

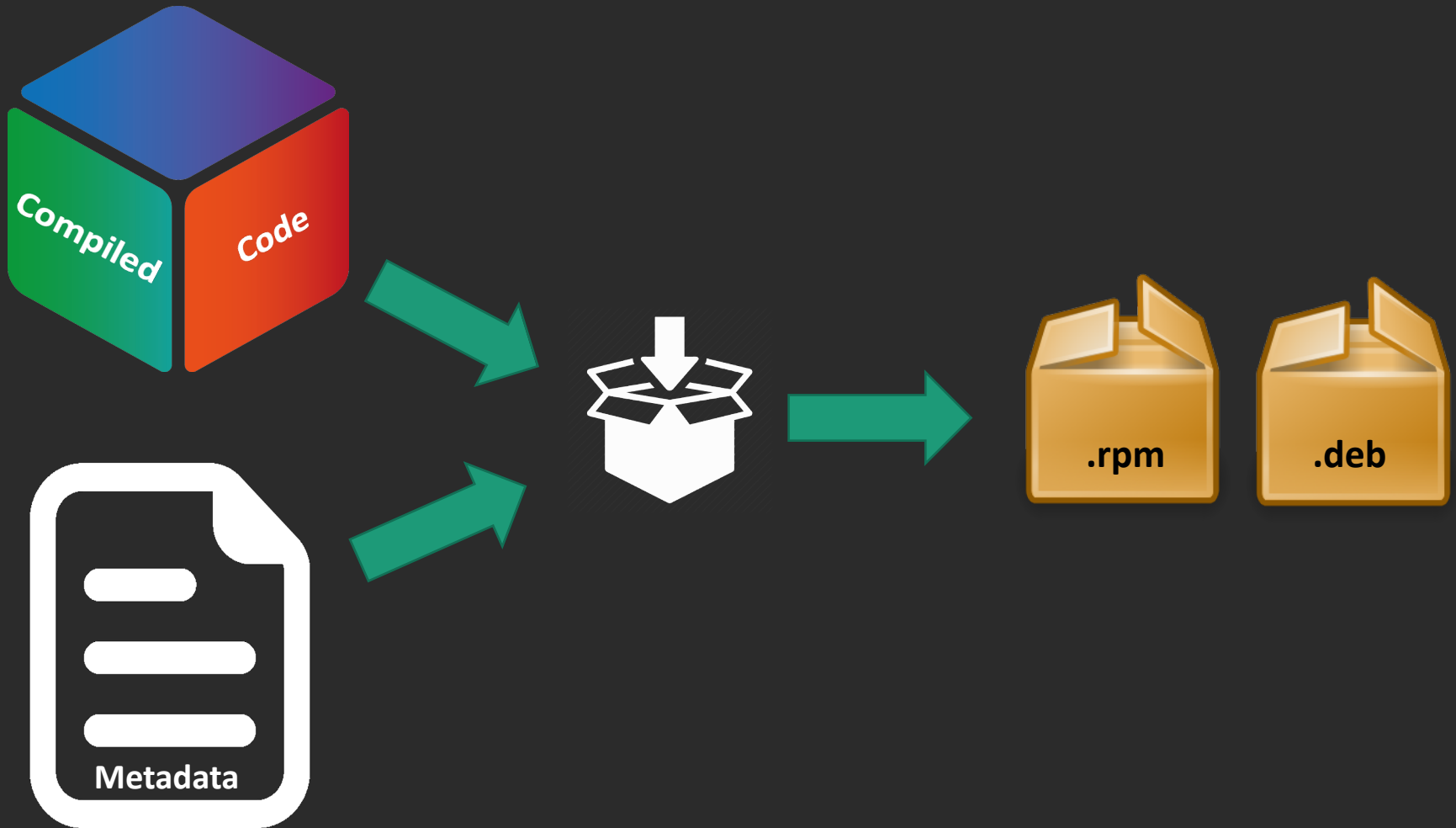
Lesson 3: Managing Software and Processes

