

Sine Nomine Associates

# Printing With CUPS

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# Agenda

- Why CUPS?
- Quick Glossary of Printing Terms
- Printing with CUPS Part I:  
Server Side
- Printing with CUPS Part II:  
Client Side and Applications Interfaces
- Q&A

# Why CUPS?

- Originally, Unix had no spooling system:  
cat file > /dev/lp1
- UC Berkeley added lpd, but very feature-poor; unusable for commercial purposes
- SysV Unix created new printing system, but grossly complex and incompatible with BSD printing system
- Vendor “extensions” introduced incompatibility
- Lpr RFC published, but didn’t actually reflect real usage
- Most Unix printing tools oriented towards line printers, not “smart” printers
- No standard interface for programs to produce output; must create temp file or pipe and print using line mode command

# Common Unix Printing System

- Designed to solve several critical problems with Unix-based output management:
  - Poor Job Management Capabilities
  - Device Driver Incompatibility
  - No Clear Standard “Way to Do It”

# CUPS

- Provides clean, portable, documented method of printing information on modern printers for humans AND programs
- Supports interface modules for vintage printing methods as well as fully standardized printing protocol (IPP)

# CUPS

- Supports smart back ends for complex processing of print streams:
  - PostScript rasterization for non-PS printers
  - Widely accepted Adobe PPD format for describing print characteristics

# Quick Glossary

- Destination:

Text name assigned to a printer for easy reference

- Example:

- “lp”
- “hp520”
- “Xerox9700inWestWing”

# Quick Glossary

- Job:
  - File or set of files to be printed with a set of print options
- Job Options:
  - Describe:
    - Print orientation and processing
    - Media selection
    - Special features (per printer basis)



# Quick Glossary

- Class:
  - Group destination allowing multiple printers to process output for a single name
- Instance:
  - Set of print options to specify a particular effect for a specific print destination, eg:
    - hp520/normal
      - Normal weight text on default paper for a HP 520
    - hp520/draft
      - Draft quality text on default paper for an HP 520

# Quick Glossary

- Filter:
  - Program to modify print stream in some way
  - Can do anything up to and including replacing the entire output stream
- Printer Driver:
  - Printer-specific filters

# Quick Glossary

- Back-End
  - Transport data to and from the printer
  - Report on available printer devices (primitive plug-and-play capability)
- Network Driver
  - Special class of back-end supporting network printing protocols:
    - LPR
    - Appletalk
    - SMB/Samba
    - IPP
    - Virtual (PDF printer)
    - Etc...

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# Printing with CUPS: Part I

Server Side Configuration

# Installing CUPS

- Default printing system with SuSE, Debian and RH (finally!)
- Managed packages available on most distributions
- Source available at:  
<http://www.cups.org>

# Major Configuration Files

- /etc/cups
  - banners: banner pages
  - ppds: printer PPD files
  - printers.conf: printer options and active printers
  - cupsd.conf: daemon configuration options

# Basic Printer Administration

- Add/modify/delete a printer
- Set the default printer
- Start/stop a printer
- Accept/reject print jobs
- Setting print quotas
- Restricting access to a printer

# Things To Know About Your Printers

- What device is it attached to?
- What communication parameters do you need?
- Do you have a .PPD file that describes the printer available?



# CUPS Devices

CUPS uses a URL-like syntax to describe what devices or processing code are available to drive a printer

```
lpinfo -v
```

to list the device types and configurations supported by CUPS on your system

# Example CUPS Device List

**network socket**  
**network http**  
**network ipp**  
**network lpd**  
**direct canon:/dev/lp0**  
**direct epson:/dev/lp0**  
**direct parallel:/dev/lp0**  
**file pipe**  
**direct scsi**  
**serial serial:/dev/ttyS0?baud=115200**  
**serial serial:/dev/ttyS1?baud=115200**  
**serial serial:/dev/ttyS2?baud=115200**

## Example Device URL/URI

parallel:/dev/lp1

smb://server/queue

lpd://vm.tx.sinenomine.net/va1p1

ipp://win3.microsoft.com/label

# Connection Parameters

- Direct connections:
  - Connection type (parallel, serial, USB, etc)
  - Device name (/dev/lp1, /dev/usb1, etc)
- Network connections:
  - Network protocol type (SMB, IPP, LPR, etc)
  - Network address of printer server
  - Queue name

# PPD Files

- PostScript Printer Description (PPD)

Text file describing all the valid options for the printer and how to employ them.

