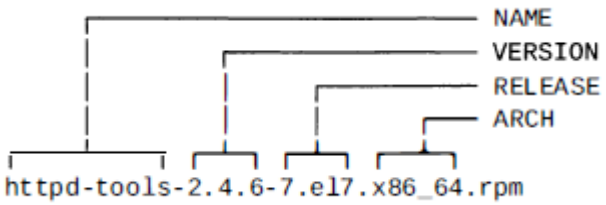
Package Installation:

Red Hat Subscription Manager provide tool to attach machines to product subscription. Allow admins to get software, updates about it and track information about support contract and subscription.

Red Hat subscription manager Tasks:

1. Register: the system to RedHat account, this will uniquely inventory the system for subscription.
2. Subscribe: provides support, expiration date and default repos
3. Enable repos: it provides default software packages based on subscription
4. Tracking the subscription.

Redhat Package Manager (RPM):
-Package installation is never interactive
-The local RPM database is maintained in /var/lib/rpm
-Package name: name-version-release .architecture.rpm
-All packages from a particular source are normally signed by the same GPG private key.



Each rpm package is a special archive made up of three components:
1- The files installed by the package.
2- Information about the package (metadata), a summary and description of the package; whether it requires other packages to be installed; licensing; a package change log and other details
3- Scripts which may run when this this package is installed, updated, or removed, or which are triggered when other packages are installed, updated, or removed.

Five Functions:

1. Install
2. Upgrade
3. Update
4. Verify
5. Remove

1. Install:
   [root@server ~]# rpm -ivh tree-1.5.2.2-4.gc12.x86-64.rpm

2. Query:
   [root@server ~]#rpm -q pkg1 pkg2 or rpm --query ==> to get info about packages
   [root@server ~]#rpm -qa ==> list all installed packages
   rpm -ql pkgname ==> list all files the package contain
   rpm -qi pkgname ==> display complete info about the package
   rpm -qf file ==> query package that own this file
   rpm -qR pkgname ==> or --Require to check package prerequisites
   rpm –qc pkgname ==> Lists only configuration files from package name
   rpm –qd pkgname ==> displays a list of files marked as documentation (man pages, info pages, READMEs, etc.).
   rpm -qpi tree-1.6.0-10.el7.x86_64.rpm ==> to know the package info before installation on the system.
   rpm -qpR ==> yelp-tools-3.28.0-1.el7.noarch.rpm

3. Verify:
   Verify an rpm compare the current status of files installed by an rpm to the file information recorded at the time the rpm was installed.
   [root@server ~]#rpm -V whois ==> to verify against db
   [root@server ~]#rpm -Va ==> to verify all installed packages
   [root@server ~]#rpm –Vf path ==> to verify a package containing a particular file.

   Note: if everything verify properly, then there is no output, Else the output will be 8 char
   [root@server ~]#man rpm
   /--verify ==> to check the codes
   . ==> mean the test passed
   Column value description
   1 5 the MD5 checksum is changed
   2 S the file size is changed
   3 L a symbolic link has changed (point to diff file)
   4 T mod. Time is changed
   5 D the file Designation is changed
   6 U the file owner is changed
   7 G the file group is changed

8 M the file mode is changed
Any ? this characteristics current status couldn't be determine (coz file perm prevent read file)
N/A missing the corresponding file doesn't exist in its default location

4. RPM Upgrading
   rpm -Uvh tree-1.5.2.2-4.gc12.x86-64.rpm
   -U ==> act as regular installation (upgrade always install an rpm even when a previous version wasn't installed)
   -F ==> freshen (only install packages that actually has been installed previously)

5. RPM Removing
   rpm -e tree
   rpm --erase pkgname

Note: to get repo from internet we use wget "link address"

[root@server ~]#wget https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm
[root@server ~]#rpm -ivh epel-release-latest-7.noarch.rpm

YUM & DNF:

Now yum is replaced by dnf in RHEL8, It is powerful command line tool that can be used to install, upgrade, remove and query software package.

