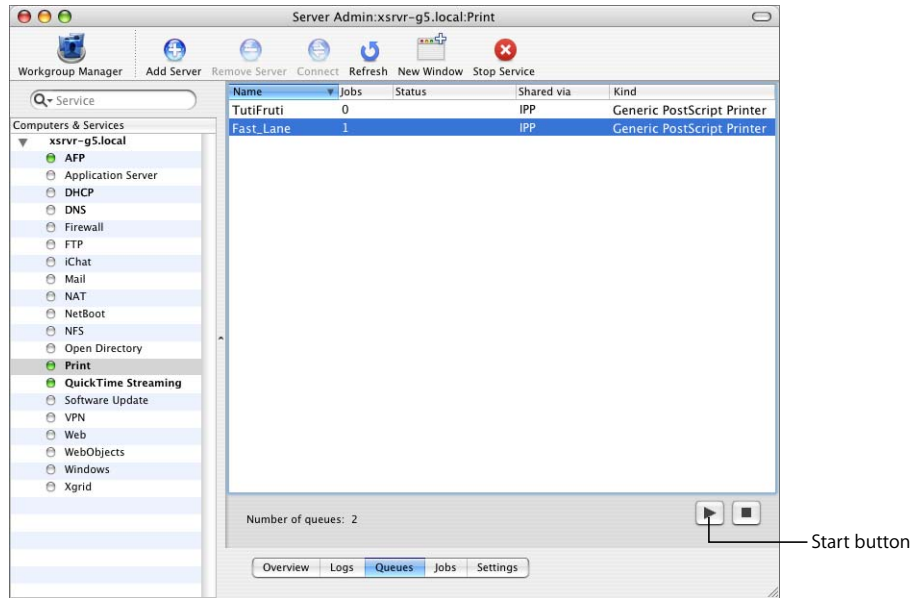


### To stop a queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Queues to see a list of print queues on the server.
- 3 Select the queue you want to stop and click the Stop button (lower right).

## Restarting a Print Queue

You can use Server Admin to restart a stopped queue and resume printing for all waiting jobs.



### To restart a print queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Queues to see a list of print queues on the server.
- 3 Select a stopped queue (look in the Status column) and click the Start button (lower right).

Individual jobs that are on hold will remain on hold. If a printing job was interrupted when you stopped the queue, that job will print again from the beginning.

## Changing Print Queue Settings

You can use Server Admin to view and change a print queue's configuration.

**Note:** When you change a queue's configuration, the queue may become unavailable to users, and they may need to set up their computers to use the queue again.

### To change a print queue's settings:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click the Queues tab.
- 3 Select the print queue you want to change and click the Edit button (below the list).
- 4 Make changes, click Save, and then click the Back button (in the upper left).

### From the Command Line

You can also change queue settings using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

### Renaming a Print Queue

When you add a printer in Printer Setup Utility, the default name of the new queue is the name of the associated printer. You can change this name to help your users choose the right printer or to comply with naming conventions imposed by the protocols your clients use.

**Note:** If you change the name of a print queue that has already been shared, users will need to set up their computers again to use the queue with its new name. New jobs that users send to the queue with the old name will not be printed.

#### To rename a queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Queues.
- 3 Select the print queue you want to change and click the Edit button (below the list).
- 4 Type a new name in the Sharing Name field.
- 5 Click Save, and then click the Back button (in the upper left).

Changing the sharing name for the queue does not change its underlying Printer Setup Utility queue name.

### From the Command Line

You can also rename a queue using the `serveradmin` command in Terminal. See the print service chapter of the command-line administration guide.

### Changing the Default LPR Print Queue

Specifying a default LPR queue simplifies setup for client computers. Users can choose to print to the default queue rather than having to enter the name of a specific queue.

#### To select a default print queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings.
- 3 In the General pane, choose the queue from the “Default Queue for LPR” pop-up menu.  
If the queue you want to use is not listed, click Queues, double-click the queue in the list, and make sure LPR protocol is enabled.

