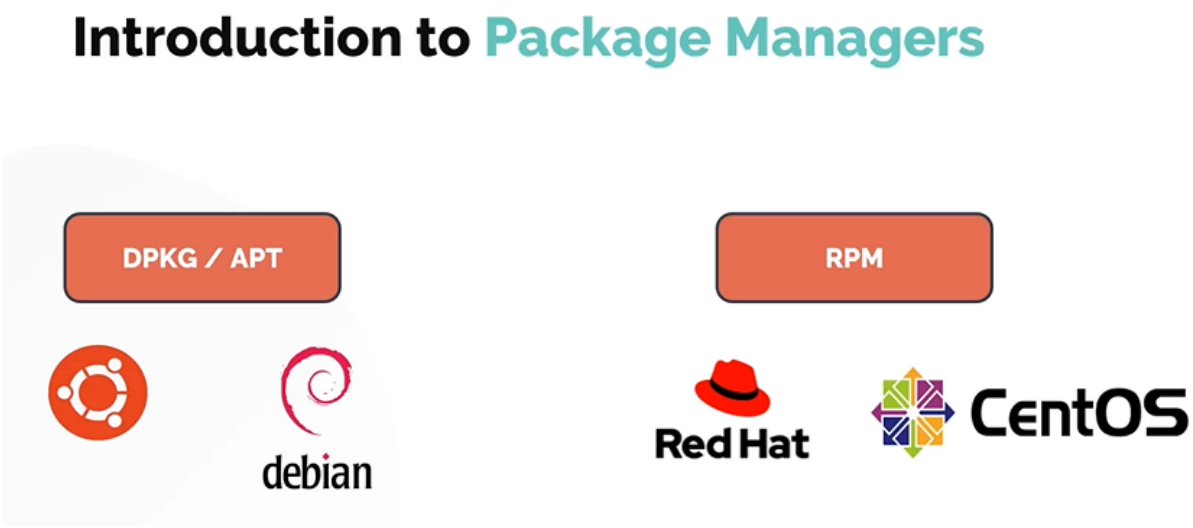
Package Management Distribution

In this section, we will look at the Linux Package Management tools used in different Linux distribution

- Will start with introduction to the package management.

Introduction to Package Managers

For **Debain/Ubuntu**, it is **apt/dpkg** and for CentOS/Redhat, it is **RPM**

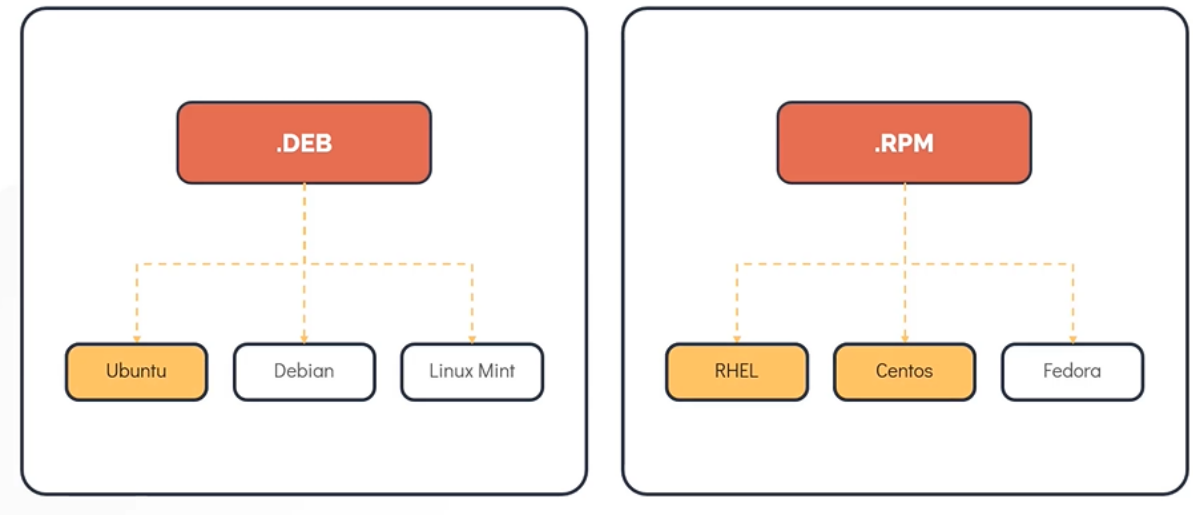


Question: What is the difference between **CentOS**, **RHEL** and **Ubuntu***?

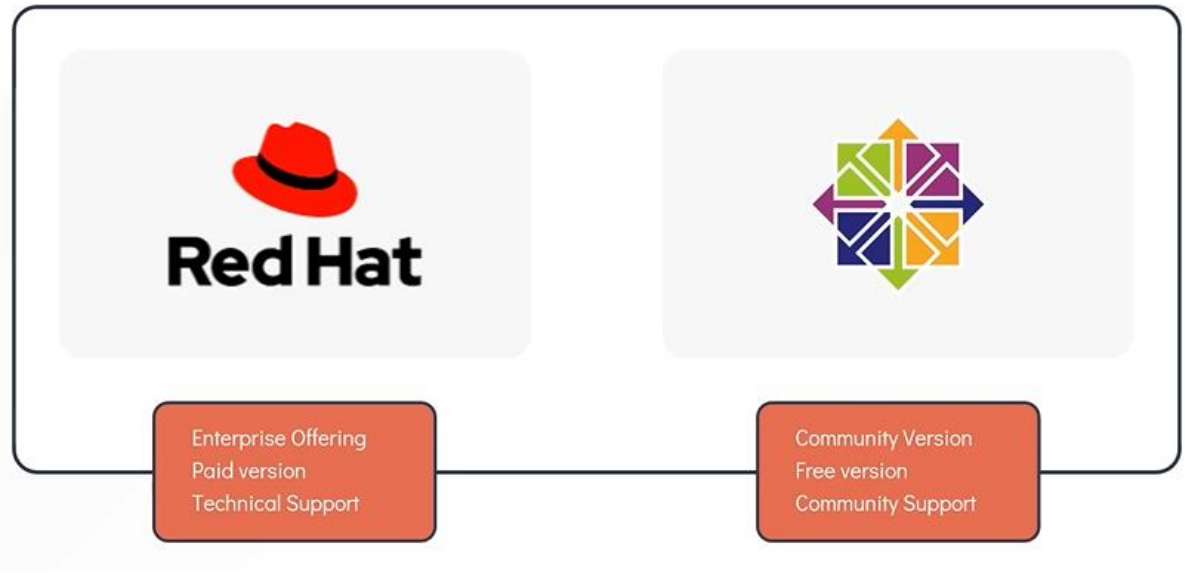
- There are hundreds of Linux distributions in use today

