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RH12407 - Package Management

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LAB #1 - The rpm Command

In order to facilitate the installation, uninstallation and management of software (called packages), RHEL 9 uses a specific installable software file format. This is called **RPM** for Red Hat Package Manager. The command used to manipulate these packages is also called **rpm**.

The rpm command switches are:

```
[root@redhat9 ~]# rpm --help
Usage: rpm [OPTION...]
```

Query/Verify package selection options:

```
-a, --all query/verify all packages
-f, --file query/verify package(s) owning installed file
    --path query/verify package(s) owning path, installed or not
-g, --group query/verify package(s) in group
-p, --package query/verify a package file
    --pkgid query/verify package(s) with package identifier
    --hdrid query/verify package(s) with header identifier
    --triggeredby query the package(s) triggered by the package
    --whatconflicts query/verify the package(s) which conflict with a dependency
    --whatrequires query/verify the package(s) which require a dependency
    --whatobsoletes query/verify the package(s) which obsolete a dependency
    --whatprovides query/verify the package(s) which provide a dependency
    --whatrecommends query/verify the package(s) which recommends a dependency
    --whatsuggests query/verify the package(s) which suggests a dependency
    --whatsupplements query/verify the package(s) which supplements a dependency
    --whatenhances query/verify the package(s) which enhances a dependency
--nomanifest do not process non-package files as manifests
```

Query/Verify file selection options:

```
-c, --configfiles only include configuration files
-d, --docfiles only include documentation files
-L, --licensefiles only include license files
```

```
-A, --artifactfiles only include artifact files
--noghost exclude %%ghost files
--noconfig exclude %%config files
--noartifact exclude %%artifact files
```

Query options (with -q or --query):

```
--dump dump basic file information
-l, --list list files in package
--queryformat=QUERYFORMAT use the following query format
-s, --state display the states of the listed files
```

Verify options (with -V or --verify):

```
--nofiledigest don't verify digest of files
--nofiles don't verify files in package
--nodeps don't verify package dependencies
--noscript don't execute verify script(s)
```

Install/Upgrade/Erase options:

```
--allfiles install all files, even configurations which might otherwise be skipped
--allmatches remove all packages which match <package> (normally an error is generated if <package>
specified multiple packages)
--badreloc relocate files in non-relocatable package
-e, --erase=<package>+ erase (uninstall) package
--excludedocs do not install documentation
--excludepath=<path> skip files with leading component <path>
--force short hand for --replacepkgs --replacefiles
-F, --freshen=<packagefile>+ upgrade package(s) if already installed
-h, --hash print hash marks as package installs (good with -v)
--ignorearch don't verify package architecture
--ignoreos don't verify package operating system
--ignoresize don't check disk space before installing
--noverify short hand for --ignorepayload --ignoresignature
-i, --install install package(s)
--justdb update the database, but do not modify the filesystem
```

```
--nodeps do not verify package dependencies
--nofiledigest don't verify digest of files
--nocontexts don't install file security contexts
--nocaps don't install file capabilities
--noorder do not reorder package installation to satisfy dependencies
--noscripts do not execute package scriptlet(s)
--notriggers do not execute any scriptlet(s) triggered by this package
--oldpackage upgrade to an old version of the package (--force on upgrades does this automatically)
--percent print percentages as package installs
--prefix=<dir> relocate the package to <dir>, if relocatable
--relocate=<old>=<new> relocate files from path <old> to <new>
--replacefiles ignore file conflicts between packages
--replacepkgs reinstall if the package is already present
--test don't install, but tell if it would work or not
-U, --upgrade=<packagefile>+ upgrade package(s)
--reinstall=<packagefile>+ reinstall package(s)
```

Common options for all rpm modes and executables:

```
-D, --define='MACRO EXPR' define MACRO with value EXPR
--undefine=MACRO undefine MACRO
-E, --eval='EXPR' print macro expansion of EXPR
--target=CPU-VENDOR-OS Specify target platform
--macros=<FILE:...> read <FILE:...> instead of default file(s)
--load=<FILE> load a single macro file
--noplugins don't enable any plugins
--nodigest don't verify package digest(s)
--nosignature don't verify package signature(s)
--rcfile=<FILE:...> read <FILE:...> instead of default file(s)
-r, --root=ROOT use ROOT as top level directory (default: '/')
--dbpath=DIRECTORY use database in DIRECTORY
--querytags display known query tags
--showrc display final rpmsrc and macro configuration
--quiet provide less detailed output
-v, --verbose provide more detailed output
```

```
--version print the version of rpm being used
```

Options implemented via popt alias/exec:

```
--scripts list install/erase scriptlets from package(s)
--setperms set permissions of files in a package
--setugids set user/group ownership of files in a package
--setcaps set capabilities of files in a package
--restore restore file/directory permissions
--conflicts list capabilities this package conflicts with
--obsoletes list other packages removed by installing this package
--provides list capabilities that this package provides
--requires list capabilities required by package(s)
--recommends list capabilities recommended by package(s)
--suggests list capabilities suggested by package(s)
--supplements list capabilities supplemented by package(s)
--enhances list capabilities enhanced by package(s)
--info list descriptive information from package(s)
--changelog list change logs for this package
--changes list changes for this package with full time stamps
--xml list metadata in xml
--triggers list trigger scriptlets from package(s)
--filetriggers list filetrigger scriptlets from package(s)
--last list package(s) by install time, most recent first
--dupes list duplicated packages
--filesbypkg list all files from each package
--fileclass list file names with their classes
--filecolor list file names with their colors
--fileprovide list file names with their provides
--filerequire list file names with requires
--filecaps list file names with their POSIX1.e capabilities
```

Help options:

```
-, --help Show this help message
--usage Display brief usage message
```

1.1 - Configuration

The main configuration file for the rpm command is **/usr/lib/rpm/rpmrc**:

```
[root@redhat9 ~]# more /usr/lib/rpm/rpmrc
#/*! \page config_rpmrc Default configuration: /usr/lib/rpm/rpmrc
# \verbatim
#
# This is a global RPM configuration file. All changes made here will
# be lost when the rpm package is upgraded. Any per-system configuration
# should be added to /etc/rpmrc, while per-user configuration should
# be added to ~/.rpmrc.
#
#####
# Values for RPM_OPT_FLAGS for various platforms

# 'fat' binary with both archs, for Darwin
optflags: fat -O2 -g -arch i386 -arch ppc

optflags: i386 -O2 -g -march=i386 -mtune=i686
optflags: i486 -O2 -g -march=i486
optflags: i586 -O2 -g -march=i586
optflags: i686 -O2 -g -march=i686
optflags: pentium3 -O2 -g -march=pentium3
optflags: pentium4 -O2 -g -march=pentium4
optflags: athlon -O2 -g -march=athlon
optflags: geode -Os -g -m32 -march=geode
optflags: ia64 -O2 -g
optflags: x86_64 -O2 -g
optflags: amd64 -O2 -g
optflags: ia32e -O2 -g

optflags: alpha -O2 -g -mieee
```

```
optflags: alphaev5 -O2 -g -mieee -mtune=ev5
optflags: alphaev56 -O2 -g -mieee -mtune=ev56
optflags: alphapca56 -O2 -g -mieee -mtune=pca56
optflags: alphaev6 -O2 -g -mieee -mtune=ev6
optflags: alphaev67 -O2 -g -mieee -mtune=ev67

optflags: sparc -O2 -g -m32 -mtune=ultrasparc
optflags: sparcv8 -O2 -g -m32 -mtune=ultrasparc -mv8
optflags: sparcv9 -O2 -g -m32 -mtune=ultrasparc
optflags: sparcv9v -O2 -g -m32 -mtune=niagara
optflags: sparc64 -O2 -g -m64 -mtune=ultrasparc
optflags: sparc64v -O2 -g -m64 -mtune=niagara

optflags: m68k -O2 -g -fomit-frame-pointer

optflags: ppc -O2 -g
optflags: ppc8260 -O2 -g
optflags: ppc8560 -O2 -g
optflags: ppc32dy4 -O2 -g
optflags: ppcseries -O2 -g
optflags: ppcpseries -O2 -g
optflags: ppc64 -O2 -g
optflags: ppc64le -O2 -g
optflags: ppc64p7 -O3 -mtune=power7 -mcpu=power7 -g

optflags: parisc -O2 -g -mpa-risc-1-0
optflags: hppa1.0 -O2 -g -mpa-risc-1-0
--More-- (10%)
[q]
```

These directives indicate how to optimise the build of an rpm according to the processor type returned by the **uname -p** command. For example, the **buildarchtranslate: athlon: i386** directive indicates that the process should use **i386** optimisations when building a src.rpm on a **athlon** architecture.

If, on the other hand, you want the **athlon** optimisations to be used, you should include the **buildarchtranslate: athlon: athlon** line in the **/etc/rpmrc** file. When the rpm package is updated, the **/usr/lib/rpm/rpmrc** file is overwritten. Any changes to the directives in this file must be written to **/etc/rpmrc** or to a user-specific **~/.rpmrc** file.

1.2 - Usage

In order to list the packages installed on the machine, the following command should be entered in a console as root:

```
[root@redhat9 ~]# rpm -qa | more
fonts-filesystem-2.0.5-7.el9.1.noarch
xkeyboard-config-2.33-2.el9.noarch
abattis-cantarell-fonts-0.301-4.el9.noarch
yelp-xsl-40.2-1.el9.noarch
mozilla-filesystem-1.9-30.el9.x86_64
google-noto-fonts-common-20201206-4.el9.noarch
foomatic-db-filesystem-4.0-72.20210209.el9.noarch
adobe-mappings-cmap-20171205-12.el9.noarch
subscription-manager-rhsm-certificates-20220623-1.el9.noarch
libreport-filesystem-2.15.2-6.el9.noarch
adobe-mappings-cmap-deprecated-20171205-12.el9.noarch
adobe-source-code-pro-fonts-2.030.1.050-12.el9.1.noarch
dejavu-without-mono-fonts-2.37-18.el9.noarch
dejavu-without-fonts-2.37-18.el9.noarch
langpacks-core-font-en-3.0-16.el9.noarch
google-droid-sans-fonts-20200215-11.el9.2.noarch
thai-scalable-fonts-common-0.7.2-5.el9.noarch
redhat-indexhtml-9-4.el9_2.noarch
poppler-data-0.4.9-9.el9.noarch
mobile-broadband-provider-info-20210805-2.el9.noarch
man-pages-overrides-9.0.0.0-1.el9.noarch
hunspell-filesystem-1.7.0-11.el9.x86_64
hplip-common-3.21.2-6.el9.x86_64
gawk-all-langpacks-5.1.0-6.el9.x86_64
```

```
adwaita-cursor-theme-40.1.1-3.el9.noarch
adobe-mappings-pdf-20180407-10.el9.noarch
vim-filesystem-8.2.2637-20.el9_1.noarch
rhsm-icons-6-1.el9.noarch
filesystem-3.16-2.el9.x86_64
urw-base35-fonts-common-20200910-6.el9.noarch
basesystem-11-13.el9.noarch
quota-nls-4.06-6.el9.noarch
publicsuffix-list-dafsa-20210518-3.el9.noarch
pkgconf-m4-1.7.3-10.el9.noarch
popt-1.18-8.el9.x86_64
xz-libs-5.2.5-8.el9_0.x86_64
libxcrypt-4.4.18-3.el9.x86_64
bzip2-libs-1.0.8-8.el9.x86_64
libzstd-1.5.1-2.el9.x86_64
libpng-1.6.37-12.el9.x86_64
libcap-ng-0.8.2-7.el9.x86_64
libicu-67.1-9.el9.x86_64
libunistring-0.9.10-15.el9.x86_64
libgpg-error-1.42-5.el9.x86_64
libseccomp-2.5.2-2.el9.x86_64
lcms2-2.12-3.el9.x86_64
readline-8.1-4.el9.x86_64
libwayland-client-1.21.0-1.el9.x86_64
libwayland-server-1.21.0-1.el9.x86_64
jansson-2.14-1.el9.x86_64
libxkbcommon-1.0.3-4.el9.x86_64
libwayland-egl-1.21.0-1.el9.x86_64
keyutils-libs-1.6.3-1.el9.x86_64
libdhash-0.5.0-53.el9.x86_64
libXau-1.0.9-8.el9.x86_64
--More--
[q]
```

To find out the total number of packages installed on the machine, use the following command:

```
[root@redhat9 ~]# rpm -qa | wc -l
1218
```

Now let's imagine that you want to check whether a package containing the string **setup** is already installed on the machine. In this case, you would use a command such as the following:

```
[root@redhat9 ~]# rpm -qa | grep setup
gnome-initial-setup-40.4-3.el9.x86_64
setup-2.13.7-10.el9.noarch
python3-setuptools-wheel-53.0.0-12.el9_4.1.noarch
python3-setuptools-53.0.0-12.el9_4.1.noarch
cryptsetup-libs-2.6.0-3.el9.x86_64
cryptsetup-2.6.0-3.el9.x86_64
ibus-setup-1.5.25-5.el9.noarch
```

To find out the details of the **setup-2.13.7-10.el9.noarch** package, enter the following command:

```
[root@redhat9 ~]# rpm -qi setup
Name: setup
Version : 2.13.7
Release: 10.el9
Architecture: noarch
Install Date: Wed 25 Sep 2024 11:52:00 AM CEST
Group : System Environment/Base
Size : 725932
License : Public Domain
Signature : RSA/SHA256, Wed 14 Feb 2024 11:15:37 AM CET, Key ID 199e2f91fd431d51
Source RPM : setup-2.13.7-10.el9.src.rpm
Build Date: Wed 07 Feb 2024 09:44:23 AM CET
Build Host : x86-64-01.build.eng.rdu2.redhat.com
Packager : Red Hat, Inc <http://bugzilla.redhat.com/bugzilla>
Vendor: Red Hat, Inc.
```

URL: <https://pagure.io/setup/>

Summary : A set of system configuration and setup files

Description :

The setup package contains a set of important system configuration and setup files, such as passwd, group, and profile.

To list all the files installed by the setup package, use the following command:

```
[root@redhat9 ~]# rpm -ql setup
/etc/aliases
/etc/bashrc
/etc/csh.cshrc
/etc/csh.login
/etc/dnf/protected.d/setup.conf
/etc/environment
/etc/ethertypes
/etc/exports
/etc/filesystems
/etc/fstab
/etc/group
/etc/gshadow
/etc/host.conf
/etc/hosts
/etc/inputrc
/etc/motd
/etc/motd.d
/etc/networks
/etc/passwd
/etc/printcap
/etc/profile
/etc/profile.d
/etc/profile.d/csh.local
/etc/profile.d/lang.csh
/etc/profile.d/lang.sh
```

```
/etc/profile.d/sh.local
/etc/protocols
/etc/services
/etc/shadow
/etc/shells
/etc/subgid
/etc/subuid
/run/motd
/run/motd.d
/usr/lib/motd
/usr/lib/motd.d
/usr/lib/tmpfiles.d/setup.conf
/usr/share/doc/setup
/usr/share/doc/setup/uidgid
/usr/share/licenses/setup
/usr/share/licenses/setup/COPYING
```

Conversely, if you know the name of a file and you want to know which package installed it, use the following command:

```
[root@redhat9 ~]# rpm -qf /etc/exports
setup-2.13.7-10.el9.noarch
```

To display only the configuration files installed by the package, use the **-qc** switches:

```
[root@redhat9 ~]# rpm -qc setup
/etc/aliases
/etc/bashrc
/etc/csh.cshrc
/etc/csh.login
/etc/environment
/etc/ethertypes
/etc/exports
/etc/filesystems
/etc/fstab
```

```
/etc/group
/etc/gshadow
/etc/host.conf
/etc/hosts
/etc/inputrc
/etc/motd
/etc/networks
/etc/passwd
/etc/printcap
/etc/profile
/etc/profile.d/csh.local
/etc/profile.d/sh.local
/etc/protocols
/etc/services
/etc/shadow
/etc/shells
/etc/subgid
/etc/subuid
/run/motd
/usr/lib/motd
```

To display only the documentation files installed by the package, use the **-qd** switches:

```
[root@redhat9 ~]# rpm -qd setup
/usr/share/doc/setup/uidgid
```

To display only installed scripts that run before or after the package is installed, use the **-q** and **-scripts** switches:

```
[root@redhat9 ~]# rpm -q --scripts setup
postinstall scriptlet (using <lua>):
for i, name in ipairs({'passwd', 'shadow', 'group', 'gshadow'}) do
    os.remove('/etc/'..name..'rpmnew')
end
if posix.access('/usr/bin/newaliases', 'x') then
```

```
os.execute('/usr/bin/newaliases >/dev/null')
end
```

To view the package change log, use the **-q** and **-changelog** switches:

```
[root@redhat9 ~]# rpm -q --changelog setup
* Wed Feb 07 2024 Martin Osvald <mosvald@redhat.com> - 2.13.7-10
- csh.login: Add csh.local into foreach loop (RHEL-17226)

* Wed Dec 21 2022 Martin Osvald <mosvald@redhat.com> - 2.13.7-9
- make setup protected package (#2155529)

* Thu Nov 24 2022 Martin Osvald <mosvald@redhat.com> - 2.13.7-8
- Set default umask for non-login shell only if it is set to 0 (#2062601)

* Mon May 09 2022 Martin Osvald <mosvald@redhat.com> - 2.13.7-7
- Move /var/log/lastlog ownership to systemd (#2066753)
- tcsh sets variable p to /usr/sbin from /etc/csh.login (#2066767)
- bashrc: Don't set up VTE-specific PROMPT_COMMAND (#2026892)
```

To find out which files have changed since a package was installed, use the **-qV** switches, for example :

```
# rpm -qV setup
.M....G... g /var/log/lastlog
```

If no files have been modified, the console displays nothing. If files have been modified, the system shows you, file by file, the modifications made according to the table below. For more information, use the man and info commands:

Keyword	Description
5	MD5 Control
S	File size
L	Symbolic link
T	Modification date

Keyword	Description
D	Peripheral
U	Owner changed
G	Group changed
M	Permissions changed
?	Unreadable file
Missing	File removed



Important : An rpm package is a modified cpio file. To be able to extract the contents of a src.rpm and explore the tree structure used to build the package, use the command **rpm2cpio package.src.rpm | cpio -i -make-directories**

LAB #2 - The dnf Command

2.1 - Overview

dnf is an abbreviation of **Dandified YUM**. Historically, RHEL has used **Yellow dog Updater, Modified (Yum)** as a package management utility. In RHEL 9, the yum command has been replaced by the **dnf-3** command:

```
[root@redhat9 ~]# ls -l /usr/bin/yum
lrwxrwxrwx. 1 root root 5 Oct 26 2023 /usr/bin/yum -> dnf-3
[root@redhat9 ~]# ls -l /usr/bin/dnf
lrwxrwxrwx. 1 root root 5 Oct 26 2023 /usr/bin/dnf -> dnf-3
[root@redhat9 ~]# ls -l /usr/bin/dnf-3
-rwxr-xr-x. 1 root root 2094 Oct 26 2023 /usr/bin/dnf-3
```

The dnf command provides the following improvements over the **yum** command:

- faster dependency resolution using less memory,

- operation in Python 2 and Python 3 environments.

