



CUPS Software Users Manual

CUPS-SUM-1.1.15

Easy Software Products
Copyright 1997–2002, All Rights Reserved

Table of Contents

<u>Preface</u>	1
<u>System Overview</u>	1
<u>Document Overview</u>	2
<u>Notation Conventions</u>	2
<u>Abbreviations</u>	3
<u>Other References</u>	3
 <u>1 – Printing System Overview</u>	 5
<u>The Printing Problem</u>	5
<u>The Technology</u>	6
<u>Jobs</u>	6
<u>Classes</u>	6
<u>Filters</u>	6
<u>Backends</u>	6
<u>Printer Drivers</u>	7
<u>Networking</u>	7
 <u>2 – Using the Printing System</u>	 9
<u>Submitting Files for Printing</u>	9
<u>Choosing a Printer</u>	9
<u>Setting Printer Options</u>	10
<u>Printing Multiple Copies</u>	10
<u>Checking the Printer Status from the Command-Line</u>	10
<u>Checking the Printer Status from the Web</u>	11
<u>Canceling a Print Job</u>	11
 <u>3 – Standard Printer Options</u>	 13
<u>General Options</u>	13
<u>Selecting the Media Size, Type, and Source</u>	13
<u>Setting the Orientation</u>	14
<u>Printing On Both Sides of the Paper</u>	14
<u>Banner Options</u>	14
<u>Selecting the Banner Page(s)</u>	14
<u>Document Options</u>	15
<u>Selecting a Range of Pages</u>	15
<u>Selecting Even or Odd Pages</u>	15
<u>N-Up Printing</u>	15
<u>Setting the Brightness</u>	16
<u>Setting the Gamma Correction</u>	16
<u>Text Options</u>	16
<u>Setting the Number of Characters Per Inch</u>	16
<u>Setting the Number of Lines Per Inch</u>	17
<u>Setting the Number of Columns</u>	17
<u>Setting the Page Margins</u>	17
<u>Pretty Printing</u>	17
<u>Image Options</u>	17
<u>Positioning the Image</u>	17
<u>Scaling the Image</u>	18

Table of Contents

3 – Standard Printer Options

<u>Adjusting the Hue (Tint) of an Image</u>	18
<u>Adjusting the Saturation (Color) of an Image</u>	19
<u>HP–GL/2 Options</u>	19
<u>Printing in Black</u>	19
<u>Fitting the Plot on the Page</u>	19
<u>Setting the Default Pen Width</u>	20
<u>Raw or Unfiltered Output</u>	20

4 – Saving Printer Options and Defaults.....21

<u>Printer Options</u>	21
<u>Setting Options for a Specific Printer</u>	21
<u>Removing Options</u>	22
<u>Viewing the Current Defaults</u>	22
<u>Viewing Options for a Specific Printer</u>	22
<u>Setting the Default Printer</u>	22
<u>Printer Instances</u>	22
<u>Removing Instances</u>	23

A – Software License Agreement.....25

<u>Common UNIX Printing System License Agreement</u>	25
<u>Introduction</u>	25
<u>License Exceptions</u>	26
<u>Trademarks</u>	26
<u>Binary Distribution Rights</u>	27
<u>Support</u>	27
<u>GNU GENERAL PUBLIC LICENSE</u>	28
<u>GNU LIBRARY GENERAL PUBLIC LICENSE</u>	33

Preface

This software users manual describes how to use the Common UNIX Printing System™ ("CUPS™") Version 1.1.15.

System Overview

CUPS provides a portable printing layer for UNIX®-based operating systems. It has been developed by [Easy Software Products](#) to promote a standard printing solution for all UNIX vendors and users. CUPS provides the System V and Berkeley command-line interfaces.

CUPS uses the Internet Printing Protocol ("IPP") as the basis for managing print jobs and queues. The Line Printer Daemon ("LPD") Server Message Block ("SMB"), and AppSocket (a.k.a. JetDirect) protocols are also supported with reduced functionality. CUPS adds network printer browsing and PostScript Printer Description ("PPD") based printing options to support real-world printing under UNIX.

