



# Developing the LSB DDK and Driver Packages - Experiences with the LSB

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# The Runtime Environment

- **Standardized environment for binary executables is LSB 3.1**
- **LSB 3.1 does not standardize the printing environment, therefore we add the printing requirements agreed on for LSB 3.2:**
  - CUPS convenience API
  - Renderer/driver interfaces: IJS, CUPS Raster, OpenPrinting Vector
  - Ghostscript (with devices “ijs”, “cups”, “opvp”, “pxlmono”, “pxlcolor”)
  - foomatic-rip
  - CUPS prepared for searching PPDs in /usr/share/ppd and subdirectories
- **All this is provided by all distributions. when the CUPS, Ghostscript, foomatic-filters, and “lsb” packages are installed and a simple symlink added**



# The Build Environment

- **Build Environment chroot of LSB 3.1**
- **LSB DDK added. LSB DDK consists of:**
  - CUPS with static libcups and libcupsimage libraries
  - Ghostscript, GPL Ghostscript with merged ESP Ghostscript functionality (current Subversion state on [ghostscript.com](http://ghostscript.com), upcoming GPL GS 8.60)
  - foomatic-filters
  - RPM macro set for
    - automatic installation in /opt
    - add absolute paths for printer driver calls to the PPD files, rename and re-arrange the PPDs
    - auto-detecting system file/directory locations at install time and symlink package's system files appropriately (via maintainer scripts)
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# Packaging Simple Printer Drivers

- **Consists of nothing more than**
  - PPD file(s)
  - Driver executable (and auxiliary files) to convert PostScript into the printer's language (with the help of Ghostscript)
- **Packaging is simple then:**
  - Put (or symlink) PPDs into a subdirectory of `/usr/share/ppd`
  - Have absolute paths to the driver executables in the PPD files
  - No restart of CUPS required if CUPS 1.2.x is used
- **Small problem: With CUPS 1.1.x CUPS needs to be restarted and this is distro-dependent:**
  - Debian/Ubuntu: `invoke-rc.d cupsys restart`
  - Others: `/etc/init.d/cups restart`



# More Complex Printer Drivers

- **Printer drivers can have the following components which need special attention:**
  - Auxiliary programs (ink level check, nozzle cleaning, ...)
    - Need to get into user's \$PATH when installing into /opt
  - Man pages
    - Need to get into user's man path when installing in /opt
  - CUPS backends, file conversion filters, file conversion rules
    - Need to determine where CUPS directories are and symlink files to there
    - Need to restart CUPS
  - Extra daemon
    - Startup/shutdown links for run levels need to be created
    - Daemon needs to be (re)started
  - Scanner drivers
    - SANE does not make part of LSB, needs to be required separately (available on all distros)
    - SANE driver directory needs to be detected at install time



# Auxiliary Programs and Man Pages

- Executables go into `/opt/<supplier>/bin/` and `/opt/<supplier>/sbin/`
- Man pages go into `/opt/<supplier>/man/man?/`
- These paths have to be added to the beginnings of `$PATH` and `$MANPATH` so that the files get automatically found
- According to LSB a login shell executes all scripts in `/etc/profile.d/` so symlinking an appropriate script to here should be sufficient
- `/etc/profile.d/` requirement not fulfilled by all distributions (Debian, Ubuntu) -> addition of script to the end of `/etc/profile` needed
  - Requires complex distro-specific code in maintainer scripts -> appropriate code pieces in **RPM macro set** of LSB DDK
  - LSB improvement: Testing needs to enforce `/etc/profile.d` support



# CUPS Backends, File Conversion Filters/Rules

- **The driver filter (converter from PostScript or CUPS Raster to printer's language) can be made accessible by absolute path in the PPD**
- **The PPD files can be in any (symlinked) subdirectory of /usr/share/ppd/**
- **All other CUPS-related files (backends, other filters, conversion rules) have to be in the appropriate CUPS directories**
- **Adding conversion rules requires restart of CUPS 1.2.x, CUPS 1.1.x always needs restart**
- **Problems**
  - CUPS directory locations distro-specific, need detection with “cups-config”
  - CUPS service name distro-specific (“cups”, “cupsys”)
  - Daemon restart distro-specific (“invoke-rc.d”, “/etc/init.d/...”)



- **Low-Level communication with the printer is done by a daemon (ex: HPLIP)**
- **Startup script needs to be symlinked to be started at boot in the desired run-levels**
  - LSB script “install\_initd”, needs to be assured that all distros provide it
- **Daemon needs to be (re)started**
  - No LSB method to (re)start daemons available, distro-specific, principally all allow “/etc/init.d/<service> ...”, but Debian/Ubuntu wants “invoke-rc.d <service> ...”



- **Needed for multi-function devices with built-in scanner**
- **Exception: Network MF devices with full control of scanner via front panel and/or web interface**
- **Scanners use SANE drivers**
  - SANE not in LSB
  - SANE in every distribution
  - SANE interface very stable for long time
  - Brother provides binary-only SANE drivers which seem to work very well everywhere
- **Side effect: If SANE is added to LSB and/or LSB DDK, LSB DDK will also cover drivers for stand-alone scanners**



- **LSB is lacking support for distribution-independent packaging of system software:**
  - Bug 1627: (Re)starting a daemon from the post-install script of an LSB package
  - Bug 1629: There is no command to link PAM config files into the PAM config directory
  - Bug 1630: Adding and removing startup scripts for system service not working with all distros
  - Bug 1631: LSB requirements for shell invocation not fulfilled by all distros
- **Issues not (yet) reported as bugs:**
  - No standardizations on CUPS directory locations and CUPS service name
  - SANE not included in the LSB