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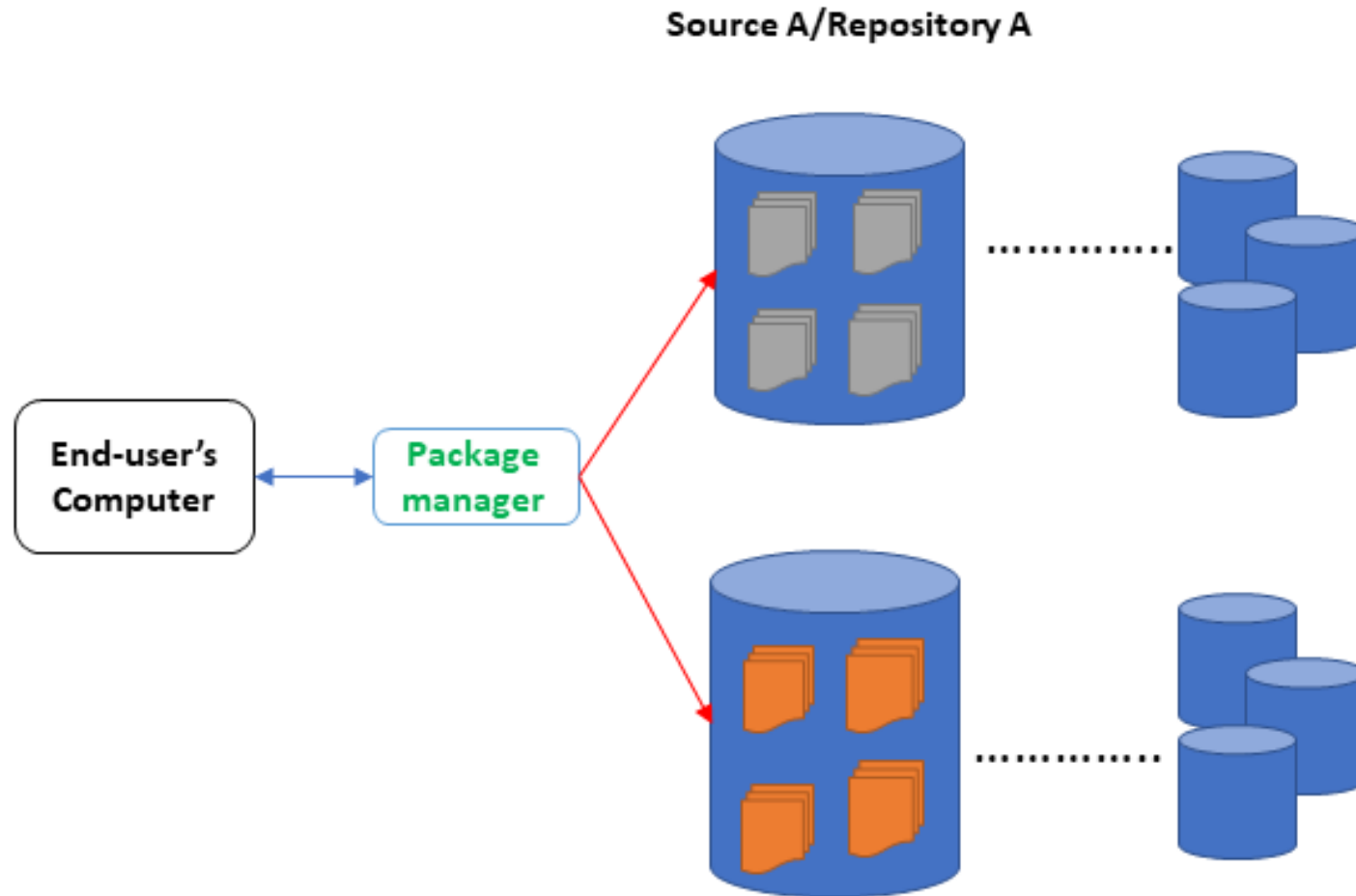
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Package management in Linux

- Package Management system/ package manager
 - A group of software tools
 - Maintaining dependencies for ensuring a package has been installed along with every package it needs
 - Assuring the authenticity and integrity of the package by authenticating their digital certificates and checksums respectively
 - Updating, installing, downloading, or looking up existing software through an app store or software repository

Package management in Linux....cont...

