# Linux Server Management - Commands

## ****1. System Resource Monitoring****

Monitor CPU, memory, and process usage to track system performance and identify resource bottlenecks

**CPU and Load Monitoring** Check system uptime, current load averages, and running processes

* **uptime**
* **top**
* **htop**

**Memory Monitoring** Check available RAM, memory usage patterns, and system memory information

* **free -h**
* **cat /proc/meminfo**

**Process Analysis** Analyze running processes, sort by resource usage, and identify high-consumption applications

* **ps aux | less**
* **ps aux --sort=-%mem | head -n 10**
* **ps aux --sort=-%cpu | head -n 10**

## ****2. Disk Usage and Storage Analysis****

Analyze disk space usage, find large files, and manage storage efficiently

**File System Space Analysis** Check disk space usage across file systems and directories

* **df -h**
* **du -sh /var/log**
* \*\*du -sh \*\*\*
* **du -sh /home/**\*

**Finding Large Files and Directories** Locate files and directories consuming significant disk space

* **sudo du -ah / | sort -rh | head -n 20**
* **du -ah ~ | sort -rh | head -n 10**
* **find / -type f -size +100M 2>/dev/null**
* **find /home/user -type f -size +50M**
* **find / -type f -size +1G 2>/dev/null**

**Interactive Disk Usage Tool** Use visual tools to explore disk usage interactively

* **sudo apt install ncdu**
* **sudo ncdu /**
* **ncdu /home/user**

**Disk Cleanup Commands** Remove unnecessary files and free up disk space

* **sudo apt-get clean**
* **sudo rm -rf /tmp/**\*
* **sudo find /var/log -type f -name "\*.log" -mtime +30 -delete**

## ****3. Network Monitoring and Port Management****

Monitor network connections, manage ports, and test network connectivity

**Port and Socket Analysis** View active network connections, listening ports, and socket information

* **ss -tulwn**
* **sudo apt install net-tools**
* **netstat -tulnp**

**Process-to-Port Mapping** Identify which processes are using specific network ports

* **sudo lsof -i :8080**
* **sudo lsof -i :22**
* **sudo lsof -i**

**Network Interface Management** Configure and view network interface settings and routing information

* **ip a**
* **ip route**
* **ip route | grep default**
* **ifconfig**
* **route -n**

**Network Connectivity Testing** Test network connectivity and troubleshoot connection issues

* **ping google.com**
* **ping 127.0.0.1**
* **ping -c 4 google.com**
* **curl http://localhost:8080**
* **curl -I https://example.com**
* **curl -X POST http://localhost:8080/api -d '{"message":"test"}' -H "Content-Type: application/json"**
* **curl -o response.html http://example.com**

**Real-time Network Monitoring** Monitor network traffic and connections in real-time

* **sudo apt install iftop**
* **sudo iftop**
* **watch -n 2 'ss -tulwn'**

## ****4. Log Management and Analysis****

Monitor, analyze, and manage system logs for troubleshooting and security

**System Log Locations** Locate and explore system log files and directories

* **ls -lh /var/log/**
* **ls -lhS /var/log/**

**Real-time Log Monitoring** Monitor log files in real-time as events occur

* **tail -f /var/log/syslog**
* **tail -f /var/log/auth.log**
* **tail -n 100 -f /var/log/syslog**
* **multitail /var/log/syslog /var/log/auth.log**

**Log Filtering and Search** Search, filter, and extract specific information from log files

* **grep "ERROR" /var/log/syslog**
* **grep -i "error" /var/log/syslog**
* **grep -A 2 -B 2 "ERROR" /var/log/syslog**
* **grep -c "ERROR" /var/log/syslog**
* **grep -r "failed login" /var/log/**
* **grep "ERROR" /var/log/syslog > errors.txt**
* **awk '/ERROR/ {print $1, $2, $3, $5}' /var/log/syslog**
* **cut -d' ' -f1-3 /var/log/syslog**

**Interactive Log Viewing** Navigate and browse log files interactively

* **less /var/log/syslog**

**Application Log Management** Monitor and analyze application-specific log files

* **tail -f /opt/myapp/app.log**
* **grep -i "exception|error" /opt/myapp/app.log**
* **tail -f /var/log/nginx/access.log**
* **tail -f /var/log/nginx/error.log**
* **grep " 404 " /var/log/nginx/access.log**
* **awk '{print $1}' /var/log/nginx/access.log | sort | uniq -c | sort -nr | head -10**

**Security Analysis** Analyze authentication logs and security-related events

* **grep "Failed password" /var/log/auth.log**
* **grep "Accepted password" /var/log/auth.log**
* **grep "sudo" /var/log/auth.log**
* **grep "session opened" /var/log/auth.log | awk '{print $1, $2, $3, $11}'**

## ****5. System Service Management****

Manage systemd services and analyze service logs using journalctl

**Service Log Management with journalctl** Access and analyze systemd service logs and journal entries

* **journalctl**
* **journalctl -r**
* **journalctl | less**
* **journalctl -u nginx.service**
* **journalctl -u myapp.service**
* **journalctl -u myapp.service -f**
* **journalctl -u myapp.service -n 100**
* **journalctl -u myapp.service -b**