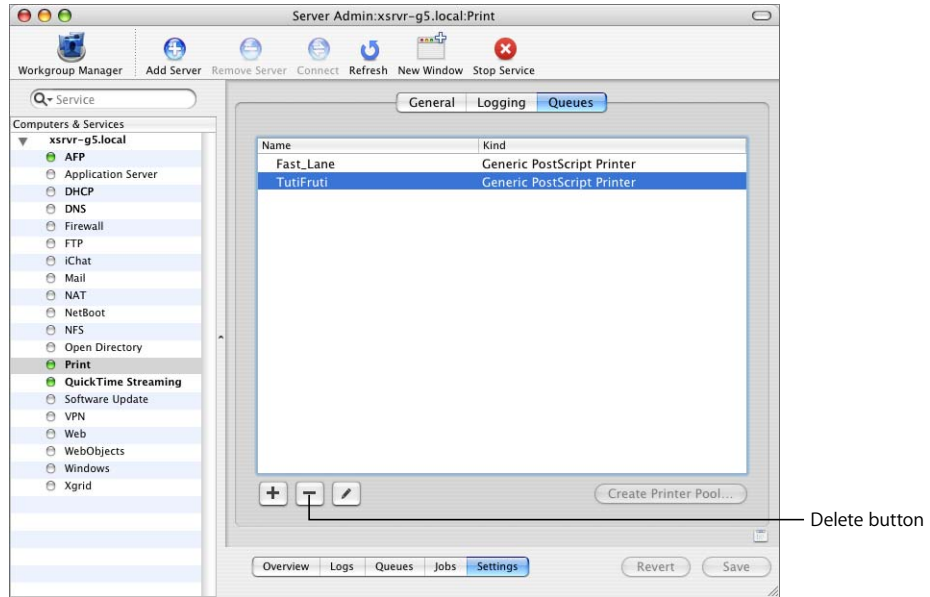
### From the Command Line

You can also change the default LPR queue using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

## Deleting a Print Queue

When you delete a print queue, jobs in the queue are also deleted.

**Note:** If a job is printing, it is canceled immediately. To avoid interrupting waiting print jobs while preventing new jobs from arriving, you can disable the sharing protocols in the queue settings and wait until all jobs have finished printing before deleting the queue.



### To delete a print queue:

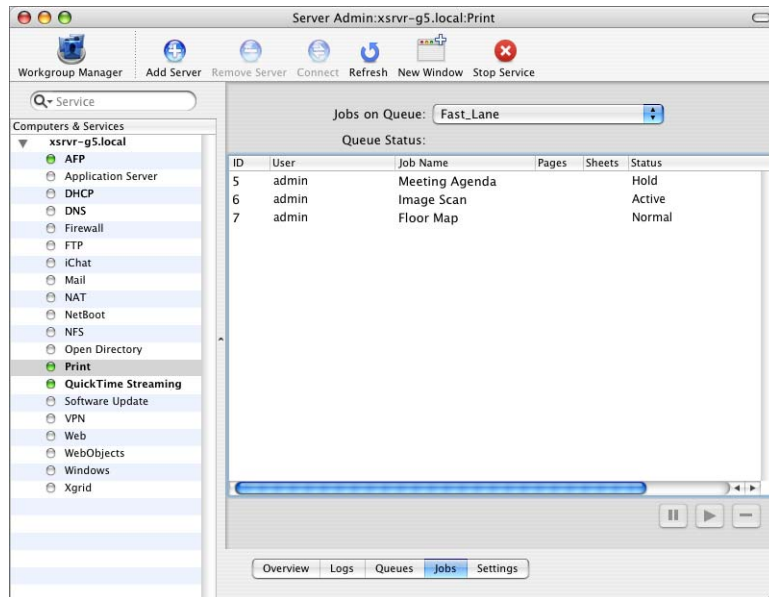
- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Queues.
- 3 Select the queue and click the Delete button (at the bottom of the list).

## Managing Print Jobs

This section tells you how to perform day-to-day management of print jobs.

### Monitoring a Print Job

You can monitor individual print jobs using Server Admin.



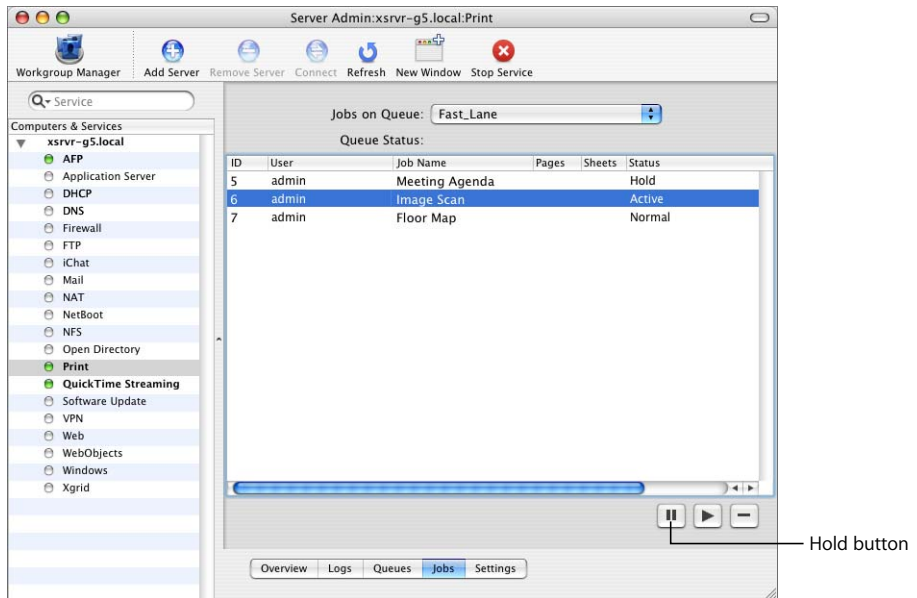
#### To view a print job:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Jobs.
- 3 Choose a queue from the “Jobs on Queue” pop-up menu.