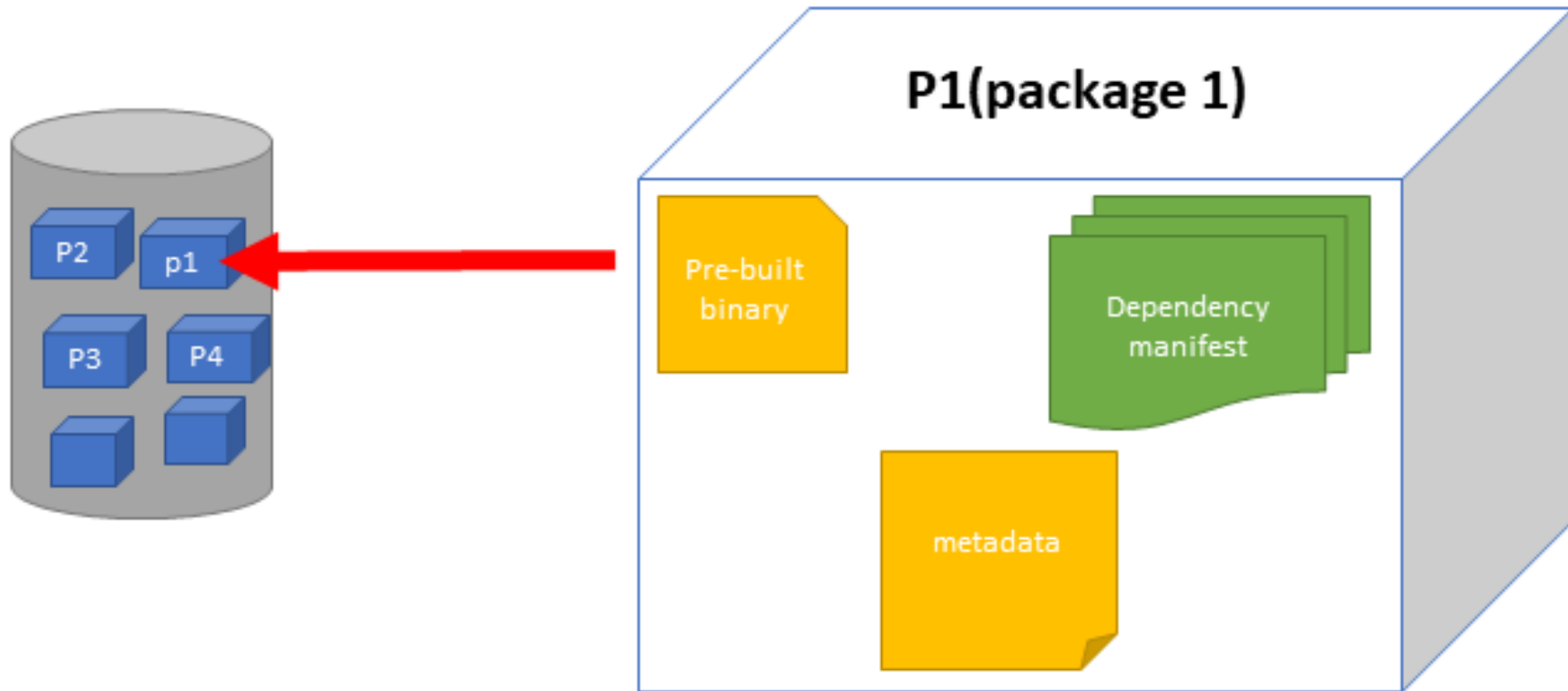


The package manager's job is to go, talk to the package repository and perform the actions on behalf of the end-user.

A Package....

- Encapsulates a specific command-line program, third-party software library, or standalone application
 - Consists of several files which are going to be used by the local package manager program
 - The packaging concept makes life easier for end-users by packaging the software application with,
 - pre-compiled source code or binary executable,
 - dependency trees
 - Metadata”
- Usually, we call these bundled units “software package archives

A Package...cont....



Some common package Managers....

➤ APT

- Stands for Advanced packaging tool
- Widely used package management system that is derived from the dpkg package manager
- A command-line tool and no graphical interface is available
- Facilitates installing software, removing packages, upgrading the system, searching for a specific package, etc
- Default package manager for the Debian family
- Operating systems like Linux Mint and Ubuntu are using the APT package manager

➤ YUM

- Comes with both the command-line tool and graphical user interface
- Capable of install, remove, search and update RPM packages
- Available to use mostly on RPM-based distributions

Some common package Managers....