CUPS also includes a customized version of GNU Ghostscript (currently based off GNU Ghostscript 5.50) and an image file RIP that are used to support non-PostScript printers. Sample drivers for HP and EPSON printers are included that use these filters.

Document Overview

This software users manual is organized into the following sections:

- [1 – Printing System Overview](#)
- [2 – Using the Printing System](#)
- [3 – Standard Printer Options](#)
- [4 – Saving Printer Options and Defaults](#)
- [A – Software License Agreement](#)

Notation Conventions

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

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

Abbreviations

The following abbreviations are used throughout this manual:

<i>kb</i>	Kilobytes, or 1024 bytes
<i>Mb</i>	Megabytes, or 1048576 bytes
<i>Gb</i>	Gigabytes, or 1073741824 bytes

Other References

CUPS Software Administrators Manual

An administration guide for the CUPS software.

CUPS Software Programmers Manual

A programmer guide for interfacing with and/or extending the CUPS software.

1 – Printing System Overview

This chapter provides an overview of how the Common UNIX Printing System works.

The Printing Problem

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

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

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

The Technology

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

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

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

CUPS provides a complete IPP/1.1 based printing system that provides Basic, Digest, and local certificate authentication and user, domain, or IP-based access control. TLS encryption will be available in future versions of CUPS.

Jobs

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

Classes

CUPS supports collections of printers known as *classes*. Jobs sent to a class are forwarded to the first available printer in the class.

Filters

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

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

Backends

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

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

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

Printer Drivers

Printer drivers in CUPS consist of one or more filters specific to a printer. CUPS includes sample printer drivers for Hewlett-Packard LaserJet and DeskJet printers and EPSON 9-pin, 24-pin, Stylus Color, and Stylus Photo printers. While these drivers do not generate optimal output for the different printer models, they do provide basic printing and demonstrate how you can write your own printer drivers and incorporate them into CUPS.

Networking

Printers and classes on the local system are automatically shared with other systems on the network. This allows you to setup one system to print to a printer and use this system as a printer server or spool host for all of the others. Users may then select a local printer by name or a remote printer using "name@server".

CUPS also provides *implicit classes*, which are collections of printers and/or classes with the same name. This allows you to setup multiple servers pointing to the same physical network printer, for example, so that you aren't relying on a single system for printing. Because this also works with printer classes, you can setup multiple servers and printers and never worry about a single point of failure unless all of the printers and servers go down!

2 – Using the Printing System

This chapter shows you how to submit, query, and cancel print jobs to different printers.

Submitting Files for Printing

CUPS provides both the System V (`lp(1)`) and Berkeley (`lpr(1)`) printing commands. Type the following command to print a file to the default (or only) printer on the system:

```
lp filename ENTER
```

or:

```
lpr filename ENTER
```

CUPS understands many different types of files directly, including PostScript and image files. This allows you to print from inside your applications or at the command-line, whichever is most convenient!

Choosing a Printer

Many systems will have more than one printer available to the user. These printers can be attached to the local system via a parallel, serial, or USB port, or available over the network.

Use the `lpstat(1)` command to see a list of available printers:

```
lpstat -p -d ENTER
```

The `-p` option specifies that you want to see a list of printers, and the `-d` option reports the current system default printer or class.

Use the `-d` option with the `lp` command to print to a specific printer:

```
lp -d printer filename ENTER
```

or the `-P` option with the `lpr` command:

```
lpr -P printer filename ENTER
```

Setting Printer Options

For many types of files, the default printer options may be sufficient for your needs. However, there may be times when you need to change the options for a particular file you are printing.

The `lp` and `lpr` commands allow you to pass printer options using the `-o` option:

```
lp -o landscape -o scaling=75 -o media=A4 filename.jpg
lpr -o landscape -o scaling=75 -o media=A4 filename.jpg
```

The available printer options vary depending on the printer. The standard options are described in [Chapter 3, "Standard Printing Options"](#).