Objectives covered

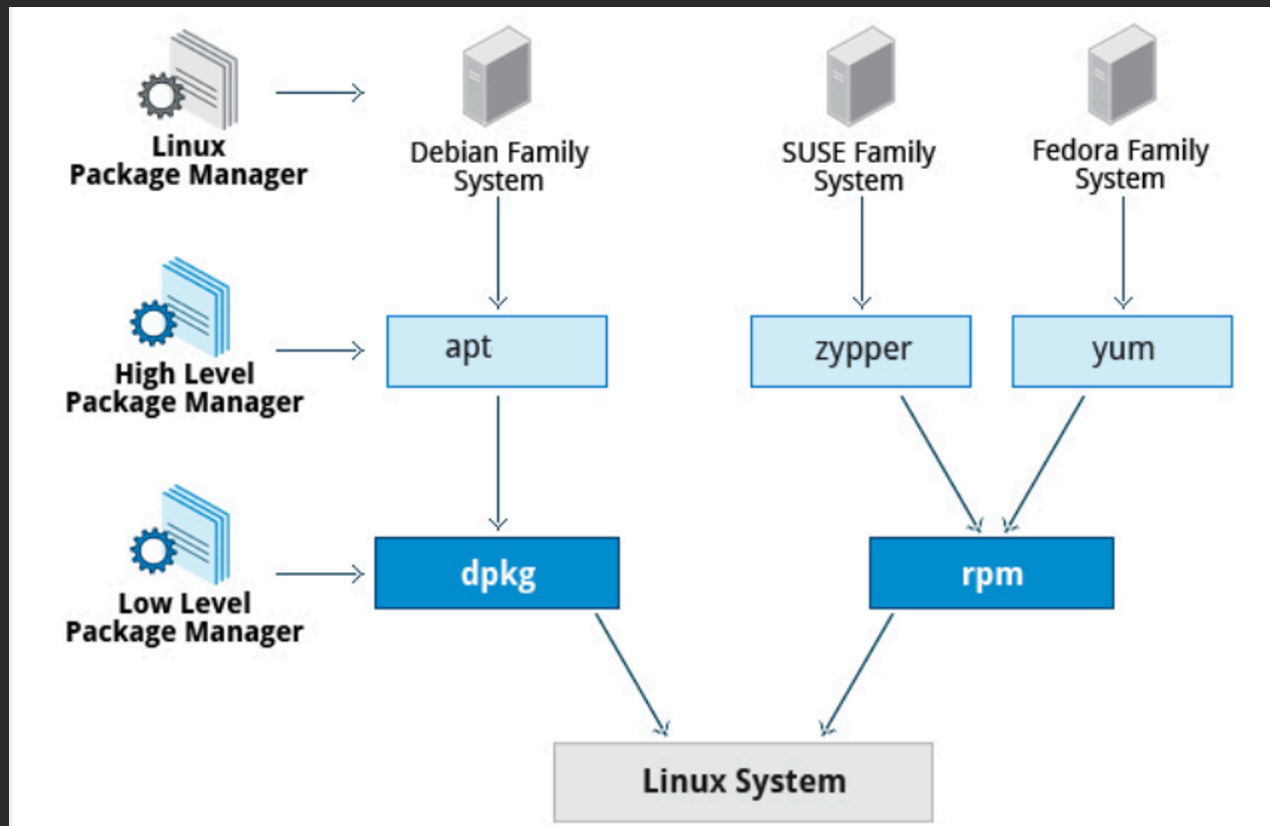
- ***102.5 Use RPM and YUM package management (weight: 3)***
- ***102.4 Manage Debian package management (weight: 3)***
- *102.3 Manage shared libraries (weight: 1)*
- *103.5 Create, monitor, and kill process (weight: 4)*
- *103.6 Modify process execution priorities (weight: 2)*

Use RPM and YUM package management

Linux package



Linux package management tools



RPM Package Manager (RPM) naming convention:

<Package name>-<Version>-<Release>.<Architecture>.rpm

docker-1.13.1-94.gitb2f74b2.el7.centos.x86_64.rpm

emacs-24.3-22.el7.x86_64.rpm

openssh-7.4p1-16.el7.x86_64.rpm

zsh-5.0.2-31.el7.x86_64.rpm

rpm tool

rpm action [option] pkg-file

Short	Long	Description
-e	--erase	Removes the specified package
-F	--freshen	Upgrades a package only if an earlier version already exists
-i	--install	Installs the specified package
-q	--query	Queries whether the specified package is installed
-U	--upgrade	Installs or upgrades the specified package
-V	--verify	Verifies whether the package files are present and the package's integrity

Querying RPM packages

rpm -q [option] pkg-file

Short option	Long option	Description
-c	--configfiles	Lists the names and absolute directory references of package configuration files
-i	--info	Provides detailed information, including version, installation date, and signatures
N/A	--provides	Shows what facilities the package provides
-R	--requires	Displays various package requirements (dependencies)
-s	--state	Provides states of the different files in a package, such as normal (installed), not installed, or replaced
N/A	--what-provides	Shows to what package a file belongs

Verifying RPM packages

rpm -V pkg-file

```
# rpm -V zsh
```

```
.....UGT.  /bin/zsh
.....T.  c /etc/zlogin
missing  c /etc/zprofile
```

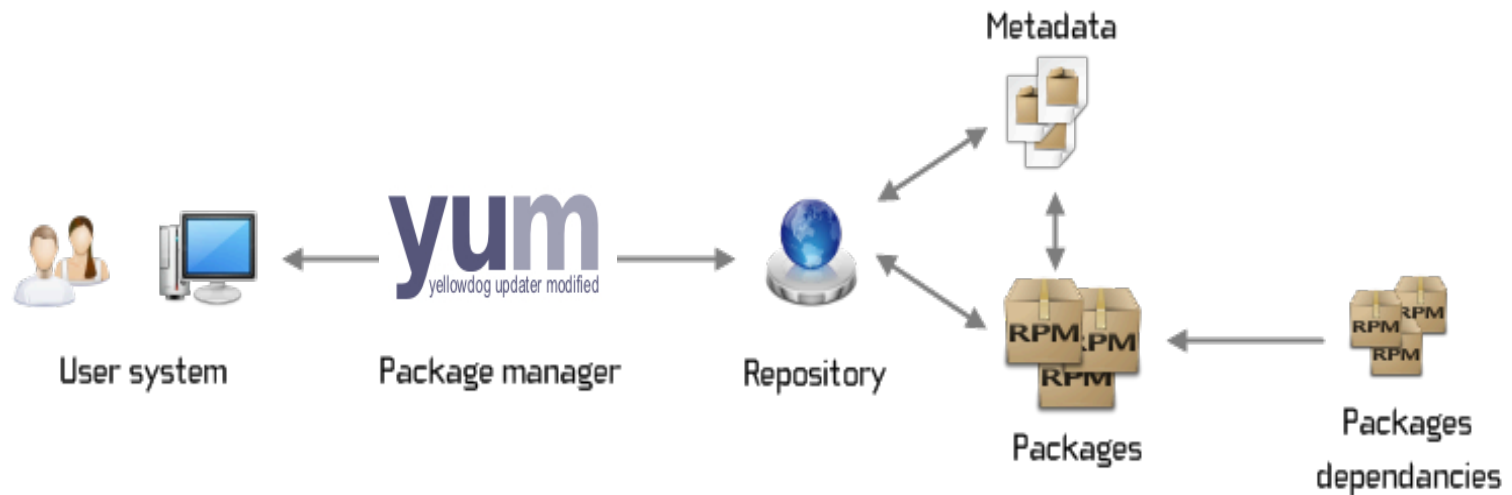
Code	Description
?	Unable to perform verification tests
5	Digest number has changed
c	File is a configuration file for the package
D	Device number (major or minor) has changed
G	Group ownership has changed
L	Link path has changed
missing	Missing file
M	Mode (permission or file type) has changed
P	Capabilities have changed
S	Size of file has changed
T	Time stamp (modification) has changed
U	User ownership has changed

