System Administration Guide: Printing

ORACLE®

Contents

Preface

System Administration Guide: Printing is part of a documentation set that covers a significant part of the Oracle Solaris system administration information. This book includes information for both SPARC and x86 based systems.

This book assumes that you have installed the Oracle Solaris operating system (OS). It also assumes that you have set up any networking software that you plan to use.

For the Oracle Solaris release, new features that are interesting to system administrators are covered in sections called *What's New in ... ?* in the appropriate chapters.

Note – This Oracle Solaris release supports systems that use the SPARC and x86 families of processor architectures. The supported systems appear in the *Oracle Solaris OS: Hardware Compatibility Lists*. This document cites any implementation differences between the platform types.

In this document, these x86 related terms mean the following:

- x86 refers to the larger family of 64-bit and 32-bit x86 compatible products.
- x64 relates specifically to 64-bit x86 compatible CPUs.
- "32-bit x86" points out specific 32-bit information about x86 based systems.

For supported systems, see the *Oracle Solaris OS: Hardware Compatibility Lists*.

Who Should Use This Book

This book is intended for anyone responsible for administering one or more systems that are running the Oracle Solaris release. To use this book, you should have 1-2 years of UNIX system administration experience. Attending UNIX system administration training courses might be helpful.

How the System Administration Guides Are Organized

Here is a list of the topics that are covered by the System Administration Guides.

Book Title	Topics
System Administration Guide: Basic Administration	User accounts and groups, server and client support, shutting down and booting a system, managing services, and managing software (packages and patches)
System Administration Guide: Advanced Administration	Terminals and modems, system resources (disk quotas, accounting, and crontabs), system processes, and troubleshooting Oracle Solaris software problems
System Administration Guide: Devices and File Systems	Removable media, disks and devices, file systems, and backing up and restoring data
System Administration Guide: IP Services	TCP/IP network administration, IPv4 and IPv6 address administration, DHCP, IPsec, IKE, Oracle Solaris IP filter, Mobile IP, IP network multipathing (IPMP), and IPQoS
System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)	DNS, NIS, and LDAP naming and directory services, including transitioning from NIS to LDAP and transitioning from NIS+ to LDAP
System Administration Guide: Naming and Directory Services (NIS+)	NIS+ naming and directory services
System Administration Guide: Network Services	Web cache servers, time-related services, network file systems (NFS and Autofs), mail, SLP, and PPP
System Administration Guide: Printing	Printing topics and tasks, using services, tools, protocols, and technologies to set up and administer printing services and printers
System Administration Guide: Security Services	Auditing, device management, file security, BART, Kerberos services, PAM, Oracle Solaris Cryptographic Framework, privileges, RBAC, SASL, and Oracle Solaris Secure Shell
System Administration Guide: Oracle Solaris Containers-Resource Management and Oracle Solaris Zones	Resource management topics projects and tasks, extended accounting, resource controls, fair share scheduler (FSS), physical memory control using the resource capping daemon (rcapd), and resource pools; virtualization using Oracle Solaris Zones software partitioning technology and `lx` branded zones
Oracle Solaris ZFS Administration Guide	ZFS storage pool and file system creation and management, snapshots, clones, backups, using access control lists (ACLs) to protect ZFS files, using ZFS on an Oracle Solaris system with zones installed, emulated volumes, and troubleshooting and data recovery

Book Title	Topics
Oracle Solaris Trusted Extensions Administrator's Procedures	System administration that is specific to the Oracle Solaris' Trusted Extensions feature
Oracle Solaris Trusted Extensions Configuration Guide	Starting with the Solaris 10 5/08 release, describes how to plan for, enable, and initially configure the Oracle Solaris' Trusted Extensions feature

Related Third-Party Web Site References

Note – Oracle is not responsible for the availability of third-party web sites mentioned in this document. Oracle does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Oracle will not be responsible or liable for any actual or alleged damage or loss caused by or in connection with the use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–1   Typographic Conventions

Typeface	Description	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file.
		Use `ls -a` to list all files.
		`machine_name% you have mail.`
AaBbCc123	What you type, contrasted with onscreen computer output	`machine_name%` **su**
		`Password:`
aabbcc123	Placeholder: replace with a real name or value	The command to remove a file is `rm` *filename*.

TABLE P–1 Typographic Conventions   *(Continued)*

Typeface	Description	Example
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* save the file. **Note:** Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P–2 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	`$`
Bash shell, Korn shell, and Bourne shell for superuser	`#`
C shell	`machine_name%`
C shell for superuser	`machine_name#`

General Conventions

Be aware of the following conventions that are used in this book.

- When following steps or using examples, be sure to type double-quotes ("), left single-quotes (`), and right single-quotes (') exactly as shown.
- The key referred to as Return is labeled Enter on some keyboards.
- It is assumed that the root path includes the /sbin, /usr/sbin, /usr/bin, and /etc directories, so the steps in this book show the commands in these directories without absolute path names. Steps that use commands in other, less common, directories show the absolute path in the example.

1

Introduction to Printing in the Oracle Solaris Operating System

This chapter provides an introduction to printing in the Oracle Solaris operating system (OS). Conceptual information about printing services, tools, and protocols is described. Each of the subsequent chapters in this book describe how to use these tools, protocols, and technologies to administer printing services and printers.

Several terms and concepts that are introduced in this chapter are used frequently throughout this book. To fully grasp printing concepts, a basic understanding of these concepts and terms is essential. For a complete listing of all the printing concepts and terms, see Glossary.

This is a list of the information that is in this chapter.

- "What's New in Printing?" on page 17
- "Available Printing Tools and Services" on page 20
- "Overview of the Oracle Solaris Printing Architecture" on page 19
- "Implementation of the Open Standard Print API" on page 21
- "Where to Find Printing Tasks" on page 35

What's New in Printing?

This section describes new and changed printing features in this Oracle Solaris release. For a complete listing of new features and a description of Oracle Solaris releases, see *Oracle Solaris 10 8/11 What's New*.

Privilege Requirements for Using Print Commands

The design of the Open Standard Print API (PAPI) implementation in the Oracle Solaris release makes it no longer necessary for applications, toolkits, and print commands to run with elevated privilege to interact with print services.

As a result, the following print commands are no longer installed SUID root:

- `/usr/bin/lp`
- `/usr/bin/lpstat`
- `/usr/bin/cancel`
- `/usr/bin/lpmove`
- `/usr/{ucb|bin}/lpr`
- `/usr/{ucb|bin}lpq`
- `/usr/{ucb|bin}/lprm`
- `/usr/lib/print/printd`

Previously, these commands were installed SUID `root` because the commands required an elevated privilege for the following purposes:

- Opening a reserved port
- Allocating a sequential job-id number
- Manipulating files in the `/var/spool/print` directory

This functionality is now localized in a small helper application, `/usr/lib/print/lpd-port`. As a result, any applications that use the RFC-1179 PAPI support no longer require elevated privilege. The `lpd-port` helper application contains minimal support for passing RFC-1179 protocol requests on a reserved port and allocating sequential job-id numbers. Although the helper application is installed SUID root, all elevated privileges are dropped until they are required. When necessary, the privilege is elevated for the required operation and then permanently dropped if the elevated privilege is no longer required. In the Oracle Solaris release, this process is accomplished through the use of privileges. On other platforms, the process is accomplished by using the `setuid`, `seteuid`, or `setreuid` functions.

If you have local printers that you do not want to share on the network, you can safely disable the printing network listeners. If you are running the Oracle Solaris release, or a Common UNIX Printing System (CUPS) server, the `lpstat` command provides you with more information about remote print queues and print jobs, as well as their capabilities when using Internet Printing Protocol (IPP) to communicate with those servers.

When IPP is in use, and with the proper authorization, the following operations can be performed on remote print queues and print jobs:

- `accept`
- `reject`
- `enable`
- `disable`
- `move job`
- `modify job`

Also, you can now move print requests between queues on a print server and modify print requests remotely when IPP is in use.

For more information, see the `privileges(5)` man page. For step-by-step procedures, see "Administering Printers on a Network When Using the Internet Printing Protocol (Task Map)" on page 141.

PPD File Management Utility

Solaris 10 5/08: The PPD File Manager, `/usr/sbin/ppdmgr`, is a utility for administering PostScript Printer Description (PPD) files that are used with the print subsystem. When you add a PPD file to the system by using the `ppdmgr` utility or the `lpadmin` command with the `-n` option, a cache of PPD file information is automatically updated. This cache is used by Oracle Solaris Print Manager.

For more information, see "Administering PPD Files by Using the PPD File Management Utility (Task Map)" on page 193 and the `ppdmgr(1M)` man page.

Overview of the Oracle Solaris Printing Architecture

At the core of the print system is a UNIX System V (R4) based spooler. In addition to the spooler are client applications that are used to make requests of and manage the spooler, filters that perform document translation, back end processing software that performs final document transformation, and device (printer) communication. To utilize the complete functionality of the print system, all these resources are required.

Printing in the Oracle Solaris OS consists of the software to support the following:

- Print commands
- Print spooler
- Over-the-wire protocol
- Underlying technologies that move a print request from the client to the server, and, or the printer

The following figure is a high level diagram that represents the print system components.

FIGURE 1–1   Line Printer (LP) Client-Server Relationship
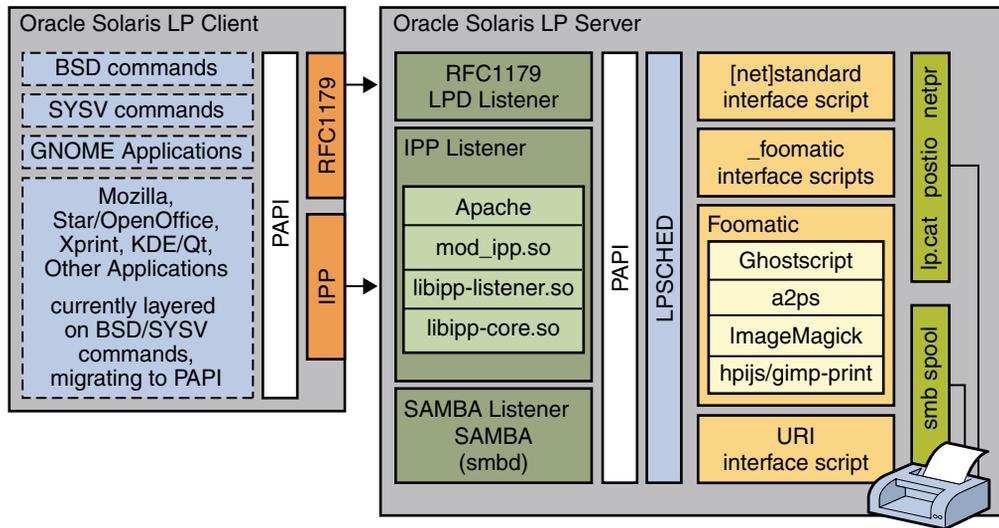
Recent changes in Oracle Solaris printing include the integration of IPP client-side support, implemented through the PAPI. The Berkeley Software Distribution (BSD) and System V (SysV) commands, as well as some applications, are layered on top of the PAPI interface. See "Implementation of the Open Standard Print API" on page 21.

Available Printing Tools and Services

The following tools can be used to set up and manage printers in the Oracle Solaris 10 OS:

- Oracle Solaris Print Manager – Is a graphical user interface (GUI) that enables you to manage printing configuration on a local system or in a naming service.
- Line Printer (LP) print service commands – Is a command-line interface (CLI) that is used to set up and manage printers on a local system or in a naming service. These commands also provide functionality that extend beyond the other print management tools.

The following interfaces, protocols, and technologies are supported in the Oracle Solaris release:

- Internet Printing Protocol (IPP)
- Server Message Block (SMB) protocol, through Samba
- Berkeley Software Distribution (BSD) protocol

Implementation of the Open Standard Print API

The Oracle Solaris implementation of the Open Standard Print API, also referred to as *PAPI*, makes it possible to layer applications, toolkits, and print commands on top of a print service, protocol neutral interface. This implementation can be used with RFC-1179, IPP-based, and LP-based printing services. Printer, server, and job attributes, as well as job submission and queries to a printer, are among the supported PAPI functions. This support enables the print client, be it an application, or the print commands themselves, to query the print system about the characteristics of a printer and to request information.

For more information, see the following references:

- "How the PAPI Is Implemented in the Oracle Solaris OS" on page 235.
- `http://sf.net/projects/openprinting`.

Print Client Commands

Historically, printing commands have been tied to a specific print system because they have been implemented on top of print system specific protocols and interfaces. Examples include the IPP, BSD, LPR, SysV LP, LPRng, and printing protocols. The introduction of the PAPI, makes it possible to layer these print commands on top of a print service, protocol neutral interface.

The PAPI provides applications a single interface for print service interaction. This means that applications can be written to use this interface and work with a variety of print services without requiring changes to the applications. Applications are no longer tied to a particular print service, such as the LP print service or CUPS. Instead, print services can easily be replaced on a system without impacting the protocol or application layers above. Ultimately, print services can be both developed and selected based on specific needs.

The PAPI implementation in the Oracle Solaris OS provides both server-side and client-side support for IPP, which is layered on top of the PAPI. IPP is implemented as a set of protocol-specific libraries and an Apache module. Like the command implementations, the IPP Listening Service can be used with any printing service that supports the PAPI. Server-side support for the RFC-1179 protocol is also available.

Definition of a Print Server and a Print Client

A *print server* is a system on which a print queue is configured and makes the printer available to other systems on the network. A *print client* is a system that utilizes configured print queues.

Printers can also be divided into two categories, local and remote. A *local printer* refers to a print queue that has been defined on a system that is local to you. A remote printer refers to a print queue that is defined anywhere *but* your local system. These terms do not have anything to

do with whether the printer is physically attached to a system or to the network, but rather, where the print queue was configured. Where the print queue is configured determines the server for that printer. Often, the print server supporting a building full of printers is the same system.

Another way to view printers and printer setup is how they are connected to the world. Some printers are directly attached to the print server by a wire. These printers are referred to as attached printers. If a printer is attached to the network, rather than to a desktop or server, it is referred to as a network-attached printer. The terms *local* and *remote* refer to print queue configuration. The terms *directly attached* and *network-attached* refer to the physical connection of the printer hardware. Referring to a printer as an attached or a network-attached printer defines the way the printer is physically connected. When you are referring to a local or a remote printer, you are referring to how the print queue for that printer was defined. Sometimes, the use of these terms can be confusing, because a printer that is physically attached to a system also most likely has a print queue that was defined on a local system. Similarly, print queues for network printers are more than likely defined on a system that is remote to your local system. This is the reason that attached and network printers are often referred to as local and remote printers.

Description of the Internet Printing Protocol

IPP is a recent industry standard network printing protocol that is used for client-to-server and server-to-printer communications. This protocol provides a basic model that includes printers and jobs, standard attributes for these printers and jobs, and a set of standard operations that can be performed against these printers and jobs. Because the objects, attributes, and operations are standardized, IPP is a method for communicating between client and server systems. In the Oracle Solaris OS, server-side support for this protocol is provided by an IPP listening service. IPP client-side support in the Oracle Solaris OS is implemented through the PAPI. IPP printer support is available through the Uniform Resource Identifier (URI) interface script.

For step-by-step procedures and additional background information that is in this document, see and Appendix A, "Using the Internet Printing Protocol."

Description of the RFC-1179 Printing Protocol

Also referred to as the BSD protocol, the Request for Comments (RFC–1179) protocol is an existing over-the-wire protocol that is widely used for communicating between print clients and servers and network-attached printers that are configured by using the LP print service or Oracle Solaris Print Manager. The RFC-1179 describes the protocol that a line printer daemon client uses to control printing. Developed originally for BSD UNIX, the RFC-1179 printing protocol has long been the cross-platform standard for printing. You can use this protocol to

perform basic printing tasks, such as submitting and canceling print jobs, and obtaining print job status. The RFC-1179 protocol is able to communicate with Line Printer Daemon (LPD) protocol based print servers and any other print server that accepts the BSD printing protocol. Many network-attached printers offer this protocol as an option for transferring job data.

IPP Compared to the RFC-1179 Protocol

The RFC-1179 protocol was originally designed to perform a very limited set of operations, but has served for decades as the standard network printing protocol. The RFC-1179 protocol lacks a common representation for status information. In addition, this protocol offers only basic print job options. Conversely, the design of IPP includes features that are lacking in the RFC-1179 and BSD protocols. The IPP can perform a broad set of operations. These operations make use of a core set of common attributes by using a common representation and encoding method. Also, IPP enables encryption and authentication to be used between a print client and a print server. Finally, IPP provides a means for extending operations and attributes, while maintaining backward compatibility and interoperability. One of the results of the evolution of the RFC-1179 protocol is that it has several conflicting vendor extensions to overcome, making IPP the preferred choice of printing protocols.

For more information about using IPP to set up and administer printers, see "Configuring the Internet Printing Protocol" on page 48 and Appendix A, "Using the Internet Printing Protocol."

Description of the SMB Protocol

The SMB protocol is an application-level network protocol that is primarily used for sharing printers, access to files, serial ports, and miscellaneous communications between nodes on the network. Mainly used by Windows systems, SMB is an authenticated inter-process communication mechanism and can run over multiple protocols. In the Oracle Solaris OS, the SMB protocol is used primarily for sharing printers. All of these processes take place over the network.

SMB uses a peer-to-peer approach. A client makes a specific request to a server, and the server responds accordingly. SMB servers make their file systems and other resources available to clients on the network. In the Oracle Solaris OS, SMB includes Samba server-side support that is managed by the Service Management Facility (SMF) and Samba smbclient client-side support. To access a Windows hosted printer, setup of a local print queue is required. This requirement is because of the differences in UNIX and Windows printing models.

What Is Samba?

Samba is an open-source SMB server freeware application that uses the SMB protocol. Samba provides Windows clients access to UNIX servers and UNIX clients access to Windows servers.

The access that is provided is for both files and other services, including printer sharing. Samba's design, as well as constraint, is to operate on top of a variety of existing UNIX systems. Samba runs as a set of daemons and services, without any need for modification of existing kernels. More information about Samba can be found at `http://www.samba.org`.

Using Printing Protocols in the Oracle Solaris Release

The printing architecture in the Oracle Solaris OS uses network printing protocols to communicate with print services in the following ways:

- Client-to-server communications
- Server-to-printer communications

The Oracle Solaris software provides applications, toolkits, printing commands, and an application programming interface that interacts with print services. This API is called the PAPI. The PAPI consists of a front-end API implementation that dynamically loads back end print service or protocol modules that communicate directly with print services. These print services contain the print job or print queue that is being acted upon. Client-to-server communications include the RFC-1179 and IPP protocols, as well as support for communicating with a local LP print service. For server-to-printer communications, the network printing protocol support enables the print service to transmit print jobs directly to network-attached printers.

Server-to-printer communications for the LP print service and Oracle Solaris Print Manager include support for the following network protocols:

- Raw Transmission Control Protocol (TCP) socket
- RFC-1179
- IPP
- SMB

Determining Which Printing Protocol to Use

The print system uses two over-the-wire protocols for sending print requests from a print client to the print server. The following table describes the printing protocols that can be used for printing in the Oracle Solaris OS.

TABLE 1–1   Supported Printing Protocols

Network Printing Protocol	Server-Side Support?	Client-Side Support?	For More Information
Internet Printing Protocol (IPP)	Server-side support for the IPP listening service is available, starting with the Oracle Solaris 10 release.	Supported in some Oracle Solaris releases.	"Configuring the Internet Printing Protocol" on page 48

TABLE 1–1 Supported Printing Protocols *(Continued)*

Network Printing Protocol	Server-Side Support?	Client-Side Support?	For More Information
RFC-1179 protocol	Supported in all Oracle Solaris releases.	Supported in all Oracle Solaris releases.	"Description of the RFC-1179 Printing Protocol" on page 22
SMB protocol, through Samba **Note –** The SMB protocol, through Samba, is an implementation that enables interoperability between Linux and UNIX servers, and Windows-based clients.	Supported, starting with the Solaris 9 OS.	Supported, starting with the Solaris 9 OS.	"Description of the SMB Protocol" on page 23

Selecting the Client-To-Server Network Printing Protocol

Applications, toolkits, and printing commands select the protocol to use for client-to-server communications, based on the value of the `printer-uri-supported` attribute that is found in the `printers.conf` database entry for the specified print queue. This value is automatically generated and populated when access to a remote print queue is configured by using the `lpadmin` command or when an application uses the interface that is being referenced to perform an action or actions.

For example, when printing a document while using Mozilla, the path that is followed to gain access to the printer is:

Mozilla → `lp` → PAPI

For more information, see the `printers.conf(4)` man page.

The `lpadmin` command generates `printer-uri-supported` values using the following format:

`{ipp|lpd}://`*server*`/printers/`*queue*

To determine which URI to use in the `printers.conf` database, the `lpadmin` command probes the remote print service. If the remote print service supports IPP, this protocol is preferred over the BSD protocol. However, you can override automatic protocol selection by specifying the `-s`option with the `lpadmin` command, then supplying a different URI. For more information, see the "Printer URI Formats That Are Supported" on page 26.

The LP print subsystem uses the BSD print protocol, also referred to as the RFC-1179 protocol, and raw Transmission Control Protocol (TCP), the basic communication language or protocol of the Internet, to communicate with the printer. If you are setting up a printer that includes printer vendor documentation, information about which protocol to use is provided. The TCP protocol is the protocol that is most often used for printing on the network.

Printer URI Formats That Are Supported

The following table describes supported printer URI formats.

TABLE 1–2   Supported URI Formats

Command	URI Format
`lpsched`	`lpsched://localhost/printers/queue` This printer URI format can only be used to contact a local LP service to access the print queue that is specified in the URI.
`lpd`	`lpd://localhost/printers/queue[#extensions]` Use this URI format to contact local or remote print services for the purpose of accessing a print queue on the host that is specified in the URI. An optional `#extensions` can be specified, for example, `#solaris`. When `#solaris` is specified, the host processes Oracle Solaris extensions to the RFC-1179 protocol during print job submissions.

Selecting the Server-To-Printer Network Printing Protocol

Network-attached printers often support more than one method of communicating with a print service. The most common method of communicating with the print service is through a raw TCP connection to a well-known port on the device. Other methods of communication include the RFC-1179 and IPP network protocols. You can select the server-to-printer communication protocol when adding a new print queue in one of following ways:

- By using the `lpadmin` command with the following options, and as shown here:

  ```
  # lpadmin -o protocol={bsd|tcp} -o dest=printer:queue-or-port
  -m netstandard{_foomatic}
  ```

  This method for communicating with the print service was introduced in the Solaris 2.6 OS and is available in all subsequent Oracle Solaris releases.

- The second method is to use the `lpadmin` command with the `-d` option to supply a device and the `-m` option to specify a *uri*.

  This method for communicating with the print service is intended to replace the previous method.

When determining which protocol to use for server-to-printer communication, consult the vendor printer documentation for more specific information. Documentation includes information such as TCP port numbers, RFC-1179 printer names, and the IPP printer URIs that are supported by the device. In most instances, a raw TCP socket communication is likely to provide the most reliable results.

Also, note that because of the differences between printing services on UNIX and Windows platforms, Windows hosted printers should be configured as network-attached printers and administered as such. These types of printers require the creation of a print queue if you are using them on a Oracle Solaris system. These printers might also use the SMB protocol for server-to-printer communication. For more information about the SMB protocol, see "Description of the SMB Protocol" on page 23.

For more information about setting up printers and configuring print queues, see "Setting Up Printers by Using Oracle Solaris Print Manager (Task Map)" on page 55 and "Setting Up Printers by Using LP Print Commands (Task Map)" on page 69.

Description of Oracle Solaris Print Manager

Oracle Solaris Print Manager is a Java technology-based GUI that enables you to manage local and remote printing configuration. This tool can be used in the files, Lightweight Directory Access Protocol (LDAP), Network Information Service Plus (NIS), and Network Information Service Plus (NIS+) naming service environments.

To use this tool, you must meet the following requirements:

- You must be logged in as superuser or assume an equivalent role.
- You must subscribe to the Print Management profile.
- You must have the `Solaris.print.admin` authorization.

Oracle Solaris Print Manager centralizes printer information when the information is used in conjunction with a naming service. Using a naming service for storing printer configuration information is the preferred method, because a naming service makes printer information available to all systems on the network. This method provides easier printer administration. Oracle Solaris Print Manager recognizes existing printer information on print servers, print clients, and in the naming service databases. No conversion tasks are required to use Oracle Solaris Print Manager as long as the print clients are running at least the Solaris 2.6 release.

The Oracle Solaris Print Manager package is `SUNWppm`.

Description of the LP Print Service

The *LP print service* is a set of software utilities that enables users to print files while continuing to work. Originally, the print service was called the *LP spooler*. *LP* represents line printer, but the meaning now includes many other types of printers, such as laser printers. *Spool* is an acronym for Simultaneous Peripheral Operations Online.

The *LP print service* consists of the LP print service software, any print filters you might provide, and the hardware, such as the printer, system, and network connections.

The LP print client commands make use of the PAPI to interact with Oracle Solaris LP (lpsched), RFC-1179 (BSD/LPD protocol), and IPP-based servers. IPP support is capable of interacting with CUPS servers by using its native IPP service. With the introduction of this API support, several common BSD and SysV printing commands use the PAPI interface. As a result, the new command implementations work with a number of existing print services. A portion of this development includes server-side support for IPP that is also layered on the API. This support is implemented as a set of protocol-specific libraries and as an Apache module, Versions 1 and 2. Similar to the print command implementation, the IPP listening service can be used with any print service that has PAPI support. The RFC-1179 server-side support is also layered on the PAPI.

For additional information about the LP print service, see "LP Print Service" on page 213.

The LP Print Client-Server Process

This section provides an overview of the print client-server process that is used by the LP print service.

Using Print Servers

The print server is a system that has a local printer connected to it and makes the printer available to other systems on the network. The following figure highlights the part of the print process in which the print server sends the print request to the printer.

FIGURE 1–2   The Print Server Sends a Print Request to the Printer
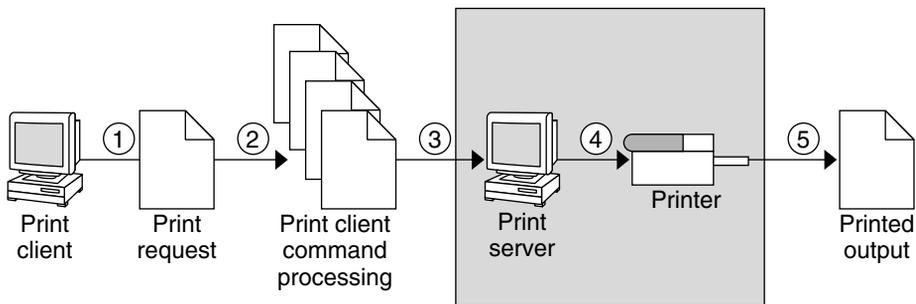
1. The print client submits a print request.
2. The print request is processed on the print client.
3. The print request goes to the print server.
4. The print request goes to the printer.
5. The print output is produced on the printer.

Using Print Clients

A *print client* is a system that can send print requests to a print server.

The following figure highlights the part of the print process in which the user submits a print request from a print client.

FIGURE 1–3 The User Submits a Print Request from a Print Client
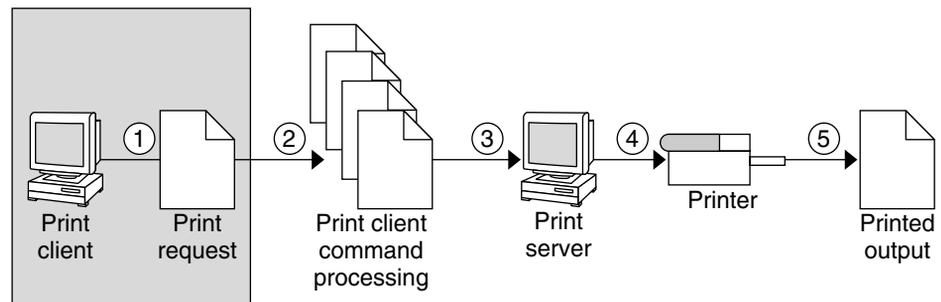
Print Client Process Used by the LP Print Service

The following figure illustrates the path of a print request from the time the user initiates the request until the print request is printed.

FIGURE 1–4 Overview of the Print Client Process
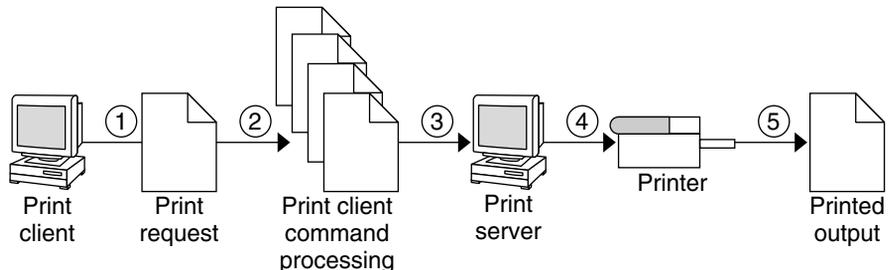
1. A user submits a print request from a print client.

2. The print command checks a hierarchy of print configuration resources to determine where to send the print request.

3. The print command sends the print request directly to the appropriate print server. A print server can be any server that accepts Berkley Software Distribution (BSD) printing protocol, including System V Release 4 (SVR4), or LP print servers and BSD LPD-based print servers, as well as servers that accept IPP.

4. The print server sends the print request to the appropriate printer.

5. The print request is printed.

How Local Printing Works

The print request follows the same path it would if the client and server were separate systems. Requests always flow from client to server following the same path.

The following figure shows what happens when a user submits a request to print a PostScript file on a *local* printer, which is a printer connected to the user's system. The lpsched daemon on the local system does all processing.

This processing might include the following:

- Matching the printer and content type
- Identifying the default printer and filtering the request
- Starting the specified printer interface program

The printer interface program does the following:

- Prints the banner page.
- Catches printer faults.
- Determines the printer fault policy to either reset, continue, or begin the print job over again.
- Finally, the interface program uses the lpcat program to download the print request to the local printer's serial port.

FIGURE 1–5   Local Printing Process
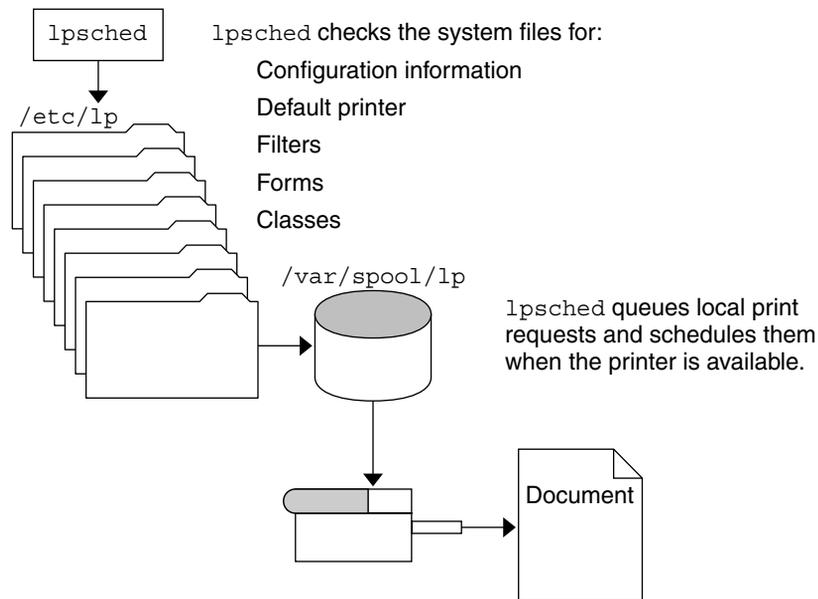
How the LP Print Service Administers Files and Schedules Local Print Requests

The LP print service has a scheduler daemon called `lpsched`. The scheduler daemon updates the LP system files with information about printer setup and configuration.

The `lpsched` daemon schedules all local print requests on a print server, as shown in the following figure. Users can issue the requests from an application or from the command line. Also, the scheduler tracks the status of printers and filters on the print server. When a printer finishes a request, the scheduler schedules the next request to queue on the print server, if a next request exists.

FIGURE 1–6 LP Print Service Print Scheduling Process

A user submits a print request.

Local system

`lpsched`

`lp` sends the request to the `lpsched` daemon.

`/var/spool/lp`

`lpsched` spools the print request.

`lpsched` matches the printer type and the file content type, and identifies the default printer for the system.

Requests

`lpsched` filters the job. (It also can put the filtered output back into the spooling area.)

file.ps

file.ps

When the printer is free, `lpsched` starts the printer's specified interface program on the serial port.

Interface program

The Interface program:

Prints the banner page

Catches faults

Depending on the fault policy, it waits to be reset, continues, or begins job over.

The interface program uses the `lpcat` program to download the file into the serial port.

Document

Without rebooting the system, you can stop the scheduler with the `svcadm disable application/print/server` command. Then, restart the scheduler with the `svcadm enable application/print/server` command. The scheduler for each system manages requests that are issued to the system by the `lp` command.

How Remote Printing Works

The following figure shows what happens when a user on a print client submits a print request to an LPD-based print server. The command opens a connection and handles its own communications with the print server directly.

FIGURE 1–7   How a Print Client Sends a Print Request to an LPD-based Print Server
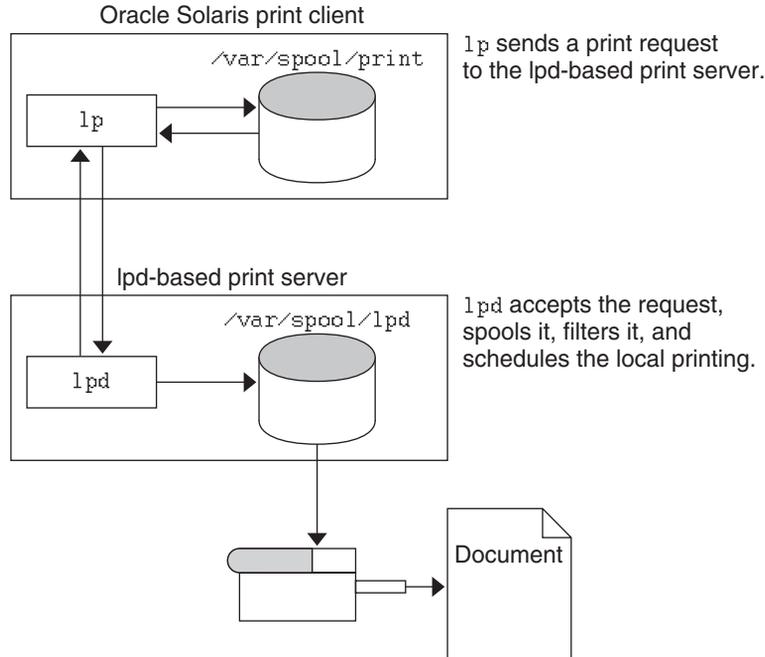
The following figure shows an LPD-based print client submitting a print request to a print server. The `lpd` daemon handles the local part of the print request and the connection to the print server. On the print server, the `inetd` process waits for network printing requests and starts a protocol adaptor to service the request. The protocol adaptor communicates with the `lpsched` daemon, which processes the request on the print server.

FIGURE 1–8   Remote Print Process

lpd-based print client
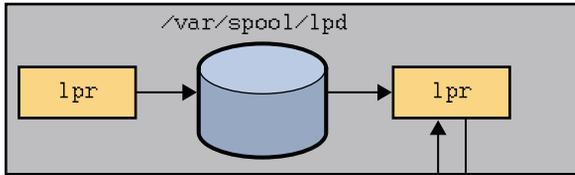
lpr submits print request to lpd, which spools it.

lpr the spool file, checks in the /etc/printcap file to find the printer location, and connects to the network if the printer is remote.
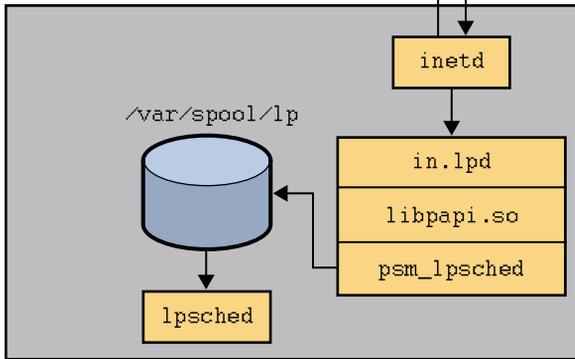
inetd listens for a request and then starts. in.lpd processes the request by making calls to libpapi.so. For local requests, libpapi.so loads psm-lpsched.so and passes the requests to lpsched by making calls to psm-lpsched.so.
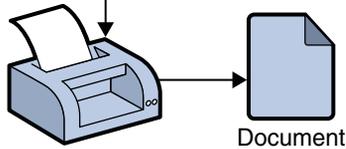
The following figure shows what happens when a user on a print client submits a print request to a print server. The print command on the print client handles the local part of each print request by communicating directly with the print server.

FIGURE 1–9 How a Print Request Is Processed

Oracle Solaris print client
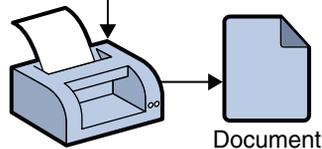
The inetd process on the print server monitors network printing requests and starts a protocol adaptor to communicate with the lpsched daemon on the print server, which processes the print request.

Where to Find Printing Tasks

TABLE 1–3 Printing Tasks

Printing Task	Topics Covered	For More Information
Set up and administer network printing protocols.	Setting up the IPP, RFC-1179, and SMB network printing protocols.	Chapter 3, "Setting Up Network Printing Services (Tasks)"

TABLE 1–3   Printing Tasks   *(Continued)*

Printing Task	Topics Covered	For More Information
Set up and administer printers by using Oracle Solaris Print Manager.	Setting up print servers, adding directly attached and network-attached printers, and adding print clients.	Chapter 4, "Setting Up and Administering Printers by Using Oracle Solaris Print Manager (Tasks)"
Set up and administer printers by using LP print commands.	Setting up print servers, adding directly attached and network-attached printers, and adding print clients.	Chapter 5, "Setting Up Printers by Using LP Print Commands (Tasks)"
Administer printers.	Administering printers and print requests.	Chapter 6, "Administering Printers by Using LP Print Commands (Tasks)"
Customize printing services and printers.	Customizing printing services. Administering character sets, print forms, print filters, and print fonts.	Chapter 7, "Customizing LP Printing Services and Printers (Tasks)"
Administer printers on a network.	Administering printers and print jobs that use the IPP, the RFC-1179, and the SMB network protocols.	Chapter 9, "Administering Printers on a Network (Tasks)"
Administer PPD files by using the PPD File Manager (ppdmgr).	Administering PPD Files on a system by using the ppdmgr utility.	Chapter 11, "Administering Printers by Using the PPD File Management Utility (Tasks)"

2

Planning for Printing (Tasks)

This chapter provides information about planning for printer setup by using Oracle Solaris Print Manager or the LP print service.

This is a list of the information that is in this chapter:

Determining a Method to Use for Printer Setup and Administration

The following sections describe printing services, tools, and protocols that you might choose to use for setting up and administering printers in the Oracle Solaris release. Each tool, service, and protocol has advantages and disadvantages. Some tools and services are more appropriate for specific uses, while others can be used for all, or most, printing tasks that you might perform. Unless otherwise mentioned, the following printing tools are available in the Oracle Solaris 10 and compatible Oracle Solaris releases. Also, all of these printing services and tools use LDAP, NIS, and NIS+.

Selecting Printing Tools and Services

This section describes the tools you can use to perform printer setup and related tasks.

The following tools are available in the Oracle Solaris release:

- Oracle Solaris Print Manager
- `lpadmin` command
- PPD File Manager (`ppdmgr`)

Oracle Solaris Print Manager

Oracle Solaris Print Manager, `/usr/sbin/printmgr`, is a Java technology-based GUI that you use to perform setup tasks for local and remote printers, either directly attached and network-attached.

For directly attached and network-attached printers, you can perform the following tasks:

- Create a print queue.
- Modify a print queue.
- Delete a print queue.

For remote printers, you can use Oracle Solaris Print Manager to define access to the print queue. Note that a remote printer is a printer that has a print queue that is defined on a system other than the local system. For more information about terminology that is commonly used in this book, see Glossary.

`lpadmin` **Command**

The `lpadmin` command, `/usr/sbin/lpadmin`, is a command-line tool that you can use to perform all of the tasks that Oracle Solaris Print Manager performs. Several additional tasks that cannot be performed by using Oracle Solaris Print Manager can be performed by using the `lpadmin` command. For more information, see "Printer Definitions" on page 208.

PPD File Manager

You can use the PPD File Manager utility, `/usr/sbin/ppdmgr`, to administer PPD files on Oracle Solaris systems. The PPD File Management utility is the preferred method for adding PPD files to a system's PPD file repository. For more information, see Chapter 11, "Administering Printers by Using the PPD File Management Utility (Tasks)."

Note – For printer setup, the Oracle Solaris Print Manager tool is easier and more convenient to use than the `lpadmin` command. These tools provide sufficient printer attributes in most situations. However, you might need to use the `lpadmin` command when setting up printers with printer attributes that cannot be defined by using Oracle Solaris Print Manager.

For more information about setting up printers, see Chapter 4, "Setting Up and Administering Printers by Using Oracle Solaris Print Manager (Tasks)," and Chapter 5, "Setting Up Printers by Using LP Print Commands (Tasks)."

Planning for Printer Setup and Administration

Planning for printer setup and administration includes the following activities:

- Defining attributes of printers, such as printer name, printer description, and printer port
- Selecting a printer make, model, and driver (for setting up printers with PPD files)
- Selecting a printer type and file content type (for setting up printers without PPD files)
- Determining which PPD file to use (for setting up printers with PPD files)
- Setting up a default printer destination
- Determining whether you want to print banner pages
- Limiting user access to printer
- Setting up printer classes
- Setting up fault notification
- Setting up fault recovery

Distributing Printers on the Network

The goal of setting up printers on a network is to give users access to one or more printers. As an administrator, you must determine whether each printer would be best used if it is dedicated to one system or available to many systems. In a network environment, distribute your printers on several print servers. The advantage of setting up several print servers is that when one print server has a problem, you can route print requests to other print servers.

If you use a centralized print configuration, you can still connect printers to user systems for convenience or for improved response. A printer that is connected to a user system is still available to other systems on the network.

The following figure shows an example of how you can have a centralized print configuration and still connect printers to user's systems.

How to Distribute Printers on a Network
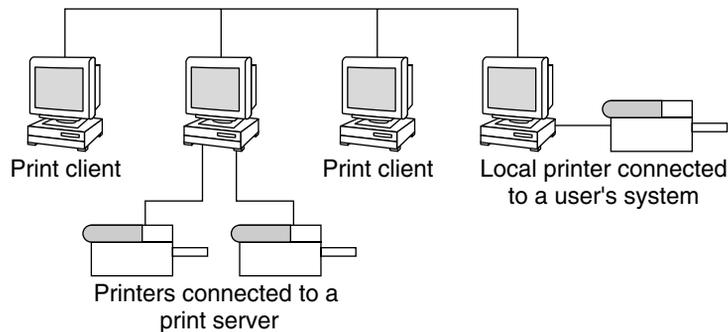
Printer Configuration Resources

The printing software uses certain resources to locate printer names and printer configuration information. The printer software may be configured to use a naming service to advertise the printers. The naming service can be used for storing printer configuration information for all printers on the network. The naming service, LDAP, NIS, or NIS+, simplifies printer configuration maintenance. When you add a printer in the naming service, all print clients on the network can access the printer.

Printing Support in the Naming Service Switch

The printers database in /etc/nsswitch.conf, the naming service switch file, provides centralized printer configuration information to print clients on the network.

By including the printers database and corresponding sources of information in the naming service switch file, print clients automatically have access to printer configuration information without having to add it to their own systems.

The default printers entry in the /etc/nsswitch.conf file for files, LDAP, NIS, or NIS+ environments are described in the following table.

naming service Type	Default printers Entry
files	printers: user files
ldap	printers: user files ldap
nis	printers: user files nis

For example, if your naming service is NIS, printer configuration information on print clients is searched for in the following sources in this order:

- `user` – Represents the user's `$HOME/.printers` file
- `files` – Represents the `/etc/printers.conf` file
- `nis` – Represents the `printers.conf.byname` table

For more information, see the `nsswitch.conf(4)` man page and *System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)*.

Adding Printer Information to a Naming Service

Adding printer information to a naming service makes access to printers available to all systems on the network. Doing so makes printer administration easier because all of the information about printers is centralized.

Naming Service Configuration	Actions to Centralize Printer Information
Use a naming service	Adding the printer to the LDAP, NIS, or NIS+ database makes the printer available to all systems on the network.
Do not use a naming service	Adding the printer adds the printer information to the printer server's configuration files only. Print clients will not automatically know about the printer.
	You will have to add the printer information to every print client that needs to use the printer.

