Linux_Process_Management_Guide

Linux Process Management Guide

Author: Divyanshi Thapa

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ps accepts options in various formats:

- not preceded with a dash (BSD style)
- preceded with a dash (UNIX style)
- preceded with two dashes (GNU style)

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NOTE: To find a process by its name like "sleep 3000": `sudo pgrep -f "sleep 1000"`
NOTE: To kill a process if you know its name like "sleep 300" : `sudo pkill -f "sleep 300"`

1. List Processes

Command:

```
ps aux
```

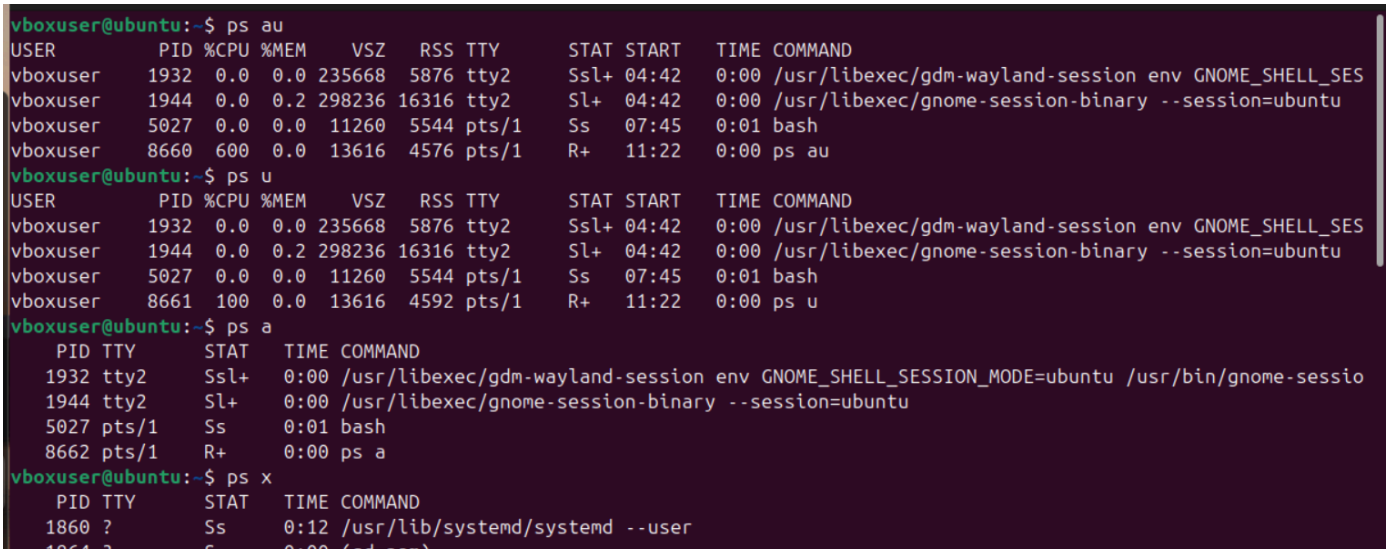
Explanation:

- **ps** → process status
- **a** → show processes for all users
- **u** → show user/owner of process
- **x** → includes off terminal commands

Example Output:

```
USER         PID  %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.1 167500  1100 ?        Ss   Sep25   0:05 /sbin/init
vibhu       1234  1.2  1.5 274532 15632 ?        Sl   10:15   0:12 /usr/bin/python3
script.py
mysql       2001  0.5  2.0 450000 20988 ?        Ssl  Sep25   1:02 /usr/sbin/mysqld
```

Sample code:



Command : `ps -e`

Note: see a more detailed output by using the -f in last.
Note : -f adds on the additional info in all the other commands.

2. Simple filtering

Command: `ps -C processname`

searching for a particular process by name with the -C option.

