

DevOps Shack

LINUX TROUBLESHOOTING GUIDE

1. System Boot Issues

1.1 Boot Loader Issues (GRUB Issues)

Symptoms:

- System does not boot into Linux.
- Stuck at GRUB prompt.
- Error: **grub-rescue>**

Causes:

- Corrupt or missing GRUB configuration.
- Wrong boot device.
- Kernel update failure.

Solution:

1. Boot using a Live CD/USB.

Mount the root partition:

```
sudo mount /dev/sdXn /mnt
```

Reinstall GRUB:

```
sudo grub-install --root-directory=/mnt /dev/sdX
```

Update GRUB:

```
sudo update-grub
```

1.2 Kernel Panic



Symptoms:

- Black screen with panic messages.
- **Kernel panic – not syncing** error.

Causes:

- Incompatible kernel update.
- Corrupt boot files.

Solution:

1. Reboot and select an older kernel from GRUB.

Check logs using:

journalctl -xb

2. Roll back the kernel update if necessary.

2. Login and User Issues

2.1 Forgotten Root Password

Symptoms:

- Cannot log in as root.

Solution:

1. Boot into recovery mode.

Remount root partition:

mount -o remount,rw /



Reset password:

`passwd root`

2. Reboot.

2.2 SSH Connection Refused

Symptoms:

- **Connection refused** when trying to SSH.

Causes:

- SSH service not running.
- Firewall blocking SSH.

Solution:

Check SSH status:

`sudo systemctl status sshd`

Start service if stopped:

`sudo systemctl start sshd`

Check firewall rules:

`sudo ufw allow ssh`

3. File System and Disk Issues

3.1 Disk Space Full

Symptoms:

- **No space left on device** error.

Solution:



Check disk usage:

```
df -h
```

Find large files:

```
du -ah / | sort -rh | head -20
```

1. Delete unnecessary files.

3.2 Read-Only File System

Symptoms:

- Read-only file system error.

Solution:

Remount the filesystem:

```
sudo mount -o remount,rw /
```

Check and repair disk errors:

```
sudo fsck -y /dev/sdXn
```

4. Process and Performance Issues

4.1 High CPU Usage

Symptoms:

- System slows down.
- High load average in top output.

Solution:

Identify culprit process:

```
top
```



Kill process:

```
kill -9 <PID>
```

5. Networking Issues

5.1 No Internet Connection

Solution:

Check network interfaces:

```
ip a
```

Restart networking:

```
sudo systemctl restart NetworkManager
```

6. Package Management Issues

6.1 Broken Package Dependencies

Symptoms:

- Unable to correct problems, you have held broken packages
- Package installation fails

Solution:

Identify broken packages:

```
sudo apt --fix-broken install
```

Clean package cache:

```
sudo apt clean && sudo apt autoremove
```

Reinstall dependencies:



```
sudo apt install -f
```

6.2 Slow Package Installation

Symptoms:

- Installing or updating packages takes too long

Solution:

Update repository lists:

```
sudo apt update
```

Switch to a faster mirror:

```
sudo sed -i  
's/http:\/\/archive.ubuntu.com/http:\/\/mirror.example.com/'  
/etc/apt/sources.list
```

7. Service and Daemon Issues

7.1 Service Not Starting

Symptoms:

- Failed to start service-name.service

Solution:

Check service logs:

```
sudo journalctl -xe | grep service-name
```

Restart the service:

```
sudo systemctl restart service-name
```

1. Check configuration files for errors.



7.2 Port Conflicts

Symptoms:

- Service fails to bind to a port

Solution:

Identify the conflicting process:

```
sudo netstat -tulnp | grep <port-number>
```

1. Kill the process or reconfigure services.

8. Kernel and Module Issues

8.1 Kernel Update Breaks System

Symptoms:

- System does not boot after update

Solution:

1. Reboot and select an older kernel in GRUB.

Remove faulty kernel:

```
sudo apt remove linux-image-<version>
```

8.2 Missing Kernel Modules

Symptoms:

- `modprobe: FATAL: Module not found`

Solution:

Check available modules:

```
lsmod | grep module-name
```

Load the module manually:

```
sudo modprobe module-name
```

9. Security and Access Control Issues

9.1 Unauthorized Access Attempts

Symptoms:

- Unusual login attempts in logs

Solution:

Check logs:

```
sudo cat /var/log/auth.log | grep "Failed password"
```

Block IP using firewall:

```
sudo ufw deny from <IP-ADDRESS>
```

9.2 SELinux Blocking Services

Symptoms:

- Service fails due to permission errors

Solution:

Check SELinux logs:

```
sudo ausearch -m AVC
```

Temporarily disable SELinux (for debugging only):

```
sudo setenforce 0
```



10. Hardware Issues

10.1 USB Device Not Recognized

Symptoms:

- USB device does not show up in **lsusb**
- **dmesg** shows errors related to USB

Solution:

Check if the USB device is detected:

Lsusb

Re-scan USB devices:

```
echo "1" | sudo tee /sys/bus/usb/devices/usb1/authorized
```

Restart the USB service:

```
sudo modprobe -r usb_storage && sudo modprobe usb_storage
```

10.2 Hard Drive Not Detected

Symptoms:

- **fdisk -l** does not show the disk
- **dmesg** shows disk-related errors

Solution:

List available disks:



lsblk

Re-scan the disk:

```
echo "- - -" | sudo tee /sys/class/scsi_host/host0/scan
```

11. Time and Date Issues

11.1 System Clock Out of Sync

Symptoms:

- Incorrect system time

Solution:

Sync time with NTP:

```
sudo timedatectl set-ntp on
```

Manually set time:

```
sudo timedatectl set-time "YYYY-MM-DD HH:MM:SS"
```

12. Firewall and Network Security Issues

12.1 Firewall Blocking Services

Symptoms:

- Cannot access services from another system

Solution:



List active firewall rules:

```
sudo ufw status
```

Allow required ports:

```
sudo ufw allow 80/tcp
```

12.2 Too Many Failed SSH Attempts

Symptoms:

- Too many authentication failures in SSH

Solution:

Edit SSH configuration:

```
sudo nano /etc/ssh/sshd_config
```

Increase allowed authentication retries:

```
MaxAuthTries 10
```

Restart SSH:

```
sudo systemctl restart sshd
```

13. Virtualization Issues

13.1 Virtual Machine Won't Start



Symptoms:

- **Failed to start the virtual machine** error

Solution:

Check virtualization support:

```
egrep -c '(vmx|svm)' /proc/cpuinfo
```

1. Enable virtualization in BIOS.

14. Miscellaneous Issues

14.1 Command Not Found

Symptoms:

- **command not found** error

Solution:

Check if the package is installed:

```
dpkg -l | grep package-name
```

Install missing package:

```
sudo apt install package-name
```

15. Logs and Monitoring Issues



15.1 Log Files Not Updating

Symptoms:

- `/var/log/syslog` or `/var/log/messages` is empty or not updating.

Solution:

Restart the logging service:

```
sudo systemctl restart rsyslog
```

Check disk space:

```
df -h
```

Verify SELinux settings:

```
sudo ausearch -m AVC
```

15.2 How to Monitor System Logs in Real-Time

Solution:

Use `tail` to follow log updates:

```
tail -f /var/log/syslog
```

Use `journalctl` for systemd logs:

```
journalctl -f
```



16. SSH Issues

16.1 SSH Connection Timeout

Symptoms:

- SSH session freezes or disconnects after inactivity.

Solution:

Edit SSH config:

```
sudo nano /etc/ssh/sshd_config
```

Set **ClientAliveInterval** and **ClientAliveCountMax**:
plaintext

```
ClientAliveInterval 60  
ClientAliveCountMax 5
```

Restart SSH service:

```
sudo systemctl restart sshd
```

16.2 Cannot SSH as Root

Symptoms:



- **Permission denied** when connecting as root.