**Time-based Log Filtering** Filter logs by specific time periods and boot sessions

* **journalctl --since "1 hour ago"**
* **journalctl --since "2025-05-22 08:00" --until "2025-05-22 10:00"**
* **journalctl --since today**
* **journalctl --since yesterday --until today**
* **journalctl -b**
* **journalctl -b -1**

**Log Severity Filtering** Filter logs by severity levels (errors, warnings, critical)

* **journalctl -p err**
* **journalctl -u myapp.service -p warning**
* **journalctl -p crit**

**Boot and System Event Analysis** Analyze boot performance and system startup events

* **journalctl -b**
* **journalctl -b -1**
* **journalctl --list-boots**
* **systemd-analyze**
* **systemd-analyze blame**
* **systemd-analyze critical-chain**

**Log Export and Analysis** Export logs to files for further analysis and processing

* **journalctl -u myapp.service --since today > myapp\_today.log**
* **journalctl -p err --since "1 week ago" > system\_errors.log**
* **journalctl -u myapp.service -o json > myapp.json**
* **journalctl -u myapp.service -o json-pretty**

**Service Health Checking** Check service status, health, and identify failed services

* **systemctl status myapp.service**
* **systemctl is-active myapp.service**
* **systemctl is-enabled myapp.service**
* **systemctl --failed**

## ****6. Log Rotation and Automation****

Manage log rotation and automate system maintenance tasks

**Log Rotation Configuration** Configure and manage automatic log rotation to prevent disk space issues

* **cat /etc/logrotate.conf**
* **ls /etc/logrotate.d/**
* **cat /etc/logrotate.d/nginx**
* **sudo logrotate /etc/logrotate.d/myapp --debug**
* **sudo logrotate /etc/logrotate.d/myapp --force**
* **sudo logrotate /etc/logrotate.conf**

**Managing Cron Jobs** Schedule and manage automated tasks and system maintenance

* **crontab -e**
* **crontab -l**
* **crontab -r**
* **ls /etc/cron.daily/**
* **ls /etc/cron.weekly/**
* **ls /etc/cron.monthly/**
* **cat /etc/crontab**

**Cron Job Troubleshooting** Debug and troubleshoot scheduled task execution issues

* **systemctl status cron**
* **journalctl -u cron**
* **grep CRON /var/log/syslog**

## ****7. File System Management****

Manage file systems, mount points, and storage devices

**File System Types** Identify and view different file system types and formats

* **df -T**
* **lsblk -f**
* **blkid**
* **mount | column -t**

**Storage Device Management** List, identify, and manage storage devices and block devices

* **lsblk**
* **lsblk -f**
* **sudo fdisk -l**
* **df -h**
* **sudo blkid**

**Mounting and Unmounting** Mount and unmount file systems with various options and troubleshoot mount issues

* **sudo mkdir -p /mnt/usb**
* **sudo mount /dev/sdb1 /mnt/usb**
* **sudo mount -t ext4 /dev/sdb1 /mnt/usb**
* **sudo mount -o rw,noexec /dev/sdb1 /mnt/usb**
* **sudo umount /mnt/usb**
* **sudo umount /dev/sdb1**
* **sudo umount -f /mnt/usb**
* **sudo umount -l /mnt/usb**
* **lsof /mnt/usb**
* **fuser -v /mnt/usb**

**File System Creation and Formatting** Create and format file systems with labels and specific configurations

* **sudo mkfs.ext4 /dev/sdb1**
* **sudo mkfs.xfs /dev/sdb1**
* **sudo mkfs.vfat -F 32 /dev/sdb1**
* **sudo mkfs.ext4 -L "DataDrive" /dev/sdb1**
* **sudo e2label /dev/sdb1 "MyData"**
* **sudo e2label /dev/sdb1**
* **sudo tune2fs -U random /dev/sdb1**
* **sudo blkid /dev/sdb1**

## ****8. Disk Partitions and Layout****

Manage disk partitions, logical volumes, and storage layouts

**Partition Management** Create, modify, and manage disk partitions and partition tables

* **sudo parted /dev/sda print**
* **sudo fdisk -l /dev/sda**
* **sudo blkid -o list**
* **sudo fdisk /dev/sdb**
* **sudo parted /dev/sdb mklabel gpt**
* **sudo parted /dev/sdb mkpart primary ext4 1MiB 1GiB**
* **sudo parted /dev/sdb set 1 boot on**

**Logical Volume Management (LVM)** Create and manage logical volumes for flexible storage management

* **sudo apt install lvm2**
* **sudo pvcreate /dev/sdb1 /dev/sdc1**
* **sudo vgcreate data\_vg /dev/sdb1 /dev/sdc1**
* **sudo lvcreate -L 10G -n data\_lv data\_vg**
* **sudo pvdisplay**
* **sudo vgdisplay**
* **sudo lvdisplay**
* **sudo lvextend -L +5G /dev/data\_vg/data\_lv**
* **sudo resize2fs /dev/data\_vg/data\_lv**