Printing Multiple Copies

Both the `lp` and `lpr` commands have options for printing more than one copy of a file:

```
lp -n num-copies filename ENTER
lpr -#num-copies filename ENTER
```

Copies are normally *not* collated for you. Use the `-o Collate=True` option to get collated copies :

```
lp -n num-copies -o Collate=True filename ENTER
lpr -#num-copies -o Collate=True filename ENTER
```

Checking the Printer Status from the Command-Line

The `lpstat` command can be used to check for jobs that you have submitted for printing:

```
lpstat ENTER
Printer-1 johndoe 4427776
Printer-2 johndoe 15786
Printer-3 johndoe 372842
```

The jobs are listed in the order they will be printed. Use the `-p` option to see which files and printers are active:

```
lpstat -p ENTER
printer DeskJet now printing DeskJet-1.
```

Use the `-o` and `-p` options together to show the jobs and the printers:

```
lpstat -o -p ENTER
Printer-1 johndoe 4427776
Printer-2 johndoe 15786
Printer-3 johndoe 372842
printer DeskJet now printing DeskJet-1.
```

Checking the Printer Status from the Web

Since CUPS uses the Internet Printing Protocol, it is also a fully-functional web server. To use your web browser to monitor the printers on your system, open the URL:

<http://localhost:631>

From there you can view the status of classes, jobs, and printers with the click of a button!

Canceling a Print Job

The `cancel(1)` and `lprm(1)` commands cancel a print job:

```
cancel job-id ENTER
lprm job-id ENTER
```

The `job-id` is the number that was reported to you by the `lp` or `lpstat` commands.

3 – Standard Printer Options

This chapter describes the standard printer options that are available when printing with the `lp` and `lpr` commands.

General Options

The following options apply when printing all types of files.

Selecting the Media Size, Type, and Source

The `-o media=xyz` option sets the media size, type, and/or source:

```
lp -o media=Letter filename ENTER
lp -o media=Letter,MultiPurpose filename ENTER
lpr -o media=Letter,Transparency filename ENTER
lpr -o media=Letter,MultiPurpose,Transparency filename ENTER
```

The available media sizes, types, and sources depend on the printer, but most support the following options (case is not significant):

- Letter – US Letter (8.5x11 inches, or 216x279mm)
- Legal – US Legal (8.5x14 inches, or 216x356mm)
- A4 – ISO A4 (8.27x11.69 inches, or 210x297mm)
- COM10 – US #10 Envelope (9.5x4.125 inches, or 241x105mm)
- DL – ISO DL Envelope (8.66x4.33 inches, or 220x110mm)
- Transparency – Transparency media type or source
- Upper – Upper paper tray
- Lower – Lower paper tray
- MultiPurpose – Multi-purpose paper tray
- LargeCapacity – Large capacity paper tray

The actual options supported are defined in the printer's PPD file in the `PageSize`, `InputSlot`, and `MediaType` options.

Setting the Orientation

The `-o landscape` option will rotate the page 90 degrees to print in landscape orientation:

```
lp -o landscape filename ENTER
lpr -o landscape filename ENTER
```

Printing On Both Sides of the Paper

The `-o sides=two-sided-short-edge` and `-o sides=two-sided-long-edge` options will enable duplexing on the printer, if the printer supports it. The `-o sides=two-sided-short-edge` option is suitable for landscape pages, while the `-o sides=two-sided-long-edge` option is suitable for portrait pages:

```
lp -o sides=two-sided-short-edge filename ENTER
lp -o sides=two-sided-long-edge filename ENTER
lpr -o sides=two-sided-long-edge filename ENTER
```

The default is to print single-sided:

```
lp -o sides=one-sided filename ENTER
lpr -o sides=one-sided filename ENTER
```

Banner Options

The following options apply when printing all types of files.

Selecting the Banner Page(s)

The `-o jobsheets=start,end` option sets the banner page(s) to use for a job:

```
lp -o job-sheets=none filename ENTER
lp -o job-sheets=standard filename ENTER
lpr -o job-sheets=classified,classified filename ENTER
```

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

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

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

Document Options

The following options apply when printing all types of files.

