```
** SYSTEM INFORMATION & STATUS **

# Show kernel name
uname

# Show all system information
uname -a

# Show kernel version
uname -r

# Show architecture
uname -m

# Show operating system
uname -o

# CPU information
lscpu

# Block devices (disks, partitions)
lsblk

# Memory information
free -h

# Disk usage by filesystem
df -h

# System uptime and load
uptime

# More detailed uptime information
uptime -p

# Show uptime since specific date
uptime -s

# Show logged-in users
who

# Detailed user information with activities
w

# Show current username
whoami

# Show login history
last

# Show all environment variables
env

# Show specific variable
echo $HOME

# Set environment variable
export PATH=$PATH:/new/path

# Show PATH variable
echo $PATH

# Current date and time
date
```

```
# Set system time (as root)
date MMddhhmmyyyy

# Time zone information
timedatectl

# Set timezone
timedatectl set-timezone America/New_York


** FILE & DIRECTORY OPERATIONS **

# List files in current directory
ls

# Detailed listing with permissions
ls -l

# Show hidden files
ls -la

# Human-readable file sizes
ls -lh

# Sort by modification time
ls -lt

# Go to home directory
cd

# Go to specific directory
cd /path/to/directory

# Go up one level
cd ..

# Show current directory
pwd

# Go to previous directory
cd -

# Create directory
mkdir newdir

# Create nested directories
mkdir -p path/to/nested/dir

# Remove empty directory
rmdir dirname

# Remove file
rm filename

# Remove directory recursively
rm -rf dirname

# Display entire file
cat filename

# View file with pagination
less filename
```

```
# Show first 10 lines
head filename

# Show last 10 lines
tail filename

# Follow file changes in real-time
tail -f logfile

# Copy file
cp source.txt destination.txt

# Copy directory recursively
cp -r sourcedir/ destdir/

# Move/rename file
mv oldname.txt newname.txt

# Move to different directory
mv file.txt /path/to/destination/

# Copy with preservation of attributes
cp -p file.txt backup.txt

# Find by name
find /path -name "filename"

# Find files modified in last 7 days
find /path -mtime -7

# Find by file type
find /path -type f -name "*.txt"

# Locate files quickly (requires updatedb)
locate filename

# Find and execute command
find /path -name "*.log" -exec rm {} \;

# Change permissions (numeric)
chmod 755 filename

# Add execute permission
chmod +x script.sh

# Change ownership
chown user:group filename

# Change ownership recursively
chown -R user:group directory/

# View file permissions
ls -l filename


** PROCESS MANAGEMENT **

# Show user processes
ps

# Show all processes with details
ps aux

# Show process tree
```

```
ps -ef --forest

# Show processes by user
ps -u username

# Real-time process monitor
top

# Kill process by PID
kill 1234

# Force kill process
kill -9 1234

# Kill by process name
killall processname

# List all signals
kill -l

# Send specific signal
kill -HUP 1234

# List active jobs
jobs

# Send job to background
bg %1

# Bring job to foreground
fg %1

# Run command in background
command &

# Detach from terminal
nohup command &

# Enhanced process viewer (if installed)
htop

# Check service status
systemctl status servicename

# Start service
systemctl start servicename

# Enable service at boot
systemctl enable servicename

# View system logs
journalctl -f


** NETWORK OPERATIONS **

# Show network interfaces
ip addr show

# Show routing table
ip route show

# Configure interface (temporary)
ip addr add 192.168.1.10/24 dev eth0
```

```
# Bring interface up/down
ip link set eth0 up

# Legacy interface configuration
ifconfig

# Test connectivity
ping google.com

# Ping with count limit
ping -c 4 192.168.1.1

# Trace route to destination
traceroute google.com

# MTR - network diagnostic tool
mtr google.com

# Show all connections
netstat -tuln

# Show listening ports
netstat -tuln | grep LISTEN

# Modern replacement for netstat
ss -tuln

# Show processes using ports
netstat -tulnp

# Check specific port
netstat -tuln | grep :80

# Copy file to remote host
scp file.txt user@host:/path/

# Copy from remote host
scp user@host:/path/file.txt ./

# Synchronize directories
rsync -avz localdir/ user@host:/remotedir/

# Rsync with progress
rsync -avz --progress src/ dest/


** TEXT PROCESSING & SEARCH **

# Search for pattern in file
grep "pattern" filename

# Case-insensitive search
grep -i "pattern" filename

# Recursive search in directories
grep -r "pattern" /path/

# Show line numbers
grep -n "pattern" filename

# Count matching lines
grep -c "pattern" filename
```

```