Note that :

- using the dnf command is similar to using the **yum** command,
- dnf and yum commands can coexist on the same system.

Using the **dnf** alias of the dnf-3 command takes the following form:

```
# dnf <switches> <command> <package(s)> [Enter]
```

The switches and commands for dnf are:

```
[root@redhat9 ~]# dnf --help
Updating Subscription Management repositories.
usage: dnf [options] COMMAND
```

List of Main Commands:

alias	List or create command aliases
autoremove	remove all unneeded packages that were originally installed as dependencies
check	check for problems in the packagedb
check-update	check for available package upgrades
clean	remove cached data
deplist	[deprecated, use repoquery --deplist] List package's dependencies and what packages
provide them	
distro-sync	synchronize installed packages to the latest available versions
downgrade	Downgrade a package
group	display, or use, the groups information
help	display a helpful usage message
history	display, or use, the transaction history
info	display details about a package or group of packages
install	install a package or packages on your system
list	list a package or groups of packages

makecache	generate the metadata cache
mark	mark or unmark installed packages as installed by user.
module	Interact with Modules.
provides	find what package provides the given value
reinstall	reinstall a package
remove	remove a package or packages from your system
repolist	display the configured software repositories
repoquery	search for packages matching keyword
repository-packages	run commands on top of all packages in given repository
search	search package details for the given string
shell	run an interactive DNF shell
swap	run an interactive DNF mod for remove and install one spec
updateinfo	display advisories about packages
upgrade	upgrade a package or packages on your system
upgrade-minimal	upgrade, but only 'newest' package match which fixes a problem that affects your system

List of Plugin Commands:

builddep	Install build dependencies for package or spec file
changelog	Show changelog data of packages
config-manager	manage dnf configuration options and repositories
copr	Interact with Copr repositories.
debug-dump	dump information about installed rpm packages to file
debug-restore	restore packages recorded in debug-dump file
debuginfo-install	install debuginfo packages
download	Download package to current directory
groups-manager	create and edit groups metadata file
kpatch	Toggles automatic installation of kpatch-patch packages
needs-restarting	determine updated binaries that need restarting
offline-distrosync	Prepare offline distrosync of the system
offline-upgrade	Prepare offline upgrade of the system
playground	Interact with Playground repository.
repoclosure	Display a list of unresolved dependencies for repositories
repodiff	List differences between two sets of repositories

```
repograph          Output a full package dependency graph in dot format
repomanage         Manage a directory of rpm packages
reposync           download all packages from remote repo
system-upgrade     Prepare system for upgrade to a new release
uploadprofile      Upload combined profile to Satellite server (list of installed RPMs, enabled
repositories and modules)
```

General DNF options:

```
-c [config file], --config [config file]
                        config file location
-q, --quiet            quiet operation
-v, --verbose          verbose operation
--version              show DNF version and exit
--installroot [path]  set install root
--nodocs               do not install documentations
--noplugins            disable all plugins
--enableplugin [plugin]
                        enable plugins by name
--disableplugin [plugin]
                        disable plugins by name
--releasever RELEASEVER
                        override the value of $releasever in config and repo files
--setopt SETOPTS      set arbitrary config and repo options
--skip-broken          resolve depsolve problems by skipping packages
-h, --help, --help-cmd
                        show command help
--allowerasing         allow erasing of installed packages to resolve dependencies
-b, --best             try the best available package versions in transactions.
--nobest              do not limit the transaction to the best candidate
-C, --cacheonly        run entirely from system cache, don't update cache
-R [minutes], --randomwait [minutes]
                        maximum command wait time
-d [debug level], --debuglevel [debug level]
                        debugging output level
```



```
--downloadonly      only download packages
--comment COMMENT   add a comment to transaction
--bugfix            Include bugfix relevant packages, in updates
--enhancement       Include enhancement relevant packages, in updates
--newpackage        Include newpackage relevant packages, in updates
--security          Include security relevant packages, in updates
--advisory ADVISORY, --advisories ADVISORY
                   Include packages needed to fix the given advisory, in updates
--bz BUGZILLA, --bzs BUGZILLA
                   Include packages needed to fix the given BZ, in updates
--cve CVES, --cves CVES
                   Include packages needed to fix the given CVE, in updates
--sec-severity {Critical,Important,Moderate,Low}, --secseverity {Critical,Important,Moderate,Low}
                   Include security relevant packages matching the severity, in updates
--forcearch ARCH    Force the use of an architecture
```

2.2 - Configuration

The main configuration of dnf is performed by editing the `/etc/dnf/dnf.conf` file:

```
[root@redhat9 ~]# cat /etc/dnf/dnf.conf
[main]
gpgcheck=1
installonly_limit=3
clean_requirements_on_remove=True
best=True
skip_if_unavailable=False
```

The `/etc/dnf` directory itself contains directories:

```
[root@redhat9 ~]# ls -l /etc/dnf
total 4
drwxr-xr-x. 2 root root 6 Oct 26 2023 aliases.d
```

```
-rw-r--r--. 1 root root 108 Sep 9 2022 dnf.conf
drwxr-xr-x. 2 root root 6 Oct 26 2023 modules.d
drwxr-xr-x. 2 root root 6 Oct 26 2023 modules.defaults.d
drwxr-xr-x. 3 root root 142 Sep 25 12:00 plugins
drwxr-xr-x. 2 root root 173 Sep 25 12:05 protected.d
drwxr-xr-x. 2 root root 6 Oct 26 2023 vars
```

2.3 - Repositories



Important : A repository is a place to store ready-to-install binary packages. A repository can be the distribution installation DVD, a folder on hard disk or remote servers accessible via the Internet.

Package repositories are specified in a *by-repository* file stored in the **/etc/yum.repos.d** directory:

```
[root@redhat9 ~]# ls /etc/yum.repos.d/
epel-cisco-openh264.repo epel-next.repo epel-next-testing.repo epel.repo epel-testing.repo redhat.repo
```

For example:

```
[root@redhat9 ~]# more /etc/yum.repos.d/redhat.repo
#
# Certificate-Based Repositories
# Managed by (rhsm) subscription-manager
#
# This file is auto-generated. Changes made here will be over-written. ***
# Use 'subscription-manager repo-override --help' if you wish to make changes. ***
#
# If this file is empty and this system is subscribed consider
# a 'yum repolist' to refresh available repos
```

#

[rhel-9-for-x86_64-highavailability-eus-rpms]

name = Red Hat Enterprise Linux 9 for x86_64 - High Availability - Extended Update Support (RPMs)

baseurl = https://cdn.redhat.com/content/eus/rhel9/\$releasever/x86_64/highavailability/os

enabled = 0

gpgcheck = 1

gpgkey = file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release

sslverify = 1

sslcacert = /etc/rhsm/ca/redhat-uep.pem

sslclientkey = /etc/pki/entitlement/9005910890346536267-key.pem

sslclientcert = /etc/pki/entitlement/9005910890346536267.pem

sslverifystatus = 1

metadata_expire = 86400

enabled_metadata = 0

[rhel-9-for-x86_64-resilientstorage-eus-rpms]

name = Red Hat Enterprise Linux 9 for x86_64 - Resilient Storage - Extended Update Support (RPMs)

baseurl = https://cdn.redhat.com/content/eus/rhel9/\$releasever/x86_64/resilientstorage/os

enabled = 0

gpgcheck = 1

gpgkey = file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release

sslverify = 1

sslcacert = /etc/rhsm/ca/redhat-uep.pem

sslclientkey = /etc/pki/entitlement/9005910890346536267-key.pem

sslclientcert = /etc/pki/entitlement/9005910890346536267.pem

sslverifystatus = 1

metadata_expire = 86400

enabled_metadata = 0

[rhel-atomic-7-cdk-3.6-source-rpms]

name = Red Hat Container Development Kit 3.6 /(Source RPMs)

baseurl = https://cdn.redhat.com/content/dist/rhel/atomic/7/7Server/\$basearch/cdk/3.6/source/SRPMs

enabled = 0

```

gpgcheck = 1
gpgkey = file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release
sslverify = 1
sslcacert = /etc/rhsm/ca/redhat-uep.pem
sslclientkey = /etc/pki/entitlement/9005910890346536267-key.pem
sslclientcert = /etc/pki/entitlement/9005910890346536267.pem
sslverifystatus = 1
metadata_expire = 86400
enabled_metadata = 0

[gitops-1.12-for-rhel-9-x86_64-rpms]
name = Red Hat OpenShift GitOps 1.12 for RHEL 9 x86_64 (RPMs)
--More-- (1%)

```

To view all repositories, activated or not, using dnf, the **repolist all** command should be used:

```

[root@redhat9 ~]# dnf repolist all
Updating Subscription Management repositories.
repo id                                     repo name
status
amq-clients-3-for-rhel-9-x86_64-debug-rpms  Red Hat AMQ Clients 3 for RHEL 9
x86_64 (Debug RPMs)                        disabled
amq-clients-3-for-rhel-9-x86_64-rpms       Red Hat AMQ Clients 3 for RHEL 9
x86_64 (RPMs)                              disabled
amq-clients-3-for-rhel-9-x86_64-source-rpms Red Hat AMQ Clients 3 for RHEL 9
x86_64 (Source RPMs)                       disabled
amq-interconnect-textonly-1-for-middleware-rpms Red Hat AMQ Interconnect Text-Only
Advisories                                 disabled
amq-textonly-1-for-middleware-rpms         Red Hat JBoss AMQ Text-Only
Advisories                                 disabled
ansible-automation-platform-2.2-for-rhel-9-x86_64-debug-rpms Red Hat Ansible Automation Platform
2.2 for RHEL 9 x86_64 (Debug RPMs)         disabled
ansible-automation-platform-2.2-for-rhel-9-x86_64-rpms       Red Hat Ansible Automation Platform
2.2 for RHEL 9 x86_64 (RPMs)              disabled

```

ansible-automation-platform-2.2-for-rhel-9-x86_64-source-rpms 2.2 for RHEL 9 x86_64 (Source RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.3-for-rhel-9-x86_64-debug-rpms 2.3 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.3-for-rhel-9-x86_64-rpms 2.3 for RHEL 9 x86_64 (RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.3-for-rhel-9-x86_64-source-rpms 2.3 for RHEL 9 x86_64 (Source RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.4-for-rhel-9-x86_64-debug-rpms 2.4 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.4-for-rhel-9-x86_64-rpms 2.4 for RHEL 9 x86_64 (RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.4-for-rhel-9-x86_64-source-rpms 2.4 for RHEL 9 x86_64 (Source RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.5-for-rhel-9-x86_64-debug-rpms 2.5 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.5-for-rhel-9-x86_64-rpms 2.5 for RHEL 9 x86_64 (RPMs)	Red Hat Ansible Automation Platform disabled
ansible-automation-platform-2.5-for-rhel-9-x86_64-source-rpms 2.5 for RHEL 9 x86_64 (Source RPMs)	Red Hat Ansible Automation Platform disabled
application-interconnect-1-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat Application Interconnect disabled
application-interconnect-1-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat Application Interconnect disabled
application-interconnect-1-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat Application Interconnect disabled
cert-manager-1.10-for-rhel-9-x86_64-debug-rpms OpenShift 1.10 for RHEL 9 x86_64 (Debug RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.10-for-rhel-9-x86_64-rpms OpenShift 1.10 for RHEL 9 x86_64 (RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.10-for-rhel-9-x86_64-source-rpms OpenShift 1.10 for RHEL 9 x86_64 (Source RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.11-for-rhel-9-x86_64-debug-rpms OpenShift 1.11 for RHEL 9 x86_64 (Debug RPMs)	Cert Manager support for Red Hat disabled

cert-manager-1.11-for-rhel-9-x86_64-rpms OpenShift 1.11 for RHEL 9 x86_64 (RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.11-for-rhel-9-x86_64-source-rpms OpenShift 1.11 for RHEL 9 x86_64 (Source RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.12-for-rhel-9-x86_64-debug-rpms OpenShift 1.12 for RHEL 9 x86_64 (Debug RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.12-for-rhel-9-x86_64-rpms OpenShift 1.12 for RHEL 9 x86_64 (RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.12-for-rhel-9-x86_64-source-rpms OpenShift 1.12 for RHEL 9 x86_64 (Source RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.13-for-rhel-9-x86_64-debug-rpms OpenShift 1.13 for RHEL 9 x86_64 (Debug RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.13-for-rhel-9-x86_64-rpms OpenShift 1.13 for RHEL 9 x86_64 (RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.13-for-rhel-9-x86_64-source-rpms OpenShift 1.13 for RHEL 9 x86_64 (Source RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.14-for-rhel-9-x86_64-debug-rpms OpenShift 1.14 for RHEL 9 x86_64 (Debug RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.14-for-rhel-9-x86_64-rpms OpenShift 1.14 for RHEL 9 x86_64 (RPMs)	Cert Manager support for Red Hat disabled
cert-manager-1.14-for-rhel-9-x86_64-source-rpms OpenShift 1.14 for RHEL 9 x86_64 (Source RPMs)	Cert Manager support for Red Hat disabled
cnv-4.13-for-rhel-9-x86_64-debug-rpms Virtualization 4.13 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Container Native disabled
cnv-4.13-for-rhel-9-x86_64-rpms Virtualization 4.13 for RHEL 9 x86_64 (RPMs)	Red Hat Container Native disabled
cnv-4.13-for-rhel-9-x86_64-source-rpms Virtualization 4.13 for RHEL 9 x86_64 (Source RPMs)	Red Hat Container Native disabled
cnv-4.14-for-rhel-9-x86_64-debug-rpms Virtualization 4.14 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Container Native disabled
cnv-4.14-for-rhel-9-x86_64-rpms Virtualization 4.14 for RHEL 9 x86_64 (RPMs)	Red Hat Container Native disabled
cnv-4.14-for-rhel-9-x86_64-source-rpms Virtualization 4.14 for RHEL 9 x86_64 (Source RPMs)	Red Hat Container Native disabled

cnv-4.15-for-rhel-9-x86_64-debug-rpms Virtualization 4.15 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Container Native disabled
cnv-4.15-for-rhel-9-x86_64-rpms Virtualization 4.15 for RHEL 9 x86_64 (RPMs)	Red Hat Container Native disabled
cnv-4.15-for-rhel-9-x86_64-source-rpms Virtualization 4.15 for RHEL 9 x86_64 (Source RPMs)	Red Hat Container Native disabled
cnv-4.16-for-rhel-9-x86_64-debug-rpms Virtualization 4.16 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Container Native disabled
cnv-4.16-for-rhel-9-x86_64-rpms Virtualization 4.16 for RHEL 9 x86_64 (RPMs)	Red Hat Container Native disabled
cnv-4.16-for-rhel-9-x86_64-source-rpms Virtualization 4.16 for RHEL 9 x86_64 (Source RPMs)	Red Hat Container Native disabled
cnv-4.17-for-rhel-9-x86_64-debug-rpms Virtualization 4.17 for RHEL 9 x86_64 (Debug RPMs)	Red Hat Container Native disabled
cnv-4.17-for-rhel-9-x86_64-rpms Virtualization 4.17 for RHEL 9 x86_64 (RPMs)	Red Hat Container Native disabled
cnv-4.17-for-rhel-9-x86_64-source-rpms Virtualization 4.17 for RHEL 9 x86_64 (Source RPMs)	Red Hat Container Native disabled
codeready-builder-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat CodeReady Linux Builder for disabled
codeready-builder-for-rhel-9-x86_64-eus-debug-rpms RHEL 9 x86_64 - Extended Update Support (Debug RPMs)	Red Hat CodeReady Linux Builder for disabled
codeready-builder-for-rhel-9-x86_64-eus-rpms RHEL 9 x86_64 - Extended Update Support (RPMs)	Red Hat CodeReady Linux Builder for disabled
codeready-builder-for-rhel-9-x86_64-eus-source-rpms RHEL 9 x86_64 - Extended Update Support (Source RPMs)	Red Hat CodeReady Linux Builder for disabled
codeready-builder-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat CodeReady Linux Builder for enabled
codeready-builder-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat CodeReady Linux Builder for disabled
discovery-1-for-rhel-9-x86_64-debug-rpms x86_64 (Debug RPMs)	Red Hat Discovery 1 for RHEL 9 disabled
discovery-1-for-rhel-9-x86_64-rpms x86_64 (RPMs)	Red Hat Discovery 1 for RHEL 9 disabled

