

Perform Process Monitoring

- **Introduction**
- **Lab Topology**
- **Exercise 1 - Perform Process Monitoring**
- **Review**

Introduction

Welcome to the **Perform Process Monitoring** Practice Lab. In this module you will be provided with the instructions and devices needed to develop your hands-on skills.

Process
Monitoring
Linux System

Learning Outcomes

In this module, you will complete the following exercise:

- Exercise 1 - Perform Process Monitoring

After completing this lab, you will be able to:

- View processes using /proc
- Work with the process monitoring commands (ps, pstree, top)

Exam Objectives

The following exam objectives are covered in this lab:

- **CompTIA: 4.1** Given a scenario, analyze system properties and remediate accordingly.

Note: Our main focus is to cover the practical, hands-on aspects of the exam objectives. We recommend referring to course material or a search engine to

research theoretical topics in more detail.

Lab Duration

It will take approximately **1 hour** to complete this lab.

Help and Support

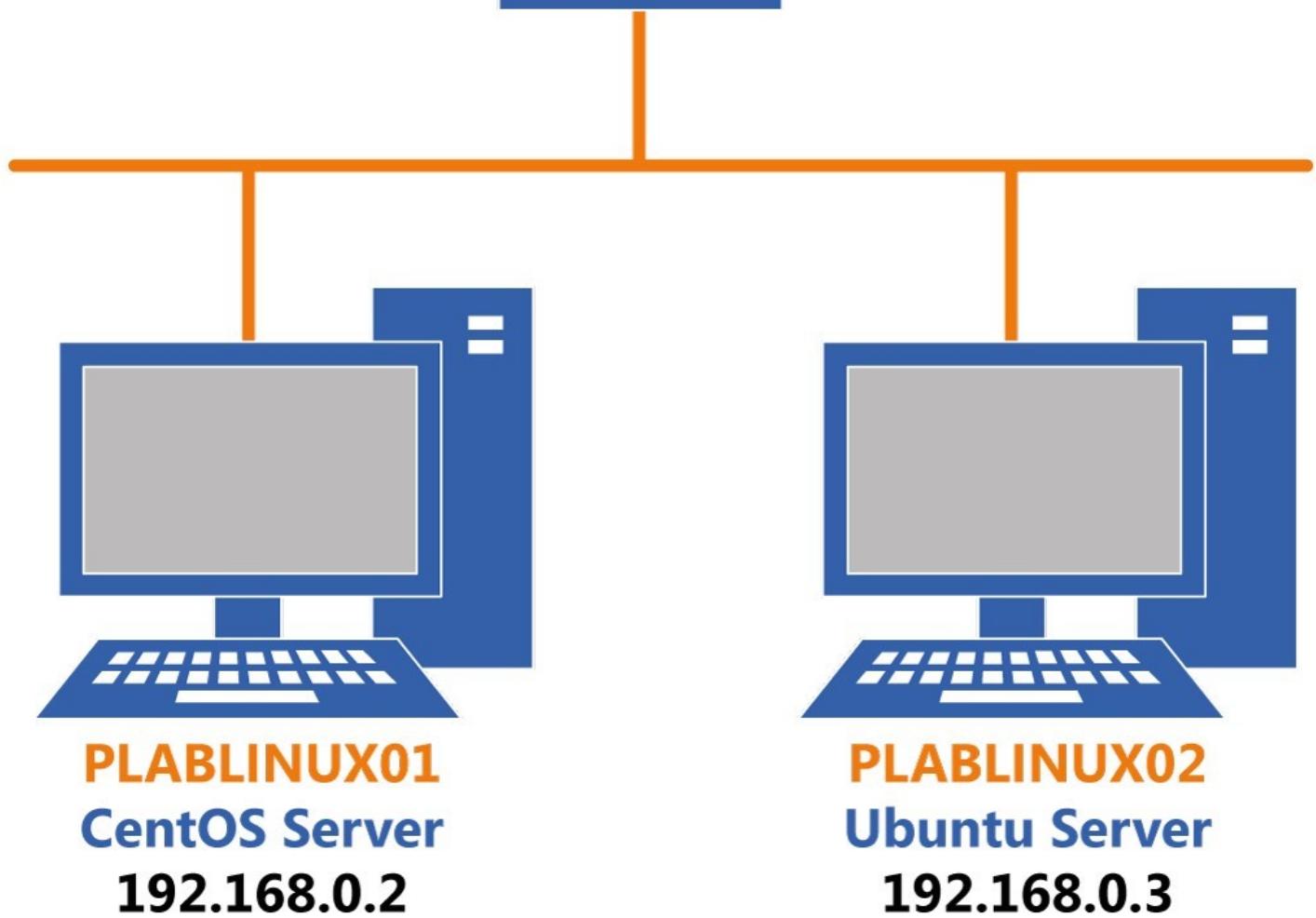
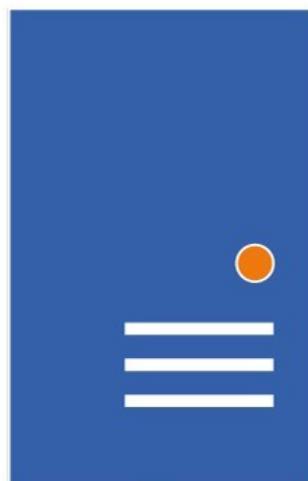
For more information on using Practice Labs, please see our **Help and Support** page. You can also raise a technical support ticket from this page.

