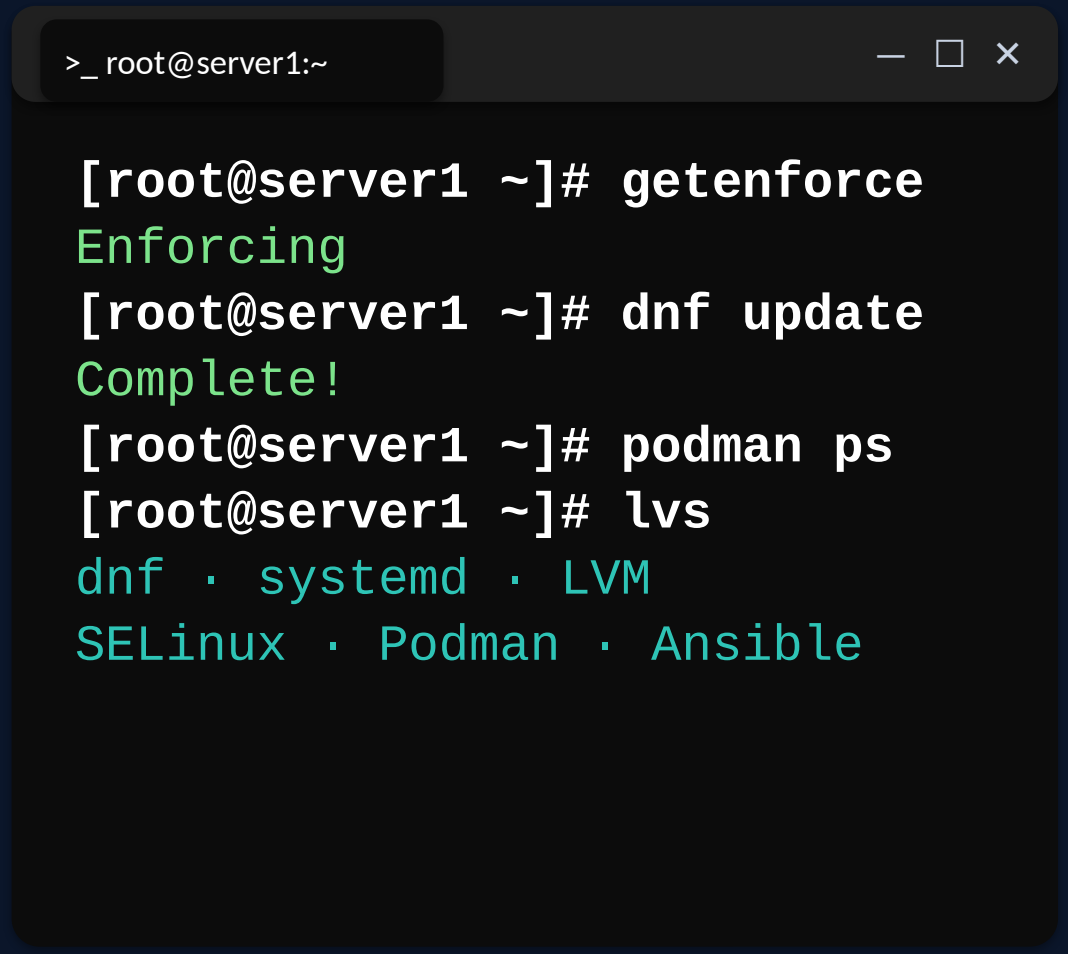


LESSON 6 OF 12

Red Hat Enterprise Linux

RHEL 9 & 10 · Admin · SELinux

systemd, Boot, Logs, Processes & Scheduling

Full Course · RHEL 10.3 & 9.9 (Nov 2026)

What You Will Learn in Lesson 6

- systemd units and systemctl
- The boot process: firmware, GRUB, kernel, systemd, targets
- Recovering a lost root password
- Logs: journalctl and /var/log
- Processes: ps, top, kill, nice
- Performance profiles with tuned
- Scheduling: cron, at and systemd timers

systemd and Units

Unit type	Example	Purpose
service	sshd.service	A daemon (background program)
socket	cockpit.socket	Starts a service when a connection arrives
target	multi-user.target	A group of units: a system state
timer	dnf-automatic.timer	Runs a service on a schedule
mount	home.mount	A mounted file system
Unit files	/usr/lib/systemd/system	Your changes go in /etc/systemd/system

Managing Services with systemctl

```
[student@server1 ~]$ systemctl status sshd
● sshd.service - OpenSSH server daemon
     Active: active (running) since Fri 2026-11-20 09:12:01 PST
[student@server1 ~]$ sudo systemctl start httpd ; sudo systemctl stop httpd
[student@server1 ~]$ sudo systemctl restart httpd ; sudo systemctl reload httpd
[student@server1 ~]$ sudo systemctl enable --now httpd     # start now and at boot
[student@server1 ~]$ systemctl is-enabled httpd ; systemctl is-active httpd
[student@server1 ~]$ systemctl list-units --type=service --state=failed
[student@server1 ~]$ sudo systemctl mask cups               # can never be started
```

