#### Processes & Jobs (Core)

Linux Commands Course · Section 10

#### What Is a Process?

A **process** is a running instance of a program.

Every process has:

- A PID (Process ID)
   A parent process
   A state (running, sleeping, stopped, zombie)
   An owner and resource usage (CPU, memory)

All running processes form a hierarchy — you can view it at any time.

#### **Viewing Processes — ps**

ps lists running processes.

ps aux

#### Columns:

- USER process owner
- PID process ID %CPU, %MEM resource usage STAT process state
- COMMAND what's running

#### Example:

USER PID %CPU %MEM COMMAND 1 0.0 0.1 systemd student 213 0.1 0.5 bash student 230 2.5 1.2 python3 script.py

# Interactive Process Viewer - top

Displays a live updating view of running processes.		
	top	
Common controls inside top:		
<ul> <li>P - sort by CPU</li> <li>M - sort by memory</li> <li>K - kill a process by PID</li> <li>Q - quit</li> </ul>		
More colorful alternative (if installed): htop		
	htop	
Use F6 to sort columns, F9 to kill, F10 to quit.		

# Finding Processes — pgrep and pkill

Search processes by name:		
	pgrep bash	
This prints PIDs for all matching processes.		
Kill by name (no need for PID):		
	pkill firefox	
Force kill with signal 9 (SIGKILL):		
	pkill -9 firefox	

# Killing by PID - kill

Stop a process using its PID.		
Example:		
	ps aux   grep sleep kill 1234	
Graceful termination (default SIGTERM 15):		
	kill 1234	
Force kill if unresponsive:		
	kill -9 1234	

### Kill Multiple at Once - killall

Ends	all	processes	with	the	same	name.
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killall python3

Useful for stopping multiple instances of a command quickly.

#### Adjusting Priority — nice

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Each process has a niceness value (priority).

Lower value → higher priority.

Start a command with custom priority:

Default nice value = 0.
```

Range = -20 (highest) to 19 (lowest).

nice -n 10 script.sh

### **Changing Priority of Running Process — renice**

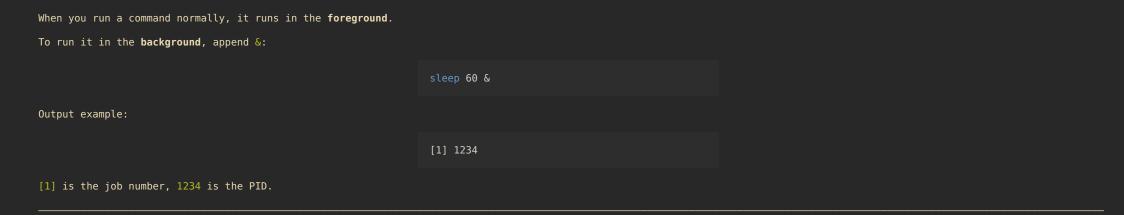
Change	niceness	for	an	existing	process
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renice +5 -p 2134

Example: lower CPU priority of a background task.

Only root can increase (raise) priority (negative nice values).

#### Foreground and Background Jobs



# Listing Jobs - jobs

Show jobs started from the current terminal:		
	jobs	
Example output:		
	[1]+ Running sleep 60 &	
Jobs are tied to your shell session.		

### Bringing Jobs to Foreground or Background

Bring job to foreground:		
	fg %1	
Send a suspended job to background again:		
	bg %1	
Stop a running job temporarily with Ctrl+Z.		

#### Disowning Jobs — disown

Detach a job from the current shell so it keeps running after you close the terminal.

disown %1

This removes it from the job table.

Example workflow:

sleep 300 & disown %1 exit

The job keeps running even after logout.

#### Persistent Background Processes — nohup

nohup runs a command immune to hangups or logouts.

nohup long\_task.sh &

Output is redirected to nohup.out by default.

Perfect for running long scripts or background services safely.

### Signals Overview

Processes can receive signals (software interrupts).

#### Common ones:

Signal	Number	Meaning
SIGTERM	15	Graceful termination
SIGKILL	9	Force kill, cannot be trapped
SIGSTOP	19	Pause process
SIGCONT	18	Resume process

#### Send custom signals:

kill -STOP 2134 # pause kill -CONT 2134 # resume

### **Combining Process Tools**

Practical usage example:

ps aux | grep nginx sudo systemctl restart nginx pgrep nginx pkill -HUP nginx

• View → restart → verify → reload gracefully

### **Monitoring Processes Efficiently**

Show top memory users:

ps -eo pid,comm,%mem --sort=-%mem | head

Show tree of process relationships:

pstree -p | less

These are great for debugging and audits.

#### Recap

- View: ps aux, top, htop
  Find / kill: pgrep, pkill, kill, killall
  Adjust priority: nice, renice
  Manage jobs: &, jobs, fg, bg, disown, nohup
  Know signals: graceful vs forceful termination

Mastering these makes you fluent in process control and multitasking.