# Replace text in file
sed 's/old/new/g' filename

# Delete lines containing pattern
sed '/pattern/d' filename

# Print specific fields
awk '{print $1, $3}' filename

# Sum values in column
awk '{sum += $1} END {print sum}' filename

# Sort file contents
sort filename

# Sort numerically
sort -n numbers.txt

# Remove duplicate lines
uniq filename

# Sort and remove duplicates
sort filename | uniq

# Count lines, words, characters
wc filename

# Count only lines
wc -l filename

# Extract first column
cut -d',' -f1 file.csv

# Extract character range
cut -c1-10 filename

# Combine files side by side
paste file1.txt file2.txt

# Use custom delimiter
cut -d':' -f1,3 /etc/passwd


** ARCHIVE & COMPRESSION **

# Create tar archive
tar -cf archive.tar files/

# Create compressed archive
tar -czf archive.tar.gz files/

# Extract archive
tar -xf archive.tar

# Extract compressed archive
tar -xzf archive.tar.gz

# List archive contents
tar -tf archive.tar

# Compress file with gzip
gzip filename

# Decompress gzip file
```

```
gunzip filename.gz

# Create zip archive
zip archive.zip file1 file2

# Extract zip archive
unzip archive.zip

# List zip contents
unzip -l archive.zip

# Create archive with compression
tar -czvf backup.tar.gz /home/user/

# Extract to specific directory
tar -xzf archive.tar.gz -C /destination/

# Add files to existing archive
tar -rf archive.tar newfile.txt

# Update archive with newer files
tar -uf archive.tar files/

# Show directory sizes
du -h /path/

# Summary of total size
du -sh /path/

# Show sizes of all subdirectories
du -h --max-depth=1 /path/

# Largest directories first
du -h | sort -hr | head -10


** SYSTEM MONITORING & PERFORMANCE **

# Memory usage summary
free -h

# Detailed memory stats
cat /proc/meminfo

# Virtual memory statistics
vmstat

# Memory usage every 2 seconds
vmstat 2

# Show swap usage
swapon --show

# I/O statistics (requires sysstat)
iostat

# I/O stats every 2 seconds
iostat 2

# Monitor disk I/O by process
iotop

# Show I/O usage for specific device
iostat -x /dev/sda
```

```
# Real-time process monitor
top

# Enhanced process viewer
htop

# Show load averages
uptime

# Show CPU information
lscpu

# Monitor specific process
top -p PID

# View system logs
journalctl

# Follow logs in real-time
journalctl -f

# Show logs for specific service
journalctl -u servicename

# Kernel messages
dmesg

# Last boot messages
dmesg | tail


** USER & PERMISSION MANAGEMENT **

# Add new user
useradd username

# Add user with home directory
useradd -m username

# Modify user account
usermod -aG groupname username

# Delete user account
userdel username

# Delete user with home directory
userdel -r username

# Create new group
groupadd groupname

# Show user's groups
groups username

# Show all groups
cat /etc/group

# Add user to group
usermod -aG groupname username

# Change user's primary group
usermod -g groupname username
```

```
# Switch to root user
su -

# Switch to specific user
su - username

# Execute command as root
sudo command

# Execute command as specific user
sudo -u username command

# Edit sudoers file
visudo

# Change password
passwd

# Change another user's password (as root)
passwd username

# Show password aging info
chage -l username

# Set password expiry
chage -M 90 username

# Force password change on next login
passwd -e username


** PACKAGE MANAGEMENT **

# Update package list (Debian/Ubuntu)
apt update

# Upgrade all packages (Debian/Ubuntu)
apt upgrade

# Install package (Debian/Ubuntu)
apt install packagename

# Remove package (Debian/Ubuntu)
apt remove packagename

# Search for packages (Debian/Ubuntu)
apt search packagename

# Show package information (Debian/Ubuntu)
apt show packagename

# Install package (RHEL/Fedora)
yum install packagename

# Update all packages (RHEL/Fedora)
yum update

# Remove package (RHEL/Fedora)
yum remove packagename

# Search for packages (RHEL/Fedora)
yum search packagename

# List installed packages (RHEL/Fedora)
```

```
yum list installed

# Install snap package
snap install packagename

# List installed snaps
snap list

# Update snap packages
snap refresh

# Remove snap package
snap remove packagename

# Search for snap packages
snap find packagename

# Install flatpak
flatpak install packagename

# List installed flatpaks
flatpak list

# Update flatpak packages
flatpak update

# Remove flatpak
flatpak uninstall packagename

# Search flatpak packages
flatpak search packagename


** SHELL & SCRIPTING **

# Show command history
history

# Show last 10 commands
history 10

# Execute previous command
!!