Repository is location where multiple software packages are available, we can have different repository with different versions of the software.

It can be divided into multiple groups like (Security Tools, Development Tools, etc) or some specific packages.

```
[root@srv1 ~]# ls -l /usr/bin/yum
lrwxrwxrwx. 1 root root 5 Aug  4 20:51 /usr/bin/yum -> dnf-3
[root@srv1 ~]# which dnf
/usr/bin/dnf
[root@srv1 ~]# ls -l /usr/bin/dnf
lrwxrwxrwx. 1 root root 5 Aug  4 20:51 /usr/bin/dnf -> dnf-3
[root@srv1 ~]# ls -l /usr/bin/dnf-3
-rwxr-xr-x. 1 root root 1954 Aug  4 20:51 /usr/bin/dnf-3
```

It is automatically configured to use redhat repository when you register your machine to redhat website, but still you can configure yum or dnf to get package from third party package repository over the network. Once a system is installed, additional software packages and updates are normally installed from a network package repository, most frequently through the red hat subscription management service.

Note: must be connected to the internet it search for the s/w metadata and install it but rpm must download it first then install.

Note: rpm doesn't resolve dependencies automatically and all packages must be listed.

The main configuration file for yum is /etc/yum.conf with additional repository configuration files located on the /etc/yum.repos.d/ directory.

Repository configuration files include, at a minimum the following:

[repo_id] ==> reponame
name=repo_name ==> repo description
baseurl=protocol:// ==> (http,ftp,file)
gpgcheck= ==> the integrity check value (0), gpgcheckfile must exist (1)
enabled= ==> to enable repo (1), disable repo (0)

dnf is a powerful command line tool that can be used to more flexibly manage (install, update , remove and query) software packages.

Registering a system to the subscription management service automatically configures access to software repo based on the attached subscription.

[root@server ~]#dnf repolist ==> to list repos
[root@server ~]#dnf repolist all ==> to list all enabled and disabled repos
[root@server ~]#dnf repoinfo ==> list repo details
[root@server ~]#dnf list installed ==> to list installed packages = rpm -qa
[root@server ~]#dnf list installed openssh ==> to list the openssh package = rpm -qa | grep httpd
[root@server ~]#dnf list kernel ==> to show all kernel available
[root@server ~]#dnf search httpd ==> to search for the httpd package

[root@server ~]#dnf search all ‘web server’ ==> to search for all packages that have web server in their name, summary, and description fields
[root@server ~]#dnf info httpd ==> to display detailed info about the package = rpm -qi httpd
[root@server ~]#yum provides “/var/www/html” ==> to display the package name that match pathname specified
[root@server ~]#dnf install httpd ==> to install package
[root@server ~]#dnf update httpd ==> to obtain newer version of software package
[root@server ~]#dnf update ==> it will update all system installed packages
[root@server ~]#dnf remove httpd ==> to remove package including any supporting packages

Installing and Removing Software Group:
dnf also has the concept of groups, which are collections or related software installed together for a particular purpose.

[root@server ~]#dnf group list ==> show the names of installed and available groups.
[root@server ~]#dnf group info "Network Servers" ==> information about packages inside the group
[root@server ~]#dnf group install "Security Tools" ==> will install a group which will install its mandatory and default packages.
[root@server ~]#dnf groups remove "Security Tools" ==> to remove the software group
[root@server ~]#tail /var/log/dnf.log ==> all install and remove transaction are logged in /var/log/dnf.log
[root@server ~]#dnf history list ==> a summary of install and remove transaction can be viewed with dnf history
[root@server ~]#dnf clean all ==> to clear the dnf cache and see the new links
[root@server ~]#dnf makecache ==> to make metadata cache create again

Adding Repository to the System:
yum-config-manager is used to add, enable or disable repositories to the system, This will change the enabled parameter in the /etc/yum.repos.d/ directory files.