Selecting a Range of Pages

The `-o page-ranges=pages` option selects a range of pages for printing:

```
lp -o page-ranges=1 filename ENTER
lp -o page-ranges=1-4 filename ENTER
lp -o page-ranges=1-4,7,9-12 filename ENTER
lpr -o page-ranges=1-4,7,9-12 filename ENTER
```

As shown above, the `pages` value can be a single page, a range of pages, or a collection of page numbers and ranges separated by commas. The pages will always be printed in ascending order, regardless of the order of the pages in the `page-ranges` option.

The default is to print all pages.

Selecting Even or Odd Pages

Use the `-o page-set=set` option to select the even or odd pages:

```
lp -o page-set=odd filename ENTER
lp -o page-set=even filename ENTER
lpr -o page-set=even filename ENTER
```

The default is to print all pages.

N-Up Printing

The `-o number-up=value` option selects N-Up printing. N-Up printing places multiple document pages on a single printed page. CUPS supports 1, 2, 4, 6, 9, and 16-Up formats; the default format is 1-Up:

```
lp -o number-up=1 filename ENTER
lp -o number-up=2 filename ENTER
lp -o number-up=4 filename ENTER
```

```
lpr -o number-up=16 filename ENTER
```

The `-o number-up-border=value` option chooses the border to draw around each page:

- `-o number-up-border=double`; draw two hairline borders around each page
- `-o number-up-border=double-thick`; draw two 1pt borders around each page
- `-o number-up-border=none`; do not draw a border (default)
- `-o number-up-border=single`; draw one hairline border around each page
- `-o number-up-border=single-thick`; draw one 1pt border around each page

The `-o number-up-layout=value` option chooses the layout of the pages on each output page:

- `-o number-up-layout=btlr`; Bottom to top, left to right
- `-o number-up-layout=btrl`; Bottom to top, right to left
- `-o number-up-layout=lrbt`; Left to right, bottom to top
- `-o number-up-layout=lrtb`; Left to right, top to bottom (default)
- `-o number-up-layout=rlbt`; Right to left, bottom to top
- `-o number-up-layout=rltb`; Right to left, top to bottom
- `-o number-up-layout=tblr`; Top to bottom, left to right
- `-o number-up-layout=tbrl`; Top to bottom, right to left

Setting the Brightness

You can control the overall brightness of the printed output using the `-o brightness=percent` option:

```
lp -o brightness=120 filename ENTER
lpr -o brightness=120 filename ENTER
```

Values greater than 100 will lighten the print, while values less than 100 will darken it.

Setting the Gamma Correction

You can control the overall gamma correction of the printed output using the `-o gamma=value` option:

```
lp -o gamma=1700 filename ENTER
lpr -o gamma=1700 filename ENTER
```

Values greater than 1000 will lighten the print, while values less than 1000 will darken it. The default gamma is 1000.

Text Options

The following options apply when printing text files.

Setting the Number of Characters Per Inch

The `-o cpi=value` option sets the number of characters per inch:

```
lp -o cpi=10 filename ENTER
lp -o cpi=12 filename ENTER
lpr -o cpi=17 filename ENTER
```

The default characters per inch is 10.

Setting the Number of Lines Per Inch

The `-o lpi=value` option sets the number of lines per inch:

```
lp -o lpi=6 filename ENTER
lpr -o lpi=8 filename ENTER
```

The default lines per inch is 6.

Setting the Number of Columns

The `-o columns=value` option sets the number of text columns:

```
lp -o columns=2 filename ENTER
lpr -o columns=3 filename ENTER
```

The default number of columns is 1.

Setting the Page Margins

Normally the page margins are set to the hard limits of the printer. Use the `-o page-left=value`, `-o page-right=value`, `-o page-top=value`, and `-o page-bottom=value` options to adjust the page margins:

```
lp -o page-left=value filename ENTER
lp -o page-right=value filename ENTER
lp -o page-top=value filename ENTER
lp -o page-bottom=value filename ENTER
lpr -o page-bottom=value filename ENTER
```

The `value` argument is the margin in points; each point is 1/72 inch or 0.35mm.

Pretty Printing

The `-o prettyprint` option puts a header at the top of each page with the page number, job title (usually the filename), and the date. Also, C and C++ keywords are highlighted, and comment lines are italicized:

```
lp -o prettyprint filename ENTER
lpr -o prettyprint filename ENTER
```

Image Options

The following options apply when printing image files.

