

Linux Scenario Practice Guide for DevOps Engineers

This guide is designed for DevOps engineers to practice real-world Linux production scenarios. Each scenario includes a situation and practical commands you'd use in day-to-day operations.

Tip: Not every command exists on every distro. Where applicable, alternatives are included (e.g., `apt` vs `yum/dnf`, `ss` vs `netstat`).

1) Disk Space Alert

Situation: Jenkins jobs are failing due to low disk space.

Solution (commands):

```
df -h
sudo du -sh /* 2>/dev/null | sort -hr | head -10
sudo find /var/log -type f -name "*.log" -mtime +7 -delete
sudo docker system prune -a --volumes
```

2) High CPU Usage

Situation: Web server is slow due to CPU hogging.

Solution (commands):

```
top
ps -eo pid,comm,%cpu,%mem --sort=-%cpu | head
sudo kill -9 <PID>
```

3) SSH Access Denied

Situation: A DevOps user cannot SSH into the server.

Solution (commands):

```
id <user>
ls -ld /home/<user>/.ssh
```

```
ls -l /home/<user>/.ssh/authorized_keys
sudo tail -n 100 /var/log/auth.log
sudo tail -n 100 /var/log/secure
sudo systemctl status sshd
```

4) Application Port Not Listening

Situation: Nginx is running but website is unreachable.

Solution (commands):

```
sudo ss -tulpn | grep -E '':80|:443'
curl -I http://localhost
sudo systemctl status nginx
sudo nginx -t
sudo firewall-cmd --list-all
```

5) Service Fails After Reboot

Situation: Docker doesn't start automatically.

Solution (commands):

```
sudo systemctl enable docker
sudo systemctl start docker
sudo systemctl status docker
sudo journalctl -u docker -n 200 --no-pager
```

6) Log File Analysis

Situation: Application crashed last night.

Solution (commands):

```
sudo grep -i "error" /var/log/syslog | tail -20
sudo journalctl -u nginx --since "yesterday" --no-pager
sudo journalctl --since "2026-01-01" --until "2026-01-02" --no-pager
```

7) Network Connectivity Issue

Situation: Ping to internal server fails.

Solution (commands):

```
ping -c 4 <ip>
ip a
ip route
sudo systemctl status NetworkManager
sudo nmcli dev status
```

8) File Permission Error

Situation: Jenkins reports “Permission denied”.

Solution (commands):

```
ls -l /var/lib/jenkins
sudo chown -R jenkins:jenkins /var/lib/jenkins
sudo chmod -R 755 /var/lib/jenkins
sudo getenforce
sudo setenforce 0
```

9) Automation with Cron

Situation: Run cleanup script daily.

Solution (commands):

```
crontab -e
# Run at 2 AM daily
0 2 * * * /usr/local/bin/cleanup.sh
crontab -l
```

10) Package Installation

Situation: Install `jq` and `git` on RHEL.

Solution (commands):

```
sudo yum install -y jq git
# or
sudo dnf install -y jq git
```

11) Check System Uptime

Situation: Check how long system has been up.

Solution (commands):

```
uptime  
who -b  
systemd-analyze
```

12) Find Recently Modified Files

Situation: Find modified files in last 24h.

Solution (commands):

```
sudo find /path/to/dir -type f -mtime -1  
sudo find /etc -type f -mmin -60
```

13) Port Conflict

Situation: Port 8080 is busy.

Solution (commands):

```
sudo ss -lntp | grep :8080  
sudo lsof -i :8080  
sudo fuser -k 8080/tcp
```

14) Copy Files Between Servers

Situation: Copy backup to another node.

Solution (commands):

```
scp /backup/db_backup.sql user@10.10.10.2:/data/backups/  
rsync -avz /backup/ user@10.10.10.2:/data/backups/
```

15) File System Read-Only Error

Situation: Can't save logs: read-only FS.

Solution (commands):

```
mount | grep -E 'on / '  
sudo dmesg | tail -50  
sudo mount -o remount,rw /
```

16) Docker Container Not Starting

Situation: Container exits immediately.

Solution (commands):

```
docker ps -a  
docker logs <container>  
docker inspect <container> | grep -i error
```

17) Docker Image Consuming Space

Situation: `/var/lib/docker` is growing.

Solution (commands):

```
docker system df  
docker image prune -a  
docker builder prune
```

18) Memory Leak Suspected

Situation: RAM usage increases over time.

Solution (commands):

```
free -m  
ps -eo pid,comm,%mem --sort=-%mem | head  
sudo pmap -x <PID> | tail -20
```

19) Swap Thrashing

Situation: System is slow due to heavy swap usage.

Solution (commands):

```
swapon --show  
vmstat 1 5  
sudo sysctl vm.swappiness
```

20) Load Average High

Situation: Load average is high but CPU seems normal.

Solution (commands):

```
uptime  
top  
ps -eo pid,comm,state,wchan:20 --sort=wchan | head
```

21) Zombie Processes

Situation: Many zombie processes appear.

Solution (commands):

```
ps aux | awk '$8 ~ /Z/ {print}'  
ps -o ppid= -p <zombie_pid>
```

22) Too Many Open Files

Situation: App error: "Too many open files".

Solution (commands):

```
ulimit -n  
cat /proc/<PID>/limits | grep "open files"  
lsof -p <PID> | wc -l
```

23) High I/O Wait

Situation: CPU iowait is high.

Solution (commands):

```
iostat -xz 1 5  
pidstat -d 1 5  
sudo iotop
```

24) Disk Full on /var

Situation: `/var` is 100% used.

