

## Linux/Unix Process Management: ps, kill, top, df, free, nice Commands

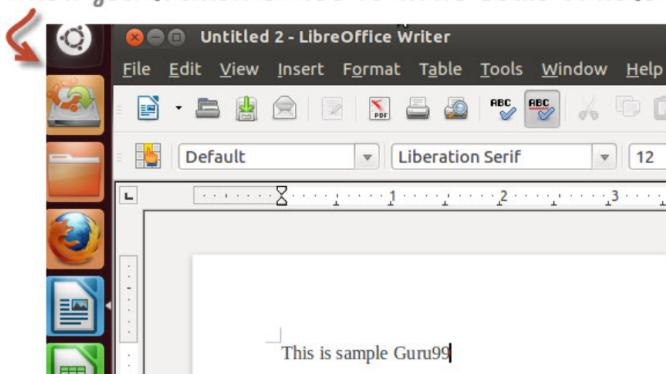


- Free

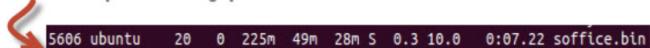
### What is a Process?

An instance of a program is called a Process. In simple terms, any command that you give to your Linux machine starts a new process.

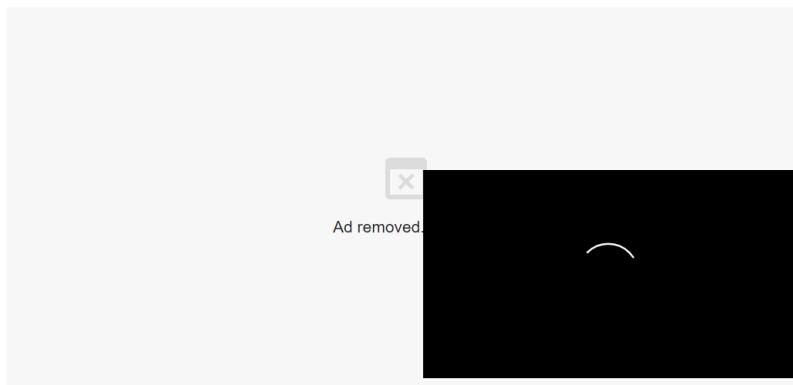
When you launch Office to write some article



Corresponding process is created



Having multiple processes for the same program is possible.



Types of Processes:

- Foreground Processes: They run on the screen and need input from the user. For example Office Programs

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- Background Processes: They run in the background and usually do not need user input. For example Antivirus.



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## Running a Foreground Process

To start a foreground process, you can either run it from the dashboard, or you can run it from the terminal.

When using the Terminal, you will have to wait, until the foreground process runs.



## Running a Background process

If you start a foreground program/process from the terminal, then you cannot work on the terminal, till the program is up and running.

Particular, data-intensive tasks take lots of processing power and may even take hours to complete. You do not want your terminal to be held up for such a long time.

To avoid such a situation, you can run the program and send it to the background so that terminal remains available to you. Let's learn how to do this -

```
Start the program and press ctrl+z
guru99@VirtualBox:~$ banshee ↗
[Info 16:08:36.688] Running Banshee 2.2.1: [Ubuntu 11.
11-12-19 14:51:26 UTC]
^Z
[1]+ Stopped                  banshee
Type 'bg' to send the process to the background
guru99@VirtualBox:~$ bg ↗
```

## Fg

You can use the command "fg" to continue a program which was stopped and bring it to the foreground.

The simple syntax for this utility is:

```
fg jobname
```

**Example**

1. Launch 'banshee' music player
2. Stop it with the 'ctrl +z' command
3. Continue it with the 'fg' utility.

```
home@VirtualBox:~$ banshee
^Z
[1]+  Stopped                  banshee
home@VirtualBox:~$ fg banshee
banshee
[Info 00:36:19.400] Running Banshee 2.2.0: [Ubuntu oneiric
(linux-gnu, i686) @ 2011-09-23 04:51:00 UTC]
```

Let's look at other important commands to manage processes -

**Top**

This utility tells the user about all the running processes on the Linux machine.

```
home@VirtualBox:~$ top
top - 23:57:43 up 2:54, 1 user, load average: 0.00, 0.01, 0.05
Tasks: 189 total, 2 running, 187 sleeping, 0 stopped, 0 zombie
Cpu(s): 0.7%us, 3.0%sy, 0.0%ni, 96.3%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 1026080k total, 924508k used, 101572k free, 37000k buffers
Swap: 1046524k total, 21472k used, 1025052k free, 367996k cached

PID USER      PR NI VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
1525 home      20  0 1775m 100m 28m S  1.7 10.0   5:05.34 Photoshop.exe
  961 root      20  0 75972 51m 7952 R  1.0  5.1   2:23.42 Xorg
  1507 home      20  0 7644 4652 696 S  1.0  0.5   2:42.66 wineserver
  1564 home      20  0 75144 29m 9840 S  0.3  3.0   0:25.96 ubuntuone-syncd
  2999 home      20  0 127m 13m 10m S  0.3  1.4   0:01.36 gnome-terminal
  3077 home      20  0 2820 1188 864 R  0.3  0.1   0:00.76 top
    1 root       20  0 3200 1704 1260 S  0.0  0.2   0:00.98 init
    2 root       20  0     0     0     0 S  0.0  0.0   0:00.00 kthreadd
    3 root       20  0     0     0     0 S  0.0  0.0   0:00.95 ksoftirqd/0
```

Press 'q' on the keyboard to move out of the process display.