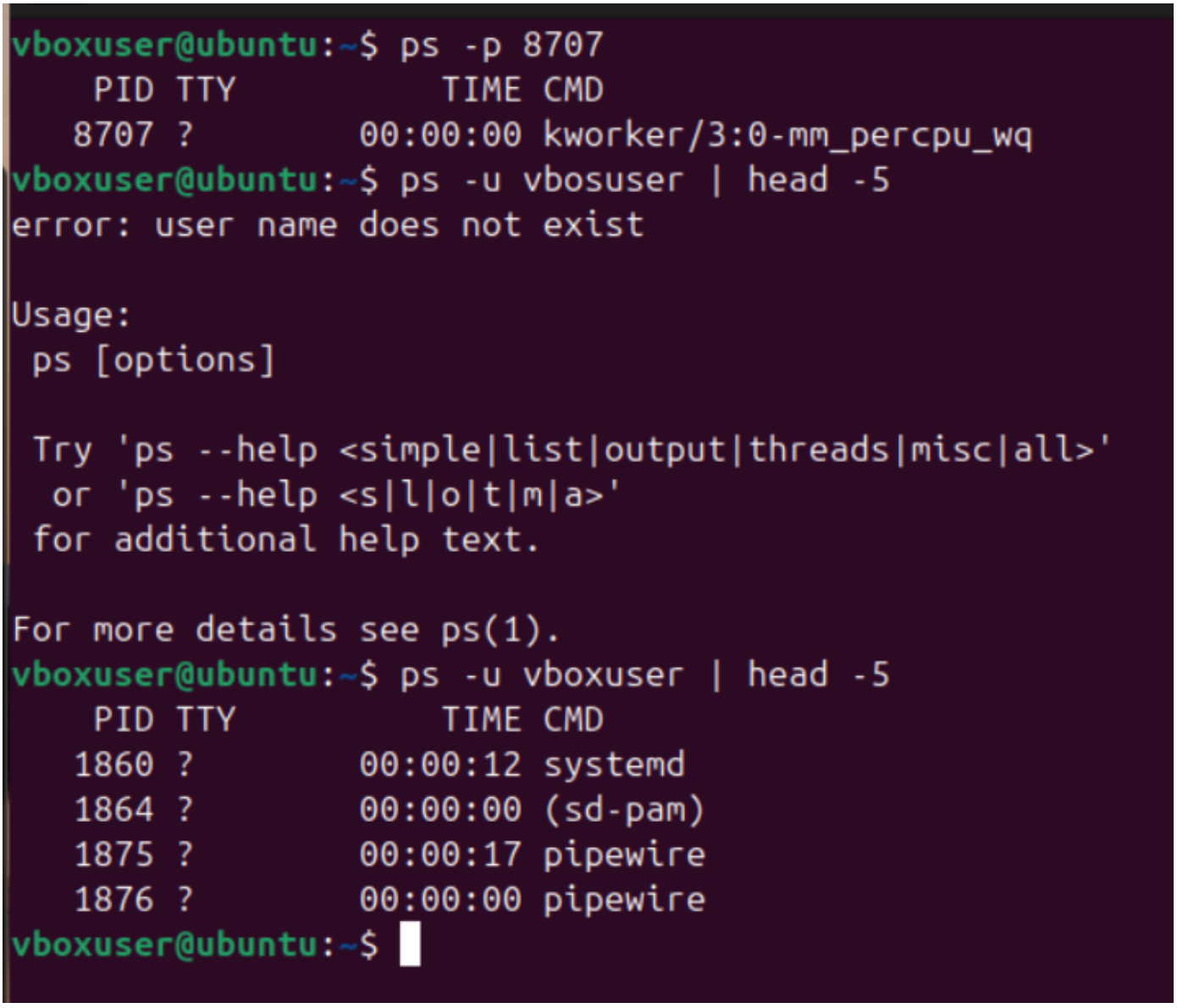
Command: `ps -p processid`

filter based on a list of process ids using the -p flag.

Command:; `ps -u username`

search by the user name by specifying it in the -u option.

Sample code:



3. Listing Threads

Command: `ps -C gedit -L`

- Todo: search a process named gedit and list all its threads.
  Note : you can ask for a more informative output then :
  `ps -C gedit -L -f`
- total number of threads of the process in the NLWP column.

Sample code:

4. Listing Child Processes

see the spawned child processes rather than the threads.

Command: `ps -e -H`

- H - for heirarchy
- we can filter by session id (SID) only and not by pid or process name.
  For that: `ps -g sid -H`

or

`ps -s sid -H`

Sample code:

```
vboxuser@ubuntu:~$ ps -e -H | head -5
    PID TTY          TIME CMD
      2 ?        00:00:00 kthreadd
      3 ?        00:00:00   pool_workqueue_release
      4 ?        00:00:00   kworker/R-rcu_gp
      5 ?        00:00:00   kworker/R-sync_wq
vboxuser@ubuntu:~$ ps -e -H -o pid,cmd | head -5
    PID CMD
      2 [kthreadd]
      3   [pool_workqueue_release]
      4   [kworker/R-rcu_gp]
      5   [kworker/R-sync_wq]
vboxuser@ubuntu:~$ ps -C bash -o sid
    SID
   2706
vboxuser@ubuntu:~$ ps -g 2706 -H | head -5
    PID TTY          TIME CMD
   2706 pts/0    00:00:00 bash
   2839 pts/0    00:00:00   ps
   2840 pts/0    00:00:00   head
vboxuser@ubuntu:~$
```

How to see my session id?

`ps -C gedit -o sid`

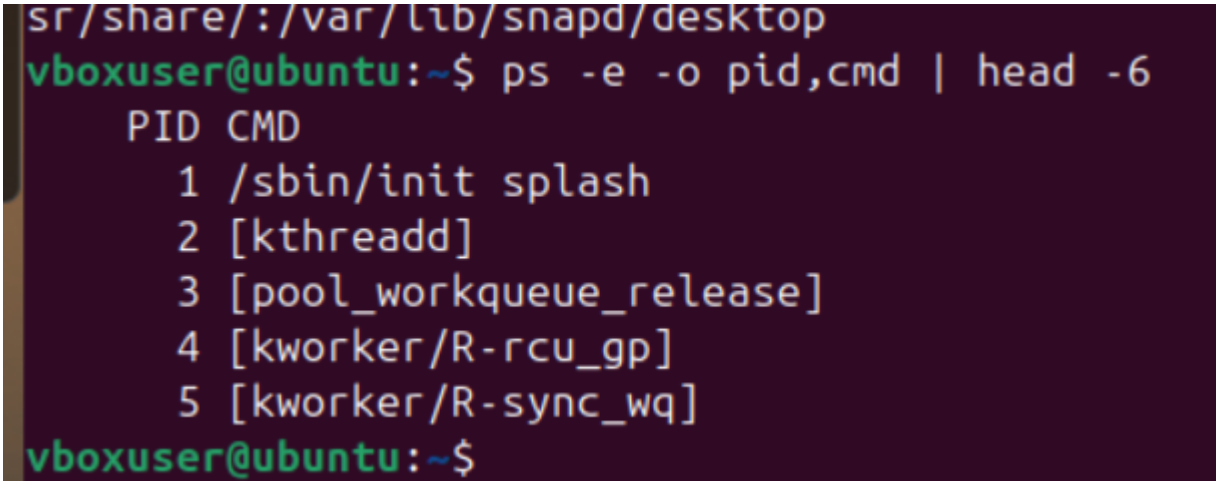
Note:

session id is equal to the process id that started the session — also called the session leader.

5. Controlling the Output

control which columns are printed with the help of the -o flag (order oriented).
`ps -C gedit -o pid,tty`

Sample code:



6. Process Tree

Command:

```
pstree -p
```

Explanation:

Shows parent-child process relationships.

- [] denote identical branches.
- { } denote child thread.