Jobs are listed in priority order, and include the name of the user who submitted each job, the name of the job, its size, the number of sheets to be printed, the current status of the job, and the number of pages in the job (you might need to scroll to see the page column).

## Putting a Print Job on Hold

When you put a print job on hold, it is not printed until you take it off hold. If the job has already started to print, printing stops and the job remains in the queue. When you resume the job, printing restarts from the beginning of the job.



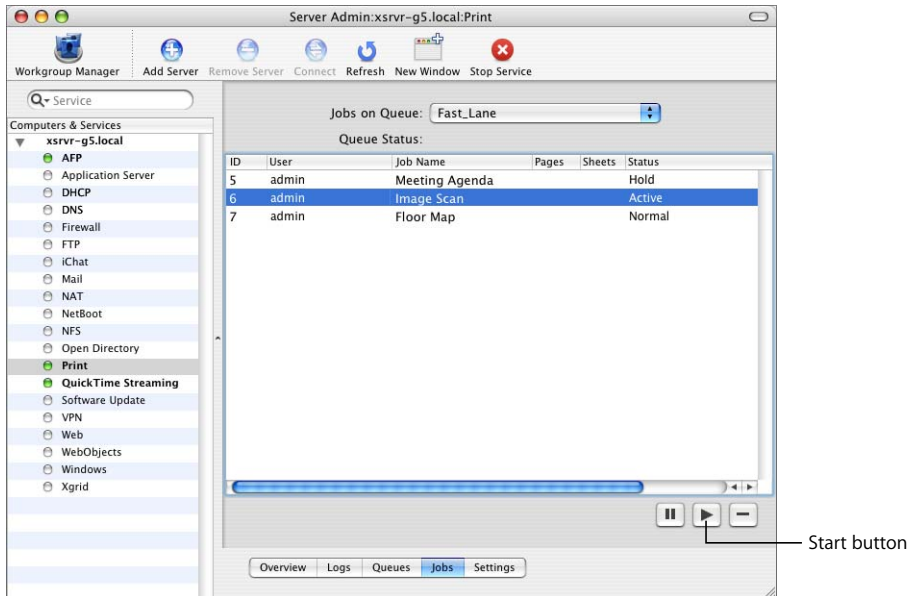
### To put a print job on hold:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Jobs.
- 3 Select the queue from the pop-up list.
- 4 Select a job and click the Hold button (below the list).  
Shift-click or Command-click to select multiple jobs.

## Restarting a Print Job

When a print job has been placed on hold, it is not printed until you resume the job. When you resume the job, printing restarts from the beginning.

**Note:** If you put the entire print queue on hold, you also need to restart the queue to print the job.



### To restart a print job:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Jobs.
- 3 Select the queue from the pop-up menu.
- 4 Select the job and click the Start button (below the list).

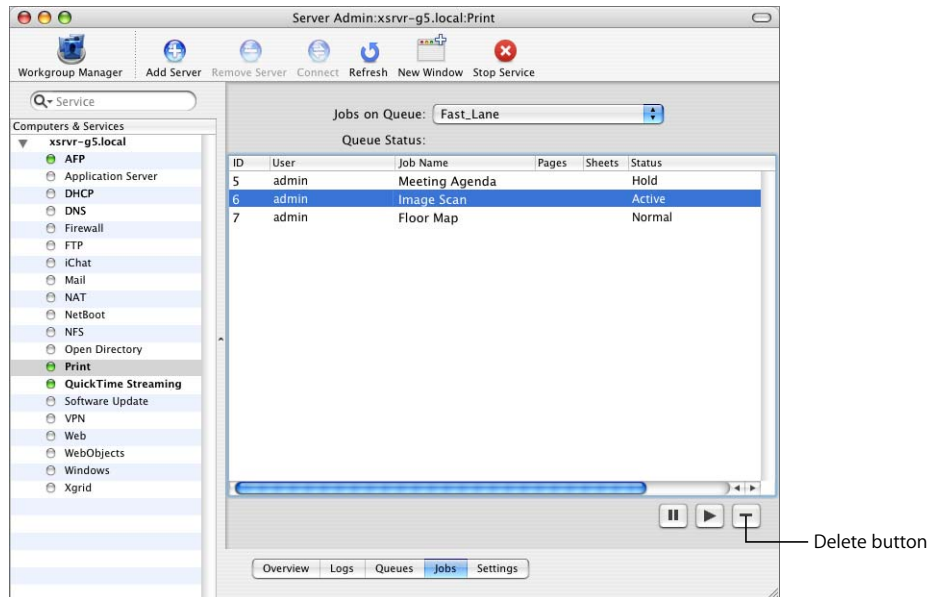
Shift-click or Command-click to select multiple jobs.