discovery-1-for-rhel-9-x86_64-source-rpms	Red Hat Discovery 1 for RHEL 9
x86_64 (Source RPMs)	disabled
epel	Extra Packages for Enterprise Linux
9 - x86_64	enabled
epel-cisco-openh264	Extra Packages for Enterprise Linux
9 openh264 (From Cisco) - x86_64	enabled
epel-cisco-openh264-debuginfo	Extra Packages for Enterprise Linux
9 openh264 (From Cisco) - x86_64 - Debug	disabled
epel-cisco-openh264-source	Extra Packages for Enterprise Linux
9 openh264 (From Cisco) - x86_64 - Source	disabled
epel-debuginfo	Extra Packages for Enterprise Linux
9 - x86_64 - Debug	disabled
epel-next	Extra Packages for Enterprise Linux
9 - Next - x86_64	enabled
epel-next-debuginfo	Extra Packages for Enterprise Linux
9 - Next - x86_64 - Debug	disabled
epel-next-source	Extra Packages for Enterprise Linux
9 - Next - x86_64 - Source	disabled
epel-next-testing	Extra Packages for Enterprise Linux
9 - Next - Testing - x86_64	disabled
epel-next-testing-debuginfo	Extra Packages for Enterprise Linux
9 - Next - Testing - x86_64 - Debug	disabled
epel-next-testing-source	Extra Packages for Enterprise Linux
9 - Next - Testing - x86_64 - Source	disabled
epel-source	Extra Packages for Enterprise Linux
9 - x86_64 - Source	disabled
epel-testing	Extra Packages for Enterprise Linux
9 - Testing - x86_64	disabled
epel-testing-debuginfo	Extra Packages for Enterprise Linux
9 - Testing - x86_64 - Debug	disabled
epel-testing-source	Extra Packages for Enterprise Linux
9 - Testing - x86_64 - Source	disabled
fast-datapath-for-rhel-9-x86_64-debug-rpms	Fast Datapath for RHEL 9 x86_64
(Debug RPMs)	disabled

fast-datapath-for-rhel-9-x86_64-rpms (RPMs)	Fast Datapath for RHEL 9 x86_64 disabled
fast-datapath-for-rhel-9-x86_64-source-rpms (Source RPMs)	Fast Datapath for RHEL 9 x86_64 disabled
fsw-textonly-1-for-middleware-rpms Text-Only Advisories	Red Hat JBoss Fuse Service Works disabled
gitops-1.12-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift GitOps 1.12 for disabled
gitops-1.12-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat OpenShift GitOps 1.12 for disabled
gitops-1.12-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift GitOps 1.12 for disabled
gitops-1.13-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift GitOps 1.13 for disabled
gitops-1.13-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat OpenShift GitOps 1.13 for disabled
gitops-1.13-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift GitOps 1.13 for disabled
gitops-1.14-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift GitOps 1.14 for disabled
gitops-1.14-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat OpenShift GitOps 1.14 for disabled
gitops-1.14-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift GitOps 1.14 for disabled
jb-coreservices-textonly-1-for-middleware-rhui-rpms Only Advisories from RHUI	Red Hat JBoss Core Services Text- disabled
jb-coreservices-textonly-1-for-middleware-rpms Only Advisories	Red Hat JBoss Core Services Text- disabled
jb-datagrid-8.4-for-rhel-9-x86_64-debug-rpms 9) (Debug RPMs)	Red Hat JBoss Data Grid 8.4 (RHEL disabled
jb-datagrid-8.4-for-rhel-9-x86_64-rpms 9) (RPMs)	Red Hat JBoss Data Grid 8.4 (RHEL disabled
jb-datagrid-8.4-for-rhel-9-x86_64-source-rpms 9) (Source RPMs)	Red Hat JBoss Data Grid 8.4 (RHEL disabled

jb-datagrid-textonly-1-for-middleware-rpms Advisories	Red Hat JBoss Data Grid Text-Only disabled
jb-eap-7.4-for-rhel-9-x86_64-debug-rpms Platform 7.4 (RHEL 9) (Debug RPMs)	JBoss Enterprise Application disabled
jb-eap-7.4-for-rhel-9-x86_64-rpms Platform 7.4 (RHEL 9) (RPMs)	JBoss Enterprise Application disabled
jb-eap-7.4-for-rhel-9-x86_64-source-rpms Platform 7.4 (RHEL 9) (Source RPMs)	JBoss Enterprise Application disabled
jb-eap-8.0-for-rhel-9-x86_64-debug-rpms Platform 8.0 (RHEL 9 x86_64) (Debug RPMs)	JBoss Enterprise Application disabled
jb-eap-8.0-for-rhel-9-x86_64-rhui-debug-rpms Platform 8.0 (RHEL 9) (Debug RPMs) from RHUI	JBoss Enterprise Application disabled
jb-eap-8.0-for-rhel-9-x86_64-rhui-rpms Platform 8.0 (RHEL 9) (RPMs) from RHUI	JBoss Enterprise Application disabled
jb-eap-8.0-for-rhel-9-x86_64-rhui-source-rpms Platform 8.0 (RHEL 9) (Source RPMs) from RHUI	JBoss Enterprise Application disabled
jb-eap-8.0-for-rhel-9-x86_64-rpms Platform 8.0 (RHEL 9 x86_64) (RPMs)	JBoss Enterprise Application disabled
jb-eap-8.0-for-rhel-9-x86_64-source-rpms Platform 8.0 (RHEL 9 x86_64) (Source RPMs)	JBoss Enterprise Application disabled
jb-eap-textonly-1-for-middleware-rpms Application Platform Text-Only Advisories	Red Hat JBoss Enterprise disabled
jdvd-textonly-1-for-middleware-rpms Text-Only Advisories	Red Hat JBoss Data Virtualization disabled
jon-textonly-1-for-middleware-rpms Text-Only Advisories	Red Hat JBoss Operations Network disabled
jpp-textonly-1-for-middleware-rpms Advisories	Red Hat JBoss Portal Text-Only disabled
kmm-1-for-rhel-9-x86_64-debug-rpms 9 x86_64 (Debug RPMs)	Kernel Module Management 1 for RHEL disabled
kmm-1-for-rhel-9-x86_64-rpms 9 x86_64 (RPMs)	Kernel Module Management 1 for RHEL disabled
kmm-1-for-rhel-9-x86_64-source-rpms 9 x86_64 (Source RPMs)	Kernel Module Management 1 for RHEL disabled

kmm-2-for-rhel-9-x86_64-debug-rpms 9 x86_64 (Debug RPMs)	Kernel Module Management 2 for RHEL disabled
kmm-2-for-rhel-9-x86_64-rpms 9 x86_64 (RPMs)	Kernel Module Management 2 for RHEL disabled
kmm-2-for-rhel-9-x86_64-source-rpms 9 x86_64 (Source RPMs)	Kernel Module Management 2 for RHEL disabled
lvms-4.14-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Logical Volume Manager Storage 4.14 disabled
lvms-4.14-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Logical Volume Manager Storage 4.14 disabled
lvms-4.14-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Logical Volume Manager Storage 4.14 disabled
lvms-4.15-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Logical Volume Manager Storage 4.15 disabled
lvms-4.15-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Logical Volume Manager Storage 4.15 disabled
lvms-4.15-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Logical Volume Manager Storage 4.15 disabled
lvms-4.16-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Logical Volume Manager Storage 4.16 disabled
lvms-4.16-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Logical Volume Manager Storage 4.16 disabled
lvms-4.16-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Logical Volume Manager Storage 4.16 disabled
lvms-4.17-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Logical Volume Manager Storage 4.17 disabled
lvms-4.17-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Logical Volume Manager Storage 4.17 disabled
lvms-4.17-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Logical Volume Manager Storage 4.17 disabled
network-observability-1-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Network Observability (NETOBSERV) 1 disabled
network-observability-1-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Network Observability (NETOBSERV) 1 disabled

network-observability-1-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Network Observability (NETOBSERV) 1 disabled
ocp-tools-4.15-for-rhel-9-x86_64-debug-rpms Services 4.15 (RHEL 9) (x86_64 Debug RPMs)	OpenShift Developer Tools and disabled
ocp-tools-4.15-for-rhel-9-x86_64-rpms Services 4.15 (RHEL 9) (x86_64 RPMs)	OpenShift Developer Tools and disabled
ocp-tools-4.15-for-rhel-9-x86_64-source-rpms Services 4.15 (RHEL 9) (x86_64 Source RPMs)	OpenShift Developer Tools and disabled
ocp-tools-4.16-for-rhel-9-x86_64-debug-rpms Services 4.16 (RHEL 9) (x86_64 Debug RPMs)	OpenShift Developer Tools and disabled
ocp-tools-4.16-for-rhel-9-x86_64-rpms Services 4.16 (RHEL 9) (x86_64 RPMs)	OpenShift Developer Tools and disabled
ocp-tools-4.16-for-rhel-9-x86_64-source-rpms Services 4.16 (RHEL 9) (x86_64 Source RPMs)	OpenShift Developer Tools and disabled
openjdk-textonly-1-for-middleware-rpms disabled	OpenJDK Text-Only Advisories
openliberty-textonly-1-for-middleware-rpms disabled	Open Liberty Text-Only Advisories
openstack-17-tools-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenStack Platform 17 Tools disabled
openstack-17-tools-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat OpenStack Platform 17 Tools disabled
openstack-17-tools-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenStack Platform 17 Tools disabled
openstack-17.1-tools-for-rhel-9-x86_64-debug-rpms Tools for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenStack Platform 17.1 disabled
openstack-17.1-tools-for-rhel-9-x86_64-rpms Tools for RHEL 9 x86_64 (RPMs)	Red Hat OpenStack Platform 17.1 disabled
openstack-17.1-tools-for-rhel-9-x86_64-source-rpms Tools for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenStack Platform 17.1 disabled
osso-1-for-rhel-9-x86_64-debug-rpms RHEL 9 for Red Hat OpenShift (Debug RPMs)	Secondary Scheduler Operator 1 for disabled
osso-1-for-rhel-9-x86_64-files RHEL 9 for Red Hat OpenShift (Files)	Secondary Scheduler Operator 1 for disabled

osso-1-for-rhel-9-x86_64-rpms RHEL 9 for Red Hat OpenShift (RPMs)	Secondary Scheduler Operator 1 for disabled
osso-1-for-rhel-9-x86_64-source-rpms RHEL 9 for Red Hat OpenShift (Source RPMs)	Secondary Scheduler Operator 1 for disabled
quarkus-textonly-1-for-middleware-rpms Advisories	Red Hat build of Quarkus Text-Only disabled
rhbop-textonly-1-for-middleware-rpms Only Advisories	Red Hat Build of OptaPlanner Text-disabled
rhceph-5-tools-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Ceph Storage Tools 5 for disabled
rhceph-5-tools-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Ceph Storage Tools 5 for disabled
rhceph-5-tools-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Ceph Storage Tools 5 for disabled
rhceph-6-tools-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Ceph Storage Tools 6 for disabled
rhceph-6-tools-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Ceph Storage Tools 6 for disabled
rhceph-6-tools-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Ceph Storage Tools 6 for disabled
rhceph-7-tools-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Ceph Storage Tools 7 for disabled
rhceph-7-tools-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Ceph Storage Tools 7 for disabled
rhceph-7-tools-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Ceph Storage Tools 7 for disabled
rhceph-8-tools-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Ceph Storage Tools 8 for disabled
rhceph-8-tools-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Ceph Storage Tools 8 for disabled
rhceph-8-tools-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Ceph Storage Tools 8 for disabled
rhdh-1-for-rhel-9-x86_64-debug-rpms (Debug RPMs)	Red Hat Developer Hub 1 (RHEL 9) disabled

rhdh-1-for-rhel-9-x86_64-rpms (RPMs)	Red Hat Developer Hub 1 (RHEL 9) disabled
rhdh-1-for-rhel-9-x86_64-source-rpms (Source RPMs)	Red Hat Developer Hub 1 (RHEL 9) disabled
rhel-9-for-x86_64-appstream-debug-rpms x86_64 - AppStream (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-e4s-debug-rpms x86_64 - AppStream - Update Services for SAP Solutions (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-e4s-rpms x86_64 - AppStream - Update Services for SAP Solutions (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-e4s-source-rpms x86_64 - AppStream - Update Services for SAP Solutions (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-eus-debug-rpms x86_64 - AppStream - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-eus-rpms x86_64 - AppStream - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-eus-source-rpms x86_64 - AppStream - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-appstream-rpms x86_64 - AppStream (RPMs)	Red Hat Enterprise Linux 9 for enabled
rhel-9-for-x86_64-appstream-source-rpms x86_64 - AppStream (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-debug-rpms x86_64 - BaseOS (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-e4s-debug-rpms x86_64 - BaseOS - Update Services for SAP Solutions (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-e4s-rpms x86_64 - BaseOS - Update Services for SAP Solutions (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-e4s-source-rpms x86_64 - BaseOS - Update Services for SAP Solutions (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-eus-debug-rpms x86_64 - BaseOS - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-eus-rpms x86_64 - BaseOS - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled

rhel-9-for-x86_64-baseos-eus-source-rpms x86_64 - BaseOS - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-baseos-rpms x86_64 - BaseOS (RPMs)	Red Hat Enterprise Linux 9 for enabled
rhel-9-for-x86_64-baseos-source-rpms x86_64 - BaseOS (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-debug-rpms x86_64 - High Availability (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-e4s-debug-rpms x86_64 - High Availability - Update Services for SAP Solutions (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-e4s-rpms x86_64 - High Availability - Update Services for SAP Solutions (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-e4s-source-rpms x86_64 - High Availability - Update Services for SAP Solutions (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-eus-debug-rpms x86_64 - High Availability - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-eus-rpms x86_64 - High Availability - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-eus-source-rpms x86_64 - High Availability - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-rpms x86_64 - High Availability (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-highavailability-source-rpms x86_64 - High Availability (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-resilientstorage-debug-rpms x86_64 - Resilient Storage (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-resilientstorage-eus-debug-rpms x86_64 - Resilient Storage - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-resilientstorage-eus-rpms x86_64 - Resilient Storage - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-resilientstorage-eus-source-rpms x86_64 - Resilient Storage - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-resilientstorage-rpms x86_64 - Resilient Storage (RPMs)	Red Hat Enterprise Linux 9 for disabled

rhel-9-for-x86_64-resilientstorage-source-rpms x86_64 - Resilient Storage (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-rt-debug-rpms x86_64 - Real Time (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-rt-rpms x86_64 - Real Time (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-rt-source-rpms x86_64 - Real Time (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-debug-rpms x86_64 - SAP NetWeaver (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-e4s-debug-rpms x86_64 - SAP NetWeaver - Update Services for SAP Solutions (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-e4s-rpms x86_64 - SAP NetWeaver - Update Services for SAP Solutions (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-e4s-source-rpms x86_64 - SAP NetWeaver - Update Services for SAP Solutions (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-eus-debug-rpms x86_64 - SAP NetWeaver - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-eus-rpms x86_64 - SAP NetWeaver - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-eus-source-rpms x86_64 - SAP NetWeaver - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-rpms x86_64 - SAP NetWeaver (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-netweaver-source-rpms x86_64 - SAP NetWeaver (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-debug-rpms x86_64 - SAP Solutions (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-e4s-debug-rpms x86_64 - SAP Solutions - Update Services for SAP Solutions (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-e4s-rpms x86_64 - SAP Solutions - Update Services for SAP Solutions (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-e4s-source-rpms x86_64 - SAP Solutions - Update Services for SAP Solutions (Source RPMs)	Red Hat Enterprise Linux 9 for disabled

rhel-9-for-x86_64-sap-solutions-eus-debug-rpms x86_64 - SAP Solutions - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-eus-rpms x86_64 - SAP Solutions - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-eus-source-rpms x86_64 - SAP Solutions - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-rpms x86_64 - SAP Solutions (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-sap-solutions-source-rpms x86_64 - SAP Solutions (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-supplementary-debug-rpms x86_64 - Supplementary (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-supplementary-eus-debug-rpms x86_64 - Supplementary - Extended Update Support (Debug RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-supplementary-eus-rpms x86_64 - Supplementary - Extended Update Support (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-supplementary-eus-source-rpms x86_64 - Supplementary - Extended Update Support (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-supplementary-rpms x86_64 - Supplementary (RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-9-for-x86_64-supplementary-source-rpms x86_64 - Supplementary (Source RPMs)	Red Hat Enterprise Linux 9 for disabled
rhel-atomic-7-cdk-2.3-debug-rpms 2.3 /(Debug RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-2.3-rpms 2.3 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-2.3-source-rpms 2.3 /(Source RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.10-rpms 3.10 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.11-rpms 3.11 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.12-rpms 3.12 /(RPMs)	Red Hat Container Development Kit disabled