Click Next to view the Lab topology used in this module.

Lab Topology

During your session, you will have access to the following lab configuration.

PLABSA01
Windows Server 2016
192.168.0.1



Depending on the exercises you may or may not use all of the devices, but they are shown here in the layout to get an overall understanding of the topology of the lab.

- **PLABSA01** (Windows Server 2016)
- **PLABLINUX01** (CentOS Server)
- **PLABLINUX02** (Ubuntu Server)

Click Next to proceed to the first exercise.

Exercise 1 - Perform Process Monitoring

Each server runs various processes. Some of them are system processes and cannot be shut down. On the other hand, several processes start only when you start an application or execute a command. Monitoring process specifically becomes crucial when you need to ensure the optimal performance of your server.

In this exercise, you will learn to perform memory monitoring.

Learning Outcomes

After completing this exercise, you will be able to:

- Log into a Linux System
- View processes using /proc
- Work with the process monitoring commands (ps, pstree, top)

Your Devices

You will be using the following device in this lab. Please power these on now.

- **PLABLINUX01** (CentOS Server)



Task 1 -View Processes Using /proc

The /proc file system is a virtual file system that is available in CentOS. It contains files that are associated with the processes.

In this task, you will learn to view processes using /proc. To view processes using /proc, perform the following steps:

Step 1

On the desktop, right-click and select **Open Terminal**.