Example Output:

```
systemd(1)─┬─NetworkManager(778)
           ├─sshd(895)─┬─sshd(1023)───bash(1024)───pstree(1101)
           ├─mysqld(2001)
           └─python3(1234)
```

Sample code:

```
            └─wpa_supplicant(863)
vboxuser@ubuntu:~$ pstree -p | head -5
systemd(1)-+-ModemManager(936)-+-{ModemManager}(965)
           |                   |-{ModemManager}(974)
           |                   `-{ModemManager}(977)
           |-NetworkManager(858)-+-{NetworkManager}(935)
           |                     |-{NetworkManager}(938)
vboxuser@ubuntu:~$
```

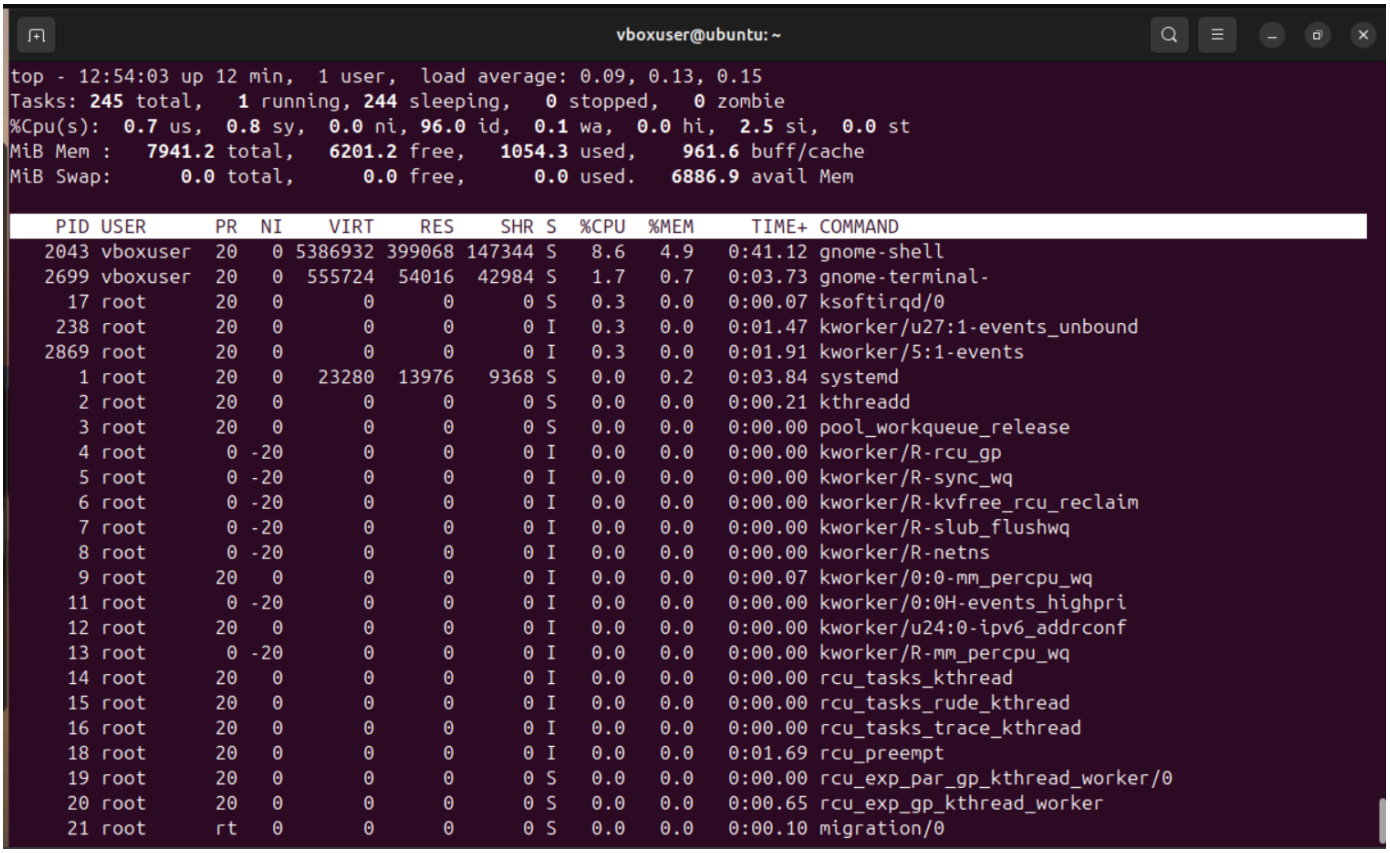
---

7. Real-Time Monitoring

Command:

```
top
```

Sample code:



Explanation:

Displays CPU, memory, and process usage in real-time.

- Press **q** to quit.

Example Output (partial):

```
top - 10:20:51 up 2 days,  3:12,  2 users,  load average: 0.22, 0.33, 0.45
Tasks: 197 total,   1 running, 196 sleeping,   0 stopped,   0 zombie
```

```
%Cpu(s): 12.3 us,  5.4 sy,  0.0 ni, 80.1 id,  2.2 wa,  0.0 hi,  0.0 si,  0.0 st
KiB Mem :  8045632 total,  3564980 free,  1876324 used,  2604328 buff/cache
```

---

8. Adjust Process Priority

The `nice` command is used to start a process with a specified nice value, while the `renice` command is used to alter priority of the running process.
Syntax:
`nice -n <nice_value> <command_name>`

Value of `nice`: -20(highest) to +20(lowest).
Default: 0.

```
-n:
Set the nice value for a new process.
-p:
Modify the nice value for a process using its PID.
```