- Used for BOTH PS and non-PS printers
- Available from printer manufacturer
- Large library supplied with Linux distributions
  - Source distribution only includes a few – snarf a copy from your favorite Linux distro (which is very likely free)

# lpadmin

- All things configuration related are done with lpadmin.
- Most important options:
  - -p: identifies printer destination to work on
  - -v: specifies device for printer queue to use
  - -m: specifies PPD file to use
- Or you could take the lower-effort option and just use the web interface (once you've configured it)

# Adding a Printer

```
lpadmin -p printer -v device-uri -m ppdfile
```

Example:

```
lpadmin -p va1p2 \  
  -v lpd://server.sinenomine.net \  
  -m Lexmark/Lexmark-T610-PS.ppd \  
  -D "Lexmark T610" \  
  -L "Executive Office, Virginia"
```

## Deleting a Printer

`lpadmin -x printer`

- Must be stopped and disabled before delete will take place



# Modifying a Printer

```
lpadmin -p printer options
```

# Setting Default Printers

```
lpadmin -d printer
```

Users can override for individual preferences using lpoptions

## Enable vs Accept

- Enable/Disable:
  - Based on physical availability of device
  - Starts/stops actual printing on the device
  - Jobs may still be submitted, but will not print until device is enabled
- Accept/Reject:
  - Independent of device status
  - Controls access to queuing for device
  
  - Jobs cannot be submitted regardless of printer status

# Enable/Disable Printer

*enable printer*  
*disable printer*

Must be root or printer admin to enable/disable devices

# Accept/Reject Jobs

*accept printer*  
*reject printer*

*lpstat* or *lpc status* will show enable/disable or accept/reject status  
for each print destination

# Setting Print Quotas

- `lpadmin -p printer -o`
  - `job-quota-period=sss`
  - `job-k-limit=xxxx`
  - `job-page-limit=nnnn`
- Enforced per user per quota period
- ALL users have same limit

# Restricting User Access

```
lpadmin -p printer -u allow: userlist  
deny: userlist
```

- Must supply COMPLETE list each time
- Can be allow or deny – but not both
- Allows use of @group notation to authorize by Unix group

# Printer Groups

```
lpadmin -p printer -c class (add printer)
```

```
lpadmin -p printer -r class (del printer)
```

```
lpadmin -x class (del class)
```

- Classes created implicitly from devices with identical settings



# Printer Discovery

- On the same subnet:
  - Do Nothing!
  - Use `BrowseAddress @LOCAL` in `/etc/cups/cupsd.conf` to announce your printers
- Other subnets:
  - Add `BrowsePoll` and `BrowseRelay` to `/etc/cups/cupsd.conf` to query specific CUPS servers and broadcast results to your subnet

# Printing with CUPS:

## Part II: Client Configuration and Misc

# Configuring Unix CUPS Clients

- Do Nothing!
  - Configuration will be built from server browse requests
  - About avg 30 second delay between printer definition and client availability

# Printing from CUPS Clients

- Use standard SysV or BSD lp or lpr suite
  - Both are natively supported
- Use Windows CUPS Driver
  - Download from [www.cups.org](http://www.cups.org)

# Print Options

- Set with lpoptions from Unix cmd line
- Set with WWW interface

Available options depend on printer capabilities in PPD file

# Printer Instances

- Instances are predefined sets of options

printername/instance

Use the instance name in place of the printer name to automatically invoke that set of print options for a job

## Instance Examples

- Define instance Hp520/legal:

```
lptions -p hp520/legal -o \  
media=Legal
```

- Use it:

```
lpr -p hp520/legal lawyerfood.txt
```

## Instance Notes

- Use instance names as LPR queue names with RSCS for specific forms (RSCS FORMDEF file provides mapping from RSCS form to LPR queue name)

```
SPOOL PRT TO RSCS FORM LAW1  
PRINT LEGAL TEXT A
```

```
→ lpr -p hp520/legal legal.text
```



# CUPS WWW Interface

Everything we've done so far can be done from a WWW browser.