LDAP Print Support Guidelines

Keep the following in mind when you manage printer information in the LDAP naming service:

- Oracle Solaris Print Manager uses the `ldapclient` command to determine the default LDAP server name. If more than one server is specified, the first server is automatically selected. For more information, see `ldapclient(1M)` man page.

- Oracle Solaris Print Manager always displays printer entries from the current LDAP server. If the current LDAP server is not the domain's LDAP master server, the list of printers displayed might not be the current list of printers. The LDAP replica server might not have been updated by the master server, and as a result, is out of sync with the master. Replica servers can have various update replication agreements. For example, a change is made on the master, and the replica servers can be updated immediately or daily.

- If the selected LDAP server is an LDAP replica server, any updates are referred to the master server and are done there. This situation again means that the printer list could be out of sync with the master server. For example, a deleted printer might still appear in the displayed printer list, until the replica is updated from the master server.

- Users can use the LDAP command-line utilities, `ldapadd` and `ldapmodify`, to update printer entries in the directory. However, this method is not recommended. If these utilities are used, the user must ensure that the *printer-name* attribute value is unique within the `ou=printers` container. If the *printer-name* attribute value is not unique, the result of modifications done by Oracle Solaris Print Manager, or by the `lpset` command, might not be predictable.

How the Printing Software Locates Printers

The following figure highlights the part of the print process in which the printing software checks a hierarchy of printer configuration resources to determine where to send the print request.

FIGURE 2–2   How the Print Client Software Locates Printers
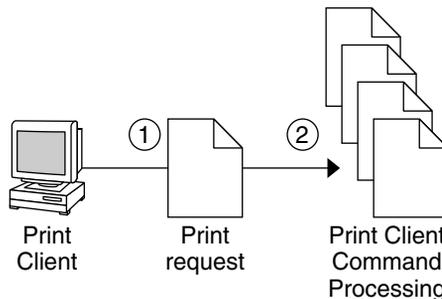
1. A user submits a print request from a print client by using the `lp` or `lpr` command. The user can specify a destination printer name or class in any of three styles:

   - Atomic style, which is the `lp` command and option, followed by the printer name or class, as shown in this example:

     % **`lp -d neptune`** *filename*

   - POSIX style, which is the print command and option, followed by *server*:*printer*, as shown in this example:

     % **`lpr -P galaxy:neptune`** *filename*

   - Context-based style, as shown in this example:

     % **`lpr -d thisdept/service/printer/`***printer-name* *filename*

2. The print command locates a printer and printer configuration information as follows:

   - The print command checks to see if the user specified a destination printer name or printer class in one of the three valid styles.

- If the user didn't specify a printer name or class in a valid style, the command checks the user's PRINTER or LPDEST environment variable for a default printer name.
- If the environment variable for the default printer is not defined, the command checks the sources configured for the printers database in the /etc/nsswitch.conf file. The naming service sources might be one of the following:
  - LDAP directory information tree in the domain's ou=printers container
  - NIS printers.conf.byname map
  - NIS+ printers.conf_dir map

Assigning Print Servers and Print Clients

You must decide which systems will have local printers physically attached to them. You must also decide which systems will use printers on other systems. A system that has a local printer attached to it and makes the printer available to other systems on the network is called a *print server*. A system that sends its print requests to a print server is called a *print client*.

The LP print service software provides printing services in the Oracle Solaris OS. Besides physically connecting a printer to a system, you must define the printer server characteristics to the LP print service. Once you have print servers set up, you can set up other systems as print clients.

Print servers and print clients can run different versions of the Oracle Solaris release and different versions of the UNIX operating system. Print clients running the Solaris 9 release and compatible versions can print to print servers that are running an LPD-based print service, such as the SunOS 4.1, BSD UNIX, and Linux releases. In addition, print clients running an lpd-based print service can print to print servers running the Solaris 9 release and compatible versions.

The following figure shows a print configuration on a network with systems running the Oracle Solaris release and an LPD-based print service.

Oracle Solaris and LPD-Based Systems Print Configuration
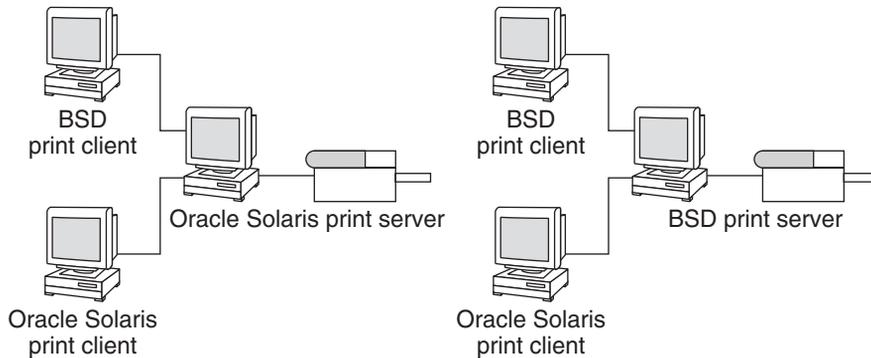
Print Server Requirements and Recommendations

You can attach a printer to a stand-alone system or to any system on the network. Any networked system with a printer can be a print server, as long as the system has adequate resources to manage the printing load.

Spooling Space

Spooling space is the amount of disk space that is used to store and process requests in the print queue. Spooling space is the single most important factor to consider when deciding which systems to designate as print servers. When users submit files for printing, the files are stored in the /var/spool/lp directory until the files are printed. The size of the /var directory depends on the size of the disk and how the disk is partitioned. Spooling space can be allocated in the /var directory on the print server, or mounted from a file server and accessed over the network.

Note – If /var is not created as a separate file system, the /var directory uses space in the root (/) file system. The root (/) file system is likely to be insufficient on a print server.

Disk Space

When evaluating systems as possible print servers, consider their available disk space. A large spool directory can consume 600 Mbytes of disk space. Evaluate the size and division of disk space on systems that can be designated as print servers.

Also, carefully evaluate the printing needs and use patterns of print client systems. For example, assume that users in a small group typically print only short email messages, which are simple ASCII files without sophisticated formatting requirements. In this example, a print server with 20 to 25 Mbytes of disk space allocated to the /var directory is probably sufficient. If, however,

many print client users are printing large documents, bit mapped images, or raster images, the users will likely fill the spooling space quite frequently. When users cannot queue their jobs for printing, work flow is interrupted. Requests for more spooling space can force you to either add disk space for spooling or designate a different system as the print server.

If the print server has a /var directory that is too small, and a larger file system is available, you can mount the larger file system on the /var directory for additional spooling space. For information about mounting file systems and editing the vfstab file, see "Overview of Mounting and Unmounting File Systems" in *System Administration Guide: Devices and File Systems*.

Memory Requirements

A print server does not require additional memory. However, you might find that more memory improves performance in managing print requests.

Swap Space

The swap space allocation on the print server should be sufficient to handle LP print service requirements. For information about how to increase swap space, see Chapter 19, "Configuring Additional Swap Space (Tasks)," in *System Administration Guide: Devices and File Systems*.

Hard Disk

For optimal performance, the print server should have a hard disk and a local /var directory. You should mount spooling space for a print server on a local hard disk. If a print server has its own hard disk and a local /var directory, printing is much faster. And, you can more accurately predict the time needed to process print requests.

◆ ◆ ◆   C H A P T E R   3

³Setting Up Network Printing Services (Tasks)

This chapter describes how to set up the printing services that are required to create and manage printers on a network by using the Internet Printing Protocol, the RFC-1179 protocol, or the SMB protocol.

This is a list of the information that is in this chapter:

For overview information, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

For printer setup information, see Chapter 5, "Setting Up Printers by Using LP Print Commands (Tasks)."

Configuring the Internet Printing Protocol (Task Map)

TABLE 3–1   Configuring IPP (Task Map)

Task	Description	For Instructions
Configure IPP server-side support.	For IPP server-side support, you can customize the listening service by adding directives to the Apache configuration file on the server.	"How to Configure IPP Server Data" on page 49
Configure IPP client-side support.	For IPP client-side support, queue configuration data is stored in the printers.conf configuration database. This database contains entries for each configured print queue.	"How to Configure IPP Client Data" on page 50

Configuring the Internet Printing Protocol

The IPP listening service provides an IPP network protocol service that enables print client systems a means of interacting with a print service on the system that is running the listener. This listener implements server-side IPP protocol support, which includes a broad set of standard operations and attributes. The listener is implemented on Oracle Solaris as an Apache module and a series of shared libraries containing IPP operation and wire support. The IPP software stack is installed when the Oracle Solaris OS is installed on the system. The listening service is an SMF service that depends on the print service to run. As a result, IPP is automatically enabled on a print server when the first print queue has been added . It is also disabled when the last print queue has been removed. If you make configuration changes, you will need to restart the listener. For more information, see "How to Restart the IPP Network Listening Service" on page 52.

The IPP listening service implementation is embedded under the Apache Web Server. The web server receives IPP operations through HTTP POST requests. When an HTTP POST request is received it is passed on to the Apache IPP module (mod_ipp.so). Based on configuration, the Apache Web Service might provide an authentication service and it might also use encryption between client and server. The listening service runs as its own dedicated instance of Apache.

IPP support in the Oracle Solaris OS is split into server-side and client-side support. Both the server-side and client-side support share some common elements, as well as elements that are unique to the client or server operation. As a result, the IPP client and server components share a code base that implements these common elements. The Table A–1 describes the components that make up IPP support in the Oracle Solaris OS.

Configuring IPP Server and Client Data

The Apache configuration for this web server instance runs as the lp print service user, which provides enough privileges to support all of the existing IPP operations, but limits access to print service specific resources. The listening service runs as its own web server instance, specifically configured to support IPP, which is intended to minimize potential security risks.

On the server-side, IPP configuration changes are made to the /etc/apache/httpd-standalone-ipp.conf file. On the client-side, IPP configuration changes are made to the /etc/printers.conf file.

Note – If you make any configuration changes, you need to restart the service to load the new configuration. For more information, see "How to Restart the Print Scheduler" on page 124.

The IPP listening service configuration file, /etc/apache/httpd-standalone-ipp.conf, is like any normal Apache 1.3 configuration file. The configuration files takes any Apache 1.3 configuration directives that you want to use.

The default configuration includes the following features:

- Listening on port 631.
- Loading of a minimal set of Apache modules.
- Enabling all supported IPP operations at the /printers/ path, for example ipp://server/printers/, without requiring authentication.

The default operations that are enabled for/printers/ is limited to a set of operations that poses less of a security risk. However, all operations are enabled at the /admin/ path, for example ipp://server/admin/, with basic authentication required.

The mod_ipp Apache configuration options to choose from are:

- **ipp-conformance** – Selects the level of protocol checking. The default is automatic, allowing maximum client interaction.
- **ipp-operation** – Allows you to selectively enable or disable IPP operation support for one more IPP operations.
- **ipp-default-user** – Selects the user name to use when contacting the local print service.

  The default is lp user, which allows for more functional proxying.
- **ipp-default-service** – Selects the default print service where print requests are directed.

  The default is the lpsched daemon.

Conformance checking types are:

- **Automatic** – Only check that the requested operation is supported by the protocol listener, which is the default.
- **1.0** – Check that the request conforms to IPP 1.0.
- **1.1** – Check that the request conforms to IPP 1.1.

IPP Keywords for Apache Web Server Configuration

The following syntax is used for the IPP operations keywords:

ipp-operation operation enable | disable

For more information about the IPP operation keywords that are used to configure the Apache Web Server, see "IPP Operation Keywords" on page 266.

▼ How to Configure IPP Server Data

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   **Open the `/etc/apache/httpd-standalone-ipp.conf` file in a text editor.**

3   **Add the desired IPP server configuration data.**

The default configuration in the `httpd-standalone-ipp.conf` file provides a working IPP listening service for the LP scheduler. To customize your IPP service, use the following section in the `httpd-standalone-ipp.conf` file:

```
# mod_ipp specific configuration
<IfModule mod_ipp.c>
...
...
</IfModule>
```

Note – You must run the IPP module as `lp` to have the necessary privileges.

See Also   For more information about IPP settings, see the mod_ipp(4) man page.

▼ How to Configure IPP Client Data

Under PAPI support, the bsdaddr value (`server,q`) is converted to its equivalent `printer-uri-supported` value (`lpd://server/printers/q`), when the `printer-uri-supported` value is missing from the printers database. However, in some situations, such as when there is a mix of client systems and the queue is on an IPP capable server, you might need to manually configure this data.

1   **Become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   **Open the `/etc/printers.conf` file in a text editor. Add the desired IPP client configuration data.**

For example:

```
/etc/printers.conf:queue: \
    :bsdaddr=server,queue,Solaris: \
    :printer-uri-supported=ipp\://server/printers/queue:
```

See Also   For additional information about printing with IPP, Appendix A, "Using the Internet Printing Protocol."

For more information about administering printers by using IPP, see "Administering Printers on a Network When Using the Internet Printing Protocol (Task Map)" on page 141.

Enabling, Disabling, and Restarting Network Printing Services (Task Map)

TABLE 3–2   Enabling, Disabling, and Restarting Printing Services (Task Map)

Task	Description	For Instructions
Enable, disable, and restart the IPP network listening service through the Service Management Facility (SMF).	The IPP listener provides server-side support for IPP. This service is controlled by SMF. You can enable, disable, and restart the IPP network listening service by using he `svcadm` command.	"How to Enable the IPP Network Listening Service" on page 52 "How to Disable the IPP Network Listening Service" on page 52 "How to Restart the IPP Network Listening Service" on page 52
Enable, disable, and restart the RFC-1179 network listening service through SMF.	The RFC-1179 network listening service is controlled by SMF. You can enable, disable, and restart the RFC-1179 network listening service by using the `svcadm` command.	"How to Enable the RFC-1179 Network Listening Service" on page 52 "How to Disable the RFC-1179 Network Listening Service" on page 53 "How to Restart the RFC-1179 Network Listening Service" on page 53
You can enable, disable, and restart the SMB network service through SMF.	Server-side support for the SMB network service is controlled by SMF and is available through Samba. You can enable, disable, and restart the SMB network listening service by using the `svcadm` command.	"How to Enable the SMB Network Service" on page 53 "How to Disable the SMB Network Service" on page 54 "How to Restart the SMB Network Service" on page 54

Managing Network Printing Services

The Fault Managed Resource Identifier (FMRI) descriptions for the SMF services for the IPP, RFC-1179, and the SMB protocols are as follows:

- For the IPP listening service, the FMRI is `svc:/application/print/ipp-listener`.
- For the RFC-1179 listening service, the FMRI is `svc:/application/print/rfc1179-listener`.
- For the SMB network service (server-side support), the FMRI is `svc:/network/samba` or `svc:/network/wins`. This service is available through Samba.

For more information about SMF services and using the svcadm command, see Chapter 18, "Managing Services (Overview)," in *System Administration Guide: Basic Administration*.

▼ How to Enable the IPP Network Listening Service

1 **Become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **To enable the IPP network service, type:**

```
# svcadm enable application/print/ipp-listener
```

▼ How to Disable the IPP Network Listening Service

1 **Become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **To disable the IPP network service, type:**

```
# svcadm disable application/print/ipp-listener
```

▼ How to Restart the IPP Network Listening Service

1 **Become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **To restart the IPP network service, type:**

```
# svcadm restart application/print/ipp-listener
```

▼ How to Enable the RFC-1179 Network Listening Service

1 **Become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 To enable the RFC-1179 network listening service, type:

```
# svcadm enable application/print/rfc1179
```

▼ How to Disable the RFC-1179 Network Listening Service

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 To disable the RFC-1179 network service, type:

```
# svcadm disable application/print/rfc1179
```

▼ How to Restart the RFC-1179 Network Listening Service

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 To restart the RFC-1179 network service, type:

```
# svcadm restart application/print/rfc1179
```

▼ How to Enable the SMB Network Service

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 To enable the SMB network service, type one of the following commands:

```
# svcadm enable application/print/samba
```

```
# svcadm enable application/print/wins
```

▼ How to Disable the SMB Network Service

1   **Become superuser or assume an equivalent role.**

    Roles contain authorizations and privileged commands. For more information about roles, see
    "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   **To disable the SMB network service, type one of the following commands:**

    ```
    # svcadm disable application/network/samba
    ```

    ```
    # svcadm disable application/network/wins
    ```

▼ How to Restart the SMB Network Service

1   **Become superuser or assume an equivalent role.**

    Roles contain authorizations and privileged commands. For more information about roles, see
    "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   **To restart the SMB network service, type:**

    ```
    # svcadm restart application/network/samba
    ```

    ```
    # svcadm restart application/network/wins
    ```

◆ ◆ ◆   **C H A P T E R   4**

4

Setting Up and Administering Printers by Using Oracle Solaris Print Manager (Tasks)

This chapter describes how to set up and administer printers by using the Oracle Solaris Print Manager graphical user interface (GUI).

This is a list of the information that is in this chapter:

- "Setting Up Printers by Using Oracle Solaris Print Manager (Task Map)" on page 55
- "Administering Printers by Using Oracle Solaris Print Manager (Task Map)" on page 66

For overview information about printing, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

Setting Up Printers by Using Oracle Solaris Print Manager (Task Map)

TABLE 4–1   Printer Setup With Oracle Solaris Print Manager (Task Map)

Task	Description	For Instructions
Start the Oracle Solaris Print Manager GUI.	Access the Oracle Solaris Print Manager GUI to set up and administer printers.	"How to Start Oracle Solaris Print Manager" on page 56
Add a new directly attached local printer by using Oracle Solaris Print Manager.	Use Oracle Solaris Print Manager to make the printer available for printing after you physically attach the printer to a system.	"How to Add a New Directly Attached Printer by Using Oracle Solaris Print Manager" on page 61

TABLE 4–1   Printer Setup With Oracle Solaris Print Manager (Task Map)   *(Continued)*

Task	Description	For Instructions
Use Oracle Solaris Print Manager to add a print queue with `localhost` specified as the system's host name.	You can specify `localhost` as the host name in the print system's databases when adding a new print queue or modifying an existing print queue by using Oracle Solaris Print Manager.	"How to Add a Print Queue With `localhost` Specified as the Host Name (Oracle Solaris Print Manager)" on page 63
Add a new network-attached printer by using Oracle Solaris Print Manager.	Use Oracle Solaris Print Manager add a new network-attached printer.	"How to Add a New Network-Attached Printer by Using Oracle Solaris Print Manager" on page 64

Getting Started With Oracle Solaris Print Manager

Oracle Solaris Print Manager is a Java-based graphical user interface that enables you to manage local and remote printer configuration. This tool can be used in the following naming service environments: LDAP, NIS, NIS+, and files. You must be logged in as superuser to use this tool.

Use Oracle Solaris Print Manager to set up print servers and print clients (Add Access to Printer). An *attached printer* is a printer that is physically cabled to the print server. A *network-attached printer* is physically attached to the network. Adding *access* to a printer, or adding *remote access* to a printer, is the process of giving print clients (all those machines that are not the server) access to the printer. For more information about printing terms, see Glossary.

Solaris 10 5/08: The print system can use and recognize `localhost` as the host name in the print system databases. Previously, `/bin/hostname` was used to generate the print host name. These improvements were made to enable print servers to maintain the same print host name, independent of the machine host name. For more information, see "How to Add a Print Queue With `localhost` Specified as the Host Name (Oracle Solaris Print Manager)" on page 63.

▼ How to Start Oracle Solaris Print Manager

1   **Before you start Oracle Solaris Print Manager, verify that the following prerequisites are met:**

   ■ You must have a bitmapped display monitor, such as the standard display monitor that comes with an Oracle workstation. Oracle Solaris Print Manager can be used only on a system with a console that is a bitmapped screen.

   ■ You must be running an X Window System, such as the GNOME Desktop Environment, or be using the remote display feature on a system running an `xhost` environment.

   ■ You must be logged in as superuser or assume an equivalent role on the print server.

- You must have the required access privileges for managing the LDAP, NIS, and NIS+ databases.

  If your naming service is LDAP, you must have the following items:

  - The distinguished name (DN) of a printer administrator and password in the directory.

  - The name or IP address of an LDAP server hosting the administered domain. This information is usually displayed and selected automatically.

  If your naming service is NIS, you must have the root password for the NIS master.

- If your naming service is NIS+, you might need to complete the following steps.

  a. Log in to the NIS+ master as superuser.

  b. Identify the group that owns the printers table.

     ```
     # niscat -o printers.org_dir.domain-name.com
                  .
                  .
                  .
              Group       : "admin.domain-name.com"
     ```

  c. If necessary, add the system that runs Oracle Solaris Print Manager to the NIS+ admin group authorized to update the printers.org_dir.<domain> file.

     ```
     # nisgrpadm -a admin.domain-name.com hostname
     ```

  d. As superuser, log in to the system that runs Oracle Solaris Print Manager. Your NIS+ configuration might make it necessary to run the /usr/bin/keylogin command. For more information, see the keylogin(1) man page.

- Have the SUNWppm package installed.

  ```
  # pkginfo | grep SUNWppm
  system      SUNWppm          Solaris Print Manager
  ```

2 Start Oracle Solaris Print Manager by using one of the following methods:

- Select Add/Remove Printer in the GNOME Desktop.

  Launch → Preferences → System Preferences → Add/Remove Printer

  You are prompted for the root password.

- Type the following command:

  ```
  # /usr/sbin/printmgr &
  ```

  Note – You can also start Oracle Solaris Print Manager by using the original path of the printmgr command:

  ```
  # /usr/sadm/admin/bin/printmgr &
  ```

  The Select Naming Service window overlays the Oracle Solaris Print Manager main window.

If Oracle Solaris Print Manager fails to start from the GNOME Desktop menu or from the command line, check the following:

- Superuser (root) might not have permission to connect to the X-server process on the local system or the remote system. In this case, type the following:

```
$ ssh -Xhostname
$ su
(Enter root's password)
# /usr/sbin/printmgr &
```

  Replace *hostname* with either the local system name or the remote system name before restarting Oracle Solaris Print Manager.

- Verify that the SUNWppm package is installed on the local system or the remote system.

```
$ pkginfo | grep SUNWppm
```

3   **Select the naming service that is used in your network from the Select Naming Service window. The choices are: LDAP, NIS, NIS+, or files.**

4   **Check that the domain name is correct.**

The Oracle Solaris Print Manager main menu is displayed after the naming service is loaded successfully.

Setting Up Directly Attached Printers by Using Oracle Solaris Print Manager

You can add, modify, and delete a printer, as well as add printer access by using Oracle Solaris Print Manager. Most of the options that you can specify by using the lpadmin command can also be specified by using Oracle Solaris Print Manager.

Note – You must become superuser or assume a role that has equivalent privileges to gain access to some of the options that are in Oracle Solaris Print Manager. Options and selectable attributes within the tool vary, depending on the user's role.

For a detailed description of all the printer definitions that you can set or reset by using Oracle Solaris Print Manager, see "Setting Printer Definitions by Using Oracle Solaris Print Manager" on page 59.

Setting Printer Definitions by Using Oracle Solaris Print Manager

The following table describes the printer definitions that you can set for a printer by using Oracle Solaris Print Manager. You can set the same definitions for a printer by using LP print commands.

TABLE 4–2 Printer Definition Descriptions

Printer Definition	Description	Example	Default	Required or Optional?
Printer Name	Name of printer	laser1	N/A	Required to install an attached or network-attached printer and to add access to a printer
Print server	Name of print server	venus	Use localhost for Printer Server attribute check box selected by default	Required to install an attached or network-attached printer and to add access to a printer This field is filled in by the tool
Description	User defined string	laser printer near breakroom	N/A	Optional
Printer Port	Device that the printer is attached to	/dev/term/a	/dev/term/a	Required to install an attached printer
Printer Type	Type of printer	unknown	PostScript	Required to install an attached printer or a network-attached printer without PPD files
File Content Type	Content to be printed	any	PostScript	Required to install an attached printer or a network-attached printer without PPD files

TABLE 4–2   Printer Definition Descriptions   *(Continued)*

Printer Definition	Description	Example	Default	Required or Optional?
`Printer Make`	Make of printer	Lexmark	N/A	Required to install an attached printer or a network-attached printer with PPD files
`Printer Model`	Model of printer	Lexmark Optra E312	N/A	Required to install an attached printer or a network-attached printer with PPD files
`Printer Driver`	Driver that is used by specifying PPD file	Foomatic/PostScript	N/A	Required to install an attached printer or a network-attached printer with PPD files
`Fault Notification`	Specifies how to notify user of errors	`Mail to superuser`	`Write to superuser`	Optional
Default Printer	Identifies the default printer	N/A	N/A	Optional
Banner Page Drop-Down Menu	Specifies to print a banner page	N/A	Banner is printed unless turned off by using `lp` command with appropriate option	Optional
`User Access List`	List of users allowed to print on the print server	`rimmer,lister`	All users can print	Optional

Specifying PPD Files When Setting Up a Printer by Using Oracle Solaris Print Manager

Oracle Solaris Print Manager includes a Use PPD files option that enables you to specify a PPD file when creating a new print queue or modifying an existing print queue. If you do not want to specify a PPD file, you can deselect this option.

Note – PPD files are not required for printers that already contain the Raster Image Processor (RIP) feature.

When setting up a printer that uses a PPD file, you are required to specify following information:

- Printer make
- Printer model
- Printer driver

▼ How to Add a New Directly Attached Printer by Using Oracle Solaris Print Manager

The following procedure describes how to add a new attached printer by using Oracle Solaris Print Manager with the Use PPD files default attribute selected. To add a new attached printer without PPD files, deselect this attribute by removing the checkmark from the check box.

1   Select the system to be the print server.

2   Connect the printer to the print server. Turn on the power to the printer.

Consult the printer vendor's installation documentation for information about the hardware switches and cabling requirements.

3   Start Oracle Solaris Print Manager on the print server where you connected the printer.

For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

You can specify localhost as the host name in the print system's databases. This modification was made to enable print servers to maintain the same print host name, localhost, independent of the machine host name. This option is the default in Oracle Solaris Print Manager. You can deselect this check box to revert to earlier behavior for this option. Note that this option applies exclusively to the set up of local print queues. For more information, see "Specifying PPD Files When Setting Up a Printer by Using Oracle Solaris Print Manager" on page 60.

To set up a local print queue specifying localhost as the host name by using the lpadmin command with the -s option, see "How to Add a Print Queue With localhost Specified as the Host Name (LP Print Commands)" on page 75.

4   Select New Attached Printer from the Printer menu.

The New Attached Printer window is displayed.

5   Fill in the required fields with the appropriate information.

If you need information to complete a field, click the Help button.

For example, to add a new attached printer with PPD files, provide the appropriate information in the following fields:

```
Printer Name:
Description:
Printer Port:
Printer Make:
Printer Model:
Printer Driver:
Fault Notification:
Options:
Default Printer
Always Print Banner
User Access List:
```

The Printer Server field is filled in by Oracle Solaris Print Manager.

To add a new attached printer without PPD files, provide the appropriate information in the following fields:

```
Printer Name:
Description:
Printer Port:
Printer Type:
File Contents:
Fault Notification:
Options:
Default Printer
Always Print Banner
User Access List:
```

The Printer Server field is filled in by Oracle Solaris Print Manager.

6   Click OK.

7   Verify that the printer has been installed. Check for the new printer entry in the Oracle Solaris Print Manager main window.

8   Verify that the printer can print requests.

`lp -d` *printer-name filename*

9   Verify that the new Oracle Solaris Print Manager feature is working.

When you are using Oracle Solaris Print Manager to create or modify a print queue, choose the `files` option as the naming service. Select the New Attached Printer option from the menu. If the drop-down menu displays the printer make and printer model, the new feature is working.

More Information Verifying That the RIP Feature Is Working

The RIP enables you to print to printers that do not have resident PostScript processing capabilities.

To ensure that the RIP feature is working, you need to create a new print queue by selecting one of the make and model combinations that is available in the New Attached Printer and New Network Printer screens used by Oracle Solaris Print Manager. Then, try printing to the new printer. If the output of the print job is recognizable, the RIP feature is working. If the output of the print job is unrecognizable, then the RIP feature is not working.

▼ How to Add a Print Queue With `localhost` Specified as the Host Name (Oracle Solaris Print Manager)

This procedure shows how to use Oracle Solaris Print Manager to add a local print queue with `localhost` specified as the host name in the print system databases. This modification was added to enable print servers to maintain the same print host name, independent of the machine host name. Note that you can also modify a print queue by using these commands.

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Start Oracle Solaris Print Manager as described in the procedure, "How to Start Oracle Solaris Print Manager" on page 56.

3 Set the print host name to `localhost` in Oracle Solaris Print Manager.

For instructions, see "Setting Printer Definitions by Using Oracle Solaris Print Manager" on page 59.

4 Check the entry in the `/etc/printers.conf` file.

```
# lpget new-print-queue
new-print-queue:
        bsdaddr=abc,new-print-queue,Solaris
```

If the print queue was created or modified successfully, the output of the `lpget` command returns the name of the new or modified print queue.

See Also For information about specifying `localhost` as the print server's host name when adding or modifying a print queue with the `lpadmin` command, see "How to Add a Print Queue With `localhost` Specified as the Host Name (LP Print Commands)" on page 75.

Setting Up Network-Attached Printers by Using Oracle Solaris Print Manager

Setting up a network-attached printer by using Oracle Solaris Print Manager is similar to setting up a directly attached printer. The printer definitions that you are required to set vary. For information on the printer definitions that you are required to set during the setup of a network-attached printer, see "Setting Printer Definitions by Using Oracle Solaris Print Manager" on page 59.

▼ How to Add a New Network-Attached Printer by Using Oracle Solaris Print Manager

The Use PPD files default attribute in Oracle Solaris Print Manager enables you to select the printer make, model, and driver when adding new printer.

The following procedure describes how to add a new network-attached printer by using Oracle Solaris Print Manager with the Use PPD files default attribute selected. To add a new network-attached printer without PPD files, deselect this attribute by removing the checkmark from the check box.

1   Select the system to be the print server.

2   Connect the printer to the network. Turn on the power to the printer.
Consult the printer vendor's installation documentation for information about the hardware switches and cabling requirements.

3   Start Oracle Solaris Print Manager on the print server.
For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

In this Oracle Solaris release you can specify localhost as the host name in the print system's databases. This modification was added to enable print servers to maintain the same print host name, localhost, independent of the machine host name. This option is the default in Oracle Solaris Print Manager. To revert to earlier behavior for this option, deselect the check box. Note that this option applies *exclusively* to the setup of local print queues.

To set up a local print queue specifying localhost as the host name by using the lpadmin command with the -s option, see "How to Add a Print Queue With localhost Specified as the Host Name (LP Print Commands)" on page 75.

4   Select New Network Printer from the Printer menu.
The New Network Printer window is displayed.

5   Fill in the required fields with the appropriate information.

If you need information to complete a field, click the Help button.

For example, to add a new network-attached printer with PPD files, provide the appropriate information in the following fields:

```
Printer Name:
Description:
Printer Make:
Printer Model:
Printer Driver:
Fault Notification:
Destination:
Protocol:
Options:
Default Printer
Always Use Banner
User Access List:
```

The Printer Server field is filled in by Oracle Solaris Print Manager.

To add a new network-attached printer without PPD files, provide the appropriate information in the following fields:

```
Printer Name:
Description:
Printer Type:
File Contents:
Fault Notification:
destination:
Protocol:
Options:
Default Printer
Always Use Banner
User Access List:
```

The Printer Server field is filled in by Oracle Solaris Print Manager.

6   Click OK.

7   Verify that the printer has been installed. Check for the new printer entry in the Oracle Solaris Print Manager main window.

8   Verify that the printer can print requests.

$ **lp -d** *printer-name filename*

Administering Printers by Using Oracle Solaris Print Manager (Task Map)

The following table lists print administration tasks that can be performed by using Oracle Solaris Print Manager. Not all print administration tasks can be performed by using Oracle Solaris Print Manager. Some tasks, for example, stopping and starting the print scheduler, must be performed by using LP print commands. For more information about administering printers by using LP print commands, see "Administering Print Requests by Using LP Print Commands (Task Map)" on page 128.

TABLE 4–3   Printer Administration by Using Oracle Solaris Print Manager (Task Map)

Task	Description	For Instructions
Add printer access by using Oracle Solaris Print Manager	Use Oracle Solaris Print Manager to add printer access on the print client.	"How to Add Printer Access by Using Oracle Solaris Print Manager" on page 66
Delete a printer or access to a printer by using Oracle Solaris Print Manager	Use Oracle Solaris Print Manager to delete local and remote printers and remove printer access. However, you cannot move queued print requests to another printer by using Oracle Solaris Print Manager.	"How to Delete a Printer by Using Oracle Solaris Print Manager" on page 67

▼ How to Add Printer Access by Using Oracle Solaris Print Manager

The following procedure describes how to use the Oracle Solaris Print Manager to add access to a printer on a print client. The example that follows describes how to add printer access by using the lp print commands.

1   Start Oracle Solaris Print Manager on the system where you want to add access to a remote printer.

For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

2   Select Add Access to Printer from the Printer menu.

The Add Access to Printer window is displayed.

3   Type the appropriate data in the entry fields.

If you need information to complete a field, click the Help button.

4   Click OK.

5   **Verify that access to the printer is added by checking for the new printer entry in the Oracle Solaris Print Manager main window.**

6   **Verify that the printer can print requests.**

$ `lp -d` *printer-name* *filename*

▼ How to Delete a Printer by Using Oracle Solaris Print Manager

Use this procedure to remove a printer from service and to remove the printer information from the print server.

For information about how to delete a printer and remove printer access by using LP print commands, see "How to Delete a Printer and Remove Printer Access by Using LP Print Commands" on page 90.

1   **On the print server for the printer that you want to delete, log in as superuser, `lp`, or assume an equivalent role.**

2   **Stop accepting print requests for the printer.**

`reject` *printer-name*

3   **Move any print requests that are still in the print queue to another printer.**

For information about how to move print requests to another printer, see "How to Move Print Requests to Another Printer" on page 136.

4   **Stop the printer.**

For information about how to stop printing, see "How to Enable or Disable a Printer" on page 131.

5   **Start Oracle Solaris Print Manager.**

For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

6   **To delete the printer, follow these steps.**

a.   **From the list of available printers, select the printer that you want to delete.**

b.   **From the Printer menu, select Delete Printer.**

c.   **Click OK to save your changes.**

7 Verify that the printer has been deleted.

```
# lpstat -p printer-name
```

◆ ◆ ◆ **C H A P T E R 5**

5

Setting Up Printers by Using LP Print Commands (Tasks)

This chapter describes how to set up printers and make those printers accessible to systems on the network by using LP print commands.

This is a list of the information that is in this chapter:

- "Setting Up Printers by Using LP Print Commands (Task Map)" on page 69
- "Setting Up and Administering Printers on a Print Client (Task Map)" on page 87

For overview information about printing, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

Setting Up Printers by Using LP Print Commands (Task Map)

TABLE 5–1   Printer Setup With LP Print Commands (Task Map)

Task	Description	For Instructions
Add a new directly attached printer by using LP print commands.	Use LP print service commands to make the printer available for printing after you physically attach the printer to a system.	"How to Add a New Directly Attached Printer by Using LP Print Commands" on page 72
Use the `lpadmin` command to add a printer queue with `localhost` specified as the host name.	Use the `lpadmin` command with the `-s` option to specify `localhost` as the host name when setting up a local print queue. This modification was added to enable print servers to maintain the same print host name, `localhost`, independent of the machine host name.	"How to Add a Print Queue With `localhost` Specified as the Host Name (LP Print Commands)" on page 75

TABLE 5–1   Printer Setup With LP Print Commands (Task Map)   *(Continued)*

Task	Description	For Instructions
Add a new network-attached printer by using LP print service commands.	Use LP print commands add a new network-attached printer.	"How to Add a New Network-Attached Printer by Using LP Print Commands" on page 81
Add a remote print queue for a printer that is connected to a Oracle Solaris print server by using IPP.	To add access to a remote print queue by using IPP, there are two methods that you can do one of the following: ■ Use the `lpadmin` command. ■ Use the `lpset` command.	"How to Set Up a Remote Printer That is Connected to a Print Server by Using IPP" on page 86
Add a new network-attached printer by using the printer vendor-supplied software.	Use Printer vendor supplied tools to configure a network-attached printer after you physically connect the printer to the network.	"How to Add a Attached Network Printer by Using Printer Vendor-Supplied Tools" on page 87

Setting Up Directly Attached Printers by Using LP Print Commands

The following table describes each of the printer definitions that you can define when setting up a new printer or modifying an existing printer by using the `lpadmin` command.

Printer Definition	Print Command Option	Description	Example	Default Setting	Required/Optional?
`Printer Name`	`-p`	Name of printer	`laser1`	N/A	Required to install an attached or network-attached printer
`Print server`		Name of print server	`venus`	`Use localhost for Printer Server`	Required to install an attached or network-attached printer
`Description`	`-d`	User defined string	`laser printer near breakroom`	N/A	Optional
`Printer Port`	`-v`	Device that the printer is attached to	`/dev/term/a`	`/dev/term/a`	Required to install an attached printer

Printer Definition	Print Command Option	Description	Example	Default Setting	Required/Optional?
`Printer Type`	`-T`	Type of printer	`unknown`	`PostScript`	Required to install an attached printer or a network-attached printer without PPD files
`File Content Type`	`-I`	Content to be printed	`any`	`PostScript`	Required to install an attached printer or a network-printer printer without PPD files
PPD file name	`-n`	Full path to the PPD file and file name with `.ppd` extension	*path*/*necprinter*`.ppd`	N/A	Optional
`Fault Notification`	`-A`	Specifies how to notify user of errors	`-A `**`mail`**	`Write to superuser`	Optional
Default Printer	`-d`	Identifies the default printer	N/A	N/A	Optional
Banner Page control Menu:	`-o`	Select whether to print banner page	`-o `**`banner=never`**	`-o `**`banner=optional`**	Optional

Specifying a PPD File When Setting Up a Printer

To specify a PPD file when adding or modifying a printer by using LP print commands, use the `lpadmin` command with the `-n` option. For example, to add a print queue named `foobar` for a Lexmark printer, you would type the following command:

```
# lpadmin -p foobar -v device -I postscript -m standard_foomatic \
-n /path/Lexmark-Optra_E312-Postscript.ppd.gz
```

When using the `lpadmin -n` command to specify a PPD file, you must provide the full path to the PPD file.

If you use the `lpadmin -n` command to add a PPD file, and the repository that you specify in the PPD file path does not exist on the system, a copy of the PPD file is stored in the `user` label directory, within the `user` repository. This directory is located at `/var/lp/ppd/user/`*manufacturer*`/ppd-file`. The Oracle Solaris Print Manager cache is then updated to reflect the printer information from the recently added PPD file. For more information, see the `ppdmgr(1M)` man page.

▼ How to Add a New Directly Attached Printer by Using LP Print Commands

This procedure describes how to add a new attached printer specifying a PPD file by using the lpadmin command with the -n option. Two examples follow this procedure. The first example illustrates how to add a new attached printer that is associated with a PPD file. The second example shows how to add a new attached printer that is not associated with a PPD file.

1   Connect the printer to the system, then turn on the power to the printer.

Consult the printer vendor's installation documentation for information about the hardware switches and cabling requirements.

2   Log in to the print server and become superuser or assume an equivalent role.

3   Collect the information that is required to configure an attached printer with PPD files.

- Printer name and port device
- File content type
- PPD file

To determine the PPD file that the printer will use, first define the printer make, model, and driver.

For overview information about using PPD files when adding a new printer or modifying an existing printer by using LP print commands, see "What's New in Printing?" on page 17.

4   Define the printer name, port device, file content type, and PPD file that the printer will use.

When using PPD files, the file content type is typically PostScript.

a. Specify the printer name and the port device that the printer will use.

```
# lpadmin -p printer-name -v /dev/printers/0
```

The device to use is /dev/printers/0.

You can now use the -s option with the lpadmin command to specify the print service host name as localhost. For more information, see "How to Add a Print Queue With localhost Specified as the Host Name (LP Print Commands)" on page 75.

b. Specify the interface script that the printer will use.

```
# lpadmin -p printer-name -m standard_foomatic
```

c. Specify the file content type and the PPD file that the printer will use.

```
# lpadmin -p printer-name -I content-type -n /path/ppdfile
```

The PPD file that you supply is located in the /path directory.

> **Note –** If /*path* is not a PPD file repository on the system, then a copy of the PPD file is placed in the user label directory in the user PPD file repository. For more information, see "Administering PPD Files by Using the PPD File Management Utility (Task Map)" on page 193.

d. Specify the printer description.

```
# lpadmin -p printer-name -D "printer-description"
```

For more information, see the lpadmin(1M) man page.

5   (Optional) Add filters to the print server.

```
# cd /etc/lp/fd
# for filter in *.fd;do
   > name='basename $filter .fd'
   > lpfilter -f $ name-F $ filter
   > done
```

6   Enable the printer to accept print requests and to print those requests.

```
# accept printer-name
# enable printer-name
```

7   Verify that the printer is correctly configured.

```
# lpstat -p printer-name -l
```

The output of the lpstat command will list the PPD file that you used.

Example 5–1   Adding a New Directly Attached Printer by Specifying a PPD File

This example shows how to add a new attached printer with PPD files. Using the -n option with the lpadmin command enables you to add a new print queue by specifying PPD files. The following information is used as an example *only*.

- Printer name: paper
- Port device: /dev/printers/0
- File content type: postscript
- PPD file: /*path*/Lexmark-Optra_E312-Postscript.ppd.gz

```
# lpadmin -p paper -v /dev/printers/0        (1)
# lpadmin -p paper -I postscript        (2)
# lpadmin -p paper -m standard_footmatic        (3)
# lpadmin -p paper -n /path/Lexmark-Optra_E312-Postscript.ppd.gz        (4)
# lpadmin -p paper -D "Color printer on third floor, rm 3003"        (5)
# cd /etc/lp/fd

# accept paper
    destination "paper" now accepting requests
```

```
# enable paper          (6)
printer "paper" now enabled
# lpstat -p paper       (7)
printer paper is idle. enabled since Feb 28 11:21 2004...
```

1. Defines the printer name and the port device that the printer will use
2. Sets the file content types to which the printer can print to directly
3. Specifies the interface script for utilizing PPD files

Note – This command also copies the PPD file to the user label in the user PPD file repository, if /*path* is not in an existing PPD file repository on the system.

---

4. Specifies the path to the PPD file and the PPD file name
5. Adds a description for the printer
6. Accepts print requests for the printer and enables the printer
7. Verifies that the printer is ready for printing

Example 5–2   Adding a New Directly Attached Printer Without Specifying a PPD File

This example shows how to add a new attached printer without associating it with a PPD file. The commands in this example must be executed on the print server where the printer is connected. The following information is used as an example *only*.

- Printer name: luna
- Port device: /dev/term/b
- Printer type: PS
- File content type: postscript

```
# chown lp /dev/term/b
# chmod 600 /dev/term/b         (1)
# lpadmin -p luna -v /dev/term/b        (2)
# lpadmin -p luna -T PS      (3)
# lpadmin -p luna -I postscript      (4)
# lpadmin -p luna -D "Room 1954 ps"       (5)
# cd /etc/lp/fd

# accept luna
destination "luna" now accepting requests
# enable luna      (6)
printer "luna" now enabled
# lpstat -p luna       (7)
printer luna is idle.enabled since Feb 28 11:21 2003.available
```

1. Gives lp ownership and sole access to a port device

2. Defines the printer name and the port device that the printer will use
3. Sets the printer type of the printer
4. Specifies the file content types to which the printer can print directly
5. Adds a description for the printer
6. Accepts print requests for the printer and enables the printer
7. Verifies that the printer is ready for printing

See Also
- "How to Add Printer Access by Using Oracle Solaris Print Manager" on page 66 to add printer access on a print client.
- "How to Set Up a .printers File" on page 89 to allow users to customize printer aliases.

▼ How to Add a Print Queue With `localhost` Specified as the Host Name (LP Print Commands)

This procedure shows how to use LP print commands to add a local print queue with the `localhost` option specified as the host name in the print system databases. Note that you can also modify a configured print queue to use `localhost` as the host name.

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Set the print host name to `localhost`.

```
# lpadmin -p new-print-queue -s localhost -v device
```

3 Check the entry in the `/etc/printers.conf` file.

```
# lpget new-print-queue
new-print-queue:
        bsdaddr=abc,new-print-queue,Solaris
```

If the print queue was created or modified successfully, the output of the `lpget` command returns the name of the new or modified print queue.