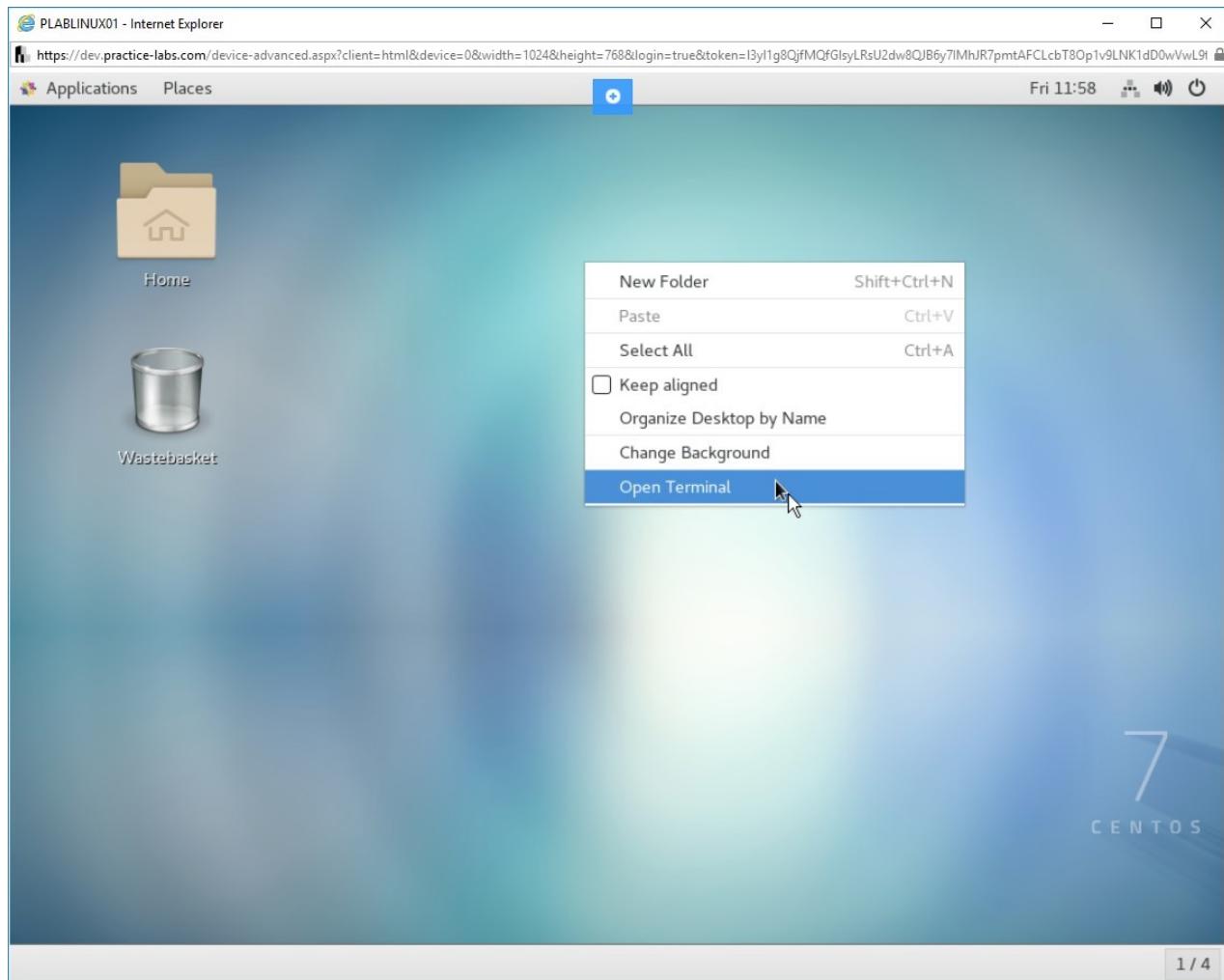


Figure 1.1 Screenshot of PLABLINUX01: Selecting the Open Terminal option from the context menu.

Step 2

The terminal window is displayed. Type the following command:

```
ls -l /proc
```

Press **Enter**. Notice that the command displays different Process directories that are available on the PLABLINUX01 device.