One of the common ways to categorize Linux distribution is by the package manager it uses.

- For example: Distributions such as **RHEL**, **Fedora** and **CentOS**. are based on RPM. Hence, they are known as **RPM** based distribution. The **Debian** family including **Ubuntu**, **Debian** and **Linux Mint** etc. make use of **Debian** based package managers such as the **DPKG**.

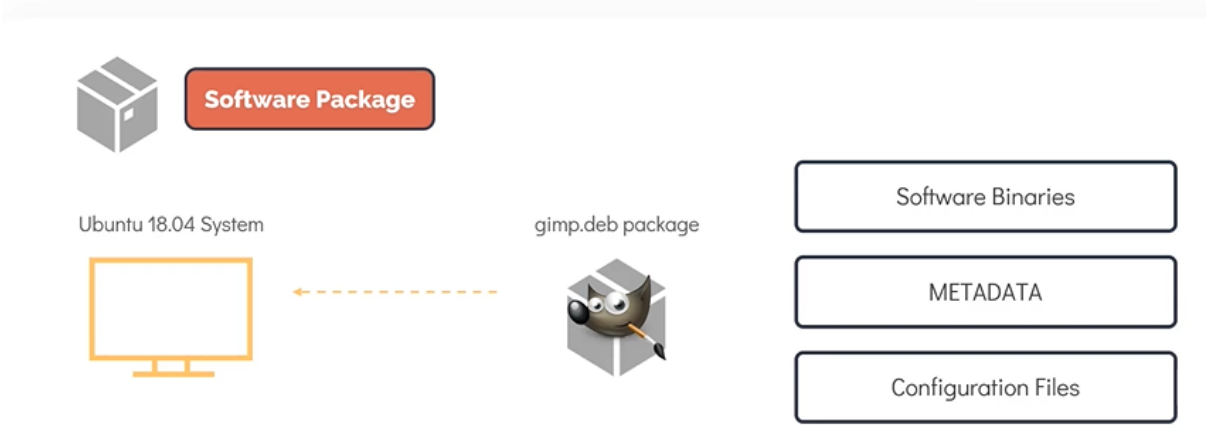


Now, Lets compare RHEL and CentOS Operating Systems.



What is a package?

- A package in its simplest definition is a compressed archive that contains all the files that are required by a particular software to run.
- For example: Let's consider an Ubuntu System, we want to install a simple editing system such as **gimp** which stands for GNU **Image Manipulation System**. To do this, we can make use of the **gimp.deb** package which contains all the software binaries and files needed to for the image editor to run along with the metadata which provides the information about the software itself.

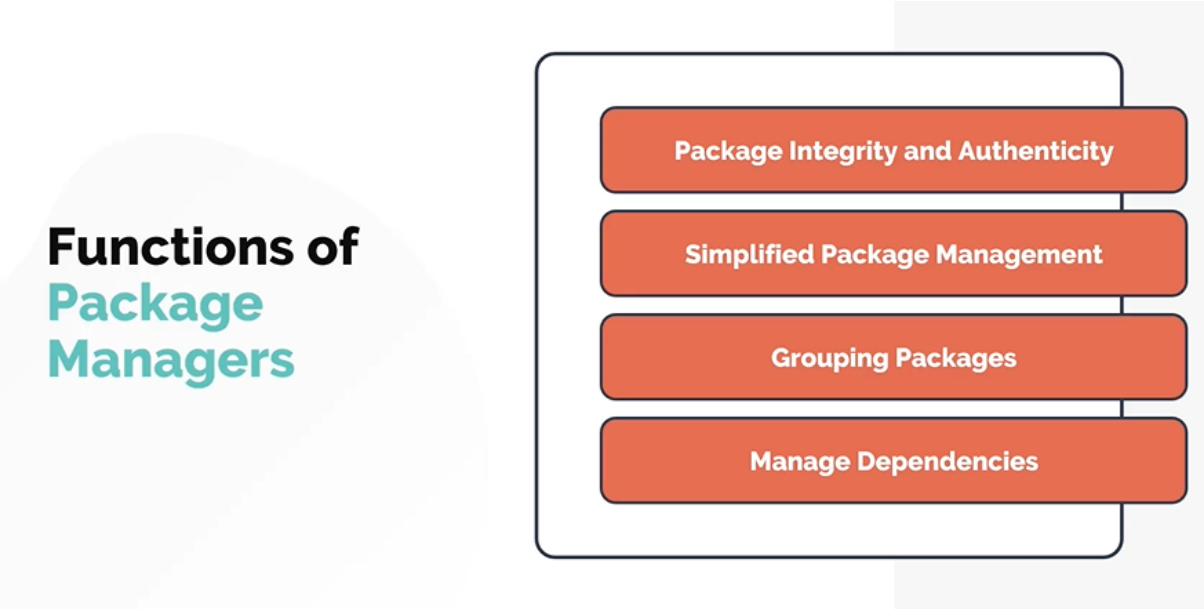


Thats seems to be a quite easy process, why don't we do all the time? download a package and install it on a linux servers. Wondering the need of package managers?