➤ DNF

- Introduced in Fedora 18
- Still maturing and yet to support debugging, excluding packages, and skipping broken packages during the installation
- supports basic operations such as software package installing, updating existing software, downgrading, and uninstalling
- Can be used within most of the Red hat based distributions such as CentOS Stream, and RedHat

➤ RPM

- Stands for Red hat Package Manager
- A very low-level package management system
- Supports configuration, installation, query, and removal software packages

Some common package Managers....

➤ PacMan

- Arch Linux is primarily using packman as its default package manager
- Easy-to-use package manager that relieves the burden of managing packages from official repositories or custom builds
- Utility program is written in C language
- Basic commands like install, remove a package, upgrade, and dependency resolution are supported

➤ Snap

- Snap (snappy) is a software deployment and package management system for Ubuntu and other Linux distributions
- A universal Linux packaging system that has a centralized store for all distributions
- When using snap, you always install a new version of the program

Some common package Managers....

➤ Zypper

- OpenSUSE Linux uses the Zypper as its main package manager
- It incorporates basic APT commands and can handle repository extensions
- A terminal-based package manager, based on the libzyapp library

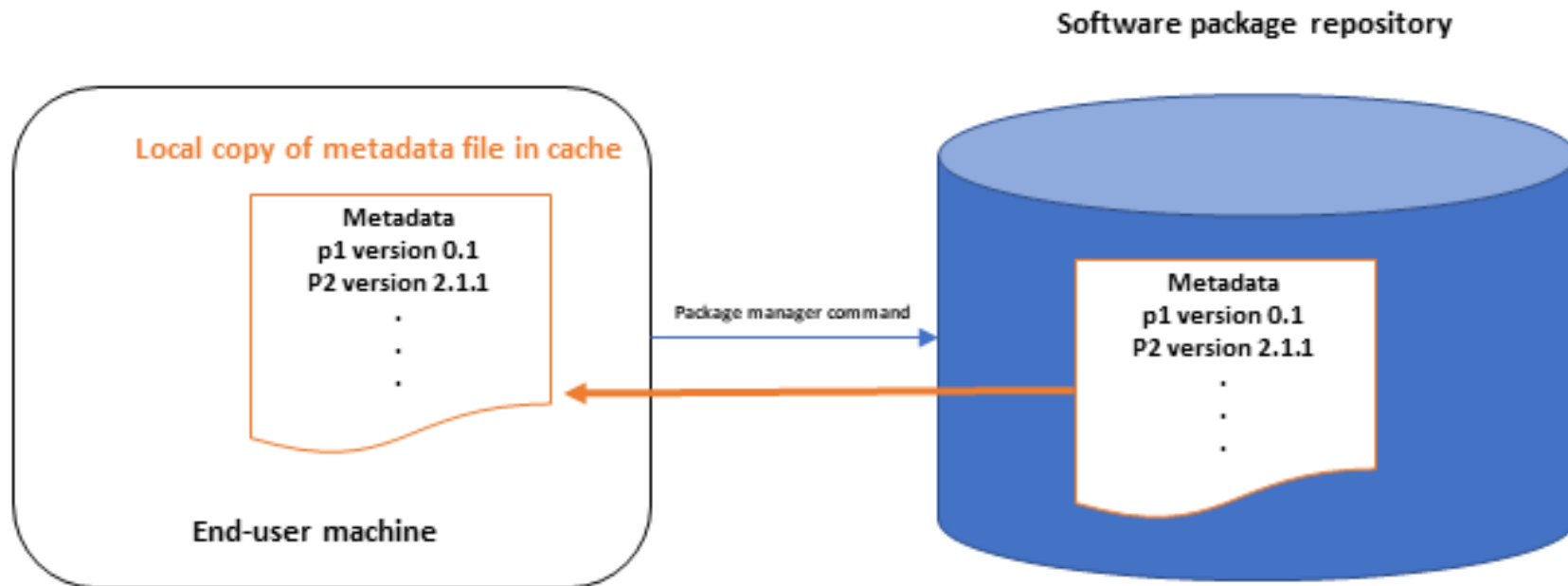
Some common package Managers....

