

Linux Cheatsheet

Basic File and Directory Management

- **ls**: List directory contents (**-l**: details, **-a**: hidden files, **-h**: human-readable sizes).
- **cd**: Change directory (**cd ..**: parent, **cd ~**: home).
- **pwd**: Show current working directory.
- **mkdir**: Create a directory (**-p**: create parent directories if needed).
- **rm**: Remove files/directories (**-r**: recursive, **-f**: force).
- **cp**: Copy files/directories (**-r**: recursive).
- **mv**: Move or rename files/directories.
- **touch**: Create a new empty file or update timestamp.
- **find**: Search for files and directories.
- **locate**: Fast file searching using a database.

Text Processing and Viewing

- **cat**: Concatenate and display file content.
- **less / more**: View file content screen by screen.
- **head / tail**: View the beginning or end of a file (**tail -f**: monitor in real-time).
- **grep**: Search for patterns in text.
- **awk**: Pattern scanning and processing language.
- **sed**: Stream editor for filtering and transforming text.
- **sort**: Sort lines of text files.
- **uniq**: Report or omit repeated lines.
- **diff**: Compare files line by line.

System Information and Monitoring

- **uname -a**: Show system and kernel information.
- **top / htop**: Real-time system monitoring (CPU, Memory, Processes).
- **df -h**: Show disk space usage in human-readable format.
- **du -sh**: show total size of a directory.
- **free -h**: Show memory usage.
- **uptime**: Show how long the system has been running.

- **dmesg**: Display kernel ring buffer messages.

Process Management

- **ps aux**: List all running processes.
- **kill [PID]**: Terminate a process by ID.
- **pkill [name]**: Terminate processes by name.
- **bg / fg**: Manage background and foreground processes.
- **jobs**: List background jobs.
- **nice / renice**: Adjust process priority.

User and Permission Management

- **sudo**: Execute a command with superuser privileges.
- **chmod**: Change file permissions (e.g., **chmod 755 file**).
- **chown**: Change file owner and group.
- **passwd**: Change user password.
- **useradd / userdel**: Create or delete a user.
- **whoami**: Show current user name.
- **groups**: List groups the user belongs to.

Networking

- **ip addr**: Show or manipulate network interfaces and IP addresses.
- **ping**: Check connectivity to a host.
- **curl / wget**: Download files or data from the web.
- **ssh**: Securely login to a remote host.
- **scp**: Securely copy files between hosts.
- **netstat / ss**: Show network statistics and sockets.
- **traceroute / mtr**: Trace the path to a network host.

Package Management

- Ubuntu/Debian (**apt**):
 - **sudo apt update**: Update package lists.
 - **sudo apt install [pkg]**: Install a package.
- CentOS/RHEL (**yum / dnf**):
 - **sudo dnf install [pkg]**: Install a package.
- Arch Linux (**pacman**):
 - **sudo pacman -S [pkg]**: Install a package.

Advanced System Management

Advanced Process Control

- **killall process_name**: Terminate all processes with a specific name.
- **kill -0 <PID>**: Check if a process is running without killing it.

Deep Analysis of System Resources

- **iostat -x 1**: Detailed disk I/O statistics every second.
- **iotop**: Real-time disk I/O usage by process.
- **vmstat 1**: Real-time virtual memory statistics.
- **sar -u 1**: CPU usage trends.
- **sar -r 1**: Memory usage trends.
- **lsof -i :80**: Find processes occupying port 80.
- **lsof -p <PID>**: List all files opened by a specific process.
- **strace -p <PID>**: Trace system calls of a running process in real-time.

Advanced Log Analysis

- **journalctl -u service_name**: Filter logs for a specific service.
- **journalctl -f**: Monitor system logs in real-time.
- **journalctl -p err**: Filter logs by Error level or higher.
- **tail -f /var/log/syslog**: Monitor general system messages.
- **awk '/ERROR/ {print \$0}' /var/log/app.log**: Extract lines containing ERROR from a log file.

Advanced Network and Security

Routing and Interface Control

- **ip route show**: View the current routing table.
- **ip route add 192.168.1.0/24 via 192.168.1.1**: Add a static route.
- **ip link show**: Check physical state of network interfaces.

- **ethtool eth0**: Check hardware settings of a network interface.

Firewall Configuration (iptables)

- **iptables -L**: List all defined rules.
- **iptables -A INPUT -p tcp --dport 22 -j ACCEPT**: Allow SSH input.
- **iptables -A INPUT -j DROP**: Block all inputs not explicitly allowed.
- **iptables -F**: Flush (delete) all rules immediately.
- **iptables-save > /etc/iptables/rules.v4**: Save current configuration to a file.

Network Diagnostics and Traffic Analysis

- **nmap -sS target_ip**: Stealth port scan.
- **nmap -sV target_ip**: Detect versions of services on active ports.
- **tcpdump -i eth0 port 80**: Capture packets on port 80 of a specific interface.
- **ss -tln**: Efficiently list all listening ports.

Advanced Disk and File System Management

Partitioning and File System Creation

- **fdisk -l**: List disks and partitions.
- **mkfs.ext4 /dev/sda1**: Format a partition with ext4.
- **fsck /dev/sda1**: Check and repair file system integrity.
- **resize2fs /dev/sda1**: Resize ext4 file system to match partition size.

LVM (Logical Volume Manager) Management

- **pvcreate /dev/sda1**: Create a physical volume.
- **vgcreate myvg /dev/sda1**: Create a volume group.
- **lvcreate -L 10G -n mylv myvg**: Create a logical volume.
- **lvextend -L +5G /dev/myvg/mylv**: Extend logical volume capacity.

System Hardening (Security)

- `passwd -l username`: Lock a user account.
- `chage -l username`: Check password expiration and change interval.
- `chattr +i file`: Set immutable attribute to prevent deletion or modification.
- `umask 022`: Set default permission mask for new files/directories.
- `ufw status`: Check UFW firewall status.

Backup and Recovery

Synchronized Backup with rsync

```
# Sync entire directory to destination
(including deletions)
```

```
rsync -avz --delete /source/ /
destination/
```

```
# Securely transfer backup to remote
host via SSH
```

```
rsync -avz -e ssh /local/path
user@remote:/remote/path
```

Disk Cloning with dd

```
# Perfect clone of a disk to another
```

```
dd if=/dev/sda of=/dev/sdb bs=4M
status=progress
```

```
# Create a disk image file
```

```
dd if=/dev/sda of=/backup/disk.img bs=4M
status=progress
```

Performance Tuning and Services

- `sysctl -a`: View all current kernel parameters.
- `sysctl -w vm.swappiness=10`: Immediately change swap usage preference.
- `systemctl list-units --type=service`: List statuses of all services.
- `systemctl enable service_name`: Set service to auto-start on boot.
- `systemctl daemon-reload`: Reload modified systemd unit files.

Troubleshooting and Diagnostics

- `journalctl -b`: View logs for the current boot session.
- `dmesg | grep -i error`: Quickly find errors in boot process or device drivers.
- `smartctl -a /dev/sda`: Diagnose physical disk health (S.M.A.R.T).
- `mtr google.com`: Real-time tracking of network latency and packet loss.
- `mount -o remount,ro /`: Remount root filesystem as read-only for safety during issues.