- There are hundreds of linux distributions are there, these distributions runs different sets of tools and libraries, software and possibly even different linux kernels as a result of this a linux program may not run the same way from one system to another. To fix this problem packages include a manifest of dependencies or list of programs in versions that must be satified for the package software to run correctly on a given computer.
- Take a look at the errors in the installation while attempting to install **gimp.deb** on this ubuntu 18.04 system, the dependencies failed as a result the installations failed. Bare in mind that each of these dependent packages may have dependencies of their own which makes package installation management a very tedious process. This is where a **Package Manager** comes into save the day.

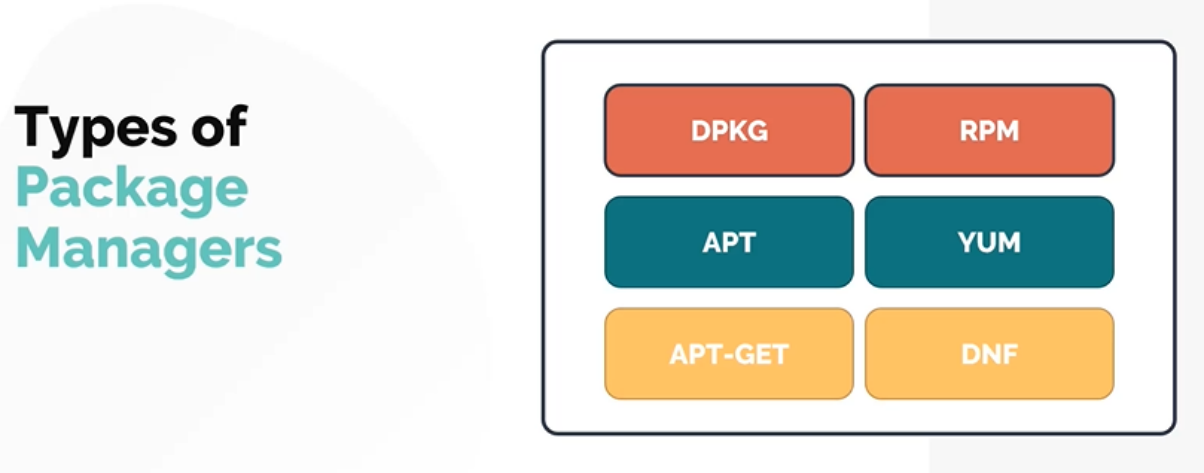
A package manager is a software in a linux system that provides the consistent and automated process in installing, upgrading, configuring and removing packages from the operating system.

Functions of Package Manager



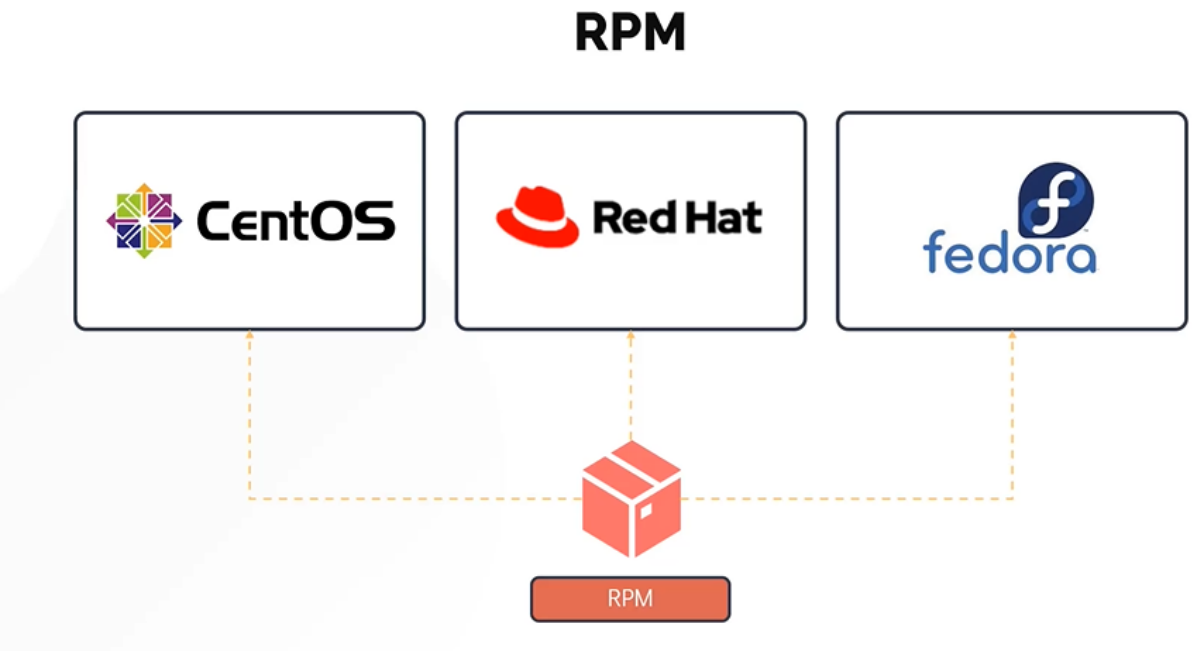
Types of Package Managers

A Linux distribution supports different types of package managers, some of the common ones are below