Your Own Settings: Drop-ins and Unit Files

```
[student@server1 ~]$ sudo systemctl edit httpd          # creates a drop-in override
[Service]
Restart=on-failure
RestartSec=5
[student@server1 ~]$ systemctl cat httpd                # unit + overrides

# /etc/systemd/system/hello.service — your own service
[Unit]
Description=Hello web app
After=network-online.target
[Service]
ExecStart=/usr/local/bin/hello --port 8080
User=svc-hello
[Install]
WantedBy=multi-user.target
```

The Boot Process

Step	What happens
1. Firmware	UEFI or BIOS tests hardware; Secure Boot checks signatures
2. Boot loader	GRUB 2 shows the menu and loads the kernel and initramfs
3. Kernel	Starts, uses the initramfs to find the root file system
4. systemd	PID 1 reads the default target and starts units in parallel
5. Target	multi-user.target (text) or graphical.target (desktop)
Commands	systemctl get-default / set-default; systemd-analyze blame

Reset a Lost Root Password

```
# 1. Reboot; in the GRUB menu press e on the kernel entry
# 2. At the end of the line starting with 'linux' add:   rd.break
# 3. Press Ctrl+X to boot into the initramfs shell
switch_root:/# mount -o remount,rw /sysroot
switch_root:/# chroot /sysroot
sh-5.2# passwd root
sh-5.2# touch /.autorelabel                # SELinux must relabel the files
sh-5.2# exit ; exit                        # the system relabels and reboots

# Protect GRUB in production:  sudo grub2-setpassword
```

Reading Logs with journalctl

```
[student@server1 ~]$ journalctl -u sshd --since '1 hour ago'
[student@server1 ~]$ journalctl -p err -b              # errors since this boot
[student@server1 ~]$ journalctl -f                     # follow live, like tail -f
[student@server1 ~]$ journalctl -b -1                  # the previous boot
[student@server1 ~]$ journalctl _UID=1000 -o verbose
[student@server1 ~]$ sudo mkdir -p /var/log/journal    # keep logs across reboots
[student@server1 ~]$ sudo less /var/log/messages ; sudo tail /var/log/secure
[student@server1 ~]$ logger 'backup finished'          # write your own message
```

Processes

```
[student@server1 ~]$ ps aux --sort=-%mem | head -5
[student@server1 ~]$ ps -ef --forest | less          # parent/child tree
[student@server1 ~]$ pgrep -a httpd
[student@server1 ~]$ top                              # press 1, M, P, k, q
[student@server1 ~]$ kill 4321 ; kill -9 4321         # TERM (polite) / KILL (forced)
[student@server1 ~]$ pkill -u sara                    # all of sara's processes
[student@server1 ~]$ nice -n 10 tar -czf big.tgz /data ; sudo renice -n -5 -p 4321
[student@server1 ~]$ sleep 300 &  ;  jobs  ;  fg %1   # background jobs
```

Performance Profiles with tuned

```
[student@server1 ~]$ tuned-adm active
Current active profile: virtual-guest
[student@server1 ~]$ tuned-adm list
balanced  powersave  throughput-performance  virtual-guest ...
[student@server1 ~]$ tuned-adm recommend
virtual-guest
[student@server1 ~]$ sudo tuned-adm profile throughput-performance
[student@server1 ~]$ uptime ; vmstat 2 5 ; free -h     # load and memory
```

Scheduling: cron, at and timers

```
[student@server1 ~]$ crontab -e                          # your personal jobs
# min hour day month weekday  command
30 2 * * *   /home/student/bin/backup.sh                # every day at 02:30
*/15 8-17 * * 1-5  /usr/local/bin/check-site            # every 15 min, office hours
[student@server1 ~]$ crontab -l ; sudo crontab -u sara -l
[student@server1 ~]$ echo 'systemctl restart httpd' | sudo at 23:00   # once
[student@server1 ~]$ atq
[student@server1 ~]$ systemctl list-timers               # systemd timers
```

Summary and Homework

- systemctl enable --now, status, restart; overrides with systemctl edit
- Boot: firmware → GRUB 2 → kernel → systemd → target
- Root password reset: rd.break, chroot, passwd, touch /.autorelabel
- journalctl -u, -p err, -b, -f; persistent journal
- ps, top, kill, nice; tuned-adm profile; cron, at, timers
- Homework: reset root's password on server2; schedule a daily tar backup of /etc

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.