Example 5–3 Adding a Print Queue With `localhost` Specified as the Host Name

This example shows how to add a new print queue, `paper`, by using the `lpadmin` command with the `-s` option to specify `localhost` as the host name.

```
$ su - root
# lpadmin -p paper -s localhost -v /dev/ecpp0

# lpget paper
paper:
        bsdaddr=localhost,paper,Solaris
```

Example 5–4   Adding a Print Queue by Using the Default Behavior of `lpadmin` to Specify the Host Name

This example shows the default behavior of the `lpadmin` command for using system host name, `abc`, when adding a new print queue.

```
$ su - root
# lpadmin -p newspaper -v /dev/printers/0

# lpget newspaper
fargo:
        bsdaddr=abc,newspaper,Solaris
```

Example 5–5   Modifying a Print Queue to Use `localhost` as the Host Name

This example shows how to modify an existing print queue, `newspaper`, and specify `localhost` as the new print server name.

```
$ su - root
# lpadmin -p newspaper -s localhost

# lpget newspaper
newspaper:
        bsdaddr=localhost,newspaper,Solaris
```

See Also   For information about specifying `localhost` as the print server's host name when adding or modifying a print queue with Oracle Solaris Print Manager, see "How to Add a Print Queue With `localhost` Specified as the Host Name (Oracle Solaris Print Manager)" on page 63.

Setting Up Network-Attached Printers by Using LP Print Commands

A *network-attached printer* is a hardware device that is directly connected to the network. This printer can be accessed from a print server without physically connecting the printer to the print server with a cable. The network-attached printer has its own system name and IP address.

⚠️ **Caution –** Configuring a network-attached printer without utilizing queue configuration on a print server is an unsupported method that results in printer misconfiguration.

You can correctly configure a network-attached printer by using Oracle Solaris Print Manager. Select the New Network Printer option. Or, you can use the lpadmin command to correctly configure a network-attached printer.

Do not use the lpadmin -p *queue-name* -s *printer-name* command or the Add Access to Printer option of Oracle Solaris Print Manager to add a network-attached printer. These methods should be used exclusively to point to an already existing queue on a remote print server. The print server includes queuing, filtering, and print administration capabilities for a network-attached printer. Printing directly to a network-attached printer results in a printer misconfiguration that is likely to cause a number of problems. Additionally, job options, such as copies, the use or disuse of burst page, and filtering, are lost.

Network printers might use one or more special protocols that require a vendor-supplied printing program. The procedures that are used to set up the vendor-supplied printing program can vary. If the printer does not come with vendor-supplied support, Oracle Solaris network-attached printer support can be used with most devices. Use the printer vendor-supplied software, whenever possible.

The vendor might supply an SVR4 printer interface script to replace the standard printer interface script. If so, that SVR4 interface script calls the vendor-supplied printing program to send the job to the printer. If not, you need to modify the standard interface script to call the vendor-supplied printing program. To do so, edit the per-printer copy of the standard interface script to call the vendor-supplied printing program.

The following are the terms that are used in network-attached printer configuration. For a complete description of printing terms, see Glossary.

- **Print server** – The system that spools and schedules the jobs for a printer.
- **Printer-host device** – The software and hardware supplied by a vendor that provides network-attached printer support for a non-network capable printer.
- **Printer node** – Either the physical printer or the printer-host device.
- **Printer name** – The name typed on the command line when you use any of the printer commands.
- **Destination or network printer access name** – The internal name of the printer node port that is used by the printer subsystem to access the printer.
- **Protocol** – The over-the-wire protocol that is used to communicate with the printer. For more information, see "Selecting the Network Printing Protocol" on page 80.
- **Timeout, or retry interval timeout** – The seed number that represents the number of seconds to wait between attempting connections to the printer.

Oracle Support for Network Printers

If the network printer vendor does not provide software support, Oracle supplied software is available. The software provides generic support for network printers and is not capable of providing full access to all possible printer attributes.

A general discussion of how to add a network-attached printer is provided in "Setting Up Network-Attached Printers by Using LP Print Commands" on page 76. The following is a discussion of printer management when you use the Oracle supplied software.

Invoking Network Printer Support

The software support for network printers is called through the network interface script `netstandard`. Configuring a network-attached printer with this script causes the network-attached printer support module to be called. Here is the command to configure the printer with the network support.

```
lpadmin -p printer-name -m netstandard
```

Selecting the Printer Node Name

You can select the printer node name. This name must be unique, as with any node on the network. The printer node name is associated with the IP address of the printer.

Selecting the Destination Name (Also Called the Network Printer Access Name)

The print subsystem requires access information for the printer. The subsystem uses the destination name when making the network connection to the printer. You supply this name to the print subsystem by using the `lpadmin` command. This name then becomes part of the printer configuration database. The printer access name is the name of the printer node, sometimes qualified by a port name. Port designation varies across printer vendors. You can find information about port designation in the printer documentation.

Here is the format of printer access name:

printer-node-name[:*port-designation*]

Destination names can be specified in one of three forms:

Atomic (simple)   (destination) - Is resolved by locating a `printer-uri-supported` key/value pair for the named destination in the `printers.conf` or the

printers configuration database. If no `printer-uri-supported` key is found for an entry, its `bsdaddr` value is converted to printer URI form and used.

For more information, see the `printers(4)` and `printers.conf(4)` man pages.

Printer URI   (`scheme://endpoint`) - Is completely resolved and specifies the protocol and communication endpoint to contact for print services. This form of destination name is useful for accessing print services outside of your system's current management domain. Since the name includes the protocol to use when contacting the print service, you can select a richer protocol than the RFC-1179 protocol.

POSIX   (`server:queue[:extensions]`) - Is complete and resolves to an equivalent printer URI form of `lpd://server/printers/queue[#extensions]` This form is being maintained for backward compatibility only. The printer URI form is the preferred replacement.

EXAMPLE 5–6   Destination Name (or Network Printer Access Name) With Port Designation (Number)

A common port designation with TCP is 9100. If the printer node name is pn1, and the printer vendor defines the port as 9100, then the printer access name is `pn1:9100`. To configure a printer in this case, use the following command:

```
lpadmin -p printer_name -o dest=pn1:9100
```

EXAMPLE 5–7   Destination Name (or Network Printer Access Name) With BSD Port Designation (Name)

When you use the BSD protocol, the port designation might not be a number, but some name defined by the printer vendor, for example: *xxx*_parallel_1. If the printer node name is *cardboard,* then the printer access name is `cardboard:xxx_parallel_1`. To configure a printer in this case, use the following command:

```
lpadmin -p printer-name -o dest=cardboard:xxx_parallel_1
```

EXAMPLE 5–8   Destination Name (or Network Printer Access Name) With No Port Designation

If there is no port designation, and the printer node name is newspaper, the printer access name is the printer node name: newspaper. To configure a printer in this case, use the following command:

```
lpadmin -p printer-name -o dest=newspaper
```

Selecting the Network Printing Protocol

By default the LP print service uses the BSD print protocol and raw TCP to communicate with the printer. The printer vendor documentation provides information about which protocol to use. In general, the TCP protocol is more generic across printers.

Note – The Device URI protocol enables remote printer access. You can specify a *device-uri* when adding a network-attached printer by using the lpadmin command or by using Oracle Solaris Print Manager.

To select the BSD protocol, type:

```
lpadmin -p printer-name -o protocol=bsd
```

To select the TCP protocol, type:

```
lpadmin -p printer-name -o protocol=tcp
```

If the protocol that is selected is the BSD print protocol, you can further select the order of sending the control file to the printer. Some printers expect the control file, then the data file. Other printers expect the reverse. For this information, see the printer vendor documentation. The default is to send the control file first.

To select the order, type one of the following commands:

```
lpadmin -p printer-name -o bsdctrl=first
```

```
lpadmin -p printer-name -o bsdctrl=last
```

Setting the Timeout Value

The timeout option allows the user to select the amount of time (in seconds) to wait between successive attempts to connect to the printer. Some printers have a long warm up time, and a longer timeout value is advised. The default is 10 seconds.

The timeout value does not impact the success or failure of the print process. The value is a seed value that the software uses as the initial timeout count. On repeated failures, this count is increased. A message is sent to the spooler when repeated attempts to connect to the printer fail. This message alerts the user that intervention might be required. The failure could be anything from the printer being turned off to the printer being out of paper. If these messages are produced too often, for example when the printer is warming up, increasing the timeout value will eliminate spurious messages.

You can experiment to find the optimal timeout value. Type the following command to set the timeout value:

```
lpadmin -p printer-name -o timeout=n
```

Managing Network-Attached Printer Access

Each network-attached printer should have only one server that provides access to the printer. This restriction enables the server to manage access to the printer and keep jobs coherent.

The default device for the network-attached printer is /dev/null. This device is sufficient when the printer has only one queue. If more queues are required, set the device to a file. This setting enables the print system to restrict access to the printer across queues. The following commands create a device file and configure it as the network-attached printer device.

```
touch /path/filename
chmod 600 /path/filename
lpadmin -p printer-name -v /path/filename
```

The following is an example of how to create a device file called devtreedown.

```
# touch /var/tmp/devtreedown
# chmod 600 /var/tmp/devtreedown
# lpadmin -p treedown -v /var/tmp/devtreedown
```

▼ How to Add a New Network-Attached Printer by Using LP Print Commands

This procedure describes how to add a new network-attached printer with the expanded printer support that enables you to associate a PPD file with a printer during its configuration. There are two examples that follow this procedure. The first example illustrates how to add a new network-attached printer with PPD files by using lp commands. The second example shows how to add a new network printer without PPD files by using lp commands.

The following steps are required to set up a network-attached printer by using the network printer support software. The use of this software is intended for printers that do not come with vendor-supplied software.

1   Connect the printer to the network, and turn on the power to the printer.

Consult the printer vendor's installation documentation for information about the hardware switches and cabling requirements. Get an IP address and select a name for the printer node. This step is equivalent to adding any node to the network.

2   **Collect the information that is required to configure a new network-attached printer with PPD files.**

- Printer name and port device
- Network printer access name
- Protocol
- Timeout
- File content type
- PPD file

To determine the PPD file, first define the printer make, model, and driver that the printer will use.

For more information, see the terms that are described in "Setting Up Network-Attached Printers by Using LP Print Commands" on page 76.

3   **On the print server, log in and become superuser or assume an equivalent role.**

4   **Define the printer name, port device, file content type, and PPD file that the printer will use. When using PPD files, the file content type is usually PostScript.**

   a. **Specify the printer name and the port device that the printer will use.**

   # **lpadmin -p** *printer-name* **-v /dev/null**

   The device to use is /dev/null.

   You can use the -s option with the lpadmin command to specify the print service host name as localhost. For more information, see "How to Add a Print Queue With localhost Specified as the Host Name (LP Print Commands)" on page 75.

   You can use the -v option to specify a *device-uri*. The protocol enables you to access remote printers. For more information, see "Using Printing Protocols in the Oracle Solaris Release" on page 24.

   b. **Specify the interface script that the printer will use.**

   # **lpadmin -p** *printer-name* **-m netstandard_foomatic**

   The interface script that is supplied with the support software for a network-attached printer is /usr/lib/lp/model/netstandard_foomatic.

   c. **Specify the file content type and PPD file that the printer will use.**

   When using PPD files, the file content type is usually PostScript.

   # **lpadmin -p** *printer-name* **-I** *content-type* **-n**
   /path/ppdfile

   The PPD file that you specify is located in the */path* directory.

> **Note –** If */path* is not a PPD file repository on the system, then a copy of PPD file is placed in the user label directory in the user PPD file repository. For more information, see Chapter 11, "Administering Printers by Using the PPD File Management Utility (Tasks)."

For more information, see lpadmin(1M) man page.

d. Specify the printer description.

```
# lpadmin -p printer-name -D  "printer-description"
```

5   Set the printer destination, protocol, and timeout values.

```
# lpadmin -p printer-name -o dest=access-name:port -o protocol=protocol
-o timeout=value
```

-p *printer-name*	Specifies the network printer name.
-o dest=*access-name:port*	Sets the printer destination to the network printer access name and a designated printer vendor port, if the port is defined in the printer vendor documentation.
-o protocol=*protocol*	Sets the over-the-wire protocol used to communicate with the printer. Both BSD and raw TCP are supported.
-o timeout=*value*	Sets a retry timeout value that represents a number of seconds to wait between attempting connections to the printer.

6   (Optional) Add filters to the print server.

```
# cd /etc/lp/fd
# for filter in *.fd;do
    > name='basename $ filter .fd'
    > lpfilter -f $name -F $ filter
    > done
```

7   Enable the printer to accept print requests and to print those requests.

```
# accept printer-name
# enable printer-name
```

8   Verify that the printer is correctly configured.

```
# lpstat -p printer-name
```

9   Add client access to the new printer.

After the printer has been configured, create access to the printer for the print clients. For more information, see "Adding Printer Access by Using LP Print Commands" on page 88. For information about how to define a print client by using a naming service, see "Printing Support in the Naming Service Switch" on page 40.

10 Complete any optional tasks.

There are several optional tasks that you might want to complete when setting up a printer. For pointers to the remaining tasks, see "Configuring the Internet Printing Protocol (Task Map)" on page 47. For information about how to define print clients by using the naming service, see "Printing Support in the Naming Service Switch" on page 40.

Example 5–9 Adding a New Network-Attached Printer by Specifying a PPD File

This example shows how to add a new network-attached printer with PPD files. The -n option of the lpadmin command enables you to add a new print queue by specifying a PPD file. The commands that are used in this example must be executed on the print server. The following information is used as an example only. The information that you provide will vary.

- Printer name : luna1
- Device: /dev/null
- Interface: /usr/lib/lp/model/netstandard_foomatic
- Network printer access name: nimquat:9100
- Protocol: tcp
- Timeout: 5
- File content type: postscript
- PPD file: */path/ppdfile*

```
# lpadmin -p luna1 -v /dev/null        (1)
# lpadmin -p luna1 -m netstandard_foomatic        (2)

# lpadmin -p luna1 -o dest=nimquat:9100 -o protocol=tcp
-o timeout=5        (3)

# lpadmin -p luna1 -I postscript        (4)
# lpadmin -p luna1 -n /path/ppdfile        (5)
# lpadmin -p luna1 -D "Second floor color printer"        (6)
# cd /etc/lp/fd
# for filter in *.fd;do
        > name ='basename $ filter .fd'
        > lpfilter -f $ name -F $ filter
        > done        (7)
# accept luna1
    destination "luna1" now accepting requests
# enable luna1        (8)
printer "luna1" now enabled
# lpstat -p luna1        (9)
 printer luna1 is idle. enabled since Mon Apr 19 15:31:15 2004. available.
```

1. Defines printer name and sets the device to /dev/null

2. Defines the interface script for network printers
3. Sets the destination, protocol, and timeout
4. Specifies the file content types to which the printer can print to directly
5. Specifies the PPD file to use
6. Adds a description for the printer
7. Adds print filters to the print server
8. Accepts print requests for the printer and enables the printer
9. Verifies that the printer is ready for printing

Example 5–10 Adding a New Network-Attached Printer Without Specifying a PPD File

This example shows how to add a new network-attached printer without specifying a PPD file. These commands must be executed on the print server. The following information is used for example purposes only.

- Printer name: luna1
- Device: /dev/null
- Interface: /usr/lib/lp/model/netstandard
- Network printer access name: nimquat:9100
- Protocol: tcp
- Timeout: 5
- File content type: postscript
- Printer type: PS

```
# lpadmin -p luna1 -v /dev/null        (1)
# lpadmin -p luna1 -m netstandard       (2)
# lpadmin -p luna1 -o dest=nimquat:9100 -o protocol=tcp
-o timeout=5       (3)
# lpadmin -p luna1 -I postscript -T PS       (4)
# lpadmin -p luna1 -D "Room 1954 ps"       (5)
# cd /etc/lp/fd
# for filter in *.fd;do
     > name ='basename $ filter .fd'
     > lpfilter -f $ name -F $ filter
     > done       (6)
# accept luna1
    destination "luna1" now accepting requests
# enable luna1       (7)
printer "luna1" now enabled
# lpstat -p luna1       (8)
printer luna1 is idle.enabled since Feb 28 11:21 2003.available.
```

1. Defines printer name and sets the device to /dev/null

2. Defines the interface script for network printers

3. Sets the destination, protocol, and timeout

4. Specifies the file content type to which the printer can print directly, and the printer type

5. Adds a description for the printer

6. Adds print filters to the print server

7. Accepts print requests for the printer and enables the printer

8. Verifies that the printer is ready for printing

▼ How to Set Up a Remote Printer That is Connected to a Print Server by Using IPP

1   Become superuser or assume an equivalent role. Become an administrator.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   To set up a remote printer, choose one of the following methods:

■ **Use the `lpadmin` command:**

   # **lpadmin -p printer -s ipp:**//*printer-ip-address*/**printers**/*printer-name*

■ **Use the `lpset` command:**

   # **lpset -a printer-uri-supported=ipp:**//*printer-ip-address*/**printers**/*printer-name*

   Using the `lpset` command with the `-a` option accepts key/value pairs. In the preceding output, the key that is specified is `printer-uri-supported`, with the value being `ipp://printer-ip-address/printers/printer-name`. Typically, you would not configure this value to refer directly to a printer, but rather a print queue on a print server.

3   (Optional) To determine the URI you have supplied, type the following command:

   $ **lpstat -p ipp:**//*printer-ip-address*/**printers**/*printer-name*

   When you use the `lpstat` command and specify the URI as the destination, the local printing configuration is bypassed, connecting you directly to the network-attached printer or the remote print server.

Adding a New Network-Attached Printer by Using Printer Vendor-Supplied Software

Network printers often have software support provided by the printer vendor. If your printer has printer vendor-supplied software, use the printer vendor software, when possible. The

software is designed to support the attributes of the printer and can take full advantage of the printer capabilities. Read the printer vendor documentation to install and configure the printer, so that it can operate with the LP print service.

▼ How to Add a Attached Network Printer by Using Printer Vendor-Supplied Tools

1   Connect the printer to the network. Turn on the power to the printer.

Consult the printer vendor's installation documentation for information about the hardware switches and cabling requirements. Get an IP address and select a name for the printer node. This method is equivalent to adding any node to the network.

2   Follow the printer vendor instructions to add the network-attached printer.

Use the printer vendor instructions to configure the network-attached printer. These instructions are specific to the vendor and printer.

3   Add client access to the new printer.

Now that the printer has been added, create access to the printer for the print clients. For more information, see "Adding Printer Access by Using LP Print Commands" on page 88.

4   Complete any optional tasks.

There are several optional tasks that you might want to complete when setting up a network-attached printer. For pointers to these tasks, see "Configuring the Internet Printing Protocol (Task Map)" on page 47.

Setting Up and Administering Printers on a Print Client (Task Map)

TABLE 5–2   Printer Setup and Administration on a Print Client (Task Map)

Task	Description	For Instructions
Add printer access by using LP print commands.	Use LP print commands to add printer access on the print client.	"How to Add Printer Access by Using LP Print Commands" on page 88
Set up a .printers file.	Use a $HOME/.printers file so that users can establish their own custom printer aliases.	"How to Set Up a .printers File" on page 89

Task	Description	For Instructions
Delete a printer and remove printer access.	If a printer needs to be replaced or moved to a different location, you can delete information about the printer from the *print-client*.	"How to Delete a Printer and Remove Printer Access by Using LP Print Commands" on page 90

Adding Printer Access by Using LP Print Commands

A *print client* is a system that is not the server for the printer. Yet, this system has access to the printer. A print client uses the services of the print server to spool, schedule, and filter the print jobs. Note that one system can be a print server for one printer and be a print client for another printer.

Access to a printer can be configured on a domain-wide basis or on a per-machine basis. If you add the printer information to the naming service database, access is configured on a domain-wide basis.

▼ How to Add Printer Access by Using LP Print Commands

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Add access to the printer.

```
# lpadmin -p printer -s print-server -D description
```

3   Set the printer as the system's default printer destination.

```
# lpamin -d printer
```

4   Verify that the printer is ready for printing.

```
# lpstat -p printer
```

Example 5–11   Adding Printer Access by Using `lp` Print Commands

If you want to print to a remote printer, you must add access to the remote printer. This example shows how to configure access to a printer named `luna`, whose print server is `saturn`.

```
# lpadmin -p luna -s saturn       (1)
# lpadmin -p luna -D "Room 1954 ps"       (2)
# lpadmin -d luna       (3)
# lpstat -p luna       (4)
```

1.   Identifies the printer and the print server

2. Adds a description for the printer
3. Sets the printer as the system's default printer destination
4. Verifies that the printer is ready for printing

Setting Up a `.printers` File

The `.printers` file is located in a user's home directory. This file includes information about a user's default printer and other frequently used printers. Having a `.printers` file enables users to establish their own printer aliases. For example, a `_default` alias can be used to specify a user's default printer. Also, a special `_all` alias can be used to define a list of printers that are affected when a print job is canceled or to check the status of printers.

The use of the `.printers` file by the LP print service is controlled by the naming service switch (/etc/nsswitch.conf). The default configuration specifies that the print service checks a user's home directory to locate printer configuration information before it checks the other naming services. So, you can tailor a user's printer configuration file to use custom printer information rather than the shared information in the naming service.

For more information about the `.printers` file, see the `printers(4)` man page. For more information about the naming service switch, see the `nsswitch.conf(4)` man page.

▼ How to Set Up a `.printers` File

This procedure shows users how to set up `.printers` file in their own home directories.

1 **Log in to the system with your user name and password.**

2 **If necessary, change directories to $HOME.**

$ **cd $HOME**

3 **Start the text editor that you want to use to create a `.printers` file.**

4 **(Optional) Set up the `_default` alias to make a specific printer the default printer. Use an entry that is similar to this entry.**

_default *printer-name*

5 **(Optional) Set up the `_all` alias to define the printers affected when you cancel a print request or check the status of printers. Use an entry similar to this entry.**

_all *printer1,printer2,printer3*

6 **Save the file as `.printers`.**

▼ How to Delete a Printer and Remove Printer Access by Using LP Print Commands

1 Log in as superuser, `lp`, or assume an equivalent role on a print client with access to the printer that you want to delete.

2 On the system that is the print client, delete information about the printer.

    # **lpadmin -x** *printer-name*

    -x   Deletes the specified printer.

    printer-name Specifies the name of the printer you want to delete.

3 Log in as superuser, `lp`, or assume an equivalent role on the print server.

4 On the system that is the printer server, stop accepting print requests for the printer.

    # **reject** *printer-name*

    reject *printer-name* rejects print requests for the specified printer.

    This step prevents any new requests from entering the printer's queue while you are in the process of removing the printer. For a detailed description, see "How to Accept or Reject Print Requests for a Printer" on page 133.

5 On the system that is the print server, stop the printer.

    # **disable** *printer-name*

    This step stops print requests from printing. For a detailed description on how to stop printing, see "How to Enable or Disable a Printer" on page 131.

6 Move any print requests that are still in the queue to another printer.

    For information about how to move print requests to another printer, see "How to Move Print Requests to Another Printer" on page 136.

7 On the system that is the print server, delete the printer.

    # **lpadmin -x** *printer-name*

8 Verify that the printer information has been deleted:

  a. Confirm that the printer information has been deleted on the print client.

      $ **lpstat -p** *printer-name* **-l**

      In the command output, you should receive an error indicating that the printer does not exist.

b. Confirm that the printer information has been deleted on the print server.

$ **lpstat -p** *printer-name* **-l**

In the command output, you should receive an error indicating that the printer does not exist.

Example 5–12   Deleting a Printer and Remote Printer Access

The following example shows how to delete the printer luna from the print client terra and from the print server jupiter. This example also shows how to delete the print client terra from the print server.

```
terra# lpadmin -x luna
Removed "luna".
terra# lpstat -p luna -l
jupiter# lpadmin -x luna
Removed "terra".
jupiter# lpstat -p luna -l
```

◆ ◆ ◆ **CHAPTER 6**

6

Administering Printers by Using LP Print Commands (Tasks)

This chapter describes how to administer printers by using LP print commands.

This is a list of the information that is in this chapter:

- "Administers Printers Using LP Print Commands (Task Map)" on page 93
- "Administering Printers That Are Associated With PPD Files (Task Map)" on page 106

For overview information about printing, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

Administers Printers Using LP Print Commands (Task Map)

TABLE 6–1   Printer Administration by Using LP Print Commands (Task Map)

Task	Description	For Instructions
Add a printer description.	Use the lp command with the -p option to add a printer description.	"How to Add a Printer Description by Using LP Print Commands" on page 95
Set a default printer for a system.	Specify a default printer destination for a user, so the user does not need to type the printer name.	"How to Set a System's Default Printer Destination by Using LP Print Commands" on page 96
Make banner pages optional.	Give users a choice to turn off printing of a banner page when they submit a print request.	"How to Make Banner Pages Optional by Using LP Print Commands" on page 98
Turn off banner pages.	Set the -o banner=never variable for a printer to turn off banner pages under all circumstances.	"How to Turn Off Banner Pages by Using LP Print Commands" on page 98

TABLE 6–1   Printer Administration by Using LP Print Commands (Task Map)   *(Continued)*

Task	Description	For Instructions
Define a class of printers.	Group printers in a class by using the lpadmin -c command. Printers can be grouped in the following classes: ■ Printer type ■ Location ■ Work group	"How to Define a Class of Printers by Using LP Print Commands" on page 100
Set fault alters for a printer.	The print service can notify you when it detects a printer fault. Use the -A option with the lpadmin command to set fault alerts for a printer.	"How to Set Fault Alerts for a Printer by Using LP Print Commands" on page 101
Set printer fault recovery.	You can choose not to receive any fault notification. You can find out about printing faults so that you can correct the problem. Use the -F option with the lpadmin command to define fault recovery options.	"How to Set Printer Fault Recovery by Using LP Print Commands" on page 103
Limit user access to a printer.	To control user access to printers, create allow and deny lists on the print server.	"How to Limit User Access to a Printer by Using LP Print Commands" on page 105

Setting Printer Definitions by Using LP Print Commands

Setting definitions for the printers on your network is an ongoing task that lets you provide a more effective print environment for users. For example, you can assign printer descriptions for all your site's printers to help users find the location of the printer. Or, you can define a class of printers to provide the fastest turnaround for print requests. See "Specifying a PPD File When Setting Up a Printer" on page 71 for more information about setting printer definitions by using LP print commands.

Many printer definitions can be set or reset by using Oracle Solaris Print Manager. For more information, see "Setting Printer Definitions by Using Oracle Solaris Print Manager" on page 59.

The following procedures provide step-by-step instructions on setting or resetting printer definitions by using LP Print Commands. These procedures show how to quickly set or reset printer definitions.

▼ **How to Add a Printer Description by Using LP Print Commands**

1   Log in as superuser, `lp`, or assume an equivalent role on the print server.

2   Add a printer description.

`lpadmin -p` *printer-name* **`-D`** "*comment*"

-p *printer-name*   Specifies the name of the printer for which you are adding a description.

-D ″*comment*″   Specifies the characteristics of the printer, such as the location or administrative contact. Enclose characters that the shell might interpret, such as *, ?, \, !, ^, in single quotation marks.

For more information, see the lpadmin(1M) man page.

3   Verify that the `Description` information is correct.

`lpstat -p` *printer-name* **`-l`**

Example 6–1   Adding a Printer Description

The following example shows how to add a printer description for the printer luna.

`lpadmin -p luna -D "Nathans office"`

Setting Up a Default Printer Destination by Using LP Print Commands

You can specify a default printer destination for a user so that the user does not need to type the printer name when using the print commands. Before you can designate a printer as the default, the printer must be known to the print service on the system.

Set a user's default printer destination by setting any of the following:

- LPDEST environment variable
- PRINTER environment variable
- The _default variable in the user's .PRINTERS file
- The system's default printer by using the lpadmin -d command or Oracle Solaris Print Manager

When an application provides a printer destination, that destination is used by the print service, regardless of whether you have set a system's default printer destination. If an application doesn't provide a printer destination or if you do not provide a printer name when using a print

command, the print command searches for the default printer in a specific order. The following table shows the search order for a system's default printer destination.

TABLE 6–2 Search Order for Default Printer Destinations

Search Order	Using /usr/bin/lp Command	Using LPD-Based Compatible Commands (lpr, lpq, and lprm)
First	LPDEST variable	PRINTER variable
Second	PRINTER variable	LPDEST variable
Third	System's default printer	System's default printer

▼ How to Set a System's Default Printer Destination by Using LP Print Commands

1 Log in as superuser, lp, or assume an equivalent role on the system where you want to set a default printer.

2 Set the system's default printer.

```
# lpadmin -d [printer-name]
```

-d *printer-name* specifies the name of the printer you are assigning as the system's default printer. If you don't specify *printer-name*, the system is set up with no default printer.

3 Check the system's default printer.

```
# lpstat -d
```

Example 6–2 Setting a System's Default Printer Destination

The following example shows how to set the printer luna as the system's default printer. The printer luna is used as the system's default printer if the LPDEST or the PRINTER environment variables are not set.

```
# lpadmin -d luna
# lpstat -d
system default destination: luna
```

Printing Banner Pages by Using LP Print Commands

A banner page identifies who submitted the print request, the print request ID, and when the request was printed. A banner page also has a modifiable title to help users identify their printouts.

Banner pages make it easy to identify the owner of a print job, which is especially helpful when many users submit jobs to the same printer. However, printing banner pages uses more paper and might be unnecessary if a printer has only a few users. In some cases, printing banner pages is undesirable. For example, if a printer has special paper or forms mounted, such as paycheck forms, printing banner pages might cause problems.

By default, the print service forces banner pages to be printed. However, you can give users a choice to turn off printing of a banner page when they submit a print request. You can set this choice through the lpadmin command or through Oracle Solaris Print Manager. If you give the users a choice, they have to use the -o banner option to turn off banner page printing.

Also, if you don't need or want banner pages, you can turn off banner pages so that they are never printed. You can turn off banner page printing by using the lpadmin command or through Oracle Solaris Print Manager.

The following table describes command options that are used to manage banner page printing.

TABLE 6–3 Banner Page Printing

Command Used	Banner Page Printing	Override?
lpadmin -p *printer* -o banner OR lpadmin -p *printer* -o banner=always	Required and printed	If you are a regular user and use -o nobanner, the request is printed. However, the nobanner argument is ignored.
		If you are superuser (root), or another privileged user, the nobanner argument is honored.
lpadmin -p *printer* -o nobanner lpadmin -p *printer* -o banner=optional	On by default, but can be disabled on a per request basis with the lp -o nobanner command	Not applicable
lpadmin -p *printer* -o banner=never	Disabled	No, if you are a regular user. If you are superuser (root), or the lp user, you can override this option to cause the generation of a burst page.

▼ How to Make Banner Pages Optional by Using LP Print Commands

1 Log in as superuser, lp, or assume an equivalent role on the print server.

2 Make banner pages optional.

```
# lpadmin -p printer-name -o banner=optional
```

-p *printer-name*   Specifies the name of the printer for which you are making banner pages optional.

-o banner=optional   Enables users to specify no banner page when they submit a print request.

3 Verify that the banner page is optional. The command output contains the line Banner not required.

```
# lpstat -p printer-name -l
```

Example 6–3 Making Banner Pages Optional

The following example shows how to make the banner page optional on the printer luna.

```
# lpadmin -p luna -o banner=optional
```

▼ How to Turn Off Banner Pages by Using LP Print Commands

1 Log in as superuser, lp, or assume an equivalent role on the print server.

2 Turn off banner printing.

```
# lpadmin -p printer-name -o banner=never
```

-p *printer-name*   Specifies the name of the printer for which you are turning off banner pages.

-o banner=never   Disables banner page printing under all circumstances.

3 Verify that banner printing is turned off.

```
# lpstat -p printer-name -l
```

The command output contains the line Banner not printed.

4 Submit a print request to the printer to ensure that a banner page does not print.

Example 6–4   Turning Off Printing Banner Pages

The following example shows how to disable the printing of banner pages on the printer luna.

```
# lpadmin -p luna -o banner=never
```

Setting Up Printer Classes by Using LP Print Commands

The LP print service enables you to group several locally attached printers into one class. You can perform this task only by using the lpadmin -c command.

After you set up a printer class, users can then specify that class, rather than individual printers, as the destination for a print request. The first printer in the class that is available to print is used. The result is faster turnaround because printers are kept as busy as possible.

No default printer classes are known to the print service. Printer classes exist only if you define them.

Here are some ways you could define printer classes:

- **By printer type** – For example, a PostScript printer.
- **By location** – For example, a printer located on the 5th floor.
- **By work group or department** – For example, the accounting department.

Alternatively, a class might contain several printers that are used in a particular order. The LP print service always checks for an available printer in the order in which printers were added to a class. Therefore, if you want a high-speed printer to be accessed first, add the high-speed printer to the class before you add a low-speed printer. As a result, the high-speed printer handles as many print requests as possible. The low-speed printer is reserved as a backup printer when the high-speed printer is in use.

Note – Print requests are balanced between printers in a class only for local printers.

Class names, similar to printer names, must be unique and can contain a maximum of 14 alphanumeric characters and underscores.

You are not obligated to define printer classes. You should add printer classes only if you determine that using them would benefit users on the network.

▼ # How to Define a Class of Printers by Using LP Print Commands

1   Log in as superuser, `lp`, or assume an equivalent role on the print server.

2   Define a class of printers.

`lpadmin -p` *printer-name* **`-c`** *printer-class*

`-p` *printer-name*   Specifies the name of the printer you are adding to a class of printers.

`-c` *printer-class*   Specifies the name of a class of printers.

3   Verify that the printers are in a printer class.

`lpstat -c` *printer-class*

Example 6–5   Defining a Class of Printers

The following example shows how to add the printer luna in the printer class roughdrafts.

`lpadmin -p luna -c roughdrafts`

Setting Up Printer Fault Alerts by Using LP Print Commands

If you choose, the LP print service can notify you when it detects a printer fault. With the `lpadmin -A` command or with Oracle Solaris Print Manager, you can select any of the following methods to receive printer fault notification:

- A message to the terminal on which root is logged in
- Electronic mail to root
- No notification

However, the `lpadmin -A` command offers you an additional option of receiving a message specified by the program of your choice. The `lpadmin -A` command also enables you to selectively turn off notification for an error that you already know about.

Unless you specify a program to deliver fault notification, the content of the fault alert is a predefined message that states that the printer has stopped printing and needs to be fixed.

The following table lists the alert values that you can set for a printer with the `lpadmin -A` command. These alert values can also be set for print wheels, font cartridges, and forms.

TABLE 6–4 Values for Printer Fault Alerts

Value for `-A` alert	Description
'mail [*username*]'	Sends the alert message by email to root or lp on the print server, or the specified *username*, which is a name of a user.
'write [*user-name*]'	Sends the alert message to the root or lp console window on the print server, or to the console window of the specified *username*, which is a name of a user. The specified user must be logged in to the print server to get the alert message.
'*command*'	Runs the specified *command* file for each alert. The environment variables and current directory are saved and restored when the file is executed.
quiet	Stops alerts until the fault is fixed. Use this valve when you, root or a specified user, receive repeated alerts.
none	Does not send any alerts. This value is the default if you don't specify fault alerts for a printer.

▼ How to Set Fault Alerts for a Printer by Using LP Print Commands

1 **Log in as superuser, lp, or assume an equivalent role on the print server.**

2 **Set fault alerts for a printer.**

    # **lpadmin -p** *printer-name* **-A** *alert* [**-W** *minutes*]

    -p *printer-name*   Specifies the name of the printer for which you are specifying an alert for printer faults.

    -A *alert*   Specifies what kind of alert occurs when the printer faults. Some valid values are mail, write, and quiet.

    -W *minutes*   Specifies how often, in minutes, the fault alert occurs. If you don't specify this option, the alert is sent one time.

3 **Verify that the fault alert has been sent properly.**

    # **lpstat -p** *printer-name* **-l**

Example 6–6   Setting Fault Alerts for a Printer

The following example shows how to set up the printer mars to send fault alerts by email to a user named joe. A reminder is sent every 5 minutes.

```
# lpadmin -p mars -A 'mail joe' -W 5
```

The following example shows how to set up the printer venus to send fault alerts to the console window. A reminder i sent every 10 minutes.

```
# lpadmin -p venus -A write -W 10
```

The following example shows how to stop fault alerts for the printer mercury.

```
# lpadmin -p mercury -A none
```

The following example shows how to stop fault alerts until the printer venus has been fixed.

```
# lpadmin -p venus -A quiet
```

Setting Up Printer Fault Recovery by Using LP Print Commands

If you choose not to send any fault notification, you can still find out about printer faults so that you can correct the problem. The LP print service will not continue to use a printer that has a fault. In addition to alerts for printer faults, you can also provide alerts that instruct you to mount print wheels, font cartridges, and forms when print requests require them.

You can define the fault recovery options for a printer only by using the lpadmin -F command. This task is not available in Oracle Solaris Print Manager.

Printer faults can be as simple as running out of paper or needing to replace a toner cartridge. More serious problems can include complete printer failure or power failure.

After you fix a printer fault, the print request that was active when the fault occurred begins printing in one of three ways:

- Starts printing from the beginning
- Continues printing from the top of the page where printing stopped
- After you enable the printer, continues printing from the top of the page where the printing stopped

The LP print service requires a separate print filter to continue printing from the top of a page where the printing stopped. This print filter records the control sequences set by the default print filters. The printer uses these control sequences to track page boundaries. You will be notified by the LP print service if recovery cannot proceed with the specified print filter. For information about creating print filters, see "How to Create a New Print Filter" on page 167.

If you want printing to resume immediately after a printer fault is fixed, enable the printer by using the enable command.

The following table lists the fault recovery values that you can set for a printer by using the lpadmin -F command.

TABLE 6–5 Values for Printer Fault Recovery

Value for **-F** *recover-options*	Description
beginning	After a fault recovery, printing restarts from the beginning of the file.
continue	After a fault recovery, printing starts at the top of the page where the printing stopped. This recovery option requires a print filter.
wait	After a fault recovery, printing stops until you enable the printer. After you enable the printer by using the enable command, printing starts at the top of the page where printing stopped. This recovery option requires a print filter.

▼ How to Set Printer Fault Recovery by Using LP Print Commands

1 **Log in as superuser, lp, or assume an equivalent role on the print server.**

2 **Set up fault recovery for the printer.**

lpadmin -p *printer-name* **-F** *recovery-options*

-p *printer-name*   Specifies the name of the printer for which you are specifying fault recovery.

-F *recovery-options*   Specifies one of the three valid recovery options: beginning, continue, or wait.

For more information, see the lpadmin(1M) man page.

3 **Verify that printer fault recovery has been set up properly.**

lpstat -p *printer-name* **-l**

Example 6–7 Setting Printer Fault Recovery

The following example shows how to set up the printer luna to continue printing at the top of the page where printing stopped.

lpadmin -p luna -F continue

Limiting User Access to a Printer by Using LP Print Commands

You can control which users can access some printers or all of the available printers. For example, you can prevent some users from printing on a high-quality printer to minimize expense. To restrict user access to printers, you create allow and deny lists by using the lpadmin -u command on the print server. Oracle Solaris Print Manager enables you to create only allow lists. If you create neither list, a printer is available to all users who can access the printer.

An allow list contains the names of users who are allowed access to the specified printer. A deny list contains the names of users denied access to the specified printer.

The rules for allow and deny lists are explained in the following table.

Allow and Deny List Rule	User Consequence
Do not create allow and deny lists. Or, leave both lists empty.	All users can access the printer.
Specify all in the allow list.	All users can access the printer.
Specify all in the deny list	All users, except root and lp user on the server, are denied access to the printer.
Make any entry in the allow list.	The deny list is ignored. Only users who are listed can access the printer.
Create a deny list, but you do not create an allow list or you leave the allow list empty.	Users who are listed in the deny list are denied access to the printer.

Because the print server is responsible for controlling access to the printer, allow and deny lists can only be created on the print server. If you create allow and deny lists, the print server will exclusively control user access to printers.

The following table lists the values that you can add to an allow list or a deny list to limit user access to a printer.

TABLE 6–6 Values for Allow and Deny Lists

Value for *user-list*	Description
user	*User* on any system
all	All users on all systems
none	No user on any system
system!*user*	*User* on *system* only

TABLE 6–6 Values for Allow and Deny Lists   *(Continued)*

Value for *user-list*	Description
!*user*	*User* on local system only
all!*user*	*User* on any system
all!all	All users on all systems
system!all	All users on *system*
!all	All users on local system

▼ How to Limit User Access to a Printer by Using LP Print Commands

1 **Log in as superuser, lp, or assume an equivalent role on the print server.**

2 **Allow or deny users access to a printer.**

lpadmin -p *printer-name* **-u allow:***user-list* [**deny:***user-list*]

-p *printer-name*   Specifies the name of the printer to which the allow or deny access list applies.

-u allow:*user-list*   Specifies the user names to be added to the allow access list. You can specify multiple user names with this command. Use a space or a comma to separate names. If you use spaces, enclose the list of names in quotation marks.

-u deny:*user-list*   Specifies user names to be added to the deny user access list. You can specify multiple user names with this command. Use a space or a comma to separate names. If you use spaces, enclose the list of names in quotation marks.

The specified users are added to the allow or deny list for the printer in one of the following files on the print server:

Note – If you specify none as the value for *user-list* in the allow list, the following files are not created on the print server:

3 **Verify that information is correct under the Users allowed or the Users denied heading in the following command output:**

lpstat -p *printer-name* **-l**

Example 6–8   Limiting User Access to a Printer

The following example shows how to allow only the users nathan and george access to the printer luna.

```
# lpadmin -p luna -u allow:nathan,george
```

The following example shows how to deny the users nathan and george access to the printer asteroid.

```
# lpadmin -p asteroid -u deny:"nathan george"
```

Administering Printers That Are Associated With PPD Files (Task Map)

TABLE 6–7   Administering Printers Associated With PPD Files (Task Map)

Task	Description	Description
Set definitions for print queues that use PPD files.	Modify the default values that are defined in PPD files that are associated with print queues by using the lpadmin command with the -o option.	"How to Set Default Values for Print Queues That Are Associated With PPD Files" on page 107
Determine if a PPD file was used to create a print queue.	Use the lpstat command to determine if a PPD file was used to create a print queue, or if a PPD file is associated with a print queue.	"Determining Whether a PPD File Is Associated With a Print Queue" on page 109

Administering Printers That are Associated With PPD Files

During the process of setting up a print queue, a PPD file that describes the print queue's capabilities can be associated with that print queue. Often, the default values that are described in the PPD file do not match the preferred settings for your site. For example, you might want the duplex feature always turned on, or you might want to always print to A4 sized paper. To modify these default values, you can edit the PPD file directly. However, the easiest and fastest method is to make the changes by using the lpadmin command with the -o option.

Some common PPD file values include:

■   PageSize

Examples of available choices include:

- Letter
- Legal
- A4
- B5
- Env10

- InputSlot

  Examples of available choices include:

  - Tray1
  - Tray2
  - Tray3
  - Manual

- Duplex

  Examples of available choices include:

  - None
  - DuplexNoTumble
  - DuplexTumble

▼ How to Set Default Values for Print Queues That Are Associated With PPD Files

This procedure shows how to set default values for a print queue that uses PPD files to describe its capabilities.

Before You Begin Check the PPD file first to determine which values can be overridden. To view information about the PPD file, use the more or less command, or open the file in a text editor.

For example:

$ **more /etc/lp/ppd/***print-queue***.ppd**

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Set the desired option.

lpadmin -p *print-queue* **-o** *key=value*

-p   Specifies the printer name or print queue where the value is to be changed.

-o   Specifies the options for adjusting printer capabilities, adjusting printer port characteristics, configuring network printers, and controlling the use of banner.

key=value Specifies the key/value pair for the option.

The set of key/value pairs that can be used for a particular printer depends on the content of the PPD file that is associated with the print queue.

For example, to set the duplex feature, type:

lpadmin -p *print-queue* **-o Duplex=DuplexNoTumble**

To change the input tray setting, type:

lpadmin -p *print-queue* **-o InputSlot=Tray2**

You can set the default value this way for any PPD file/foomatic option.

3 **Verify that the option was set to the correct value by checking the print queue's capabilities.**

lpstat -p *print-queue* **-l**

Example 6–9 Setting Values for Print Queues That Use PPD Files

```
# lpadmin -p hp4550 -o Media=A4 -o InputSlot=Tray2
# lpadmin -p hp4550 -o PageSize=A4
# lpstat -p hp4550 -l
printer hp4550 idle. enabled since December  5, 2006  6:38:50 PM CET. available.
        Form mounted:
        Content types: application/postscript
        Description:
        Connection:
 Interface: /usr/lib/lp/model/netstandard_foomatic
        PPD: /usr/lib/lp/model/ppd/system/foomatic/ \
HP/HP-Color_LaserJet_4550-Postscript.ppd.gz
        On fault: write root
        After fault: continue
        Users allowed:
                (all)
        Forms allowed:
                (none)
        Media supported:
                Letter
                A4
                11x17
                A3
                A5
                B5
                Env10
                EnvC5
                EnvDL
                EnvISOB5
                EnvMonarch
                Executive
                Legal
        Banner not required
        Character sets:
                (none)
```

```
        Default pitch:
        Default page size:
        Default port setting:
        Options: PageSize=A4, Media=A4, InputSlot=Tray2, \
dest=192.168.245.62:9100, protocol=tcp
# uname -a
SunOS shuttle 5.11 snv_52 i86pc i386 i86pc
# lpstat -p hp4550 -l
printer hp4550 idle. enabled since December  5, 2006  6:38:50 PM CET. available.
        Form mounted:
        Content types: application/postscript
        Description:
        Connection:
        Interface: /usr/lib/lp/model/netstandard_foomatic
        PPD: /usr/lib/lp/model/ppd/system/foomatic/ \
HP/HP-Color_LaserJet_4550-Postscript.ppd.gz
        On fault: write root
        After fault: continue
        Users allowed:
                (all)
        Forms allowed:
                (none)
        Media supported:
                Letter
                A4
                11x17
                A3
                A5
                B5
                Env10
                EnvC5
                EnvDL
                EnvISOB5
                EnvMonarch
                Executive
                Legal
        Banner not required
        Character sets:
                (none)
        Default pitch:
        Default page size:
        Default port setting:
        Options: dest=192.168.245.62:9100, protocol=tcp
```

Determining Whether a PPD File Is Associated With a Print Queue

If a PPD file was used during the creation of a print queue, the PPD file that the specified queue is configured to use is listed in the lpstat command output. If you do not specify a PPD file when creating a new print queue, the lpstat command continues to display the same output as it did previously. For an example of the lpstat command output that shows the use of PPD files, see .