RPM (Redhat Package Manager)

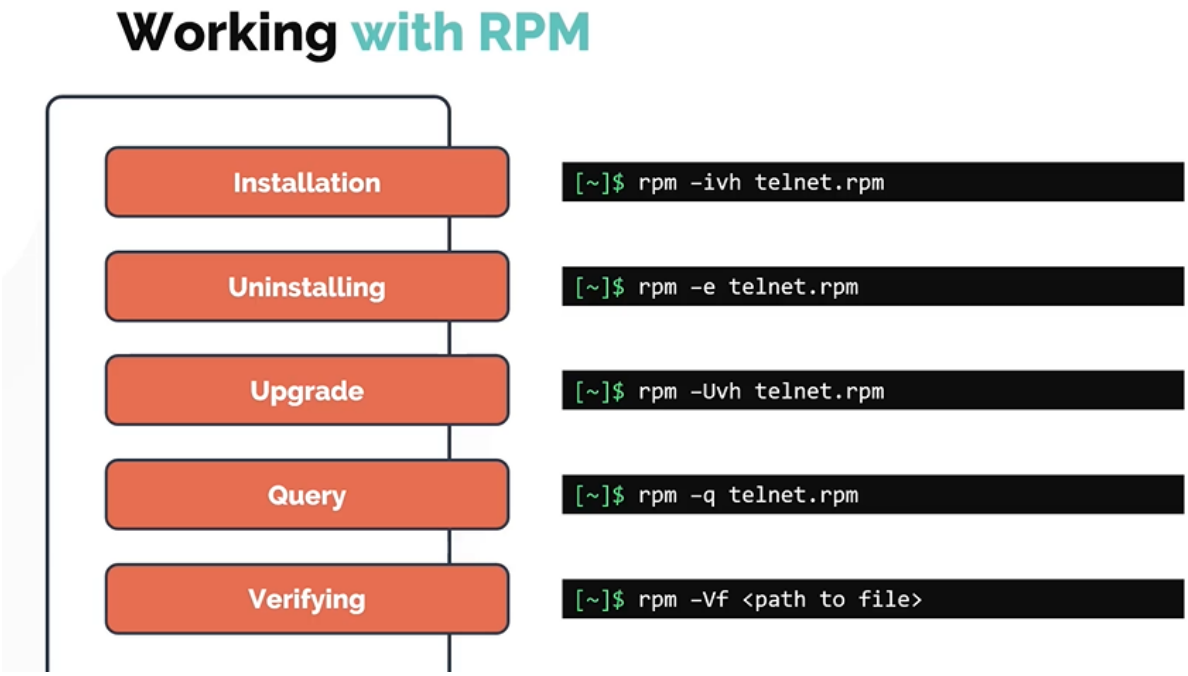
This package manager is used in RHEL as well as other linux distributions but these are the most common ones. The File extensions for packages manage by RPM is **.RPM**



Working with RPM

RPM has five basic modes of operations. Each of these modes can be run using **rpm** command followed by a specific command **options**. Despite of this, RPM doesn't resolve dependencies on its own. This is why we make use of a higher level of package manager called **YUM**.

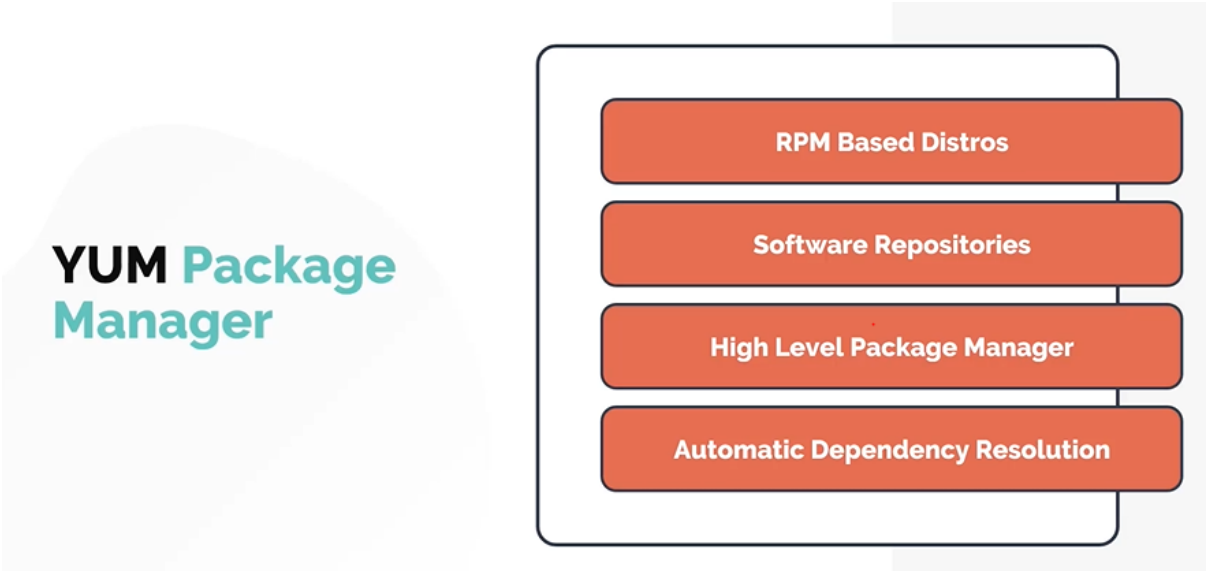
1. Installing
2. Uninstalling
3. Upgrade
4. Query
5. Verifying



