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)
```

www.devopsshack.com
office@devopsshack.com

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
```