Solution:

Enable root login in SSH config:

```
sudo nano /etc/ssh/sshd_config
```

Set:

plaintext

```
PermitRootLogin yes
```

Restart SSH:

```
sudo systemctl restart sshd
```

17. Printer and Device Issues

17.1 Printer Not Working

Symptoms:

- Printer not detected.

Solution:

Restart the CUPS service:

```
sudo systemctl restart cups
```

Check printer connections:

```
lpstat -p
```



18. User Management Issues

18.1 User Cannot Run sudo Commands

Symptoms:

- **user is not in the sudoers file** error.

Solution:

Add user to the sudo group:

```
sudo usermod -aG sudo username
```

18.2 User Cannot Write to a Directory

Symptoms:

- **Permission denied** error.

Solution:

Change ownership:

```
sudo chown username:groupname /path/to/directory
```

Set proper permissions:

```
sudo chmod 755 /path/to/directory
```

19. Software and Application Issues

19.1 Application Crashes Unexpectedly

Solution:

Check application logs:

```
journalctl -xe | grep application-name
```

1. Run application in debug mode if available.

19.2 Web Server Not Working

Symptoms:

- **502 Bad Gateway** or **503 Service Unavailable**.

Solution:

Restart the web server:

```
sudo systemctl restart apache2 # For Apache  
sudo systemctl restart nginx   # For Nginx
```

20. Advanced Security Issues

20.1 Detecting Unauthorized Root Access

Solution:

Check recent root logins:

```
sudo last -n 10
```



Check for unauthorized sudo commands:

```
cat /var/log/auth.log | grep sudo
```

20.2 Blocking Brute-Force Attacks

Solution:

Install Fail2Ban:

```
sudo apt install fail2ban
```

Enable SSH protection:

```
sudo systemctl enable fail2ban
```

21. Disk and Storage Issues

21.1 Unable to Mount a Disk

Symptoms:

- **mount: unknown filesystem type** error
- Disk not visible in **lsblk** or **fdisk -l**

Solution:

Identify the disk:

```
lsblk
```

Check filesystem type:



```
sudo blkid /dev/sdX
```

Manually mount the disk:

```
sudo mount /dev/sdX /mnt
```

If the filesystem is corrupted, repair it:

```
sudo fsck -y /dev/sdX
```

21.2 LVM Volume Not Found

Symptoms:

- **lvdisplay** does not show expected volumes

Solution:

Scan for missing volumes:

```
sudo vgscan --mknodes  
sudo lvscan
```

Activate volume group:

```
sudo vgchange -ay
```

Mount the logical volume:

```
sudo mount /dev/mapper/vgname-lvname /mnt
```

22. Kernel and Driver Issues

22.1 Missing Graphics Drivers

Symptoms:

- GUI does not load
- **NVIDIA driver not found** error

Solution:

Identify the graphics card:

```
lspci | grep -i vga
```

Install the correct driver:

```
sudo ubuntu-drivers autoinstall
```

Reboot the system:

```
sudo reboot
```



22.2 Sound Not Working

Symptoms:

- No audio output
- **No sound device found** error

Solution:

Check audio devices:

```
aplay -l
```

Restart PulseAudio:

```
pulseaudio --kill && pulseaudio --start
```

Unmute sound:

```
amixer set Master unmute
```

23. Network Troubleshooting

23.1 Wi-Fi Not Connecting

Symptoms:



- **No Wi-Fi adapter found** error

Solution:

List available network interfaces:

```
nmcli device
```

Restart NetworkManager:

```
sudo systemctl restart NetworkManager
```

If the Wi-Fi adapter is missing, install drivers:

```
sudo apt install firmware-iwlwifi
```

23.2 IP Address Not Assigned

Symptoms:

- **ip a** does not show an IP address

Solution:

Restart DHCP client:

```
sudo dhclient -r && sudo dhclient
```

Manually assign an IP address:

```
sudo ip addr add 192.168.1.100/24 dev eth0
```

