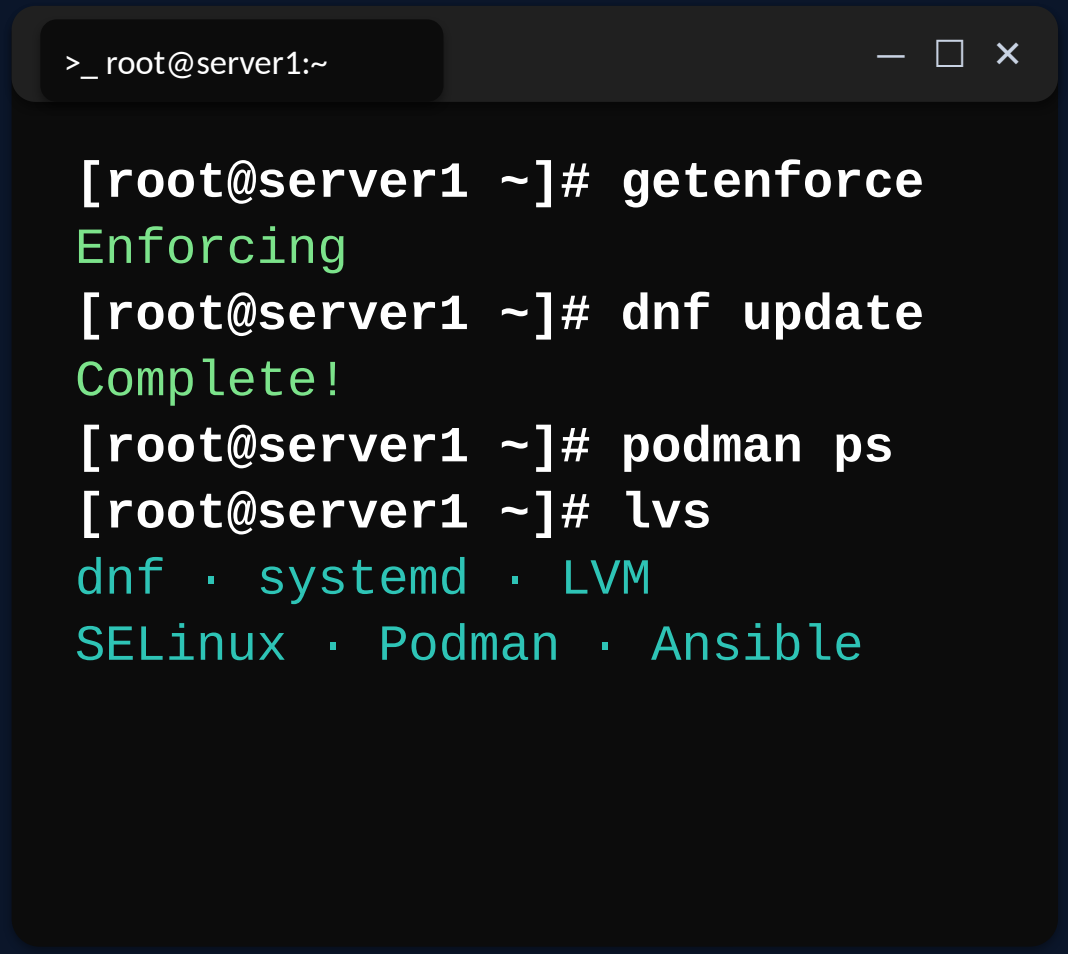


LESSON 8 OF 12

Red Hat Enterprise Linux

RHEL 9 & 10 · Admin · SELinux

Networking, firewalld & Secure SSH

Full Course · RHEL 10.3 & 9.9 (Nov 2026)

What You Will Learn in Lesson 8

- Network basics: interfaces, IP, gateway, DNS
- Checking the network: ip, ss, ping, dig
- NetworkManager with nmcli: static IP, DNS, hostname
- Name resolution: /etc/hosts and resolv.conf
- firewalld: zones, services and ports
- SSH: keys, secure configuration, copying files
- Troubleshooting step by step

Check the Network

```
[student@server1 ~]$ ip -br addr
lo        UNKNOWN  127.0.0.1/8 ::1/128
enp1s0    UP       10.0.0.11/24 fe80::5054:ff:fe12:3456/64
[student@server1 ~]$ ip route                    # default via 10.0.0.1
[student@server1 ~]$ ping -c 3 10.0.0.1          # gateway reachable?
[student@server1 ~]$ dig +short redhat.com        # DNS working?
[student@server1 ~]$ ss -tulpn                   # listening ports + programs
[student@server1 ~]$ tracepath redhat.com
[student@server1 ~]$ curl -I https://www.mywebuniversity.com
```

NetworkManager Concepts

Term	Meaning
Device	A network interface, e.g. enp1s0
Connection (profile)	Settings for a device: IP, gateway, DNS, autoconnect
Files	/etc/NetworkManager/system-connections/*.nmconnection
Tools	nmcli (command line), nmtui (text menus), Cockpit, GNOME
RHEL 9 and 10	Keyfile format; old ifcfg files are no longer used in RHEL 10
Rule	Never edit while NetworkManager runs — use nmcli