rhel-atomic-7-cdk-3.13-rpms 3.13 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.14-rpms 3.14 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.15-rpms 3.15 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.16-rpms 3.16 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.17-rpms 3.17 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.3-debug-rpms 3.3 /(Debug RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.3-rpms 3.3 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.3-source-rpms 3.3 /(Source RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.4-debug-rpms 3.4 /(Debug RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.4-rpms 3.4 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.4-source-rpms 3.4 /(Source RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.5-debug-rpms 3.5 /(Debug RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.5-rpms 3.5 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.5-source-rpms 3.5 /(Source RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.6-debug-rpms 3.6 /(Debug RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.6-rpms 3.6 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.6-source-rpms 3.6 /(Source RPMs)	Red Hat Container Development Kit disabled

rhel-atomic-7-cdk-3.7-rpms 3.7 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.8-rpms 3.8 /(RPMs)	Red Hat Container Development Kit disabled
rhel-atomic-7-cdk-3.9-rpms 3.9 /(RPMs)	Red Hat Container Development Kit disabled
rhelai-1.1-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat Enterprise Linux AI (1.1) disabled
rhelai-1.1-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat Enterprise Linux AI (1.1) disabled
rhelai-1.1-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat Enterprise Linux AI (1.1) disabled
rhelai-1.2-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat Enterprise Linux AI (1.2) disabled
rhelai-1.2-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat Enterprise Linux AI (1.2) disabled
rhelai-1.2-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat Enterprise Linux AI (1.2) disabled
rhelai-1.2-gaudi-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 - Gaudi (Debug RPMs)	Red Hat Enterprise Linux AI (1.2) disabled
rhelai-1.2-gaudi-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 - Gaudi (RPMs)	Red Hat Enterprise Linux AI (1.2) disabled
rhelai-1.2-gaudi-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 - Gaudi (Source RPMs)	Red Hat Enterprise Linux AI (1.2) disabled
rhocp-4.12-for-rhel-9-x86_64-debug-rpms Platform 4.12 for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift Container disabled
rhocp-4.12-for-rhel-9-x86_64-rpms Platform 4.12 for RHEL 9 x86_64 (RPMs)	Red Hat OpenShift Container disabled
rhocp-4.12-for-rhel-9-x86_64-source-rpms Platform 4.12 for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift Container disabled
rhocp-4.13-for-rhel-9-x86_64-debug-rpms Platform 4.13 for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift Container disabled
rhocp-4.13-for-rhel-9-x86_64-rpms Platform 4.13 for RHEL 9 x86_64 (RPMs)	Red Hat OpenShift Container disabled

rhocp-4.13-for-rhel-9-x86_64-source-rpms Platform 4.13 for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift Container disabled
rhocp-4.14-for-rhel-9-x86_64-debug-rpms Platform 4.14 for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift Container disabled
rhocp-4.14-for-rhel-9-x86_64-rpms Platform 4.14 for RHEL 9 x86_64 (RPMs)	Red Hat OpenShift Container disabled
rhocp-4.14-for-rhel-9-x86_64-source-rpms Platform 4.14 for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift Container disabled
rhocp-4.15-for-rhel-9-x86_64-debug-rpms Platform 4.15 for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift Container disabled
rhocp-4.15-for-rhel-9-x86_64-rpms Platform 4.15 for RHEL 9 x86_64 (RPMs)	Red Hat OpenShift Container disabled
rhocp-4.15-for-rhel-9-x86_64-source-rpms Platform 4.15 for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift Container disabled
rhocp-4.16-for-rhel-9-x86_64-debug-rpms Platform 4.16 for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift Container disabled
rhocp-4.16-for-rhel-9-x86_64-rpms Platform 4.16 for RHEL 9 x86_64 (RPMs)	Red Hat OpenShift Container disabled
rhocp-4.16-for-rhel-9-x86_64-source-rpms Platform 4.16 for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift Container disabled
rhocp-4.17-for-rhel-9-x86_64-debug-rpms Platform 4.17 for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenShift Container disabled
rhocp-4.17-for-rhel-9-x86_64-rpms Platform 4.17 for RHEL 9 x86_64 (RPMs)	Red Hat OpenShift Container disabled
rhocp-4.17-for-rhel-9-x86_64-source-rpms Platform 4.17 for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenShift Container disabled
rhocp-ironic-4.12-for-rhel-9-x86_64-debug-rpms OpenShift Container Platform 4.12 for RHEL 9 x86_64 (Debug RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.12-for-rhel-9-x86_64-rpms OpenShift Container Platform 4.12 for RHEL 9 x86_64 (RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.12-for-rhel-9-x86_64-source-rpms OpenShift Container Platform 4.12 for RHEL 9 x86_64 (Source RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.13-for-rhel-9-x86_64-debug-rpms OpenShift Container Platform 4.13 for RHEL 9 x86_64 (Debug RPMs)	Ironic content for Red Hat disabled

rhocp-ironic-4.13-for-rhel-9-x86_64-rpms OpenShift Container Platform 4.13 for RHEL 9 x86_64 (RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.13-for-rhel-9-x86_64-source-rpms OpenShift Container Platform 4.13 for RHEL 9 x86_64 (Source RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.14-for-rhel-9-x86_64-debug-rpms OpenShift Container Platform 4.14 for RHEL 9 x86_64 (Debug RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.14-for-rhel-9-x86_64-rpms OpenShift Container Platform 4.14 for RHEL 9 x86_64 (RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.14-for-rhel-9-x86_64-source-rpms OpenShift Container Platform 4.14 for RHEL 9 x86_64 (Source RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.15-for-rhel-9-x86_64-debug-rpms OpenShift Container Platform 4.15 for RHEL 9 x86_64 (Debug RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.15-for-rhel-9-x86_64-rpms OpenShift Container Platform 4.15 for RHEL 9 x86_64 (RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.15-for-rhel-9-x86_64-source-rpms OpenShift Container Platform 4.15 for RHEL 9 x86_64 (Source RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.16-for-rhel-9-x86_64-debug-rpms OpenShift Container Platform 4.16 for RHEL 9 x86_64 (Debug RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.16-for-rhel-9-x86_64-rpms OpenShift Container Platform 4.16 for RHEL 9 x86_64 (RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.16-for-rhel-9-x86_64-source-rpms OpenShift Container Platform 4.16 for RHEL 9 x86_64 (Source RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.17-for-rhel-9-x86_64-debug-rpms OpenShift Container Platform 4.17 for RHEL 9 x86_64 (Debug RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.17-for-rhel-9-x86_64-rpms OpenShift Container Platform 4.17 for RHEL 9 x86_64 (RPMs)	Ironic content for Red Hat disabled
rhocp-ironic-4.17-for-rhel-9-x86_64-source-rpms OpenShift Container Platform 4.17 for RHEL 9 x86_64 (Source RPMs)	Ironic content for Red Hat disabled
rhosds-textonly-3-for-middleware-rpms Container Advisories	Red Hat OpenShift Dev Spaces 3 disabled
rhose-textonly-1-for-middleware-rpms Advisories	Red Hat Middleware Container disabled
rhoso-tools-18-beta-for-rhel-9-x86_64-debug-rpms OpenShift 18 Tools Beta for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenStack Services on disabled

rhoso-tools-18-beta-for-rhel-9-x86_64-rpms OpenShift 18 Tools Beta for RHEL 9 x86_64 (RPMs)	Red Hat OpenStack Services on disabled
rhoso-tools-18-beta-for-rhel-9-x86_64-source-rpms OpenShift 18 Tools Beta for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenStack Services on disabled
rhoso-tools-18-for-rhel-9-x86_64-debug-rpms OpenShift 18 Tools for RHEL 9 x86_64 (Debug RPMs)	Red Hat OpenStack Services on disabled
rhoso-tools-18-for-rhel-9-x86_64-rpms OpenShift 18 Tools for RHEL 9 x86_64 (RPMs)	Red Hat OpenStack Services on disabled
rhoso-tools-18-for-rhel-9-x86_64-source-rpms OpenShift 18 Tools for RHEL 9 x86_64 (Source RPMs)	Red Hat OpenStack Services on disabled
rhpm-1-for-rhel-9-x86_64-textonly-debug-rpms OpenShift (for RHEL 9 x86_64) (Debug RPMs)	Power monitoring for Red Hat disabled
rhpm-1-for-rhel-9-x86_64-textonly-rpms OpenShift (for RHEL 9 x86_64) (RPMs)	Power monitoring for Red Hat disabled
rhpm-1-for-rhel-9-x86_64-textonly-source-rpms OpenShift (for RHEL 9 x86_64) (Source RPMs)	Power monitoring for Red Hat disabled
rhsi-textonly-1-for-middleware-rpms Only Advisories	Red Hat Service Interconnect Text-disabled
rhv-4-tools-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Virtualization 4 Tools for disabled
rhv-4-tools-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Virtualization 4 Tools for disabled
rhv-4-tools-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Virtualization 4 Tools for disabled
rodo-1-for-rhel-9-x86_64-debug-rpms (RODO0) 1 for RHEL 9 x86_64 (Debug RPMs)	Run Once Duration Override Operator disabled
rodo-1-for-rhel-9-x86_64-rpms (RODO0) 1 for RHEL 9 x86_64 (RPMs)	Run Once Duration Override Operator disabled
rodo-1-for-rhel-9-x86_64-source-rpms (RODO0) 1 for RHEL 9 x86_64 (Source RPMs)	Run Once Duration Override Operator disabled
satellite-client-6-for-rhel-9-x86_64-debug-rpms 9 x86_64 (Debug RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-e4s-debug-rpms 9 x86_64 - Update Services for SAP Solutions (Debug RPMs)	Red Hat Satellite Client 6 for RHEL disabled

satellite-client-6-for-rhel-9-x86_64-e4s-rpms 9 x86_64 - Update Services for SAP Solutions (RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-e4s-source-rpms 9 x86_64 - Update Services for SAP Solutions (Source RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-eus-debug-rpms 9 x86_64 - Extended Update Support (Debug RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-eus-rpms 9 x86_64 - Extended Update Support (RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-eus-source-rpms 9 x86_64 - Extended Update Support (Source RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-rpms 9 x86_64 (RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-client-6-for-rhel-9-x86_64-source-rpms 9 x86_64 (Source RPMs)	Red Hat Satellite Client 6 for RHEL disabled
satellite-maintenance-6.16-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat Satellite Maintenance 6.16 disabled
satellite-maintenance-6.16-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat Satellite Maintenance 6.16 disabled
satellite-maintenance-6.16-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat Satellite Maintenance 6.16 disabled
satellite-utils-6.16-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Satellite Utils 6.16 for disabled
satellite-utils-6.16-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Satellite Utils 6.16 for disabled
satellite-utils-6.16-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Satellite Utils 6.16 for disabled
service-interconnect-1-for-rhel-9-x86_64-debug-rpms RHEL 9 x86_64 (Debug RPMs)	Red Hat Service Interconnect for disabled
service-interconnect-1-for-rhel-9-x86_64-rpms RHEL 9 x86_64 (RPMs)	Red Hat Service Interconnect for disabled
service-interconnect-1-for-rhel-9-x86_64-source-rpms RHEL 9 x86_64 (Source RPMs)	Red Hat Service Interconnect for disabled
service-interconnect-1.4-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat Service Interconnect 1.4 disabled

service-interconnect-1.4-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat Service Interconnect 1.4 disabled
service-interconnect-1.4-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat Service Interconnect 1.4 disabled
service-interconnect-1.8-for-rhel-9-x86_64-debug-rpms for RHEL 9 x86_64 (Debug RPMs)	Red Hat Service Interconnect 1.8 disabled
service-interconnect-1.8-for-rhel-9-x86_64-rpms for RHEL 9 x86_64 (RPMs)	Red Hat Service Interconnect 1.8 disabled
service-interconnect-1.8-for-rhel-9-x86_64-source-rpms for RHEL 9 x86_64 (Source RPMs)	Red Hat Service Interconnect 1.8 disabled
soa-textonly-1-for-middleware-rpms Advisories	Red Hat JBoss SOA Text-Only disabled
wfk-textonly-1-for-middleware-rpms Text-Only Advisories	Red Hat JBoss Web Framework Kit disabled

To view only the list of active repositories, use the **repolist** command alone:

```
[root@redhat9 ~]# dnf repolist
Updating Subscription Management repositories.
repo id                                repo name
codeready-builder-for-rhel-9-x86_64-rpms  Red Hat CodeReady
Linux Builder for RHEL 9 x86_64 (RPMs)
epel                                     Extra Packages for
Enterprise Linux 9 - x86_64
epel-cisco-openh264                     Extra Packages for
Enterprise Linux 9 openh264 (From Cisco) - x86_64
epel-next                                Extra Packages for
Enterprise Linux 9 - Next - x86_64
rhel-9-for-x86_64-appstream-rpms         Red Hat Enterprise
Linux 9 for x86_64 - AppStream (RPMs)
rhel-9-for-x86_64-baseos-rpms           Red Hat Enterprise
Linux 9 for x86_64 - BaseOS (RPMs)
```

To deactivate a repository, the **yum-config-manager** command should be used:

```
[root@redhat9 ~]# yum-config-manager --disable epel
bash: yum-config-manager: command not found...
Install package 'yum-utils' to provide command 'yum-config-manager'? [N/y] y
```

```
* Waiting in queue...
* Loading list of packages....
The following packages have to be installed:
yum-utils-4.3.0-13.el9.noarch Yum-utils CLI compatibility layer
Proceed with changes? [N/y] y
```

```
* Waiting in queue...
* Waiting for authentication...
* Waiting in queue...
* Downloading packages...
* Requesting data...
* Testing changes...
* Installing packages...
Updating Subscription Management repositories.
```

```
[root@redhat9 ~]# dnf repolist
Updating Subscription Management repositories.
repo id                                repo name
codeready-builder-for-rhel-9-x86_64-rpms  Red Hat CodeReady
Linux Builder for RHEL 9 x86_64 (RPMs)
epel-cisco-openh264                      Extra Packages for
Enterprise Linux 9 openh264 (From Cisco) - x86_64
epel-next                                  Extra Packages for
Enterprise Linux 9 - Next - x86_64
rhel-9-for-x86_64-appstream-rpms          Red Hat Enterprise
Linux 9 for x86_64 - AppStream (RPMs)
rhel-9-for-x86_64-baseos-rpms            Red Hat Enterprise
Linux 9 for x86_64 - BaseOS (RPMs)
```

To activate a repository, the **yum-config-manager** command should be used again:

```
[root@redhat9 ~]# yum-config-manager --enable epel
Updating Subscription Management repositories.

[root@redhat9 ~]# dnf repolist
Updating Subscription Management repositories.
repo id                                repo name
codeready-builder-for-rhel-9-x86_64-rpms  Red Hat CodeReady
Linux Builder for RHEL 9 x86_64 (RPMs)
epel                                     Extra Packages for
Enterprise Linux 9 - x86_64
epel-cisco-openh264                     Extra Packages for
Enterprise Linux 9 openh264 (From Cisco) - x86_64
epel-next                                 Extra Packages for
Enterprise Linux 9 - Next - x86_64
rhel-9-for-x86_64-appstream-rpms         Red Hat Enterprise
Linux 9 for x86_64 - AppStream (RPMs)
rhel-9-for-x86_64-baseos-rpms            Red Hat Enterprise
Linux 9 for x86_64 - BaseOS (RPMs)
```

2.4 - Search Packages

To list all the installed **and** available packages you should use the **list** command:

```
[root@redhat9 ~]# dnf list | more
Updating Subscription Management repositories.
Last metadata expiration check: 3:33:08 ago on Mon 30 Sep 2024 07:52:55 AM CEST.
Installed Packages
ModemManager.x86_64                                1.20.2-1.el9
@anaconda
ModemManager-glib.x86_64                           1.20.2-1.el9
@anaconda
```

