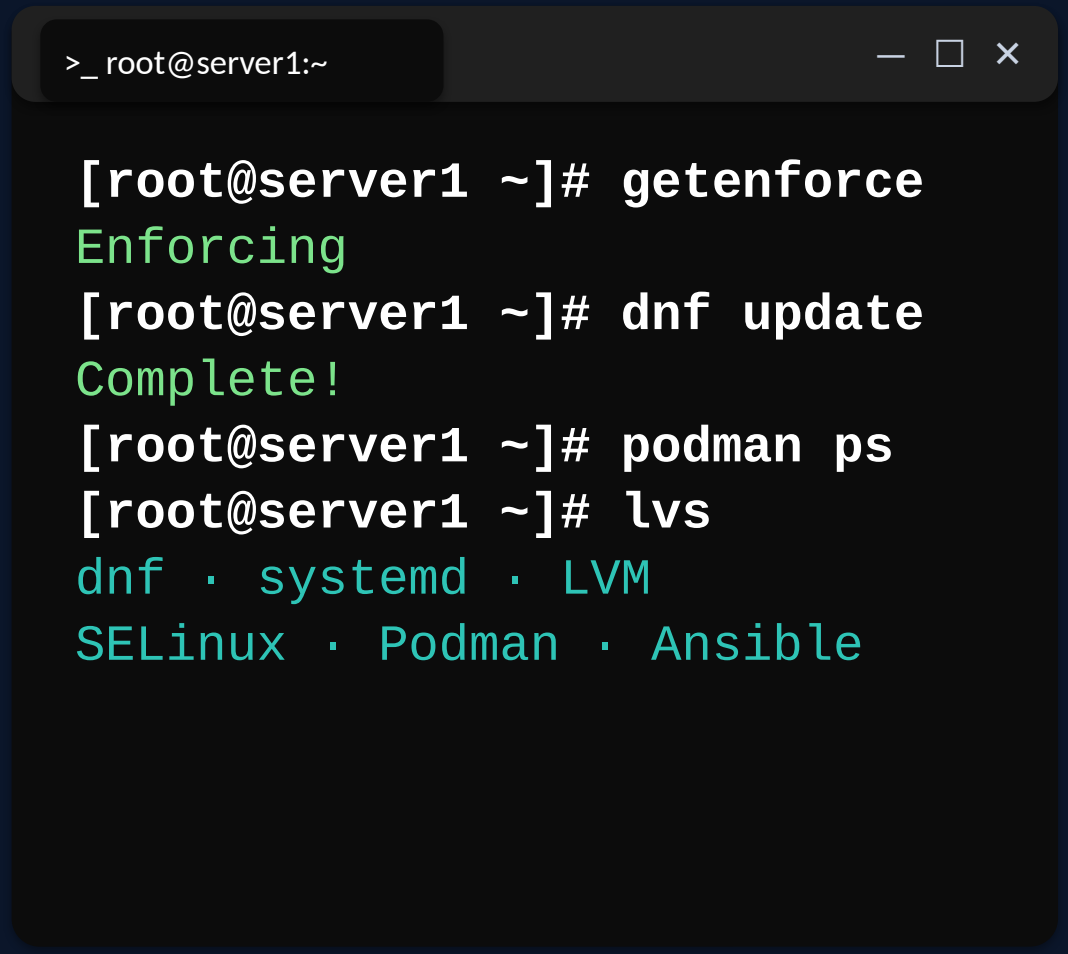


LESSON 7 OF 12

Red Hat Enterprise Linux

RHEL 9 & 10 · Admin · SELinux

Storage: Partitions, XFS, LVM, Swap & Stratis

Full Course · RHEL 10.3 & 9.9 (Nov 2026)

What You Will Learn in Lesson 7

- Disks, partitions and device names
- Partitioning with parted: GPT
- File systems: XFS and ext4; mounting
- Permanent mounts in /etc/fstab with UUIDs
- LVM: physical volumes, volume groups, logical volumes
- Growing a file system while it is in use
- Swap space; Stratis; LUKS encryption

Find Your Disks

```
[student@server1 ~]$ lsblk
NAME          MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
vda           252:0    0   30G  0 disk
├─vda1        252:1    0  600M  0 part /boot/efi
├─vda2        252:2    0    1G  0 part /boot
└─vda3        252:3    0 28.4G  0 part
  ├─rhel-root 253:0    0 25.4G  0 lvm  /
  └─rhel-swap 253:1    0    3G  0 lvm  [SWAP]
vdb           252:16   0    5G  0 disk
vdc           252:32   0    5G  0 disk
[student@server1 ~]$ lsblk -f ; df -hT ; sudo blkid
```

Partition a Disk with parted

```
[student@server1 ~]$ sudo parted /dev/vdb mklabel gpt
[student@server1 ~]$ sudo parted /dev/vdb mkpart data xfs 1MiB 2GiB
[student@server1 ~]$ sudo parted /dev/vdb mkpart lvm1 2GiB 100%
[student@server1 ~]$ sudo parted /dev/vdb set 2 lvm on
[student@server1 ~]$ sudo parted /dev/vdb print
Number  Start   End     Size    File system  Name  Flags
 1      1049kB  2147MB  2146MB               data
 2      2147MB  5368MB  3221MB               lvm1  lvm
[student@server1 ~]$ sudo udevadm settle ; lsblk /dev/vdb
```