The terminology follows:

Field	Description	Example 1	Example 2
PID	The process ID of each task	1525	961
User	The username of task owner	Home	Root
PR	Priority Can be 20(highest) or -20(lowest)	20	20
NI	The nice value of a task	0	0
VIRT	Virtual memory used (kb)	1775	75972
RES	Physical memory used (kb)	100	51
SHR	Shared memory used (kb)	28	7952

Status

There are five types:

'D' = uninterruptible sleep

S	'R' = running	S	R
---	---------------	---	---

'S' = sleeping

'T' = traced or stopped

'Z' = zombie

%CPU	% of CPU time	1.7	1.0
%MEM	Physical memory used	10	5.1

TIME+	Total CPU time	5:05.34	2:23.42
Command	Command name	Photoshop.exe	Xorg

## PS

This command stands for 'Process Status'. It is similar to the "Task Manager" that pop-ups in a Windows Machine when we use Cntrl+Alt+Del. This command is similar to 'top' command but the information displayed is different.

To check all the processes running under a user, use the command -

```
ps ux
```

```
home@VirtualBox:~$ ps ux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
home     1114  0.0  0.8  46548  8512 ?        Ssl Sep03  0:00 gnome-sess
home     1151  0.0  0.0   3856   140 ?        Ss  Sep03  0:00 /usr/bin/s
home     1154  0.0  0.0   3748   484 ?        S  Sep03  0:00 /usr/bin/d
home     1155  0.1  0.2   6656  3036 ?        Ss  Sep03  0:18 //bin/dbus
home     1157  0.0  0.2   9148  2368 ?        S  Sep03  0:00 /usr/lib/g
home     1162  0.0  0.2  31588  2296 ?        Ssl Sep03  0:00 /usr/lib/g
home     1174  0.0  1.1 122472 14994 ?        S1  Sep03  0:02 /usr/lib/g
```

You can also check the process status of a single process, use the syntax -

```
ps PID
```

```
guru99@VirtualBox:~$ ps 1268
 PID TTY      STAT   TIME COMMAND
 1268 ?        S<l   0:02 /usr/bin/pulseaudio --start --log-target=syslog
```

## Kill

This command **terminates running processes** on a Linux machine.

To use these utilities you need to know the PID (process id) of the process you want to kill

Syntax -

```
kill PID
```

To find the PID of a process simply type

```
pidof Process name
```

Let us try it with an example.

```
home@VirtualBox:~$ pidof Photoshop.exe
1525
home@VirtualBox:~$ kill 1525
```

## NICE

Linux can run a lot of processes at a time, which can slow down the speed of some high priority processes and result in poor performance.

To avoid this, you can tell your machine to prioritize processes as per your requirements.

This priority is called Niceness in Linux, and it has a value between -20 to 19. The lower the Niceness index, the higher would be a priority given to that task.

The default value of all the processes is 0.

To start a process with a niceness value other than the default value use the following syntax

```
nice -n 'Nice value' process name
```

```
home@VirtualBox:~$ nice -n 19 banshee
```

If there is some process already running on the system, then you can 'Renice' its value using syntax.

```
renice 'nice value' -p 'PID'
```

To change Niceness, you can use the 'top' command to determine the PID (process id) and its Nice value. Later use the renice command to change the value.

Let us understand this by an example.

### *Checking the niceness value of the process 'banshee'*

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
3293	home	20	0	277m	64m	35m	5	96.4	6.4	9:56.72	banshee

### *Renicing the value to -20*

```
home@VirtualBox:~$ sudo renice -20 -p 3293
[sudo] password for home:
3293 (process ID) old priority 0, new priority -20
```

### *The value changed to -20*

3293	home	6	-20	277m	64m	35m	5	95.2	6.4	3:32.95	banshee
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## DF

This utility reports the free disk space(Hard Disk) on all the file systems.

```
guru99@guru99-VirtualBox:~$ df
Filesystem      1K-blocks   Used   Available Use% Mounted on
/dev/sda1        7837756 2921376   4523216  40% /
udev             246488      4   246484   1% /dev
tmpfs            101512    752   100760   1% /run
none              5120      0    5120   0% /run/lock
none              253776     76   253700   1% /run/shm
```

If you want the above information in a readable format, then use the command

```
'df -h'
```

```
guru99@guru99-VirtualBox:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda1        7.5G  2.8G  4.4G  40% /
udev             241M  4.0K  241M  1% /dev
tmpfs            100M  752K  99M  1% /run
none              5.0M  0     5.0M  0% /run/lock
none              248M  76K  248M  1% /run/shm
```

## Free

This command shows the free and used memory (RAM) on the Linux system.

```
home@VirtualBox:~$ free
              total        used        free      shared  buffers  cached
Mem:       1026080      803604      222476          0      36312    343376
  -/+ buffers/cache:      423916      602164
Swap:        1046524      35832     1010692
```

You can use the arguments

free -m to display output in MB

free -g to display output in GB

## Summary:

- Any running program or a command given to a Linux system is called a process
- A process could run in foreground or background
- The priority index of a process is called Nice in Linux. Its default value is 0, and it can vary between 20 to -19

- The lower the Niceness index, the higher would be priority given to that task

Command	Description
bg	To send a process to the background
fg	To run a stopped process in the foreground
top	Details on all Active Processes
ps	Give the status of processes running for a user
ps PID	Gives the status of a particular process
pidof	Gives the Process ID (PID) of a process
kill PID	Kills a process
nice	Starts a process with a given priority
renice	Changes priority of an already running process
df	Gives free hard disk space on your system
free	Gives free RAM on your system

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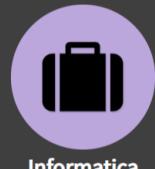
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