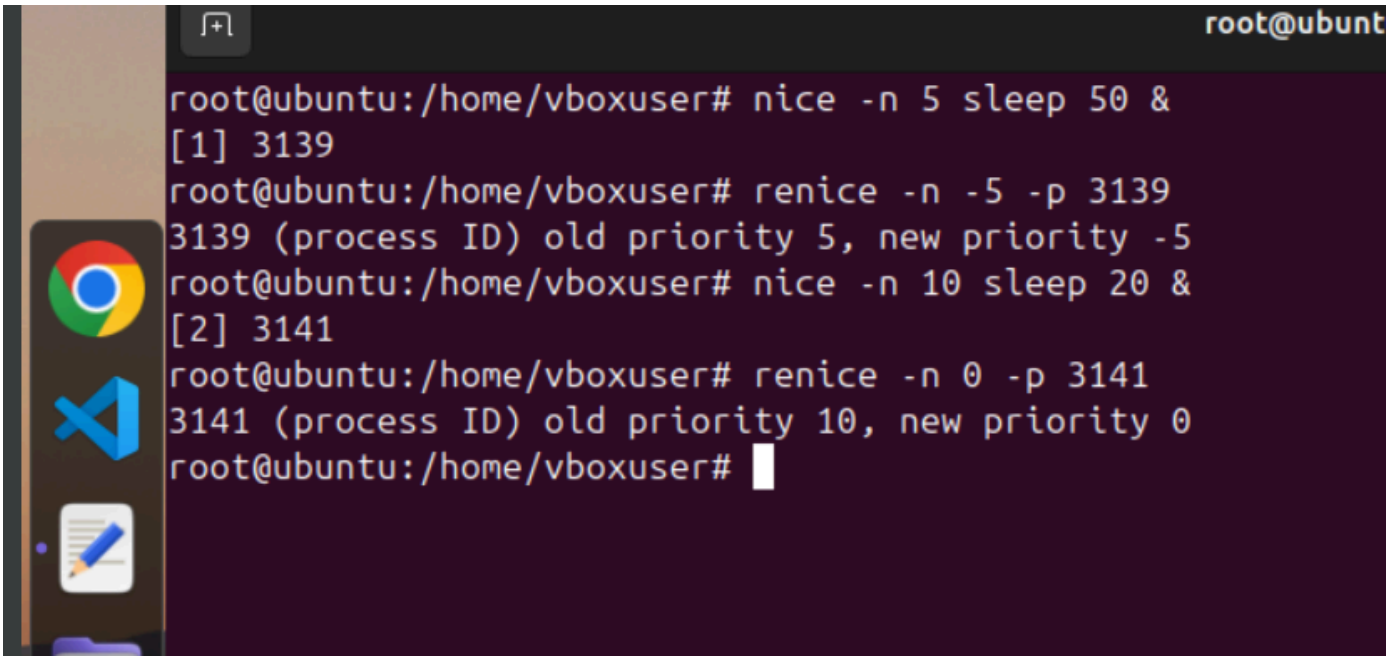
Start a process with low priority:

```
nice -n 10 sleep 300 &
```

Output:

```
[1] 3050
```

Sample code:



Change priority of `running` process:

```
renice -n -5 -p 3050
```

Note: You can only use renice when the process is running and hasnt ended.

Output:

```
3050 (process ID) old priority 10, new priority -5
```

> **Note:** Lower *nice* values (negative) mean **higher** priority. Requires appropriate privileges.

---

9. CPU Affinity (Bind Process to CPU Core)

Check CPU affinity:

```
taskset -cp 3050
```

Here, if u use -p instead of -cp then it just shows 3f (in my system)

Output:

```
pid 3050's current affinity list: 0-3
```

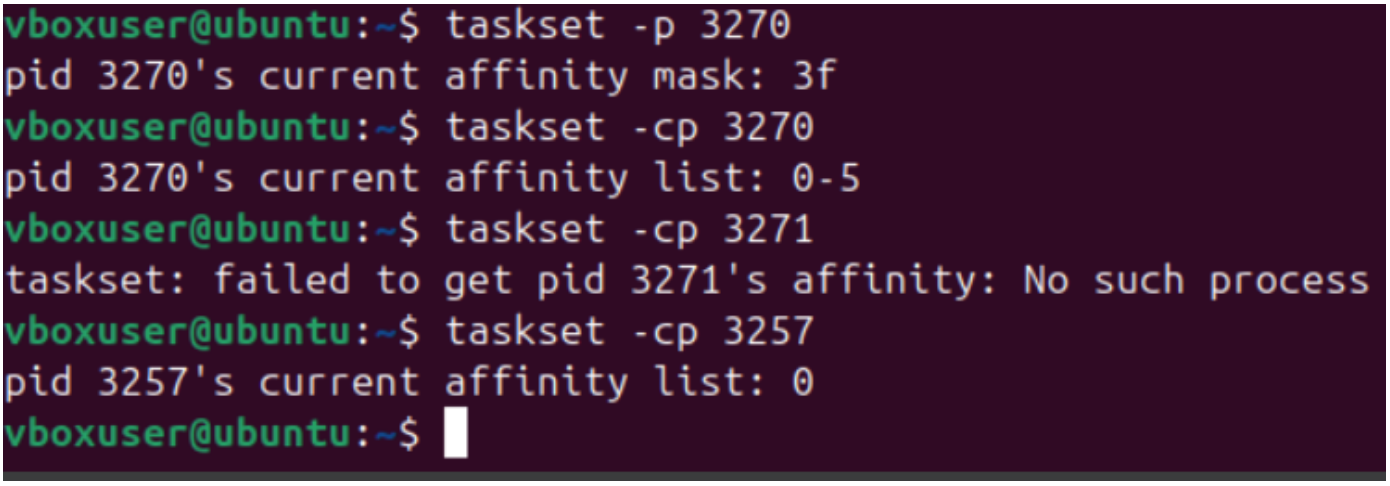
Restrict to core 1 only:

```
taskset -cp 1 3050
```

Output:

```
pid 3050's current affinity list: 1
```

Sample code:



10. I/O Scheduling Priority

Command:

Syntax:

`ionice -c scheduling_class -n priority_nice_value command`

Note: `ionice` affects Disk I/O not CPU.

Number of the scheduling classes:
-0 for none
-1 for real-time
-2 for best-exertion
-3 for inactive.

