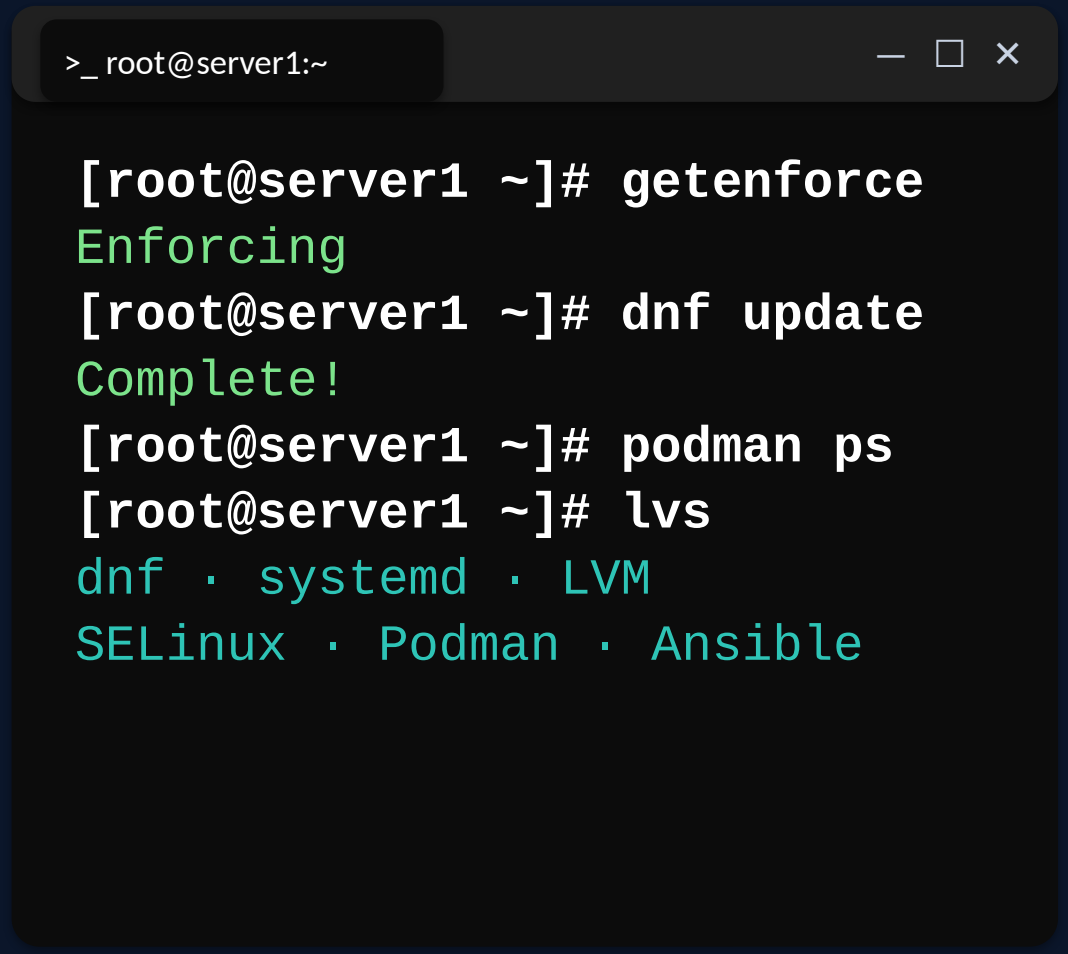


LESSON 5 OF 12

Red Hat Enterprise Linux

RHEL 9 & 10 · Admin · SELinux

Software Management with DNF, RPM, Repos & Flatpak

Full Course · RHEL 10.3 & 9.9 (Nov 2026)

What You Will Learn in Lesson 5

- RPM packages and repositories: BaseOS and AppStream
- dnf: search, install, update, remove
- Package groups and environments
- History and undo
- Application Streams: newer versions of languages and databases
- Querying packages with rpm
- Adding repositories: EPEL and your own; Flatpak

Packages and Repositories

Term	Meaning
RPM package	httpd-2.4.63-1.el10.x86_64.rpm — name, version, release, architecture
Repository	A signed collection of packages that dnf downloads from
BaseOS	The core operating system, supported for the whole life of the version
AppStream	Applications, languages, databases and tools
CodeReady Builder	Extra developer packages (enable when needed)
GPG signature	Proves a package really came from Red Hat