Extracting RPM packages

```
$ rpm2cpio emacs-24.3-22.el7.x86_64.rpm > emacs.cpio
```

```
$ cpio -idv < emacs.cpio
./usr/bin/emacs-24.3
./usr/share/applications/emacs.desktop
./usr/share/applications/emacsclient.desktop
./usr/share/icons/hicolor/128x128/apps/emacs.png
./usr/share/icons/hicolor/16x16/apps/emacs.png
./usr/share/icons/hicolor/24x24/apps/emacs.png
./usr/share/icons/hicolor/32x32/apps/emacs.png
./usr/share/icons/hicolor/48x48/apps/emacs.png
./usr/share/icons/hicolor/scalable/apps/emacs.svg
./usr/share/icons/hicolor/scalable/mimetypes/emacs-document.svg
28996 blocks
$
$ ls ./usr/bin/emacs-24.3
./usr/bin/emacs-24.3
```

Using YUM



Repositories definition folder: `/etc/yum.repos.d/`

YUM commands

yum [Option] [Command] [Package]

Command	Description
check-update	Checks the repository for updates to installed packages
clean	Removes temporary files downloaded during installs
deplist	Displays dependencies for the specified package
groupinstall	Installs the specified package group
info	Displays information about the specified package
install	Installs the specified package
list	Displays information about installed packages
localinstall	Installs a package from a specified RPM file
localupdate	Updates the system from specified RPM files
provides	Shows to what package a file belongs
reinstall	Reinstalls the specified package
remove	Removes a package from the system
resolvedep	Displays packages matching the specified dependency
search	Searches repository package names and descriptions for specified keyword
shell	Enters yum command-line mode
update	Updates the specified package(s) to the latest version in the repository
upgrade	Updates specified package(s) but removes obsolete packages

YUM commands

```
# yum install emacs
[...]
Resolving Dependencies
--> Running transaction check
--> Package emacs.x86_64 1:24.3-22.el7 will be installed
--> Processing Dependency: emacs-common = 1:24.3-22.el7 for
package: 1:emacs-24.3-22.el7.x86_64
[...]
--> Running transaction check
--> Package ImageMagick.x86_64 0:6.7.8.9-16.el7_6 will be installed
[...]
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package                Arch      Version              Repository            Size
=====
Installing:
  emacs                x86_64    1:24.3-22.el7        base                  2.9 M
Installing for dependencies:
ImageMagick            x86_64    0:6.7.8.9-16.el7_6  updates              2.1 M
[...]
Transaction Summary
=====
Install 1 Package (+8 Dependent packages)

Total download size: 26 M
Installed size: 92 M
Is this ok [y/d/N]: y
Downloading packages:
(1/9): OpenEXR-libs-1.7.1-7.el7.x86_64.rpm | 217 kB  00:01
[...]
(9/9): emacs-common-24.3-22.el7.x86_64.rpm | 20 MB  00:22
-----
Total                               1.2 MB/s | 26 MB  00:22
```

```
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
[...]
Installing : ImageMagick-6.7.8.9-16.el7_6.x86_64      8/9
Installing : 1:emacs-24.3-22.el7.x86_64              9/9
[...]
Verifying  : ImageMagick-6.7.8.9-16.el7_6.x86_64      8/9
Verifying  : 1:emacs-24.3-22.el7.x86_64              9/9

Installed:
  emacs.x86_64 1:24.3-22.el7

Dependency Installed:
  ImageMagick.x86_64 0:6.7.8.9-16.el7_6 [...]
  emacs-common.x86_64 1:24.3-22.el7 [...]
  libXaw.x86_64 0:1.0.13-4.el7 [...]
  libotf.x86_64 0:0.9.13-4.el7 [...]

Complete!
#
```