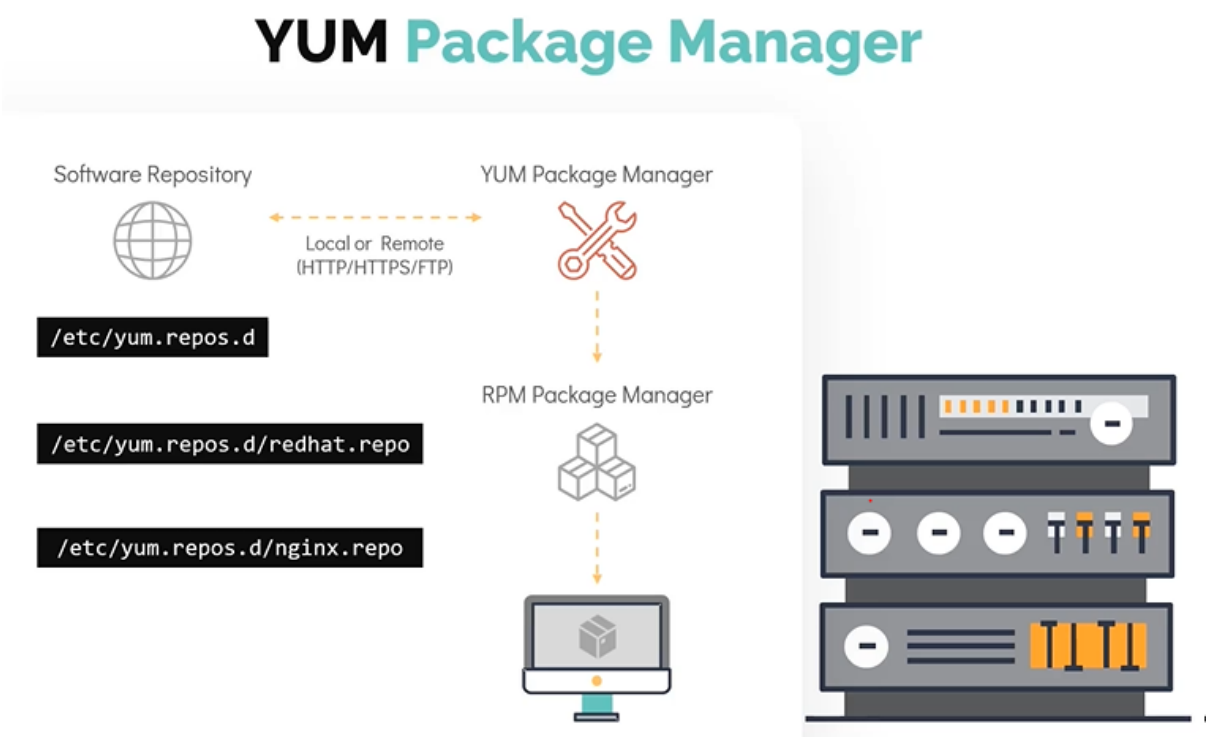
YUM (Yellowdog Updater Modifier)

YUM is a free and opensource package manager.

- Works on RPM based Linux systems
- Works with Software repositories which are essentially a collection of packages and provides package independency management on RPM based distro. The repository information is stored in **/etc/yum.repos.d/** and repository files will have the **.repo** extension.
- Acts as a high level package manager but under the hood it still depeneds on **RPM** to manage packages on the linux systems.
- Unlike RPM, YUM handles package dependencies very well (Automatic Dependency Resolution). It is able to install any dependencies packages to get the base package install on the linux system.



Let us see how YUM installs a package.



Now, let's take a look at sequence of steps involve while installing the package.

- Once yum runs **yum install** command is issued YUM first runs transaction check, if the package is not installed in the system yum checks the configured repositories under **/etc/yum.repos.d/** for the availability of the requested package.
- It also checks if there are any dependent packages are already installed in the system or if it needs to be upgrade.

```
[~]$ yum install httpd
Loading mirror speeds from cached hostfile
 * base: centos.mirror.net-d-sign.de
 * epel: mirror.nl.leaseweb.net
 * extras: mirror.softaculous.com
 * remi-php72: mir01.syntis.net
 * remi-safe: mir01.syntis.net
 * updates: linux.darMMenguin.net
Resolving Dependencies
--> Running transaction check
---> Package httpd.x86_64 0:2.4.6-90.el7.centos will be installed

--> Finished Dependency Resolution

Dependencies Resolved

================================================================================================================================
 Package                  Arch                     Version                                 Repository                Size
================================================================================================================================
Installing:
 httpd                    x86_64                   2.4.6-90.el7.centos                     base                     2.7 M

Transaction Summary
================================================================================================================================
Install  1 Package
```

- After this step, transaction summary is displayed on the screen for the user to review, if we wish to proceed with the install enter the **y** button (this step can be skipped by providing the **-y** flag with the **yum install** command).
- Yum will download and install necessary RPMs to linux system

```
Transaction Summary
================================================================================================================================
Install  1 Package

Total download size: 2.7 M
Installed size: 9.4 M
Is this ok [y/d/N]: y
Downloading packages:
httpd-2.4.6-90.el7.centos.x86_64.rpm                                                        | 2.7 MB  00:00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : httpd-2.4.6-90.el7.centos.x86_64                                                                  1/1
  Verifying  : httpd-2.4.6-90.el7.centos.x86_64                                                                  1/1

Installed:
  httpd.x86_64 0:2.4.6-90.el7.centos

Complete!
```

If you want to update a single package, use **yum update** command. If the package is already in the latest version in the repository and hence no action will be taken

```
[~]$ yum update telnet
Loaded plugins: fastestmirror, ovl
Loading mirror speeds from cached hostfile
 * base: centos.mirror.net-d-sign.de
 * epel: mirror.nl.leaseweb.net
 * extras: mirror.softaculous.com
No packages marked for update
```

Common Commands

To list all the repos added to your system. Run **yum repolist**

$ yum repolist

To check which package should be installed for specific command to work. Use **yum provides** command followed by name.