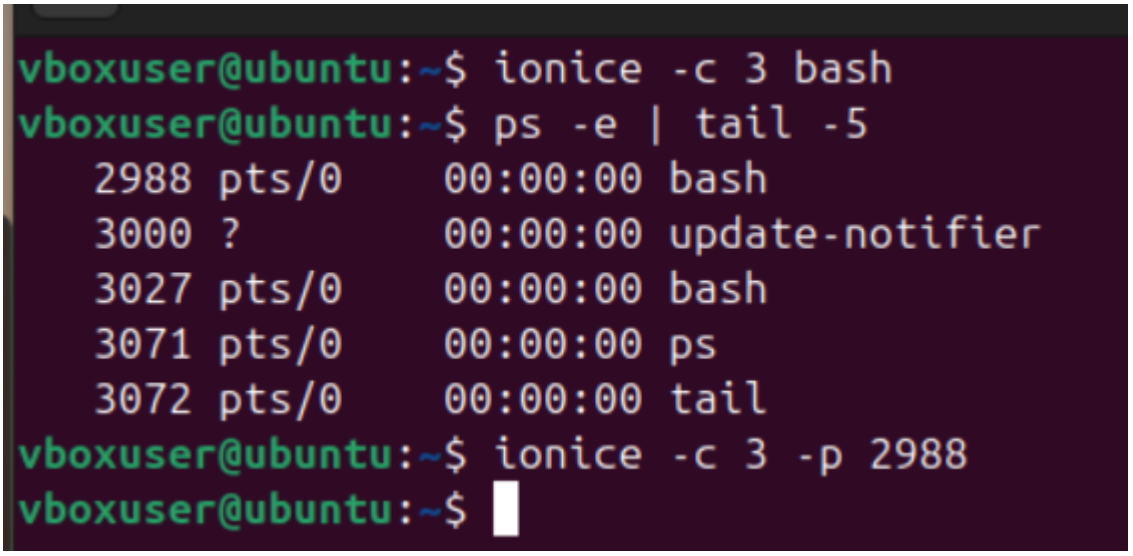
```
ionice -c 3 -p 3050
```

Output:

```
successfully set pid 3050's IO scheduling class to idle
```

- **Class 3 (idle)** → Process only gets I/O when system is idle.

Sample code:



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11. File Descriptors Used by a Process

Command:

`lsof`: The command itself, used to list open files.
Note: This command lists out all the files that are opened by any process in the system.

```
lsof -p 3050 | head -5
```

Note:
`head -5` shows the first 5 lines of the output incl the column heads.

Example Output:

```
COMMAND  PID USER   FD   TYPE DEVICE SIZE/OFF   NODE NAME
sleep   3050 vibhu  cwd  DIR  253,0     4096  131073 /home/vibhu
sleep   3050 vibhu  rtd  DIR  253,0     4096       2 /
sleep   3050 vibhu  txt  REG  253,0    17520  133580 /usr/bin/sleep
```

Sample code:

```
vboxuser@ubuntu:~$ lsof -p 2988
COMMAND  PID     USER   FD   TYPE DEVICE SIZE/OFF    NODE NAME
bash    2988 vboxuser  cwd    DIR    8,2     4096 1179650 /home/vboxuser
bash    2988 vboxuser  rtd    DIR    8,2     4096       2 /
bash    2988 vboxuser  txt    REG    8,2  1446024 1311289 /usr/bin/bash
bash    2988 vboxuser  mem    REG    8,2  5719296 1368750 /usr/lib/locale/locale
-archive
bash    2988 vboxuser  mem    REG    8,2  2125328 1313198 /usr/lib/x86_64-linux-
gnu/libc.so.6
bash    2988 vboxuser  mem    REG    8,2   208328 1322742 /usr/lib/x86_64-linux-
gnu/libtinfo.so.6.4
bash    2988 vboxuser  mem    REG    8,2    27028 1313187 /usr/lib/x86_64-linux-
gnu/gconv/gconv-modules.cache
bash    2988 vboxuser  mem    REG    8,2   236616 1313195 /usr/lib/x86_64-linux-
gnu/ld-linux-x86-64.so.2
bash    2988 vboxuser    0u   CHR  136,0      0t0       3 /dev/pts/0
bash    2988 vboxuser    1u   CHR  136,0      0t0       3 /dev/pts/0
bash    2988 vboxuser    2u   CHR  136,0      0t0       3 /dev/pts/0
bash    2988 vboxuser  255u   CHR  136,0      0t0       3 /dev/pts/0
vboxuser@ubuntu:~$
```

---

12. Working with Strace Process Monitoring Tool

Command:

```
strace -p 3050
```

Example Output:

```
strace: Process 3050 attached
restart_syscall(<... resuming interrupted nanosleep ...>) = 0
nanosleep({tv_sec=300, tv_nsec=0}, 0x7ffd4a60d8b0) = ? ERESTART_RESTARTBLOCK
(Interrupted by signal)
```

> Press **Ctrl+C** to detach from `strace`.

Sample code:

```
vboxuser@ubuntu:~$ strace bash
execve("/usr/bin/bash", ["bash"], 0x7ffe4420f9c0 /* 48 vars */) = 0
brk(NULL)                               = 0x60fd172d3000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7d86dcf83000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=58027, ...}) = 0
mmap(NULL, 58027, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7d86dcf74000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libtinfo.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=208328, ...}) = 0
mmap(NULL, 211240, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7d86dcf40000
mmap(0x7d86dcf4e000, 77824, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe000) = 0x7d86dcf4e000
mmap(0x7d86dcf61000, 57344, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x21000) = 0x7d86dcf61000
mmap(0x7d86dcf6f000, 20480, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2e000) = 0x7d86dcf6f000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784
fstat(3, {st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784
mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7d86dcc00000
mmap(0x7d86dcc28000, 1605632, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x7d86dcc28000
mmap(0x7d86dcdb0000, 323584, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x7d86dcdb0000
mmap(0x7d86dcdff000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x7d86dcdff000
mmap(0x7d86dce05000, 52624, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7d86dce05000
close(3)                                = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7d86dcf3d000
arch_prctl(ARCH_SET_FS, 0x7d86dcf3d740) = 0
set_tid_address(0x7d86dcf3da10)         = 3102
set_robust_list(0x7d86dcf3da20, 24)     = 0
rseq(0x7d86dcf3e060, 0x20, 0, 0x53053053) = 0
mprotect(0x7d86dcdff000, 16384, PROT_READ) = 0
mprotect(0x7d86dcf6f000, 16384, PROT_READ) = 0
mprotect(0x60fd028e1000, 16384, PROT_READ) = 0
mprotect(0x7d86dcfc1000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7d86dcf74000, 58027)           = 0
openat(AT_FDCWD, "/dev/tty", O_RDWR|O_NONBLOCK) = 3
close(3)                                = 0
getrandom("\xc8\x84\x74\x62\x50\x42\x0e\xaf", 8, GRND_NONBLOCK) = 8
```