Solution (commands):

```
df -h /var  
sudo du -sh /var/* 2>/dev/null | sort -hr | head -10  
sudo journalctl --vacuum-time=7d
```

25) Inodes Exhausted

Situation: Disk free but cannot create files.

Solution (commands):

```
df -i  
sudo find /var -xdev -type f | wc -l  
sudo find /var -xdev -type f -size 0 -delete
```

26) Identify Large Files

Situation: Need to find huge files quickly.

Solution (commands):

```
sudo find / -type f -size +1G 2>/dev/null -exec ls -lh {} \; | sort -k5 -hr |  
head
```

27) Deleted Files Still Using Space

Situation: Disk usage stays high after deleting logs.

Solution (commands):

```
sudo lsof | grep deleted  
sudo systemctl restart <service>
```

28) RAID Degraded

Situation: Software RAID shows degraded state.

Solution (commands):

```
cat /proc/mdstat  
sudo mdadm --detail /dev/md0
```

29) LVM Volume Out of Space

Situation: `/` or `/var` on LVM is full.

Solution (commands):

```
lsblk  
sudo vgs  
sudo lvs  
sudo lvextend -L +10G /dev/<vg>/<lv>  
sudo resize2fs /dev/<vg>/<lv>  
# XFS:  
sudo xfs_growfs /
```

30) Filesystem Corruption Suspected

Situation: Errors in `dmesg` indicate filesystem issues.

Solution (commands):


```
sudo dmesg | tail -100
sudo touch /forcefsck
sudo reboot
```

31) Process Not Found But Port Busy

Situation: Port shows listening but process unclear.

Solution (commands):

```
sudo ss -lntp | grep :<port>
sudo lsof -iTCP:<port> -sTCP:LISTEN
```

32) Service Starts Then Stops

Situation: Systemd service immediately exits.

Solution (commands):

```
sudo systemctl status <svc>
sudo journalctl -u <svc> -n 200 --no-pager
sudo systemctl cat <svc>
```

33) Systemd Unit Override

Situation: Need custom environment variables for a service.

Solution (commands):

```
sudo systemctl edit <svc>
# add:
# [Service]
# Environment="KEY=value"
sudo systemctl daemon-reload
sudo systemctl restart <svc>
```

34) Service Dependency Failure

Situation: App fails because DB service not ready.

Solution (commands):

```
sudo systemctl list-dependencies <svc>
sudo systemctl status <dependency>
```

35) Nginx 502 Bad Gateway

Situation: Nginx returns 502.

Solution (commands):

```
sudo tail -n 200 /var/log/nginx/error.log
sudo ss -lntp | grep :<upstream_port>
curl -v http://127.0.0.1:<upstream_port>
```

36) Nginx Config Test Fails

Situation: Reload fails due to syntax error.

Solution (commands):

```
sudo nginx -t
sudo nginx -T | head
```

37) Apache Not Serving Pages

Situation: HTTPD runs but pages not loading.

Solution (commands):

```
sudo systemctl status httpd
sudo tail -n 100 /var/log/httpd/error_log
sudo ss -lntp | grep :80
```

38) DNS Resolution Failure

Situation: `curl` fails: "Could not resolve host".

Solution (commands):

```
cat /etc/resolv.conf
nslookup example.com
# or
getent hosts example.com
```

39) Wrong Hostname

Situation: Hostname incorrect after rebuild.

Solution (commands):

```
hostnamectl
sudo hostnamectl set-hostname <newname>
```

40) Time Drift / NTP Issue

Situation: TLS fails due to wrong time.

Solution (commands):

```
timedatectl
sudo timedatectl set-ntp true
sudo chronyc sources -v
sudo systemctl status chronyd
```

41) SSL Certificate Expired

Situation: HTTPS warning due to expired cert.

Solution (commands):

```
openssl s_client -connect example.com:443 -servername example.com | openssl
x509 -noout -dates
```

42) Permission Denied on Executable

Situation: Script cannot execute.

Solution (commands):

```
ls -l ./script.sh
chmod +x ./script.sh
file ./script.sh
```

43) Bash Script Fails in Cron

Situation: Works manually, fails in cron.

Solution (commands):

```
# Use absolute paths and set PATH in script
which python3
env | sort
```

44) Sudo Without Password

Situation: Allow CI user to run limited commands.

Solution (commands):

```
sudo visudo
# Example:
# jenkins ALL=(ALL) NOPASSWD:/bin/systemctl restart nginx
```

45) User Locked Out

Situation: User cannot log in.

Solution (commands):

```
sudo passwd -S <user>
sudo usermod -U <user>
```

46) Reset Forgotten Root Password (GRUB)

Situation: Need emergency access.

Solution (commands):

```
# Boot into single-user / rescue mode, then:  
passwd
```

47) SSH Key Authentication Not Working

Situation: SSH keeps asking password.

Solution (commands):

```
ssh -vvv user@host  
chmod 700 ~/.ssh  
chmod 600 ~/.ssh/authorized_keys  
sudo grep -i pubkey /var/log/auth.log | tail
```

48) SSH Hangs on Connect

Situation: SSH times out.

Solution (commands):

```
ping -c 3 <host>  
tracert <host>  
ssh -vv user@host  
sudo ss -lntp | grep :22
```

49) Firewall Blocking Traffic

Situation: App accessible locally but not externally.

Solution (commands):

```
sudo firewall-cmd --list-ports  
sudo firewall-cmd --add-port=8080/tcp --permanent  
sudo firewall-cmd --reload
```

50) UFW Allow Port

Situation: Ubuntu firewall blocks service.

Solution (commands):

```
sudo ufw status verbose  
sudo ufw allow 8080/tcp  
sudo ufw reload
```