$ yum provides scp

To Install a package

$ yum install httpd

To Install a package to automatically answer "yes" to any question prompt during the operation. Use **-y** flag with the **yum install** command.

$ yum install httpd -y

To remove a package

$ yum remove httpd

To update a package

$ yum update telnet

To update all packages in the system, use the **yum update** command without any arguments.

$ yum update

Which package managers would you use on centos machine

Centos makes use of RPM and YUM

Use an **rpm** command and find out the exact package name for **wget** installed in this server

$ rpm -qa |grep wget

To install a package for **firefox** browser that has been downloaded under **/home/bob** in the system. Caution: It might fail due to failed dependencies

$ sudo rpm -ivh /home/bob/firefox-68.6.0-1.el7.centos.x86_64.rpm

To install a package for **firefox** browser along with its dependencies

$ sudo yum install firefox -y

To check how many software repositories are configured for YUM in the system

$ sudo yum repolist

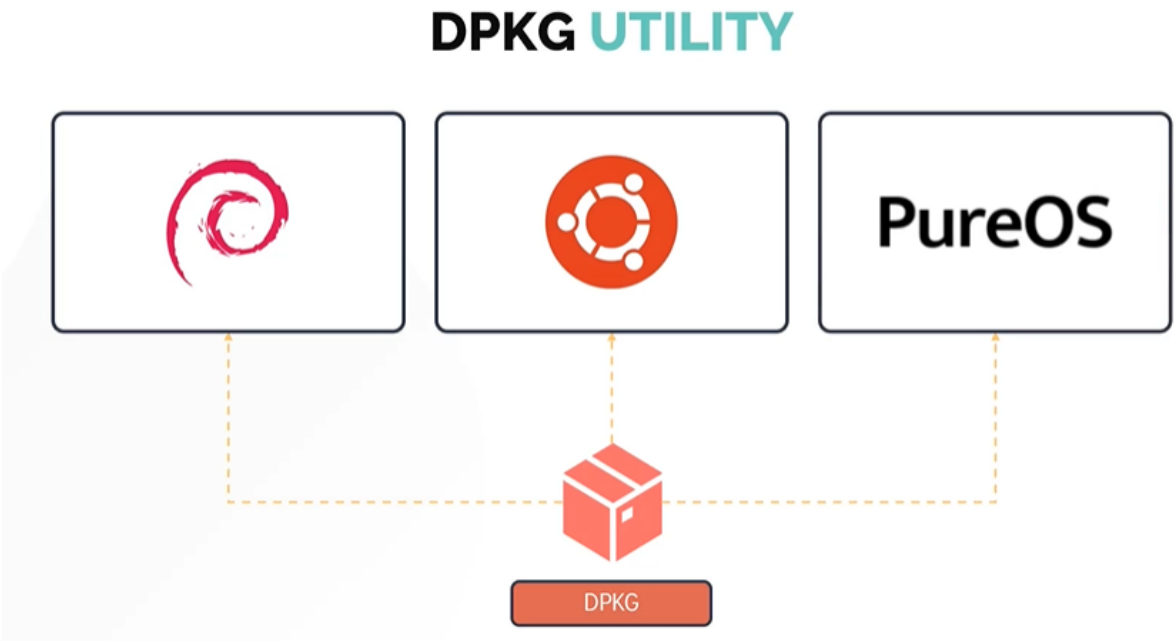
DPKG and APT Package Managers

In this section, we will look at debian package managers for distributions like **Ubuntu**, **Debian** and **PureOS**.

- DPKG
- APT

DPKG Utility

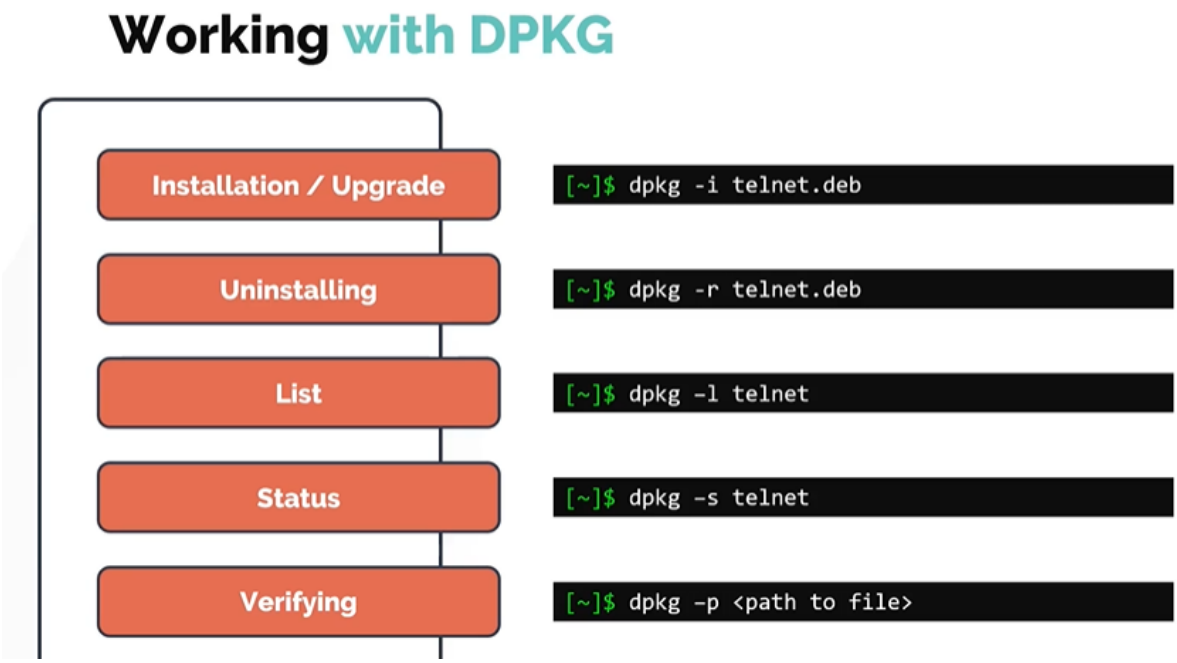
- DPKG stands for Debian Package Manager
- It is a low-level package manager



