Linux Administration

Software management

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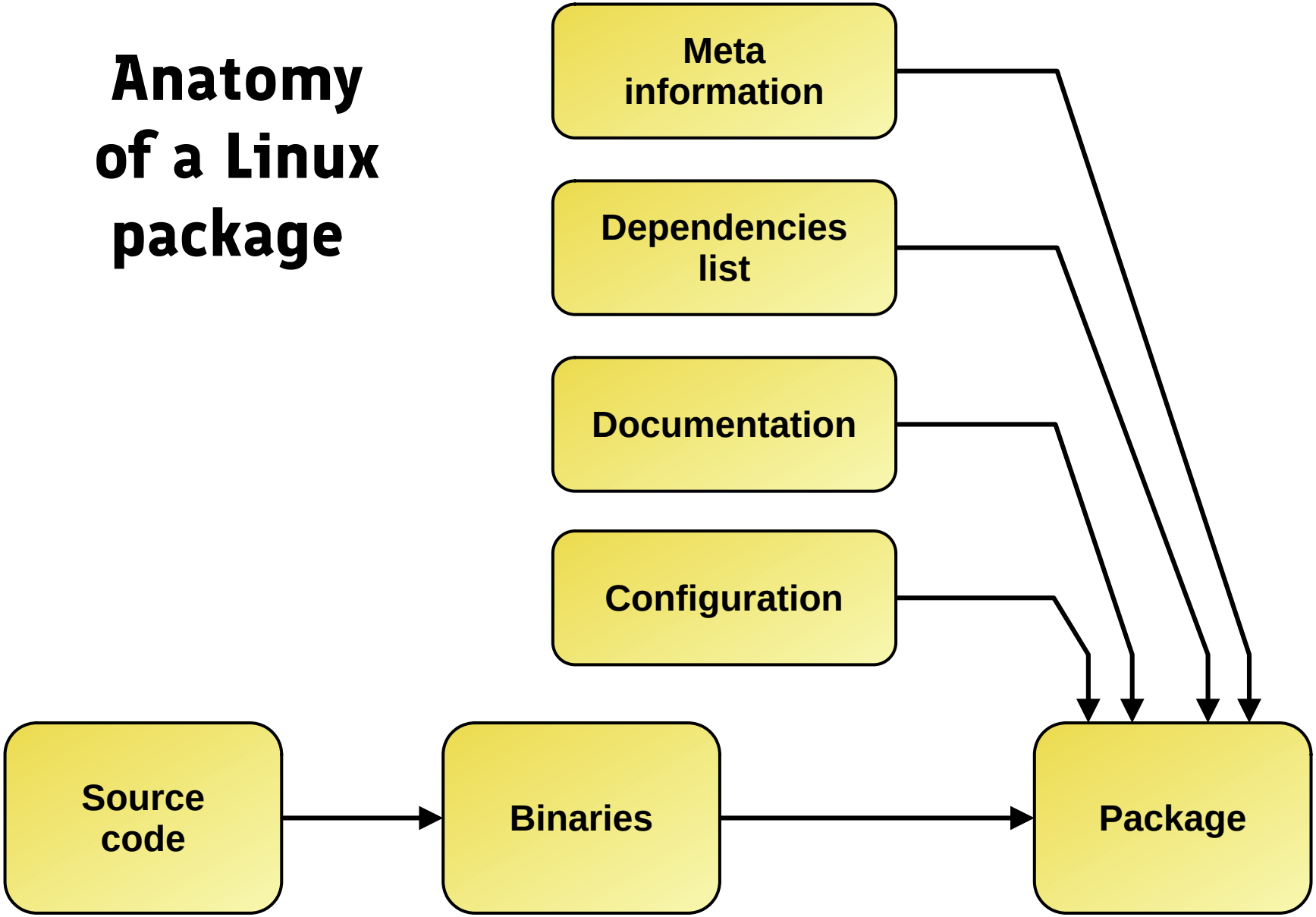
Installing new applications

- By default, most applications added to a Linux system are already made available by the distribution that you are using. The process boils down to identify and install the right package.
- On occasion, you may need to install an application directly from source and compile it.
- Last, few applications (mostly commercial ones) will come as an independent binary and will have their own installation process.