Positioning the Image

The `-o position=name` option specifies the position of the image on the page:

- `center` – Center the image on the page (default)

- `top` – Print the image centered at the top of the page
- `left` – Print the image centered on the left of page
- `right` – Print the image centered on the right of the page
- `top-left` – Print the image at the top left corner of the page
- `top-right` – Print the image at the top right corner of the page
- `bottom` – Print the image centered at the bottom of the page
- `bottom-left` – Print the image at the bottom left corner of the page
- `bottom-right` – Print the image at the bottom right corner of the page

Scaling the Image

The `-o scaling=percent`, `-o ppi=value`, and `-o natural-scaling=percent` options change the size of a printed image:

```
lp -o scaling=percent filename ENTER
lp -o ppi=value filename ENTER
lpr -o natural-scaling=percent filename ENTER
```

The `scaling=percent` value is a number from 1 to 800 specifying the size in relation to the page (*not* the image.) A scaling of 100 percent will fill the page as completely as the image aspect ratio allows. A scaling of 200 percent will print on up to 4 pages.

The `ppi=value` value is a number from 1 to 1200 specifying the resolution of the image in pixels per inch. An image that is 3000x2400 pixels will print 10x8 inches at 300 pixels per inch, for example. If the specified resolution makes the image larger than the page, multiple pages will be printed to satisfy the request.

The `natural-scaling=percent` value is a number from 1 to 800 specifying the size in relation to the natural image size. A scaling of 100 percent will print the image at its natural size, while a scaling of 50 percent will print the image at half its natural size. If the specified scaling makes the image larger than the page, multiple pages will be printed to satisfy the request.

Adjusting the Hue (Tint) of an Image

The `-o hue=value` option will adjust the hue of the printed image, much like the tint control on your television:

```
lp -o hue=value filename ENTER
lpr -o hue=value filename ENTER
```

The `value` argument is a number from -360 to 360 and represents the color hue rotation. The following table summarizes the change you'll see with different colors:

Original	hue=-45	hue=45
Red	Purple	Yellow-orange
Green	Yellow-green	Blue-green
Yellow	Orange	Green-yellow
Blue	Sky-blue	Purple
Magenta	Indigo	Crimson
Cyan	Blue-green	Light-navy-blue

The default hue adjustment is 0.

Adjusting the Saturation (Color) of an Image

The `-o saturation=percent` option adjusts the saturation of the colors in an image, much like the color knob on your television:

```
lp -o saturation=percent filename ENTER
lpr -o saturation=percent filename ENTER
```

The `percent` argument specifies the color saturation from 0 to 200. A color saturation of 0 produces a black-and-white print, while a value of 200 will make the colors extremely intense.

The default saturation is 100.

HP-GL/2 Options

The following options apply to HP-GL/2 files.

Printing in Black

The `-o blackplot` option specifies that all pens should plot in black:

```
lp -o blackplot filename ENTER
lpr -o blackplot filename ENTER
```

The default is to use the colors defined in the plot file or the standard pen colors defined in the HP-GL/2 reference manual from Hewlett Packard.

Fitting the Plot on the Page

The `-o fitplot` option specifies that the plot should be scaled to fit on the page:

```
lp -o fitplot filename ENTER
lpr -o fitplot filename ENTER
```

The default is to use the absolute distances specified in the plot file.

NOTE:

This feature depends upon an accurate plot size (PS) command in the HP-GL/2 file. If no plot size is given in the file than the HP-GL/2 filter assumes the plot is ANSI E size.

Setting the Default Pen Width

The `-o penwidth=value` option specifies the default pen width for HP-GL/2 files:

```
lp -o penwidth=value filename ENTER
lpr -o penwidth=value filename ENTER
```

The pen width value specifies the pen width in micrometers. The default value of 1000 produces lines that are 1 millimeter in width. Specifying a pen width of 0 produces lines that are exactly 1 pixel wide.

NOTE:

This option is ignored when the pen widths are set in the plot file.