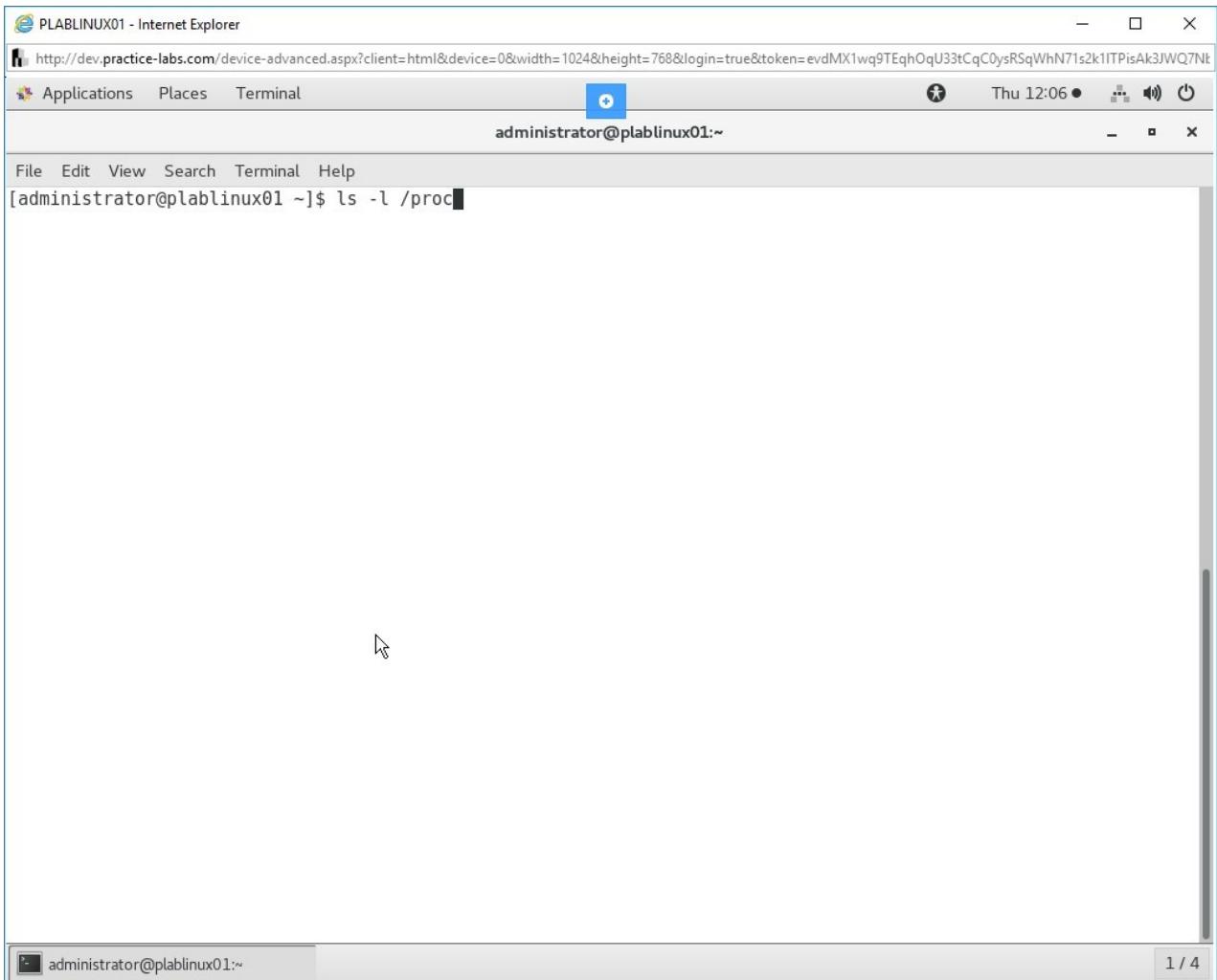


Figure 1.2 Screenshot of PLABLINUX01: Executing the ls command to view the /proc directory.

Step 3

The output of the command is displayed. Notice that the majority of the files are **0** in their size. These empty directories and files provide views into the processes.