YUM commands

```
# rpm -V emacs
missing      /usr/bin/emacs-24.3
#
# yum reinstall emacs
[...]
---> Package emacs.x86_64 1:24.3-22.el7 will be reinstalled
[...]
Total download size: 2.9 M
Installed size: 14 M
Is this ok [y/d/N]: y

[...]
Installed:
  emacs.x86_64 1:24.3-22.el7

Complete!
#
# rpm -V emacs

#
```

```
# yum remove emacs
[...]
Remove 1 Package

Installed size: 14 M
Is this ok [y/N]: y
[...]
Removed:
  emacs.x86_64 1:24.3-22.el7

Complete!
#
```

ZYpp – OpenSUSE's package management tool

zypper [Option] [Command] [Package]

Command	Description
help	Displays overall general help information or help on a specified command
install	Installs the specified package
info	Displays information about the specified package
list-updates	Displays all available package updates for installed packages from the repository
lr	Displays repository information
packages	Lists all available packages or lists available packages from a specified repository
what-provides	Shows to what package a file belongs
refresh	Refreshes a repository's information
remove	Removes a package from the system
search	Searches for the specified package(s)
update	Updates the specified package(s) or if no package is specified, updates all currently installed packages to the latest version(s) in the repository
verify	Verifies that installed packages have their needed dependencies satisfied

ZYpp commands

```
$ sudo zypper install emacs
[sudo] password for root:
[...]
Reading installed packages...
Resolving package dependencies...

The following 9 NEW packages are going to be installed:
  emacs emacs-info emacs-x11 etags libm17n0 libotf0 libXaw3d8 m17n-db
  m17n-db-lang

The following recommended package was automatically selected:
  m17n-db-lang

9 new packages to install.
Overall download size: 0 B. Already cached: 27.4 MiB. After the operation,
additional 111.6 MiB will be used.
Continue? [y/n/...? shows all options] (y): y

[...]
Checking for file conflicts: .....[done]
[...]
(9/9) Installing: emacs-x11-25.3-lp150.2.3.1.x86_64 .....[done]
$
```


ZYpp commands

```
$ zypper info emacs
```

```
[...]
```

```
Information for package emacs:
```

```
-----
```

```
Repository      : openSUSE-Leap-15.0-Update
```

```
Name            : emacs
```

```
Version         : 25.3-lp150.2.3.1
```

```
Arch            : x86_64
```

```
Vendor          : openSUSE
```

```
Installed Size  : 67.7 MiB
```

```
Installed       : Yes
```

```
Status          : up-to-date
```

```
Source package  : emacs-25.3-lp150.2.3.1.src
```

```
Summary         : GNU Emacs Base Package
```

```
Description     :
```

```
    Basic package for the GNU Emacs editor. Requires emacs-x11 or  
    emacs-nox.
```

ZYpp commands

```
$ sudo zypper remove emacs
```

```
[sudo] password for root:
```

```
[...]
```

```
The following application is going to be REMOVED:
```

```
"GNU Emacs"
```

```
The following 2 packages are going to be REMOVED:
```

```
emacs emacs-x11
```

```
2 packages to remove.
```

```
After the operation, 99.6 MiB will be freed.
```

```
Continue? [y/n/...? shows all options] (y): y
```

```
(1/2) Removing emacs-25.3-lp150.2.3.1.x86_64 .....[done]
```

```
(2/2) Removing emacs-x11-25.3-lp150.2.3.1.x86_64 .....[done]
```

```
There are some running programs that might use files deleted by recent upgrade. You may wish to check and restart some of them. Run 'zypper ps -s' to list these programs.
```

```
$
```

Manage Debian package management

Debian package naming convention:

<Package name>_<Version>-<Release>_<Architecture>.deb

docker_1.5-1build1_amd64.deb

emacs_47.0_all.deb

openssh-client_1%3a7.6p1-4ubuntu0.3_amd64.deb

vim_2%3a8.0.1453-1ubuntu1_amd64.deb

zsh_5.4.2-3ubuntu3.1_amd64.deb

dpkg tool

dpkg [option] action pkg-file

Short	Long	Description
-c	--contents	Displays the contents of a package file
-C	--audit	Searches for broken installed packages and suggests how to fix them
N/A	--configure	Reconfigures an installed package
N/A	--get-selections	Displays currently installed packages
-i	--install	Installs the package; if package is already installed, upgrades it
-I	--info	Displays information about an uninstalled package file
-l	--list	Lists all installed packages matching a specified pattern
-L	--listfiles	Lists the installed files associated with a package
-p	--print-avail	Displays information about an installed package
-P	--purge	Removes an installed package, including configuration files
-r	--remove	Removes an installed package but leaves the configuration files
-s	--status	Displays the status of the specified package
-S	--search	Locates the package that owns the specified files