Static IP with nmcli

```
[student@server1 ~]$ nmcli device status
[student@server1 ~]$ nmcli connection show
NAME    UUID        TYPE      DEVICE
enp1s0  9c2e...     ethernet  enp1s0
[student@server1 ~]$ sudo nmcli con mod enp1s0 ipv4.method manual \
      ipv4.addresses 10.0.0.11/24 ipv4.gateway 10.0.0.1 \
      ipv4.dns '10.0.0.1 1.1.1.1' ipv4.dns-search lab.local
[student@server1 ~]$ sudo nmcli con up enp1s0
[student@server1 ~]$ sudo nmcli con add con-name lab2 type ethernet ifname enp2s0 \
      ipv4.method manual ipv4.addresses 192.168.50.11/24
[student@server1 ~]$ sudo hostnamectl set-hostname server1.lab.local
```

Name Resolution

```
[student@server1 ~]$ cat /etc/hosts
127.0.0.1   localhost
10.0.0.11   server1.lab.local server1
10.0.0.12   server2.lab.local server2
[student@server1 ~]$ cat /etc/resolv.conf      # written by NetworkManager
search lab.local
nameserver 10.0.0.1
[student@server1 ~]$ grep ^hosts /etc/nsswitch.conf
hosts:      files dns myhostname
[student@server1 ~]$ getent hosts server2      # uses the same order as programs
```

firewalld: Zones, Services, Ports

Concept	Meaning
Zone	A trust level for a network; public is the default
Service	A named set of ports, e.g. http = 80/tcp, ssh = 22/tcp
Port	A single port/protocol, e.g. 8080/tcp
Runtime vs permanent	Runtime is lost at reload; --permanent is saved
Rich rules	Allow or deny by source address, logging, limits
Backend	nftables in RHEL 9 and 10

Using firewall-cmd

```
[student@server1 ~]$ sudo firewall-cmd --state ; sudo firewall-cmd --get-active-zones
[student@server1 ~]$ sudo firewall-cmd --list-all
public (active)
  interfaces: enp1s0
  services: cockpit dhcpv6-client ssh
[student@server1 ~]$ sudo firewall-cmd --permanent --add-service={http,https}
[student@server1 ~]$ sudo firewall-cmd --permanent --add-port=8080/tcp
[student@server1 ~]$ sudo firewall-cmd --permanent --remove-service=dhcpv6-client
[student@server1 ~]$ sudo firewall-cmd --permanent --add-rich-rule=\
      'rule family=ipv4 source address=10.0.0.0/24 service name=mysql accept'
[student@server1 ~]$ sudo firewall-cmd --reload ; sudo firewall-cmd --list-services
```

SSH Keys

```
[student@server1 ~]$ ssh-keygen -t ed25519 -C 'student@server1'
Your public key has been saved in /home/student/.ssh/id_ed25519.pub
[student@server1 ~]$ ssh-copy-id student@server2
[student@server1 ~]$ ssh student@server2              # no password now
[student@server1 ~]$ ssh server2 'uptime; df -h /'    # run a remote command
[student@server1 ~]$ scp report.txt server2:/tmp/
[student@server1 ~]$ rsync -avz projects/ server2:projects/
[student@server1 ~]$ sftp server2
```

A Secure SSH Server

```
[student@server2 ~]$ sudo vim /etc/ssh/sshd_config.d/50-security.conf
PermitRootLogin no
PasswordAuthentication no          # keys only (test your key first!)
MaxAuthTries 3
AllowGroups wheel sshusers
[student@server2 ~]$ sudo sshd -t                    # test the syntax
[student@server2 ~]$ sudo systemctl reload sshd

# A different port needs SELinux and firewall changes (Lesson 9):
[student@server2 ~]$ sudo semanage port -a -t ssh_port_t -p tcp 2222
```

Troubleshooting the Network

Step	Check	Command
1	Is the link up and the address right?	ip -br addr; nmcli device status
2	Can I reach the gateway?	ping -c3 10.0.0.1; ip route
3	Does DNS work?	dig redhat.com; getent hosts server2
4	Is the service listening?	ss -tlnp | grep :80; systemctl status httpd
5	Is the firewall open?	firewall-cmd --list-all
6	Is SELinux blocking it?	ausearch -m AVC -ts recent (Lesson 9)
7	What do the logs say?	journalctl -u NetworkManager -u httpd

Summary and Homework

- ip, ss, ping, dig, getent: look before you change
- nmcli con mod … ipv4.method manual; nmcli con up
- /etc/hosts → DNS (order in nsswitch.conf)
- firewall-cmd --permanent --add-service, then --reload
- ssh-keygen, ssh-copy-id; PermitRootLogin no
- Homework: static IPs on both servers, open http on server1, key-only SSH to server2

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.