NetworkManager.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-adsl.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-bluetooth.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-config-server.noarch	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-libnm.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-team.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-tui.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-wifi.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
NetworkManager-wwan.x86_64	1:1.46.0-19.el9_4
@rhel-9-for-x86_64-baseos-rpms	
PackageKit.x86_64	1.2.6-1.el9
@rhel-9-for-x86_64-appstream-rpms	
PackageKit-command-not-found.x86_64	1.2.6-1.el9
@rhel-9-for-x86_64-appstream-rpms	
PackageKit-glib.x86_64	1.2.6-1.el9
@rhel-9-for-x86_64-appstream-rpms	
PackageKit-gstreamer-plugin.x86_64	1.2.6-1.el9
@rhel-9-for-x86_64-appstream-rpms	
PackageKit-gtk3-module.x86_64	1.2.6-1.el9
@rhel-9-for-x86_64-appstream-rpms	
aardvark-dns.x86_64	2:1.10.0-3.el9_4
@rhel-9-for-x86_64-appstream-rpms	
abattis-cantarell-fonts.noarch	0.301-4.el9
@AppStream	
accountsservice.x86_64	0.6.55-10.el9
@AppStream	

accountsservice-libs.x86_64	0.6.55-10.el9
@AppStream	
acl.x86_64	2.3.1-4.el9
@rhel-9-for-x86_64-baseos-rpms	
adcli.x86_64	0.9.2-1.el9
@anaconda	
adobe-mappings-cmap.noarch	20171205-12.el9
@AppStream	
adobe-mappings-cmap-deprecated.noarch	20171205-12.el9
@AppStream	
adobe-mappings-pdf.noarch	20180407-10.el9
@AppStream	
adobe-source-code-pro-fonts.noarch	2.030.1.050-12.el9.1
@anaconda	
adwaita-cursor-theme.noarch	40.1.1-3.el9
@AppStream	
adwaita-icon-theme.noarch	40.1.1-3.el9
@AppStream	
alsa-lib.x86_64	1.2.10-2.el9
@rhel-9-for-x86_64-appstream-rpms	
alsa-ucm.noarch	1.2.10-2.el9
@rhel-9-for-x86_64-appstream-rpms	
alsa-utils.x86_64	1.2.10-1.el9
@rhel-9-for-x86_64-appstream-rpms	
alternatives.x86_64	1.24-1.el9
@rhel-9-for-x86_64-baseos-rpms	
appstream.x86_64	0.16.1-1.el9
@rhel-9-for-x86_64-appstream-rpms	
appstream-data.noarch	1:9-20230504.el9
@rhel-9-for-x86_64-appstream-rpms	
apr.x86_64	1.7.0-12.el9_3
@rhel-9-for-x86_64-appstream-rpms	
apr-util.x86_64	1.6.1-23.el9
@rhel-9-for-x86_64-appstream-rpms	

```
apr-util-bdb.x86_64 1.6.1-23.el9
@rhel-9-for-x86_64-appstream-rpms
apr-util-openssl.x86_64 1.6.1-23.el9
@rhel-9-for-x86_64-appstream-rpms
at.x86_64 3.1.23-11.el9
@anaconda
at-spi2-atk.x86_64 2.38.0-4.el9
@AppStream
at-spi2-core.x86_64 2.40.3-1.el9
@AppStream
atk.x86_64 2.36.0-5.el9
@AppStream
atkmm.x86_64 2.28.2-2.el9
@AppStream
attr.x86_64 2.5.1-3.el9
@anaconda
audit.x86_64 3.1.2-2.el9
@rhel-9-for-x86_64-baseos-rpms
audit-libs.x86_64 3.1.2-2.el9
@rhel-9-for-x86_64-baseos-rpms
authselect.x86_64 1.2.6-2.el9
@rhel-9-for-x86_64-baseos-rpms
authselect-libs.x86_64 1.2.6-2.el9
@rhel-9-for-x86_64-baseos-rpms
avahi.x86_64 0.8-20.el9
@rhel-9-for-x86_64-baseos-rpms
avahi-glib.x86_64 0.8-20.el9
@rhel-9-for-x86_64-appstream-rpms
avahi-libs.x86_64 0.8-20.el9
@rhel-9-for-x86_64-baseos-rpms
baobab.x86_64 40.0-3.el9
@AppStream
--More--
[q]
```

To list only installed packages, the list command takes the **installed** option:

```
[root@redhat9 ~]# dnf list installed | more
Updating Subscription Management repositories.
Installed Packages
ModemManager.x86_64                1.20.2-1.el9                @anaconda
ModemManager-glib.x86_64           1.20.2-1.el9                @anaconda
NetworkManager.x86_64              1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-adsl.x86_64         1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-bluetooth.x86_64   1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-config-server.noarch 1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-libnm.x86_64        1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-team.x86_64         1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-tui.x86_64          1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-wifi.x86_64         1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
NetworkManager-wwan.x86_64         1:1.46.0-19.el9_4          @rhel-9-for-x86_64-baseos-rpms
PackageKit.x86_64                  1.2.6-1.el9                 @rhel-9-for-x86_64-appstream-
rpms
PackageKit-command-not-found.x86_64 1.2.6-1.el9                 @rhel-9-for-x86_64-appstream-
rpms
PackageKit-glib.x86_64              1.2.6-1.el9                 @rhel-9-for-x86_64-appstream-
rpms
PackageKit-gstreamer-plugin.x86_64  1.2.6-1.el9                 @rhel-9-for-x86_64-appstream-
rpms
PackageKit-gtk3-module.x86_64       1.2.6-1.el9                 @rhel-9-for-x86_64-appstream-
rpms
aardvark-dns.x86_64                 2:1.10.0-3.el9_4           @rhel-9-for-x86_64-appstream-
rpms
abattis-cantarell-fonts.noarch      0.301-4.el9                 @AppStream
accountsservice.x86_64              0.6.55-10.el9              @AppStream
accountsservice-libs.x86_64         0.6.55-10.el9              @AppStream
acl.x86_64                           2.3.1-4.el9                 @rhel-9-for-x86_64-baseos-rpms
adcli.x86_64                         0.9.2-1.el9                 @anaconda
adobe-mappings-cmap.noarch           20171205-12.el9            @AppStream
```

adobe-mappings-cmap-deprecated.noarch	20171205-12.el9	@AppStream
adobe-mappings-pdf.noarch	20180407-10.el9	@AppStream
adobe-source-code-pro-fonts.noarch	2.030.1.050-12.el9.1	@anaconda
adwaita-cursor-theme.noarch	40.1.1-3.el9	@AppStream
adwaita-icon-theme.noarch	40.1.1-3.el9	@AppStream
alsa-lib.x86_64 rpms	1.2.10-2.el9	@rhel-9-for-x86_64-appstream-
alsa-ucm.noarch rpms	1.2.10-2.el9	@rhel-9-for-x86_64-appstream-
alsa-utils.x86_64 rpms	1.2.10-1.el9	@rhel-9-for-x86_64-appstream-
alternatives.x86_64	1.24-1.el9	@rhel-9-for-x86_64-baseos-rpms
appstream.x86_64 rpms	0.16.1-1.el9	@rhel-9-for-x86_64-appstream-
appstream-data.noarch rpms	1:9-20230504.el9	@rhel-9-for-x86_64-appstream-
apr.x86_64 rpms	1.7.0-12.el9_3	@rhel-9-for-x86_64-appstream-
apr-util.x86_64 rpms	1.6.1-23.el9	@rhel-9-for-x86_64-appstream-
apr-util-bdb.x86_64 rpms	1.6.1-23.el9	@rhel-9-for-x86_64-appstream-
apr-util-openssl.x86_64 rpms	1.6.1-23.el9	@rhel-9-for-x86_64-appstream-
at.x86_64	3.1.23-11.el9	@anaconda
at-spi2-atk.x86_64	2.38.0-4.el9	@AppStream
at-spi2-core.x86_64	2.40.3-1.el9	@AppStream
atk.x86_64	2.36.0-5.el9	@AppStream
atkmm.x86_64	2.28.2-2.el9	@AppStream
attr.x86_64	2.5.1-3.el9	@anaconda
audit.x86_64	3.1.2-2.el9	@rhel-9-for-x86_64-baseos-rpms
audit-libs.x86_64	3.1.2-2.el9	@rhel-9-for-x86_64-baseos-rpms
authselect.x86_64	1.2.6-2.el9	@rhel-9-for-x86_64-baseos-rpms
authselect-libs.x86_64	1.2.6-2.el9	@rhel-9-for-x86_64-baseos-rpms

```

avahi.x86_64                0.8-20.el9                @rhel-9-for-x86_64-baseos-rpms
avahi-glib.x86_64          0.8-20.el9                @rhel-9-for-x86_64-appstream-
rpms
avahi-libs.x86_64         0.8-20.el9                @rhel-9-for-x86_64-baseos-rpms
baobab.x86_64             40.0-3.el9               @AppStream
basesystem.noarch        11-13.el9                 @anaconda
--More--
[q]

```

To list only available packages, the list command takes the **available** option:

```

[root@redhat9 ~]# dnf list available | more
Updating Subscription Management repositories.
Last metadata expiration check: 0:00:11 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Available Packages
389-ds-base.x86_64                2.4.5-9.el9_4
rhel-9-for-x86_64-appstream-rpms
389-ds-base-devel.x86_64        2.4.5-9.el9_4
codeready-builder-for-rhel-9-x86_64-rpms
389-ds-base-libs.x86_64        2.4.5-9.el9_4
rhel-9-for-x86_64-appstream-rpms
3proxy.x86_64                   0.9.4-4.el9
epel
6tunnel.x86_64                  0.13-1.el9
epel
AMF-devel.noarch                1.4.34-1.el9
epel
AMF-samples.noarch             1.4.34-1.el9
epel
Agda.x86_64                     2.6.2.2-36.el9
epel
Agda-common.noarch            2.6.2.2-36.el9
epel
BackupPC.x86_64                4.4.0-9.el9

```

epel	
BackupPC-XS.x86_64	0.62-11.el9
epel	
BibTool.x86_64	2.68-5.el9
epel	
Box2D.i686	2.4.1-7.el9
rhel-9-for-x86_64-appstream-rpms	
Box2D.x86_64	2.4.1-7.el9
rhel-9-for-x86_64-appstream-rpms	
CCfits.x86_64	2.6-6.el9
epel	
CCfits-devel.x86_64	2.6-6.el9
epel	
CCfits-doc.noarch	2.6-6.el9
epel	
CFR.noarch	0.151-9.el9
epel	
CFR-javadoc.noarch	0.151-9.el9
epel	
CGAL-demos-source.noarch	5.6.1-1.el9
epel	
CGAL-devel.x86_64	5.6.1-1.el9
epel	
CGAL-qt5-devel.x86_64	5.6.1-1.el9
epel	
CGSI-gSOAP.x86_64	1.3.12-1.el9
epel	
CGSI-gSOAP-devel.x86_64	1.3.12-1.el9
epel	
CUnit.i686	2.1.3-25.el9
rhel-9-for-x86_64-appstream-rpms	
CUnit.x86_64	2.1.3-25.el9
rhel-9-for-x86_64-appstream-rpms	
CUnit-devel.i686	2.1.3-25.el9

codeready-builder-for-rhel-9-x86_64-rpms		
CUnit-devel.x86_64		2.1.3-25.el9
codeready-builder-for-rhel-9-x86_64-rpms		
CharLS.x86_64		2.0.0-7.el9
epel		
CharLS-devel.x86_64		2.0.0-7.el9
epel		
Coin4.x86_64		4.0.0-11.el9
epel		
Coin4-devel.x86_64		4.0.0-11.el9
epel		
Coin4-doc.x86_64		4.0.0-11.el9
epel		
DNS-Compliance-Testing.x86_64		
0^20230708git4aea40b-2.el9	epel	
FoXlibf.x86_64		4.1.2-19.el9
epel		
FoXlibf-devel.x86_64		4.1.2-19.el9
epel		
FoXlibf-static.x86_64		4.1.2-19.el9
epel		
GConf2.x86_64		3.2.6-34.el9
epel		
GConf2-devel.x86_64		3.2.6-34.el9
epel		
GMT.x86_64		6.4.0-4.el9
epel		
GMT-common.noarch		6.4.0-4.el9
epel		
GMT-devel.x86_64		6.4.0-4.el9
epel		
GMT-doc.noarch		6.4.0-4.el9
epel		
GeographicLib.x86_64		2.3-2.el9

```

epel
GeographicLib-devel.x86_64                2.3-2.el9
epel
GeographicLib-doc.noarch                  2.3-2.el9
epel
GraphicsMagick.x86_64                     1.3.38-1.el9
epel
GraphicsMagick-c++.x86_64                 1.3.38-1.el9
epel
GraphicsMagick-c++-devel.x86_64          1.3.38-1.el9
epel
GraphicsMagick-devel.x86_64              1.3.38-1.el9
epel
GraphicsMagick-doc.noarch                 1.3.38-1.el9
epel
GraphicsMagick-perl.x86_64                1.3.38-1.el9
epel
--More--
[q]

```

To search for a string in the package name or short description, use the **search** command:

```

[root@redhat9 ~]# dnf search httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:01:15 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
===== Name Exactly Matched:
httpd =====
httpd.x86_64 : Apache HTTP Server
===== Name & Summary Matched:
httpd =====
httpd-core.x86_64 : httpd minimal core
keycloak-httpd-client-install.noarch : Tools to configure Apache HTTPD as Keycloak client
libmicrohttpd-devel.x86_64 : Development files for libmicrohttpd
libmicrohttpd-devel.i686 : Development files for libmicrohttpd

```

```
libmicrohttpd-doc.noarch : Documentation for libmicrohttpd
lighttpd-fastcgi.x86_64 : FastCGI module and spawning helper for lighttpd and PHP configuration
lighttpd-filesystem.noarch : The basic directory layout for lighttpd
lighttpd-mod_authn_gssapi.x86_64 : Authentication module for lighttpd that uses GSSAPI
lighttpd-mod_authn_ldap.x86_64 : Authentication module for lighttpd that uses LDAP
lighttpd-mod_authn_pam.x86_64 : Authentication module for lighttpd that uses PAM
lighttpd-mod_authn_sasl.x86_64 : Authentication module for lighttpd that uses SASL
lighttpd-mod_deflate.x86_64 : Compression module for lighttpd
lighttpd-mod_gnutls.x86_64 : TLS module for lighttpd that uses GnuTLS
lighttpd-mod_magnet.x86_64 : Lua module for lighttpd
lighttpd-mod_maxminddb.x86_64 : GeoIP2 module for lighttpd to use for location lookups
lighttpd-mod_mbedtls.x86_64 : TLS module for lighttpd that uses mbedtls
lighttpd-mod_nss.x86_64 : TLS module for lighttpd that uses NSS
lighttpd-mod_openssl.x86_64 : TLS module for lighttpd that uses OpenSSL
lighttpd-mod_vhostdb_ldap.x86_64 : Virtual host module for lighttpd that uses LDAP
lighttpd-mod_vhostdb_mysql.x86_64 : Virtual host module for lighttpd that uses MySQL
lighttpd-mod_vhostdb_pgsqldb.x86_64 : Virtual host module for lighttpd that uses PostgreSQL
lighttpd-mod_webdav.x86_64 : WebDAV module for lighttpd
nextcloud-httpd.noarch : Httpd integration for NextCloud
python3-keycloak-httpd-client-install.noarch : Tools to configure Apache HTTPD as Keycloak client
radicale3-httpd.noarch : httpd config for Radicale
redhat-logos-httpd.noarch : Red Hat-related icons and pictures used by httpd
sympa-lighttpd.x86_64 : Sympa with lighttpd
```

```
===== Name Matched:
httpd =====
```

```
httpd-devel.x86_64 : Development interfaces for the Apache HTTP Server
httpd-filesystem.noarch : The basic directory layout for the Apache HTTP Server
httpd-manual.noarch : Documentation for the Apache HTTP Server
httpd-tools.x86_64 : Tools for use with the Apache HTTP Server
libmicrohttpd.i686 : Lightweight library for embedding a webserver in applications
libmicrohttpd.x86_64 : Lightweight library for embedding a webserver in applications
lighttpd.x86_64 : Lightning fast webserver with light system requirements
mirmon-httpd.noarch : Apache configuration for mirmon
perl-Test-Fake-HTTPD.noarch : Fake HTTP server module for testing
```

```
python3-sphinxcontrib-httpdomain.noarch : Sphinx domain for documenting HTTP APIs
rust-httpdate+default-devel.noarch : HTTP date parsing and formatting
rust-httpdate-devel.noarch : HTTP date parsing and formatting
rust-tower-http+httpdate-devel.noarch : Tower middleware and utilities for HTTP clients and servers
sympa-httpd.x86_64 : Sympa with Apache HTTP Server
sysusage-httpd.noarch : Apache configuration for sysusage
web-assets-httpd.noarch : Web Assets aliases for the Apache HTTP daemon
===== Summary Matched:
httpd =====
mod_auth_mellon.x86_64 : A SAML 2.0 authentication module for the Apache Httpd Server
mod_dav_svn.x86_64 : Apache httpd module for Subversion server
mod_proxy_cluster.x86_64 : JBoss mod_proxy_cluster for Apache httpd
```

To search only for the string in the package name, use the **list** command:

```
[root@redhat9 ~]# dnf list httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:01:50 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Installed Packages
httpd.x86_64                                     2.4.57-11.el9_4.1
@rhel-9-for-x86_64-appstream-rpms
```

To find the package that contains the httpd executable, use the **provides** command:

```
[root@redhat9 ~]# dnf provides httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:02:56 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
httpd-2.4.51-7.el9_0.x86_64 : Apache HTTP Server
Repo           : rhel-9-for-x86_64-appstream-rpms
Matched from:
Provide        : httpd = 2.4.51-7.el9_0

httpd-2.4.53-7.el9.x86_64 : Apache HTTP Server
Repo           : rhel-9-for-x86_64-appstream-rpms
```

Matched from:

Provide : httpd = 2.4.53-7.el9

httpd-2.4.53-7.el9_1.1.x86_64 : Apache HTTP Server

Repo : rhel-9-for-x86_64-appstream-rpms

Matched from:

Provide : httpd = 2.4.53-7.el9_1.1

httpd-2.4.53-7.el9_1.5.x86_64 : Apache HTTP Server

Repo : rhel-9-for-x86_64-appstream-rpms

Matched from:

Provide : httpd = 2.4.53-7.el9_1.5

httpd-2.4.53-11.el9_2.4.x86_64 : Apache HTTP Server

Repo : rhel-9-for-x86_64-appstream-rpms

Matched from:

Provide : httpd = 2.4.53-11.el9_2.4

httpd-2.4.53-11.el9_2.5.x86_64 : Apache HTTP Server

Repo : rhel-9-for-x86_64-appstream-rpms

Matched from:

Provide : httpd = 2.4.53-11.el9_2.5

httpd-2.4.57-5.el9.x86_64 : Apache HTTP Server

Repo : rhel-9-for-x86_64-appstream-rpms

Matched from:

Provide : httpd = 2.4.57-5.el9

httpd-2.4.57-8.el9.x86_64 : Apache HTTP Server

Repo : rhel-9-for-x86_64-appstream-rpms

Matched from:

Provide : httpd = 2.4.57-8.el9

httpd-2.4.57-11.el9_4.x86_64 : Apache HTTP Server

```
Repo      : rhel-9-for-x86_64-appstream-rpms
Matched from:
Provide   : httpd = 2.4.57-11.el9_4

httpd-2.4.57-11.el9_4.1.x86_64 : Apache HTTP Server
Repo      : @System
Matched from:
Provide   : httpd = 2.4.57-11.el9_4.1

httpd-2.4.57-11.el9_4.1.x86_64 : Apache HTTP Server
Repo      : rhel-9-for-x86_64-appstream-rpms
Matched from:
Provide   : httpd = 2.4.57-11.el9_4.1
```

To search for any package starting with **kerne**, use the following command:

```
[root@redhat9 ~]# dnf list kerne\*
Updating Subscription Management repositories.
Last metadata expiration check: 0:03:38 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Installed Packages
kernel.x86_64                               5.14.0-284.11.1.el9_2
@anaconda
kernel.x86_64                               5.14.0-427.37.1.el9_4
@rhel-9-for-x86_64-baseos-rpms
kernel-core.x86_64                         5.14.0-284.11.1.el9_2
@anaconda
kernel-core.x86_64                         5.14.0-427.37.1.el9_4
@rhel-9-for-x86_64-baseos-rpms
kernel-modules.x86_64                      5.14.0-284.11.1.el9_2
@anaconda
kernel-modules.x86_64                      5.14.0-427.37.1.el9_4
@rhel-9-for-x86_64-baseos-rpms
kernel-modules-core.x86_64                 5.14.0-284.11.1.el9_2
@anaconda
```

kernel-modules-core.x86_64	5.14.0-427.37.1.el9_4
@rhel-9-for-x86_64-baseos-rpms	
kernel-tools.x86_64	5.14.0-427.37.1.el9_4
@rhel-9-for-x86_64-baseos-rpms	
kernel-tools-libs.x86_64	5.14.0-427.37.1.el9_4
@rhel-9-for-x86_64-baseos-rpms	
Available Packages	
kernel-abi-stablelists.noarch	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-cross-headers.x86_64	5.14.0-427.37.1.el9_4
codeready-builder-for-rhel-9-x86_64-rpms	
kernel-debug.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-debug-core.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-debug-devel.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-appstream-rpms	
kernel-debug-devel-matched.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-appstream-rpms	
kernel-debug-modules.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-debug-modules-core.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-debug-modules-extra.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-debug-uki-virt.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms	
kernel-devel.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-appstream-rpms	
kernel-devel-matched.x86_64	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-appstream-rpms	
kernel-doc.noarch	5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-appstream-rpms	
kernel-headers.x86_64	5.14.0-427.37.1.el9_4

```
rhel-9-for-x86_64-appstream-rpms
kernel-modules-extra.x86_64          5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms
kernel-rpm-macros.noarch              185-13.el9
rhel-9-for-x86_64-appstream-rpms
kernel-srpm-macros.noarch             1.0-13.el9
rhel-9-for-x86_64-appstream-rpms
kernel-tools-libs-devel.x86_64       5.14.0-427.37.1.el9_4
codeready-builder-for-rhel-9-x86_64-rpms
kernel-uki-virt.x86_64                5.14.0-427.37.1.el9_4
rhel-9-for-x86_64-baseos-rpms
kernelshark.x86_64                    1:1.2-10.el9
rhel-9-for-x86_64-appstream-rpms
```

To list package groups, use the **grouplist** command:

```
[root@redhat9 ~]# dnf grouplist
Updating Subscription Management repositories.
Last metadata expiration check: 0:04:11 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Available Environment Groups:
  Server
  Minimal Install
  Workstation
  KDE Plasma Workspaces
  Virtualization Host
  Custom Operating System
Installed Environment Groups:
  Server with GUI
Installed Groups:
  Container Management
  Headless Management
Available Groups:
  RPM Development Tools
  .NET Development
```

```
Console Internet Tools
Scientific Support
Legacy UNIX Compatibility
Smart Card Support
Security Tools
Graphical Administration Tools
System Tools
Network Servers
Development Tools
Fedora Packager
VideoLAN Client
Xfce
```

To obtain information about a group of packages, use the **group info** command:

```
[root@redhat9 ~]# dnf groupinfo Server
Updating Subscription Management repositories.
Environment Group: Server
Description: An integrated, easy-to-manage server.
Mandatory Groups:
  Container Management
  Core
  Hardware Support
  Headless Management
  Server product core
  Standard
Optional Groups:
  Basic Web Server
  DNS Name Server
  Debugging Tools
  FTP Server
  File and Storage Server
  GNOME
  Guest Agents
```

```
Hardware Monitoring Utilities
Infiniband Support
Mail Server
Network File System Client
Network Servers
Performance Tools
Remote Management for Linux
Virtualization Hypervisor
Windows File Server
```

2.5 - Obtaining Information about a Package and Downloading it

To obtain information about a package, the **info** command should be used:

```
[root@redhat9 ~]# dnf info httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:04:53 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Installed Packages
Name           : httpd
Version        : 2.4.57
Release        : 11.el9_4.1
Architecture   : x86_64
Size           : 59 k
Source         : httpd-2.4.57-11.el9_4.1.src.rpm
Repository     : @System
From repo      : rhel-9-for-x86_64-appstream-rpms
Summary        : Apache HTTP Server
URL            : https://httpd.apache.org/
License        : ASL 2.0
Description    : The Apache HTTP Server is a powerful, efficient, and extensible
                : web server.
```

To download without installing a package, the old **yumdownloader** command has been replaced by dnf's **download** command:

```
[root@redhat9 ~]# dnf download httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:05:25 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
httpd-2.4.57-11.el9_4.1.x86_64.rpm
```

This package is downloaded to the current directory:

```
[root@redhat9 ~]# updatedb

[root@redhat9 ~]# locate httpd-2.4.57
/root/httpd-2.4.57-11.el9_4.1.x86_64.rpm
```

2.6 - Installing a Package

To install a package, dnf has the **install** command:

```
[root@redhat9 ~]# dnf install httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:09:28 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Dependencies resolved.
```

```
=====
=====
Package                               Architecture  Size          Version
Repository
=====
=====
Installing:
 httpd                                   x86_64        51 k          2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms
Installing dependencies:
 apr                                    x86_64       126 k          1.7.0-12.el9_3
rhel-9-for-x86_64-appstream-rpms
```

apr-util	x86_64		1.6.1-23.el9
rhel-9-for-x86_64-appstream-rpms		97 k	
apr-util-bdb	x86_64		1.6.1-23.el9
rhel-9-for-x86_64-appstream-rpms		14 k	
httpd-core	x86_64		2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms		1.5 M	
httpd-filesystem	noarch		2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms		14 k	
httpd-tools	x86_64		2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms		86 k	
redhat-logos-httpd	noarch		90.4-2.el9
rhel-9-for-x86_64-appstream-rpms		18 k	
Installing weak dependencies:			
apr-util-openssl	x86_64		1.6.1-23.el9
rhel-9-for-x86_64-appstream-rpms		17 k	
mod_http2	x86_64		2.0.26-2.el9_4
rhel-9-for-x86_64-appstream-rpms		167 k	
mod_lua	x86_64		2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms		60 k	

Transaction Summary

=====
=====
Install 11 Packages

Total download size: 2.2 M

Installed size: 6.0 M

Is this ok [y/N]: n

Operation aborted.

To automatically answer yes to every question asked by dnf, use the **-y** option :

```
[root@redhat9 ~]# dnf install httpd -y
Updating Subscription Management repositories.
```

Last metadata expiration check: 0:10:12 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
 Dependencies resolved.

```

=====
Package                               Architecture  Size  Version
Repository
=====
Installing:
  httpd                                x86_64      51 k  2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms
Installing dependencies:
  apr                                   x86_64     126 k  1.7.0-12.el9_3
rhel-9-for-x86_64-appstream-rpms
  apr-util                             x86_64      97 k  1.6.1-23.el9
rhel-9-for-x86_64-appstream-rpms
  apr-util-bdb                         x86_64      14 k  1.6.1-23.el9
rhel-9-for-x86_64-appstream-rpms
  httpd-core                           x86_64     1.5 M  2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms
  httpd-filesystem                    noarch      14 k  2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms
  httpd-tools                          x86_64      86 k  2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms
  redhat-logos-httpd                  noarch      18 k  90.4-2.el9
rhel-9-for-x86_64-appstream-rpms
Installing weak dependencies:
  apr-util-openssl                    x86_64      17 k  1.6.1-23.el9
rhel-9-for-x86_64-appstream-rpms
  mod_http2                           x86_64     167 k  2.0.26-2.el9_4
rhel-9-for-x86_64-appstream-rpms
  mod_lua                             x86_64      60 k  2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms

```

Transaction Summary

=====
=====
Install 11 Packages

Total download size: 2.2 M

Installed size: 6.0 M

Downloading Packages:

(1/11): apr-util-1.6.1-23.el9.x86_64.rpm

350 kB/s | 97 kB 00:00

(2/11): apr-util-bdb-1.6.1-23.el9.x86_64.rpm

47 kB/s | 14 kB 00:00

(3/11): apr-util-openssl-1.6.1-23.el9.x86_64.rpm

53 kB/s | 17 kB 00:00

(4/11): redhat-logos-httpd-90.4-2.el9.noarch.rpm

97 kB/s | 18 kB 00:00

(5/11): apr-1.7.0-12.el9_3.x86_64.rpm

654 kB/s | 126 kB 00:00

(6/11): httpd-2.4.57-11.el9_4.1.x86_64.rpm

677 kB/s | 51 kB 00:00

(7/11): mod_http2-2.0.26-2.el9_4.x86_64.rpm

677 kB/s | 167 kB 00:00

(8/11): httpd-core-2.4.57-11.el9_4.1.x86_64.rpm

11 MB/s | 1.5 MB 00:00

(9/11): httpd-filesystem-2.4.57-11.el9_4.1.noarch.rpm

104 kB/s | 14 kB 00:00

(10/11): httpd-tools-2.4.57-11.el9_4.1.x86_64.rpm

261 kB/s | 86 kB 00:00

(11/11): mod_lua-2.4.57-11.el9_4.1.x86_64.rpm

219 kB/s | 60 kB 00:00

Total

2.4 MB/s | 2.2 MB 00:00

```
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :
1/1
  Installing     : apr-1.7.0-12.el9_3.x86_64
1/11
  Installing     : apr-util-bdb-1.6.1-23.el9.x86_64
2/11
  Installing     : apr-util-openssl-1.6.1-23.el9.x86_64
3/11
  Installing     : apr-util-1.6.1-23.el9.x86_64
4/11
  Installing     : httpd-tools-2.4.57-11.el9_4.1.x86_64
5/11
  Running scriptlet: httpd-filesystem-2.4.57-11.el9_4.1.noarch
6/11
  Installing     : httpd-filesystem-2.4.57-11.el9_4.1.noarch
6/11
  Installing     : httpd-core-2.4.57-11.el9_4.1.x86_64
7/11
  Installing     : mod_lua-2.4.57-11.el9_4.1.x86_64
8/11
  Installing     : redhat-logos-httpd-90.4-2.el9.noarch
9/11
  Installing     : mod_http2-2.0.26-2.el9_4.x86_64
10/11
  Installing     : httpd-2.4.57-11.el9_4.1.x86_64
11/11
  Running scriptlet: httpd-2.4.57-11.el9_4.1.x86_64
11/11
  Verifying     : apr-util-1.6.1-23.el9.x86_64
```

```
1/11
  Verifying      : apr-util-bdb-1.6.1-23.el9.x86_64
2/11
  Verifying      : apr-util-openssl-1.6.1-23.el9.x86_64
3/11
  Verifying      : redhat-logos-httpd-90.4-2.el9.noarch
4/11
  Verifying      : apr-1.7.0-12.el9_3.x86_64
5/11
  Verifying      : mod_http2-2.0.26-2.el9_4.x86_64
6/11
  Verifying      : httpd-2.4.57-11.el9_4.1.x86_64
7/11
  Verifying      : httpd-core-2.4.57-11.el9_4.1.x86_64
8/11
  Verifying      : httpd-filesystem-2.4.57-11.el9_4.1.noarch
9/11
  Verifying      : httpd-tools-2.4.57-11.el9_4.1.x86_64
10/11
  Verifying      : mod_lua-2.4.57-11.el9_4.1.x86_64
11/11
Installed products updated.

Installed:
  apr-1.7.0-12.el9_3.x86_64          apr-util-1.6.1-23.el9.x86_64          apr-util-
bdb-1.6.1-23.el9.x86_64          apr-util-openssl-1.6.1-23.el9.x86_64  httpd-2.4.57-11.el9_4.1.x86_64
  httpd-core-2.4.57-11.el9_4.1.x86_64  httpd-filesystem-2.4.57-11.el9_4.1.noarch  httpd-
tools-2.4.57-11.el9_4.1.x86_64  mod_http2-2.0.26-2.el9_4.x86_64          mod_lua-2.4.57-11.el9_4.1.x86_64
  redhat-logos-httpd-90.4-2.el9.noarch

Complete!
```

It is possible to re-install a package with the **reinstall** command:

```
[root@redhat9 ~]# dnf reinstall httpd
Updating Subscription Management repositories.
Last metadata expiration check: 0:11:00 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Dependencies resolved.
```

```
=====
=====
Package                Architecture                Size                Version
Repository
=====
=====
Reinstalling:
  httpd                x86_64                51 k                2.4.57-11.el9_4.1
rhel-9-for-x86_64-appstream-rpms
```

Transaction Summary

```
=====
=====
Total download size: 51 k
Installed size: 59 k
Is this ok [y/N]: y
```

To install a group of packages, dnf has the **groupinstall** command :

```
[root@redhat9 ~]# dnf groupinstall 'System Tools'
Updating Subscription Management repositories.
Last metadata expiration check: 0:12:43 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Dependencies resolved.
```

```
=====
=====
Package                Architecture                Version
Repository                Size
=====
=====
```

Installing group/module packages:

NetworkManager-libreswan	x86_64		1.2.18-3.el9_4
rhel-9-for-x86_64-appstream-rpms		152 k	
cifs-utils	x86_64		7.0-1.el9
rhel-9-for-x86_64-baseos-rpms		103 k	
libreswan	x86_64		4.12-2.el9_4.1
rhel-9-for-x86_64-appstream-rpms		1.4 M	
nmap	x86_64		3:7.92-1.el9
rhel-9-for-x86_64-appstream-rpms		5.6 M	
openldap-clients	x86_64		2.6.6-3.el9
rhel-9-for-x86_64-baseos-rpms		184 k	
samba-client	x86_64		4.19.4-105.el9_4
rhel-9-for-x86_64-appstream-rpms		694 k	
setserial	x86_64		2.17-54.el9
rhel-9-for-x86_64-baseos-rpms		29 k	
tigervnc	x86_64		1.13.1-8.el9_4.3
rhel-9-for-x86_64-appstream-rpms		311 k	
tmux	x86_64		3.2a-5.el9
rhel-9-for-x86_64-baseos-rpms		476 k	
zsh	x86_64		5.8-9.el9
rhel-9-for-x86_64-baseos-rpms		3.2 M	
Installing dependencies:			
fltk	x86_64		1.3.8-1.el9
rhel-9-for-x86_64-appstream-rpms		620 k	
keyutils	x86_64		1.6.3-1.el9
rhel-9-for-x86_64-baseos-rpms		78 k	
ldns	x86_64		1.7.1-11.el9
rhel-9-for-x86_64-appstream-rpms		163 k	
nss-tools	x86_64		3.101.0-7.el9_2
rhel-9-for-x86_64-appstream-rpms		449 k	
tigervnc-icons	noarch		1.13.1-8.el9_4.3
rhel-9-for-x86_64-appstream-rpms		40 k	
tigervnc-license	noarch		1.13.1-8.el9_4.3
rhel-9-for-x86_64-appstream-rpms		18 k	

```
unbound-libs                                x86_64                                1.16.2-3.el9_3.5
rhel-9-for-x86_64-appstream-rpms           553 k
```

Installing Groups:

System Tools

Transaction Summary

=====
=====
Install 17 Packages

Total download size: 14 M

Installed size: 47 M

Is this ok [y/N]: y

2.7 - Updating Packages

To check the availability of updates, dnf has the **check-update** command :

```
[root@redhat9 ~]# dnf check-update
Updating Subscription Management repositories.
Last metadata expiration check: 0:13:55 ago on Mon 30 Sep 2024 11:27:31 AM CEST.

cups-filters.x86_64                                1.28.7-17.el9_4
rhel-9-for-x86_64-appstream-rpms
cups-filters-libs.x86_64                          1.28.7-17.el9_4
rhel-9-for-x86_64-appstream-rpms
net-snmp-libs.x86_64                               1:5.9.1-13.el9_4.3
rhel-9-for-x86_64-appstream-rpms
```

To update all the packages, dnf has the **update** and **upgrade** commands. It is also possible to specify a specific package:

```
[root@redhat9 ~]# dnf update net-snmp-libs.x86_64
Updating Subscription Management repositories.
```

Last metadata expiration check: 0:14:57 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Dependencies resolved.

```
=====
```

Package	Architecture	Size	Version
Repository			

```
=====
```

```
Upgrading:
 net-snmp-libs                x86_64                763 k                1:5.9.1-13.el9_4.3
 rhel-9-for-x86_64-appstream-rpms
```

Transaction Summary

```
=====
```

Upgrade 1 Package

Total download size: 763 k
Is this ok [y/N]: y

Package group updates are managed using the **groupupdate** command :

```
[root@redhat9 ~]# dnf groupupdate 'System Tools'
Updating Subscription Management repositories.
Last metadata expiration check: 0:15:46 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Dependencies resolved.
```

```
=====
```

Package	Architecture	Version
Repository	Size	

```
=====
```

Installing Groups:
System Tools

Transaction Summary

```

=====
=====
Is this ok [y/N]: y
Complete!

