

# 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`).

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## 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
```