The job is printed after all other jobs in the queue that have the same priority.



## Deleting a Print Job

You can use Server Admin to delete a print job and prevent it from printing.



### To delete a print job:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Jobs.
- 3 Select the queue from the pop-up list.
- 4 Select the job and click the Delete button (below the list).

Any pages already sent to the printer will continue to print even after you delete the job.

## Managing Print Quotas

This section tells you how to perform day-to-day management of print quotas.

### Suspending Quotas for a Print Queue

You can use Server Admin to enforce and suspend print quotas for specific queues. Suspending quotas for a print queue allows all users unlimited printing to the queue.

### To suspend quotas for a print queue:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Queues.
- 3 Select the print queue you want to change and click Edit.

- 4 Deselect “Enforce quotas for this queue.”
- 5 Click Save, then click the Back button (in the upper left).

### From the Command Line

You can also disable quotas using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

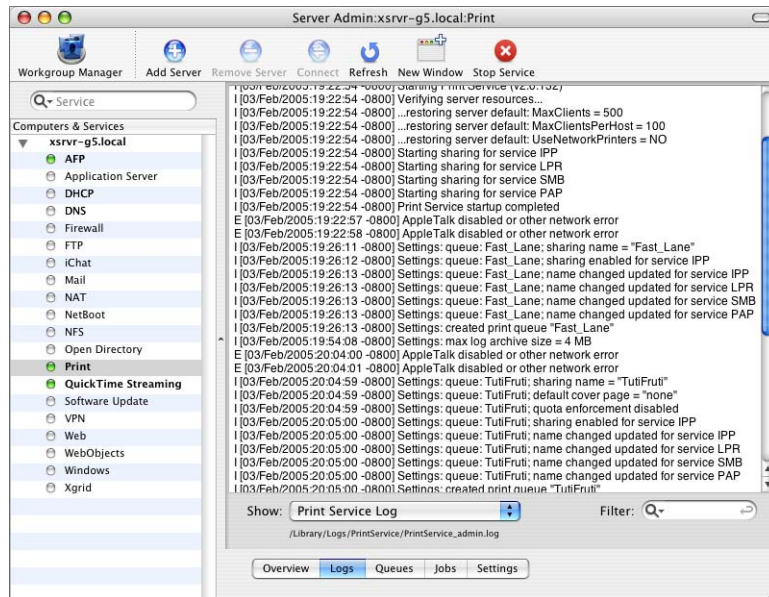
## Managing Print Logs

This section tells you how to view and archive print service and queue logs.

### Viewing Print Service and Queue Logs

Print service keeps two kinds of logs: a print service log and individual print queue logs. The print service log records events such as when print service is started and stopped and when a print queue is put on hold. Print queue logs record information such as which user submitted a job and the size of the jobs.

You can view the print service logs using Server Admin.



### To view print service logs:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Logs, then choose a log from the Show pop-up menu.

The Print Service Admin log (`PrintService_admin.log`) records print service administrative actions performed using Server Admin or the `serveradmin` command-line tool. This log is located in `/Library/Logs/PrintService`. A separate set of log files is maintained by the underlying Common UNIX Print Service (CUPS) used by print service. The log files are `error_log`, `access_log`, and `page_log`. These logs contain information about printed jobs and are located in `/var/log/cups`.

Job logs are named after their queues (for example, `PrintService.myqueue.job.log`). Archived logs have the archive date appended (for example, `PrintService.myqueue.job.log.20021231`).

### From the Command Line

You can also view the logs by using the `cat` or `tail` command in Terminal. For more information, see the print service chapter of the command-line administration guide.

### Archiving Print Service Logs

You can use Server Admin to specify how large the print service logs should grow before they are archived and new logs started.

### To specify the maximum log size of archive print logs and archive job logs:

- 1 In Server Admin, select Print in the Computers & Services list.
- 2 Click Settings, then click Logging.
- 3 Select a level of log reporting in the Log Level pop-up menu.

Choosing only to log errors will produce a less verbose log of events in the log file than choosing to log events at the debug level.

- 4 Select Archive server log.

This will activate the “Max log size” pop-up menu.

- 5 Select the maximum log size, in megabytes, from the “Max log size” pop-up menu.