EXAMPLE 6–10   Displaying Information About a PPD File by Using the `lpstat` Command

In this example, the `lpstat` command output indicates that the print queue was configured by using the PPD file, `Mitsubishi-CP50_Color_Printer-cp50.ppd.gz`.

```
# lpstat -l -p paper
printer paper is idle. enabled since Tue 30 Mar 2004 01:48:38 PM PST
        available.
    Form mounted:
    Content types: any
    Printer types: unknown
    Description:
    Connection: direct
    Interface: /usr/lib/lp/model/standard_foomatic
    PPD: /path/Mitsubishi-CP50_Color_Printer-cp50.ppd.gz
    After fault: continue
    Users allowed:
        (all)
    Forms allowed:
        (none)
    Banner required
    Character sets:
        (none)
    Default pitch:
    Default page size:
    Default port settings# lpstat l p <queue>
```

◆ ◆ ◆ **C H A P T E R 7**

7

Customizing LP Printing Services and Printers (Tasks)

This chapter provides information about customizing LP printing services and printers.

Customizing Printing Services (Task Map)

TABLE 7–1 Customizing the LP Print Service (Task Map)

Task	Description	For Instructions
Add a `terminfo` entry of an unsupported printer.	Add an entry to the `terminfo` database to initialize an unsupported printer and establish required settings.	"How to Add a `terminfo` Entry for an Unsupported Printer" on page 114
Set up a custom printer interface program.	You can furnish a custom printer interface program if you have a printer that is not supported by the standard printer interface program.	"How to Set Up a Custom Printer Interface Program" on page 118
Adjust the printer port characteristics.	Make printer port characteristics that are set by the LP print service compatible with the printer communication settings.	"How to Adjust the Printer Port Characteristics" on page 113

Customizing the LP Print Service

Although the LP print service is designed to be flexible enough to handle most printers and printing needs, the LP print service does not handle every possible situation. You might have a print request that is not accommodated by the standard features of the LP print service. Or, you might have a printer that does not quite fit into the way the LP print service handles printers.

You can customize the LP print service in the following ways:

- Adjust the printer port characteristics.
- Adjust the terminfo database.
- Customize the printer interface program.
- Create a print filter.
- Define a form.

Adjusting Printer Port Characteristics

The printer port characteristics set by the LP print service must be compatible with the printer communication settings. If the default printer port settings provided by the LP print service do not work with a printer, refer to the printer manual from the manufacturer to determine what settings the printer requires from the LP print service. Use the stty command to set and display printer communication settings.

The following table shows the default stty settings that are used by the LP print service.

TABLE 7–2   Default stty Settings Used by the LP Print Service

Option	Description
-9600	Sets baud to 9600
-cs8	Sets 8-bit bytes
-cstopb	Sends one stop bit per byte
-parity	Does not generate parity
-ixon	Enables XON/XOFF (also known as START/STOP or DC1/DC3)
-opost	Does "output post-processing" using all the settings that follow in this table
-olcuc	Do not map lowercase to uppercase
-onlcr	Changes line feed to carriage return/line feed
-ocrnl	Does not change carriage returns into line feeds
-onocr	Outputs carriage returns even at column 0
-n10	Provides no delay after line feeds
-cr0	Provides no delay after carriage returns
-tab0	Provides no delay after tabs
-bs0	Provides no delay after backspace characters
-vt0	Provides no delay after vertical tabs

TABLE 7–2 Default stty Settings Used by the LP Print Service   *(Continued)*

Option	Description
-ff0	Provides no delay after form feeds

▼ How to Adjust the Printer Port Characteristics

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Adjust the printer port characteristics.

lpadmin -p *printer-name* **-o "stty=**options**"**

-p   Specifies the name of the printer for which you are adjusting the port characteristics.

-o "stty=*options*"   Sets the port characteristic (stty option) specified by *options*. You can change more than one stty option setting with this command. Enclose each option in single quotation marks, and use a space to separate the options. For a complete list of options, see the stty(1) man page. Table 7–2 shows the default stty settings used by the LP print service.

3   Verify that the printer port characteristics have been changed.

lpstat -p *printer-name* **-l**

Example 7–1   Adjusting the Printer Port Characteristics

This example shows how to set the port characteristics for the printer luna. The parenb option enables parity checking/generation. The parodd option sets odd parity generation. The cs7 option sets the character size to 7 bits.

lpadmin -p luna -o "stty='parenb parodd cs7'"

Example 7–2   Setting the Terminal Baud Rate

This example shows how to set the terminal baud rate to 19200 for the printer venus.

lpadmin -p venus -o "stty=19200"

Adding a `terminfo` Entry for an Unsupported Printer

The LP print service uses an interface program and the `terminfo` database to initialize each printer and establish the following:

- Selected page size
- Character pitch
- Line pitch
- Character set

Each printer is identified in the `terminfo` database with a short name. The short name required by the `terminfo` database is identical to the name used to set the `TERM` shell variable. This name is also the printer type that you specify when setting up a printer. For example, the entries for different types of PostScript printers are in the `/usr/share/lib/terminfo/P` directory. The default entries provided with the SunOS software release are `PS` (for PostScript) and `PSR` (for PostScript Reverse).

If you cannot find a `terminfo` entry for your printer, you still might be able to use the printer with the LP print service without the automatic selection of page size, pitch, and character sets. However, you might have trouble keeping the printer set in the correct modes for each print request.

If no `terminfo` entry exists for your type of printer and you want to keep the printer set in the correct modes, you can do one of the following:

- Customize the interface program used with the printer.
- Add an entry to the `terminfo` database.

A terminal or printer entry in the `terminfo` database contains and defines hundreds of items. The LP print service, however, uses fewer than 50 of these items. For more information about the `terminfo` items that are required for a printer, see "Required `terminfo` Items For a Printer" on page 218.

▼ How to Add a `terminfo` Entry for an Unsupported Printer

Note – Before you create a `terminfo` entry for a printer, make sure that none of the existing `terminfo` entries will support the printer. To do so, try to set up the printer with an entry for a similar printer, if a similar printer exists.

---

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Determine a `terminfo` entry name for the printer.

The directories in the /usr/share/lib/terminfo directory contain all the valid terminfo entries. Use these entries as a guide for choosing a name for the printer.

3 Create a `terminfo` entry file for the printer.

Table 12–6 shows the items you must define in the terminfo entry to add a new printer to the LP print service. For more details about the structure of the terminfo database, see the terminfo(4) man page.

To help you start writing a new terminfo entry, use the infocmp command to save an existing terminfo entry to a file. This command is helpful if there is a terminfo entry that is similar to entry you want to create. For example, the following command saves the ps entry to the ps_cust file, which will become the new terminfo entry.

```
infocmp ps > ps_cust
```

4 Compile the `terminfo` entry file into the `terminfo` database.

tic *terminfo_entry*

where *terminfo-entry* variable is the terminfo entry file you created.

5 Check for the new `terminfo` entry file in the `/usr/share/lib/terminfo` directory.

Customizing the Printer Interface Program

If you have a printer that is not supported by the standard printer interface program, you can furnish your own printer interface program. You can copy the standard program and then tell the LP print service to use it for a specified printer. First, you need to understand what is in the standard program. The following section describes the standard program.

A printer interface program should perform the following tasks:

- Initialize the printer port, if necessary. The standard printer interface program uses the stty command to initialize the printer port.
- Initialize the printer hardware. The standard printer interface program receives the control sequences from the terminfo database and the TERM shell variable.
- Print a banner page, if necessary.
- Print the number of copies that are specified by the print request.

⚠️ **Caution –** If you have a printer interface program from a release of UNIX System V prior to release 3.2, it will probably work with the SunOS 5.10 or compatible LP print service. However, several -o options have been standardized in the SunOS 5.10 or compatible LP print service. These options are passed to every printer interface program. These options might interfere with similarly named options used by the old interface.

The LP print service, not a printer interface program, is responsible for opening the printer port. The printer port is given to the printer interface program as standard output. In addition, the printer is identified as the "controlling terminal" for the printer interface program so that a "hang-up" of the port causes a SIGHUP signal to be sent to the printer interface program.

The Standard Printer Interface Program

The standard (model) printer interface program is /usr/lib/lp/model/standard. This program is used by the LP print service to set the printing defaults shown in the following table.

TABLE 7–3 Default Printer Port Characteristics

Characteristic	Default Setting
Default filter	None
Character pitch	None
Line pitch	None
Page width	None
Page length	None
Character set	None
stty options	9600 cs8 -cstopb -parenb -parodd ixon -ixany opost -olcuc onlcr -ocrnl -onocr -onlret -ofill nl0 cr0 tab0 bs0 vt0 ff0
Exit code	0

Customizing `stty` Modes

If you need to change the terminal characteristics, such as baud rate or output options, find the section of the standard printer interface program that begins with the following comment:

```
## Initialize the printer port
```

For more information, see the "Adjusting Printer Port Characteristics" on page 112.

Exit Codes

When printing is complete, your interface program should exit with a code that shows the status of the print job. The exit code is the last entry in the printer interface program.

The following table shows the exit codes and how they are interpreted by the LP print service.

TABLE 7–4 Printer Interface Program Exit Codes

Exit Code	Meaning to the LP Print Service
0	The print request has been successfully completed. If a printer fault occurred, it has been cleared.
1 to 127	A problem was encountered when printing a request. For example, there were too many non-printable characters or the request exceeds the printer's capabilities. The LP print service notifies the person who submitted the request that an error occurred when printing it. This error does not affect future print requests. If a printer fault has occurred, it has been cleared.
128	This code is reserved for use by the LP print service. Interface programs must not exit with this code.
129	A printer fault was encountered when printing the request. This fault does affect future print requests. If the fault recovery for the printer directs the LP print service to wait for the administrator to correct the problem, the LP print service disables the printer. If the fault recovery is to continue printing, the LP print service does not disable the printer. However, the print service will try printing again in a few minutes.
>129	These codes are reserved for use by the LP print service. Interface programs must not exit with codes in this range.

If the program exits with a code of 129, `root` is alerted of a printer fault. The LP print service must also reprint the request from the beginning, after the fault has been cleared. If you do not want the entire request to be reprinted, you can have the interface program send a fault message to the LP print service. (First wait for the fault to be cleared.) When the fault is cleared, the interface program can resume printing the file. When printing is finished, the printer interface program can give a `0` exit code, just as if the fault had never occurred. An added advantage of this approach: The interface program can detect when the fault is cleared automatically. Thus, the administrator does not need to re-enable the printer.

Fault Messages

You can use the `lp.tell` program to send fault messages to the LP print service. This program is referenced by the `LPTELL` shell variable in the standard printer interface code. The program takes standard input and sends it to the LP print service. The LP print service puts standard input into the message that alerts the administrator to the printer fault. If its standard input is

empty, the `lp.tell` program does not initiate an alert. For an example of how the `lp.tell` program is used, examine the standard printer interface code immediately after the following comment:

```
# Set up the $LPTELL program to capture fault messages here
```

If you use the special exit code 129 or the `lp.tell` program, the printer interface program does not need to disable the printer itself. The interface program can disable the printer directly. However, doing so overrides the fault-alerting mechanism. Alerts are sent only if the LP print service detects that the printer has a fault, and the special exit code and the `lp.tell` program are its main detection tools.

If the LP print service has to interrupt printing of a file at any time, it kills the interface program with a signal TERM (trap number 15). For more information, see the kill(1) and signal(3C) man pages. If the printer interface program dies from receipt of any other signal, the LP print service assumes that future print requests are not be affected. As a result, the LP print service continues to use the printer. The LP print service notifies the user who submitted the request that the request has not been finished successfully.

When the interface is first invoked, the signals HUP, INT, QUIT, and PIPE (trap numbers 1, 2, 3, and 13) are ignored. The standard interface changes this default behavior, so that the signals are trapped at appropriate times. The standard interface interprets receipt of these signals as warnings that the printer has a problem. When the standard interface receives a signal, it issues a fault alert.

Using a Customized Printer Interface Program

You can create a customized printer interface program and use it instead of the standard printer interface program on the print server. To do so, you use the `lpadmin` command to register the program with the LP print service for a specific printer.

▼ How to Set Up a Custom Printer Interface Program

1 Log in as superuser, `lp`, or assume an equivalent role on the print server.

2 Copy the standard printer interface program.

```
# cp /var/spool/lp/model/standard   custom-interface
```

3 (Optional) If you already have a custom printer interface program, go to Step 5.

4 Change the copy of the standard printer interface program to meet your needs.

Refer to the description of the program in "The Standard Printer Interface Program" on page 116 to determine what you need to change.

5 Set up the custom printer interface program for a specific printer.

    # **lpadmin -p** *printer-name* **-i** *custom-interface*

-p   Specifies the printer that will use the custom printer interface program.

-i   Is the name of the custom printer interface program.

The custom printer interface program is registered with the LP print service, and will be used by that printer when users submit print requests.

6 Verify that the custom printer interface program has been added in the /etc/lp/printers/{.} *printer-name***/configuration** file.

Example 7–3 Setting Up a Custom Printer Interface Program

This example shows how to set up a custom printer interface program named custom for the printer luna.

```
# lpadmin -p luna -i custom
```

Example 7–4 Copying a Custom Printer Interface Program

This example shows how to copy a custom printer interface program from the printer venus to the printer asteroid.

```
# lpadmin -p asteroid -e venus
```

◆ ◆ ◆   **C H A P T E R   8**

Administering the LP Print Scheduler and Managing Print Requests (Tasks)

This chapter includes miscellaneous printing tasks that a system administrator might perform on a daily, weekly, or occasional basis by using LP print service commands.

For overview information, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

Administering the LP Print Scheduler (Task Map)

TABLE 8–1   Administering Printers by Using LP Print Scheduler (Task Map)

Task	Description	For Instructions
Check the status of printers.	Use the `lpstat` command to check the status of all printers or a specific printer. This command allows you to determine which printers are available for use and enables you to examine the characteristics of those printers.	"How to Check the Status of Printers" on page 122
Stop the print scheduler.	If the print scheduler stops accepting print requests, you might need to stop and restart the print scheduler.	"How to Stop the Print Scheduler" on page 124
Restart the print scheduler.	After you stop the print scheduler, you will need to restart the print scheduler, so the printer can begin accepting requests.	"How to Restart the Print Scheduler" on page 124

TABLE 8–1   Administering Printers by Using LP Print Scheduler (Task Map)   *(Continued)*

Task	Description	For Instructions
Start the print scheduler with options.	There are two ways to pass options to the print scheduler under the Solaris Management Facility (SMF). You can set options for the duration of a call, or you can set options to remain over a system boot.	"How to Set Print Option Values Only for the Duration of a Call" on page 125 "How to Set Printer Option Values That Remain Over a System Reboot" on page 126

Checking Printer Status

Many routine printer administration tasks require information about the status of the LP print service or a specific printer. For example, you can determine which printers are available for use. You can also examine the characteristics of those printers. You can use the lpstat command to find status information about the LP print service or a specific printer.

If a PPD file was used to create or modify a print queue, the specific PPD file is listed in the lpstat output. If a PPD file was not specified when the print queue was created, the PPD entry in the lpstat output is none.

▼ How to Check the Status of Printers

1   Log in to any system on the network.

2   Check the status of printers.

Only the most commonly used options are shown here. For other options, see the lpstat(1) man page.

```
$ lpstat [-d] [-p] printer-name [-D] [-l] [-t]
```

-d   Shows the system's default printer.

-p *printer-name*   Shows if a printer is active or idle, when the printer was enabled or disabled, and whether the printer is accepting print requests.

                        You can specify multiple printer names with this command. Use a space or a comma to separate printer names. If you use spaces, enclose the list of printer names in quotation marks. If you don't specify *printer-name*, the status of all printers is displayed.

-D   Shows the description of the specified *printer-name*.

-l   Shows the characteristics of the specified *printer-name*.

-t   Shows status information about the LP print service, including the status
                             of all printers, such as whether they are active and accepting print requests.

Example 8–1 Checking the Status of Printers

The following example shows how to display the system's default printer.

```
$ lpstat -d
system default destination: luna
```

The following example shows how to display the status of the printer luna.

```
$ lpstat -p luna
printer luna is idle. enabled since Jul 12 11:17 2001. available.
```

The following example shows how to display the description of the printers asteroid and luna.

```
$ lpstat -p "asteroid luna" -D
printer asteroid faulted. enabled since Jan 5 11:35 2004. available.
unable to print: paper misfeed jam

Description: Printer by break room
printer luna is idle. enabled since Jan 5 11:36 2004. available.
Description: Printer by server room.
```

The following example shows how to display the characteristics of the printer luna.

```
$ lpstat -p luna -l
printer luna is idle. enabled since Thu Jul 12 15:02:32 PM PDT
        Form mounted:
        Content types: postscript
        Printer types: PS
        Description:
        Connection: direct
        Interface: /usr/lib/lp/model/standard
                PPD: none
        After fault: continue
        Users allowed:
                (all)
        Forms allowed:
                (none)
        Banner not required
        Character sets:
                            (none)
                Default pitch:
        Default page size: 80 wide 66 long
        Default port settings:
```

Stopping and Restarting the Print Scheduler

The print scheduler, lpsched, handles print requests on print servers. However, the print scheduler might sometimes stop running on a system, so print requests stop being accepted or printed. The lpadmin command automatically enables the lpsched service when local printers are added to the system and disables it when the last local printer is removed. The following procedures describe how to stop and restart the print scheduler. If a print request was printing when the print scheduler stopped running, the print request will be printed in its entirety when you restart the print scheduler.

▼ How to Stop the Print Scheduler

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Determine if the print scheduler is running.

```
# svcs application/print/server
```

You can also use the lpstat -r command to determine if the print scheduler is running.

If the print scheduler is not running, the message scheduler is not running is displayed.

3   If the print scheduler is running, stop it.

```
# svcadm disable application/print/server
```

You can also use the lpshut command to stop the print scheduler.

▼ How to Restart the Print Scheduler

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Determine if the print scheduler is running.

```
# svcs application/print/server
```

You can also use the lpstat -r command to determine if the print scheduler is running.

If the print scheduler is not running, the message scheduler is not running is displayed.

3   If the print scheduler is not running, start it.

```
# svcadm enable application/print/server
```

You can also use the /usr/lib/lpsched command to start the print scheduler. For more information about the difference between starting the print scheduler by using the /usr/lib/lpsched command or by using the svcadm enable application/print server command, see "Starting the Print Scheduler With Options" on page 125.

Starting the Print Scheduler With Options

There are two ways to pass options to the print scheduler by using SMF:

- By modifying option values only for the duration of a call.

  Use the /usr/lib/lpsched command with the appropriate options when you only want to pass options to the print scheduler for the duration of a call. Before setting options, see the lpsched(1M) man page for more information about these default values and reasons for changing them.

- By maintaining option values over a system reboot, or if the print scheduler is restarted.

  The SMF manifest for the print server contains properties that are utilized by the print server start-up script. These property values are passed on to the print scheduler and represent the options, which are set by using the svccfg command.

  The properties are as follows:
  - lpsched/num_filters
  - lpsched/num_notifiers
  - lpsched/fd_limit
  - lpsched/reserved_fds

  Any options that are not set with the svccfg command will use the default values that are in the print scheduler. For more information about using the svccfg command, see the svccfg(1M) man page.

▼ How to Set Print Option Values Only for the Duration of a Call

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Set option values.

```
# /usr/lib/lpsched option value
```

-f num_filters	Specifies the number of concurrent slow filters that can be run on a print server.
-n num_notifiers	Specifies the number of concurrent notification processes that can run on a print server.
-p fd_limit	Specifies the file descriptor resource limit for the lpsched process.
-r reserved_fds	Specifies the number of file descriptors that the scheduler reserves for internal communications under heavy load.

Example 8–2 Setting Option Values Only for the Duration of a Call

This example shows how to set the number of filters to 2. The remaining options will use the defaults that are in the print scheduler.

```
# /usr/lib/lpsched -f 2
```

To use the default options that are in the print scheduler, run the /usr/lib/lpsched command without any options.

Note that starting the print scheduler by using the /usr/lib/lpsched command does not utilize the values that are set with the svccfg command.

▼ How to Set Printer Option Values That Remain Over a System Reboot

1 Become superuser, lp, or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Set one or all options.

```
# svccfg
svc:> select svc:/application/print/server
svc:/application/print/server> setprop property = value
.
.
.
svc:/application/print/server> quit
```

For each option that you want to set, repeat the setprop *property* = *value* command on a separate line.

3   Verify that the option has been correctly set by displaying the current values of the print server properties.

```
# svcprop svc:/application/print/server
```

4   Restart the print scheduler.

- If the print scheduler is not running, use the following commands:

```
# svcadm refresh svc:/application/print/server
# svcadm enable svc:/application/print/server
```

- If the print scheduler is running, use the following commands:

```
# svcadm refresh svc:/application/print/server
# svcadm restart svc:/application/print/server
```

To determine if the print scheduler is running, run the svcs application/print/server command.

Example 8–3   Setting Printer Option Values That Remain Over a System Reboot

This example shows how to set the number of filters to 1. This option will remain set over a system reboot, or if you restart the print scheduler.

```
# svccfg
svc:> select svc:/application/print/server
svc:/application/print/server> setprop lpsched/num_filters = count: 1
svc:/application/print/server> quit
```

This example shows how to set all options.

```
# svccfg
svc:> select svc:/application/print/server
svc:/application/print/server> setprop lpsched/num_filters = count: 1
svc:/application/print/server> setprop lpsched/num_notifiers = count: 1
svc:/application/print/server> setprop lpsched/fd_limit = count: 4096
svc:/application/print/server> setprop lpsched/reserved_fds = count: 2
svc:/application/print/server> quit
```

The following is a sample script that sets all options.

```
#!/bin/ksh

svccfg <<-EOF
select svc:/application/print/server
setprop lpsched/num_filters = count: 1
setprop lpsched/num_notifiers = count: 1
setprop lpsched/fd_limit = count: 4096
setprop lpsched/reserved_fds = count: 2

EOF
```

Administering Print Requests by Using LP Print Commands (Task Map)

TABLE 8–2   Administering Print Requests by Using LP Print Commands

Task	Description	For Instructions
Check the status of print requests.	Use the `lpstat` command to check the status of print requests.	"How to Check the Status of Print Requests" on page 129
Enable or disable a printer.	Use the `enable` and `disable` commands to control whether a printer prints requests or stops printing requests that are in the print queue.	"How to Enable or Disable a Printer" on page 131
Accept or reject print requests for a printer.	Use the `accept` and `reject` commands to turn on or turn off a print queue that stores requests to be printed.	"How to Accept or Reject Print Requests for a Printer" on page 133
Cancel a print request.	Use the `cancel` command to cancel print requests.	"How to Cancel a Print Request" on page 134
Cancel a print request from a specific user.	Cancel the print request from a specific user.	"How to Cancel a Print Request From a Specific User" on page 135
Move print requests to another printer.	Move or cancel any print requests that are currently queued to a printer.	"How to Move Print Requests to Another Printer" on page 136
Change the priority of a print request.	Change the priority of a print request in one of the following ways: ■ Put a print request on hold if it has not finished printing. ■ Move a print request to the head of the queue. ■ Change the priority of a job still waiting to be printed.	"How to Change the Priority of a Print Request" on page 138

When a user submits a print request from a print client, the print request is added to a queue on the print server before it is sent to the printer. While a print request is in the queue, you can cancel or gain status information on the request from a client system. You must log in to the print server to move, hold, resume, or change the priorities of print requests with LP print service commands. These actions can help you keep printing services operating smoothly.

The following table lists the values for changing the priority of a print request by using the `lp -H` command.

TABLE 8–3 Values for Changing the Priority of a Print Request

Value for **-H** *change-priority*	Description
hold	Places the print request on hold until you cancel the request or instruct the LP print service to resume printing the request.
resume	Places a print request that has been on hold back in the queue. The request is printed according to its priority and placement in the queue. If you place on hold a print job that is already printing, resume places the print request at the head of the queue so that it becomes the next request printed.
immediate	Places a print request at the head of the queue. If a request is already printing, you can put the request on hold to allow the next request to print immediately.

▼ How to Check the Status of Print Requests

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Check the status of printers and print requests.

Only the most commonly used options are shown here. For other valid options, see the lpstat(1) man page.

```
$ lpstat -o [list] | -u [user-list]
```

-o *list*   Shows the status of print requests on a specific printer. *list* can be one or more printer names, printer class names, or print request IDs.

   To specify multiple printer names, class names, and IDs for *list*, use a space or a comma to separate values. If you use spaces, enclose the list of values in quotation marks.

   If you don't specify *list*, the status of print requests sent to all printers is displayed.

-u *user-list*   Shows the status of print requests for a specific user. *user-list* can be one or more user names.

To specify multiple users with this command, use a space or a comma to separate user names. If you use spaces, enclose the list of names in quotation marks.

If you don't specify *user-list*, the status of print requests for all users is displayed.

When used to check the status of print requests, the `lpstat` command displays one line for each print request.

From left to right, the line shows the following information:

- Request ID
- User
- Output size in bytes
- Date and time of the request
- Information about the request, such as "being filtered"

Example 8–4   Checking the Status of Print Requests

The following example shows that user `fred` has one print request queued on the printer `luna`.

```
$ lpstat
luna-1    fred     1261    Jul 12 17:34
```

The following example shows that the user `paul` currently has no print requests in queue.

```
$ lpstat -u paul
```

The following example shows that two print requests are queued on the printer `moon`.

```
$ lpstat -o moon
moon-78    root     1024    Jul 14 09:07
moon-79    root     1024    Jul 14 09:08
```

Enabling or Disabling a Printer From Printing

The `enable` and `disable` commands control whether a printer prints or stops printing requests that are in the print queue. When you disable a printer, the printer stops printing requests in the queue. However, requests are still added to the queue. You must set the printer to reject print requests so that requests are not added to the queue. For information about rejecting print requests, see "Accepting or Rejecting Print Requests" on page 132.

A printer is enabled to print and accepts print requests when the printer is added by using Oracle Solaris Print Manager. Oracle Solaris Print Manager doesnot provide any additional printer processing management.

You must enable the printer whenever it has been disabled, which can happen when a printer fault occurs. When you enable a printer, it prints requests from the print queue until the queue is empty, even if the print service rejects additional requests for the print queue.

The following figure shows the point at which the processing of print requests is interrupted when a printer is disabled.

FIGURE 8–1   What Happens When a Printer Is Enabled or Disabled
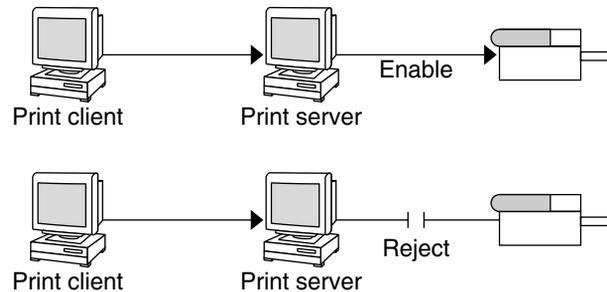
▼ How to Enable or Disable a Printer

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Stop printing print requests.

```
# disable [-c | -W] [-r "reason"] printer-name
```

disable	Cancels the current job, then disables the printer. The current job is saved to reprint when the printer is enabled.
-c	Cancels the current job, then disables the printer. The current job is not printed later.
-W	Waits until the current job is finished before disabling the printer.
-r *"reason"*	Provides users with a reason why the printer is disabled. The reason is stored and displayed whenever a user checks on the status of the printer by using the lpstat -p command.
printer-name	Specifies the name of the printer that will stop printing print requests.

Note – You cannot enable or disable classes of printers. Only individual printers can be enabled or disabled.

3   Start printing print requests.

enable *printer-name*

4   Verify that the printer is enabled.

lpstat -p *printer-name*

Example 8–5   Enabling or Disabling a Printer

The following example shows how to stop the current job on the printer luna, save the job to print later, and provide a reason why the printer has stopped printing print requests.

disable -r "changing the form" luna

The following example shows how to start printing print requests on the printer luna.

enable luna
```
printer "luna" enabled
```

Accepting or Rejecting Print Requests

The accept and reject commands enable you to turn on or turn off a print queue that stores requests to be printed.

When you use the reject command, the print queue for a specified printer is turned off. No new print requests can enter the queue on the print server. However, all print requests that are in the queue are still printed. You must disable the printer if you want it to stop printing requests that are already in the queue. The following table compares the functions of the accept, reject, enable, and disable commands.

TABLE 8–4   Functions of accept, reject, enable, and disable Print Commands

Command	Function
accept	Accepts print requests that are sent to the print queue.
disable	Stops printing requests that are currently in the print queue.
enable	Prints the requests that are in the print queue.
reject	Rejects print requests that are sent to the print queue.

If a print request is rejected, the LP print service writes or mails a message to the user who submitted the request. The message states that print requests are not being accepted for the specified printer.

You can also specify a reason for not accepting requests through the command line. The reason is displayed on a user's system when a user tries to check the printer's queue. The following figure shows the point at which the processing of print requests is interrupted when a print queue rejects print requests.

FIGURE 8–2 What Happens When a Print Queue Accepts or Rejects Requests
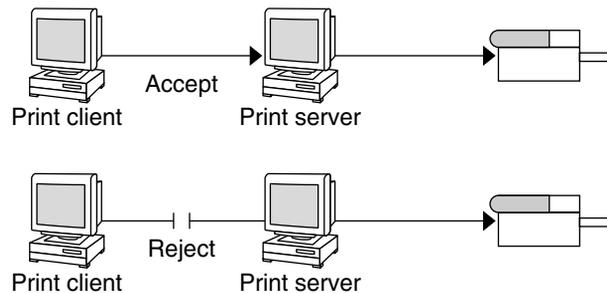
▼ How to Accept or Reject Print Requests for a Printer

1 **Log in as superuser, `lp`, or assume an equivalent role on the print server.**

2 **Stop accepting print requests for the printer.**

   # **reject** [**-r** "*reason*"] *printer-name*

   -r "*reason*" Provides users with a reason why the printer is rejecting print requests. The reason is stored and displayed whenever a user checks on the status of the printer by using the lpstat -p command.

   printer-name Specifies the name of the printer that will stop accepting print requests.

   The queued requests continue printing as long as the printer is enabled. For instructions on disabling a printer so that it stops printing, see "How to Enable or Disable a Printer" on page 131.

3 **Start accepting print requests for the printer.**

   # **accept** *printer-name*

4 **Check that the status of the printer to see whether it is accepting or rejecting print requests.**

   $ **lpstat -p** *printer-name*

Example 8–6   Accepting or Rejecting Print Requests for a Printer

The following example shows how to stop the printer luna from accepting print requests.

```
# reject -r "luna is down for repairs" luna
destination "luna" will no longer accept requests
```

The following example shows how to set the printer luna to accept print requests.

```
# accept luna
destination "luna" now accepting requests
```

Canceling a Print Request

You can use the cancel command to cancel print requests in printer queues or to cancel jobs that are printing.

There are three ways to use the cancel command:

- Cancel requests by request identification number (request ID)
- Cancel requests from a specific user on all printers or specific printers
- Cancel the job currently printing

When you use the cancel command, a message tells you the request or requests are canceled, and the next request in queue is being printed.

You can cancel a print request only under the following conditions:

- You are the user who submitted the request and you are logged in on the system from which you submitted the request.
- You are the user who submitted the request on any client system and the print server has the "user-equivalence" option configured for the printer in its /etc/printers.conf file.
- You are logged in as superuser, lp, or have assumed an equivalent role on the print server.

To cancel a specific request, you need to know its request ID. The request ID contains the name of the printer, a dash, and the number of the print request. For example, luna-185.

When you submit the print request, the request ID is displayed. If you do not remember the print request ID, you can find it by using the lpstat command with the -o printer option.

▼ How to Cancel a Print Request

1   If you are going to cancel the print requests of other users, then become superuser, lp, or assume an equivalent role.

2   Determine the request IDs of the print requests to cancel.

lpstat

For more details, see "How to Check the Status of Print Requests" on page 129.

3   Cancel the print request.

cancel *request-id* | *printer-name*

request-id   Specifies the request ID of a print request to be canceled. You can specify multiple request IDs with this command. Use a space or a comma to separate request IDs. If you use spaces, enclose the list of request IDs in quotation marks.

printer-name   Specifies the printer for which you want to cancel the current print request.

You can specify multiple printer names with this command. Use a space or a comma to separate printer names. If you use spaces, enclose the list of printer names in quotation marks.

4   Verify that the print requests are canceled.

$ **lpstat -o** *printer-name*

Example 8–7   Canceling a Print Request

The following example shows how to cancel the luna-3 and luna-4 print requests.

```
$ cancel luna-3 luna-4
request "luna-3" cancelled
request "luna-4" cancelled
```

The following example shows how to cancel the print request that is currently printing on the printer luna.

```
# cancel luna
request "luna-9" cancelled
```

▼ **How to Cancel a Print Request From a Specific User**

1   If you are going to cancel the print requests of other users, become superuser, lp, or assume an equivalent role.

2   Cancel a print request from a specific user.

$ **cancel -u** *user-list* [*printer-name*]

-u *user-list*   Cancels the print request for a specified user.

user-list can be one or more user names. Use a space or a comma to separate user names. If you use spaces, enclose the list of names in double quotation marks.

printer-name   Specifies the printer for which you want to cancel the print requests for a specified user.

printer-name can be one or more printer names. Use a space or a comma to separate printer names. If you use spaces, enclose the list of printer names in quotation marks.

If you don't specify the *printer-name*, the print requests for the specified user is canceled on all printers.

Example 8–8   Canceling a Print Request From a Specific User

The following example shows how to cancel all the print requests submitted by the user george on the printer luna.

```
# cancel -u george luna
request "luna-23" cancelled
```

The following example shows how to cancel all the print requests submitted by the user george on all printers.

```
# cancel -u george
request "asteroid-3" cancelled
request "luna-8" cancelled
```

Moving a Print Request

If you plan to change the way a printer is used or decide to take a printer out of service, you should set up the LP print service to reject additional print requests. Then, move or cancel any requests that are currently queued to the printer. You can use the lpmove command to move individual or all print requests to another local printer.

Request IDs are not changed when you move print requests, so users can still find their requests. Print requests that have requirements, such as a specific file content type or form, that cannot be met by the newly specified printer cannot be moved. These print requests must be canceled.

▼ How to Move Print Requests to Another Printer

To move all print requests from one printer to another printer, you do not need to know the request IDs. However, first determine how many print requests are affected before you move them.

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   List the IDs of the print requests on the original printer.

lpstat -o *printer-name1*

3   Check to see if the destination printer is accepting print requests.

lpstat -a *printer-name2*

-a *printer-name2* reports whether print destinations are accepting requests.

4   Move all the print requests from the original printer to the destination printer.

lpmove *printer-name1 printer-name2*

printer-name1   Specifies the name of the printer from which all print requests will be moved.

printer-name2   Specifies the name of the printer to which all print requests will be moved.

For more information, see the lpmove(1M) man page.

If some requests cannot be printed on the destination printer, the requests are left in the original printer's queue. By using request IDs, you can also move specific print requests to another printer by using the lpmove command.

5   Start accepting print requests on the original printer.

If you move all the print requests to another printer, the lpmove command automatically stops accepting print requests for the printer. This step is necessary if you want to begin accepting new print requests for the printer.

accept *printer-name1*

6   Check for any remaining print requests in the original printer's queue.

lpstat -o *printer-name1*

Ensure that all specified print requests were moved to the destination printer's queue.

lpstat -o *printer-name2*

Example 8–9   Moving Print Requests to Another Printer

The following example shows how to move print requests from the printer luna to the printer terra. Then, the original printer, luna, is instructed to resume accepting print requests.

```
# lpmove luna terra
# accept luna
```

Changing the Priority of Print Requests

After a user has submitted a print request, you can change its priority in the print server's queue by doing any of the following:

- Putting any print request on hold if it has not finished printing. Putting a request on hold stops the request, if it is currently printing, and keeps it from printing until you resume printing it. Other print requests go ahead of the on-hold request.

- Moving any print request to the head of the queue, where it will become the next job eligible for printing. If you want a job to start printing immediately, you can interrupt the job that is currently printing by putting it on hold.

- Changing the priority of a job still waiting to be printed or moving the job in the queue. Doing so will move the job ahead of lower priority requests and behind other requests that are the same priority or higher priority.

▼ How to Change the Priority of a Print Request

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Determine the request IDs of the print requests whose priority you want to change.

`# lpstat`

For more information, see "How to Check the Status of Print Requests" on page 129.

3 Change the priority of a print request.

`# lp -i` *request-id* `-H` *change-priority*

-i *request-id*   Specifies the request ID of a print request you want to change.

                       You can specify multiple request IDs with this command. Use a space or a comma to separate request IDs. If you use spaces, enclose the list of request IDs in quotation marks.

-H *change-priority*   Specifies one of the three ways to change the priority of a print request: `hold`, `resume`, `immediate`.

                       For detailed information about valid values for *change-priority*, see Table 8–3.

You can also use the `lp -q` command to change the priority level of a specified print request. You can change the priority level from 0, the highest priority, to 39, the lowest priority.

Example 8–10 Changing the Priority of a Print Request

The following example shows how to change a print request with the request ID `asteroid-79`, to priority level 1.

```
# lp -i asteroid-79 -q 1
```

9

Administering Printers on a Network (Tasks)

This chapter describes how to administer printers remotely when using the IPP, RFC-1179, and SMB network protocols. For information about planning for printer setup by using IPP, see Chapter 3, "Setting Up Network Printing Services (Tasks)."

This is a list of the information that is in this chapter:

- "Administering Printers on a Network When Using the Internet Printing Protocol (Task Map)" on page 141
- "Administering Printers on a Network When Using the RFC-1179 Printing Protocol (Task Map)" on page 147
- "Administering Printers on a Network When Using the SMB Protocol" on page 148

For overview information about printing services and printers, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

Administering Printers on a Network When Using the Internet Printing Protocol (Task Map)

TABLE 9–1   Administering Printers by Using IPP (Task Map)

Task	Description	For Instructions
Check printer status and obtain information about a printer when using IPP.	The lpset command is used to check printer status when using IPP.	"How to Obtain Information About Printers When Using IPP" on page 142
Move a remote print request when using IPP.	The lpmove command is used to move print jobs to a new destination when using IPP.	"How to Move Remote Print Requests Between Print Queues When Using IPP" on page 143

TABLE 9–1   Administering Printers by Using IPP (Task Map)   *(Continued)*

Task	Description	For Instructions
Modify a remote print request when using IPP.	The `lp` command is used to modify remote print requests when using IPP.	"How to Modify Remote Print Requests When Using IPP" on page 144
Share printers when using IPP.	To share printers when using IPP, you need to modify the default file configuration.	"Sharing Printers When Using IPP" on page 145
Turn on IPP authentication mechanisms.	In some Oracle Solaris releases, client authentication is required to access some `uri-path` and operation combinations.	"Turning On IPP Authentication Mechanisms" on page 146
Set authorizations that enable you to accept print queues when using IPP.	The proper authentication information is required to enable an operation to be processed for the `uri` path.	"Setting Authorizations That Enable You to Accept Print Queues When Using IPP" on page 146
Add a user to the IPP `AuthUser` file.	Adding a user to the IPP `AuthUser` file requires modification of the `httpd-standalone-ipp.conf` file by using the `htpasswd` command.	" How to Add a User to the IPP `AuthUser` File" on page 147

▼ How to Obtain Information About Printers When Using IPP

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   To obtain information about a printer when using IPP, you would type:

```
# lpset -a printer-uri-supported=ipp://server/printers/server queue
```

3   To see the return output for the printer, you would type:

```
# lpstat -p test -l
```

Example 9–1   Obtaining Information About Printers When Using IPP

```
# lpset -a printer-uri-supported=ipp://server/printers/test test
# lpstat -p test -l
printer test disabled since Fri Nov 03 11:48:53 2006. available.
        new printer
        Form mounted:
        Content types: application/postscript
        Description:
        Connection:
```

```
        Interface: /usr/lib/lp/model/uri
        PPD: /usr/lib/lp/model/ppd/system/foomatic \
/HP/HP-Color_LaserJet_4600-Postscript.ppd.gz
        On fault: write root
        After fault: continue
        Users allowed:
                (all)
        Forms allowed:
                (none)
        Media supported:
                Letter
                A4
                11x17
                A3
                A5
                B5
                Env10
                EnvC5
                EnvDL
                EnvISOB5
                EnvMonarch
                Executive
                Legal
        Banner required
        Character sets:
                (none)
        Default pitch:
        Default page size:
        Default port setting:
        Options:
```

▼ How to Move Remote Print Requests Between Print Queues When Using IPP

You can remotely move print jobs between print queues when IPP is in use by using the lpmove command. Print jobs can be moved to the new destination by request ID or by the destination.

● **To move a remote print request from one print queue to another print queue when using IPP, type the following command:**

$ **lpmove** *request-id old-destination new-destination*

Example 9–2 Moving Remote Print Requests by Request ID

This example shows how to move a remote print request luna-185 to the new destination printer lucille by using the request ID.

$ **lpmove luna-185 lucille**

Example 9–3   Moving Remote Print Requests by Destination

This example shows how to move all of the print requests from the printer luna to the new destination printer lucille.

```
$ lpmove luna luciille
```

▼ How to Modify Remote Print Requests When Using IPP

You can use the lp command to perform a variety of tasks when using IPP. For more information about using the lp command, see the lp(1) man page.

● **Use the lp command with the appropriate command options to modify remote print jobs.**

```
$ lp [-d] [-H] [-i] [-n] [-o]
```

-d   Specifies the destination for the print request.

-H   Specifies special-handling. Prints the request according to the value of the special-handling.

-i   Specifies the request ID.

-n   Specifies number of copies. Specify this option as a digit. The default for number is 1.

-o   Specifies printer dependent options.

Example 9–4   Submitting Previously Held Print Requests

This example shows how to submit previously held print requests for the printer lucille.

```
$ lp -d lucille -H hold /etc/motd
```

Example 9–5   Changing the Number of Copies Requested

This example shows how to change the number of copies requested for the request ID lucille-233.

```
$ lp -i lucille-233 -n 5
```

Example 9–6   Turning on and Releasing the Duplex Feature

This example shows how to turn on and release the duplex feature for a specified request ID.

```
$ lp -i lucille-233 -o Duplex=DuplexNoTumble -H resume
```

Sharing Printers When Using IPP

When you install the Oracle Solaris OS, the IPP listening service is automatically enabled on a print server when you add the first print queue. The listening service is also disabled when the last print queue has been removed. The default configuration in Oracle Solaris 10 releases is fairly permissive. If you have security concerns, you might want to modify the default configuration to make it more restrictive. The set of unauthenticated IPP operations that is supported by the service should be limited to operations that are the least destructive.

Operations include:

- `print-job`
- `validate-job`
- `create-job`
- `get-jobs`
- `get-printer-attributes`
- `send-document`
- `cancel-job`
- `get-job-attributes`
- `cups-get-default`
- `cups-get-printers`
- `cups-get-classes`
- `cups-move-job`

IPP Authentication Mechanisms

IPP is layered on top of HTTP. As a result, the protocol uses authentication mechanisms that are built into the HTTP and the Apache software. In certain Oracle Solaris releases, the default configuration that is shipped with the operating system does not make use of these authentication mechanisms.

For example, the more common form of *printer-uri* that is used by client systems is:

`ipp://`*server*`/printers/`*queue*

When printing on a system that is running a Windows version , specify the URI by using the following syntax:

`http://`*server*`:631/printers/`*queue*

Turning On IPP Authentication Mechanisms

To authenticate, use the `accept` command as follows:

```
$ accept ipp://server/admin/queue
```

For example, to authenticate the print queue `masterly` on the server `noreaster` type:

```
$ accept ipp://noreaster/admin/masterly
```

You are prompted for authentication.

Enter the proper authentication information to enable the operation to be processed for the `uri` path.