```

2.8 - Removing packages

To remove a package, use the **remove** command:

```

[root@redhat9 ~]# dnf remove httpd
Updating Subscription Management repositories.
Dependencies resolved.

```

```

=====
=====
Package
Repository                Architecture      Size              Version
=====
=====
Removing:
  httpd                    x86_64           59 k              2.4.57-11.el9_4.1
@rhel-9-for-x86_64-appstream-rpms
Removing unused dependencies:
  apr                      x86_64           288 k             1.7.0-12.el9_3
@rhel-9-for-x86_64-appstream-rpms
  apr-util                 x86_64           211 k             1.6.1-23.el9
@rhel-9-for-x86_64-appstream-rpms
  apr-util-bdb             x86_64           15 k              1.6.1-23.el9
@rhel-9-for-x86_64-appstream-rpms
  apr-util-openssl         x86_64           23 k              1.6.1-23.el9
@rhel-9-for-x86_64-appstream-rpms
  httpd-core                x86_64           2.4.57-11.el9_4.1

```

```

@rhel-9-for-x86_64-appstream-rpms      4.7 M
  httpd-filesystem                    noarch                    2.4.57-11.el9_4.1
@rhel-9-for-x86_64-appstream-rpms      400
  httpd-tools                          x86_64                   2.4.57-11.el9_4.1
@rhel-9-for-x86_64-appstream-rpms      199 k
  mod_http2                             x86_64                   2.0.26-2.el9_4
@rhel-9-for-x86_64-appstream-rpms      442 k
  mod_lua                               x86_64                   2.4.57-11.el9_4.1
@rhel-9-for-x86_64-appstream-rpms      142 k
  redhat-logos-httpd                   noarch                    90.4-2.el9
@rhel-9-for-x86_64-appstream-rpms      12 k

```

Transaction Summary

```
=====
=====
Remove 11 Packages
```

```

Freed space: 6.0 M
Is this ok [y/N]: n
Operation aborted.
```

To remove a group of packages, use the **groupremove** command:

```

[root@redhat9 ~]# dnf groupremove 'System Tools'
Updating Subscription Management repositories.
Dependencies resolved.
```

```

=====
=====
Package                                Architecture      Version
Repository                              Size
=====
=====
Removing:
NetworkManager-libreswan                x86_64            1.2.18-3.el9_4

```

@rhel-9-for-x86_64-appstream-rpms cifs-utils	x86_64	457 k	7.0-1.el9
@rhel-9-for-x86_64-baseos-rpms libreswan	x86_64	220 k	4.12-2.el9_4.1
@rhel-9-for-x86_64-appstream-rpms nmap	x86_64	5.2 M	3:7.92-1.el9
@rhel-9-for-x86_64-appstream-rpms openldap-clients	x86_64	24 M	2.6.6-3.el9
@rhel-9-for-x86_64-baseos-rpms samba-client	x86_64	658 k	4.19.4-105.el9_4
@rhel-9-for-x86_64-appstream-rpms setserial	x86_64	2.5 M	2.17-54.el9
@rhel-9-for-x86_64-baseos-rpms tigervnc	x86_64	35 k	1.13.1-8.el9_4.3
@rhel-9-for-x86_64-appstream-rpms tmux	x86_64	967 k	3.2a-5.el9
@rhel-9-for-x86_64-baseos-rpms zsh	x86_64	1.1 M	5.8-9.el9
@rhel-9-for-x86_64-baseos-rpms Removing unused dependencies:		7.6 M	
fltk	x86_64		1.3.8-1.el9
@rhel-9-for-x86_64-appstream-rpms keyutils	x86_64	1.5 M	1.6.3-1.el9
@rhel-9-for-x86_64-baseos-rpms ldns	x86_64	158 k	1.7.1-11.el9
@rhel-9-for-x86_64-appstream-rpms nss-tools	x86_64	426 k	3.101.0-7.el9_2
@rhel-9-for-x86_64-appstream-rpms tigervnc-icons	noarch	1.3 M	1.13.1-8.el9_4.3
@rhel-9-for-x86_64-appstream-rpms tigervnc-license	noarch	36 k	1.13.1-8.el9_4.3
@rhel-9-for-x86_64-appstream-rpms unbound-libs	x86_64	18 k	1.16.2-3.el9_3.5
@rhel-9-for-x86_64-appstream-rpms		1.5 M	

```
Removing Groups:
  System Tools
```

```
Transaction Summary
```

```
Remove 17 Packages
```

```
Freed space: 47 M
```

```
Is this ok [y/N]: y
```

To delete unused dependencies, use the **autoremove** command :

```
[root@redhat9 ~]# dnf autoremove
[root@redhat9 ~]# dnf autoremove
Updating Subscription Management repositories.
Last metadata expiration check: 0:18:14 ago on Mon 30 Sep 2024 11:27:31 AM CEST.
Dependencies resolved.
```

Package Repository	Architecture	Size	Version
Removing: efivar-libs @anaconda	x86_64	367 k	38-3.el9
grub2-tools-efi @rhel-9-for-x86_64-baseos-rpms	x86_64	2.7 M	1:2.06-82.el9_4
grub2-tools-extra @rhel-9-for-x86_64-baseos-rpms	x86_64	5.3 M	1:2.06-82.el9_4
libgcab1 @anaconda	x86_64	207 k	1.4-6.el9
libglvnd-opengl	x86_64		1:1.3.4-1.el9

@AppStream		173 k	
libsmbios	x86_64		2.4.3-4.el9
@anaconda		388 k	
openldap-compat	x86_64		2.6.6-3.el9
@rhel-9-for-x86_64-baseos-rpms		59 k	
pulseaudio-utils	x86_64		15.0-2.el9
@AppStream		199 k	
python3-ethtool	x86_64		0.15-2.el9
@anaconda		94 k	

Transaction Summary

Remove 9 Packages

Freed space: 9.5 M

Is this ok [y/N]: y

To clean the cache of downloaded packages, use the **clean all** command :

```
[root@redhat9 ~]# dnf clean all
Updating Subscription Management repositories.
61 files removed
```

2.9 - The dnf log

Transactions from dnf are logged in the **/var/log/dnf.rpm.log** file:

```
[root@redhat9 ~]# tail /var/log/dnf.rpm.log
2024-09-30T11:46:10+0200 SUBDEBUG Erase: pulseaudio-utils-15.0-2.el9.x86_64
2024-09-30T11:46:10+0200 SUBDEBUG Erase: openldap-compat-2.6.6-3.el9.x86_64
2024-09-30T11:46:10+0200 SUBDEBUG Erase: libsmbios-2.4.3-4.el9.x86_64
2024-09-30T11:46:10+0200 SUBDEBUG Erase: libglvnd-opengl-1:1.3.4-1.el9.x86_64
```

```
2024-09-30T11:46:10+0200 SUBDEBUG Erase: libgcab1-1.4-6.el9.x86_64
2024-09-30T11:46:10+0200 SUBDEBUG Erase: grub2-tools-extra-1:2.06-82.el9_4.x86_64
2024-09-30T11:46:10+0200 SUBDEBUG Erase: grub2-tools-efi-1:2.06-82.el9_4.x86_64
2024-09-30T11:46:10+0200 SUBDEBUG Erase: efivar-libs-38-3.el9.x86_64
2024-09-30T11:46:30+0200 INFO --- logging initialized ---
2024-09-30T11:49:36+0200 INFO --- logging initialized ---
```

These transactions are also visible using the `dnf history` command:

```
[root@redhat9 ~]# dnf history
Updating Subscription Management repositories.
Extra Packages for Enterprise Linux 9 - x86_64
8.7 MB/s | 23 MB      00:02
Extra Packages for Enterprise Linux 9 openh264 (From Cisco) - x86_64
3.0 kB/s | 2.5 kB     00:00
Extra Packages for Enterprise Linux 9 - Next - x86_64
585 kB/s | 277 kB     00:00
Red Hat Enterprise Linux 9 for x86_64 - AppStream (RPMs)
26 MB/s | 41 MB       00:01
Red Hat Enterprise Linux 9 for x86_64 - BaseOS (RPMs)
13 MB/s | 32 MB       00:02
Red Hat CodeReady Linux Builder for RHEL 9 x86_64 (RPMs)
8.5 MB/s | 9.2 MB     00:01
```

ID	Command line		
Date and time	Action(s)		Altered
-----	-----	-----	-----
17	autoremove		
2024-09-30 11:46	Removed		9
16	groupremove System Tools		
2024-09-30 11:45	Removed		18 EE
15	groupupdate System Tools		
2024-09-30 11:43	Install		1

```
14 | update net-snmp-libs.x86_64
| 2024-09-30 11:42 | Upgrade | 1
13 | groupinstall System Tools
| 2024-09-30 11:40 | Install | 18 EE
12 | reinstall httpd
| 2024-09-30 11:39 | R | 2
11 | install httpd -y
| 2024-09-30 11:37 | Install | 11
10 | install telnet-server
| 2024-09-29 14:19 | Install | 1
9 |
| 2024-09-29 13:58 | Install | 1
8 |
| 2024-09-29 13:44 | Install | 1
7 |
| 2024-09-29 13:21 | Install | 1
6 | install patch -y
| 2024-09-25 16:20 | Install | 1
5 | install screen
| 2024-09-25 15:43 | Install | 1
4 | install epel-release epel-next-release
| 2024-09-25 15:42 | Install | 1 <
3 | install https://dl.fedoraproject.org/pub/epel/epel-release-latest-9.noarch.rpm
| 2024-09-25 15:39 | Install | 1 >E
2 | update
| 2024-09-25 11:50 | I, U | 584 E<
1 |
| 2023-10-19 18:08 | Install | 1198 >E
```

This command has an **undo** option:

```
[root@redhat9 ~]# dnf history undo 14
Updating Subscription Management repositories.
Last metadata expiration check: 0:22:38 ago on Mon 30 Sep 2024 11:50:09 AM CEST.
```

Dependencies resolved.

```
=====
=====
Package                Architecture      Size      Version
Repository
=====
=====
Downgrading:
 net-snmp-libs          x86_64          760 k     1:5.9.1-13.el9_4.2
 rhel-9-for-x86_64-appstream-rpms
=====
```

Transaction Summary

Downgrade 1 Package

Total download size: 760 k

Is this ok [y/N]: y

Downloading Packages:

net-snmp-libs-5.9.1-13.el9_4.2.x86_64.rpm

1.2 MB/s | 760 kB 00:00

Total

1.2 MB/s | 760 kB 00:00

Running transaction check

Transaction check succeeded.

Running transaction test

Transaction test succeeded.

Running transaction

Preparing :

1/1

Downgrading : net-snmp-libs-1:5.9.1-13.el9_4.2.x86_64

1/2

```
Cleanup      : net-snmp-libs-1:5.9.1-13.el9_4.3.x86_64
2/2
Running scriptlet: net-snmp-libs-1:5.9.1-13.el9_4.3.x86_64
2/2
Verifying    : net-snmp-libs-1:5.9.1-13.el9_4.2.x86_64
1/2
Verifying    : net-snmp-libs-1:5.9.1-13.el9_4.3.x86_64
2/2
Installed products updated.

Downgraded:
  net-snmp-libs-1:5.9.1-13.el9_4.2.x86_64

Complete!
```

2.10 - The Application Stream Repository

RHEL 9 content is distributed via two main software repositories: BaseOS and Application Stream (AppStream).

By using the Application Stream repository, several versions of the user space components delivered with the distribution are delivered at the same time. They can be updated more frequently than the main operating system packages. This provides greater flexibility to customise RHEL without affecting the underlying stability of the platform or specific deployments.

The Application Stream repository contains two types of content, Modules and traditional RPM packages. A module describes a set of RPM packages that go together.

Modules can contain multiple streams to make multiple versions of applications available for installation. Activating a Module stream gives the system access to the RPM packages contained in that Module stream.

A Module is a set of RPM packages that form a coherent whole that go together. Typically, this is organised around a specific version of a software application or programming language. A typical Module may contain packages with an application, packages with shared libraries, documentation packages for the application and packages containing utilities.

Each Module can have one or more streams of Modules that contain different versions of the content. Each of the streams receives updates

```

PHP scripting language
php                        8.2                common [d], devel, minimal
PHP scripting language
postgresql                15                client, server [d]
PostgreSQL server and client module
postgresql                16                client, server [d]
PostgreSQL server and client module
redis                     7                 common [d]
Redis persistent key-value database
ruby                      3.1               common [d]
An interpreter of object-oriented scripting language
ruby                      3.3               common [d]
An interpreter of object-oriented scripting language

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

```

To list the available Module streams and their statuses for a particular module, use the following command:

```

[root@redhat9 ~]# dnf module list php
Updating Subscription Management repositories.
Last metadata expiration check: 0:38:17 ago on Mon 30 Sep 2024 12:48:56 PM CEST.
Red Hat Enterprise Linux 9 for x86_64 - AppStream (RPMs)
Name                               Stream                               Profiles
Summary
php                                 8.1                                 common [d], devel, minimal
PHP scripting language
php                                 8.2                                 common [d], devel, minimal
PHP scripting language

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

```

To obtain information on the Module streams for a particular module, use the following command:

```
[root@redhat9 ~]# dnf module info php | more
```

Updating Subscription Management repositories.

Last metadata expiration check: 0:42:18 ago on Mon 30 Sep 2024 12:48:56 PM CEST.

Name : php

Stream : 8.1

Version: 9010020220706080036

Context : 9

Architecture: x86_64

Profiles : common [d], devel, minimal

Default profiles : common

Repo : rhel-9-for-x86_64-appstream-rpms

Summary : PHP scripting language

Description : php 8.1 module

Requires : platform:[el9]

Artifacts : apcu-panel-0:5.1.21-1.module+el9.1.0+15477+1fc469b9.noarch

: php-0:8.1.8-1.module+el9.1.0+15877+c3862210.src

: php-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-bcmath-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-bcmath-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-cli-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-cli-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-common-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-common-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-dba-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-dba-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-dbg-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-dbg-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-debugsource-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-devel-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-embedded-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-embedded-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-enchanted-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-enchanted-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

: php-ffi-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

```

: php-ffi-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-fpm-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-fpm-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-gd-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-gd-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-gmp-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-gmp-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-intl-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-intl-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-ldap-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-ldap-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-mbstring-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-mbstring-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-mysqlnd-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-mysqlnd-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-odbc-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-odbc-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-opcache-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-opcache-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-pdo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64
: php-pdo-debuginfo-0:8.1.8-1.module+el9.1.0+15877+c3862210.x86_64

```

--More--

[q]

To install **and** activate a particular Module stream, it is necessary to stipulate the stream concerned:

```

[root@redhat9 ~]# dnf module install php:8.2 -y
Updating Subscription Management repositories.
Last metadata expiration check: 0:54:10 ago on Mon 30 Sep 2024 12:48:56 PM CEST.
Dependencies resolved.