**Persistent Mounting** Configure automatic mounting of file systems at boot time

* **sudo blkid /dev/sdb1**
* **sudo nano /etc/fstab**
* **sudo mount -a**

## ****9. Storage Optimization and Cleanup****

Optimize storage usage and clean up unnecessary files

**Package Management Cleanup** Clean up package caches and remove unused packages

* **sudo apt clean**
* **sudo apt autoclean**
* **sudo apt autoremove**
* **sudo apt autoremove --purge**
* **du -sh /var/cache/apt/archives/**

**Log File Management** Manage journal logs and truncate large log files

* **find /var/log -type f -size +100M -ls**
* **sudo journalctl --vacuum-time=2weeks**
* **sudo journalctl --vacuum-size=500M**
* **sudo truncate -s 0 /var/log/large\_file.log**

**Temporary File Cleanup** Remove temporary files and clear user caches

* **sudo rm -rf /tmp/**\*
* **sudo rm -rf /var/tmp/**\*
* **rm -rf ~/.cache/**\*
* **rm -rf ~/.thumbnails/**\*

**Advanced Find Operations** Find files based on complex criteria for cleanup and analysis

* **find /home -type f -size +50M -atime +30**
* **find /home -type d -empty -delete**
* **find /home -type f -perm 777**

**File Compression** Compress files and create archives to save storage space

* **gzip large\_file.txt**
* **bzip2 large\_file.txt**
* **tar -czf backup.tar.gz /path/to/directory**
* **zip -r archive.zip /path/to/files**

**Link Optimization** Find and manage duplicate files and broken symbolic links

* **fdupes -r /path/to/check**
* **fdupes -r -L /path/to/check**
* **find /home -type l -xtype l**

## ****10. File System Internals****

Understand and manage file system internal structures and performance

**Inode Management** Monitor and manage file system inodes and file metadata

* **df -i**
* **find /home -inum 123456**
* **stat filename**
* **ls -li**

**File System Performance** Tune file system parameters and optimize performance settings

* **tune2fs -l /dev/sda1 | grep "Block size"**
* **dumpe2fs /dev/sda1 | head -20**
* **blockdev --getra /dev/sda**
* **sudo blockdev --setra 256 /dev/sda**

**Journal Management** Manage and configure file system journaling features

* **tune2fs -l /dev/sda1 | grep -i journal**
* **tune2fs -j /dev/sda1**
* **debugfs -R "stats" /dev/sda1**

## ****11. File System Maintenance and Monitoring****

Maintain file system health and monitor storage device performance

**File System Consistency Checks** Schedule and perform file system integrity checks

* **tune2fs -c 30 /dev/sda1**
* **tune2fs -l /dev/sda1 | grep "Last checked"**
* **touch /forcefsck**
* **fsck -n /dev/sda1**

**Bad Block Detection** Detect and manage bad blocks on storage devices

* **badblocks -v /dev/sda1**
* **badblocks -v /dev/sda1 > bad\_blocks.txt**
* **fsck.ext4 -l bad\_blocks.txt /dev/sda1**

**Performance Monitoring** Monitor disk I/O performance and benchmark storage devices

* **sudo apt install hdparm iotop**
* **hdparm -tT /dev/sda**
* **sudo iotop -o**
* **iostat -x 1**
* **dd if=/dev/zero of=testfile bs=1M count=1000 oflag=direct**
* **dd if=testfile of=/dev/null bs=1M iflag=direct**

**SMART Monitoring** Monitor storage device health using SMART technology

* **sudo apt install smartmontools**
* **smartctl -i /dev/sda**
* **smartctl -t short /dev/sda**
* **smartctl -a /dev/sda**
* **smartctl -A /dev/sda | grep Temperature**
* **sudo nano /etc/smartd.conf**
* **sudo systemctl enable smartd**
* **sudo systemctl start smartd**

**Troubleshooting** Diagnose and repair file system issues and mount problems

* **fsck -y /dev/sda1**
* **fsck.ext4 -p -v /dev/sda1**
* **fsck.ext4 -b 32768 /dev/sda1**
* **mount | grep sda1**
* **file -s /dev/sda1**
* **dmesg | grep -i error**
* **mount -o remount,rw /dev/sda1**

**Backup and Recovery** Create disk images, snapshots, and perform data recovery operations

* **lvcreate -L 1G -s -n backup\_snap /dev/vg/lv**
* **mount /dev/vg/backup\_snap /mnt/snap**
* **lvremove /dev/vg/backup\_snap**
* **dd if=/dev/sda of=/backup/disk\_image.img bs=4M**
* **dd if=/dev/sda bs=4M | gzip > /backup/disk\_image.img.gz**
* **gunzip -c /backup/disk\_image.img.gz | dd of=/dev/sda bs=4M**