Print service archives logs following the CUPS model. When a print service log file reaches the maximum size, the print service moves the file to `<log_name>.0`, where `<log_name>` is the name of the log file, and starts a new log file with the previous name (`<log_name>`). If an archive already exists, the print service overwrites it.

**Note:** If you want to increase log history, set the maximum log size to a higher value.

### From the Command Line

You can also set the archive interval using the `serveradmin` command in Terminal. For more information, see the print service chapter of the command-line administration guide.



This chapter shows how to troubleshoot print service problems.

Try these suggestions to solve or avoid printing problems you or your users encounter while using print service.

## Print Service Doesn't Start

- Verify that the server's software serial number is entered correctly and has not expired. To check the number, open Server Admin, select the server in the Computers & Services list, and click Overview. To enter an updated serial number, click Settings.
- Check the print service log for problem indications. Open Server Admin, select Print in the Computers & Services list, and click Logs.

## Clients Can't Add Queue

- Make sure that print service is running. Open Server Admin and select Print in the Computers & Services list. If the service is not running, click Start Service.
- Verify that the queue is shared correctly. SMB/CIFS is for Windows users only. LPR is a standard protocol that users on (some) Windows computers, as well as on Macintosh, UNIX, and other computers, can use for printing.

## Users Can't Print

- Make sure that print service is running. Open Server Admin and select Print in the Computers & Services list. If the service is not running, click Start Service.
- Make sure the queue has been added. On Mac OS 8 or Mac OS 9 computers, use the Chooser (for AppleTalk print queues) or Desktop Printer Utility (for LPR print queues) to make sure the printer setup is correct. On Mac OS X, use Printer Setup Utility to add print queues to the printer list.
- Verify that Mac OS clients have TCP/IP set up correctly.

- If Windows NT 4.x clients can't print to the server, make sure that the queue name is not the TCP/IP address of the printer or server. Use the DNS host name instead of the printer or server address or, if there is no DNS name, enter a queue name containing only letters and numbers.

## Jobs in a Server Queue Don't Print

- Make sure that neither the queue nor the jobs in it are on hold. Open Server Admin, select Print in the Computers & Services list, and click Queues and Jobs.
- Make sure that the printer is connected to the server or to the network to which the server is connected.
- Make sure the printer is turned on and that there are no problems with the printer itself (out of paper, paper jams, and so on).
- Review the print logs for additional information. Open Server Admin, select Print in the Computers & Services list, and click Logs.

## Print Queue Becomes Unavailable

- If you changed a print queue name that has already been shared, print jobs sent by users to the old queue name will not be printed. Users need to set up their computers again to use the queue with its new name.

**AFP** Apple Filing Protocol. A client/server protocol used by Apple file service on Macintosh-compatible computers to share files and network services. AFP uses TCP/IP and other protocols to communicate between computers on a network.

**address** A number or other identifier that uniquely identifies a computer on a network, a block of data stored on a disk, or a location in a computer memory. See also **IP address**, **MAC address**.

**administrator** A user with server or directory domain administration privileges. Administrators are always members of the predefined “admin” group.

**alias** Another email address at your domain that redirects incoming email to an existing user.

**Apple Filing Protocol** See **AFP**.

**automount** To make a share point appear automatically on a client computer. See also **mount**.

**bit** A single piece of information, with a value of either 0 or 1.

**Bonjour** A protocol developed by Apple for automatic discovery of computers, devices, and services on IP networks. This proposed Internet standard protocol is sometimes referred to as “ZeroConf.” For more information, visit [www.apple.com](http://www.apple.com) or [www.zeroconf.org](http://www.zeroconf.org). To see how this protocol is used in Mac OS X Server, see **local hostname**.

**CIFS** Common Internet File System. See **SMB/CIFS**.

**client** A computer (or a user of the computer) that requests data or services from another computer, or server.

**command line** The text you type at a shell prompt when using a command-line interface.

**command-line interface** A way of interfacing with the computer (for example, to run programs or modify file system permissions) by entering text commands at a shell prompt.

**Common Internet File System** See **SMB/CIFS**.

**daemon** A program that runs in the background and provides important system services, such as processing incoming email or handling requests from the network.

**DHCP** Dynamic Host Configuration Protocol. A protocol used to dynamically distribute IP addresses to client computers. Each time a client computer starts up, the protocol looks for a DHCP server and then requests an IP address from the DHCP server it finds. The DHCP server checks for an available IP address and sends it to the client computer along with a lease period—the length of time the client computer may use the address.

**directory** Also known as a folder. A hierarchically organized list of files and/or other directories.

**directory domain** A specialized database that stores authoritative information about users and network resources; the information is needed by system software and applications. The database is optimized to handle many requests for information and to find and retrieve information quickly. Also called a directory node or simply a directory.