```

```

=====
=====
Package                               Architecture  Size  Version
Repository

```

Installing group/module packages:

```
php-cli x86_64 rhel-9-for-x86_64-appstream-rpms
8.2.13-1.module+el9.4.0+20748+b46899d2
3.6 M
php-common x86_64 rhel-9-for-x86_64-appstream-rpms
8.2.13-1.module+el9.4.0+20748+b46899d2
703 k
php-fpm x86_64 rhel-9-for-x86_64-appstream-rpms
8.2.13-1.module+el9.4.0+20748+b46899d2
1.8 M
php-mbstring x86_64 rhel-9-for-x86_64-appstream-rpms
8.2.13-1.module+el9.4.0+20748+b46899d2
524 k
php-xml x86_64 rhel-9-for-x86_64-appstream-rpms
8.2.13-1.module+el9.4.0+20748+b46899d2
150 k
```

Installing dependencies:

```
nginx-filesystem noarch 1:1.20.1-16.el9_4.1
rhel-9-for-x86_64-appstream-rpms 11 k
```

Installing module profiles:

```
php/common
```

Enabling module streams:

```
php 8.2
```

Transaction Summary

```
Install 6 Packages
```

```
Total download size: 6.8 M
```

```
Installed size: 34 M
```

```
Downloading Packages:
```

```
(1/6): php-common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64.rpm
1.4 MB/s | 703 kB      00:00
(2/6): php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64.rpm
2.2 MB/s | 1.8 MB     00:00
(3/6): php-mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64.rpm
899 kB/s | 524 kB     00:00
(4/6): php-xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64.rpm
566 kB/s | 150 kB     00:00
(5/6): php-cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64.rpm
2.4 MB/s | 3.6 MB     00:01
(6/6): nginx-filesystem-1.20.1-16.el9_4.1.noarch.rpm
23 kB/s | 11 kB       00:00
-----
-----
Total
4.4 MB/s | 6.8 MB     00:01
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :
1/1
  Installing     : php-common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
1/6
  Running scriptlet: nginx-filesystem-1:1.20.1-16.el9_4.1.noarch
2/6
  Installing     : nginx-filesystem-1:1.20.1-16.el9_4.1.noarch
2/6
  Installing     : php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
3/6
  Running scriptlet: php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
3/6
  Installing     : php-cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
```

```
4/6
  Installing      : php-mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
5/6
  Installing      : php-xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
6/6
  Running scriptlet: php-xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
6/6
  Verifying       : php-cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
1/6
  Verifying       : php-common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
2/6
  Verifying       : php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
3/6
  Verifying       : php-mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
4/6
  Verifying       : php-xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
5/6
  Verifying       : nginx-filesystem-1:1.20.1-16.el9_4.1.noarch
6/6
Installed products updated.
```

Installed:

```
  nginx-filesystem-1:1.20.1-16.el9_4.1.noarch           php-
cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64     php-
common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
  php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64   php-
mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64  php-
xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
```

Complete!

Note the status of the **php** Module stream:

```
[root@redhat9 ~]# dnf module list --enabled
```

Updating Subscription Management repositories.

Last metadata expiration check: 0:54:59 ago on Mon 30 Sep 2024 12:48:56 PM CEST.

Red Hat Enterprise Linux 9 for x86_64 - AppStream (RPMs)

Name	Stream	Profiles
Summary		
php	8.2 [e]	common [d] [i], devel,
minimal	PHP scripting language	

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

To remove the Module stream, use the **dnf module remove** command:

```
[root@redhat9 ~]# dnf module remove php:8.2 -y
```

Updating Subscription Management repositories.

Last metadata expiration check: 0:56:35 ago on Mon 30 Sep 2024 12:48:56 PM CEST.

Dependencies resolved.

```
=====
=====
Package                Architecture      Size              Version
Repository
=====
=====
Removing:
 php-cli                x86_64
8.2.13-1.module+el9.4.0+20748+b46899d2 @rhel-9-for-x86_64-appstream-rpms
16 M
 php-common             x86_64
8.2.13-1.module+el9.4.0+20748+b46899d2 @rhel-9-for-x86_64-appstream-rpms
8.1 M
 php-fpm                x86_64
8.2.13-1.module+el9.4.0+20748+b46899d2 @rhel-9-for-x86_64-appstream-rpms
8.2 M
 php-mbstring           x86_64
8.2.13-1.module+el9.4.0+20748+b46899d2 @rhel-9-for-x86_64-appstream-rpms
```

```
1.2 M
 php-xml                x86_64
8.2.13-1.module+el9.4.0+20748+b46899d2 @rhel-9-for-x86_64-appstream-rpms
465 k
Removing unused dependencies:
 nginx-filessystem     noarch                1:1.20.1-16.el9_4.1
@rhel-9-for-x86_64-appstream-rpms 0
Disabling module profiles:
 php/common
```

Transaction Summary

```
=====
Remove 6 Packages
```

Freed space: 34 M

Running transaction check

Transaction check succeeded.

Running transaction test

Transaction test succeeded.

Running transaction

```
  Preparing           :
1/1
  Running scriptlet: php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
1/6
  Erasing           : php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
1/6
  Erasing           : php-xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
2/6
  Erasing           : php-mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
3/6
  Erasing           : php-cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
4/6
  Erasing           : nginx-filessystem-1:1.20.1-16.el9_4.1.noarch
```

```
5/6 Erasing      : php-common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
6/6 Running scriptlet: php-common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
6/6 Verifying     : nginx-filesystem-1:1.20.1-16.el9_4.1.noarch
1/6 Verifying     : php-cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
2/6 Verifying     : php-common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
3/6 Verifying     : php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
4/6 Verifying     : php-mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
5/6 Verifying     : php-xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
6/6
Installed products updated.
```

Removed:

```
nginx-filesystem-1:1.20.1-16.el9_4.1.noarch      php-
cli-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64  php-
common-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
php-fpm-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64  php-
mbstring-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64  php-
xml-8.2.13-1.module+el9.4.0+20748+b46899d2.x86_64
```

Complete!

Note again the status of the **php** Module stream:

```
[root@redhat9 ~]# dnf module list --enabled
Updating Subscription Management repositories.
Last metadata expiration check: 0:57:06 ago on Mon 30 Sep 2024 12:48:56 PM CEST.
```

```

Red Hat Enterprise Linux 9 for x86_64 - AppStream (RPMs)
Name                               Stream                               Profiles
Summary
php                                 8.2 [e]                             common [d], devel, minimal
PHP scripting language

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

```



Important : Note that the Module stream has been uninstalled (absence of **[i]**) but that it is still enabled (presence of **[e]**).

To disable the Module stream, use the **dnf module disable** command:

```

[root@redhat9 ~]# dnf module disable php:8.2 -y
Updating Subscription Management repositories.
Last metadata expiration check: 0:58:47 ago on Mon 30 Sep 2024 12:48:56 PM CEST.
Only module name is required. Ignoring unneeded information in argument: 'php:8.2'
Dependencies resolved.

```

```

=====
Package                               Architecture                               Version
Repository                               Size
=====

```

```

Disabling modules:
  php

```

```

Transaction Summary
=====
=====

```

Complete!

```
[root@redhat9 ~]# dnf module list --enabled
Updating Subscription Management repositories.
Last metadata expiration check: 0:59:14 ago on Mon 30 Sep 2024 12:48:56 PM CEST.
```

LAB #3 - Shared Libraries

3.1 - Introduction

Shared libraries are functions common to several different programs in the same **domain** (sound, database, video etc.). The functions offered by one or more libraries form an **API** (*Application Programming Interface*). Under Linux, libraries are called **Shared Objects** and have the suffix **.so**.

Storage

By convention, shared libraries are stored in **lib** directories, for example :

Directory	Contents
/lib	Base system libraries
/usr/lib	User libraries
/usr/local/lib	Local libraries
/usr/X11R6/lib	X environment libraries
/opt/kde4/lib	KDE Libraries



Important: The most important library is **libc**. Without it, the Linux system cannot function.

ld-linux.so.2

The **ld-linux.so.2** library is used by the system to create a link with a shared library at program runtime and is called the **link loader**. It searches for shared libraries in a specific order:

- in the paths specified by the **LD_LIBRARY_PATH** system variable,
- in the paths specified in the compiled contents of the **/etc/ld.so.cache** file,
- in **/lib** and **/usr/lib**.

It should be noted that the contents of the **ld.so.cache** are built from the information contained in the **/etc/ld.so.conf** configuration file.

In order to study the libraries linked to an application, we will first install the **mc** application:

```
[root@redhat9 ~]# dnf install mc -y
```

3.2 - The ldd command

To determine which libraries are linked to an application, use the **ldd** command:

```
[root@redhat9 ~]# ldd /usr/bin/mc
linux-vdso.so.1 (0x00007ffe40b83000)
libslang.so.2 => /lib64/libslang.so.2 (0x00007f0579a00000)
libgpm.so.2 => /lib64/libgpm.so.2 (0x00007f0579e2d000)
libe2p.so.2 => /lib64/libe2p.so.2 (0x00007f0579e21000)
libglib-2.0.so.0 => /lib64/libglib-2.0.so.0 (0x00007f0579ce6000)
libc.so.6 => /lib64/libc.so.6 (0x00007f0579600000)
libm.so.6 => /lib64/libm.so.6 (0x00007f0579925000)
libpcre.so.1 => /lib64/libpcre.so.1 (0x00007f05798ad000)
/lib64/ld-linux-x86-64.so.2 (0x00007f0579f99000)
```

To understand what happens if a library is missing, rename the **/usr/lib/libslang.so.2** library to **/usr/lib/libslang.so.2.old**:

```
[root@redhat9 ~]# mv /lib64/libslang.so.2 /lib64/libslang.so.2.old
```

Run the ldd command again. You will get a result similar to the following:

```
[root@redhat9 ~]# ldd /usr/bin/mc
linux-vdso.so.1 (0x00007ffe893a6000)
libslang.so.2 => not found
libgpm.so.2 => /lib64/libgpm.so.2 (0x00007fdff3ea8000)
libe2p.so.2 => /lib64/libe2p.so.2 (0x00007fdff3e9c000)
libglib-2.0.so.0 => /lib64/libglib-2.0.so.0 (0x00007fdff3d61000)
libc.so.6 => /lib64/libc.so.6 (0x00007fdff3a00000)
libpcrc.so.1 => /lib64/libpcrc.so.1 (0x00007fdff3ce9000)
/lib64/ld-linux-x86-64.so.2 (0x00007fdff4014000)
```

Note the presence of the line **libslang.so.2 => not found**. Given the missing shared library, the **mc** program can no longer be run:

```
[root@redhat9 ~]# mc
/usr/bin/mc: error while loading shared libraries: libslang.so.2: cannot open shared object file: No such file or directory
```

Rename the library correctly and check that the previous error has been resolved with the ldd command :

```
[root@redhat9 ~]# mv /lib64/libslang.so.2.old /lib64/libslang.so.2

[root@redhat9 ~]# ldd /usr/bin/mc
linux-vdso.so.1 (0x00007ffff85f9000)
libslang.so.2 => /lib64/libslang.so.2 (0x00007effc9e00000)
libgpm.so.2 => /lib64/libgpm.so.2 (0x00007effca1d4000)
libe2p.so.2 => /lib64/libe2p.so.2 (0x00007effca1c8000)
libglib-2.0.so.0 => /lib64/libglib-2.0.so.0 (0x00007effc9cc5000)
libc.so.6 => /lib64/libc.so.6 (0x00007effc9a00000)
libm.so.6 => /lib64/libm.so.6 (0x00007effca0ed000)
libpcrc.so.1 => /lib64/libpcrc.so.1 (0x00007effc9c4d000)
```

```
/lib64/ld-linux-x86-64.so.2 (0x00007effca340000)
```

3.3 - The `/etc/ld.so.conf` file

The `/etc/ld.so.conf` file is used to configure the `/etc/ld.so.cache` cache:

```
[root@redhat9 ~]# cat /etc/ld.so.conf
include ld.so.conf.d/*.conf
```

In this case, the file only contains an **include** directive which refers to the contents of the `/etc/ld.so.conf.d/` directory:

```
[root@redhat9 ~]# ls -l /etc/ld.so.conf.d/
total 4
-rw-r--r--. 1 root root root 30 Jan 19 2024 pipewire-jack-x86_64.conf
```

For example, the contents of the `pipewire-jack-x86_64.conf` file are:

```
[root@redhat9 ~]# cat /etc/ld.so.conf.d/pipewire-jack-x86_64.conf
/usr/lib64/pipewire-0.3/jack/
```

3.4 - The `ldconfig` command

The **ldconfig** command is used to:

- update the cache for the paths included in the `/etc/ld.so.conf` file as well as for the `/lib` and `/usr/lib` directories. The **-N** option in the `ldconfig` command prevents paths in the file from being updated,
- update symbolic links on libraries. The **-X** option to the `ldconfig` command prevents symbolic links from being updated.

Symbolic links are used to manage library versions.

The `ldconfig` command can be used with the **-p** option to view the contents of the cache:

```
[root@redhat9 ~]# ldconfig -p | more
827 libs found in cache `/etc/ld.so.cache'
  libzstd.so.1 (libc6,x86-64) => /lib64/libzstd.so.1
  libz.so.1 (libc6,x86-64) => /lib64/libz.so.1
  libyelp.so.0 (libc6,x86-64) => /lib64/libyelp.so.0
  libyaml-0.so.2 (libc6,x86-64) => /lib64/libyaml-0.so.2
  libyajl.so.2 (libc6,x86-64) => /lib64/libyajl.so.2
  libxtables.so.12 (libc6,x86-64) => /lib64/libxtables.so.12
  libxslt.so.1 (libc6,x86-64) => /lib64/libxslt.so.1
  libxshmfence.so.1 (libc6,x86-64) => /lib64/libxshmfence.so.1
  libxml2.so.2 (libc6,x86-64) => /lib64/libxml2.so.2
  libxmlsec1.so.1 (libc6,x86-64) => /lib64/libxmlsec1.so.1
  libxmlsec1-openssl.so.1 (libc6,x86-64) => /lib64/libxmlsec1-openssl.so.1
  libxmlsec1-openssl.so (libc6,x86-64) => /lib64/libxmlsec1-openssl.so
  libxmlb.so.2 (libc6,x86-64) => /lib64/libxmlb.so.2
  libxklavier.so.16 (libc6,x86-64) => /lib64/libxklavier.so.16
  libxkbregistry.so.0 (libc6,x86-64) => /lib64/libxkbregistry.so.0
  libxkbfile.so.1 (libc6,x86-64) => /lib64/libxkbfile.so.1
  libxkbcommon.so.0 (libc6,x86-64) => /lib64/libxkbcommon.so.0
  libxkbcommon-x11.so.0 (libc6,x86-64) => /lib64/libxkbcommon-x11.so.0
  libxcvt.so.0 (libc6,x86-64) => /lib64/libxcvt.so.0
  libxcb.so.1 (libc6,x86-64) => /lib64/libxcb.so.1
  libxcb-xvmc.so.0 (libc6,x86-64) => /lib64/libxcb-xvmc.so.0
  libxcb-xv.so.0 (libc6,x86-64) => /lib64/libxcb-xv.so.0
  libxcb-xtest.so.0 (libc6,x86-64) => /lib64/libxcb-xtest.so.0
  libxcb-xselinux.so.0 (libc6,x86-64) => /lib64/libxcb-xselinux.so.0
  libxcb-xkb.so.1 (libc6,x86-64) => /lib64/libxcb-xkb.so.1
  libxcb-xinput.so.0 (libc6,x86-64) => /lib64/libxcb-xinput.so.0
  libxcb-xinerama.so.0 (libc6,x86-64) => /lib64/libxcb-xinerama.so.0
  libxcb-xf86dri.so.0 (libc6,x86-64) => /lib64/libxcb-xf86dri.so.0
  libxcb-xfixes.so.0 (libc6,x86-64) => /lib64/libxcb-xfixes.so.0
  libxcb-util.so.1 (libc6,x86-64) => /lib64/libxcb-util.so.1
  libxcb-sync.so.1 (libc6,x86-64) => /lib64/libxcb-sync.so.1
  libxcb-shm.so.0 (libc6,x86-64) => /lib64/libxcb-shm.so.0
```

```
libxcb-shape.so.0 (libc6,x86-64) => /lib64/libxcb-shape.so.0
libxcb-screensaver.so.0 (libc6,x86-64) => /lib64/libxcb-screensaver.so.0
libxcb-res.so.0 (libc6,x86-64) => /lib64/libxcb-res.so.0
libxcb-render.so.0 (libc6,x86-64) => /lib64/libxcb-render.so.0
libxcb-record.so.0 (libc6,x86-64) => /lib64/libxcb-record.so.0
libxcb-randr.so.0 (libc6,x86-64) => /lib64/libxcb-randr.so.0
libxcb-present.so.0 (libc6,x86-64) => /lib64/libxcb-present.so.0
libxcb-glx.so.0 (libc6,x86-64) => /lib64/libxcb-glx.so.0
libxcb-dri3.so.0 (libc6,x86-64) => /lib64/libxcb-dri3.so.0
libxcb-dri2.so.0 (libc6,x86-64) => /lib64/libxcb-dri2.so.0
libxcb-dpms.so.0 (libc6,x86-64) => /lib64/libxcb-dpms.so.0
libxcb-damage.so.0 (libc6,x86-64) => /lib64/libxcb-damage.so.0
libxcb-composite.so.0 (libc6,x86-64) => /lib64/libxcb-composite.so.0
libxatracker.so.2 (libc6,x86-64) => /lib64/libxatracker.so.2
libwpe-1.0.so.1 (libc6,x86-64) => /lib64/libwpe-1.0.so.1
libwoff2enc.so.1.0.2 (libc6,x86-64) => /lib64/libwoff2enc.so.1.0.2
libwoff2dec.so.1.0.2 (libc6,x86-64) => /lib64/libwoff2dec.so.1.0.2
libwoff2common.so.1.0.2 (libc6,x86-64) => /lib64/libwoff2common.so.1.0.2
libwnck-3.so.0 (libc6,x86-64) => /lib64/libwnck-3.so.0
libwireplumber-0.4.so.0 (libc6,x86-64) => /lib64/libwireplumber-0.4.so.0
libwebrtc_audio_processing.so.1 (libc6,x86-64) => /lib64/libwebrtc_audio_processing.so.1
libwebpmux.so.3 (libc6,x86-64) => /lib64/libwebpmux.so.3
```

--More--

To add shared libraries, you need to:

- create a file in the **/etc/ld.so.conf.d/** directory and enter the path(s) to the storage location of the shared libraries to be added,
- run the **ldconfig -v** command, where v stands for verbose, to rebuild the cache.