Search, Install and Remove

```
[student@server1 ~]$ dnf search nginx
[student@server1 ~]$ dnf info httpd
[student@server1 ~]$ dnf provides /usr/bin/dig       # which package has this file?
bind-utils-9.18...el10.x86_64 : Utilities for querying DNS name servers
[student@server1 ~]$ sudo dnf install -y httpd bind-utils
[student@server1 ~]$ sudo dnf remove nginx
[student@server1 ~]$ sudo dnf reinstall httpd
[student@server1 ~]$ dnf list installed | grep httpd
[student@server1 ~]$ sudo dnf install ./local-tool-1.0.rpm   # a downloaded file
```

Updates

```
[student@server1 ~]$ dnf check-update                  # what is waiting?
[student@server1 ~]$ sudo dnf update -y                # update everything
[student@server1 ~]$ sudo dnf update --security        # security fixes only
[student@server1 ~]$ dnf updateinfo list --security    # advisories (RHSA)
[student@server1 ~]$ sudo dnf update openssl           # one package
[student@server1 ~]$ dnf needs-restarting -r           # is a reboot needed?
[student@server1 ~]$ sudo dnf install dnf-automatic
[student@server1 ~]$ sudo systemctl enable --now dnf-automatic.timer
```

Groups, History and Undo

```
[student@server1 ~]$ dnf group list
[student@server1 ~]$ dnf group info 'Development Tools'
[student@server1 ~]$ sudo dnf group install -y 'Development Tools'
[student@server1 ~]$ dnf history
ID | Command line              | Date and time    | Action(s) | Altered
 7 | group install Developmen.. | 2026-11-20 10:42 | Install   |   38
 6 | install -y httpd bind-u..  | 2026-11-20 10:30 | Install   |    9
[student@server1 ~]$ dnf history info 7
[student@server1 ~]$ sudo dnf history undo 7           # remove those 38 packages
```

Application Streams

Item	RHEL 9	RHEL 10
Idea	Several versions of a language or database	Same idea
How	Modules: dnf module enable nodejs:22	Versioned packages, e.g. nodejs24
Examples	nodejs, php, postgresql, ruby modules	python3.12, postgresql18, nodejs24
List	dnf module list	dnf list --available 'postgresql*'
Life cycle	Each stream has its own support dates	Check the Application Streams life cycle page

Query Packages with rpm

```
[student@server1 ~]$ rpm -qa | wc -l                    # how many packages?
[student@server1 ~]$ rpm -qi httpd                      # information
[student@server1 ~]$ rpm -ql httpd | head               # files in the package
[student@server1 ~]$ rpm -qc httpd                      # its configuration files
[student@server1 ~]$ rpm -qf /etc/ssh/sshd_config      # which package owns this file?
openssh-server-9.9p1-...el10.x86_64
[student@server1 ~]$ rpm -V openssh-server              # what changed since install?
S.5....T.  c /etc/ssh/sshd_config
[student@server1 ~]$ rpm -q --changelog openssl | head
```

Repositories: EPEL and Your Own

```
[student@server1 ~]$ dnf repolist --all
[student@server1 ~]$ sudo subscription-manager repos \
      --enable codeready-builder-for-rhel-10-x86_64-rpms
[student@server1 ~]$ sudo dnf install \
      https://dl.fedoraproject.org/pub/epel/epel-release-latest-10.noarch.rpm
[student@server1 ~]$ sudo dnf install htop

[student@server1 ~]$ sudo vim /etc/yum.repos.d/internal.repo
[internal]
name=Company packages
baseurl=http://10.0.0.11/repo/
gpgcheck=1
gpgkey=http://10.0.0.11/repo/RPM-GPG-KEY-internal
```

Flatpak and Desktop Apps

```
[student@server1 ~]$ flatpak remotes
Name    Options
rhel    system,oci
[student@server1 ~]$ flatpak search firefox
[student@server1 ~]$ flatpak install rhel org.mozilla.firefox
[student@server1 ~]$ flatpak list --app
[student@server1 ~]$ flatpak update
# Optional, community apps:
[student@server1 ~]$ flatpak remote-add --if-not-exists flathub \
      https://dl.flathub.org/repo/flathub.flatpakrepo
```

Summary and Homework

- BaseOS + AppStream; packages are GPG-signed RPMs
- dnf search, info, provides, install, remove, update
- dnf history undo is your safety net
- rpm -qa, -qi, -ql, -qc, -qf, -V answer questions
- EPEL for extras (unsupported); Flatpak for desktop apps
- Homework: install httpd and Development Tools, find who owns /etc/ssh/sshd_config, undo the group install

Thank You! 🙏

Free videos & PDFs: www.MyWebUniversity.com

Slides for this lesson: MyWebUniversity.com/presentations

YouTube: @MyWebUniversity · @MyWebUniversity-Dari

Wahidullah Lutfy — Founder and Director of IT of MyWebUniversity, and CS teacher

Book: The Direct Path to Linux Ubuntu (Amazon · Barnes & Noble)

Learn it, then pass it on.