24. Performance Optimization

24.1 System Running Slow

Symptoms:

- High load average
- Applications freezing

Solution:

Check system load:

```
top
```

Kill high CPU usage processes:

```
kill -9 <PID>
```

Clear cached memory:

```
sudo sync && sudo sysctl -w vm.drop_caches=3
```



24.2 High Memory Usage

Symptoms:

- **Out of memory** errors

Solution:

Check memory usage:

```
free -h
```

Enable swap:

```
sudo fallocate -l 2G /swapfile  
sudo chmod 600 /swapfile  
sudo mkswap /swapfile  
sudo swapon /swapfile
```

25. Backup and Recovery

25.1 Restoring Deleted Files

Symptoms:

- Important files deleted accidentally

Solution:

Recover files from the trash:

```
ls ~/.local/share/Trash/files/
```

If permanently deleted, use **extundelete**:

```
sudo extundelete /dev/sdX --restore-all
```

25.2 Creating a Full System Backup

Solution:

Use **rsync** for backup:

```
sudo rsync -av --progress /home/ /backup/home/
```

Restore files when needed:

```
sudo rsync -av /backup/home/ /home/
```

26. Advanced Security

26.1 Encrypting a Directory

Solution:

Install **ecryptfs-utils**:

```
sudo apt install ecryptfs-utils
```

Encrypt a directory:

```
ecryptfs-mount-private
```

26.2 Setting Up Automatic Security Updates

Solution:

Install unattended-upgrades:

```
sudo apt install unattended-upgrades
```

Enable automatic updates:

```
sudo dpkg-reconfigure unattended-upgrades
```

27. Miscellaneous Troubleshooting

27.1 How to Find Which Process is Using a Port

Solution:

Use **netstat**:



```
sudo netstat -tulnp | grep :<port>
```

Use **lsof**:

```
sudo lsof -i :<port>
```

Kill the process if needed:

```
sudo kill -9 <PID>
```

27.2 How to Check System Uptime

Solution:

Display uptime:

```
uptime
```

View uptime in human-readable format:

```
who -b
```

28. Debugging and Log Analysis



28.1 Checking Kernel Logs for Errors

Solution:

View logs in real-time:

```
dmesg -w
```

Filter errors:

```
dmesg | grep -i error
```

28.2 Finding Recently Modified Files

Solution:

Search for files modified in the last 24 hours:

```
find / -type f -mtime -1
```

29. Essential Linux Commands

29.1 Finding a File by Name

Solution:

Use **find**:



```
find / -name "filename"
```

29.2 Checking Disk Usage per Directory

Solution:

Use **du** to find large directories:

```
du -ah / | sort -rh | head -10
```

30. Common Errors and Fixes

30.1 Fixing **command not found** for Common Commands

Solution:

Refresh the PATH:

```
export PATH=$PATH:/usr/local/bin
```

Reinstall the package:

```
sudo apt install package-name
```

30.2 Fixing **permission denied** When Running a Script

Solution:



Make the script executable:

```
chmod +x script.sh
```

Run the script with **sudo** if needed:

```
sudo ./script.sh
```

31. Advanced File System Issues

31.1 Filesystem Goes into Read-Only Mode

Symptoms:

- Unable to write files
- **dmesg** shows **EXT4-fs error**

Solution:

Check disk errors:

```
dmesg | tail -50
```

Remount the filesystem:

```
sudo mount -o remount,rw /
```



Run filesystem check:

```
sudo fsck -y /dev/sdX
```

31.2 Recovering Deleted Files from EXT4 Filesystem

Solution:

Unmount the affected partition:

```
sudo umount /dev/sdX
```

Use **extundelete**:

```
sudo extundelete /dev/sdX --restore-all
```

32. Advanced Networking Issues

32.1 Identifying Slow Network Connections

Symptoms:

- Websites load slowly
- High latency on SSH

Solution:



Test network speed:

```
speedtest-cli
```

Identify packet loss:

```
ping -c 10 google.com
```

Check for dropped packets:

```
sudo netstat -s | grep "dropped"
```

32.2 Troubleshooting DNS Issues

Symptoms:

- `ping google.com` fails, but `ping 8.8.8.8` works

Solution:

Check DNS settings:

```
cat /etc/resolv.conf
```



Change to Google DNS:

```
echo "nameserver 8.8.8.8" | sudo tee /etc/resolv.conf
```

33. Docker and Container Issues

33.1 Docker Container Won't Start

Symptoms:

- `docker run` fails with an error

Solution:

Check container logs:

```
docker logs container_id
```

Restart Docker:

```
sudo systemctl restart docker
```

Prune unused containers:

```
docker system prune -a
```



33.2 Docker Container Can't Access the Internet

Solution:

Restart the Docker network:

```
sudo systemctl restart docker
```

Add network to the container:

```
docker network connect bridge container_id
```

34. Kernel Panic and Boot Issues

34.1 Kernel Panic After Update

Symptoms:

- System does not boot after an update

Solution:

1. Boot into an older kernel from GRUB.

Reinstall the latest kernel:

```
sudo apt install --reinstall linux-image-$(uname -r)
```

34.2 System Stuck at GRUB Rescue Mode

Solution:

Identify the boot partition:

```
ls
```

Load the correct partition:

```
set prefix=(hd0,gpt2)/boot/grub
set root=(hd0,gpt2)
insmod normal
normal
```

35. High Availability and Load Balancing Issues

35.1 Load Balancer Not Distributing Traffic Evenly

Solution:

Check Nginx load balancer configuration:

```
sudo nano /etc/nginx/nginx.conf
```

Verify upstream servers:



```
sudo systemctl restart nginx
```

36. Virtualization and Cloud Issues

36.1 VM is Running Slowly

Solution:

Enable CPU virtualization:

```
egrep -c '(vmx|svm)' /proc/cpuinfo
```

1. Increase allocated RAM and CPU in the hypervisor.

36.2 Cloud Instance Fails to Boot

Solution:

1. Check the instance console logs.
2. Attach the disk to another instance and repair the OS files.

37. SELinux and AppArmor Issues

37.1 Application Blocked by SELinux

Symptoms:

- **Permission denied** errors even with correct permissions

Solution:

Check SELinux logs:

```
sudo ausearch -m AVC
```

Set the correct SELinux policy:

```
sudo semanage fcontext -a -t httpd_sys_content_t  
"/var/www/html(/.*)?"  
sudo restorecon -Rv /var/www/html
```

37.2 AppArmor Blocking a Service

Solution:

Check AppArmor logs:

```
sudo journalctl -xe | grep apparmor
```

Set AppArmor profile to complain mode:

```
sudo aa-complain /usr/sbin/nginx
```

38. System Recovery and Rescue Mode

38.1 How to Boot into Single User Mode

Solution:



1. Edit the GRUB boot entry.
2. Add `single` or `init=/bin/` to the kernel parameters.

38.2 Resetting Root Password from Recovery Mode

Solution:

1. Boot into recovery mode.

Mount the root filesystem:

```
mount -o remount,rw /
```

Reset password:

```
passwd root
```

39. Advanced Performance Tuning

39.1 Identifying Bottlenecks with iostat

Solution:

Install `sysstat`:

```
sudo apt install sysstat
```

Check disk I/O performance:

```
iostat -x 1 5
```

39.2 Reducing Swap Usage

Solution:

Check current swap usage:

```
swapon -s
```

Lower the swappiness value:

```
sudo sysctl vm.swappiness=10
```

40. Debugging and Profiling Applications

40.1 Debugging a Segmentation Fault

Solution:

Run the application with **gdb**:

```
gdb ./application  
run
```



40.2 Profiling CPU Usage with **perf**

Solution:

Install **perf**:

```
sudo apt install linux-tools-common
```

1. Profile CPU usage:

```
sudo perf top
```