➤ Dpkg

- The core package management system for Debian Linux package managers
- a very low-level utility program and has no support for automatic dependency resolution
- The primary front-end package manager for the DPKG is Aptitude
- It can build .deb packages
- It has been used in the Debian-based systems, used inside the derivatives of the Debian family such as Linux-mint, Ubuntu, etc

What is a Repository in Linux

- A storage location that contains essential and popular software for different Linux distributions
- Software repositories consist of a metadata file where all the package names, versions, repository details, and package descriptions are stored



Repository in Linux....cont....

Standard Linux repositories provide:

- Reliable locations to get software with confidence, knowing that it's free from malware and properly tested
- Simple installations without concerns for dependencies (all the required packages are provided)
- Easy ways to find and download what you need

Repository key in Linux...

- "Authentication keys" are usually obtained from the maintainer of the software repository.
 - ✓ you can validate you got the package from the person you think you're getting it from (to keep people from injecting bad packages into updates)
 - ✓ The maintainer will often place a copy of the authentication key on a public key server such as www.keyserver.net.

Mirrors...

- A mirror holds a duplicate copy of all of the data on the master server. This exists for redundancy and speed. In a broader sense, a mirror is just a copy of some data for the same purposes.
- A copy of programs available for download

Difference between mirror and backup

- Mirror ensures the most recent changes made to any given file are on your computer and drive,
 - while backup is appropriate for longer term plans, such as finding an old file that might've been deleted from the source on accident.

Mirrors...Cont...

➤ Advantages behind using mirrors

- Able to choose a mirror which is located in the country or is closer or in any other way, have a more reliable and faster access to that.
- When we have access to thousands of mirrors, there is a really low chance that we miss or lose repositories.
- By redundancy it helps to achieve fault tolerance, it means that in any case of accident, We can make services up and available to the users.
- It help us achieve better performance by not a server being used by millions of people.
- Able to mirror on our local network and hundreds of machines will work with that repository without the need of going to the Internet.

Let's look into Ubuntu a little.....

Let's look into Ubuntu Since the most Common os in Linux world

- Ubuntu uses APT package manager
- You can find software repository information in the **/etc/apt/sources. list file** on Debian-based Linux installation.

Repositories in Linux...cont....

In Ubuntu ships with four different types of repositories.

➤ Main

- officially supported, open-source software. Canonical provides official support for these packages. Every open-source software package included in the default installation is included along with some other important packages.

➤ Restricted

- officially supported, closed-source software – e.g., hardware drivers -- supported for the length of the release.

➤ Universe

- community-maintained, open-source. The majority of the Ubuntu software comes from this repository. Canonical does not provide official support or updates.

➤ Multiverse

- Unsupported, closed-source and patent-encumbered software.

Repositories in Ubuntu....cont....

- Adding apt-repository manually in ubuntu
 - To add repositories manually in ubuntu edit the /etc/apt/sources.list file and add the apt repository line to the file
 - `sudo add-apt-repository 'repo'`

- Adding PPA Repositories
 - ✓ Personal Package Archives (PPA) allows to upload Ubuntu source packages that are built and published with Launchpad as an apt repository

Repositories in Linux...cont....

- Enable Universe, Multiverse and Restricted Repository on Ubuntu
 - Universe Repository
add-apt-repository universe
 - Multiverse Repository
add-apt-repository multiverse
 - Restricted Repository
add-apt-repository restricted

- Disable Universe, Multiverse and Restricted Repository on Ubuntu
 - Universe Repository
add-apt-repository -r universe
 - Multiverse Repository
add-apt-repository -r multiverse
 - Restricted Repository
add-apt-repository -r restricted

Keys...

- Public key files, which are **used in this process to authenticate repositories as valid sources within apt** .
- GPG, or GNU Privacy Guard, is an open-source alternative to PGP.
- GPG files are usually keyrings, which are files that hold multiple

But adding keys might cause for security concerns.

Apt-Key

- ✓ Utility used to manage the keys that APT uses to authenticate packages
- ✓ Used to manage a keyring of gpg keys for secure apt.
- ✓ Can be used to show the keys in the keyring, and to add or remove a key.
- ✓ Closely related to the add-apt-repository utility, which adds external repositories using key servers to an APT installation's list of trusted sources.
- ✓ keys added using apt-key and add-apt-repository are trusted globally by apt

Apt-key....cont....

- Import the repository public key by running apt-key command

Example:

```
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv  
9DA31620334BD75D9DCB49F368818C72E52529D4
```