Package management systems

- There is two main packaging systems used across various Linux distributions:
  - apt, originally used with Debian
  - rpm, originally used with Red Hat
- One cannot be used instead of, or with the other.
- Few distributions may have an unique packaging system of their own.

Anatomy of a Linux package



Packages repositories

- Packages managed by a distribution are hosted in repositories (*repos* for short).
- Various repositories can be used, usually by release and architecture.
- Applications are already compiled, for specific platforms and with specific options.
- The source code is also available, if you need to repackage an application yourself.
- Repositories can be mirrored on the Internet.

Updates frequency

- Depending on the Linux distribution and the branch that you are using (stable, testing), updates may be available at different paces.
- Subscribe to the announce distribution list (or RSS feed or similar system) to know when new patches are released.

Updating a Linux system

- In a nutshell:
  - fetch new packages
  - install new packages
  - reboot
- Make sure to test first, adjust configuration as needed.

apt packages

- Stands for “Advanced Package Tool”.
- *apt* is used by Debian, Ubuntu and other Debian-based distributions.
- *apt* (and other related commands) is a front-end for the *dpkg* tool (Debian package manager).
- File names are using the .deb extension.

apt basic operations

- Searching for a package
  apt search <pattern>
- Installing a package
  apt install <package>
- Removing a package
  apt remove <package>
- Updating the package list
  apt update
- Upgrading all installed packages
  apt upgrade

rpm packages

- Originally standing for “Red Hat Package Manager”, now used as “RPM Package Manager”.
- *yum* is the most common front-end to manage rpm packages. *dnf* is a newest tool designed to replace *yum*.
- RPM is mostly used by Red Hat Enterprise Linux, Fedora, CentOS, Rocky Linux, Oracle Linux and SUSE Linux.
- File names are using the .rpm extension.

yum/dnf basic operations

- Searching for a package
  dnf search <pattern>
- Installing a package
  dnf install <package>
- Removing a package
  dnf remove <package>
- Updating the package list
  dnf check-update
- Upgrading all installed packages
  dnf upgrade

Snaps

- A Snap is an application packaged and containerized to work on a Linux system.
- The application is running in its own space (sandbox) and has limited access to the system.
- The Snap Store, managed by Canonical, allow to publish and distribute new applications.

Installing software from sources

- Some applications may not be packaged for your distribution (too old or too recent).
- Some applications may require options defined at compilation time; a package may not include the ones that you need.
- You may want to create a patch or join the development team for a project; compiling code will be part of that process.

Building environment

- Compiling some core, low-level software (glibc, openssl, …) should be done with caution as you do not want to replace the versions provided by your distribution.
- Compiling some applications may use some resources (CPU, storage space, etc.).
- It is recommended to set a specific, independent system for that purpose, do not use a production system.

Preparatory steps

- Check for documentation provided on the software website, with the source files.
- Check for dependencies, including version numbers.
- Subscribe to the announce distribution list (or RSS feed or similar system) to know when new versions are released.
- If you get stuck, ask on forums, distribution lists or even contact the developers. Always provide details.

Obtaining the source files

- Download the source files and check their validity (checksum, digital signature).
- You can also clone a git repository, but that may not give you a stable version.
- Decompress the files in an appropriate directory (typically */usr/local/src*).
- Check for documentation files, configuration examples and release notes.

GNU Autotools

- For many applications developed in C, the most common build system are the GNU Autotools; it's a suite of applications to configure, check and compile source code.
- In it's most basic form, three commands are used:
  - ./configure
  - make
  - make install

./configure

- This step is the one that define the build options and other options on how to use the software:
  - specific features
  - configuration files, log files locations, ...
  - linked libraries, databases connections, …
- ./configure usually provides some internal help

make

- This is the main operation, it could be really time consuming.
- Just wait.

make install

- After a successful compilation, the software can be installed into the system (binaries, configuration files, manual pages, etc.).
- In some cases, updating the list of shared libraries could be needed before using the new application (*ldconfig*).
- Some applications also provide a *make uninstall* target.

Maintaining your application

- Repeat the same steps for each new version, with updates for new features as needed.
- The *config.log* file keeps track of the options used with the previous installation.