Raw or Unfiltered Output

The `-o raw` option allows you to send files directly to a printer without filtering. This is sometimes required when printing from applications that provide their own "printer drivers" for your printer:

```
lp -o raw filename ENTER
lpr -o raw filename ENTER
```

The `-l` option can also be used with the `lpr` command to send files directly to a printer:

```
lpr -l filename ENTER
```


4 – Saving Printer Options and Defaults

This chapter describes how to save printer options for your printer and set your own default printer.

Printer Options

Each printer supports a large number of options, which you learned about in [Chapter 3, "Standard Printer Options"](#). Rather than specifying these options each time you print a file, CUPS allows you to save them as "default" options for the printer.

The `lpoptions(1)` command saves the options for your printers. Like the `lp` and `lpr` commands, it accepts printer options using the `-o` argument:

```
lpoptions -o prettyprint ENTER
lpoptions -o media=A4 -o sides=two-sided-long-edge ENTER
lpoptions -o media=Legal -o scaling=100 ENTER
```

Once saved, any `lp` or `lpr` command will use them when you print.

Setting Options for a Specific Printer

The previous example shows how to set the options for the default printer. The `-p` printer option specifies the options are for another printer:

```
lpoptions -p laserjet -o prettyprint ENTER
lpoptions -p laserjet -o media=A4 -o sides=two-sided-long-edge ENTER
```

```
lpoptions -p deskjet -o media=Legal -o scaling=100 ENTER
```

Removing Options

The previous two examples shows how to set options for the default and a specific printer. Below, shows you how to remove the saved option using the `-r` argument:

```
lpoptions -r prettyprint ENTER
lpoptions -p laserjet -r prettyprint ENTER
```

Viewing the Current Defaults

The `lpoptions` command can also be used to show the current options by not specifying any new options on the command-line:

```
lpoptions ENTER
media=A4 sides=two-sided-long-edge
lpoptions -p deskjet ENTER
media=Legal scaling=100
```

Viewing Options for a Specific Printer

You can display the supported options using the `lpoptions` command with the `-l` option, as follows:

```
lpoptions -p laserjet -l ENTER
```

Setting the Default Printer

The administrator normally will set a system-wide default printer that is normally used as the default printer by everyone. Use the `-d printer` option to set your own default printer:

```
lpoptions -d deskjet ENTER
```

The printer can be local (`deskjet`) or remote (`deskjet@server`).

Printer Instances

Besides setting options for each print queue, CUPS supports *printer instances* which allow you to define several different sets of options for each printer. You specify a printer instance using the slash (/) character:

```
lpoptions -p laserjet/duplex -o sides=two-sided-long-edge ENTER
lpoptions -p laserjet/legal -o media=Legal ENTER
```

The `lp` and `lpr` commands also understand this notation:

```
lp -d laserjet/duplex filename ENTER
lpr -P laserjet/legal filename ENTER
```

Removing Instances

Use the `-x printer/instance` option to remove a printer instance that you no longer need:

```
lpoptions -x laserjet ENTER
lpoptions -x laserjet/duplex ENTER
lpoptions -x laserjet/legal ENTER
```

The `-x` option only removes the default options for that printer and instance; the original print queue will remain until deleted with the `lpadmin(8)` command by the administrator.

A – Software License Agreement

Common UNIX Printing System License Agreement

Copyright 1997–2002 by Easy Software Products
44141 AIRPORT VIEW DR STE 204
HOLLYWOOD, MARYLAND 20636–3111 USA

Voice: +1.301.373.9600
Email: cups-info@cups.org
WWW: <http://www.cups.org>

Introduction

The Common UNIX Printing System™, ("CUPS™"), is provided under the GNU General Public License ("GPL") and GNU Library General Public License ("LGPL"), Version 2, with exceptions for Apple operating systems and the OpenSSL toolkit. A copy of the exceptions and licenses follow this introduction.

The GNU LGPL applies to the CUPS API library, located in the "cups" subdirectory of the CUPS source distribution and in the "cups" include directory and library files in the binary distributions. The GNU GPL applies to the remainder of the CUPS distribution, including the "pdftops" filter which is based upon Xpdf and the CUPS imaging library.