---

13. Find Process Using a Port

Command:

```
sudo fuser -n tcp 8080
#used to identify which process is using TCP port 8080
```

Example Output:

```
8080/tcp:             4321
```

> PID **4321** is using port **8080**.

NOTE: it will output null if no process is running in that port.

Sample code:

```
vboxuser@ubuntu:~$ sudo fuser -n tcp 1091
vboxuser@ubuntu:~$ sudo fuser -n tcp 0
0/tcp:                   570  1186
vboxuser@ubuntu:~$
```

14. Monitoring processes

Command:

```
pidstat -p 3050 2 3
```

- pidstat: A performance monitoring tool from the sysstat package.(not in my device ##)
- -p 3050: Monitor only the process with PID 3050.
- 2: Interval in seconds between each report.
- 3: Number of reports to generate.

Example Output:

```
Linux 5.15.0 (ubuntu)   09/25/25        _x86_64_        (4 CPU)
12:30:20      UID       PID    %usr %system  %CPU   CPU  Command
12:30:22     1000      3050    0.00    0.00   0.00     1  sleep
12:30:24     1000      3050    0.00    0.00   0.00     1  sleep
12:30:26     1000      3050    0.00    0.00   0.00     1  sleep
```

> **Tip:** `pidstat` is part of the `sysstat` package on most distros.

Sample code:

```
vboxuser@ubuntu:~$ pidstat -p 3113 3 3
Linux 6.14.0-27-generic (ubuntu)        09/26/2025      _x86_64_        (6 CPU)

02:56:24 PM   UID       PID    %usr %system  %guest   %wait    %CPU   CPU  Command
02:56:27 PM  1000      3113    0.00    0.00    0.00    0.00    0.00     2  bash
02:56:30 PM  1000      3113    0.00    0.00    0.00    0.00    0.00     2  bash
02:56:33 PM  1000      3113    0.00    0.00    0.00    0.00    0.00     2  bash
Average:     1000      3113    0.00    0.00    0.00    0.00    0.00     -  bash
vboxuser@ubuntu:~$
```

---

15. Control Groups for Resource Limits

`cgroups`

- a Linux kernel feature that limits, accounts for, and isolates the resource usage (CPU, memory, disk I/O, network, etc.) of a collection of processes.

Q 1: We will create a disk-controlled group so that we may run any process with a finite amount of disk read/writes available. i.e. we want to throttle reads and writes done by a process or a group of

processes.

Create a new cgroup:

```
sudo cgcreate -g cpu,memory:/testgroup
```

Limit CPU and Memory:

```
echo 50000 | sudo tee /sys/fs/cgroup/cpu/testgroup/cpu.cfs_quota_us

echo 100M   | sudo tee /sys/fs/cgroup/memory/testgroup/memory.limit_in_bytes
```

Add a process (PID 3050) to cgroup:

```
echo 3050 | sudo tee /sys/fs/cgroup/cpu/testgroup/cgroup.procs
```

> **Note:** Paths and controllers differ between **cgroups v1** and **v2**. Adjust for your system.

Sample code:

```
root@ubuntu:/# stat -fc %T /sys/fs/cgroup/
cgroup2fs
root@ubuntu:/# cd /sys/fs/cgroup
root@ubuntu:/sys/fs/cgroup# echo +cpu +memory | sudo tee cgroup.subtree_control
+cpu +memory
root@ubuntu:/sys/fs/cgroup# sudo mkdir firstgrp
root@ubuntu:/sys/fs/cgroup# ls -l firstgrp
total 0
-r--r--r-- 1 root root 0 Sep 26 15:17 cgroup.controllers
-r--r--r-- 1 root root 0 Sep 26 15:17 cgroup.events
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.freeze
--w------- 1 root root 0 Sep 26 15:17 cgroup.kill
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.max.depth
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.max.descendants
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.pressure
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.procs
-r--r--r-- 1 root root 0 Sep 26 15:17 cgroup.stat
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.subtree_control
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.threads
-rw-r--r-- 1 root root 0 Sep 26 15:17 cgroup.type
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.idle
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.max
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.max.burst
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.pressure
-r--r--r-- 1 root root 0 Sep 26 15:17 cpu.stat
-r--r--r-- 1 root root 0 Sep 26 15:17 cpu.stat.local
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.uclamp.max
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.uclamp.min
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.weight
-rw-r--r-- 1 root root 0 Sep 26 15:17 cpu.weight.nice
-rw-r--r-- 1 root root 0 Sep 26 15:17 io.pressure
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.current
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.events
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.events.local
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.high
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.low
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.max
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.min
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.numa_stat
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.oom.group
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.peak
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.pressure
--w------- 1 root root 0 Sep 26 15:17 memory.reclaim
```

```
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.oom.group
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.peak
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.pressure
--w------- 1 root root 0 Sep 26 15:17 memory.reclaim
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.stat
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.swap.current
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.swap.events
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.swap.high
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.swap.max
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.swap.peak
-r--r--r-- 1 root root 0 Sep 26 15:17 memory.zswap.current
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.zswap.max
-rw-r--r-- 1 root root 0 Sep 26 15:17 memory.zswap.writeback
-r--r--r-- 1 root root 0 Sep 26 15:17 pids.current
-r--r--r-- 1 root root 0 Sep 26 15:17 pids.events
-r--r--r-- 1 root root 0 Sep 26 15:17 pids.events.local
-rw-r--r-- 1 root root 0 Sep 26 15:17 pids.max
-r--r--r-- 1 root root 0 Sep 26 15:17 pids.peak
root@ubuntu:/sys/fs/cgroup# echo $$ | sudo tee /firstgrp/cgroup.procs
tee: /firstgrp/cgroup.procs: No such file or directory
3149
root@ubuntu:/sys/fs/cgroup# cd firstgrp
root@ubuntu:/sys/fs/cgroup/firstgrp# echo $$ | sudo tee cgroup.procs
3149
root@ubuntu:/sys/fs/cgroup/firstgrp# echo "50000 100000" | sudo tee cpu.max
50000 100000
root@ubuntu:/sys/fs/cgroup/firstgrp# echo 104857600 | sudo tee memory.max
104857600
root@ubuntu:/sys/fs/cgroup/firstgrp# cat cpu.stat
usage_usec 185642
user_usec 59247
system_usec 126394
nice_usec 0
core_sched.force_idle_usec 0
nr_periods 16
nr_throttled 0
throttled_usec 0
nr_bursts 0
burst_usec 0
root@ubuntu:/sys/fs/cgroup/firstgrp# cat memory.current
675840
root@ubuntu:/sys/fs/cgroup/firstgrp#
```