The repository file must end with .repo and the GPG Integrity Check file: /etc/pki/rpm-gpg/key-file

[root@srv1 ~]# dnf install createrepo ==> to Create repos
[root@srv1 ~]# mkdir /repos
[root@srv1 ~]# cp -r /mnt/AppStream/Packages/ /repos/
[root@srv1 ~]# ls -ld /repos/
[root@srv1 ~]# chmod -R 775 /repos/
[root@srv1 ~]# createrepo --database /repos/Packages ==> create sqllitedb
[root@srv1 ~]# yum-config-manager --add-repo file:///repos/Packages
[root@srv1 ~]# ls /etc/yum.repos.d/repos_Packages.repo
[root@srv1 ~]# cat /etc/yum.repos.d/repos_Packages.repo
[repos_Packages]
name=created by dnf config-manager from file:///repos/Packages
baseurl=file:///repos/Packages
enabled=1
[root@srv1 ~]# echo "gpgcheck=0" >> /etc/yum.repos.d/repos_Packages.repo
[root@srv1 ~]# dnf repolist
[root@srv1 ~]# dnf repoinfo repos_Packages
[root@srv1 ~]# yum-config-manager --enable repos_Packages
[root@srv1 ~]# yum-config-manager --disable repos_Packages

Testing Our Repo:
[root@srv1 ~]# yum-config-manager --disable AppStream
[root@srv1 ~]# yum-config-manager --disable BaseOS
[root@srv1 ~]# yum-config-manager --disable extras
[root@srv1 ~]# yum install bind

```
[root@srv1 ~]# yum install bind
Last metadata expiration check: 0:05:42 ago on Thu 24 Dec 2020 02:50:34 AM EET.
Dependencies resolved.
================================================================================
 Package          Architecture       Version                    Repository                Size
================================================================================
Installing:
 bind             x86_64             32:9.11.13-3.el8           repos_Packages            2.1 M

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

Total size: 2.1 M
Installed size: 4.5 M
Is this ok [y/N]: y
Downloading Packages:
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                        1/1
  Running scriptlet: bind-32:9.11.13-3.el8.x86_64                           1/1
  Installing       : bind-32:9.11.13-3.el8.x86_64                           1/1
  Running scriptlet: bind-32:9.11.13-3.el8.x86_64                           1/1
  Verifying        : bind-32:9.11.13-3.el8.x86_64                           1/1
```

FTP Repo:
Considerations take all the repo from the Centos 8.2 Everything DVD and put it at the server side.
Disable SELINUX and FIREWALLd just for testing.

[root@srv1 ~]# dnf install vsftpd –y
[root@srv1 Packages]# vim /etc/vsftpd/vsftpd.conf
anonymous_enable=YES
[root@srv1 ~]# cp -r /mnt/AppStream/Packages/* /var/ftp/pub/.
[root@srv1 ~]# chmod -R 775 /var/ftp/pub/
[root@srv1 ~]# cd /var/ftp/pub/
[root@srv1 pub]# createrepo --database /var/ftp/pub/
[root@srv1 ~]# systemctl enable --now vsftpd
[root@srv1 ~]# systemctl status vsftpd

Note: check that this file is on the repo folder or not repodata/repomd.xml

At the client side:
Disable selinux and firewalld
[root@centos-test ~]# dnf install ftp ===> login with anonymous user to check
[root@centos-test ~]# dnf install dnf-utils
[root@centos-test ~]# yum-config-manager --add-repo ftp://192.168.10.25/pub
[root@centos-test ~]# echo "gpgcheck=0" >>
/etc/yum.repos.d/192.168.10.25_pub.repo

```
[root@centos-test ~]# dnf repolist
repo id                       repo name
192.168.10.25_pub             created by dnf config-manager from ftp://192.168.10.25/pub
AppStream                     CentOS-8 - AppStream
BaseOS                        CentOS-8 - Base
extras                        CentOS-8 - Extras
```

```
[root@centos-test ~]# dnf repoinfo 192.168.10.25_pub
Last metadata expiration check: 0:00:59 ago on Thu 24 Dec 2020 06:05:02 AM EET.
Repo-id             : 192.168.10.25_pub
Repo-name           : created by dnf config-manager from ftp://192.168.10.25/pub
Repo-status         : enabled
Repo-revision       : 1608774905
Repo-updated        : Thu 24 Dec 2020 03:55:05 AM EET
Repo-pkgs           : 5,326
Repo-available-pkgs: 4,500
Repo-size           : 6.0 G
Repo-baseurl        : ftp://192.168.10.25/pub
Repo-expire         : 172,800 second(s) (last: Thu 24 Dec 2020 06:05:02 AM EET)
Repo-filename       : /etc/yum.repos.d/192.168.10.25_pub.repo
Total packages: 5,326
```