The screenshot shows a terminal window titled "PLABLINUX01 - Internet Explorer" with the URL "http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=evdMX1wq9TEqhOqU33tCqC0ysRSqWhN71s2k1TPisAk3JWQ7Nk". The terminal window has tabs for Applications, Places, Terminal, and a plus sign icon. The title bar shows "administrator@plablinux01:~". The main area displays a long list of files in the /proc directory, including mounts, net, self, and various system statistics files like meminfo, loadavg, and swapinfo. The terminal prompt "[administrator@plablinux01 ~]\$" is at the bottom. A status bar at the bottom right shows "1 / 4".

```
-r--r--r--. 1 root      root          0 Jan 17 12:06 key-users
-r-----. 1 root      root          0 Jan 17 12:06 kmsg
-r-----. 1 root      root          0 Jan 17 12:06 kpagecount
-r-----. 1 root      root          0 Jan 17 12:06 kpageflags
-r--r--r--. 1 root      root          0 Jan 17 12:06 loadavg
-r--r--r--. 1 root      root          0 Jan 17 12:06 locks
-r--r--r--. 1 root      root          0 Jan 17 12:06 mdstat
-r--r--r--. 1 root      root          0 Jan 17 12:06 meminfo
-r--r--r--. 1 root      root          0 Jan 17 12:06 misc
-r--r--r--. 1 root      root          0 Jan 17 12:06 modules
lrwxrwxrwx. 1 root      root          11 Jan 17 12:06 mounts -> self/mounts
-rw-r--r--. 1 root      root          0 Jan 17 11:40 mtrr
lrwxrwxrwx. 1 root      root          8 Jan 17 12:06 net -> self/net
-r--r--r--. 1 root      root          0 Jan 17 12:06 pagetypeinfo
-r--r--r--. 1 root      root          0 Jan 17 12:06 partitions
-r--r--r--. 1 root      root          0 Jan 17 12:06 sched_debug
-r--r--r--. 1 root      root          0 Jan 17 12:06 schedstat
dr-xr-xr-x. 3 root      root          0 Jan 17 12:06 scsi
lrwxrwxrwx. 1 root      root          0 Jan 17 11:39 self -> 3796
-r-----. 1 root      root          0 Jan 17 12:06 slabinfo
-r--r--r--. 1 root      root          0 Jan 17 12:06 softirqs
-r--r--r--. 1 root      root          0 Jan 17 12:06 stat
-r--r--r--. 1 root      root          0 Jan 17 11:39 swaps
dr-xr-xr-x. 1 root      root          0 Jan 17 11:39 sys
--w-----. 1 root      root          0 Jan 17 12:06 sysrq-trigger
dr-xr-xr-x. 2 root      root          0 Jan 17 12:06 sysvipc
-r--r--r--. 1 root      root          0 Jan 17 12:06 timer_list
-rw-r--r--. 1 root      root          0 Jan 17 12:06 timer_stats
dr-xr-xr-x. 4 root      root          0 Jan 17 12:06 tty
-r--r--r--. 1 root      root          0 Jan 17 12:06 uptime
-r--r--r--. 1 root      root          0 Jan 17 12:06 version
-r-----. 1 root      root          0 Jan 17 12:06 vmallocinfo
-r--r--r--. 1 root      root          0 Jan 17 12:06 vmstat
-r--r--r--. 1 root      root          0 Jan 17 12:06 zoneinfo
[administrator@plablinux01 ~]$
```

Figure 1.3 Screenshot of PLABLINUX01: Displaying the files in the /proc directory.

Step 4

Clear the screen by entering the following command:

```
clear
```

You will now navigate to the **/proc** directory. To do this, type the following command:

```
cd /proc
```

Press **Enter**. You are now in the /proc directory.