<http://your.cups.server:631>

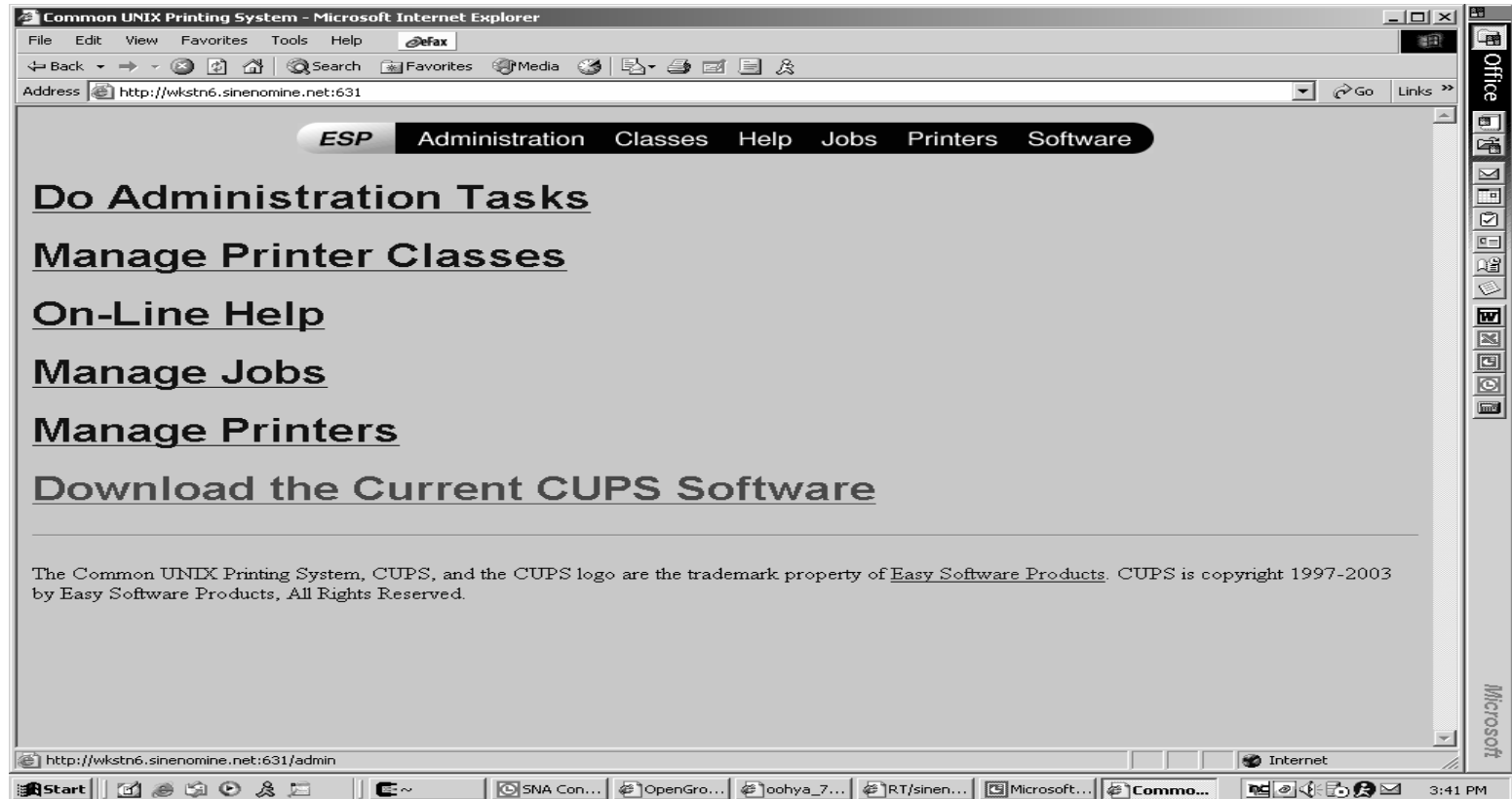
Accessible for printer monitoring to anyone; admin function requires password

# CUPS WWW Interface

- Not accessible for admin use by default:

Edit `/etc/cups/cupsd.conf` and comment out the lines starting with `Deny`, then restart CUPS

# CUPS WWW Interface



# CUPS WWW Printer Admin

The screenshot shows a web browser window titled "Printer on wkstn6 - CUPS v1.1.19 - Microsoft Internet Explorer". The address bar shows "http://wkstn6.sinenomine.net:631/printers/". The page features a navigation menu with "ESP" and "Administration Classes Help Jobs Printers Software". The main content area is titled "Printer" and lists two printers:

- lp** **Lexmark Optra T610 Foomatic/Postscript (recommended)**  
Description: default configuration  
Location: VA Office (basement)  
Printer State: idle, accepting jobs.  
Device URI: lp d://dbt610.sinenomine.net:515/raw  
Buttons: Print Test Page, Stop Printer, Reject Jobs, Modify Printer, Configure Printer, Delete Printer
- lp1** **Lexmark T420 PS**  
Description: default configuration  
Location: Va Office (main level)  
Printer State: idle, accepting jobs.  
Device URI: lp d://ibmt420.sinenomine.net:515/pass  
Buttons: Print Test Page, Stop Printer, Reject Jobs, Modify Printer, Configure Printer, Delete Printer

There is also an "Add Printer" button. The footer contains copyright information: "Copyright 1993-2003 by Easy Software Products. All Rights Reserved. The Common UNIX Printing System, CUPS, and the CUPS logo are the trademark property of Easy Software Products. All other trademarks are the property of their respective owners." The Windows taskbar at the bottom shows the Start button, several open applications, and the system tray with the time 3:48 PM.

## Printing from LPR-only Hosts

- Make sure that cups-lpd is installed and enabled in /etc/inetd.conf
- Configure lpr client as normally
  - Works well for Windows 2K and XP

# Printing with Samba

- See Mike McIsaac's Redpaper "Printing with Samba" for all the gory details
- High points:
  - Must have a [printers] share that is printable and browseable
  - If you want printer driver download to work, you must use either cupssmbadd to copy the drivers to the Samba server or upload them with a Windows machine

# Printing with Samba

- Use the PostScript conversion filter supplied with CUPS to allow you to install only a PS driver on the desktop and convert the PS remotely
  - The Adobe generic PS printer driver uses the same PPD files as CUPS
    - easy matchup
  - This approach lets older pre-OS X Mac users print to any printer (Mac OS X users use CUPS natively!)

## Printing to VM Line Printer

- Configure and use RSCS as the LPD server (free with VM, no license needed for LPR/LPD work)
- Use the Genicom line printer filter (RSCS will convert)



# Conclusion

- CUPS is powerful, standardized, and flexible.
- Once you understand the concepts of IPP, you can build very scalable printing systems for VM and for distributed platforms.

# Q&A

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