For those not familiar with the GNU GPL, the license basically allows you to:

- Use the CUPS software at no charge.
- Distribute verbatim copies of the software in source or binary form.
- Sell verbatim copies of the software for a media fee, or sell support for the software.
- Distribute or sell printer drivers and filters that use CUPS so long as source code is made available under the GPL.

What this license **does not** allow you to do is make changes or add features to CUPS and then sell a binary distribution without source code. You must provide source for any new drivers, changes, or additions to the software, and all code must be provided under the GPL or LGPL as appropriate. The only exceptions to this are the portions of the CUPS software covered by the Apple operating system license exceptions outlined later in this license agreement.

The GNU LGPL relaxes the "link-to" restriction, allowing you to develop applications that use the CUPS API library under other licenses and/or conditions as appropriate for your application.

License Exceptions

In addition, as the copyright holder of CUPS, Easy Software Products grants the following special exceptions:

1. Apple Operating System Development License Exception;

- a. Software that is developed by any person or entity for an Apple Operating System ("Apple OS–Developed Software"), including but not limited to Apple and third party printer drivers, filters, and backends for an Apple Operating System, that is linked to the CUPS imaging library or based on any sample filters or backends provided with CUPS shall not be considered to be a derivative work or collective work based on the CUPS program and is exempt from the mandatory source code release clauses of the GNU GPL. You may therefore distribute linked combinations of the CUPS imaging library with Apple OS–Developed Software without releasing the source code of the Apple OS–Developed Software. You may also use sample filters and backends provided with CUPS to develop Apple OS–Developed Software without releasing the source code of the Apple OS–Developed Software.
- b. An Apple Operating System means any operating system software developed and/or marketed by Apple Computer, Inc., including but not limited to all existing releases and versions of Apple's Darwin, Mac OS X, and Mac OS X Server products and all follow-on releases and future versions thereof.
- c. This exception is only available for Apple OS–Developed Software and does not apply to software that is distributed for use on other operating systems.
- d. All CUPS software that falls under this license exception have the following text at the top of each source file:

This file is subject to the Apple OS–Developed Software exception.

2. OpenSSL Toolkit License Exception;

- a. Easy Software Products explicitly allows the compilation and distribution of the CUPS software with the OpenSSL Toolkit.

No developer is required to provide these exceptions in a derived work.

Trademarks

Easy Software Products has trademarked the Common UNIX Printing System, CUPS, and CUPS logo. These names and logos may be used freely in any direct port or binary distribution of CUPS. Please contract Easy

Software Products for written permission to use them in derivative products. Our intention is to protect the value of these trademarks and ensure that any derivative product meets the same high-quality standards as the original.

Binary Distribution Rights

Easy Software Products also sells rights to the CUPS source code under a binary distribution license for vendors that are unable to release source code for their drivers, additions, and modifications to CUPS under the GNU GPL and LGPL. For information please contact us at the address shown above.

The Common UNIX Printing System provides a "pdftops" filter that is based on the Xpdf software. For binary distribution licensing of this software, please contact:

Derek B. Noonburg

Email: derekn@foolabs.com

WWW: <http://www.foolabs.com/xpdf/>

Support

Easy Software Products sells software support for CUPS as well as a commercial printing product based on CUPS called ESP Print Pro. You can find out more at our web site:

<http://www.easysw.com/>

GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright 1989, 1991 Free Software Foundation, Inc.
59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Everyone is permitted to copy and distribute verbatim
copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

10. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

9. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

8. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:
- a. You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
 - b. You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
 - c. if the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

7. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:
 - a. Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
 - b. Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
 - c. Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

0. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.
1. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.
2. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.
6. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this

License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

3. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.
5. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

4. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

GNU LIBRARY GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1991 Free Software Foundation, Inc.
59 Temple Place - Suite 330, Boston, MA 02111-1307, USA
Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.

[This is the first released version of the library GPL. It is
numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which

was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the

Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- d. The modified work must itself be a software library.
- c. You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- b. You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- a. If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than

version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- d. Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2

above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

- c. Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- b. If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- a. Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

- b. Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.
- a. Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to

these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Library General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN

OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

