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Printers, Print Spoolers and Printcap

You can print
You can share a "network" printer

Printing occurs in two steps:
1) you send the file to the print daemon (print spooler) (`lpd`)
2) the print daemon prints it or
sends it to a print daemon on another machine

Because Unix is designed for large systems,
and a large system may have several printers,
each printer on a machine is given a unique name.
The printer on `jaguar` is named `jaguar`

The system default printer is called `lp`.

A user can set their default printer using the environment variable `PRINTER`. Usually this would be setup in the user's `.bashrc`

`setenv PRINTER jaguar`
(`printenv` displays your environment)

Commands for the User

Actions apply to the default printer unless you specify a printer using the `-P` option

`lpr` *file_name* – print the file (send the file to lpd). The file is queued (spooled) for printing.
The file will be printed when the printer is on and it reaches the front of the queue.
The queue is kept in a directory

```
lpr -Pcecs1  .bashrc
```

`lpq` – examine what is in the print queue
Jobs are assigned an identification number for easy reference.

`lprm` – remove jobs from the print queue
Default: Removes all jobs you own.
Option: list the jobs by their identification number (found using `lpq`)

```
lprm 231
```

Print Spools

Situation:
Printing is slow, several jobs may be backed up.
Unix does not make you wait for the print to complete.

Problem: if you return control to the user before the print completes; the user could remove the file to be printed.

Solution: Make a copy of the file to a special directory controlled by `lpd` and then can `lpd` print it later.

Default print spool directory:
`/var/spool/lpd`
default in the sense that it already exists

Second consideration:
Have a separate spool directory for each printer.
Helps keep straight what is going to each printer.

Line Printer Control

`lpc status` – status of all known printers,

`root` can use `lpc` to control printers

`lpc disable cecs1` – jobs can no longer be spooled to the specified printer. (`enable`)

`stop` – stop printing, you can still spool a job, if a job is in progress it is completed (`start`)

`kill` – stop and restart the server start printing

`reread` – reread the configuration files

`topq` – send a job to the front of the queue

`down` – disable printing and queuing (`up`)

Ports and Device Drivers

`/dev` supplies access to the device drivers that are found in the kernel.

Printers are often hung of the printer (parallel) port.

`jaguar` – `jaguar`: attached to the parallel port

A printer can be accessed over the serial port.

`cheetah` – `cecs1`: attached to the primary serial port `/dev/ttyS0`.

`/dev/lp0`, `/dev/lp1`, `/dev/lp2` the first, second and third PC printer ports

`/dev/usb/lp0` the first usb printer.
The file appears/disappears with the presence/absence of the printer.
The printer may need to be started after being plugged in so it registers correctly with the usb drivers.

Protections and Permissions

`rw-rw----` `root` `daemon` `/dev/lp0` – technically the printer daemon and root can access the device, actually `lpd` runs with `root` privilidge, so `rw-------` will work.

print programs run with Set UID and Set GID.

```
rws--s--x   root   lp   lpq
```

Printcap

Printer capability database (`/etc/printcap`) controls printing

On jaguar:

```
lp|jaguar:lp=/dev/lp0:\
    :sd=/var/spool/lpd:\
    :tr=\f:
```

the printer is called `jaguar` or `lp` or
`lp` – it is on the parallel port `lp0`
`/var/spool/lp` is the spool directory
`tr` – do a form feed after the job

If you are using an old printer off the serial cable, you may need to know about the control lines and control commands.

A Remote Printer

```
cecs1|lp|cecs line printer:\
        :lp=:rm=cheetah.net.cecs.csulb.edu:\
        :rp=cecs1:sd=/var/spool/cecs1:
```

`cecs1` or `lp` – what we call the printer
`lp` – no device for this printer
`rm` – the printer is attached to this remote machine
`rp` – what the remote machine calls the printer
(need not be the same name we give it)
`sd` – the spool directory. We have one locally for those files to be sent to the remote machine. The remote machine will also have one for those files it has received.

Allowing Remote Printing

A machine must/may grant printer access to other machines.

File: `/etc/hosts.lpd`

File Contents: a list of remote machines authorized to spool jobs to our printers.

CUPS

Common Unix Printing System

A good choice for a MS environment, problematic for a Linux lab.

Administration is through commands, not files.

Files are found in `/etc/cups`.
Do not edit them directly, they are modified by commands.
`cupsd` is the main server.
Commands talk to the server, the server writes the files.

`cupsd` also scans the LAN for other CUPS printers and shared MS printers.

`cupsd` can forward files to other print spoolers, including `lpd`.

CUPS configuration commands

`lpadmin`: basic printer administration

Core options (pick one): `-p -d -x`

`-p` configure (add) a printer.

```
lpadmin -p lj -v parallel:/dev/lp1 -m laserjet.ppd
```

A printer called `lj` is now available.
It is attached to the parallel port and is a laserjet.
`ppd` definition needs to be in `ppds.dat` or added to `/etc/cupsd/ppd` directory.

```
lpadmin -p cheetah -v lpd://134.139.248.17/lp
```

A printer called `cheetah` is now available on this machine.

This is a remote printer. This printer is attached to the machine `134.139.248.17`, and which is running the `lpd` protocol. On `134.139.248.17` the printer is called `lp`.

`-d` sets the printer to be the default

```
lpadmin -d cheetah
```

The `cheetah` printer is the default for this machine.

`-x` deletes the printer

```
lpadmin -x cheetah
```

The `cheetah` printer is not available on this machine.

CUPS configuration commands

`accept`: start accepting jobs to the specified printer

The jobs are accepted and spooled, they are not sent to the printer.

`accept cheetah`
Jobs to the `cheetah` printer are spooled.
The named printer has to be configured (available).

`reject`: stop accepting jobs to the specified printer

`reject lj`
Requests to print to the `lj` printer are refused.

`enable`: print any jobs that are spooled for the specified printer

`enable cheetah`
Jobs spooled for the `cheetah` printer are sent to that printer (are printed).

`disable`: stop printing to the specified printer.

`disable lj`
Jobs spooled for the `lj` printer are kept in the spool.