



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, 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