Create File Systems and Mount Them

```
[student@server1 ~]$ sudo mkfs.xfs -L data /dev/vdb1      # XFS: the RHEL default
[student@server1 ~]$ sudo mkdir /data
[student@server1 ~]$ sudo mount /dev/vdb1 /data
[student@server1 ~]$ df -h /data
Filesystem      Size  Used Avail Use% Mounted on
/dev/vdb1       2.0G   47M  1.9G   3% /data
[student@server1 ~]$ sudo umount /data
# ext4 is also supported:  sudo mkfs.ext4 /dev/vdX1
# XFS can grow but cannot shrink; ext4 can do both (offline)
```

Permanent Mounts in /etc/fstab

```
[student@server1 ~]$ sudo blkid /dev/vdb1
/dev/vdb1: LABEL="data" UUID="5b2e7c1a-..." TYPE="xfs"
[student@server1 ~]$ sudo vim /etc/fstab
# device                                mount  type  options   dump fsck
UUID=5b2e7c1a-...                       /data  xfs   defaults  0 0
[student@server1 ~]$ sudo systemctl daemon-reload
[student@server1 ~]$ sudo mount -a          # test: mounts everything in fstab
[student@server1 ~]$ findmnt /data
# A mistake here can stop the boot: ALWAYS test with mount -a
```

LVM: Logical Volume Manager

Layer	What it is	Commands
Physical volume (PV)	A disk or partition given to LVM	pvcreate, pvs
Volume group (VG)	A pool of space from one or more PVs	vgcreate, vgextend, vgs
Logical volume (LV)	A 'partition' cut from the pool	lvcreate, lvextend, lvs
File system	XFS or ext4 on the LV	mkfs.xfs, xfs_growfs
Why	Grow online, add disks, snapshots	RHEL installs on LVM by default

Build LVM Step by Step

```
[student@server1 ~]$ sudo pvcreate /dev/vdb2 /dev/vdc
[student@server1 ~]$ sudo vgcreate vgdata /dev/vdb2 /dev/vdc
[student@server1 ~]$ sudo lvcreate -n lvweb -L 3G vgdata
[student@server1 ~]$ sudo lvcreate -n lvlogs -l 50%FREE vgdata
[student@server1 ~]$ sudo mkfs.xfs /dev/vgdata/lvweb
[student@server1 ~]$ sudo mkdir /srv/web
[student@server1 ~]$ echo '/dev/vgdata/lvweb /srv/web xfs defaults 0 0' | sudo tee -a /etc/fstab
[student@server1 ~]$ sudo systemctl daemon-reload ; sudo mount -a
[student@server1 ~]$ sudo pvs ; sudo vgs ; sudo lvs
```

Grow a File System Online

```
[student@server1 ~]$ df -h /srv/web
/dev/mapper/vgdata-lvweb  3.0G  2.8G  200M  94% /srv/web
[student@server1 ~]$ sudo lvextend -r -L +1G /dev/vgdata/lvweb    # -r grows the FS too
  Size of logical volume vgdata/lvweb changed from 3.00 GiB to 4.00 GiB.
[student@server1 ~]$ df -h /srv/web
/dev/mapper/vgdata-lvweb  4.0G  2.8G  1.2G  70% /srv/web

# Pool full? Add a disk first:
[student@server1 ~]$ sudo vgextend vgdata /dev/vdd
# Without -r:  sudo xfs_growfs /srv/web   (ext4: sudo resize2fs /dev/vgdata/lvweb)
```

Swap Space

```
[student@server1 ~]$ swapon --show ; free -h
[student@server1 ~]$ sudo lvcreate -n lvswap -L 1G vgdata
[student@server1 ~]$ sudo mkswap /dev/vgdata/lvswap
[student@server1 ~]$ echo '/dev/vgdata/lvswap none swap defaults 0 0' | sudo tee -a /etc/fstab
[student@server1 ~]$ sudo systemctl daemon-reload ; sudo swapon -a
[student@server1 ~]$ swapon --show
NAME       TYPE      SIZE USED PRIO
/dev/dm-1  partition   3G   0B   -2
/dev/dm-4  partition   1G   0B   -3
```

Stratis and LUKS Encryption

Tool	What it does	Example
Stratis	Pool-based storage on XFS: thin provisioning, snapshots	stratis pool create pool1 /dev/vdd
Stratis FS	File systems grow automatically inside the pool	stratis fs create pool1 docs
Stratis mount	fstab needs x-systemd.requires=stratisd.service	see man stratis; mount -a to test
LUKS	Encrypts a whole partition or LV	cryptsetup luksFormat /dev/vdb1
Open LUKS	Unlock, then mkfs and mount the mapper device	cryptsetup open /dev/vdb1 secret
At boot	/etc/crypttab, or Clevis with TPM 2.0 / Tang	Laptops: encrypt during installation

Summary and Homework

- lsblk, blkid, df -hT show disks, UUIDs and space
- parted mklabel gpt / mkpart; mkfs.xfs; mount
- fstab with UUIDs; always test with mount -a
- LVM: pvcreate → vgcreate → lvcreate; lvextend -r grows online
- mkswap + swapon; Stratis pools; LUKS encryption
- Homework: build vgdata from vdb2 + vdc, create lvweb, mount at /srv/web, then grow it by 1 GB

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.