Advanced Package Tool (APT) Suite

apt-cache
apt-get

Repositories definition file: `/etc/apt/sources.list`

apt-cache commands

apt-cache command

- **depends:** Displays the dependencies required for the package
- **pkgnames:** Shows all the packages installed on the system
- **search:** Displays the name of packages matching the specified item
- **showpkg:** Lists information about the specified package
- **stats:** Displays package statistics for the system
- **unmet:** Shows any unmet dependencies for all installed packages or the specified installed package

apt-cache commands

```
$ apt-cache pkgnames | grep ^nano
```

```
nano
```

```
[...]
```

```
nano-tiny
```

```
[...]
```

```
$
```

```
$ apt-cache search zsh
```

```
zsh - shell with lots of features
```

```
zsh-common - architecture independent files for Zsh
```

```
zsh-dev - shell with lots of features (development files)
```

```
zsh-doc - zsh documentation - info/HTML format
```

```
[...]
```

```
$
```

```
$ apt-cache showpkg zsh
```

```
Package: zsh
```

```
Versions:
```

```
5.4.2-3ubuntu3.1 [...]
```

```
[...]
```

```
Reverse Depends:
```

```
usrmerge,zsh 5.2-4~
```

```
zsh-static,zsh
```

```
zsh:i386,zsh
```

```
zsh-common,zsh 5.0.2-1
```

```
[...]
```

```
Dependencies:
```

```
5.4.2-3ubuntu3.1 - [...]
```

```
5.4.2-3ubuntu3 - [...]
```

```
Provides:
```

```
5.4.2-3ubuntu3.1 -
```

```
5.4.2-3ubuntu3 -
```

```
Reverse Provides:
```

```
$
```


apt-get commands

apt-get action

Action	Description
autoclean	Removes information about packages that are no longer in the repository
check	Checks the package management database for inconsistencies
clean	Cleans up the database and any temporary download files
dist-upgrade	Upgrades all packages, but monitors for package dependencies
dselect-upgrade	Completes any package changes left undone
install	Installs or updates a package and updates the package management database
remove	Removes a package from the package management database
source	Retrieves the source code package for the specified package
update	Retrieves updated information about packages in the repository
upgrade	Upgrades all installed packages to newest versions

apt-get commands

```
$ sudo apt-get install zsh
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  zsh-common
Suggested packages:
  zsh-doc
The following NEW packages will be installed:
  zsh zsh-common
0 upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
[...]
Unpacking zsh (5.4.2-3ubuntu3.1) ...
Setting up zsh-common (5.4.2-3ubuntu3.1) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Setting up zsh (5.4.2-3ubuntu3.1) ...
$
```

Display current package configuration

debconf-show

```
$ sudo debconf-show cups  
* cupsys/backend: lpd, socket, usb, snmp, dnssd  
* cupsys/raw-print: true  
$
```

Reconfiguring packages

dpkg-reconfigure

```
sudo dpkg-reconfigure cups
```

Package configuration

Configuring cups

The Internet Printing Protocol (IPP) enforces a MIME type for all print jobs. Since not all sources of print jobs can attach an appropriate type, many jobs get submitted as the MIME type application/octet-stream and could be rejected if CUPS cannot guess the job's format.

CUPS can handle all such jobs as "raw" jobs, which causes them to be sent directly to the printer without processing.

It is recommended to choose this option if the server will be accepting print jobs from Windows computers or Samba servers.

Do you want CUPS to print unknown jobs as raw jobs?

<Yes>

<No>

Question... ■