---

16. Alternatives to nice / renice

1. `chrt` command

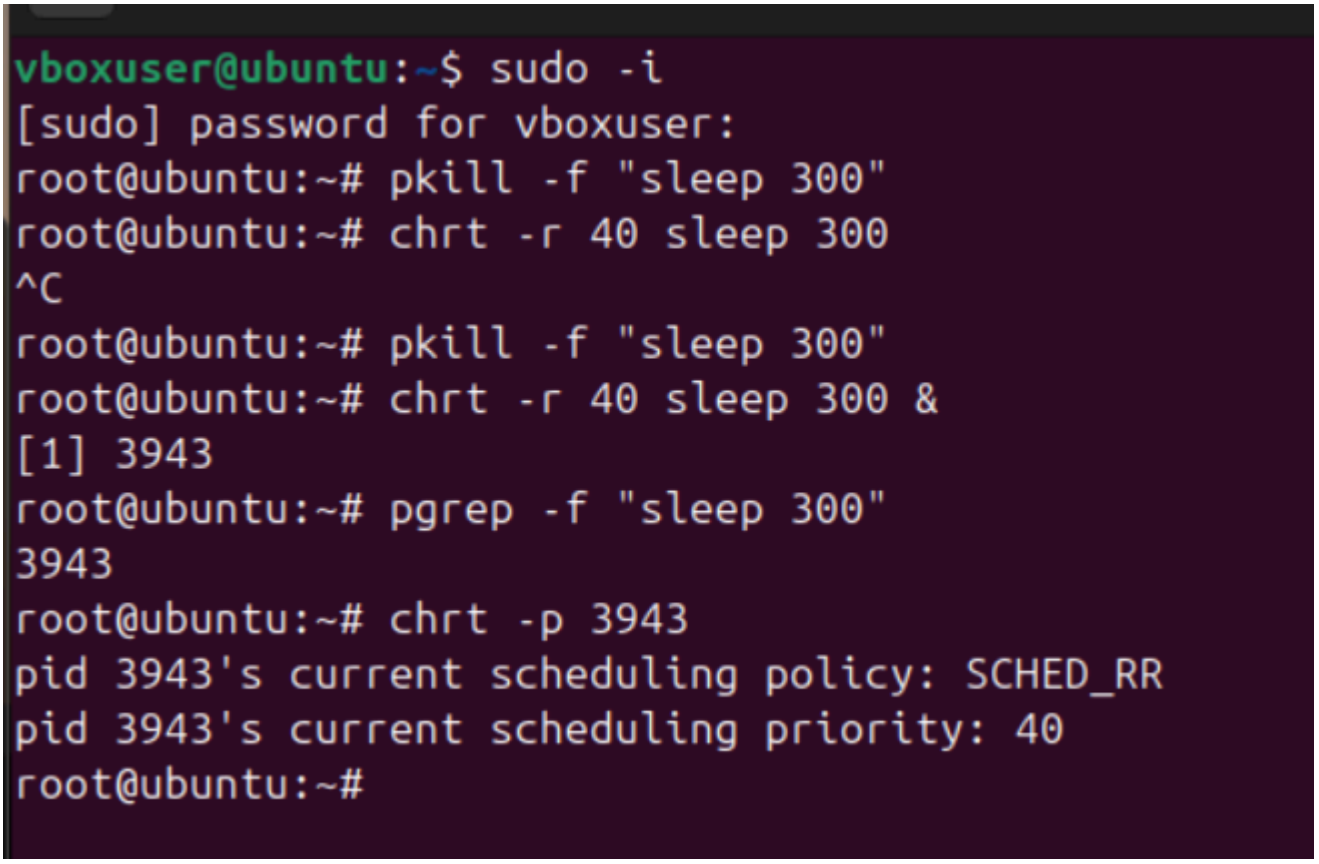
- command-line utility used to set or retrieve the real-time scheduling policy and priority of a process in Linux.