# Execute command by number
!123

# Search history interactively
Ctrl+R

# Create alias
alias ll='ls -la'

# Show all aliases
alias

# Remove alias
unalias ll

# Make alias permanent (add to .bashrc)
echo "alias ll='ls -la'" >> ~/.bashrc

# Redirect output to file
command > output.txt
```

```
# Append output to file
command >> output.txt

# Redirect input from file
command < input.txt

# Redirect both stdout and stderr
command &> output.txt

# Pipe output to another command
command1 | command2

# Edit bash configuration
nano ~/.bashrc

# Reload configuration
source ~/.bashrc

# Set environment variable
export VARIABLE=value

# Add to PATH
export PATH=$PATH:/new/path

# Show environment variables
printenv


** SECURITY & BEST PRACTICES **

# Enable UFW firewall
ufw enable

# Allow specific port
ufw allow 22/tcp

# Allow service by name
ufw allow ssh

# Deny access
ufw deny 23

# Show firewall status
ufw status verbose

# Advanced rules with iptables
iptables -L

# Generate MD5 checksum
md5sum filename

# Generate SHA256 checksum
sha256sum filename

# Verify checksum
sha256sum -c checksums.txt

# Create checksum file
sha256sum *.txt > checksums.txt

# Ubuntu security updates
apt update && apt upgrade
```

```
# Automatic security updates
unattended-upgrades

# CentOS/RHEL updates
yum update --security

# List available updates
apt list --upgradable

# Monitor authentication logs
tail -f /var/log/auth.log

# Check failed login attempts
grep "Failed password" /var/log/auth.log

# Monitor system logs
tail -f /var/log/syslog

# View login history
last

# Check for suspicious activities
journalctl -p err


** TROUBLESHOOTING & RECOVERY **

# Mount root filesystem
mount /dev/sda1 /mnt

# Chroot into system
chroot /mnt

# Reinstall GRUB
grub-install /dev/sda

# Update GRUB configuration
update-grub

# Check file system
fsck /dev/sda1

# Force file system check
fsck -f /dev/sda1

# Automatic repair
fsck -y /dev/sda1

# Check all mounted filesystems
fsck -A

# Check service status
systemctl status servicename

# View service logs
journalctl -u servicename

# Restart failed service
systemctl restart servicename

# Enable service at boot
systemctl enable servicename

# List failed services
```

```
systemctl --failed

# Check disk space
df -h

# Monitor I/O usage
iotop

# Check memory usage
free -h

# Identify CPU usage
top

# List open files
lsof


** FILE TRANSFER – FTP **

# Connect to FTP server
ftp ftp.example.com

# Connect to FTP server with username
ftp username@ftp.example.com

# Log in anonymously
ftp anonymous@ftp.example.com

# Download file from FTP server (interactive)
get filename.txt

# Upload file to FTP server (interactive)
put filename.txt

# Download directory recursively (if supported, use mget/mput)
mget *.txt

# Upload multiple files recursively (interactive)
mput *.txt

# Exit FTP session
bye


** FILE TRANSFER – SCP **

# Copy file to remote host
scp file.txt user@host:/remote/path/

# Copy file from remote host
scp user@host:/remote/path/file.txt .

# Copy directory recursively to remote host
scp -r folder/ user@host:/remote/path/

# Copy directory recursively from remote host
scp -r user@host:/remote/path/folder/ ./localpath/

# Use custom SSH port with SCP
scp -P 2222 file.txt user@host:/remote/path/

# Use private key for SCP authentication
scp -i key.pem file.txt user@host:/remote/path/
```

```
# Enable verbose output for SCP
scp -v file.txt user@host:/remote/path/

# Limit bandwidth for SCP transfer
scp -l 5000 file.txt user@host:/remote/path/


** FILE TRANSFER – RSYNC **

# Copy local file to remote host
rsync -av file.txt user@host:/remote/path/

# Copy remote file to local host
rsync -av user@host:/remote/path/file.txt ./localpath/

# Copy directory recursively to remote host
rsync -avz folder/ user@host:/remote/path/

# Copy directory recursively from remote host
rsync -avz user@host:/remote/path/folder/ ./localpath/

# Show progress during transfer
rsync -av --progress file.txt user@host:/remote/path/

# Delete files on destination not present in source
rsync -av --delete folder/ user@host:/remote/path/

# Use SSH with custom port
rsync -av -e "ssh -p 2222" folder/ user@host:/remote/path/

# Perform dry-run to see what would be copied
rsync -avn folder/ user@host:/remote/path/

# Compress files during transfer to save bandwidth
rsync -avz folder/ user@host:/remote/path/

# Preserve symbolic links, permissions, timestamps
rsync -a folder/ user@host:/remote/path/

# Test connectivity before transfer
ping host

# Check open SSH port before transfer
nc -zv host 22

# Check disk space on remote host
ssh user@host "df -h /remote/path"

# Resume interrupted transfer with rsync
rsync -av --partial folder/ user@host:/remote/path/
```