For example:

```
system% accept ipp://printing/printers/wspe
accept: ipp://printing/printers/wspe: operation-not-supported
system% accept ipp://printing/admin/wspe
passphrase for user-name to access ipp://printing/admin/wspe:
accept: ipp://printing/admin/wspe: not-authorized
system%
```

Note – The following command fails under the default configuration for IPP, because the operation is not enabled for that `uri` path:

```
$ accept ipp://server/printers/queue
```

Setting Authorizations That Enable You to Accept Print Queues When Using IPP

To set authorizations for accepting print queues when using IPP, edit the `/etc/apache/httpd-standalone-ipp.conf` file.

Add the following entries to set up authentication:

- `AuthType`
- `AuthName`
- `AuthUserFile`

For an example, see the `/etc/apache/httpd-standalone-ipp.conf` file.

▼ How to Add a User to the IPP `AuthUser` File

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Update the `/etc/apache/httpd-standalone-ipp.conf` file by using the `htpasswd` command:

```
# /usr/sfw/bin/htpasswd /etc/ipp-users user-name
```

3 Verify the user was added, check the `/etc/ipp-users` file.

```
# grep user-name /etc/ipp-users
```

Administering Printers on a Network When Using the RFC-1179 Printing Protocol (Task Map)

TABLE 9–2   Administering Printers by Using the RFC–1179 Printing Protocol (Task Map)

Task	Description	For Instructions
Use the RFC-1179 protocol to cascade print requests.	Use this procedure to remove the dependency on the print scheduler service, if the print host is used to cascade print requests.	"How to Cascade Print Requests by Using the RFC-1179 Protocol" on page 147
Share printers when using the RFC-1179 network protocol.	Printer sharing when using the RFC-1179 printing protocol is accomplished by enabling and disabling the network listening service.	"Enabling, Disabling, and Restarting Network Printing Services (Task Map)" on page 51

▼ How to Cascade Print Requests by Using the RFC-1179 Protocol

The RFC-1179 protocol listener is represented by the FMRI, `svc:/application/print/rfc1179` (in.lpd). By default, this FMRI is dependent on the print scheduler service, `svc:/application/print/server`, and will only run if the host is running the print scheduler service.

Normally, the RFC-1179 listener is not needed when the print scheduler is not running. However, if the host is used to cascade print requests, the dependency on the print scheduler service should be removed.

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Remove the dependency on the print scheduler service.

```
# cat <<EOF | svccfg
>           select application/print/rfc1179
>           delpg lpsched
>           end
>           EOF
```

3   After you have removed the dependency, run the following command for the changes to take effect immediately:

```
# svcadm refresh application/print/rfc1179
```

Administering Printers on a Network When Using the SMB Protocol

Often, a system that is running the Oracle Solaris OS provides file and print services to a variety of systems on a network, including Windows systems. In a network where only Windows systems exist, the SMB protocol is commonly used to share printers. In the Oracle Solaris OS, server-side support for SMB is provided through Samba and managed through the Service Management Facility (SMF). Client-side printing support is also available through Samba. To access a Windows hosted printer, setup of a local print queue is required. This requirement is because of the differences in UNIX and Windows printing models.

The SMB service is controlled by the contents of the /etc/sfw/smb.conf file. An example of this file, /etc/sfw/smb.conf-example, is provided when you install the Oracle Solaris software on your system. To share printers by using the SMB protocol, you must first enable the service.

To start using this service, follow these steps:

- Create an /etc/sfw/smb.conf file.
- Set the workgroup string within the file to a value that is appropriate for your network.

  The WORKGROUP value is typically used for Windows installations. However, the MSHOME value is also sometimes used. Check your Windows client systems to determine the value to use.

10

Administering Character Sets, Filters, Forms, and Fonts (Tasks)

This chapter provides overview information and procedures for administering character sets, filters, forms, and fonts on a system with printers that have been configured by using the LP print service or with Oracle Solaris Print Manager.

This is a list of the information that is in this chapter:

Administering Character Sets (Task Map)

TABLE 10–1   Administering Character Sets and Font Cartridges (Task Map)

Task	Description	For Instructions
Define a print wheel or font cartridge.	Define a print wheel or font cartridge that can be used with a printer.	"How to Set an Alert to Mount a Print Wheel or Font Cartridge" on page 155
Unmount and mount a print wheel or font cartridge.	Delete a current print wheel or font cartridge from the print server's configuration file. Adds a new print wheel or font cartridge to the print server's configuration file.	"How to Unmount and Mount a Print Wheel or Font Cartridge" on page 153
Set up alerts to mount a print wheel or font cartridge.	Set up email alerts for print requests.	"How to Set an Alert to Mount a Print Wheel or Font Cartridge" on page 155

TABLE 10–1   Administering Character Sets and Font Cartridges (Task Map)   *(Continued)*

Task	Description	For Instructions
Set up an alias for a selectable character set.	Set up aliases when terminfo names for the selectable character sets are inadequate.	"How to Set Up an Alias for a Selectable Character Set" on page 156

Administering Character Sets

Printers differ in the method that they use to print text in various font styles. For example, PostScript printers treat text as graphics. These printers can generate text in different fonts. They can also place the text in any position, size, or orientation on the page. Other types of printers support a more limited number of font styles and sizes. These printers use either print wheels, font cartridges, or preprogrammed selectable character sets. Usually, only one printing method applies to a given printer type.

From the perspective of the LP print service, print wheels and font cartridges are similar. In both cases, someone must intervene and mount the hardware on the printer, when needed. Character sets that require you to physically mount a print wheel or font cartridge are referred to as *hardware character sets*. Character sets that do not require hardware mounting, come preprogrammed with the printer. These character sets can be selected by a print request. They are referred to as *software character sets*.

When you set up a non-PostScript printer, you need to tell the LP print service which print wheels or selectable character sets are available to users. When users submit print requests, the lp -S command enables them to specify a print wheel or selectable character set to use for the print job. Users do not have to know which type of character set applies. They just refer to the font style by the name you have defined. For example, you can define a print wheel as gothic. To request the gothic print wheel, the user would use the following command:

```
% lp -S gothic filename
```

Selectable Character Sets

The selectable character sets supported by a printer are listed in the terminfo entry for that printer. For example, the entry for the ln03 printer is /usr/share/lib/terminfo/l/ln03. You can find the names of selectable character sets for any printer type in the terminfo database by using the tput command. The syntax for the tput command is as follows:

```
tput -T printer-type csn
```

The cs*n* option is an abbreviation for character set number. The number starts with 0, which is always the default character set number after the printer is initialized. To display the names of

the other character sets, you can repeat the command by using -1, -2, -3, and so on, in place of the -0. For each selectable character set, a terminfo name, for example, usascii, english, finnish, and so forth, is returned.

In general, the terminfo character set names should closely match the character set names that are used in the manufacturer's documentation for the printer. Because all manufacturers do not use the same character set names, the terminfo character set names can differ from one printer type to the next printer type.

You do not have to register the selectable character set names with the LP print service. However, you can give them more meaningful names or aliases.

Note – If you do not specify the selectable character sets that can be used with a printer, the LP print service assumes that the printer can accept any character set name, such as cs0, cs1, or cs2, or the terminfo name known for the printer.

Character sets for PostScript printers are not listed when you use the lpstat -p -l command. The PostScript fonts are controlled by PostScript filters, not by entries in the terminfo database. For information about how to administer PostScript fonts, see "Administering Fonts" on page 187.

Users can use the lpstat -p -l command to display the names of the selectable character sets that you have defined for each printer on a print server.

Hardware Character Sets

Another method to obtain alternative character sets is to use removable print wheels or font cartridges that you physically attach, or mount, in a printer.

To administer hardware-mounted character sets, you inform the LP print service of the following:

- The names you want to use for the available print wheels
- How you want to be alerted when a printer needs a different print wheel

Then, when a user requests a particular character set by using the lp -S command, the print scheduler sends an alert to mount the print wheel. In addition, the print request is placed in the print queue. When you mount the correct print wheel and tell the LP print service that the print wheel is mounted, the job is printed. For more information, see "How to Unmount and Mount a Print Wheel or Font Cartridge" on page 153.

If you do not specify multiple print wheels or font cartridges for a printer, the LP print service assumes that the printer has a single, fixed print wheel or font cartridge. As such, users cannot specify a special print wheel or font cartridge when using that printer.

Unlike selectable character sets, the names you use for print wheels or font cartridges are not tied to entries in the terminfo database. Print wheel names or font cartridge names are used only for the purpose of communicating with the LP print service and its users.

However, the names you choose for print wheels or font cartridges should have meaning to the users. The names should refer to font styles. In addition, the names should be the same across printers that have similar print wheels, font cartridges, or selectable character sets. That way, users can specify a font style (character set), without regard to which printer will be used, or whether a print wheel, font cartridges, or a selectable character set will be used.

You and the printer users should agree on the meanings of print wheel names or font cartridge names. Otherwise, what a user asks for and what you mount might not be the same character set.

Tracking Print Wheels

The procedure for tracking print wheels is similar to the procedure for tracking forms. Some printers, usually letter-quality printers, have removable print heads that provide a particular font or character set. Removable print heads include print wheels and print cartridges. A user can request a named character set. If that character set is not available, the LP print service notifies root of the request. The job is stored in the print queue until the print wheel is changed.

Alerts for Mounting Print Wheels or Font Cartridges

You request alerts for mounting print wheels or font cartridges in the same way that you request other alerts from the LP print service. For general information about alerts, see "Setting Up Printer Fault Recovery by Using LP Print Commands" on page 102.

▼ How to Define a Print Wheel or Font Cartridge

The following procedure shows how to define a print wheel or font cartridge that can be used with the printer.

1 On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Define a print wheel or font cartridge.

print-server **lpadmin -p** *printer-name* **-S** *hard-charset1*[**,** *hard-charset2* . . .]

-p *printer-name*   Specifies the name of the printer for which you are defining a print wheel or font cartridge.

-s *hard-charset*   Specifies the hardware character set name of the print wheel or font cartridge.

You can specify multiple hardware character sets with this command. Use commas or spaces to separate character set names. If you use spaces, enclose the list of character set names in quotation marks.

Define names that are meaningful to users. Inform the users of these names.

The print wheel or font cartridge definition is specified in the print server's /etc/lp/printers/*printer-name*/configuration file.

3   On a print client of the print server, log in as superuser, lp, or assume an equivalent role.

4   Define the same print wheel or font cartridge for the print client.

print-client **lpadmin -p** *printer-name* **-S** *hard-charset1, hard-charset2...*

In this command, the variables are the same as the variables in Step 2.

The print wheel or font cartridge definition is added to the print client's /etc/lp/printers/*printer-name*/configuration file.

5   Repeat Step 3 and Step 4 for each print client that might need to use the print wheel or font cartridge.

6   Verify that the print wheel or font cartridge is defined.

You should see the name of the character set and the notation (mounted).

lpstat -p *printer-name* **-l**

Example 10–1   Defining a Print Wheel

The following example shows how to define the pica print wheel on the printer luna. The print client is named asteroid.

```
asteroid# lpadmin -p luna -S pica
```

▼ How to Unmount and Mount a Print Wheel or Font Cartridge

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2. **Unmount the print wheel or font cartridge that is mounted in the printer.**

   # **lpadmin -p** *printer-name* **-M -S none**

   -p *printer-name*   Specifies the printer on which you are unmounting a print wheel or font cartridge.

   -M -S none   Indicates that you want to unmount the current print wheel or font cartridge.

   For more information, see the lpadmin(1M) man page.

   The current print wheel or font cartridge is deleted from the print server's /etc/lp/printers/*printer-name*/configuration file.

3. **Remove the print wheel or font cartridge from the printer.**

4. **Put the new print wheel or font cartridge in the printer.**

5. **Mount the new print wheel or font cartridge.**

   # **lpadmin -p** *printer-name* **-M -S** *hard-charset...*

   -p *printer-name*   Specifies the printer on which you are mounting a print wheel or font cartridge.

   -M -S *hard-charset*   Specifies the hardware character set name of the print wheel or font cartridge you want to mount.

   The print wheel or font cartridge is added to the print server's /etc/lp/printers/*printer-name*/configuration file. The mounted print wheel or font cartridge remains active until it is unmounted or until a new print wheel or font cartridge is mounted.

6. **Check the information under the `Print wheels` or `Character set` heading in the output of the following command.**

   You should see the name of the print wheel or character set and the notation (mounted).

   # **lpstat -p** *printer-name* **-l**

Example 10–2   Unmounting and Mounting a Print Wheel

The following example shows how to unmount the current print wheel on the printer luna and mount the pica print wheel.

```
# lpadmin -p luna -M -S none
# lpadmin -p luna -M -S pica
```

▼ How to Set an Alert to Mount a Print Wheel or Font Cartridge

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Set an alert to mount a print wheel or font cartridge.

```
# lpadmin -S hard-charset -A alert [-Q requests] [-W minutes]
```

-S *hard-charset*	Specifies the hardware character set name of the print wheel or font cartridge for which you want to set an alert.
-A *alert*	Specifies what kind of alert will occur when a print wheel or font cartridge is requested. For detailed information about the valid values for *alert*, see Table 6–5. Some valid values are mail, write, and quiet.
	If you specify mail or write, a predefined alert message says to mount the specified print wheel or font cartridge. The message includes the names of one or more printers that have been set up to use such a print wheel or font cartridge.
-Q *requests*	Specifies the number of print requests that require the print wheel or font cartridge that must be in the queue before an alert occurs. If you don't specify this option, only one print request in the queue triggers an alert.
-W *minutes*	Specifies how often (in minutes) the alert occurs. If you do not specify this option, the alert is sent one time.

For more information, see the lpadmin(1M) man page.

The alert is added to the print server's /etc/lp/pwheels/*charset-name*/alert.sh file.

3   Verify that the alert has been added for the print wheel or font cartridge by checking the output of the following command.

```
# lpadmin -S hard-charset -A list
```

Alternately, if you have set a low number of print requests to trigger the alert, submit enough print requests to meet the minimum requirements. Ensure that you receive an alert to mount the print wheel or font cartridge.

Example 10–3   Setting an Alert to Mount a Print Wheel

The following example shows how to set email alerts to occur every 5 minutes for the elite print wheel when the print queue contains 10 print requests for the elite.

```
# lpadmin -S elite -A mail -Q 10 -W 5
```

Example 10–4 Setting an Alert to Mount a Font Cartridge

The following example shows how to set email alerts to occur every minute for the finnish font cartridge when the print queue contains 5 print requests for the finnish.

```
# lpadmin -S finnish -A mail -Q 5 -W 1
```

Example 10–5 Setting Up No Alerts for a Print Wheel

The following example shows how to set up no alerts for the elite print wheel.

```
# lpadmin -S elite -A none
```

▼ How to Set Up an Alias for a Selectable Character Set

You do not need to perform this procedure if the terminfo names for the selectable character sets are adequate. For more information on using the terminfo database, see "Adding a terminfo Entry for an Unsupported Printer" on page 114.

1 On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Display the names of the selectable character sets for the specified printer type.

```
# tput -T printer-type csn
```

-T *printer-type*   Specifies the printer type found in the terminfo database. For information on entries in the terminfo database, see "Printer Type" on page 209.

n   Specifies the number (0, 1, 2, 3, 4, 5, and so on) that represents a selectable character set for the specified printer type. The system displays the selectable character set name followed by the prompt symbol. For example, cs1 could cause the system to display english#.

For more information, see the tput(1) man page.

3 Set up an alias for a selectable character set.

```
# lpadmin -p printer-name -S select-charset1=alias1,select-charset2=alias2...
```

-p *printer-name*   Specifies the printer on which you are setting up aliases for selectable character sets.

-S*select-charset*	Specifies the selectable character set name. The name can be found in Step 2.
alias	Is the alias for the specified selectable character set. This alias can be used in addition to the selectable character set name.
	You can set up more than one alias with this command. Use commas or spaces to separate the aliases. If you use spaces, enclose the list of aliases in quotation marks.

The alias is added to the print server's /etc/lp/printers/*printer-name*/configuration file.

4   On a system that is a print client of the print server, log in as superuser, lp, or assume an equivalent role.

5   Set up an alias for the selectable character set.

```
# lpadmin -p printer-name -S select-charset1=alias1,select-charset2=alias2...
```

In this command, the variables are the same as the variables in Step 3.

The alias is added to the print client's /etc/lp/printers/*printer-name*/configuration file.

6   Repeat Step 4 and Step 5 for each print client that might need to use the alias.

7   On the print server and print clients, verify that the selectable character set alias is listed in the output of the following command.

```
# lpstat -p printer-name -l
```

Alternately, submit a print request that uses the alias for the selectable character set and check for output.

Example 10–6   Setting Up an Alias for a Selectable Character Set

The following example shows how to display the names of selectable character sets for the usascii selectable character set on the printer luna. The printer luna is a ln03 printer type. This example also shows how to specify text as an alias for the usascii selectable character set.

```
# tput -T ln03 cs0
usascii# tput -T ln03 cs1
english# tput -T ln03 csn2
finnish# tput -T ln03 csn3
japanese# tput -T ln03 cs4
norwegian#
# lpadmin -p luna -S usascii=text
```

Administering Print Filters (Task Map)

TABLE 10–2   Administering Print Filters

Task	Description	For Instructions
Create a new print filter.	Create a new print filter for file types that the LP print service cannot interpret.	"How to Create a New Print Filter" on page 167
Add a print filter.	Add information about print filters, which are programs that convert the content type of a file to a content type that is acceptable to the destination printer.	"How to Add a Print Filter" on page 171
Delete a print filter.	Delete information about print filters, which are programs that convert the content type of a file to a content type that is acceptable to the destination printer.	"How to Delete a Print Filter" on page 171
View information about a print filter.	Delete information about print filters, which are programs that convert the content type of a file to a content type that is acceptable to the destination printer.	"How to View Information About a Print Filter" on page 172

Creating a New Print Filter

A filter is used by the LP print service each time it has to print a type of file that the printer cannot interpret. Creating a new print filter is not easy, and it usually requires extensive experimentation.

The process of defining a new print filter consists of two steps:

- Writing a print filter program
- Creating a print filter definition

A print filter can be as simple or as complex as needed. Filters contain input types, output types, and complex options that provide a language to process command-line arguments within the filter.

If you have nonPostScript printers, you have to create and add print filters as required. First, you need to understand what print filters are and the requirements that must be met by a filter program.

Writing a Print Filter Program

The LP print service provides filter programs in the `/usr/lib/lp/postscript` directory. These filters cover most PostScript printing situations, where the destination printer requires the data to be in PostScript format. A print filter program must be a binary executable file.

Types of Filters

There are two types of print filters: fast filters and slow filters.

Fast filters do not require much processing time to prepare a file for printing. They must have access to the printer when they run. To be capable of detecting printer faults, a print filter must be a fast filter. Any filter that uses the PRINTER keyword as a filter option must be installed as a fast filter.

Slow filters require a great deal of processing time to prepare a file for printing. They do not require access to the printer when they run. Slow filters are run in the background so they do not tie up the printer, allowing other files that do not need slow filtering to be printed.

Converting Files

The LP print service uses print filters to convert files from one content type to another content type. You can specify the accepted file content types for each printer. The user specifies the file content type when submitting a print request. Then, the LP print service finds a printer that can print files of that content type. Because many applications can generate files for various printers, this method is often sufficient. However, some applications can generate files that cannot be printed on any available printers.

Each time the LP print service receives a request to print a type of file that is in a format that cannot be accepted directly by a printer, the LP print service tries to match the content type of the print request with the content type of the available (or specified) printer. If there is a match, the file can be sent directly to the printer without filtering. If no match is found, or if the content type specifies that a filter be used, the LP print service tries to match the content type of the file with the input content type of available filters. In addition, the LP print service tries to match the output type of the filter with the content type of the printer. When an appropriate filter is found, the print request is passed through the filter.

Handling Special Printing Modes

A print filter handles special printing modes and requests to print specific pages. A special printing mode is needed to print any characteristics of print requests that require a customized filter.

Filters handle the following characteristics:

- Printer type
- Character pitch
- Line pitch
- Page length
- Page width
- Pages to print
- Character set
- Form name
- Number of copies

The LP print service provides default settings for these characteristics. However, a print filter can handle some characteristics more efficiently. For example, some printers can handle multiple copies more efficiently than the LP print service. So, in this case, you can provide a filter for multiple-copy page control.

Detecting Printer Faults

Each printer has its own way of detecting printer faults and transmitting fault signals to the LP print service. The LP print service only checks for hang-ups (loss of carrier) and excessive delays in printing.

Some printers provide good fault coverage and can send a message that describes the reason for a fault. Other printers indicate a fault by using signals other than the signals for loss of carrier signal or shut off of data flow. A filter is required to interpret this additional printer fault information.

A filter can also put a print request on hold, wait for a printer fault to clear, and then resume printing. With this capability, the print request that was interrupted does not need to be reprinted in its entirety. Only a filter that knows the control sequences used by a printer can determine where to break a file into pages. Consequently, only such a filter can find the place in the file where printing should start after a fault is cleared.

When a print filter generates messages, those messages are handled by the LP print service. If alerts are enabled, the LP print service sends alerts to the system administrator. For further information, see "Setting Up Printer Fault Alerts by Using LP Print Commands" on page 100.

Requirements for a Print Filter Program

A print filter can be simple or complex, but it has to meet the following requirements:

- The filter should get the contents of a file from its standard input and send the converted file to the standard output.

- A program cannot be used as a filter if it references external files. You might be tempted to use a program such as astroff, nroff, or a similar word processing program as a filter. The LP print service does not recognize references to other files, known as *include files*, from a filter program. Because troff and nroff programs allow include files, they can fail when used as filters. If the program needs other files to complete its processing, the program should not be used as a filter.

- The filter should not depend on files that normally would not be accessible to a user. If a filter fails when run directly by a user, it will fail when run by the LP print service.

- A slow filter can send messages about errors in the file to standard error. A fast filter should not. Error messages from a slow filter are collected and sent to the user who submitted the print request.

- If a slow filter dies because it received a signal, the print request is stopped and the user who submitted the request is notified. Likewise, if a slow filter exits with a nonzero exit code, the print request is stopped and the user is notified. The exit codes from fast filters are treated differently.

If you want the filter to detect printer faults, it should also meet the following requirements:

- If possible, the filter should wait for a fault to be cleared before exiting. The filter should also continue to print at the top of the page where printing stopped after the fault is cleared. If you do not want use the continuation feature, the LP print service stops the filter before alerting the administrator.

- The filter should send printer fault messages to its standard error as soon as the fault is recognized. The filter does not have to exit, but can wait for the fault to be cleared.

- The filter should not send messages about errors in the file to standard error. These messages should be included in the standard output, where they can be read by the user.

- The filter should exit with a zero exit code if the file is finished printing (even if errors in the file have prevented it from being printed correctly).

- The filter should exit with a nonzero exit code, only if a printer fault has prevented the filter from finishing a print request.

- When added to the filter table, the filter must be added as a fast filter.

Creating a Print Filter Definition

A print filter definition tells the LP print service about the filter, what print filter program to run, what kind of conversion the print filter does, and so on. A set of filter descriptor files are

provided in the /etc/lp/fd directory. These files describe the characteristics of the filters (for example, fast filter or slow filter), and point to the filter programs (for example, /usr/lib/lp/postscript/postdaisy).

When defining a new print filter, you must create a print filter definition.

A print filter definition contains the following information used by the LP print service:

- Name of the filter program to run
- Input types the filter program accepts
- Output types the filter program produces
- Printer types to which the filter program can send jobs
- Names of specific printers to which the filter program can send jobs
- Filter types (either fast or slow)
- Options

You can type the characteristics as direct input to the lpfilter command. You also can create a file that specifies the filter's characteristics, and use the file name as input to the lpfilter command arguments. Such a file is called a *filter descriptor file* and should be located in the /etc/lp/fd directory. These files are not the filters themselves. Rather, these files point to the filters.

Whether you store the information in a file, or type the information directly on the command line, use the following format:

```
Command: command-pathname [options]
Input types: input-type-list
Output types: output-type-list
Printer types: printer-type-list
Printers: printer-list
Filter type: fast or slow
Options: template-list
```

Note – If you provide more than one definition (that is, more than one line) for any filter characteristic other than Options, only the second definition is used by the print service.

The information can be arranged in any order, and not all the information is required. When you do not specify values, the values shown in the following table are assigned by default. These values are not very useful, which is why you should specify values.

TABLE 10–3 Default Values for lpfilter Command

Item	Default Value
Input types	any
Output type	any

TABLE 10–3 Default Values for `lpfilter` Command *(Continued)*

Item	Default Value
Printer types	`any`
Printers	`any`
Filter type	`slow`

`lpfilter` Command

Use the full path of the filter program. If there are any fixed options that the program always needs, include them here.

`lpfilter` Input Types Argument

Input types is a list of file content types that the print filter can process. The LP print service does limit the number of input types, but most filters can accept only one input type. Several file types can be similar enough, such that the filter can deal with them. You can use whatever names you prefer, with a maximum of 14 alphanumeric characters and dashes. Do not use underscores as part of the input type name.

The LP print service uses these names to match a filter to a file type, so follow a consistent naming convention. For example, if more than one filter can accept the same input type, use the same name for that input type when you specify it for each filter. Inform your users of these names so that they know how to identify the file type when submitting a file for printing.

`lpfilter` Output Types Argument

Output types is list of file types that the filter can produce as output. For each input type, the filter produces a single output type. The output type can vary, however, from job to job. The name of the output type is restricted to 14 alphanumeric characters and dashes.

The output type names should either match the types of available (local or remote) printers, or match the input types handled by other filters. The LP print service groups filters in a shell pipeline if it finds that several passes by different filters are needed to convert a file. You will unlikely need this level of sophistication, but the LP print service allows it. Try to find a set of filters that takes as input types all the different files the users might want printed, and that converts those files directly into file types the printer can handle.

`lpfilter` Printer Types Argument

Printer types is a list of the types of printers into which the print filter can convert files. For most printers and filters, you can leave this part of the filter definition blank, because this list is identical to the list of output types. However, this list can be different. For example, you could have a printer with a single printer type for purposes of initialization. However, that printer can recognize several different file content types. Essentially, this printer has an internal filter that

converts the various file types into a filter type that it can handle. Thus, a filter might produce one of several output types that match the file types that the printer can handle. The print filter should be marked as working with that printer type.

As another example, you might have two different models of printers that are listed as accepting the same file types. Due to slight differences in manufacture, however, one printer deviates in the results it produces. You label the printers as being of different printer types, say A and B, where B is the printer that deviates. You create a filter that adjusts files to account for the deviation produced by printers of type B. Because this filter is needed only for those printer types, you would list this filter as working only on type B printers.

`lpfilter` Printers Argument

A print filter normally can work with all printers that accept its output, so you can usually skip this part of the filter definition.

You might, however, have some printers that are inappropriate for the output that the filter produces. For example, you might want to dedicate one printer for fast turnaround, only sending files that require no filtering to that printer. Other printers of identical type can be used for files that need extensive filtering before they can be printed.

`lpfilter` Filter Type Argument

The LP print service recognizes fast filters and slow filters, as described in "Types of Filters" on page 159.

Slow filters that are invoked by printing modes, by using the `lp -y` command, must be run on the system from which the print request originated. The LP print service cannot pass values for modes to print servers. It can, however, match a file content type (specified after the `-T` option of the `lp` command) to a content type on a print server. Therefore, if you want to activate special modes on a print server, you must specify content types that permit the LP print service to match input types and output types.

`lpfilter` Options Argument

Options specify how different types of information are converted into command-line arguments to the filter command. This information can include specifications from a user (with the print request), the printer definition, and the specifications implemented by any filters that are used to process the request.

Defining Print Filter Options With Templates

There are 13 sources of information for defining print filter options, each of which is represented by a *keyword*. Each option is defined in a *template*. A template is a statement in a filter definition that defines an option to be passed to the filter command, based on the value of one of the filter characteristics.

The options specified in a filter definition can include none, all, or any subset of the 13 keywords. In addition, a single keyword can be defined more than once, if multiple definitions are required for a complete filter definition. The following table contains descriptions of the 13 keywords available for defining options in a print filter definition.

TABLE 10–4 Keywords for Print Filter Options

Option Characteristic	Keyword	Patterns	Example
Content type (input)	INPUT	*content-type*	troff
Content type (output)	OUTPUT	*content-type*	postscript, impress
Printer type	TERM	*printer-type*	att495
Printer name	PRINTER	*printer-name*	lp1
Character pitch	CPI	*scaled-decimal*	10
Line pitch	LPI	*scaled-decimal*	6
Page length	LENGTH	*scaled-decimal*	66
Page width	WIDTH	*scaled-decimal*	80
Pages to print	PAGES	*page-list*	1-5,13-20
Character set	CHARSET	*character-set*	finnish
Form name	FORM	*form-name*	invoice2
Number of copies	COPIES	*integer*	3
Special modes	MODES	*mode*	landscape

A print filter definition can include more than one template. Multiple templates are entered on a single line and separated with commas, or they are entered on separate lines, preceded by the Options: prefix.

The format of a template is as follows: *keywordpattern = replacement*

The *keyword* identifies the type of option being registered for a particular characteristic of the filter.

The *pattern* is a specific option for the keyword.

The *replacement* is what happens when the keyword has the noted value.

For an example of how an option is defined for a particular filter, suppose you want to have the print service scheduler assign print requests to filters following this criteria:

- If the type of OUTPUT to be produced by the filter is impress, then pass the -I option to the filter.

- If the type of OUTPUT to be produced by the filter is postscript, then pass the -P option to the filter.

To specify these criteria, provide the following templates as options to the lpfilter command:

```
Options: OUTPUT impress=-I, OUTPUT postscript=-P
```

If the Options line becomes too long, put each template on a separate line, as follows:

```
Options: OUTPUT impress=-I
Options: OUTPUT postscript=-P
```

In both templates, the *keyword* is defined as OUTPUT. In the first template, the pattern is impress, and the value of the *replacement* is --I. In the second template, the value of *pattern* is postscript, and the value of *replacement* is -P.

To determine which values to supply for each type of template (that is, for the *pattern* and *replacement* arguments for each keyword), consider the following:

- The values for the INPUT templates come from the file content type that needs to be converted by the filter.

- The values for the OUTPUT templates come from the output type that has to be produced by the filter.

- The value for the TERM template is the printer type.

- The value for the PRINTER template is the name of the printer that will print the final output.

- The values for the CPI, LPI, LENGTH, and WIDTH templates come from the user's print request, the form being used, or the default values for the printer.

- The value for the PAGES template is a list of pages that should be printed. Typically, the value consists of a list of page ranges separated by commas. Each page range consists of a pair of numbers separated by a dash, or a single number. (For example, 1–5,6,8,10 indicates pages 1 through 5, plus pages 6, 8, and 10.) However, whatever value was given in the -P option to a print request is passed unchanged.

- The value for the CHARSET template is the name of the character set to be used.

- The value for the FORM template is the name of the form requested by the lp -f command (the command used to submit a print request).

- The value of the COPIES template is the number of copies of the file to print. If the filter uses this template, the LP print service reduces to one the number of copies of the filtered file it prints. This "single copy" includes the multiple copies that are produced by the filter.

- The value of the MODES template comes from the lp -y command. Because a user can specify several -y options, the MODES template might have several values. The values are applied in the left-to-right order given by the user.

The *replacement* option shows how the value of a template should be given to the filter program. This part typically a literal option, sometimes with the placeholder asterisk (*) included to show where the value goes. The *pattern* and *replacement* options also can use the regular expression syntax of the ed command for more complex conversion of user input options into filter options. All regular expression syntax of ed is supported, including the \(... \) and \n constructions. These constructions can be used to extract portions of the *pattern* option for copying into the *replacement* option, and the & option, which can be used to copy the entire *pattern* option into the *replacement* option. For more information, see the ed(1) man page.

Note – If a comma or an equal sign (=) is included in a *pattern* or a *replacement* option, precede it with a backslash (\). A backslash in front of any of these characters is removed when the *pattern* or *replacement* option is used.

▼ How to Create a New Print Filter

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Create a print filter program.

For information on print filter programs, see "Writing a Print Filter Program" on page 159. By convention, filter programs for PostScript printers are located in the /usr/lib/lp/postscript directory. You should put programs you create under the /usr/lib/lp directory in a directory of your choosing.

3   Create a print filter definition.

For information on print filter definitions, see "Creating a Print Filter Definition" on page 161. You should save the print filter definition in a text file. By convention, filter definitions are located in the /etc/lp/fd directory and are identified with the .fd suffix.

4   Add the print filter to a print server.

For instructions, see "How to Add a Print Filter" on page 171.

Example 10–7   Creating a New Print Filter

This example shows a print filter definition that is used to convert N37 or Nlp to simple.

```
Input types: N37, Nlp, simple
Output types: simple
Command: /usr/bin/col
Options: MODES expand = -x
Options: INPUT simple = -p -f
```

In this example, the print filter program is named `col`. Once you add the new print filter to a print server, a user's print requests are handled as follows:

When a user types the following command:

$ **`lp -y expand report.doc`**

The print filter program is run with the following arguments to convert the file:

```
/usr/bin/col -x -p -f
```

When a user types the following command:

$ **`lp -T N37 -y expand report.doc`**

The print filter program is run with the following arguments to convert the file:

```
/usr/bin/col -x
```

Example 10–8   Creating a New Print Filter by Converting One Input Type to Another Output Type

This example shows a print filter definition that is used to convert from `troff` to a PostScript file.

```
Input types: troff
 Output types: postscript
 Printer types: PS
 Filter type: slow
 Command: /usr/lib/lp/postscript/dpost
 Options: LENGTH * = -l*
 Options: MODES port = -pp, MODES land = -pl
 Options: MODES group \=\([1-9]\) = -n\l
```

In this example, the filter program is named `dpost`. The filter program takes one input type, `troff`, produces a `postscript` output, and works with any printer of type `PS` (PostScript). Users need to give just the abbreviation `port` or `land` when they ask for the paper orientation to be in either portrait mode or landscape mode. Because these options are not intrinsic to the LP print service, users must specify them by using the `lp -y` command.

After you add the new print filter to a print server, print requests will be handled as follows:

- When a user types the following command to submit a `troff` file type for printing on a PostScript printer (type `PS`), with requests for landscape orientation and a page length of 60 lines:

  $ **`lp -T troff -o length=60 -y land -d luna ch1.doc`**

The print filter program dpost is run with the following arguments to convert the file:

```
/usr/lib/lp/postscript/dpost -l60 -pl
```

- When a user enters the following command:

  ```
  $ lp -T troff -y group=4 -d luna ch1.doc
  ```

  The print filter program dpost is run with the following arguments to convert the file:

  ```
  /usr/lib/lp/postscript/dpost -n4
  ```

Administering Print Filters

Print filters are programs that convert the content type of a file to a content type that is acceptable to the destination printer.

The LP print service uses filters to complete the following tasks:

- Convert a file from one data format to another format so that it can be printed properly on a specific type of printer
- Handle the special modes of printing, such as two-sided printing, landscape printing, draft-quality, and letter-quality printing
- Detect printer faults and notify the LP print service, so that the print service can alert users and system administrators

Not every print filter can perform all these tasks. Because each task is printer-specific, the tasks can be implemented separately.

The LP print service provides the PostScript filters listed in Table 10–5. The filter programs are located in the /usr/lib/lp/postscript directory. For PostScript printing, you usually only need to install the filter programs when setting up a print server. Oracle Solaris Print Manager automatically enables the supplied filters. However, if you administer other printers, you might need to administer print filters for them.

Creating Print Filters

To create a new print filter, you must write a print filter program and create a print filter definition. Filters contain input types, output types, and complex options that provide a language to process command-line arguments within the filter. For more information and step-by-step instructions, see "Creating a New Print Filter" on page 158.

Adding, Changing, Deleting, and Restoring Print Filters

Print filters are added, changed, deleted, or restored on the print server only.

You can use the `lpfilter` command to manage the list of available filters. System information about filters is stored in the `/etc/lp/filter.table` file. The `lpfilter` command gets the information about filters to write to the table from filter descriptor files. The filter descriptor files that are supplied (PostScript only) are located in the `/etc/lp/fd` directory. The actual filter programs are located in the `/usr/lib/lp` directory.

The LP print service imposes no fixed limit on the number of print filters you can define. You can remove filters that are no longer used to avoid extra processing by the LP print service. (LP examines all filters to find a filter that works for a specific print request.) If in doubt, do not remove a filter.

As you add, change, or delete filters, you can overwrite or remove some of the original filters provided by the LP print service. You can restore the original set of filters, if necessary. You can also remove any filters you have added.

SunOS software provides a default set of PostScript filters. Oracle Solaris Print Manager automatically adds these filters to a print server. Some of the TranScript filters used with LPD-based print services have SunOS equivalents, but other TranScript filters do not. The following table lists the default PostScript filters and identifies the equivalent TranScript filters, where applicable.

TABLE 10–5 Default PostScript Filters

PostScript Filter	Action	TranScript Equivalent
download	Used to download fonts	
dpost	Changes `ditroff` to PostScript	psdit
postdaisy	Changes `daisy` to PostScript	
postdmd	Changes dmd to PostScript	
postio	Used for serial interface for PostScript printer	pscomm
postior	Used to communicate with printer	
postmd	Changes matrix gray scales to PostScript	
postplot	Changes `plot` to PostScript	psplot
postprint	Changes `simple` to PostScript	enscript
postreverse	Used to reverse or select pages	psrev
posttek	Changes TEK4014 to PostScript	ps4014

The SunOS software does *not* provide the following filters:

- TEX
- `oscat` (NeWSprint `opost`)

- Enscript

The postreverse, postprint, postio, and dpost filters are provided in place of Enscript.

Oracle Solaris Print Manager adds the default PostScript filters to a print server. If you have printing needs that are not met by these filters, see "How to Create a New Print Filter" on page 167. This section provides information about writing a custom print filter.

▼ How to Add a Print Filter

1 On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Add a print filter that is based on a print filter definition.

lpfilter -f *filter-name* **-F** *filter-definition*

-f *filter-name*   Specifies the name you choose for the print filter.

-F *filter-definition*   Specifies the name of the print filter definition.

For more information, see the lpfilter(1M) man page.

The print filter is added in the print server's /etc/lp/filter.table file.

3 Verify that the print filter was added.

lpfilter -f *filter-name* **-l**

Example 10–9   Adding a Print Filter

The following example shows how to add the daisytroff print filter that has the daisytroff.fd print filter definition.

lpfilter -f daisytroff -F /etc/lp/fd/daisytroff.fd

▼ How to Delete a Print Filter

1 On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Delete the print filter.

lpfilter -f *filter-name* **-x**

-f
filter-name   Specifies the name of the print filter to be deleted.

-x   Deletes the specified filter.

The print filter is deleted from the print server's `/etc/lp/filter.table` file.

3 Verify that the filter was deleted.

`# `**`lpfilter -f`** *filter-name* **`-l`**

You should receive an error indicating that no filter by the specified name exists.

Example 10–10   Deleting a Print Filter

The following example shows how to delete the `daisytroff` print filter.

```
# lpfilter -f daisytroff -x
```

▼ How to View Information About a Print Filter

1 On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Request information about a print filter.

`# `**`lpfilter -f`** *filter-name* **`-l`**

-f   Specifies the print filter for which you want to view information. Specify `all` for *filter-name* to view information about all available print filters.

-l   Displays information about the specified filter.

Information about the specified print filter or filters is displayed.

Example 10–11   Viewing Information About a Print Filter

This example shows how to request information for the `postdaisy` print filter. Sample command output follows.

```
# lpfilter -f postdaisy -l
Input types: daisy
Output types: postscript
Printer types: any
Printers: any
Filter type: slow
Command: /usr/lib/lp/postscript/postdaisy
```

```
Options: PAGES * = -o*
Options: COPIES * = -c*
Options: MODES group = -n2
Options: MODES group\=\([2-9]\) = -n\1
Options: MODES portrait = -pp
Options: MODES landscape = -pl
Options: MODES x\=\(\-*[\.0-9]*\) = -x\1
Options: MODES y\=\(\-*[\.0-9]*\) = -y\1
Options: MODES magnify\=\([\.0-9]*\) = -m\1
```

Example 10–12   Viewing Information About All Print Filters on a System

This example shows how to display all the print filters that have been added to the system. Sample command output follows.

```
# lpfilter -f all -l | grep Filter
(Filter "download")
Filter type: fast
(Filter "postio")
Filter type: fast
(Filter "postior")
Filter type: fast
(Filter "postreverse")
Filter type: slow
```

Example 10–13   Redirecting Information About a Print Filter

This example shows how to redirect information about the daisytroff filter to a file. This task is useful if a filter definition is removed unintentionally.

```
# lpfilter -f daisytroff -l > daisytroff.fd
```

Administering Forms (Task Map)

TABLE 10–6   Administering Printer Forms

Task	Description	For Instructions
Create a new form definition.	Provide a new form definition by specifying information for nine required printer characteristics.	"How to Create a New Printer Form Definition" on page 177
Limit user access to a form.	Control user access to printers and forms that are available on the network.	"How to Limit User Access to a Form" on page 185

TABLE 10–6 Administering Printer Forms *(Continued)*

Task	Description	For Instructions
Add a form.	Add the definition of a form to the list of available forms, so that the LP print service can recognize the form.	"How to Add a Form" on page 178
Delete a form.	Remove the definition of a form from the list of available forms that are recognized by the LP print service.	"How to Delete a Form" on page 178
Mount a form.	Use the mount command to notify the LP print service to accept print requests for a form with a specific definition.	"How to Unmount and Mount a Form" on page 180
Set an alert to mount a form.	Set alerts for forms that are mounted to a printer.	"How to Set an Alert to Mount a Form" on page 182
View information about a form.	View form names and other form information by listing the contents of the /etc/lp/forms directory.	"How to View Information About a Form" on page 183
View the current status of a form.	Use the lpforms command to display the current status of a form.	"How to View the Current Status of a Form" on page 184
Limit printer access to a form.	Control what forms printers have access to.	"How to Limit Printer Access to a Form" on page 186

Creating a New Printer Form

When you want to provide a new form, you must define its characteristics by specifying information for nine required printer characteristics (such as page length and page width) as input to the lpforms command.

The LP print service uses this information to perform the following tasks:

- Initialize the printer so that printing is done properly on the form
- Send reminders to the system administrator about how to handle the form

The form name can be anything you choose, as long as it does not contain more than 14 alphanumeric characters or any underscores. The information must use the following format:

```
Page length: scaled-number
Page width: scaled-number
Number of pages: integer
Line pitch: scaled-number
```

```
Character pitch: scaled-number
Character set choice: character-set-name [,mandatory]
Ribbon color: ribbon-color
Comment:
informal notes about the form
Alignment pattern: [content-type] alignment pattern
```

The optional word [,mandatory], means that the user cannot override the character set choice in the form. The *content-type* can be given, although this information is optional, with an alignment pattern. If this value is given, the print service uses it to determine, as necessary, how to filter and print the file.

Aside from following two exceptions, the information can appear in any order:

- The Alignment pattern (which must always be last).

- The comment (which must always follow the line with the Comment: prompt).

    If the comment contains a line that begins with a key phrase, such as Page length, Page width, and so on, precede that line with a > character so that the key phrase is not at the beginning of the line. The initial > character is stripped from the comment and is not displayed.

Not all of the information must be given. When you do not specify values, the default values in the following table are assigned. Before running the lpforms command, gather the following information about the new form that is described in this table.

TABLE 10–7 Default Values for Printer Forms

Value	Default	Description
Page length	66 lines	The length of the form, or the length of each page in a multipage form. This information can be the number of lines, or the size in inches or centimeters.
Page width	80 columns	The width of the form, in characters, inches, or centimeters.
Number of pages	1	The number of pages in a multipage form. The LP print service uses this number with a print filter (if available) to restrict the alignment pattern to a length of one form. See the description of alignment pattern below. If no filter is available, the LP print service does not truncate the output.
Line pitch	6 lines per inch	A measurement of how close lines appear on the form. Line pitch is also called *leading*.

TABLE 10–7 Default Values for Printer Forms *(Continued)*

Value	Default	Description
Character pitch	10 characters per inch	Character pitch is the distance between two lines, from baseline to baseline, measured by either lines per inch or lines per centimeter.
		A measurement of how close together characters appear on the form. It is the distance between characters, measured by either characters per inch or characters per centimeter.
Character set choice	Any	The character set, print wheel, or font cartridge that should be used when this form is used. Users can choose a different character set for their own print requests when using this form. Or, you can require that only one character set be used.
Ribbon color	Any	If the form should always be printed using a certain color ribbon, the LP print service can give a mount alert message indicating which color to use.
Comment	(No default)	Any remarks that might help users understand the form. For example, the remarks could indicate the name of the form, its revision, its purpose, or restrictions on its use.
Alignment pattern	(No default)	A sample file that the LP print service uses to fill one blank form. When mounting the form, you can print this pattern on the form to align it properly. You can also define a content type for this pattern so that the print service knows how to print it.