**DNS** Domain Name System. A distributed database that maps IP addresses to domain names. A DNS server, also known as a name server, keeps a list of names and the IP addresses associated with each name.

**DNS domain** A unique name of a computer used in the Domain Name System to translate IP addresses and names. Also called a **domain name**.

**DNS name** A unique name of a computer used in the Domain Name System to translate IP addresses and names. Also called a **domain name**.

**domain** Part of the domain name of a computer on the Internet. It does not include the Top Level Domain designator (for example, .com, .net, .us, .uk). Domain name “www.example.com” consists of the subdomain or host name “www,” the domain “example,” and the top level domain “com.”

**domain name** See **DNS name**.

**Domain Name System** See **DNS**.



**drop box** A shared folder with privileges that allow other users to write to, but not read, the folder's contents. Only the owner has full access. Drop boxes should be created only using AFP. When a folder is shared using AFP, the ownership of an item written to the folder is automatically transferred to the owner of the folder, thus giving the owner of a drop box full access to and control over items put into it.

**everyone** Any user who can log in to a file server: a registered user or guest, an anonymous FTP user, or a website visitor.

**export** In the Network File System (NFS), a way of sharing a directory with clients on a network. TBD for RAID context.

**file server** A computer that serves files to clients. A file server may be a general-purpose computer that's capable of hosting additional applications or a computer capable only of serving files.

**file system** A scheme for storing data on storage devices that allows applications to read and write files without having to deal with lower-level details.

**File Transfer Protocol** See **FTP**.

**FTP** File Transfer Protocol. A protocol that allows computers to transfer files over a network. FTP clients using any operating system that supports FTP can connect to a file server and download files, depending on their access privileges. Most Internet browsers and a number of freeware applications can be used to access an FTP server.

**group** A collection of users who have similar needs. Groups simplify the administration of shared resources.

**guest user** A user who can log in to your server without a user name or password.

**home directory** A folder for a user's personal use. Mac OS X also uses the home directory, for example, to store system preferences and managed user settings for Mac OS X users.

**host** Another name for a server.

**host name** A unique name for a server, historically referred to as the UNIX hostname. The Mac OS X Server host name is used primarily for client access to NFS home directories. A server determines its host name by using the first name available from the following sources: the name specified in the `/etc/hostconfig` file (`HOSTNAME=some-host-name`); the name provided by the DHCP or BootP server for the primary IP address; the first name returned by a reverse DNS (address-to-name) query for the primary IP address; the local hostname; the name "localhost."

**Internet** Generally speaking, a set of interconnected computer networks communicating through a common protocol (TCP/IP). The Internet (note the capitalization) is the most extensive publicly accessible system of interconnected computer networks in the world.

**Internet Protocol** See **IP**.

**IP** Internet Protocol. Also known as IPv4. A method used with Transmission Control Protocol (TCP) to send data between computers over a local network or the Internet. IP delivers packets of data, while TCP keeps track of data packets.

**IP address** A unique numeric address that identifies a computer on the Internet.

**IP subnet** A portion of an IP network, which may be a physically independent network segment, that shares a network address with other portions of the network and is identified by a subnet number.

**Kerberos** A secure network authentication system. Kerberos uses tickets, which are issued for a specific user, service, and period of time. Once a user is authenticated, it's possible to access additional services without retyping a password (this is called single sign-on) for services that have been configured to take Kerberos tickets. Mac OS X Server uses Kerberos v5.

**LDAP** Lightweight Directory Access Protocol. A standard client-server protocol for accessing a directory domain.

**Line Printer Remote** See **LPR**.

**local hostname** A name that designates a computer on a local subnet. It can be used without a global DNS system to resolve names to IP addresses. It consists of lowercase letters, numbers, or hyphens (except as the last characters), and ends with ".local" (e.g, bills-computer.local). Although the name is derived by default from the computer name, a user can specify this name in the Network pane of System Preferences. It can be changed easily, and can be used anywhere a DNS name or fully qualified domain name is used. It can only resolve on the same subnet as the computer using it.

**LPR** Line Printer Remote. A standard protocol for printing over TCP/IP.

**Mac OS X** The latest version of the Apple operating system. Mac OS X combines the reliability of UNIX with the ease of use of Macintosh.

**Mac OS X Server** An industrial-strength server platform that supports Mac, Windows, UNIX, and Linux clients out of the box and provides a suite of scalable workgroup and network services plus advanced remote management tools.

**mount (verb)** In general, to make a remote directory or volume available for access on a local system. In Xsan, to cause an Xsan volume to appear on a client's desktop, just like a local disk.

**Network File System** See **NFS**.

**network interface** Your computer's hardware connection to a network. This includes (but isn't limited to) Ethernet connections, AirPort cards, and FireWire connections.