Working with DPKG

Similar to RPM, DPKG can be used for the below. The package extension is .deb.

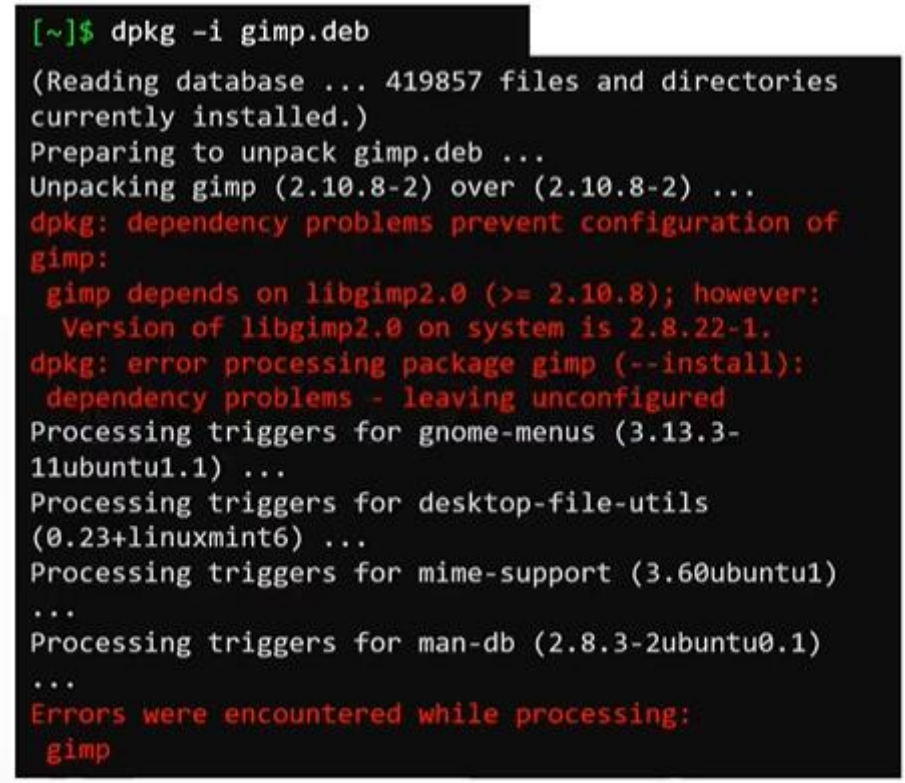
1. Installing
2. Uninstalling
3. Upgrade
4. List
5. Status
6. Verifying



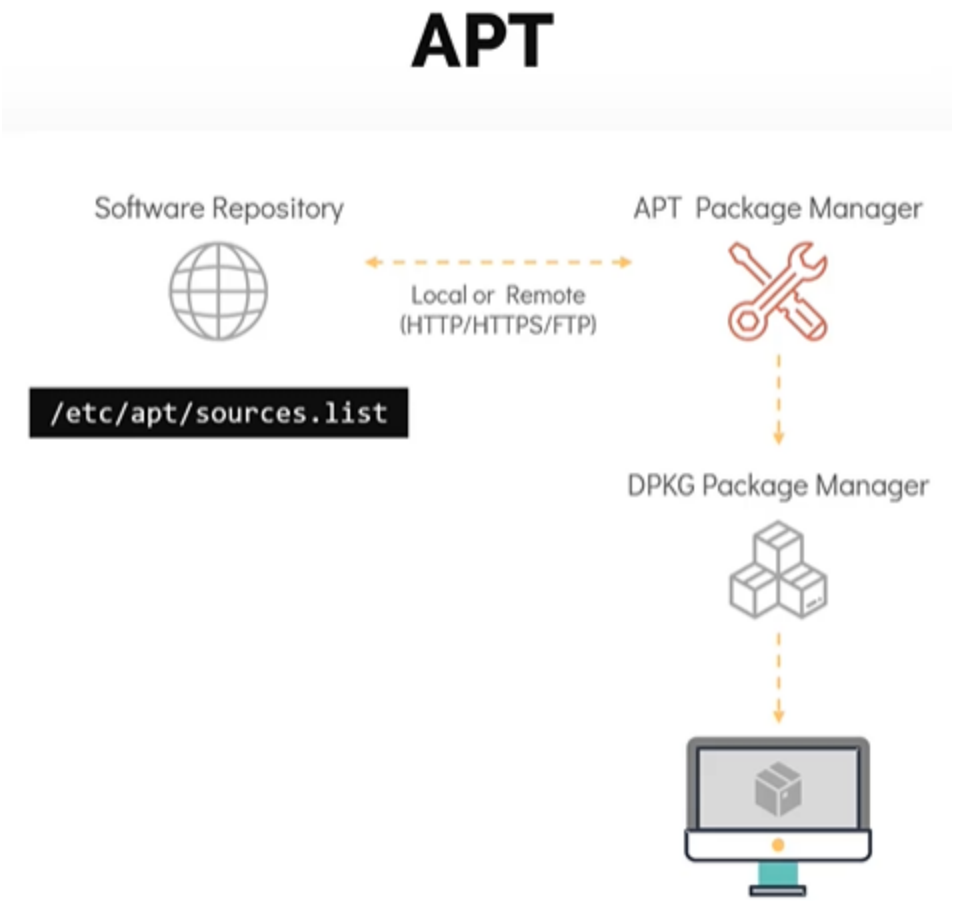
APT and APT-GET

Similar to RPM, DPKG doesn't resolve the dependencies when it comes to package management.