Note – The LP print service does not try to mask sensitive information in the alignment pattern. If you do not want sensitive information printed on sample forms, for example when you align checks, then you should mask the appropriate data. The LP print service keeps the alignment pattern stored in a safe place, where only users logged in as superuser or `lp` user can read it.

When you have gathered the information for the form, specify it as input to the `lpforms` command. You should record this information first in a separate file so that you can edit it before specifying it with the `lpforms` command. You can then use the file as input instead of typing each piece of information separately after a prompt.

▼ How to Create a New Printer Form Definition

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Create a form definition file.

For a description on creating printer forms, see "Creating a New Printer Form" on page 174. You should save the printer definition in a text file.

3   Add the form to the LP print service.

```
# lpadmin -p printer-name -M -f form-name
```

4   Add the form to a print server.

For instructions, see "How to Add a Form" on page 178.

Administering Forms

A *form* is a sheet of paper on which information is printed in a predetermined format. Unlike plain paper stock, forms usually have text or graphics preprinted on them. Common examples of forms are company letterhead, invoices, blank checks, receipts, and labels.

The term *form* has two meanings: the physical medium (the paper) and the software that defines a form to the LP print service.

The LP print service allows you to control the use of forms. This section provides information about adding, changing, deleting, mounting, and limiting access to forms.

Adding, Changing, or Deleting Forms

When you add a form, you tell the LP print service to include the form in its list of available forms. You also have to supply the information required to describe or define the form. Although you can specify such definitions when you add the form, it helps to create the definitions first and save them in files. You can then change the form definition by editing the file.

Note – No form definitions are supplied with the LP print service.

To change a form, you must re-add the form with a different definition.

The LP print service imposes no limit on the number of forms you can define. However, you should delete forms that are no longer appropriate. Obsolete forms can result in unnecessary processing by the print service.

▼ How to Add a Form

1 **On the print server, become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **Add a form that is based on a form definition.**

```
# lpforms -f form-name -F /etc/lp/forms/form
```

-f   Specifies the name you choose for the form

-F /etc/lp/forms/ *form*   Specifies the name of the form definition.

For more information, see the lpforms(1M) man page.

The form is added to the print server's /etc/lp/forms/*form-name*/describe file.

3 **Verify that the form was added by checking the output of the following command:**

```
# lpforms -f form-name -l
```

Example 10–14 Adding a Form

The following example shows how to add the medical form that uses the medical.fmd form definition.

```
# lpforms -f medical -F /etc/lp/forms/medical.fmd
```

See Also Before the form can be used, one or more printers must be given access to the form. For more information, see "How to Limit Printer Access to a Form" on page 186.

▼ How to Delete a Form

1 **On the print server, become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **Delete the form.**

```
# lpforms -f form-name -x
```

-f   Is the form to be deleted.

-x   Deletes the specified form

The form is deleted from /etc/lp/forms/*form-name* file.

For more information, see the lpforms(1M) man page.

3   Verify that the form was deleted.

lpforms -f *form-name* **-l**

You should receive an error indicating that a form by the specified name does not exist.

Example 10–15   Deleting a Form

The following example shows how to delete the medical form.

lpforms -f medical -x

Mounting Forms

To print a form, you must load the paper in the printer and use a command to *mount* the form. This command notifies the LP print service that print requests submitted to the printer are to be printed using the form definition.

If you use one printer for different types of printing, including forms, you should do the following:

- Disable the printer before you load the paper and mount the form.
- Re-enable the printer when the form is ready. Otherwise, the LP print service will continue to print files that do not need the form on the printer.

When you mount a form, ensure that it is aligned properly. If an alignment pattern has been defined for the form, you can request that the pattern print repeatedly after you have mounted the form. Let the pattern print repeatedly until you have adjusted the printer so the alignment is correct.

When you want to change or discontinue using a form on a printer, you must notify the LP print service by unmounting the form.

▼ How to Unmount and Mount a Form

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Stop accepting print requests on the printer on which you are unmounting the current form.

```
# reject printer-name
```

printer-name is the name of the printer on which you are unmounting a form.

New print requests (which might not require the form) are not allowed to enter the printer's queue.

3   Unmount the current form.

```
# lpadmin -p printer-name -M -f none
```

In this command, the variable *printer-name* is the same variable that is used in Step 2.

The current form is deleted from the print server's /etc/lp/printers/*printer-name*/configuration file.

4   Remove the form paper from the printer.

5   Load the new form paper for the next print request.

6   Mount the form.

```
# lpadmin -p printer-name -M -f form-name[-a -o filebreak]
```

-p	Specifies the printer on which you are mounting a form.
-M	Specifies the name of the form to be mounted.
-a -o filebreak	Optionally enables you to print a copy of the alignment pattern defined for the form, if this definition exists.
-p *printer-name*	Printer on which you are mounting a form.
-M -f *form-name*	Name of the form to be mounted.

The specified form is added in the print server's /etc/lp/printers/*printer-name*/configuration file.

7   Start accepting print requests on the printer.

```
# accept printer-name
```

The printer is ready to print the form you just mounted.

8   Verify that the form has been mounted.

lpstat -p *printer-name* **-l**

Otherwise, submit a print request that requires the new form and check the printer for output.

Example 10–16   Unmounting a Form

The following example shows the process of unmounting the currently mounted form on the printer luna.

```
# reject luna
destination "luna" will no longer accept requests
# lpadmin -p luna -M f none
# accept luna
destination "luna" now accepting requests
```

Example 10–17   Mounting a Form

The following example shows the process of mounting the medical form on the printer luna.

```
# reject luna
destination "luna" will no longer accept requests
# lpadmin -p luna -M f medical -a -o filebreak
# accept luna
destination "luna" now accepting requests
```

Tracking Forms

The LP print service helps you track which forms are mounted on each printer. The print service also notifies you when it cannot find a description it needs to print a form. You are responsible for creating form descriptions, and mounting and unmounting form paper in each printer. You complete this task either as part of setting up a printer or in response to alerts from the LP print service.

Users can specify the form on which they want a job to print. As superuser, you can mount a specific form, then tell the LP print service that the form is available and on which printer it is mounted. Users can submit print requests specifying a particular form. When the LP print service receives the request, it sends an alert message to root requesting that you mount the form.

Defining Alerts for Mounting Forms

You request alerts for mounting forms in the same way that you request other alerts from the LP print service. For general information about alerts, see "Setting Up Printer Fault Recovery by Using LP Print Commands" on page 102.

▼ How to Set an Alert to Mount a Form

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Set a request alert for mounting a form.

```
# lpforms -f form-name -A alert [-Q requests] [-W minutes]
```

-f   Specifies the form for which you want to set a request alert.

-A *alert*   Specifies what kind of alert will occur when a form is requested. Some valid values are mail, write, and quiet. If you choose mail or write, a predefined alert message says to mount the specified form. The message includes names of one or more printers that have been set up to use the form.

-Q *requests*   Specifies how many print requests that require the form must be in the queue to trigger an alert. If you don't specify this option, an alert occurs with just one print request in the queue.

-W *minutes*   Specifies how often (in minutes) the alert will occur. If you don't specify this option, the alert is sent one time.

The request alert is added to the print server's /etc/lp/forms/*form-name*/alert.sh file.

3   Verify that the alert has been added for the form.

```
# lpforms -f form-name -A list
```

Alternately, if you have set a low number of print requests to trigger the alert, submit print requests to meet the minimum requirement. Ensure that you receive an alert to mount the form.

Example 10–18   Setting an Alert to Mount a Form

This example shows how to set email alerts to occur every 5 minutes for the letterhead form when 10 print requests for letterhead reside in the print queue.

```
# lpforms -f letterhead -A mail -Q 10 -W 5
```

Example 10–19 Setting a Console Window Alert

This example shows how to set console window alerts to occur every 10 minutes for the letterhead form when 5 requests for letterheadreside in the print queue.

```
# lpforms -f letterhead -A write -Q 5 -W 10
```

Example 10–20 Setting up No Request Alerts

This example shows how to set no request alerts for the invoice form.

```
# lpforms -f invoice -A none
```

Checking Forms

When you have defined a form for the LP print service, you can check the form with either of two commands. Which command you choose depends on the type of information you want to check.

- To show the attributes of the form, use the lpforms command. You can also redirect the output of the command into a file to save it for future reference.
- To display the current status of the form, use the lpstat command. To protect potentially sensitive content, the alignment pattern is not shown.

If you are not sure about the name of an existing form, you can view the form names by listing the contents of the /etc/lp/forms directory.

▼ How to View Information About a Form

1 On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Request information about a form.

```
# lpforms -f form-name -l
```

-f   Specifies the form for which you want to view information. Specify all for *form-name* to view information about all the available forms.

-l   Lists the specified form.

Information about the specified form or forms is displayed.

Example 10–21   Viewing Information About a Form

The following example shows how to display information about the medical form.

```
# lpforms -f medical -l
Page length: 62
Page width: 72
Number of pages: 2
Line pitch: 6
Character pitch: 12
Character set choice: pica
Ribbon color: black
Comment:
Medical claim form
```

The following example shows how to redirect the information about the medical form to a file. This command creates the form definition for the form. This command is useful if a form definition is removed unintentionally.

```
# lpforms -f medical -l > medical.fmd
```

▼ How to View the Current Status of a Form

1   **Log in on the print server.**

2   **Request information about the current status of a form.**

$ **lpstat -f** *form-name*

The -f option specifies the form for which you want to view the current status. Specify all for *form-name* to view the current status of all the forms.

Information about the current status of the specified form or forms is displayed.

Example 10–22   Viewing the Current Status of a Form

This example shows how to display the status of the medical form.

```
$ lpstat -f medical
form medical is available to you
```

Limiting Access to Forms

You can control which printers and which users have access to some or all of the forms available on the network. For example, you might want only the people in the payroll or accounts payable department to be able to print check forms. In addition, you might want the check forms to be available only on certain printers.

For more information, see "How to Limit User Access to a Form" on page 185. To limit printer access to a form, see "How to Limit Printer Access to a Form" on page 186.

▼ How to Limit User Access to a Form

1 **On the print server, become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **Allow or deny users access to a form.**

```
# lpforms -f form-name -u allow:user-list | deny:user-list
```

-f   Specifies the name of the form for which the allow user access lists or the deny user access list is being created.

-u allow:*user-list*   Represents users to be added to the allow user access list. Use a comma or a space to separate user login IDs. If you use spaces, enclose the list of IDs in quotation marks.

                            Table 6–6 provides the valid values for *user-list*.

-u deny:*user-list*   Represents users to be added to the deny user access list. Use a comma or a space to separate user login IDs. If you use spaces, enclose the list of IDs in quotation marks. Table 6–6 provides the valid values for *user-list*.

The specified users are added to the appropriate user access list for the specified form in one of the following files on the print server:

- /etc/lp/forms/*form-name*/allow
- /etc/lp/forms/*form-name*/deny

3 **Verify that the allow user access list and deny user access list are set up correctly.**

```
# lpforms -f form-name -l
```

Example 10–23 Allowing User Access to a Form

This example shows how to allow only the users nathan and marcia access to the check form.

```
# lpforms -f check -u allow:nathan,marcia
```

Example 10–24 Denying User Access to a Form

This example shows how to deny users jones and smith access to the dental form.

```
# lpforms -f dental -u deny:jones,smith
```

▼ How to Limit Printer Access to a Form

1 **On the print server, become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 **Allow or deny use of forms on a printer.**

```
# lpadmin -p printer-name -f allow:form-list | deny:form-list
```

-p	Specifies the name of the printer for which the allow forms list or deny forms list is being created.
-f allow: *form-list*	Specifies the form name to be added to the allow list. Use a space or a comma to separate multiple form names. If you use spaces to separate form names, enclose the list of form names in quotation marks.
-f deny: *form-list*	Is the form name to be added to the deny list. Use a space or a comma to separate multiple form names. If you use spaces to separate form names, enclose the list of form names in quotation marks.

The specified form or forms are added to the allow forms list or the deny forms list in one of the following files on the print server:

- /etc/lp/printers/*printer-name*/form.allow
- /etc/lp/printers/*printer-name*/form.deny

3 **Verify that the allow forms list and the deny forms list are set up correctly.**

```
# lpstat -p printer-name -l
```

Example 10–25 Allowing Printer Access to a Form

This example shows how to allow the printer luna to access only the medical, dental, and check forms.

```
# lpadmin -p luna -f allow:medical,dental,check
```

Example 10–26 Limiting Printer Access to a Form

This example shows how to deny the printer luna from accessing the medical, dental, and check forms.

```
# lpadmin -p luna -f deny:"medical dental check"
```

Administering Fonts (Task Map)

TABLE 10–8   Administering PostScript Fonts

Task	Description	For Instructions
Install downloaded PostScript fonts.	Permanently download a font if most print requests serviced by the printer use that font. To avoid transmitting fonts across the network, add all the printer-resident fonts.	"How to Install Downloaded PostScript Fonts" on page 190
Install host-resident PostScript fonts.	Install host-resident fonts on a system that is shared by many users. Use this method when numerous fonts are available, or when these fonts are not used by all print requests.	"How to Install Host-Resident PostScript Fonts" on page 190

Administering Fonts

If you have a laser printer, you might need to install and maintain PostScript fonts. For many printers, the fonts are set up as part of the printer installation process.

PostScript fonts are stored in outline form, either on the printer or on a system that communicates with the printer. When a document is printed, the PostScript interpreter generates each character as needed in the appropriate size from the outline description of it. If a font required for a document is not stored on the printer being used, the font must be transmitted to that printer before the document can be printed. This transmission process is called *downloading fonts*.

Fonts are stored and accessed in several ways:

- *Printer-resident fonts* are stored permanently on a printer. These fonts are installed in read-only memory (ROM) on the printer by the manufacturer. If the printer has a disk, you can install fonts on that disk. Most PostScript printers are shipped with 35 standard fonts.

- A *permanently downloaded font* is transmitted to a printer with a PostScript `exitserver` program. A permanently downloaded font remains in printer memory until the printer is turned off. Memory allocated to a downloaded font reduces the memory available on the server for PostScript print requests. Use of an `exitserver` program requires the printer system password and can be reserved for the printer administrator. You should permanently download a font if most print requests serviced by the printer use that font.

- Fonts that are used infrequently or for special purposes can be stored on a user's system. The user can specify these fonts when submitting the print request. The fonts are appended to the print request and transmitted to the printer. When the print request is processed, the space allocated for the font is freed for other print requests.

- *Host-resident fonts* are stored on a system that is shared by many users. The system that stores the fonts can be a print server or a print client. Each user can request fonts in the document to be printed. This method is useful when numerous fonts are available, or when these fonts are not used by all print requests. If the fonts will be used only on printers attached to a print server, they should be stored on the print server. If the fonts will be used by the users on one system and those users can submit requests to multiple printers on a network, the fonts should be stored on the users' system.

  The LP print service provides a special download filter to manage host-resident fonts. The LP print service also supplies `troff` width tables for the 35 standard PostScript fonts that reside on many PostScript printers. For more information about the `troff` program, see the `troff(1)` man page.

Managing Printer-Resident Fonts

Most PostScript printers come equipped with fonts that are resident in the printer ROM. Some printers have a disk on which additional fonts are stored. When a printer is installed, you should add the list of printer-resident fonts to the font list for that printer. By identifying printer-resident fonts, you prevent fonts from being transmitted unnecessarily across a network. Each printer has its own list of resident fonts, which is contained in this file:

`/etc/lp/printers/`*printer-name*`/residentfonts`

When the printer is attached to a print server, ensure that the list in the `residentfonts` file includes fonts that are on the print server. The file must also include fonts that are available for downloading to the printer.

You must edit the files that contain the list of printer-resident fonts by using a text editor such as `vi`.

Downloading Host-Resident Fonts

When a PostScript document contains a request for fonts not loaded on the printer, the download filter manages this request. The download filter uses PostScript document structuring conventions to determine which fonts to download.

LP print filters are either fast or slow. A *fast filter* quickly prepares a file for printing. Also, a fast filter must have access to the printer while the filter is processing. A *slow filter* takes longer to convert a file. However, a slow filter does not need to access the printer while the filter is processing. An example of a slow filter is a filter that converts an ASCII document to a PostScript document.

The *download filter* is a fast filter. This filter downloads fonts automatically if the fonts are on the print server. The download filter can also be used to send fonts to a print server. To do so, you can create a new filter table entry that calls the download filter as a slow filter by using the `lp -y` command. Alternatively, you can force selection of this filter by changing the input type.

The download filter performs five tasks:

1. The filter searches the PostScript document to determine which fonts are requested. These requests are documented with the following PostScript structuring comments: `%%DocumentFonts:` *font1 font2* … in the header comments.
2. The download filter searches the list of printer-resident fonts to determine if the requested font must be downloaded.
3. If the font is not resident on the printer, the download filter searches the host-resident font directory table to determine if the requested font is available. This filter performs this search by getting the appropriate file name from the map.
4. If the font is available, the download filter takes the file for that font and appends it to the file to be printed.
5. The download filter sends the font definition file and the source file to the PostScript printer. The *source file* is the file to be printed.

Installing and Maintaining Host-Resident Fonts

Some fonts reside on the host system and are transmitted to the printer as needed for particular print requests. As the administrator, you make PostScript fonts available to all users on a system. To do so, you must know how and where to install these fonts. Because fonts are requested by name and stored in files, the LP print service keeps a *map file*. A map file shows the correspondence between the names of fonts and the names of the files that contain those fonts. Both the map file and the font list must be updated when you install host-resident fonts.

The fonts available for use with PostScript printers are stored in directories that you create. These directories are called /usr/share/lib/hostfontdir/*typeface*/*font*. The variable *typeface* is replaced by a name, such as palatino or helvetica. The variable *font* is replaced by a an attribute name, such as bold or italic.

▼ How to Install Downloaded PostScript Fonts

1   On the print server, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Change directory to the /etc/lp/printers/*printer-name* directory.

```
# cd /etc/lp/printers/printer-name
```

The variable *printer-name* specifies the name of the printer on which you want to install downloaded PostScript fonts.

3   Create the residentfonts file, if this file does not already exist.

```
# touch residentfonts
```

This file might not exist if you are adding permanently downloaded fonts for the first time.

4   Edit the residentfonts file. Add all the printer-resident fonts and the fonts to be permanently downloaded.

▼ How to Install Host-Resident PostScript Fonts

1   On the print server or the print client, become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   Create the hostfontdir directory.

```
# cd /usr/share/lib
```

a.   Change to the /usr/share/lib directory.

```
# cd /usr/share/lib
```

b.   Create the hostfontdir directory, if this directory does not already exist.

```
# mkdir hostfontdir
```

c.   Change the permissions on the hostfontdir directory to 775.

```
# chmod 775 hostfontdir
```

3   Create a directory for a new typeface, if the directory does not already exist.

    # **mkdir** *typeface*

4   Copy the font file to the appropriate directory.

    # **cp** *filename* **/usr/share/lib/hostfontdir/***typeface***/***font*

5   Add to the map file the name of the font and the name of the file in which it resides.

a. Change to the /usr/share/lib/hostfontdir directory.

b. Edit the map file by using a text editor such as the vi editor.

Add a one-line entry for each font that you want to add to the file. Put the font name first, followed by a space, followed by the name of the file where the font resides. For example:

    Palatino-Bold /usr/share/lib/hostfontdir/palatino/bold

c. Save the file.

When an example entry exists in the map file on the appropriate system, users can apply the font (for example, Palatino Bold) to their print jobs. When users submit a print request that contains this font, the LP print service appends a copy of the /usr/share/lib/hostfontdir/palatino/bold file to that file before sending it to the printer.

6   If you are using the troff program, you must create new width tables for this font in the standard troff font directory.

◆ ◆ ◆   C H A P T E R   1 1

11

Administering Printers by Using the PPD File Management Utility (Tasks)

This chapter describes how to use the PPD File Manager, `/usr/sbin/ppdmgr`, utility to administer PostScript Printer Description (PPD) that are used with the print subsystem. The `ppdmgr` utility enables you to customize printers and automates a variety of administrative printing tasks.

This is a list of the information that is in this chapter:

For reference information, see .

Administering PPD Files by Using the PPD File Management Utility (Task Map)

TABLE 11–1   Administering PPD Files by using `ppdmgr` (Task Map)

Task	Description	For Instructions
Add a PPD file to a system by using the `ppdmgr` utility.	Use the `ppdmgr` utility to add a PPD file to the system.	"How to Add a PPD File to a System by Using the `ppdmgr` Utility" on page 197
Add a PPD file to a system by using the `lpadmin -n` command.	Use the `lpadmin -n` command to modify an existing print queue to associate a PPD file with it.	"How to Add a PPD File to a System by Using the `lpadmin -n` Command" on page 200

TABLE 11–1   Administering PPD Files by using `ppdmgr` (Task Map)   *(Continued)*

Task	Description	For Instructions
Request an update or a rebuild of the PPD cache file that is associated with a specific label or all labels. **Note –** Depending on the number of PPD files to process, a rebuild of the PPD cache file can be time-consuming.	Use the `ppdmgr` utility to request an update of the PPD cache file, if you added a PPD file manually or by using the `pkgadd` command. If you suspect the PPD cache file has become corrupted, you can request a rebuild of the PPD cache file information for PPD files in these locations: ■ In a specified label directory within a specified repository on a system ■ Within all the repositories on a system	"How to Update or Rebuild the PPD Cache File by Using the `ppdmgr` Utility" on page 202
Enable the `application/print /ppd-cache-update` service.	The `application/print /ppd-cache-update` service must be online to reflect changes made to PPD file repositories in the PPD cache. This service is enabled by default. You can enable the service by using the `svcadm` command, if necessary.	"How to Enable or Disable the `ppd-cache-update` Service" on page 204
Disable the `application/print /ppd-cache-update` service.	Use the `svcadm` command to disable the `application/print /ppd-cache-update` service.	"How to Enable or Disable the `ppd-cache-update` Service" on page 204

Overview of the PPD File Management Utility

To provide support for a wide range of printers, the print system has the ability to use PostScript Printer Description (PPD) files. The PPD File Manager (`/usr/sbin/ppdmgr`) provides a means of administering PPD files on a system. This utility enables you to add PPD files to the system and update printer information for printers that are not yet supported in the running Oracle Solaris OS.

With the `ppdmgr` utility, you can perform the following tasks:

■ Add a PPD file to a PPD file repository on a system.

■ Supply a label that groups PPD files within a PPD file repository.

■ Update the information in the PPD cache file Oracle Solaris Print Manager uses to display supported printer information.

Adding PPD Files to a System

When you add or modify a printer by using Oracle Solaris Print Manager, a *PPD cache* file, ppdcache, is referenced to display printer driver information. See "Description of the Printer Driver Field in Oracle Solaris Print Manager" on page 231. The PPD File Management utility generates the cache file by gathering printer information from the PPD files in all of the PPD file repositories on a system. To reflect any changes that are made in Oracle Solaris Print Manager, the PPD cache file must be updated.

You can use the following methods to add a PPD file to a system:

- ppdmgr utility
- lpadmin command with the -n option
- pkgadd command

When you add a PPD file to a system by using the ppdmgr utility or the lpadmin -n command, the changes are reflected in Oracle Solaris Print Manager. If the PPD file is manually copied to the system or added by using the pkgadd command, you can use the ppdmgr utility to make sure that the new PPD files are reflected in the cache file that is used by Oracle Solaris Print Manager.

Using the ppdmgr utility to add a PPD file to the system provides more flexibility because you can specify what label is used and where the file is stored. The -L and -R options of the ppdmgr utility enable you to specify a label and repository of your own choosing. See "Specifying a PPD File Label" on page 195. If you add a PPD files to a system by using the lpadmin -n command or the ppdmgr utility and do not specify a label or repository, the PPD file is stored in the user label directory within the user repository. Similarly, if the source path to the PPD file that you provide is not from an existing PPD file label within an existing PPD file repository on the system, then the file is copied to the user label within the user repository.

Specifying a PPD File Label

A *PPD file label* describes a grouping of PPD files and refers to a user-selected or default directory name within a PPD file repository. When you use the ppdmgr utility to add a PPD file to the system, you can optionally specify a label. Using labels allows for easier organization of PPD files, which makes for easier identification of PPD files when you add or modify a printer by using Oracle Solaris Print Manager.

You can also specify a file label when you request an update or a rebuild of the PPD cache file by using the -u or the -r option . If you do not specify a label, the user default label is assigned to the PPD file. If you request an update or a rebuild of the PPD cache file, the default label is all, which specifies all PPD file repositories.

> **Note** – You cannot specify the `all` label when adding a PPD file to a system by using the `ppdmgr` utility with the `-a` option. See "PPD File Labels" on page 230 for more information.

Specifying a PPD File Repository

You can specify a repository when adding a PPD file to a system by using the `ppdmgr` utility or when requesting an update of the PPD cache file. A *repository* is a directory where PPD file information is stored. More than one PPD file repository can exist on a system. PPD files that are supplied by third-party vendors are stored in the `vendor` repository. PPD files that are added by system administrators can be stored in the `admin` repository.

The following are locations where PPD files are stored on a system:

- The PPD files that are delivered with Oracle Solaris are stored in the `system` repository.

- PPD files that are added manually by using the `ppdmgr -a` command or the `lpadmin -n` command are stored in the `user` repository.

- PPD files that are added manually by using the `ppdmgr` utility with the `-R` option are stored in the repository that you specify with this option.

- The `all` repository is used to specify all the repositories on a system. You can specify the `all` repository when requesting an update or a rebuild of the PPD cache file by using the `-u` or `-r` option of the `ppdmgr` command. If no repository is specified, the default repository is `user`. For more information, see "How to Update or Rebuild the PPD Cache File by Using the `ppdmgr` Utility" on page 202.

> **Note** – You cannot specify the `all` repository when adding a PPD file to a system by using the `ppdmgr` utility with the `-a` option. See "PPD File Repositories" on page 229 for more information.

Locating PPD File Label and Repository Information in Oracle Solaris Print Manager

The Printer Driver field in Oracle Solaris Print Manager now displays the PPD file label and the PPD file repository abbreviation, in addition to the printer driver information. The addition of the label and repository information assists in the selection of the correct printer driver. This information is especially useful in situations where multiple PPD files with identical names are located on a system, within various label directories and repositories.

For more information, see "Description of the Printer Driver Field in Oracle Solaris Print Manager" on page 231.

Using the PPD File Manager (`ppdmgr`) Utility

▼ How to Add a PPD File to a System by Using the `ppdmgr` Utility

This procedure describes how to use the ppdmgr utility to add a new PPD file to the system. You can also specify a PPD file label, PPD repository, or the source path of the PPD file, by using the appropriate arguments with the ppdmgr -a command. Note that when you add a PPD file to the system by using the ppdmgr command, the file is copied to the label and repository that you specify and then compressed.

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 Add the PPD file to the system.

```
# ppdmgr -a ppd-file-path [ -L label ] [ -R repository ] [-w]
```

-a   Copies the PPD file that is specified in ppd-file-path to the PPD repository, then updates the information in the cache file to reflect the change.

                   If the -L option is not specified, the default label that is assigned to the PPD file is user.

                   If the -R option is not specified, the default repository that is assigned to the PPD file is user.

ppd-file-path   Specifies the source path to the PPD file and the name of that file. This file is used with the -a option to add a copy of *ppd-file-path* to the specified label within the specified repository with the specified label. The ppdmgr utility accepts a valid PPD file that has either a .ppd or .ppd.gz extension.

-L *label*   Specifies a PPD file label. The default label is user. Label names must contain characters that are in the portable file name character set. Label names must not begin with a hyphen (-) or contain a semicolon (:). Label names cannot be a reserved label name.

                   The following label names are reserved and cannot be used with the -a option:

                   - caches
                   - ppdcache
                   - manufaliases
                   - all

-R *repository*   Specifies the name of a PPD file repository that represents one of the PPD file installation locations. When using this option, one of the following PPD file repositories can be specified:

- user (default)
- admin

-w   Displays the full path where the PPD file was copied. The -w option is only valid if it is used with the -a option. Otherwise, this option is ignored.

3   Verify that the PPD file was added by using one of the following methods:

- **Check that the file is displayed in Oracle Solaris Print Manager:**

    a. **Start Oracle Solaris Print Manager.**

    For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

    b. **Select Modify Printer Attributes (attached or network).**

    c. **Select the printer for which you added the PPD file.**

    If the PPD file that you specified was added successfully, the information is displayed in the Printer Driver field. See "Description of the Printer Driver Field in Oracle Solaris Print Manager" on page 231.

Example 11–1   Adding a PPD File to a System

This example shows how to add a PPD file, myHPprinter.ppd, to the system.

Note that in this example and the examples that follow the *path* that is specified varies.

```
# ppdmgr -a /net/somesystem/myHPprinter.ppd
```

The path to where the copy of the PPD file can be found on the system is /usr/share/model/ppd/system/foomatic/HP/myHPprinter.ppd.gz.

Using this command, with the -a option, copies the file to the user label within the user repository.

Example 11–2   Adding a PPD File to a System With a Specified Label

This example shows how to add the PPD file myHPprinter.ppd, with the specified label, Photos, to the system.

```
# ppdmgr -a /net/somesystem/myHPprinter.ppd -L Photos
```

The path to where the copy of the PPD file can be found on the system is
/usr/share/model/ppd/Photos/HP/myHPprinter.ppd.gz

Using this command, with the -a and the -L options, copies the PPD file to the Photos label
within the user repository.

Example 11–3 Adding a PPD File to a System to a Specified Repository

This example shows how to add a PPD file, myHPprinter.ppd, to the admin repository on a
system.

```
# ppdmgr -a /net/somesystem/myHPprinter.ppd -R admin
```

The path to where the copy of the PPD file can be found on the system is
/usr/local/share/ppd/user/HP/myHPprinter.ppd.gz.

Using this command with the -a and -R options copies the file to the user label directory within
the admin repository.

Example 11–4 Adding a PPD File to a System With a Specified Label to a Specified Repository

This example shows how to add a PPD file, myHPprinter.ppd, to a system, specifying the
Photos label and the admin repository.

```
# ppdmgr -a /net/somesystem/myHPprinter.ppd -L Photos -R admin
```

The path to where the copy of the PPD file can be found on the system is
/usr/local/share/ppd/Photos/HP/myHPprinter.ppd.gz.

Using this command with the -a, -L, and -R options copies the file to the Photos label within
the admin repository.

Example 11–5 Adding a PPD File to a System and Displaying the Full Path to Where the File Was
Copied

This example shows how to add a PPD file, myHPprinter.ppd, to a system by displaying the
destination path of the PPD file. Use the ppdmgr command with this option to determine where
the PPD file was copied on the system.

```
# ppdmgr -a /net/somesystem/myHPprinter.ppd -w
```

The path to where the copy of the PPD file can be found on the system is
/var/lp/ppd/user/HP/myHPprinter.ppd.gz.

Using this command with the -a and -w options copies the specified file to the user label within the user repository.

The -w option is only valid when used in combination with the -a option. Otherwise, this option is ignored.

See Also   For a detailed description of the ppdmgr command-line options and for guidelines on adding PPD files, see "Description of the Command-Line Options for the ppdmgr Utility" on page 233.

▼ How to Add a PPD File to a System by Using the `lpadmin -n` Command

This procedure shows how to use the lpadmin command to modify an existing print queue configuration to associate a specified PPD file with the print queue.

If you use the lpadmin command with the -n option to add a PPD file to a system, you cannot specify a label or a repository. Instead, the user label is assigned to the file, and the file is then copied to the user repository. If you want to specify a user-defined label or repository, use the ppdmgr utility to add the PPD file. See "How to Add a PPD File to a System by Using the ppdmgr Utility" on page 197.

1   **Become superuser or assume an equivalent role.**

    Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   **Modify an existing print queue by associating it with a PPD file.**

    # **lpadmin -p** *print-queue* **-n** *ppd-file-path*

lpadmin	Administrative command that is used to configure the LP print service.
-p *print-queue*	Specifies the print queue. Note that the print queue is sometimes referred to as the *printer-name*.
-n	Copies the PPD file that is specified in the *ppd-file-path* to the default user label directory that is located within the default user PPD file repository.
ppd-file-path	Specifies the source path to the PPD file and the name of that file. This file is used with the -a option to add a copy of *ppd-file-path* to the specified label within the specified repository. The ppdmgr utility accepts a valid PPD file with either a .ppd or .ppd.gz extension.

3 **Verify that the PPD file was added by using one of the following methods:**

- **Check that the file is displayed in Oracle Solaris Print Manager:**

  a. **Start Oracle Solaris Print Manager.**

     For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

  b. **Select Modify Printer Attributes (attached or network).**

  c. **Select the print queue that you specified in Step 2 of this procedure.**

     If the PPD file that is associated with the print queue was added successfully, it is displayed in the Printer Driver field. See "Description of the Printer Driver Field in Oracle Solaris Print Manager" on page 231.

- **Use the `lpstat` command to verify the PPD file was added:**

  ```
  % lpstat -p print-queue -l
  ```

  If the PPD file was added to the print queue successfully, the PPD file name is included in the PPD field of the lpstat command's output.

Example 11–6 Adding a PPD File to an Existing Print Queue by Using the `lpadmin -n` Command

This example shows how to modify the print queue, printer1, to associate it with a copy of the specified PPD file.

```
# lpadmin -p printer1 -n /path/mynewHPppdfile.ppd
```

The specified PPD file is stored in /var/lp/ppd/user/HP/mynewHPppdfile.ppd.gz.

Updating the PPD Cache File

An update of the PPD cache file on a system updates the existing information in the PPD cache file.

You might make the request and update of the PPD cache file on a system in the following instances:

- If you add a PPD file to the system by using the pkgadd command.
- If you copied a PPD file to a label directory, within a known PPD file repository manually.

Any changes that you make are reflected in Oracle Solaris Print Manager after the update has completed.

Rebuilding the PPD Cache File

A rebuild of the PPD cache file removes the existing cache and builds a completely new cache. This process can be time-consuming, especially if many PPD files are on the system. Therefore, only request a rebuild of the PPD cache file in troubleshooting situations. For guidelines that pertain to updating and rebuilding the PPD cache file, see "Description of the Command-Line Options for the ppdmgr Utility" on page 233.

▼ How to Update or Rebuild the PPD Cache File by Using the ppdmgr Utility

This procedure describes how to update or rebuild the PPD cache file by using either the -u or the -r option of the ppdmgr utility.

- To update the PPD cache file, use the ppdmgr command with the -u option.
- To rebuild the PPD cache file, use the ppdmgr command with the -r option.

1   Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*

2   Update or rebuild the PPD cache file to reflect any recent changes.

`# ppdmgr -u | -r [ -R `*repository*` ] [ -L `*label*` ]`

-u   Updates the PPD cache file with information about the PPD file, or files, that are assigned to the specified label within the specified repository. The default label is user. The default repository is also user. If no changes are identified, no changes are made to the cache file.

-r   Removes the existing PPD cache file, then rebuilds the file with the PPD file information for the PPD file, or files, within the specified label.

If no label is specified, the default label is user, within the specified repository. If a repository is not specified, the default repository is also user.

Under normal circumstances, you do not need to request a rebuild of the PPD cache file. Use this option only if you suspect that the PPD cache file has become corrupted.

-R *repository*   Specifies a PPD file repository to update. You can specify one of the following PPD file repositories:

- admin
- all (Specifies all available PPD file repositories on a system)
- system

- user (default)
- vendor

-L *label*   Specifies a PPD file label.

The default label is user. Label names must contain characters that are in the portable file name character set. Label names must not begin with a hyphen (-) or contain a semicolon (:). Label names cannot be a reserved label name.

The following label names are reserved:

- caches
- ppdcache
- manufaliases
- all

3   **Verify that the PPD file was added by using one of the following methods:**

- **Check that the file is displayed in Oracle Solaris Print Manager:**

    a. **Start Oracle Solaris Print Manager.**

    For instructions, see "How to Start Oracle Solaris Print Manager" on page 56.

    b. **Select Modify Printer Attributes (attached or network).**

    c. **Select the print queue for which you added the PPD file in Step 2 of this procedure.**

    If the PPD file that you specified was added successfully, the information is displayed in the Printer Driver field. See "Description of the Printer Driver Field in Oracle Solaris Print Manager" on page 231.

- **Use the lpstat command to verify the PPD file was added:**

    % **lpstat -p** *printer-name* **-l**

    If the PPD file was added to the system successfully, the PPD file name is included in the PPD field of the lpstat command's output.

Example 11–7   Updating the PPD Cache File by Using the ppdmgr Utility

This example shows how to update the PPD cache file to reflect information from the PPD files that are assigned in all the labels within the user repository.

ppdmgr -u

This example shows how to update the PPD cache file to reflect information from the PPD files that are assigned in the Photos label within the user repository.

```
# ppdmgr -u -L Photos
```

This example shows how to update the PPD cache file to reflect the information from the PPD files that are assigned in all the labels within the admin repository.

```
# ppdmgr -u -R system
```

This example shows how to update the PPD cache file to reflect information from the PPD files that are assigned in the Photos label within the admin repository.

```
# ppdmgr -u -L Photos -R admin
```

Managing the `ppd-cache-update` Service

The Service Management Facility (SMF) service for updating the PPD cache file, `application/print/ppd-cache-update`, is run once during system reboot to ensure that modifications made to any PPD file repositories on a system are reflected in the ppdcache file. The service instance is `svc:/application/print/ppd-cache-update`. This service is enabled by default when you install the Oracle Solaris software. To enable or disable the service, use the svcadm command.

Note – During a software installation or an upgrade, the cache file entries are generated for all PPD files that are delivered to the system repository, /var/lp/ppd. As a result, when the system reboots, it might take longer for the service to make the transition to an online state.

For instructions, see "How to Enable or Disable the `ppd-cache-update` Service" on page 204. For information about using SMF and the svcadm command, see the smf(5) and svcadm(1M) man pages.

▼ How to Enable or Disable the `ppd-cache-update` Service

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2 To enable or disable the `application/print/ppd-cache-update` service, type:

```
# svcadm enable|disable application/print/ppd-cache-update
```

3 To verify that the service is enabled or disabled, type:

svcs application/print/ppd-cache-update

If the service is enabled, the output is as follows:

```
# svcs application/print/ppd-cache-update
STATE          STIME    FMRI
online         Apr_26   svc:/application/print/ppd-cache-update:default
```

If the service is disabled, the output is as follows:

```
# svcs application/print/ppd-cache-update
STATE          STIME    FMRI
diabled        Apr_26   svc:/application/print/ppd-cache-update:default
```

See Also For step-by-step instructions on using the ppdmgr utility with the -u option to update the PPD cache file, see "How to Update or Rebuild the PPD Cache File by Using the ppdmgr Utility" on page 202.

12

Printing in the Oracle Solaris Operating System (Reference)

This chapter provides the following reference information for the following features:

Oracle Solaris Print Manager

The following sections provides additional reference information that applies to setting up and administering printers by using Oracle Solaris Print Manager.

Oracle Solaris Print Manager and Special Characters

Oracle Solaris Print Manager checks user input for the various text fields in the input screens. There are two types of checking: general illegal input and input that is illegal for specific fields.

Oracle Solaris Print Manager does not accept the following characters as input, except for the help screens:

- Shell metacharacters, such as "\$^&*(){}''|;:?<>, except for the destination field on the network printer screen, which accepts colons (:)
- Multibyte characters
- Pound signs (#), spaces, or tabs, except the description field, which accepts tabs

Printer Definitions

The following sections describe each printer definition you can set with Oracle Solaris Print Manager.

Printer Name

When adding a printer to a system, you specify a *printer name* for the printer.

A printer name must adhere to these guidelines:

- The printer name must be unique among all printers within the bounds of an administrative domain.
- The printer name can have a maximum of 14 alphanumeric characters, which can include dashes and underscores.

Note – Printer names can now include a dot (.) and be up to 255 characters in length.

- The printer name should be easy to remember and can identify the type of printer, its location, or the print server name.

Establish a naming convention that works for your site. For example, if you have different types of printers on the network, including the printer type as part of the printer name can help users choose an appropriate printer. For instance, you could identify PostScript printers with the letters PS. However, if all of the printers at your site are PostScript printers, you would not need to include the initials PS as part of the printer name.

Printer Server

The print server is the system that has a local printer connected to it and makes the printer available to other systems on the network.

Printer Description

You can assign a description to a printer by using the lpadmin -D command or by using Oracle Solaris Print Manager. The printer's description should contain information that helps users identify the printer. You might include the room number where the printer is located, the type of printer, the manufacturer, or the name of the person to call if printing problems occur.

Users can view a printer description by using the following command:

```
$ lpstat -D -p printer-name
```

Printer Port

When you initially install a printer, or later change its setup, you can specify the device, or the *printer port*, to which the printer is connected. You can use either Oracle Solaris Print Manager or the lpadmin -p *printer-name* -v *device-name* command to specify the device or printer port.

Most systems have two serial ports, plus a parallel port or USB ports. Unless you add ports, you cannot directly connect more than two serial printers and a parallel printer, or two USB printers, to one system.

You can select the following printer port types by using Oracle Solaris Print Manager. These options give you as much flexibility as using the lpadmin command.

Printer Port Type	Corresponding Device Name Options
Serial	/dev/term/a
Serial	/dev/term/b
Parallel	/dev/printers/0 –> /dev/ecpp0
USB	/dev/printers/[1–9]
Specify any port name that the print server recognizes	Other

The LP print service initializes the printer port by using the settings from the standard printer interface program. For more information about printer interface programs, see "Administering Print Filters" on page 169. If you have a parallel printer or a serial printer for which the default settings do not work, see "Adjusting Printer Port Characteristics" on page 112.

---

x86 only – If you use multiple ports on an x86 based system, only the first port is enabled by default. The second port, and any subsequent ports, are disabled by default. To use more than one port, you must manually edit the device driver port configuration file for each additional asy (serial) port or ecpp (parallel) port. The path names for the x86 port configuration files are the following:

/kernel/drv/asy.conf

/kernel/drv/ecpp.conf

Printer Type

The *printer type* is a generic name for a type of printer. Printer type identifies the terminfo database entry that contains various control sequences for the printer. By convention, printer type is usually derived from the manufacturer's model name. For example, the printer type name for the DECwriter printer is decwriter. However, the common printer type PS does not

follow this convention. `PS` is used as the printer type for many models of PostScript printers, such as the Apple LaserWriterI and Apple LaserWriterII printers. For more information about the `terminfo` database, see "The `terminfo` Database" on page 217.

You can specify the printer type by using the `lpadmin -T` command or Oracle Solaris Print Manager.

File Content Type

In this Oracle Solaris release, to assign the file content type printer definition by using Oracle Solaris Print Manager, first deselect the Use PPD files default attribute in the Print Manager drop-down menu in Oracle Solaris Print Manager. You cannot select a file content type if you use PPD files. The default file content type for printers that are associated with PPD files is PostScript. This file content type is automatically set by the tool. You can also specify file content type by using the `lpadmin -I` command.

Print filters convert the content type of a file to a content type that is acceptable to the destination printer. The *file content type* tells the LP print service the type of file contents that can be printed directly, without any filtering. To print without filtering, the necessary fonts must also be available in the printer. You must set up and use filtering for other types of files.

Most printers can print directly the following types of files:

- The same type as the printer type. For example, `PS` for a PostScript printer.
- The `simple` type. For example, an ASCII text file.

When submitting a file for printing, the user can indicate the content type of the file by using the `lp -T` *content-type* command. If no file content type is supplied when the request is submitted, the LP print service checks the first file in the request to determine the content type. If the file begins with `^D%!` or `%!`, the request is considered to contain PostScript data. Otherwise, the request is assumed to contain `simple` (ASCII) text. The LP print service uses the file content type to determine which filters to use to convert the file contents into a type the printer can handle.

When you are not specifying PPD files, Oracle Solaris Print Manager provides a list of file content types from which you can choose when you install or modify an attached or network-attached printer. The choices are translated to the names that the LP print service uses. The following table describes the file content types that you can choose with Oracle Solaris Print Manager.

TABLE 12–1 Choosing File Content Type With Oracle Solaris Print Manager When Not Using PPD Files

File Contents Choice	LP Print Service Name	Description
PostScript	`postscript`	PostScript files do not require filtering.
ASCII	`simple`	ASCII files do not require filtering.

TABLE 12–1   Choosing File Content Type With Oracle Solaris Print Manager When Not Using PPD Files   *(Continued)*

File Contents Choice	LP Print Service Name	Description
Both PostScript and ASCII	simple, postscript	PostScript files and ASCII files do not require filtering.
None	""	All files require filtering, except those files that match the printer's type.
Any	any	No filtering is required. If the printer cannot handle a file content type directly, the file will not be printed.

Choose the file content type that best matches the printer's capabilities. PostScript is the default choice in Oracle Solaris Print Manager and is probably correct most of the time. PostScript means that filtering is not needed for PostScript files.

Printer Make

When you set up a printer with PPD files, the *printer make* is the name of the manufacturer of the printer. The printer make is found on the printer itself, and on the packaging materials and documentation that is shipped with the printer.