Application or module Stream:
It allow us to have a different Versions from particular package available in the same dnf repository.

Example: php, python scripts and postgres database

```
[root@centos-test ~]# dnf module list | grep php
php                  7.2 [d]      common [d], devel, minimal              PHP scripting language

php                  7.3          common [d], devel, minimal              PHP scripting language

php                  7.4          common [d], devel, minimal              PHP scripting language
```

Note: 7.2 [d] ==> means default version installed is version 7.2 common [d], may be available devel or minimal

[root@centos-test ~]# dnf module info --profile php ==> to view what is inside the common, minimal and devel packages

```
[root@centos-test ~]# dnf install php
Last metadata expiration check: 0:11:42 ago on Thu 24 Dec 2020 06:05:02 AM EET.
Dependencies resolved.
================================================================================
 Package              Arch     Version                                Repository           Size
================================================================================
Installing:
 php                  x86_64   7.2.24-1.module_el8.2.0+313+b04d0a66   192.168.10.25_pub   1.5 M
Installing dependencies:
 apr                  x86_64   1.6.3-11.el8                           AppStream           125 k
```

```
[root@centos-test ~]# dnf module install php:7.3/devel
Last metadata expiration check: 0:16:14 ago on Thu 24 Dec 2020 06:05:02 AM EET.
Dependencies resolved.
================================================================================
 Package                 Arch    Version                                 Repository          Size
================================================================================
Upgrading:
 glibc                   x86_64  2.28-127.el8                            BaseOS             3.6 M
 glibc-common            x86_64  2.28-127.el8                            BaseOS             1.3 M
 glibc-langpack-en       x86_64  2.28-127.el8                            BaseOS             824 k
 pcre2                   x86_64  10.32-2.el8                             BaseOS             246 k
Installing group/module packages:
 libzip                  x86_64  1.5.2-1.module_el8.2.0+314+53b99e08      192.168.10.25_pub   63 k
 php-cli                 x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream          3.0 M
 php-common              x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream          669 k
 php-devel               x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream          735 k
 php-fpm                 x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream          1.6 M
 php-json                x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream           73 k
 php-mbstring            x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream          618 k
 php-pear                noarch  1:1.10.9-1.module_el8.2.0+314+53b99e08   192.168.10.25_pub  359 k
 php-pecl-zip            x86_64  1.15.4-1.module_el8.2.0+314+53b99e08     AppStream           50 k
 php-process             x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream           84 k
 php-xml                 x86_64  7.3.20-1.module_el8.2.0+498+4deef2f1     AppStream          187 k
```

To check php module version:
[root@centos-test ~]# php -v
PHP 7.3.20 (cli) (built: Jul 7 2020 07:53:49) (NTS)
Copyright (c) 1997-2018 The PHP Group
Zend Engine v3.3.20, Copyright (c) 1998-2018 Zend Technologies

[root@centos-test ~]# dnf module remove php ==> to remove module
[root@centos-test ~]# dnf module reset php ==> to remove the module and set common version.

```
[root@centos-test ~]# dnf module reset php
Last metadata expiration check: 0:23:15 ago on Thu 24 Dec 2020 06:05:02 AM EET.
Dependencies resolved.
================================================================================
 Package               Architecture          Version                 Repository              Size
================================================================================
Disabling module profiles:
 php/devel
Resetting modules:
 php

Transaction Summary
================================================================================
```