- Install may fail due to dependencies issues. This is the reason why we use higher level Debian package managers such as **APT** and **APT-GET**.



- Instead of relying on DPKG, you can install software along with its dependencies using **APT** or **APT-GET**.
- **APT** or **APT-GET** although sounds similar, but they do not depend on each other.
- **APT** stands for advanced package managers, it is more user friendly and overall better tool compared to **APT-GET**.
- $sudo apt install gimp
- $sudo apt-get install gimp
- APT act as a frontend package manager that relies on DPKG utility. In similar to YUM, APT relies on software repository that contains packages that would eventually be installed on a system.
- The software repository for APT is defined in **/etc/apt/sources.list** file.



Let us know see some common commands

To refresh a repository. Run **apt update** command.

$ sudo apt update

To install available upgrades of all packages currently installed on the system from the sources configured.

$ sudo apt upgrade

Another way to update the repository is to use **apt edit-sources** command. This opens up the **/etc/apt/sources.list** file in the text editor of your choice.

$ sudo apt edit-sources

To install the package

$ sudo apt install telnet

To remove the package

$ sudo apt remove telnet

To search or look for a package in the repository.

$ sudo apt search telnet

To list all the available packages

$ sudo apt list |grep telnet

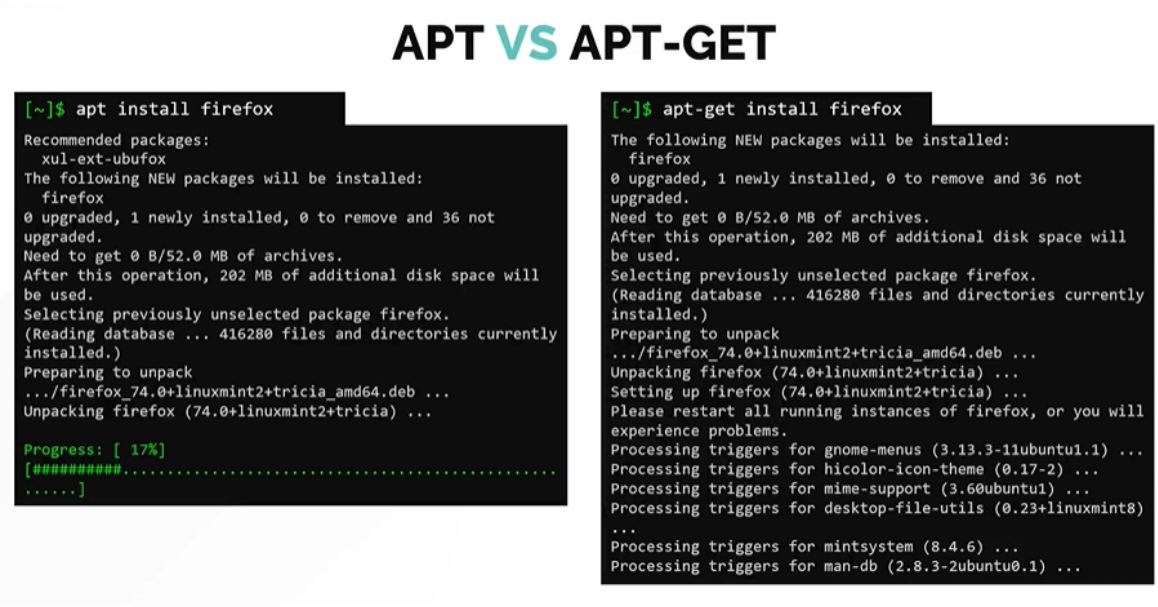
Difference between APT vs APT-GET

- APT is a more user-friendly tool when compared to APT-GET
- In all the latest Debian based distros APT is already installed by default.

Let's look why APT is better when compared to APT-GET

Let's try to install **Firefox** package using both APT and APT-GET

- You will notice APT does easy on the eyes, you get just enough information and also a nice little progress bar
- APT-GET is just effective and doesn't provide the output in user-friendly format.



Lets try another comparision by search a **telent** package.

- You will notice with apt, all its options are located in one place. You can search with **apt search telnet** command.
- On the other hand, you cannot use search command with **apt-get** command. Instead, you have to use another tool called **apt-cache search telnet**.
- If you compare the results of the two commands, you will also see the **apt-cache** throws in a lot of extra information in the search result, which may not be really useful for the end user.

Package managers that you use on a debian based distro

Debain distros use dpkg.

To install a package for **firefox** browser which has been downloaded at /root/firefox.deb. The dependencies might fail.

$ sudo dpkg -i /root/firefox.deb

To install a package using **APT**

$ sudo apt install firefox

Lets now locate the package to install Chromium browser in the system. Use **apt search** functionality to locate the correct package name. The browser has the description of: Chromium web browser, open-source version of Chrome

$ sudo apt search chromium-browser

To install the **chromium-browser**

sudo apt install -y chromium-browser

To remove the **firefox** browser from the system.

$ sudo apt remove firefox