The following are examples of printer makes that are available in this release:

- Lexmark
- Epson
- Canon
- QMS
- Xerox

Printer Model

The printer manufacturers produce several types and models of printers. When you set up a printer with PPD files, the *printer model* defines the printer precisely. The model is usually stamped on the front or top of the printer. This information is also displayed on the packaging materials and documentation that is shipped with the printer.

The following are examples of printer models that are available in this release:

- Lexmark Optra E312
- Lexmark Z32
- Lexmark 1000

Printer Driver

The *printer driver* is determined when you select the PPD file for the specified printer make and printer model.

Printer Destination

This printer definition specifies the host name, IP address, or URI of the target printer. This definition applies to network-attached printers *only*.

Printer URIs can be specified by using the following formats:

- `lpd://{`*printer-name* or *ip*`}/printers/`*print-queue*
- `ipp://{`*printer-name* or *ip*`}/printers/`*print-queue*
- `socket://{`*printer-name* or *ip*`}:{`*port*`}`
- `smb://{`*windows-host*`}/{`*printer*`}`

Network Protocol

This printer definition specifies the protocol to be used between the print server and the printer. The current choices are the BSD, TCP, and URI network protocols. This printer definition applies to network-attached printers only.

Fault Notification

This printer definition is used to specify whether a notification is sent when a printer fault is detected, and how the notification should be sent.

Default Printer

The default printer is the printer that the print system commands use when a printer is not specified on the command line or in by using a printing tool. For more information about using LP print commands to set up a default printer destination, see "Setting Up a Default Printer Destination by Using LP Print Commands" on page 95.

Banner Page

The banner page is the first sheet that is printed when on a print job is requested. The banner page can be set to always print, optionally print, or never print. For more information about using LP print commands to specify banner page options, see "Printing Banner Pages by Using LP Print Commands" on page 96.

User Access List

The user access list specifies a list of users are allowed to print from the specified print server. For more information about using LP print commands to limit user access to a printer, see "Limiting User Access to a Printer by Using LP Print Commands" on page 104.

Printer Class

A printer class is a collection of printers. Print requests that go to a class of printers are handled by the first available printer in that class. For more information about using LP print command to define printer classes, see "Setting Up Printer Classes by Using LP Print Commands" on page 99.

Fault Recovery

You can find out about printing faults so that you can correct the problem. Fault recovery options are defined by using the lpadmin command with the -F option. For more information about using LP print commands to set up fault recovery, see "Setting Up Printer Fault Recovery by Using LP Print Commands" on page 102.

LP Print Service

This section describes the directory structure, files, and logs of the LP print service.

LP Print Service Commands

Note – The LP Print Service client commands have been modified to be a consumer of the FSG OpenPrinting Open Standard Print API (PAPI). These print commands are layered on top of the PAPI. See "How the PAPI Is Implemented in the Oracle Solaris OS" on page 235 for more information.

The following table lists frequently used LP print service commands.

TABLE 12–2 LP Print Service Commands

Command	Task	Man Page
enable	Activate a printer	enable(1)
cancel	Cancel a print request	cancel(1)
lp	Send one or more file or files to a printer	lp(1)
lpstat	Report the status of the LP print service	lpstat(1)
disable	Deactivate on or more printers	enable(1)
accept	Permit print requests to be queued for a specific destination	accept(1M)

TABLE 12–2 LP Print Service Commands *(Continued)*

Command	Task	Man Page
reject	Prevent print requests from being queued for a specific destination	accept(1M)
lpadmin	Set up or change a printer configuration	lpadmin(1M)
lpfilter	Set up or change filter definitions	lpfilter(1M)
lpforms	Set up or change preprinted forms	lpforms(1M)
lpadmin	Mount a form	lpadmin(1M)
lpmove	Move output requests from one destination to another destination	lpmove(1M)
lpsched	Start the LP print service scheduler	lpsched(1M)
lpshut	Stop the LP print service scheduler	lpshut(1M)
lpusers	Set or change the default priority and priority limits that can be requested of the LP print service by users	lpusers(1M)

For information about print commands that have been modified for use with the PAPI, see "How the PAPI Is Implemented in the Oracle Solaris OS" on page 235.

Functions of the LP Print Service

The LP print service performs the following functions:

- Administers files and schedules local print requests
- Receives and schedules network requests
- Filters files, if necessary, so they print properly
- Starts programs that interface with the printers
- Tracks the status of print jobs
- Tracks forms that are mounted on the printer
- Tracks print wheels that are currently mounted
- Delivers alerts to mount new forms or different print wheels
- Delivers alerts about printing problems

Daemons and LP Internal Files

The /usr/lib/lp directory contains daemons and files used by the LP print service, as described in the following table.

TABLE 12–3 Contents of the /usr/lib/lp Directory

File	Type	Description
bin	Directory	Contains files for generating printing alerts, slow filters, and queue management programs.
model	Directory	Contains the standard printer interface program.
postscript	Directory	Contains all PostScript filter programs provided by the LP print service. These filters come with descriptor files in the /etc/lp/fd directory. These files tell the LP print service the characteristics of the filters and where to locate them.

LP Print Service Directories

The files of the LP print service are distributed among the directories that are shown in the following table.

TABLE 12–4 Directories for the LP Print Service

Directory	Contents
/usr/bin	The LP print service user commands.
/etc/lp	A hierarchy of LP server configuration files.
/usr/share/lib	The terminfo database directory.
/usr/lib/print	The lp conversion scripts, in.lpd daemon, and the printd daemon. The printd daemon transfers all pending jobs in the/var/spool/print directory once per minute. When no jobs are remaining to transfer, the printd daemon exits.
/usr/sbin	The LP print service administrative commands.
/usr/lib/lp	The lpsched program, binary files, PostScript filters, and the model directory, which contains the standard printer interface program.
/var/lp/logs	LP log files such as lpsched.n (which includes messages from lpsched) and requests.n (which includes information about completed print requests).
/var/spool/lp	The spooling directory where files are queued for printing.
/var/spool/print	The staging area for LP print service client-side requests.
/etc/lp/model/uri	The location of the interface script that process *device-uri* information.

LP Print Service Configuration Files

The `lpsched` daemon stores configuration information in the `/etc/lp` directory, as described in the following table.

Caution – The configuration files listed in this table are private interfaces. These files are subject to change in future releases. You should not build software that relies on these files being in their current locations or that relies on the data being in the format currently used.

TABLE 12–5   Contents of the `/etc/lp` Directory

File	Type	Description
classes	Directory	Files identifying classes provided by the `lpadmin -c` command.
fd	Directory	Description of existing filters.
filter.table	File	Print filter look-up table.
forms	Directory	Location to put files for each form. Initially, this directory is empty.
interfaces	Directory	Printer interface program files.
logs	Link to `/var/lp/logs`	Log files of printing activities.
model	Link to `/usr/lib/lp/model`	The standard printer interface program.
printers	Directory	Directories for each local printer. Each directory contains configuration information and alert files for an individual printer.
pwheels	Directory	Print wheel files or cartridge files.
ppd	Directory	Each local queue that is configured with a PPD file has a copy of the PPD file placed here.

These configuration files serve a function similar to the `/etc/printcap` file on LPD-based print servers.

Note – You can check the contents of the configuration files, but you should not edit these files directly. Instead, use the `lpadmin` command to make configuration changes. Your changes are written to the configuration files in the `/etc/lp` directory. The `lpsched` daemon administers and updates the configuration files.

The `/etc/lp/printers` directory has a subdirectory for each local printer that is known to the system. The following example shows the `/etc/lp/printers` subdirectories of printers `sparc1` and `luna`.

```
$ ls -l /etc/lp/printers
drwxrwxr-x 2 lp lp 512 Jan 23 23:53 luna
drwxrwxr-x 2 lp lp 512 Jan 11 17:50 sparc1
```

The following table describes the files within each printer-specific directory.

File Name	Description
alert.sh	Shell to execute in response to alerts
alert.vars	Alert variables
configuration	Configuration file
users.deny	List of users to whom printer access is denied
comment	Printer description

The configuration file for the printer `luna`, `/etc/lp/printers/luna/configuration`, would typically appear as follows:

```
Banner: on: Always
Content types: PS
Device: /dev/term/b
Interface: /usr/lib/lp/model/standard
Printer type: PS
Modules: default
```

The `terminfo` Database

The `/usr/share/lib` directory contains the `terminfo` database directory. This directory contains definitions for many types of terminals and printers. The LP print service uses information in the `terminfo` database to perform the following tasks:

- Initializes a printer
- Establishes a selected page size, character pitch, line pitch, and character set
- Communicates the sequence of codes to a printer

Each printer is identified in the `terminfo` database with a short name. If necessary, you can add entries to the `terminfo` database, but doing so is tedious and time-consuming. For more information, see "Adding a `terminfo` Entry for an Unsupported Printer" on page 114.

Printer Names in the `terminfo` Database

Information about each printer type is stored in the `terminfo` database
(`/usr/share/lib/terminfo`). This information includes the printer capabilities and
initialization control data. The printer you install must correspond to an entry in the `terminfo`
database.

```
$ pwd
/usr/share/lib/terminfo
$ ls
1  3  5  7  9  B  H  P  a  c  e  g  i  k  m  o  q  s  u  w  y
2  4  6  8  A  G  M  S  b  d  f  h  j  l  n  p  r  t  v  x  z
$
```

Each subdirectory contains compiled database entries for terminals or printers. The entries are
organized by the first letter of the printer or terminal type. For example, if you have an Epson
printer, look in the `/usr/share/lib/terminfo/e` directory to find your particular model of
Epson printer.

```
$ cd /usr/share/lib/terminfo/e
$ ls
emots          ep2500+high   ep48          ergo4000      exidy2500
env230         ep2500+low    epson2500     esprit
envision230    ep40          epson2500-80  ethernet
ep2500+basic   ep4000        epson2500-hi  ex3000
ep2500+color   ep4080        epson2500-hi80 exidy
$
```

The entries for Epson printers begin with `epson`.

If you have an NEC printer, look in the `/usr/share/lib/terminfo/n` directory for your NEC
printer model.

```
$ cd /usr/share/lib/terminfo/n
$ ls
ncr7900        ncr7900iv     netronics     network       nuc
ncr7900-na     ncr7901       netty         netx          nucterm
ncr7900i       nec           netty-Tabs    newhp
ncr7900i-na    net           netty-vi      newhpkeyboard
$
```

The `nec` entry in this directory is for the NEC printer.

Required `terminfo` Items For a Printer

The following three tables list the `terminfo` items that are required for a printer.

TABLE 12–6 Required `terminfo` Items for a Printer (Booleans)

Item	Description
Booleans:	
cpix	Changing character pitch changes resolution
daisy	Printer requires an operator to change character set
lpix	Changing line pitch changes resolution

TABLE 12–7 Required `terminfo` Items for a Printer (Numbers)

Item	Description
Numbers:	
bufsx	Number of bytes buffered before printing
cols	Number of columns in a line
cps	Average print rate in characters per second
it	Tabs initially every n spaces
lines	Number of lines on a page
orc	Horizontal resolution, in units per character
orhi	Horizontal resolution, in units per inch
orl	Vertical resolution, in units per line
orvi	Vertical resolution, in units per inch

TABLE 12–8 Required `terminfo` Items for a Printer (Strings)

Item	Description
Strings:	
chr	Changes horizontal resolution
cpi	Changes number of characters per inch
cr	Carriage return
csnm	List of character set names
cudl	Moves carriage down one line
cud	Moves carriage down n lines
cuf	Moves carriage to the right n columns

TABLE 12–8 Required `terminfo` Items for a Printer (Strings) *(Continued)*

Item	Description
cvr	Changes vertical resolution
ff	Ejects page
hpa	Horizontal position absolute
ht	Tabs to next 8-space tab stop
if	Is the name of initialization file
iprog	Is the path name of initialization program
is1	Is a printer initialization string
is2	Is a printer initialization string
is3	Is a printer initialization string
lpi	Changes number of lines per inch
mgc	Clears all margins (top, bottom, and sides)
rep	Repeats a character n times
rwidm	Disables double-wide printing
scs	Selects character set
scsd	Starts definition of a character set
slines	Set page length to n lines per page
smgl	Sets left margin at current column
smglp	Set left margin
smgr	Sets right margin at current column
smgrp	Sets right margin
smglr	Sets both left and right margins
msgt	Sets top margin at current line
smgtp	Sets top margin
smgb	Sets bottom margin at current line
smgbp	Sets bottom margin
smgtb	Sets both top and bottom margins
swidm	Enables double-wide printing
vpa	Sets vertical position to absolute

LP Print Service Log Files

The LP print service maintains two sets of log files that are described in the following table.

Log File Name	Description
`syslogd`	Set `lpr.debug` in `/etc/syslog.conf` to enable LP print service logging
`/var/spool/lp`	A list of current requests that are in the print queue
`/var/lp/logs/requests`	An ongoing history of print requests

Print Queue Logs

The scheduler for each system keeps a log of print requests in the `/var/spool/lp/tmp/`*system* and `/var/spool/lp/requests/`*system* directories. Each print request has two files, one file in each directory, that contain information about the request. The information in the `/var/spool/lp/requests/`*system* directory can be accessed only by superuser or `lp`. The information in the `/var/spool/lp/tmp/`*system* directory can be accessed only by the user who submitted the request, superuser, or `lp`.

The following example shows the contents of the `/var/spool/lp/tmp/starbug` directory:

```
$ ls /var/spool/lp/tmp/starbug
5      5-0
# cat 5-0
C 1
D print1
F /etc/profile
P 20
T /etc/profile
t simple
U root
s 0000
v 2
```

These files remain in their directories only as long as the print request is in the queue. Once the print request is finished, the information in the files is combined and appended to the `/var/lp/logs/requests` file. This file is described in the next section.

Use the information in the `/var/spool/lp/logs` directory if you need to track the status of a print request that is currently in the queue.

History Log Files

The LP print service records a history of printing services in two log files, lpsched and requests. These log files are located in the /var/lp/logs directory. You can use the information in these log files to diagnose and troubleshoot printing problems. An example of the contents of the /var/lp/logs directory is as follows:

```
# cd /var/lp/logs
# ls
lpsched.1    requests    requests.2
lpsched      lpsched.2   requests.1
#
```

The two most important log files for troubleshooting are the following:

- The lpsched log file – Contains information about local printing requests.

- The requests log file – Contains information about print requests that are completed and no longer in the print queue.

The requests log file has a simple structure so that you can extract data using common UNIX shell commands. Requests are listed in the order they are printed. They are also separated by lines showing their request IDs. Each line below the separator line, the line that starts with =, is marked with a single letter that identifies the kind of information contained in that line. Each letter is separated from the data by a single space.

The following example shows the contents of a requests log file:

```
# pwd
/var/lp/logs
# tail requests.2
= print1-3, uid 0, gid 1, size 206662, Wed Mar 14 08:56:30 MST 2003
z print1
C 1
D print1
F /usr/dict/words
P 20
T /usr/dict/words
t simple
U root
s 0x0014
v 2
#
```

The following table shows the letter codes and the content of their corresponding lines in the requests log file.

TABLE 12–9 Codes in the `requests` Log File

Letter	Content of Line
=	The separator line, which contains the following items: request ID, user ID (UID), and group IDs (GIDs) of the user, the total number of bytes in the original (unfiltered) file size, and the time when the request was queued.
z	The name of the printer.
C	The number of copies printed.
D	The printer or class destination, or the word `any`.
F	The name of the file printed. The line is repeated for each file printed. Files were printed in the order shown.
f	(Optional) The name of the form that is used.
H	(Optional) One of three types of special handling: resume, hold, and immediate.
N	(Optional) The type of alert used when the print request was successfully completed. The type is the letter M if the user was notified by email or W if the user was notified by a message to the terminal.
O	(Optional) The printer-dependent `-o` options. For example, `nobanner`.
P	The priority of the print request.
p	The list of pages printed.
r	(Optional) A single-letter line that is included if the user asked for "raw" processing of the files with the `lp -r` command.
S	(Optional) The character set, print wheel, or cartridge used.
T	The title placed on the banner page.
t	The type of content found in the files.
U	The name of the user who submitted the print request.
s	The outcome of the request, shown as a combination of individual bits expressed in hexadecimal format. Several bits are used internally by the print service. The bits and what they mean are described in the following table.
v	■ 0 – Identifies that the print job originated from the `in.lpd` print daemon or another system on the network. ■ 2 – Identifies that the print job originated from the `/usr/bin/lp` or `/usr/ucb/lpr` commands. ■ 1 – Identifies that the print job originated from an older version of the printing software.

TABLE 12–9 Codes in the `requests` Log File   *(Continued)*

Letter	Content of Line
x	(Optional) The slow filter used for the print request.
Y	(Optional) The list of special modes for the print filters used to print the request.
z	(Optional) The printer used for the request. This printer differs from the destination (the D line) if the request was queued for any printer or a class of printers, or if the request was moved to another destination.

The following table shows the outcome codes in the LP `requests` log file and their descriptions.

TABLE 12–10 Outcome Codes in the `requests` Log File

Outcome Code	Description
0x0001	The request was held pending resume.
0x0002	Slow filtering is running.
0x0004	Slow filtering finished successfully.
0x0008	The request is on the printer.
0x0010	Printing finished successfully.
0x0020	The request was held pending user change.
0x0040	The request was canceled.
0x0080	The request will print next.
0x0100	The request failed filtering or printing.
0x0200	The request is in transit to a remote printer (obsolete).
0x0400	The user will be notified.
0x0800	A notification is running.
0x1000	A remote system has accepted the request (obsolete).
0x2000	The administrator placed a hold on the request.
0x4000	The printer had to change filters.
0x8000	The request is temporarily stopped.

Spooling Directories

Files queued for printing are stored in the `/var/spool/lp` directory until they are printed, which might be only seconds. The following table shows the contents of the `/var/spool/lp` directory.

TABLE 12–11 Contents of the `/var/spool/lp` Directory

File	Type	Description
SCHEDLOCK	File	Lock file for the scheduler. Check for this file if the scheduler terminates and will not restart.
admins	Directory	Link to `/etc/lp`.
bin	Directory	Link to `/usr/lib/lp/bin`.
logs	Link	Link to `../lp/logs` where completed print requests are logged.
model	Link	Link to `/usr/lib/lp/model`.
requests	Directory	Directory that contains subdirectories for each configured printer where print requests are logged until printed. Users cannot access this log.
system	Directory	A print status file for the system.
temp	Link	Link to `/var/spool/lp/tmp/`*hostname*, which contains the spooled requests.
tmp	Directory	Directory for each configured printer where print requests are logged until printed. Changes to existing print requests are also recorded in this directory.

Filtering Print Files

Print filters are programs on the print server that convert the content of a queued file from one format to another format.

A print filter can be as simple or as complex as needed. The Oracle Solaris OS provides print filters in the `/usr/lib/lp/postscript` directory that cover most situations where the destination printer requires the data to be in PostScript format. If you need filters for non-PostScript printers, you have to create the filters and add them to the systems that need filters.

A set of *print filter descriptor files* are provided in the `/etc/lp/fd` directory. These descriptor files describe the characteristics of the filter (for example, fast or slow filter). These description files point to the filter program (for example, to `/usr/lib/lp/postscript/postdaisy`).

How the Printer Interface Program Works

The LP print service interacts with other parts of the Oracle Solaris OS. The print service uses a standard printer interface program to do the following:

- Initialize the printer port, if necessary. The standard printer interface program uses the `stty` command to initialize the printer port.
- Initialize the printer. The standard printer interface program uses the `terminfo` database and the `TERM` shell variable to find the appropriate control sequences.
- Print a banner page, if necessary.
- Print the correct number of copies specified by the print request.

The LP print service uses the standard interface program, found in the `/usr/lib/lp/model` directory, unless you specify a different program. You can create custom interface programs. However, you must make sure that the custom program does not terminate the connection to the printer or interfere with proper printer initialization.

Support for the Use of PPD Files To Set Up Printers

Support for setting up and administering printers with PPD files has been incorporated into the Oracle Solaris print subsystem. Two interface scripts, `standard_foomatic`, and `netstandard_foomatic`, are available. These interface scripts provide the generic interface between the Oracle Solaris spooler and the back-end process of the print server.

The following are examples of the types of printers that are supported:

- Lexmark Optra E312
- Epson Stylus Photo 1280
- Canon BJC-55
- QMS magicolor 2+

Raster Image Processor Support

The Raster Image Support (RIP) in the Oracle Solaris OS enables you to print to printers that do not have resident PostScript processing capabilities. The printing software provides the print server RIP and supporting technologies. The RIP occurs behind the scenes. However, to use the appropriate driver you need to configure each printer by using either Oracle Solaris Print Manager or the `lpadmin -n` command. For step-by-step instructions on using the `lpadmin -n` command, see .

Support for PostScript Printer Description Files

The lpadmin and lpstat commands, as well as the Oracle Solaris Print Manager printer definition screens, support the use of PPD files.

The following new software packages are associated with this feature:

- SUNWa2psr
- SUNWa2psu
- SUNWespgs
- SUNWffiltersr
- SUNWffiltersu
- SUNWfppd
- SUNWgimpprint
- SUNWhpijs
- SUNWimagick
- SUNWpsutils

Where to Find Information About Supported Printers and Available PPD Files

Caution – The location where the PPD files and the ppdcache file is stored are private, as is the contents of the ppdcache file. The placement of these files and the contents of the ppdcache are subject to change. Do not build software that relies on these files being in their current location or that relies on the data being in the format that is currently used.

If the file required by your printer is not available, you can add your own PPD file. If you use the lpadmin -n command to create a new print queue, you can store your own PPD files anywhere that you choose. If you are running the Oracle Solaris 10 OS, and you use Oracle Solaris Print Manager to create the print queue, the PPD file must have an entry in the ppdcache file.

If you are running a supported Oracle Solaris release, PPD files are located in any of following four repositories on the system:

/usr/share/ppd	Specifies the system repository.
/usr/local/share/ppd	Specifies the admin repository.
/opt/share/ppd	Specifies the vendor repository.
/var/lp/ppd	Specifies the user repository.

Copies of PPD files that are specified by using the lpadmin command with the -n option, or by using the -a option with the ppdmgr command are stored in the user repository under the same PPD file name.

If you use the ppdmgr utility with the -a and the -R options, a copy of the specified PPD file can be stored in the admin repository.

If you create a print queue with Oracle Solaris Print Manager, and no entry exists for the PPD file in the ppdcache file, you can use the ppdmgr utility to add the file to the system. The cache of PPD file information that Oracle Solaris Print Manager uses is then updated to reflect any changes you make by using either of these two methods.

In later Oracle Solaris releases, PPD files are located in the /usr/lib/lp/model/ppd/system directory or any alternate directory that you specify.

The output of the ls command lists all the PPD files for a particular printer manufacturer.

For additional task-related information, see "Administering Printers That Are Associated With PPD Files (Task Map)" on page 106.

PPD File Management Utility

This section contains reference information for managing PPD files.

When the ppdmgr utility is used to add a PPD file to the system, a compressed (gzipped) copy of the specified PPD file is stored on the system. The purpose is to maintain a current cache of PPD file information from all known PPD files on the system.

The full path of the PPD file that is copied to the system follows:

repository/*label*/*manufacturer*/*ppd-file-name*

repository	Is the specified repository. If no repository is specified by using the -R option, the default repository is the user repository, /var/lp/ppd/.
label	Is the specified label. If no label is specified by using the -L option, the default label is user, within the user repository.
manufacturer	Is the manufacturer's name that is contained within the PPD file. This name might be modified according to the manufacturer aliases that are defined in the /var/lp/ppd/manufaliases file. See "Manufacturer Aliases File" on page 232.
ppd-file-name	Is the same as the original PPD file name that is specified with the ppdmgr utility. This file can also contain the .gz extension if the PPD file is compressed.

The following figures show the layout of a typical PPD file repository and the ppdmgr utility directory layout, which contains all relevant ppdmgr delivered and generated files, including the PPD user file repository.

FIGURE 12–1 PPD File Repository Layout

```
┌─────────────────────────────────────────────────────────────┐
│           Directory Layout of a PPD File Repository           │
│                                                               │
│                        PPD-repository/                        │
│                             │                                 │
│        ┌────────────────────┼──────────────┬──────────┐       │
│     label1/             label2/        ...          labelN/   │
│        │                    │                          │      │
│   ┌────┴──────────┬─────────┼────────────┬──────────┐         │
│ manufacturer1/  manufacturer2/   ...          manufacturerN/  │
│        │                    │                          │      │
│   ┌────┴────────┬───────────┼────────────┬──────────┐         │
│   ppdfile1      ppdfile2         ...          ppdfileN        │
└─────────────────────────────────────────────────────────────┘
```

```
┌──────────────────────────────────────────────────────────────────┐
│        Directory Layout for Delivered and Generated ppdmgr Files   │
│                                                                    │
│                           /var/lp/ppd/                             │
│                               │                                    │
│   ┌──────────┬───────────┬─────────────┬───────┬─────────┬──────┐  │
│ caches/   ppdcache  manufaliases   label1/  ...  labelN/  user/    │
│   │                                                  │             │
│  ┌┴──────────────┬─────────────────┐        ┌────────┴──────────┐  │
│ PPD-repository:label1 ... PPD-repository:label1N  manufacturer1/ ... manufacturerN/ │
│                                              │                     │
│                                     ┌────────┴──────┐              │
│                                   ppdfile1   ...  ppdfileN         │
└──────────────────────────────────────────────────────────────────┘
```

PPD File Repositories

The following table describes the PPD file repositories that are located on a system.

TABLE 12–12 Description of the PPD File Repositories

Repository	Location	Contents	Method Used to Add or Modify
admin	/usr/local/share/ppd/	This PPD file repository is used to store PPD files that are used by system administrators.	PPD files can be added to this repository manually, by using either the ppdmgr utility or the pkgadd command.

TABLE 12–12 Description of the PPD File Repositories *(Continued)*

Repository	Location	Contents	Method Used to Add or Modify
all	Represents all of the PPD repositories on a system	This repository represents all supported PPD repository locations on a system.	You can only specify the all repository when requesting an update or rebuild of the PPD cache file by using the ppdmgr utility.
system	/usr/share/ppd/	This repository contains PPD files that are delivered with Oracle Solaris.	PPD files that are delivered by Oracle can be added to the system repository by using the pkgadd and patchadd commands. A PPD file in this repository should not be modified manually or by using the ppdmgr utility. If you modify this repository manually, your changes might be lost.
user	/var/lp/ppd	This repository is used, as needed, by administrators and users with appropriate privileges (Printer Management).	PPD files that are added to the system by using the ppdmgr command with the -a option are added to this repository unless otherwise specified.
vendor	/opt/share/ppd/	This repository is a central location for storing PPD files that are delivered to Oracle Solaris by vendors.	The pkgadd command is used to add PPD files to this repository **Note –** This repository cannot be modified by using the ppdmgr utility.

⚠ **Caution –** The location of the PPD files and the ppdcache file is private and is therefore subject to change. Do *not* build software that relies on these files being in their current location or the data being in its current format.

PPD File Labels

On a system that is running the Oracle Solaris software, PPD files can be stored default label directories. You can also specify a label of your own choosing to organize PPD files, as long as the label is not reserved by the system.

The following label names are reserved:

- `caches`
- `ppdcache`
- `manufaliases`
- `all`

With the exception of the `all` label name, these label names cannot be specified by using either the `-L` or `-R` options of the `ppdmgr` utility. However, you can specify the `all` label name with the `-L` or the `-R` option when using the `-r` and `-u` options. Any label name that begins with `SUNW` is reserved for use by Oracle, but is not prohibited.

If you add a PPD file to a system and specify a label that does not exist, a directory with that label name is created in the specified repository. By default, if no PPD file repository is specified, this directory is `/var/lp/ppd/label`. For more information about specifying labels when you add PPD files to a system, see "Description of the Command-Line Options for the `ppdmgr` Utility" on page 233.

Description of the Printer Driver Field in Oracle Solaris Print Manager

The Printer Driver field in Oracle Solaris Print Manager is displayed when you select the Add New Printer (attached or network) or Modify Printer Attributes (attached or network) menu options. This field contains printer driver descriptions from the PPD cache file, based on the printer model that you select. To distinguish between duplicate printer driver descriptions that have different labels within the PPD file repositories, the label and abbreviation of the PPD file repository name is also displayed.

The format that is used for the printer driver description is as follows:

label(*repository-letter*): *driver-description*

For example, the following PPD file is located in the `PHOTOS` label within the `user` PPD file repository:

`/var/lp/ppd/PHOTOS/HP/HP-PhotoSmart_P1100-hpijs.ppd.gz`

This PPD file would appear in Oracle Solaris Print Manager's Printer Driver field selection list as follows:

`PHOTOS(U): Foomatic/hpijs (recommended)`

In the following example, the following PPD file is located in the `SUNWfoomatic` label within the `system` PPD file repository:

This PPD file would appear in Oracle Solaris Print Manager's Printer Driver field selection list as follows:

```
SUNWfoomatic(S): Foomatic/hpijs (recommended)
```

The following table describes the PPD file repository letters, the repositories they represent and the location of the repositories a the system.

Repository Abbreviation	Repository Name	Repository Location
A	admin	/usr/local/share/ppd
S	system	/usr/share/ppd
U	user	/var/lp/ppd
V	vendor	/opt/share/ppd

Manufacturer Aliases File

Manufacturer directories, one for each manufacturer, are located in the PPD repositories on a system. When PPD files are added to a system, the manufacturer name that is contained in the PPD file is used to determine which manufacturer directory to copy the PPD file to. A private file, /var/lp/ppd/manufaliases, contains aliases for all the manufacturer entries in a PPD file. The manufaliases file is referenced to determine which manufacturer directory to copy the PPD file to. This process ensures that there is one directory per manufacturer, rather than one directory per manufacturer alias. For example, if a PPD file contains the manufacturer name, Hewlett-Packard, and an HP alias for Hewlett-Packard is listed in the manufaliases file, the PPD file is stored in the HP directory. This strategy applies to all PPD files that are added to a system by using the ppdmgr utility and the lpadmin -n command.

Note – The manufaliases file is a private file. Do *not* edit this file. Do *not* build software that relies on the file being in its current location or the data being in its current format.

PPD File Caches

Private PPD file caches are maintained in the /var/lp/ppd/caches/ directory, one for each label within each repository.

The format of the cache file name that is used follows:

PPD-repository: *label*

The information about PPD files that is in the PPD cache files is maintained by using the ppdmgr utility. Do *not* edit the PPD cache files manually. Note that the cache files in the /var/lp/ppd/caches directory are used to generate the private PPD cache file, /var/lp/ppd/ppdcache. This file is used by the printmgr utility. For more information, see the printmgr(1M) man page.

Note – The location of the ppdcache and its contents is private. Do *not* build software that relies on this file being in its current location or on the data being in its current format. This information applies to any private files that are generated or delivered for use by the ppdmgr utility.

Description of the Command-Line Options for the ppdmgr Utility

In this section, the command-line options for the ppdmgr utility are described. Additional information about processes, guidelines, and restrictions for administering PPD files by using the ppdmgr utility are also described.

The PPD Manager (ppdmgr) utility is located in /usr/sbin/ppdmgr.

To add a PPD file to a system, you would use the following syntax:

ppdmgr -a *ppd-file-path*

The -a option copies the PPD file that is specified in ppd-file-path to the PPD repository, then updates the PPD cache file to reflect the change. If you do not specify a PPD file repository by using the -R option, the PPD file is stored in the user PPD file repository. If you do not specify a label by using the -L option, the PPD file is stored in the user label directory.

The following verifications are performed when you use the -a option with the ppdmgr utility:

- **Label verification** – A label name must *not* be a reserved label name.

  The following label names are reserved:
  - caches
  - ppdcache
  - manufaliases
  - all
- **PPD File Path verification** – The specified *ppd-file-path* must be accessible and must contain either the .pdd or ppd.gz extension.
- **PPD file verification** – The PPD file that is specified in *ppd-file-path* must be a valid PPD file.

Note – If you provide information that does not pass the various verification checks, or if any of the actions that are performed by the ppdmgr utility are unsuccessful, an error message is displayed, and the utility exits.

Additional Actions Performed:

- If needed, parent directories of the destination path are created.
- If a version of the PPD file with a `.gz` extension already exists in the PPD file repository, and the gzipped versions are not duplicates, an error message is displayed.
- The *ppd-file-path* is copied to the destination path.
- To reflect the change in the ppdcache file, the update action is then applied.

To specify PPD file repository, you would use the following syntax:

`ppdmgr -R` *repository*

The `-R` option with *repository* is used to identify one of the supported PPD file repositories. When the `-R` option is not specified, the default *repository* is user. When the `-R` option is specified with the `-a` option, the valid repository names are user and admin. See "PPD File Repositories" on page 229 for more information about all of the supported repository names and their locations.

To specify a label, you would use the following syntax:

`ppdmgr -L` *label-name*

The `-L` option with the *label-name* is used to identify a grouping of PPD files within a PPD file repository. The label is also the name of the directory that is located in the PPD file repository. The label can be comprised of any characters from the portable character set. However, the label cannot contain a semicolon (`;`).

When the `-L` option is *not* specified, the following are the defaults that are used for specifying a label name.

ppdmgr Command-Line Option	Default Label
-a	Defaults to the *label* in ppd-file-path, if the ppd-file-path is located within a supported repository. Otherwise *label* defaults to user.
-r	Defaults to the all label.
-u	Defaults to the all label.

To request an update of the PPD cache file, you would use the following syntax:

`ppdmgr -u`

This option updates the cache file to reflect modifications within PPD file repositories. The PPD cache file is updated only if modifications are detected.

Note – When the `-a` option is specified, an update of the PPD cache file occurs automatically to reflect the change in the label directory within the repository where the PPD file was copied.

When the `-R` or `-L` option is not specified, the PPD cache file is updated to reflect modifications in the `all` label directory within the `user` repository.

To request a rebuild of PPD cache file, you would use the following syntax:

`ppdmgr -r`

The `-r` option rebuilds the cache by removing and regenerating any intermediary cache files that are associated with the specified label within the specified PPD file repository. This action results in an update of the PPD cache file, `/var/lp/ppd/ppdcache`, if any intermediary cache files are removed. Because a regeneration of the specified label within the specified PPD file repository is required, the regeneration of the PPD cache information can be very time-consuming. The time that it takes to rebuild the PPD cache file depends upon the number of PPD files that are affected. Therefore, the `-r` option should only be used when PPD cache file corruption is suspected.

When the `-R` or `-L` option is not specified, intermediary cache files that are associated with all of the labels within the `user` PPD file repository are removed. These modifications are then reflected in the PPD cache file.

To display the full path of PPD File in the repository, you would use the following syntax:

`ppdmgr -a` *ppd-file-path* `-w`

The `-w` option must be specified with the `-a` option, and the PPD file is added to the system successfully, the full destination path of the PPD file is displayed on `stdout`. Otherwise, this option is ignored.

How the PAPI Is Implemented in the Oracle Solaris OS

This section contains additional background information about the FSG OpenPrinting Open Standard Print Application Programming Interface (PAPI), a print service-independent interface for accessing printing support on a local host or a network.

The PAPI contains a set of printing related objects or data structures and a set of operations or functions to manipulate the objects.

The following are supported tasks:

- Querying the print service
- Submitting print jobs

- Modifying print jobs
- Canceling print jobs

Modified Print Commands

The following table describes the print commands that have been modified for use with the PAPI.

TABLE 12–13   Modified Print Commands

Command	Origin	Function
lpr	BSD	Submit print jobs.
lpq	BSD	Query print queues and print jobs.
lprm	BSD	Remove print jobs.
lpc	BSD	Control print jobs: accept, reject, enable, disable, clear, topq
lp	SysV	Submit print jobs.
lpstat	SysV	Query print server (print queues, print jobs, other).
cancel	SysV	Remove print jobs.
lpmove	SysV	Move jobs between local print queues.
accept	SysV	Enable queueing of print jobs on a print queue.
reject	SysV	Disable queueing of print jobs on a print queue.
enable	SysV	Enable job processing on a print queue.
disable	SysV	Disable job processing on a print queue.

13

Troubleshooting Printing Problems in the Oracle Solaris OS (Tasks)

This chapter explains how to troubleshoot printing problems that might occur when you set up or maintain printing services.

This is a list of the information that is in this chapter:

For overview information about printing, see Chapter 1, "Introduction to Printing in the Oracle Solaris Operating System."

Tips on Troubleshooting Printer Setup Problems

Sometimes, when setting up a printer, you might need to locate printer device identification information. See "Locating Information About Parallel and USB-Connected Print Devices" on page 237 for more information.

Locating Information About Parallel and USB-Connected Print Devices

Information about parallel and USB-connected printers is located in the `/dev/printers` directory.

To query printers for IEEE1284 device identification information, type:

```
# /usr/lib/lp/bin/printer-info -a /dev/printers/*
```

For example:

```
# /usr/lib/lp/bin/printer-info -a /dev/printers/*
 /dev/printers/0:
        Manufacturer: Hewlett-Packard
        Model:       hp color LaserJet 4650
        Description:  Hewlett-Packard color LaserJet 4650
        Class:        PRINTER
        Command set:
                cmd[0]: PJL
                cmd[1]: MLC
                cmd[2]: BIDI-ECP
                cmd[3]: PCLXL
                cmd[4]: PCL
                cmd[5]: PDF
                cmd[6]: PJL
                cmd[7]: MIME
                cmd[8]: POSTSCRIPT
```

Note that when you add a device with Oracle Solaris Print Manager, the same program is used to detect and provide information about the printer make and model in the Add Attached Printer dialog box. See the printmgr(1M) man page for more information.

Tips on Troubleshooting Printing Problems

Sometimes after setting up a printer, you find that nothing prints. Or, you might get a little farther in the process: something prints, but it is not what you expect, the output is incorrect or illegible.

Then, when you get past these problems, other problems might occur, such as:

- lp commands hanging
- Printers becoming idle
- Users getting conflicting messages

Note – Although many of the suggestions in this chapter are relevant to parallel printers, they are geared toward the more common serial printers.

Troubleshooting No Output (Nothing Prints)

When nothing prints, there are three general areas to check:

- The printer hardware
- The network
- The LP print service

If you get a banner page, but nothing else, this is a special case of incorrect output. See "Troubleshooting Incorrect Output" on page 240.

Check the Hardware

The hardware is the first area to check. As obvious as it sounds, you should make sure that the printer is plugged in and turned on. In addition, you should refer to the manufacturer's documentation for information about hardware settings. Some computers use hardware switches that change the characteristics of a printer port.

The printer hardware includes the printer, the cable that connects it to the computer, and the ports into which the cable plugs at each end. As a general approach, you should work your way from the printer to the computer. Check the printer. Check where the cable connects to the printer. Check the cable. Check where the cable connects to the computer.

Check the Network

Problems are more common with remote print requests that are going from a print client to a print server. You should make sure that network access between the print server and print clients is enabled.

If the network is running the Network Information Service Plus (NIS+), see *System Administration Guide: Naming and Directory Services (NIS+)* for instructions to enable access between systems. If the network is not running NIS or NIS+, before you set up print servers and print clients, include the Internet address and system name for each client system in the /etc/hosts file on the print server. Also, the IP address and system name for the print server must be included in the /etc/hosts file of each print client system.

Check the LP Print Service

For printing to work, the LP scheduler must be running on the print server. If it is not running, you need to start it using the following command:

```
# svcadm enable application/print/server
```

In addition to the scheduler running, a printer must be enabled and accepting requests before it will produce any output. If the LP print service is not accepting requests for a printer, the submitted print requests are rejected. Usually, in that instance, the user receives a warning message after submitting a print request. If the LP print service is not enabled for a printer, print requests remain queued on the system until the printer is enabled.

In general, you should analyze a printing problem as follows:

- Follow the path of the print request step-by-step.
- Examine the status of the LP print service at each step.
  - Is the configuration correct?
  - Is the printer accepting requests?
  - Is the printer enabled to process requests?
- If the request is hanging on transmission, set up lpr.debug in syslog.conf to display the flow. See "Debugging Printing Problems" on page 240.

- If the request is hanging locally, examine the `lpsched` log (`/var/lp/logs/lpsched`).
- If the request is hanging locally, have notification of the printer device errors (faults) mailed to you, and re-enable the printer.

The procedures found in "Troubleshooting Miscellaneous Printing Problems" on page 243 use this strategy to help you troubleshoot various problems with the LP print service.

Debugging Printing Problems

Enabling `lpr.debug` in the `/etc/syslog.conf` file provides a variety of useful information. Because a large volume of information is provided, the preferred method is to enable this feature only while debugging printing problems.

For more information, see "How to Debug Printing Problems" on page 245.

Troubleshooting Incorrect Output

If the printer and the print service software are not configured correctly, the printer might print, but it might provide output that is not what you expect.

Check the Printer Type and File Content Type

If you used the wrong printer type when you set up the printer with the LP print service, inappropriate printer control characters can be sent to the printer. The results are unpredictable: nothing might print, the output might be illegible, or the output might be printed in the wrong character set or font.

If you specified an incorrect file content type, the banner page might print, but that is all. The file content types specified for a printer indicate the types of files the printer can print directly, without filtering. When a user sends a file to the printer, the file is sent directly to the printer without any attempt to filter it. The problem occurs if the printer cannot handle the file content type.

When setting up print clients, you increase the chance for a mistake because the file content types must be correct on both the print server and the print client. If you set up the print client as recommended with any as the file content type, files are sent directly to the print server and the print server determines the need for filtering. Therefore, the file content types have to be specified correctly only on the server.

You can specify a file content on the print client to off-load filtering from the server to the client, but the content type must be supported on the print server.

Check the `stty` Settings

Many formatting problems can result when the default `stty` (standard terminal) settings do not match the settings required by the printer. The following sections describe what happens when some of the settings are incorrect.

Wrong Baud Settings

When the baud setting of the computer does not match the baud setting of the printer, usually you get some output, but it does not look like the file you submitted for printing. Random characters are displayed, with an unusual mixture of special characters and undesirable spacing. The default for the LP print service is 9600 baud.

Note – If a printer is connected by a parallel port, the baud setting is irrelevant.

Wrong Parity Setting

Some printers use a parity bit to ensure that data received for printing has not been garbled during transmission. The parity bit setting for the computer and the printer must match. If they do not match, some characters either will not be printed at all, or will be replaced by other characters. In this case, the output looks approximately correct. The word spacing is all right and many letters are in their correct place. The LP print service does not set the parity bit by default.

Wrong Tab Settings

If the file contains tabs, but the printer expects no tabs, the printed output might contain the complete contents of the file, but the text might be jammed against the right margin. Also, if the tab settings for the printer are incorrect, the text might not have a left margin, it might run together, it might be concentrated to a portion of the page, or it might be incorrectly double-spaced. The default is for tabs to be set every eight spaces.

Wrong Return Setting

If the output is double-spaced, but it should be single-spaced, either the tab settings for the printer are incorrect or the printer is adding a line feed after each return. The LP print service adds a return before each line feed, so the combination causes two line feeds.

If the print zigzags down the page, the `stty` option `onlcr` that sends a return before every line feed is not set. The `stty=onlcr` option is set by default, but you might have cleared it while trying to solve other printing problems.

Troubleshooting Hung `lp` Commands

If you type any of the `lp` commands (such as `lpsystem`, `lpadmin`, or `lpstat`) and nothing happens (no error message, status information, or prompt is displayed), chances are something is wrong with the LP scheduler. Such a problem can usually be resolved by stopping and restarting the LP scheduler. See for instructions.

Troubleshooting Idle (Hung) Printers

You might find a printer that is idle, even though it has print requests queued to it.

A printer might seem idle when it should not be for one of the following reasons:

- The current print request is being filtered.
- The printer has a fault.
- Networking problems might be interrupting the printing process.

Check the Print Filters

Slow print filters run in the background to avoid tying up the printer. A print request that requires filtering will not print until it has been filtered.

Check Printer Faults

When the LP print service detects a fault, printing resumes automatically, but not immediately. The LP print service waits about five minutes before trying again, and continues trying until a request is printed successfully. You can force a retry immediately by enabling the printer.

Check Network Problems

When printing files over a network, you might encounter the following types of problems:

- Requests sent to print servers might back up in the client system (local) queue.

- Requests sent to print servers might back up in the print server (remote) queue.

Print Requests Backed Up in the Local Queue

Print requests submitted to a print server might back up in the client system queue for the following reasons:

- The print server is down.
- The printer is disabled on the print server.
- The network between the print client and print server is down.
- Underlying network software was not set up properly.

While you are tracking the source of the problem, you should stop new requests from being added to the queue. See "How to Accept or Reject Print Requests for a Printer" on page 133 for more information.

Print Requests Backed Up in the Remote Queue

If print requests back up in the print server queue, the printer has probably been disabled. When a printer is accepting requests, but not processing them, the requests are queued to print. Unless there is a further problem, once the printer is enabled, the print requests in the queue should print.

Troubleshooting Conflicting Status Messages

A user might enter a print request and be notified that the client system has accepted it, then receive mail from the print server that the print request has been rejected.