**NFS** Network File System. A client/server protocol that uses Internet Protocol (IP) to allow remote users to access files as though they were local. NFS exports shared volumes to computers according to IP address, rather than user name and password.

**nfsd daemon** An NFS server process that runs continuously behind the scenes and processes read and write requests from clients. The more daemons that are available, the more concurrent clients can be served.

**Open Directory** The Apple directory services architecture, which can access authoritative information about users and network resources from directory domains that use LDAP, NetInfo, or Active Directory protocols; BSD configuration files; and network services.

**open source** A term for the cooperative development of software by the Internet community. The basic principle is to involve as many people as possible in writing and debugging code by publishing the source code and encouraging the formation of a large community of developers who will submit modifications and enhancements.

**oplocks** See **opportunistic locking**.

**opportunistic locking** Also known as oplocks. A feature of Windows services that prevents users of shared files from changing the same file at the same time. Opportunistic locking locks the file or part of the file for exclusive use, but also caches the user's changes locally on the client computer for improved performance.

**owner** The owner of an item can change access permissions to the item. The owner may also change the group entry to any group in which the owner is a member. By default the owner has Read & Write permissions.

**password** An alphanumeric string used to authenticate the identity of a user or to authorize access to files or services.

**pathname** The location of an item within a file system, represented as a series of names separated by slashes (/).

**permissions** Settings that define the kind of access users have to shared items in a file system. You can assign four types of permissions to a share point, folder, or file: read/write, read-only, write-only, and none (no access). See also **privileges**.

**print queue** An orderly waiting area where print jobs wait until a printer is available. The print service in Mac OS X Server uses print queues on the server to facilitate management.

**port** A sort of virtual mail slot. A server uses port numbers to determine which application should receive data packets. Firewalls use port numbers to determine whether data packets are allowed to traverse a local network. "Port" usually refers to either a TCP or UDP port.

**privileges** The right to access restricted areas of a system or perform certain tasks (such as management tasks) in the system.

**process** A program that has started executing and has a portion of memory allocated to it.

**protocol** A set of rules that determines how data is sent back and forth between two applications.

**QTSS** QuickTime Streaming Server. A technology that lets you deliver media over the Internet in real time.

**QuickTime** A set of Macintosh system extensions or a Windows dynamic-link library that supports the composition and playing of movies.

**QuickTime Streaming Server** See **QTSS**.

**queue** An orderly waiting area where items wait for some type of attention from the system. See also **print queue**.

**Samba** Open source software that provides file, print, authentication, authorization, name resolution, and network service browsing to Windows clients using the SMB/CIFS protocol.

**server** A computer that provides services (such as file service, mail service, or web service) to other computers or network devices.

**Server Message Block/Common Internet File System** See **SMB/CIFS**.

**share point** A folder, hard disk (or hard disk partition), or CD that's accessible over the network. A share point is the point of access at the top level of a group of shared items. Share points can be shared using AFP, Windows SMB, NFS (an "export"), or FTP protocols.

**short name** An abbreviated name for a user. The short name is used by Mac OS X for home directories, authentication, and email addresses.

**single sign-on** An authentication strategy that relieves users from entering a name and password separately for every network service. Mac OS X Server uses Kerberos to enable single sign-on.

**SLP DA** Service Location Protocol Directory Agent. A protocol that registers services available on a network and gives users easy access to them. When a service is added to the network, the service uses SLP to register itself on the network. SLP/DA uses a centralized repository for registered network services.

**SMB/CIFS** Server Message Block/Common Internet File System. A protocol that allows client computers to access files and network services. It can be used over TCP/IP, the Internet, and other network protocols. Windows services use SMB/CIFS to provide access to servers, printers, and other network resources.

**TCP** Transmission Control Protocol. A method used along with the Internet Protocol (IP) to send data in the form of message units between computers over the Internet. IP takes care of handling the actual delivery of the data, and TCP takes care of keeping track of the individual units of data (called packets) into which a message is divided for efficient routing through the Internet.

**ticket, Kerberos** A temporary credential that proves a Kerberos client's identity to a service.

**Transmission Control Protocol** See TCP.

**UDP** User Datagram Protocol. A communications method that uses the Internet Protocol (IP) to send a data unit (called a datagram) from one computer to another in a network. Network applications that have very small data units to exchange may use UDP rather than TCP.

**UID** User ID. A number that uniquely identifies a user within a file system. Mac OS X computers use the UID to keep track of a user's directory and file ownership.

**URL** Uniform Resource Locator. The address of a computer, file, or resource that can be accessed on a local network or the Internet. The URL is made up of the name of the protocol needed to access the resource, a domain name that identifies a specific computer on the Internet, and a hierarchical description of a file location on the computer.