🧭 Linux Scheduling Policies: `SCHED_FIFO`, `SCHED_RR`, `SCHED_OTHER`

Policy	Type	Priority Range	Time Slice	Preemption	Use Case
`SCHED_FIFO`	Real-time	1–99	None	Yes	Deterministic tasks needing strict order
`SCHED_RR`	Real-time	1–99	Yes	Yes	Fair time-sharing among real-time tasks
`SCHED_OTHER`	Normal (default)	0	Yes	Yes	General-purpose user processes

Notes:

- `SCHED_FIFO`: Runs until blocked or preempted. No time slice.
  ⛳FLAG: `-f`
- `SCHED_RR`: Round-robin with time slices. Fair among equal-priority tasks.
  ⛳ FLAG : `-r`
- `SCHED_OTHER`: Default Linux scheduler (CFS). Used by most user-space processes.
  ⛳ FLAG: `-o`



2. ionice (I/O Priority Control)
   Refer to: [I/O Scheduling Priority]

3. taskset (CPU Affinity)
   Refer to : CPU Affinity (Bind Process to CPU Core)
4. Control Groups (cgroups)
   Refer to : Control Groups for Resource Limits
5. systemd-run
   Code:
   `systemd-run --scope -p CPUWeight=200 stress --cpu 4`

Output:
launching the stress tool inside a transient systemd scope unit with a CPU weight of 200.

Explaination:

- `systemd-run`: Creates and starts a transient systemd unit.
- `--scope`: Runs the command in a scope unit, which is suitable for processes that are not started by systemd itself (like interactive commands).
  -`-p CPUWeight=200`: Sets the CPU weight for the scope unit. This is part of systemd's CPU scheduling via cgroups. The default weight is 100; higher values give more CPU time relative to other units.
- `stress --cpu 4`: Runs the stress tool to spawn 4 CPU workers, each spinning in a tight loop to simulate CPU load.

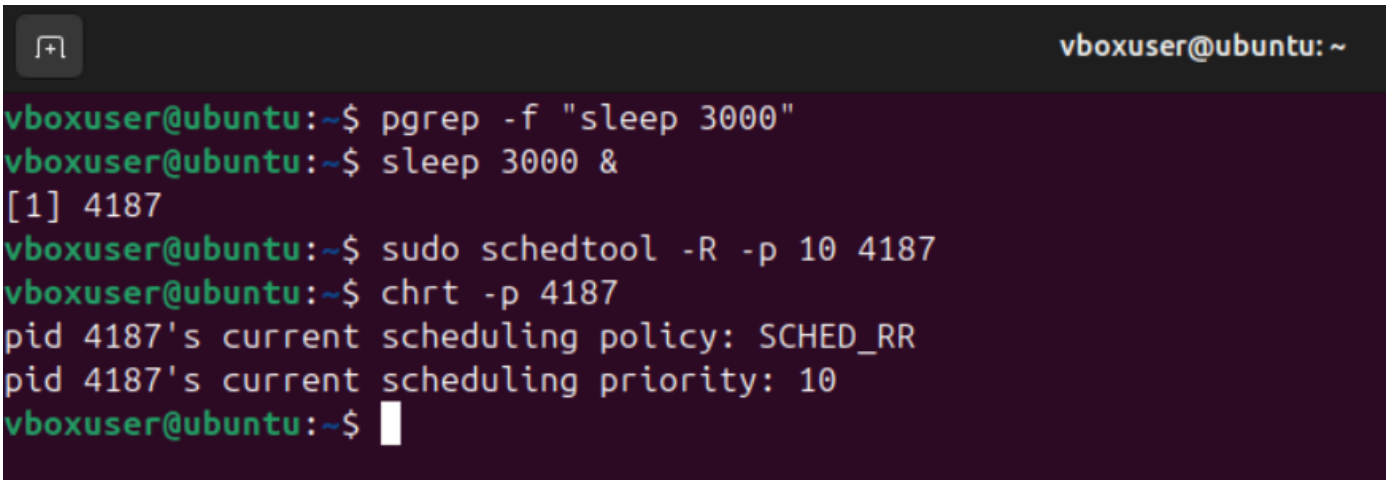
```
vboxuser@ubuntu:~$ sudo apt install stress
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  libllvm19
Use 'sudo apt autoremove' to remove it.
The following NEW packages will be installed:
  stress
0 upgraded, 1 newly installed, 0 to remove and 36 not upgraded.
Need to get 18.1 kB of archives.
After this operation, 52.2 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu noble/universe amd64 stress amd64 1.0.7-1 [18.1 kB]
Fetched 18.1 kB in 1s (29.0 kB/s)
Selecting previously unselected package stress.
(Reading database ... 202873 files and directories currently installed.)
Preparing to unpack .../stress_1.0.7-1_amd64.deb ...
Unpacking stress (1.0.7-1) ...
Setting up stress (1.0.7-1) ...
Processing triggers for man-db (2.12.0-4build2) ...
vboxuser@ubuntu:~$ systemd-run --scope -p CPUWeight=200 stress --cpu 4
Running as unit: run-u111.scope; invocation ID: ceea114cb00f48d1909ed1d31ab24431
stress: info: [3641] dispatching hogs: 4 cpu, 0 io, 0 vm, 0 hdd
^C
vboxuser@ubuntu:~$ top

top - 06:11:52 up 15 min,  1 user,  load average: 0.86, 0.82, 0.56
Tasks: 248 total,   1 running, 247 sleeping,   0 stopped,   0 zombie
```

7. schedtool
   Syntax:

`sudo schedtool -R -p 10 <pid>`

Sample code:



17. 📌 Cheat Sheet

Command	Purpose
`ps -C processname`	Filter processes by name
`ps -p PID`	Show details for specific PID
`ps -u username`	List processes by user
`ps -C gedit -L`	List threads of a process
`ps -e -H`	Show child processes in hierarchy
`ps -C gedit -o pid,tty`	Customize output columns
`strace -p PID`	Monitor system calls of a process
`sudo fuser -n tcp PORT`	Find process using a TCP port
`pidstat -p PID interval count`	Monitor CPU usage over time
`cgcreate -g cpu,memory:/group`	Create a control group
`echo PID | tee /sys/fs/cgroup/...`	Add process to cgroup
`systemd-run --scope -p CPUWeight=200 command`	Run process with CPU weight control
`schedtool -R -p N PID`	Set real-time scheduling policy