These conflicting messages might occur for the following reasons:

- The print client might be accepting requests, while the print server is rejecting requests.
- The definition of the printer on the print client might not match the definition of that printer on the print server. More specifically, the definitions of the print job components, like filters, character sets, print wheels, or forms are not the same on the client and server systems.

You should check that identical definitions of these job components are registered on both the print clients and print servers so that local users can access printers on the print servers.

Troubleshooting Miscellaneous Printing Problems

This section contains step-by-step instructions that explain:

- How to troubleshoot no output
- How to troubleshoot incorrect output
- How to unhang the `lp` commands
- How to troubleshoot an idle (hung) printer
- How to resolve conflicting status messages

Troubleshooting No Printer Output

This task includes the following troubleshooting procedures to try when you submit a print request to a printer and nothing prints:

- Check the hardware ("How to Check the Printer Hardware" on page 244).
- Check the network ("How To Check the Printer Network Connections" on page 245).
- Check the LP print service basic functions ("How to Check the Basic Functions of the LP Print Service" on page 246).
- Check printing from a print client to a print server ("How to Check Printing From a Print Client to a Print Server" on page 249).

Try the first three procedures in the order in which they are listed, before going to the print client/server section. However, if the banner page prints, but nothing else does, turn to the instructions under "How to Troubleshoot Incorrect Output" on page 250.

▼ How to Check the Printer Hardware

1   Check that the printer is plugged in and turned on.

2   Check that the cable is connected to the port on the printer and to the port on the system or server.

3   Make sure that the cable is the correct cable and that it is not defective.

Refer to the manufacturer's documentation. If the printer is connected to a serial port, verify that the cable supports hardware flow control. A NULL modem adapter supports this. The following table shows the pin configuration for NULL modem cables.

	Host	Printer
Mini-Din-8	25-Pin D-sub	25-Pin D-sub
-	1 (FG)	1(FG)
3(TD)	2(TD)	3(RD)
5(RD)	3(RD)	2(TD)
6(RTS)	4(RTS)	5(CTS)
2(CTS)	5(CTS)	4(RTS)
4(SG)	7(SG)	7(SG)
7(DCD)	6(DSR), 8(DCD)	20(DTR)
1(DTR)	20(DTR)	6(DSR), 8(DCD)

4   **Check that any hardware switches for the ports are set properly.**

See the printer documentation for the correct settings.

5   **Check that the printer is operational.**

Use the printer's self-test feature, if the printer has one. Check the printer documentation for information about printer self-testing.

6   **Check that the baud settings for the computer and the printer are correct.**

If the baud settings are not the same for both the computer and the printer, sometimes nothing will print, but more often you get incorrect output. For instructions, see "How to Troubleshoot Incorrect Output" on page 250.

▼ How To Check the Printer Network Connections

● **Check that the network link between the print server and the print client is set up correctly.**

```
print-client# ping print-server
print-server is alive
print-server# ping print-client
print-client not available
```

If the message says the system is alive, you know you can reach the system, so the network is all right. The message also tells you that either a naming service or the local /etc/hosts file has translated the host (system) name you entered into an IP address; otherwise, you would need to enter the IP address.

If you get a not available message, try to answer the following questions: How is NIS or NIS+ set up at your site? Do you need to take additional steps so that print servers and print clients can communicate with one another? If your site is not running NIS, have you entered the IP address for the print server in each print client's /etc/hosts file, and entered all print client IP addresses in the /etc/hosts file of the print server?

▼ How to Debug Printing Problems

1   **On the system that you want to debug remote printing problems, become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see "Configuring RBAC (Task Map)" in *System Administration Guide: Security Services*.

2   **Type the following command:**

```
# echo "lpr.debug /var/tmp/lpr.debug" >>/etc/syslog.conf
```

Note – The white space between lpr.debug and /var/tmp/lpr.debug *must* be a tab.

---

3   Create the `lpr.debug` file.

```
# touch /var/tmp/lpr.debug
```

4   Restart the syslog service.

```
# svcadm restart system.log
```

▼ How to Check the Basic Functions of the LP Print Service

This procedure uses the printer luna as an example of checking basic LP print service functions.

1   On the print server, make sure that the LP print service is running.

a. Check whether the LP scheduler is running by using one of the following methods.

  ■ Use the lpstat command.

```
% lpstat -r
scheduler is running
```

  A message is displayed, indicating whether the LP scheduler is running.

  ■ Use the svcs command.

```
% svcs application/print/server
```

  The following output is displayed if the scheduler is running.

```
STATE          STIME          FMRI
online         Oct_24         svc:/application/print/server:default
```

  The following output is displayed if the scheduler is not running.

```
STATE          STIME          FMRI
disabled       14:27:48       svc:/application/print/server:default
```

b. If the scheduler is not running, become superuser, `lp`, or assume an equivalent role. Start the scheduler by using one of the following methods.

  ■ Use the lpsched command.

```
# /usr/lib/lpsched
Print services started.
```

  A message is displayed, indicating the print services have been started.

  ■ Use the svcadm command.

```
# svcadm enable application/print/server
```

When you use the `svcadm` command, no message indicating whether the print services have been started is displayed. To determine if the print services are online, run the `svcs application/print/server` command again.

If you have trouble starting the scheduler, see .

2   On both the print server and print client, make sure that the printer is accepting requests.

a. Check that the printer is accepting requests.

```
# lpstat -a
mars accepting requests since Jan 12 14:23 2004
luna not accepting requests since Jan 12 14:23 2004
unknown reason
```

This command verifies that the LP system is accepting requests for each printer configured for the system.

b. If the printer is not accepting requests, become superuser, lp, or assume an equivalent role, and allow the printer to accept print requests.

```
# accept luna
```

The specified printer now accepts requests.

3   On both the print server and print client, make sure that the printer is enabled to print submitted print requests.

a. Check that the printer is enabled.

```
# lpstat -p luna
printer luna disabled since Jan 12 14:25 2004.
available.
unknown reason
```

This command displays information about printer status. You can omit the printer name to obtain information about all printers set up for the system. The following example shows a printer that is disabled.

b. If the printer is disabled, become superuser, lp, or assume an equivalent role, and enable the printer.

```
# enable luna
printer "luna" now enabled.
```

The specified printer is enabled to process print requests.

4   On the print server, make sure that the printer is connected to the correct serial port.

a. Check that the printer is connected to the correct serial port.

```
# lpstat -t
scheduler is running
```

```
system default destination: luna
device for luna: /dev/term/a
```

The message `device for` *printer-name* shows the port address. Is the cable connected to the port to which the LP print service says is connected? If the port is correct, skip to Step 5.

b. Become superuser or assume an equivalent role.

c. Change the file ownership of the device file that represents the port.

```
# chown lp device-filename
```

This command assigns the special user `lp` as the owner of the device file. In this command, *device-filename* is the name of the device file.

d. Change the permissions on the printer port device file.

```
# chmod 600 device-filename
```

This command allows only superuser, `lp`, or an equivalent role to access the printer port device file.

5 On both the print server and print client, make sure that the printer is configured properly.

a. Check that the printer is configured properly.

```
# lpstat -p luna -l
printer luna is idle. enabled since Jan 12 14:24 2004. available
        Content types: postscript
        Printer types: PS
```

The above example shows a PostScript printer that is configured properly, and that is available to process print requests. If the printer type and file content type are correct, skip to Step 6.

b. If the printer type or file content type is incorrect, try setting the print type to `unknown` and the content type to `any` on the print client.

```
# lpadmin -p printer-name -T printer-type -I file-content-type
```

6 On the print server, make sure that the printer is not faulted.

a. Check that the printer is not waiting because of a printer fault.

```
# lpadmin -p printer-name -F continue
```

This command instructs the LP print service to continue if it is waiting because of a fault.

b. Force an immediate retry by re-enabling the printer.

```
# enable printer-name
```

c. (Optional) Instruct the LP print service to enable quick notification of printer faults.

```
# lpadmin -p printer-name -A 'write root'
```

This command instructs the LP print service to set a default policy of writing root, sending the printer fault message to the terminal on which root is logged in, if the printer fails. This might help you get quick notification of faults as you try to fix the problem.

7 Make sure that the printer is not set up incorrectly as a login terminal.

Note – It is easy to mistakenly set up a printer as a login terminal, so be sure to check this possibility even if you think it does not apply.

---

a. Look for the printer port entry in the `ps -ef` command output.

```
# ps -ef
    root   169   167  0   Apr 04 ?        0:08 /usr/lib/saf/listen tcp
    root   939     1  0 19:30:47 ?        0:02 /usr/lib/lpsched
    root   859   858  0 19:18:54 term/a   0:01 /bin/sh -c \ /etc/lp
/interfaces/luna
luna-294 rocket!smith "passwd\n##
#
```

In the output from this command, look for the printer port entry. In the above example, port `/dev/term/a` is set up incorrectly as a login terminal. You can tell by the `"passwd\n##` information at the end of the line. If the port is set correctly, skip the last steps in this procedure.

b. Cancel the print request(s).

```
# cancel request-id
```

In this command, *request-id* is the request ID number for a print request to be canceled.

c. Set the printer port to be a nonlogin device.

```
# lpadmin -p printer-name -h
```

d. Check the `ps -ef` command output to verify that the printer port is no longer a login device.

If you do not find the source of the printing problem in the basic LP print service functions, continue to one of the following procedures for the specific client/server case that applies.

▼ How to Check Printing From a Print Client to a Print Server

1 Check the basic functions of the LP print service on the print server, if you have not done so already.

For instructions on checking basic functions, see "How to Check the Basic Functions of the LP Print Service" on page 246. Make sure that the printer works locally before trying to figure out why nothing prints when a request is made from a print client.

2 Check the basic functions of the LP print service on the print client, if you have not done so already.

On the print client, the printer has to be enabled and accepting requests before any request from the client will print.

Note – For most of the following steps, you must be logged in as root or lp.

---

3 Make sure that the print server is accessible.

a. On the print client, send an "are you there?" request to the print server.

print-client# **ping** *print-server*

If you receive the message *print-server* not available, you might have a network problem.

4 Verify that the print server is operating properly.

```
# lpstat -t luna
scheduler is running
system default destination: luna
device for luna: /dev/term/a
luna accepting requests since Jan 12 14:26 2004
printer luna now printing luna-314. enabled since Jan 12 14:26 2004.
available.
luna-129            root                488   Jan 12 14:32
#
```

The above example shows a print server up and running.

5 If the print server is not operating properly, go back to step 1.

▼ How to Troubleshoot Incorrect Output

1 Log in as superuser, lp, or assume an equivalent role.

2 Make sure that the printer type is correct.

An incorrect printer type might cause incorrect output. For example, if you specify printer type PS and the pages print in reverse order, try printer type PSR. (These type names must be in uppercase.) Also, an incorrect printer type might cause missing text, illegible text, or text with the wrong font. To determine the printer type, examine the entries in the terminfo database. For information on the structure of the terminfo database, see "Printer Type" on page 209.

a. On the print server, display the printer's characteristics.

```
$ lpstat -p luna -l
printer luna is idle. enabled since Thu Jul 12 15:02:32 ...
        Form mounted:
        Content types: postscript
```

```
           Printer types: PS
           Description:
           Connection: direct
           Interface: /usr/lib/lp/model/standard
           After fault: continue
           Users allowed:
                   (all)
           Forms allowed:
                   (none)
           Banner not required
           Character sets:

           Default pitch:
           Default page size: 80 wide 66 long
           Default port settings:
$
```

b. **Consult the printer manufacturer's documentation to determine the printer model.**

c. **If the printer type is not correct, change it with Oracle Solaris Print Manager's Modify Printer Properties window, or use the following `lpadmin` command.**

   # **lpstat -p** *printer-name* **-T** *printer-type*

   On the print client, the printer type should be unknown. On the print server, the printer type must match a terminfo entry that is defined to support the model of printer you have. If there is no terminfo entry for the type of printer you have, see "How to Add a terminfo Entry for an Unsupported Printer" on page 114.

3 **If the banner page prints, but there is no output for the body of the document, check the file content types.**

File content types specified for a printer indicate the types of files the printer can print directly without filtering. An incorrect file content type causes filtering to be bypassed when it might be needed.

a. **Note the information on file content type that was supplied in the previous step by the `lpstat` command.**

   On the print client, the file content type should be any, unless you have good reason to specify one or more explicit content types. If a content is specified on the client, filtering is done on the print client, rather than the print server. In addition, content types on the client must match the content types specified on the print server, which in turn must reflect the capabilities of the printer.

b. **Consult your printer manufacturer's documentation to determine which types of files the printer can print directly.**

   The names you use to refer to these types of files do not have to match the names used by the manufacturer. However, the names you use must agree with the names used by the filters known to the LP print service.

    c. If the file content type is not correct, change it with Oracle Solaris Print Manager's Modify Printer Properties window, or the following `lpadmin` command.

```
# lpadmin -p printer-name -I file-content-type(s)
```

Run this command on either the print client, or print server, or both, as needed. Try `-I any` on the print client, and `-I ""` on the print server. The latter specifies a null file content type list, which means an attempt should be made to filter all files, because the printer can directly print only files that exactly match its printer type.

This combination is a good first choice when files are not printing. If it works, you might want to try specifying explicit content types on the print server to reduce unnecessary filtering. For a local PostScript printer, you should use `postscript`, or `postscript,simple`, if the printer supports these types. Be aware that PS and PSR are not file content types; they are printer types.

If you omit `-I`, the file content list defaults to `simple`. If you use the `-I` option and want to specify file content types in addition to `simple`, `simple` must be included in the list.

When specifying multiple file content types, separate the names with commas. Or you can separate names with spaces and enclose the list in quotation marks. If you specify `any` as the file content type, no filtering will be done and only file types that can be printed directly by the printer should be sent to it.

4 Check that the print request does not bypass filtering needed to download fonts.

If a user submits a print request to a PostScript printer with the `lp -T PS` command, no filtering is done. Try submitting the request with the `lp -T postscript` command to force filtering, which might result in the downloading of non-resident fonts needed by the document.

5 Make sure that the `stty` settings for the printer port are correct.

    a. Read the printer documentation to determine the correct `stty` settings for the printer port.

Note – If a printer is connected to a parallel or USB port, the baud setting is irrelevant.

    b. Examine the current settings by using the `stty` command.

```
# stty -a < /dev/term/a
speed 9600 baud;
rows = 0; columns = 0; ypixels = 0; xpixels = 0;
eucw 1:0:0:0, scrw 1:0:0:0
intr = ^c; quit = ^|; erase = ^?; kill = ^u;
eof = ^d; eol = <undef>; eol2 = <undef>; swtch = <undef>;
start = ^q; stop = ^s; susp = ^z; dsusp = ^y;
rprnt = ^r; flush = ^o; werase = ^w; lnext = ^v;
parenb -parodd cs7 -cstopb -hupcl cread -clocal -loblk -parext
-ignbrk brkint -ignpar -parmrk -inpck istrip -inlcr -igncr icrnl -iuclc
ixon -ixany -ixoff imaxbel
isig icanon -xcase echo echoe echok -echonl -noflsh
-tostop echoctl -echoprt echoke -defecho -flusho -pendin iexten
```

```
opost -olcuc onlcr -ocrnl -onocr -onlret -ofill -ofdel tab3
#
```

This command shows the current `stty` settings for the printer port.

The following table shows the default `stty` options used by the LP print service's standard printer interface program.

Option	Meaning
-9600	Set baud rate to 9600
-cs8	Set 8-bit bytes
-cstopb	Send one stop bit per byte
-parity	Do not generate parity
-ixon	Enable XON/XOFF (also known as START/STOP or DC1/DC3)
-opost	Do "output post-processing" using all the settings that follow in this table
-olcuc	Do not map lowercase to uppercase
-onlcr	Change line feed to carriage return/line feed
-ocrnl	Do not change carriage returns into line feeds
-onocr	Output carriage returns even at column 0
-n10	No delay after line feeds
-cr0	No delay after carriage returns
-tab0	No delay after tabs
-bs0	No delay after backspaces
-vt0	No delay after vertical tabs
-ff0	No delay after form feeds

c. **Change the `stty` settings.**

```
# lpadmin -p printer-name -o "stty= options"
```

Use the following table to choose `stty` options to correct various problems affecting print output.

stty Values	Result	Possible Problem From Incorrect Setting
110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400	Sets baud rate to the specified value (enter only one baud rate)	Random characters and special characters might be printed and spacing might be inconsistent

stty Values	Result	Possible Problem From Incorrect Setting
oddp	Sets odd parity	Missing or incorrect characters appear randomly
evenp	Sets even parity	
-parity	Sets no parity	
-tabs	Sets no tabs	Text is jammed against right margin
tabs	Sets tabs every eight spaces	Text has no left margin, is run together, or is jammed together
-onlcr	Sets no carriage return at the beginning of line(s)	Incorrect double spacing
onlcr	Sets carriage return at beginning of line(s)	The print zigzags down the page

You can change more than one option setting by enclosing the list of options in single quotation marks and separating each option with spaces. For example, suppose the printer requires you to enable odd parity and set a 7-bit character size. You would type a command similar to that shown in the following example:

```
# lpadmin -p neptune -o "stty='parenb parodd cs7'"
```

The stty option parenb enables parity checking/generation, parodd sets odd parity generation, and cs7 sets the character size to 7 bits.

6   Verify that the document prints correctly.

```
# lp -d printer-name filename
```

▼ How to Unhang the LP Print Service

1   Log in as superuser, lp, or assume an equivalent role.

2   Stop the LP print service.

```
# svcadm disable /application/print/server
```

3   Restart the LP print service.

```
# svcadm enable /application/print/server
```

The LP print service should restart. If you are having trouble restarting the scheduler, see "How to Restart the Print Scheduler" on page 124.

Troubleshooting an Idle (Hung) Printer

This task includes a number of procedures to use when a printer appears idle but it should not be. It makes sense to try the procedures in order, but the order is not mandatory.

▼ How to Check That the Printer is Ready to Print

1 Display printer status information.

lpstat -p *printer-name*

The information displayed shows whether the printer is idle or active, enabled or disabled, or available or not accepting print requests. If everything looks all right, continue with other procedures in this section. If you cannot run the lpstat command, see .

2 If the printer is not available (not accepting requests), allow the printer to accept requests.

accept *printer-name*

The printer begins to accept requests into its print queue.

3 If the printer is disabled, re-enable it.

enable *printer-name*

This command re-enables the printer so that it will act on the requests in its queue.

Checking for Print Filtering

Check for print filtering by using the lpstat -o command.

```
$ lpstat -o luna
luna-10         fred         1261   Mar 12 17:34 being filtered
luna-11         iggy         1261   Mar 12 17:36 on terra
luna-12         jack         1261   Mar 12 17:39 on terra
$
```

See if the first waiting request is being filtered. If the output looks like the above example, the file is being filtered; the printer is not hung, it just is taking a while to process the request.

▼ How to Resume Printing After a Printer Fault

1 Look for a message about a printer fault and try to correct the fault if there is one.

Depending on how printer fault alerts have been specified, messages might be sent to root by email or written to a terminal on which root is logged in.

2   Re-enable the printer.

```
# enable printer-name
```

If a request was blocked by a printer fault, this command will force a retry. If this command does not work, continue with other procedures in this section.

▼ How to Send Print Requests to a Remote Printer When Requests Are Backed Up in the Local Queue

1   On the print client, stop further queuing of print requests to the print server.

```
# reject printer-name
```

2   On the print client, send an "are you there?" request to the print server.

```
print-client# ping print-server
print-server is alive
```

If you receive the message *print-server* not available, you might have a network problem.

3   After you fix the above problem, allow new print requests to be queued.

```
# accept printer-name
```

4   If necessary, re-enable the printer.

```
# enable printer-name
```

▼ How to Free Print Requests From a Print Client That Are Backed Up in the Print Server Queue

1   On the print server, stop further queuing of print requests from any print client to the print server.

```
# reject printer-name
```

2   Display the `lpsched` log file.

```
# more /var/lp/logs/lpsched
```

The information displayed might help you pinpoint what is preventing the print requests from the print client to the print server from being printed.

3   After you fix the problem, allow new print requests to be queued.

```
# accept printer-name
```

4   If necessary, re-enable the printer on the print server.

```
# enable printer-name
```

▼ How to Resolve Conflicting Printer Status Messages

1 On the print server, verify the printer is enabled and is accepting requests.

lpstat -p *printer-name*

Users will see conflicting status messages when the print client is accepting requests, but the print server is rejecting requests.

2 On the print server, check that the definition of the printer on the print client matches the definition of the printer on the print server.

lpstat -p -l *printer-name*

Look at the definitions of the print job components, like print filters, character sets, print wheels, and forms, to be sure they are the same on both the client and server systems so that local users can access printers on print server systems.

Using the Internet Printing Protocol

This appendix includes information for using the Internet Printing Protocol (IPP) in the Oracle Solaris OS. IPP provides interoperability for CUPS and Windows clients. In the Oracle Solaris OS, the PAPI implementation of IPP provides both server-side and client-side printing support.

The following information is included in this appendix:

For more information about open printing, go to `http://sf.net/projects/openprinting`.

Overview of Oracle Solaris IPP Support

IPP is an application level network printing protocol that can be used for distributed printing though the use of Internet tools and technologies. The protocol was initiated to provide universal solutions for printing documents from the Internet. IPP is employed by several system and printer vendors because the protocol includes tools that are necessary to make a broad set of standard requests and receive standard responses from print client systems. IPP provides versioning, extensibility, and security, as well as enhanced functionality, including improvements in job and printer status retrieval.

IPP support in the Oracle Solaris release is comprised of client-side support and server-side support. Both the client-side and the server-side support share some common elements, as well as elements that are unique to either client or server operations. IPP client and server support

shares a base code that implements some of these common components. Server-side support for IPP is available, starting with the **Solaris 10 3/05** release. Client-side support was introduced in the **Solaris 10 5/08** release.

With IPP, you can perform the following tasks:

- Find out about a printer's capabilities
- Submit print jobs to a printer
- Determine the status of a printer or a print job
- Cancel a previously submitted print job
- Hold, release, and restart print jobs
- Modify print jobs
- Move print jobs between queues
- Accept, reject, enable, and disable print queues
- Modify and delete printers

IPP includes a simplified model for printing that abstracts the various facets of real world printing solutions. This model uses objects, attributes, and a set of operations that are performed against these objects. IPP uses these abstracts to communicate information between print service consumers, or customers, and print service providers in a detailed, standard, extensible, and secure manner.

Overview of the IPP Listening Service

The IPP Listening Service, also referred to as the *listener*, provides an IPP network protocol service that enables print client systems with a means of interacting with a print service on the system that is running the listener. This listener implements server-side IPP support, which includes a set of standard operations and attributes. The listener is implemented on Oracle Solaris as an Apache module and a series of shared libraries containing IPP operation and wire support. The IPP software stack is installed when the Oracle Solaris OS is installed on the system. The IPP listening service is an SMF service that depends on the print service to run. As a result, IPP is automatically enabled on a print server when the first print queue has been added . It is also disabled when the last print queue has been removed.

On the front end, IPP server support is layered on top of HTTP, Version 1.1. The server receives IPP operations through an HTTP POST request. The server then performs the requested operation and sends a response back to the client via HTTP. These operations include, but are not limited to, submitting and canceling a print job, and querying attributes of a printer, a print job, or all the print jobs that have been queued to a printer. On the back end, the IPP listener performs operations by communicating with a print spooler. In the Oracle Solaris OS, this spooler is currently the `lpsched` daemon.

How the IPP Listening Service Works

The IPP Listening Service implementation (server-side support) is embedded under the Apache web server. The web server receives IPP operations through HTTP POST requests. When an HTTP POST request is received, it is then passed on to the Apache IPP module (mod_ipp.so). Based on configuration, the Apache web service can also provide an authentication service and be used for encryption between print client and server. The listening service runs as its own dedicated instance of Apache.

This process is as follows:

1. An IPP request is sent from the client to the server.
2. The Apache web server accepts the connection.
3. The Apache web server then hands the connection to mod_ipp.
4. mod_ipp passes the connection and configuration data to libipp-listener.
5. libipp-listener reads the request by using lipipp-core.
6. libipp-listener dispatches the request to the operation handler located in lipipp-listener.
7. The operation handler converts the request to a PAPI call and then makes the call.
8. The PAPI call is translated to a print service specific request by using psm-lpsched.
9. The print service responds to the request.
10. The psm-lpsched command converts the response to PAPI results.
11. The libpapi operation returns to the libipp-listener operation handler.
12. The libipp-listener operation handler passes results to dispatcher.
13. The libipp-listener dispatcher writes results to client by using the libipp-core library.
14. The dispatcher returns the mod_ipp entry point.

IPP Components

The following table describes the components that make up IPP support in the Oracle Solaris OS.

TABLE A–1 IPP Components

Component	Function
httpd	The Apache Web Server. This provides an HTTP transport listener that can listen for HTTP requests on the IANA registered IPP port of tcp/631. Once a request has been received, it is passed on to the IPP Apache module.

TABLE A–1 IPP Components *(Continued)*

Component	Function
`mod_ipp.so`	The Apache IPP module. This Apache module looks at the clients HTTP request to determine if it looks like an IPP request (mime-type of `application/ipp` and HTTP POST operation). Once it has been determined to be an IPP request it is passed on to the IPP listener library. This module also introduces and processes IPP-specific Apache configuration directives.
`libipp-listener.so`	The IPP listener library. This library makes use of a core IPP marshaling library to decode the IPP request and dispatch it to one of its IPP operation implementation functions. These functions convert the IPP request into PAPI calls to interact with the local print service. Once serviced, the listener library encodes and sends the results back to the requesting client.
`libipp-core.so`	The IPP marshaling library decodes and encodes IPP byte streams for reception and transmission on the wire.
`libpapi.so`	The PAPI library provides applications like the IPP listening service a means of interacting with the print service.

IPP Libraries

The IPP Listening Service library (`libipp-listener`) – Is where the bulk of the protocol request processing occurs. The library reads and validates requests by using the core IPP library, `libipp-core.so`. After the request has been validated, the request is translated to a series of client API calls. The result of these calls are then translated into an appropriate IPP response by using the core IPP library. The response is returned to the client system by the web server. The interface to the listening service library is a project private interface that is specific to the IPP server-side implementation.

The IPP Core library (`libipp-core.so`) – Is shared between client and server operation. The IPP core library contains routines that enable it to read and write protocol requests and responses. The library converts IPP request and response data between the standard binary representation and a set of common data structures. Ultimately, this common data representation is used in translating requests to and from a print service neutral representation and passed between a generic printing interface, `libpapi.so`. Since both client-side and server-side IPP support must perform this function, this is shared by clients and servers.

The PAPI library (`libpapi.so`) – Provides applications a print service independent means of interacting with a print service or protocol. In this instance, it provides the Apache IPP listening service a means of interacting with the local LP service. It determines the print service to interact with based on client-side queue configuration data stored in the `printers.conf` configuration database.

IPP Support Model

The sections that follow describe the various aspects of the IPP support model.

IPP Object Model

IPP contains two basic object types: Printer and Job. Each object type contains characteristics of a real printer or a real print job. Each object type is defined as a set of possible attributes that can be supported by that particular object type.

To enable all Printer and Job objects to be unambiguously referenced, they are all identified by a Uniform Resource Identifier (URI). The URI concept and implementation as an identifier is useful because it provides a means of uniquely identifying both the method of communicating with the print service (IPP) and a distinct network identifier for a printer queue (`//server/printers/queue`) or job.

When a print request is created, the IPP protocol message generated must contain the `printer-uri` of the Printer object the operation is to be performed against. Possible values for a `printer-uri` can be retrieved from a printer object or naming service `printer-uri-supported` attribute.

IPP Printer Object

The Printer object is the main object in the IPP model. The Printer object provides the server-side support for IPP. The Printer object contains the functions that are normally associated with physical output devices. These functions include spooling, scheduling, transformation, and managing of multiple devices that are associated with the print server. Printer objects are uniquely identified by a `printer-uri`. They can be registered as entries in a directory for the purpose of searching and locating static information about the Printer object, such as name, context, and printer capabilities. Dynamic information, for example, the number of jobs that are queued to the printer, errors and warnings, are associated with the Printer object itself.

Note – A Printer object can be used to represent a real or virtual device, as long as the semantics are consistent with those of a Printer object.

IPP clients implement the protocol on the client-side, providing you, or a program running on your behalf, the ability to query Printer objects for the purpose of submitting and managing print jobs. The IPP server is the part of the Printer object that implements the application semantics of the print service. Printer objects can be embedded in an output device or they can be implemented on network host that communicates with an output device.

When a job is submitted to a Printer object, the Printer object validates the attributes in the request and then creates the Job object. When you query a job status or monitor its progress, you are interacting with the Job object. If you cancel a print job, you are using the Job objects's Cancel-job operation. For more information about Job object operations, see "IPP Operation Keywords" on page 266.

IPP Job Object

A Job object is used to model a print job. Job objects contain documents. The information that is required to create a Job object is sent to the print sever in the form of a create request when you initiate a print request through the IPP client to the Printer object. The Printer object validates the create request, and if accepted, the Printer object then creates a new Job object. This object is uniquely identified by a combination of `printer-uri` and `job-id` attributes or a `job-uri` attribute. See "IPP Operation Keywords" on page 266 for more details.

IPP Server-Side Support

The IPP listening service provides an IPP network protocol service that enables print client systems a means of interacting with a print service on the system that is running the listener. This listener implements server-side IPP protocol support that includes a broad set of standard operations and attributes. The listener is implemented in the Oracle Solaris OS as an Apache module and a series of shared libraries that contain IPP operation and wire support. The IPP software stack is installed when the Oracle Solaris OS is installed on the system. The IPP listening service is an SMF service that depends on the print service to run. As a result, IPP is automatically enabled on a print server when the first print queue has been added . IPP is disabled when the last print queue has been removed.

Server-side support for IPP starts with the IPP module, `mod_ipp`. The listening service uses the Apache web server because the Oracle Solaris OS ships with the Apache software. The Apache module uses the Dynamic Shared Object (DSO) interface to plug in under the web server. Using the DSO interface, the module includes configuration support for the IPP Listening service and an entry point for the web server to hand the listener the HTTP connection. This modular approach enables the IPP support to reuse Apache delivered encryption and authentication mechanisms.

FIGURE A–1   IPP Server Configuration
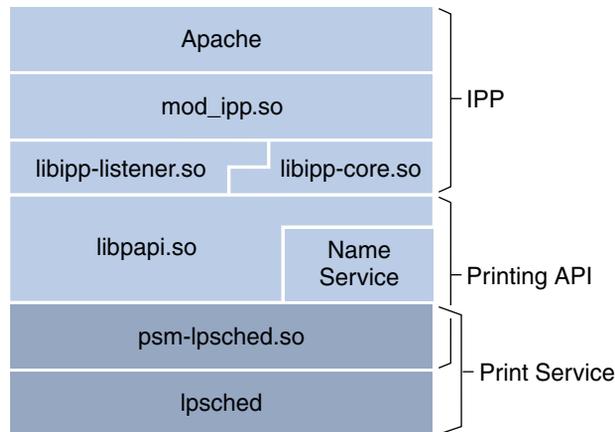
Configuration of IPP Server-Side Data

The IPP listening service configuration file, /etc/apache/httpd-standalone-ipp.conf, is like any normal Apache 1.3 configuration file. The configuration files takes any Apache 1.3 configuration directives that you want to use.

The default configuration includes the following features:

- Listening on port 631.
- Loading of a minimal set of Apache modules.
- Enabling all supported IPP operations at the /printers/path (ipp://server/printers/) without requiring authentication.

The default operations that are enabled for /printers/ is limited to a set of operations that poses less of a security risk. However, all operations are enabled at the /admin/path (ipp://server/admin/), with basic authentication required.

The mod_ipp Apache configuration options to choose from are described in the following table.

TABLE A–2   mod_ipp Apache Module Configuration Options

Value	Description
ipp-conformance	Selects level of protocol checking. The default is *automatic*, which provides maximal client interaction.
ipp-operation	Enables you to selectively enable or disable IPP operation support for one more IPP operations.

TABLE A–2   mod_ipp Apache Module Configuration Options   *(Continued)*

Value	Description
ipp-default-user	Selects the user name to use when contacting the local print service. The default is the lp print user, which enables more functional proxying.
ip-default-service	Selects the default print service to direct requests to. The default is the lpsched daemon and currently only has been tested against lpsched.

The following table shows the conformance checking types for the Apache Web Server Configuration. The syntax to use is:

```
ipp-conformance value
```

TABLE A–3   Apache Web Server Conformance Checking Types

Value	Meaning
Automatic	Only check that the requested operation is supported by the protocol listener. (default)
1.0	Check that the request conforms to IPP/1.0.
1.1	Check that the request conforms to IPP/1.1.

The following is an annotated example of an apache configuration file:

```
if mod_ipp is loaded User lp run as "lp"
URI: ipp://{host}/printers/{queue}
SetHandler application/ipp use mod_ipp for this location
ipp-conformance strict enable strict protocol checking (default)
ipp-operation all enable enable all supported operations
```

IPP Operation Keywords

IPP objects support operations. An operation consists of a request and a response. When a print client communicates with an IPP object, the client issues an operation request to the URI for that object. Operation requests and responses have parameters that identify the operation. Operations also have attributes that affect the run time characteristics of the operation. These operation-specific attributes are defined as operation attributes. Print requests contain operation attributes, object attributes, and the required document data to perform the specific operation. Each request requires a response from the object. Each response indicates success or failure of the operation with a corresponding status code as a response parameter. Responses contain operation attributes, object attributes, and status messages that are generated during the operation request.

The following table describes the IPP operation keywords for the Apache Web Server Configuration.

TABLE A–4 IPP Operation Keywords

Value	Meaning
All	This keyword is used in place of an operation. The keyword is meant to signify that all operations that are supported by mod_ipp are selected.
Required	This keyword is used in place of an operation. The keyword is meant to signify that all the required operations, as defined in RFC-2911, are selected, including the following: print-job, cancel-job, get-job-attributes, get-jobs, and get-printer-attributes.
Print-job	A client wants to submit a print job with only a single document. The document data is sent with the request.
Print-uri	Unsupported.
Validate-job	A client wants to validate that a print job can be handled by the scheduler before submitting a print job.
Create-job	A client wants to submit a print job with multiple documents. The documents are sent with the send-document and send-uri operations.
Send-document	A client wants to add a document to a print job that is created with the print-job operation. The document data is sent with the request.
Send-uri	Unsupported.
Cancel-job	A client wants to cancel a print job.
Get-job-attributes	A client wants to gather information about a print job.
Get-jobs	A client wants to gather a list of print jobs in a particular print queue.
Get-printer-attributes	A client wants to gather information about a particular print queue.
Hold-job	A client wants to hold a particular print job.
Release-job	A client wants to release a particular print job.
Restart-job	A client wants to restart a particular print.

TABLE A–4 IPP Operation Keywords   *(Continued)*

Pause-printer	A client wants to pause (disable) a particular print queue. This operation will stop the processing of print requests in the queue. Note that the operation does not stop the queue from accepting jobs.
Resume-printer	A client wants to resume (enable) processing of jobs in a particular print queue.
Purge-jobs	A client wants to remove all jobs from a particular print queue.
Set-printer-attributes	Create or modify attributes of a printer.
Set-job-attributes	Modify attributes of an existing print job.
Enable-printer	Resume (accept) queueing of print jobs.
Disable-printer	Disable (reject) queueing of print jobs.
cups-get-default	Retrieve the default destination for a print service.
cups-get-printers	Enumerate all printers available from the print service.
cups-get-classes	Enumerate all classes available from the print service.
cups-accept-jobs	CUPS specific equivalent of Enable-printer.
cups-reject-jobs	CUPS specific equivalent of Disable-printer.
cups-move-jobs	Move jobs between queues in the same print service.

IPP Client-Side Support

The IPP client-side support in Oracle Solaris is implemented underneath the PAPI. This support enables any applications that are using the PAPI to use IPP, as well as other print services and protocols.

Applications include the following:

- GNOME Desktop Environment - Applications using libgnomeprint
- BSD commands - BSD UNIX LPD print service commands:
  - lpr
  - lpq
  - lprm
  - lpc
- LP commands - System V UNIX LP print service commands:
  - lp

- `lpstat`
- `lpmove`
- `accept`
- `reject`
- `enable`
- `disable`

The IPP client-side support for applications is provided through a loadable module, `psm-ipp.so`, that is loaded at runtime, based on the `printer-uri` for the printer or job that is being manipulated.

Because IPP is layered on top of an HTTP transport, both client-side and server-side support need the ability to read and write HTTP protocol. On the server-side, this support is provided by the Apache web server. On the client-side, this support is provided by an HTTP library, `libhttp-core.so`.

`lpsched` Support

`psm-lpsched` provides a translation between the print service independent representation of the PAPI and the LP print spooler (`lpsched`). It takes the PAPI attributes passed into various PAPI functions and converts them into an internal `lpsched` representation of the data. It then contacts `lpsched` to perform the requested operation. Once performed, it converts the results back into a print service neutral PAPI representation and returns them to the caller.

The LP print spooler (`lpsched`), provides a spooling service, translations of job data to a printer ready format, and transmission of the job data to the physical printer.

IPP Attributes

For each object instance, there is a set of supported attributes and values that describes a specific implementation of that object.

An object's attributes and values include the following information about that object:

- State
- Capabilities
- Features
- Job processing functions
- Default behaviors
- Default characteristics

Each attribute that defines an object is included in a set. This set of attributes for a specific object includes all of the attributes that the object could potentially support. For attributes that are labeled as REQUIRED, each object must support the attribute. If an attribute is labeled OPTIONAL, then each object may support the attribute.

Printer attributes are divided in to two groups:

job-template   These attributes describe the supported job processing capabilities and defaults for the Printer object.

printer-description   These attributes include identification, state, location, and references to other sources of information about the Printer object.

Examples of configurations that support a Printer object include the following:

- Output device with no spooling capabilities
- Output device with a built-in spooler
- Print server that supports IPP, with one or more associated output devices where the following applies:
    - Might or might not be capable of spooling jobs
    - Might or might not support IPP

The characteristics of a Job object are also described by its attributes.

Job attributes are grouped into two groups:

- job-template – These attributes are supplied by you or the print client. The attributes include job processing instructions that are intended to override any Printer object defaults or instructions that might be embedded within the document data.
- job-description – These attributes include the following information about the Job object:
    - Identification
    - State
    - Size

Note that the print client supplies some of these attributes, while the Printer object generates others. An implementation can support multiple documents per Job object, but it must support at least one document per Job object.

Note – In IPP, Version 1.0 and Version 1.1, a document is not modeled as an IPP object. Therefore, the document has no object identifier or associated attributes. All job processing instruction are modeled as Job object attributes. These attributes are called Job Template attributes. These attributes apply equally to all documents within a Job object.

IPP objects have relationships that are maintain persistently along with the persistent storage of the object attributes.

For task related information, see "Configuring the Internet Printing Protocol" on page 48.

Glossary

The following are terms that are commonly used throughout this book. Note that some of these terms are not limited to printing.

alias An alternative name that can be assigned to a printer.

allow list A file that includes a list of users who have access to forms or printers.

attached printer A hardware printing device that is directly connected to a system. An attached printer is sometimes referred to as a *local printer*.

banner page A cover page that is printed with each print request. This page displays the name of the user who submitted the print request, the request ID, and the date/time the request was printed. Banner pages can be disabled by using the `lpadmin` command in Oracle Solaris Print Manager.

baud rate The rate at which information is transmitted between devices, for example, between a computer and a printer. Baud rate measures the number of events, or signal changes, that occur in one second.

BSD print server A print server that uses the Berkeley Software Distribution (BSD) version of the UNIX operating system.

BSD printing protocol See RFC-1179 (Line Printer Daemon Protocol).

daemon A special type of program that starts itself and carries out a specific task without any need for user input. Daemons are typically used to handle print jobs that have been queued for printing.

default printer The printer that you designate as the default destination for all print requests. If no printer name is used, the default printer is used.

deny list A file that includes a list of users who are denied access to forms or printers.

destination or network printer access name The internal name of the printer node port that is used by the printer subsystem to access the printer. The access name is the name of the printer node or the name of the printer node with a printer vendor port designation. Any printer vendor port designation is explicitly defined in the printer vendor documentation.

device URI The device Uniform Resource Identifier (URI) contains the type of interface and the device path for printing on the Internet. A device URI can be used with the IPP, RFC-1179, and Server Message Block (SMB) printing protocols.

Domain Name System (DNS) A service that provides the naming policy and mechanisms for mapping domain and machine names to IP addresses outside of the enterprise, such as those IP addresses on the Internet.

filter

filter	A file that converts a print request into a format that can be processed by a particular type of printer.
form	A form is a printed paper stock, such as letterhead or blank checks. A form can also be a software file that contains printing characteristics, such as page length, page width, number of pages, line pitch, character pitch, character set choice, ribbon color, and alignment pattern.
Internet Printing Protocol (IPP)	An Internet protocol that provides universal solutions to printing documents on the Internet.
IPP listening service	A service that monitors the network for service requests, accepts the requests, and then invokes services in response to these service requests. In the Oracle Solaris OS, the listening service provides server-side support for printing on a network.
Lightweight Directory Access Protocol (LDAP)	A standard extensible directory access protocol that is used by LDAP naming service clients and servers to communicate with each other.
local printer	A print queue that has been defined on a system that is local to you.
Network Information Service (NIS) database	A distributed database that contains key information about the systems and the users on a network. The NIS database is stored on a master server and all replica or slave servers.
Network Information Service Plus (NIS+) database	A distributed database that contains hierarchical information about the systems and the users on a network. The NIS+ database is stored on the master server and all replica or slave servers.
network printer	A hardware printing device that is connected directly to a network. A network-attached printer transfers data directly over the network to the output device. The printer or network connection hardware has its own system name and IP address.
Open Standard Print API (PAPI)	A programming specification for cross-platform and cross-print system printing.
Oracle Solaris Print Manager	A Java technology-based GUI that enables you to manage local and remote printer configuration.
PAPI	See Open Standard Print API (PAPI).
PostScript Printer Description (PPD) file	A file that describes the fonts, paper sizes, resolution, and other capabilities that are standard for a particular printer.
PPD File Manager	A command-line utility for administering PostScript Printer Description (PPD) files that are used with the Oracle Solaris print subsystem.
print client	A system that has the printing software installed on it and that has been enabled to access remote printers on a network.
print job	A file to be printed. A print job is also referred to as a *print request*.

x

print queue	1. Refers to the setup and configuration of a printer. 2. A temporary lineup of print requests that are scheduled to print on a printer.
print request	A file to be printed. A print request is also referred to as a *print job*.
print scheduler	A program that schedules print requests. In the Oracle Solaris OS, the print scheduler is the `lpsched` daemon.
print server	A system with a local printer configured on it that makes the printer available to other systems on a network.
print spooler	Software that intercepts a print request and then sends it to disk or memory, where the request is held until the printer is ready to print it. The term, spooler, is an acronym for *Simultaneous Peripheral Operations On-line*.
printer driver	A program that is used to convert the input file (or job data) into a format that is specific to the target printer.
printer-host device	The software and hardware, supplied by a vendor, that provides network printer support for a non-network-capable printer. The combination of the printer-host device with one or more printers attached to it creates a *network-attached printer*.
printer interface program	A program, or interface script, that is the interface between the LP scheduler and the printers. The printer interface program enables insertion of customized software.
printer name	The name that is typed on the command line when you use print commands. You select the printer name at the time of the printer's configuration. Any one physical printer can have several printer or print queue names. Each name provides access to the printer.
printer node	Either the physical printer or the printer-host device. The printer node is the physical printer when network support resides in the physical printer. The printer node is the printer-host device when an external device is used to provide the network interface. The printer node name is the system name that is provided with the IP address.
printing protocols	Over-the-wire protocols that enable communication between a print client and a print server and between a print server and a printer. The supported protocols for communication between a print client and printer server are IPP and RFC-1179. The supported protocols for communication between a print server and a printer are TCP/IP, RFC-1179, and IPP. Often, the documentation from the printer vendor supplies the information regarding the protocol to select.
protocol	A set of formal rules that describe how to transmit data across a network. See printing protocols.
remote printer	A hardware printing device that has its print queue defined on a system that is *not* local to you.
RFC-1179 (Line Printer Daemon Protocol)	Defines a standard method by which print jobs can be transferred between hosts by using the TCP/IP protocol. The RFC describes the protocols with which a line printer daemon client can control printing. Also know as BSD or LPD.
Samba	An open-source free software suite that provides file and print services to Server Message Block (SMB) clients, including the numerous versions of Windows.

Server Message Block (SMB)   A protocol that enables clients to access files and to request services from a server on a network.

Uniform Resource Identifier (URI)   An addressing technology for identifying resources on the Internet or on a private intranet. URIs can be used with application-level protocols, which are called *URI schemes*.

URI scheme   A scheme that enables the inline inclusion of small data items, as if they were being referenced as an external resource.

Index