**USB** Universal Serial Bus. A standard for communicating between a computer and external peripherals using an inexpensive direct-connect cable.

**User Datagram Protocol** See UDP.

**user ID** See UID.

**user name** The long name for a user, sometimes referred to as the user's "real" name. See also **short name**.

**volume** A mountable allocation of storage that behaves, from the client's perspective, like a local hard disk, hard disk partition, or network volume. In Xsan, a volume consists of one or more storage pools. See also **logical disk**.

**WebDAV** Web-based Distributed Authoring and Versioning. A live authoring environment that allows client users to check out webpages, make changes, and then check the pages back in while a site is running.

**WINS** Windows Internet Naming Service. A name resolution service used by Windows computers to match client names with IP addresses. A WINS server can be located on the local network or externally on the Internet.

## A

- AFP service
  - described 8
- AppleTalk printer
  - adding a queue 22
- AppleTalk printing
  - Mac OS 8 or 9 clients 36
  - Mac OS X clients 34
- authentication 19

## B

- Bonjour 26, 35

## C

- Chooser
  - setting up printing via AppleTalk 36
- client computers, Mac OS 8 and 9
  - setting up printing 36
- client computers, Mac OS X
  - setting up printing 34
- client computers, UNIX
  - setting up printing 37
- client computers, Windows
  - setting up printing 37
- Common UNIX Printing System (CUPS). *See* CUPS
- configuring a queue 43
- CUPS (Common UNIX Printing System) 13
- CUPS (Common Unix Printing System)
  - log files 51
  - printer classes 18

## D

- default LPR queue
  - adding a queue 22
  - changing 44
- deleting a job 49
- deleting a queue 45
- Desktop Printer Utility
  - setting up LPR printing 36
- documentation 9

## F

- file services
  - overview 7
  - related applications 8
- FTP service
  - described 8

## I

- Inspector
  - in Server Admin 27
- Internet Printing Protocol (IPP). *See* IPP
- IPP (Internet Printing Protocol)
  - print service and security 19

## L

- log files
  - archiving 51
  - CUPS 51
  - managing 50
  - naming convention 51
  - setting archival interval 25
  - viewing 39, 50
- LPR printing
  - client chooses default queue 24
  - Mac OS 8 or 9 clients 36
  - Mac OS X clients 34
  - setting default queue 44
  - UNIX clients 37

## N

- naming printers and queues. *See* queue names
- NFS service
  - described 8

## O

- Open Directory
  - listing LPR queues 27

## P

- PostScript Printer Description (PPD) file. *See* PPD files
- PPD files
  - examining content 27

- overview 33
- specified in Open Directory 27
- viewing installed 33
- printer classes 18
- printer names. *See* queue names
- Printer Setup Utility
  - setting up a printer class 18
- print jobs
  - deleting 49
  - holding 47
  - monitoring 46
  - restarting 48
- print queues. *See* queues
- print service
  - adding queues 22
  - applications for managing 13
  - monitoring 39
  - overview 13
  - setting up Mac OS 8 and 9 clients 36
  - setting up Mac OS X clients 34
  - setup overview 21
  - starting 28, 29
  - stopping 40
  - supported clients 17
  - supported printers 16
  - troubleshooting 53
  - UNIX clients 37
  - Windows clients 37

## Q

- queue names
  - changing 44
  - considerations and restrictions 23
  - sharing name 23
- queues
  - adding 22
  - default 44
  - deleting 45
  - listing in Open Directory 27
  - monitoring 41
  - overview 14–15
  - reconfiguring 43
  - renaming 44
  - restarting 43
  - stopping 42
- quotas
  - enforcing 29
  - managing 49
  - overview 29
  - security of 19
  - setting up 29

## R

- restarting a queue 43

## S

- Server Admin
  - adding queues 22
  - archiving log files 51
  - changing print queue quotas 49
  - deleting print jobs 49
  - deleting print queues 45
  - enforcing quotas for queues 29–31
  - holding print jobs 47
  - Inspector 27
  - monitoring print jobs 46
  - monitoring print queues 41
  - monitoring print service 39
  - reconfiguring print queues 43
  - renaming print queues 44
  - restarting print jobs 48
  - restarting print queues 43
  - specifying default LPR queue 44
  - stopping print queues 42
  - stopping print service 40
  - viewing print logs 50
- server administration guides 9
- sharing name 44
- sheet count
  - checking a job's 46
- SMB printing
  - Windows clients 37
- starting a queue 43
- starting print service 28, 29
- stopping a queue 42
- stopping print service 40

## T

- troubleshooting 53

## U

- Universal Serial Bus (USB). *See* USB printers
- USB (Universal Serial Bus) printers 16

## V

- viewing log files 50

## W

- Windows services
  - described 8