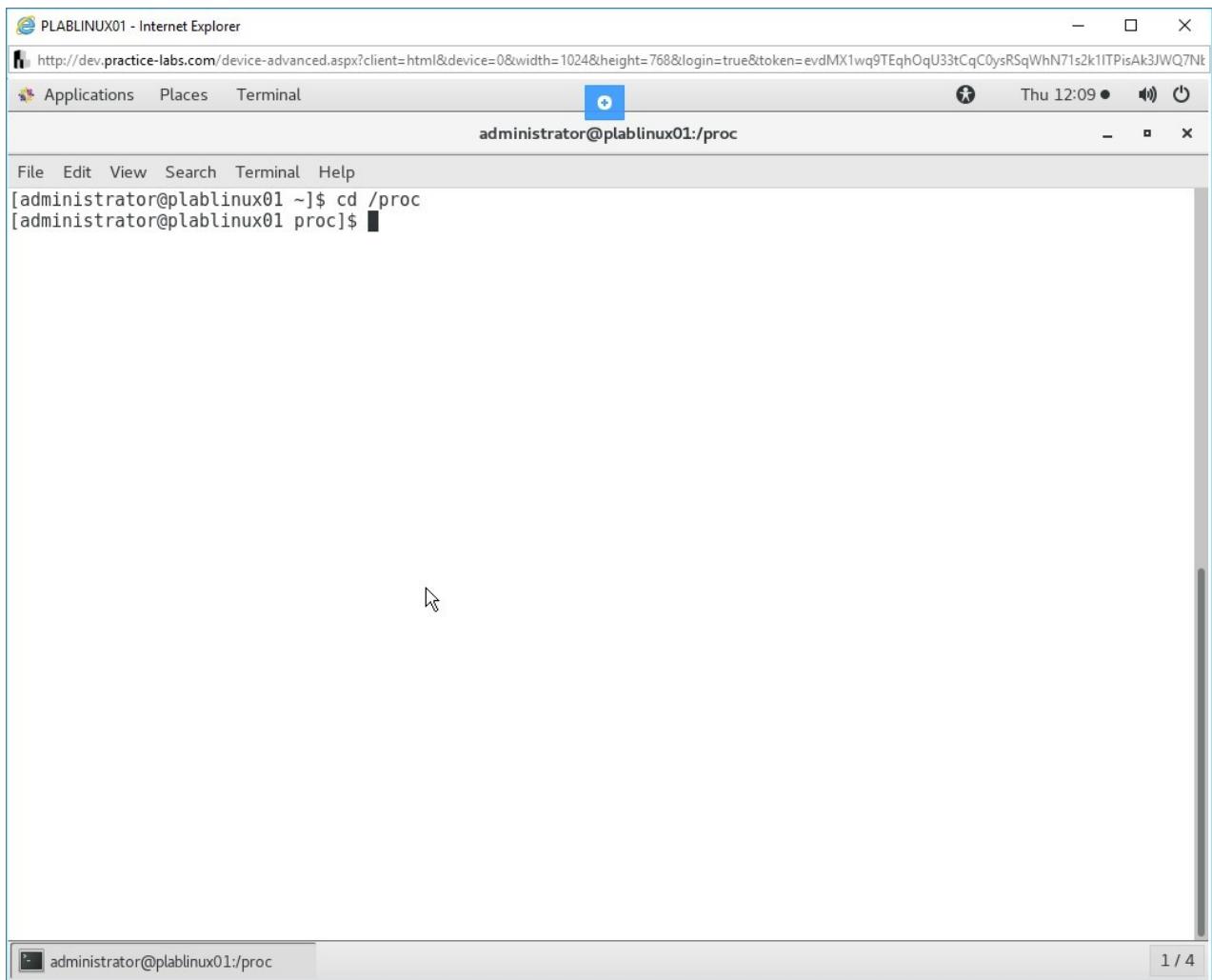


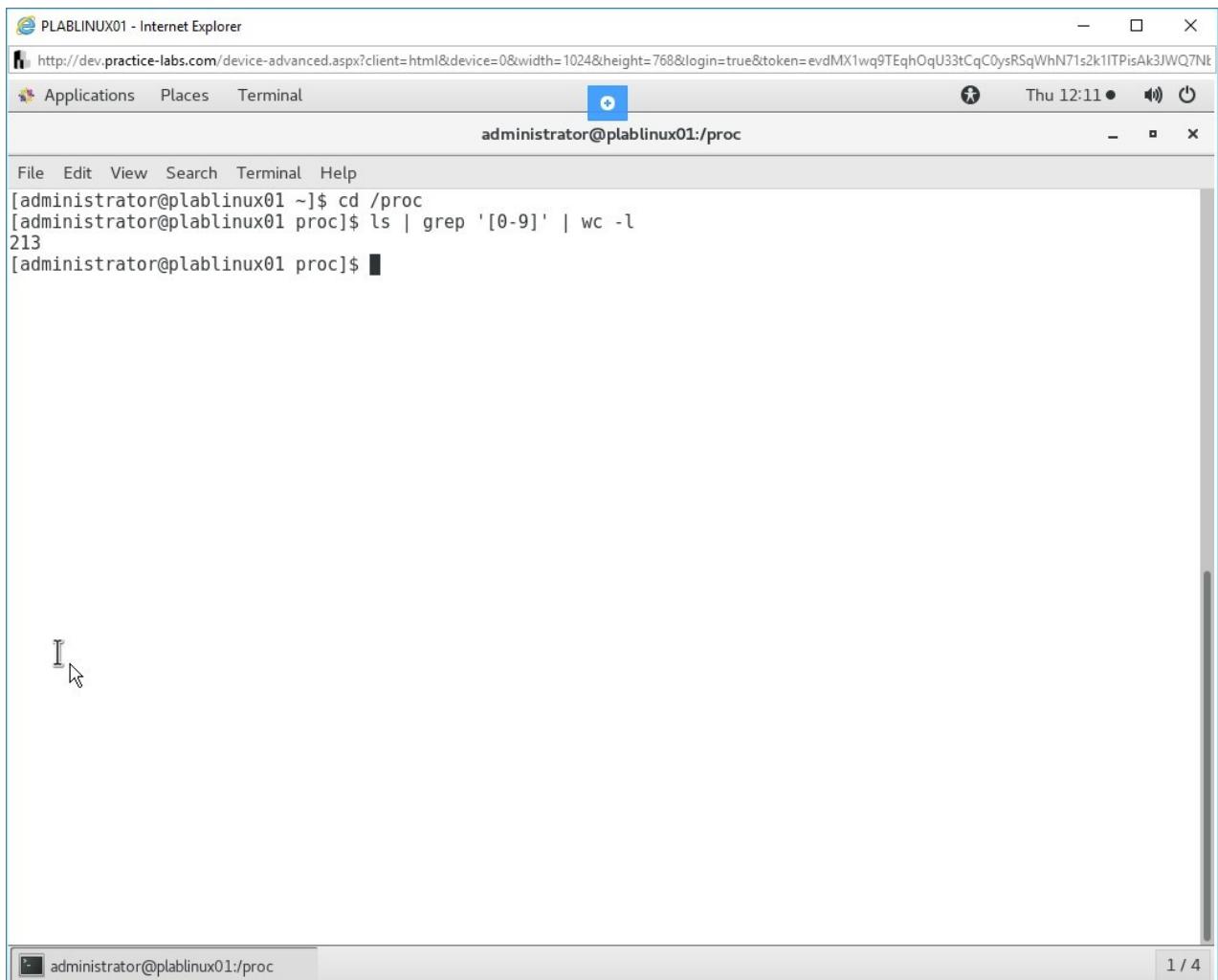
Figure 1.4 Screenshot of PLABLINUX01: Navigating to the /proc directory.

Step 5

Some of the directories will have only the process IDs as their name. You can count the files with numeric names and processes running on the system. To do this, type the following command:

```
ls | grep '[0-9]' | wc -l
```

Press **Enter**.



The screenshot shows a terminal window titled "PLABLINUX01 - Internet Explorer" with the URL "http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=evdMX1wq9TEqhOqU33tCqC0ysRSqWhN71s2k1ITPisAk3JWQ7Nk". The terminal window has a title bar with "Applications", "Places", "Terminal", and a blue "+" button. The status bar shows "administrator@plablinux01:/proc" and the date/time "Thu 12:11". The main area of the terminal shows the following command and output:

```
[administrator@plablinux01 ~]$ cd /proc  
[administrator@plablinux01 proc]$ ls | grep '[0-9]' | wc -l  
213  
[administrator@plablinux01 proc]$
```

Figure 1.5 Screenshot of PLABLINUX01: Counting the number of files in the /proc directory.

Step 6

Clear the screen by entering the following command:

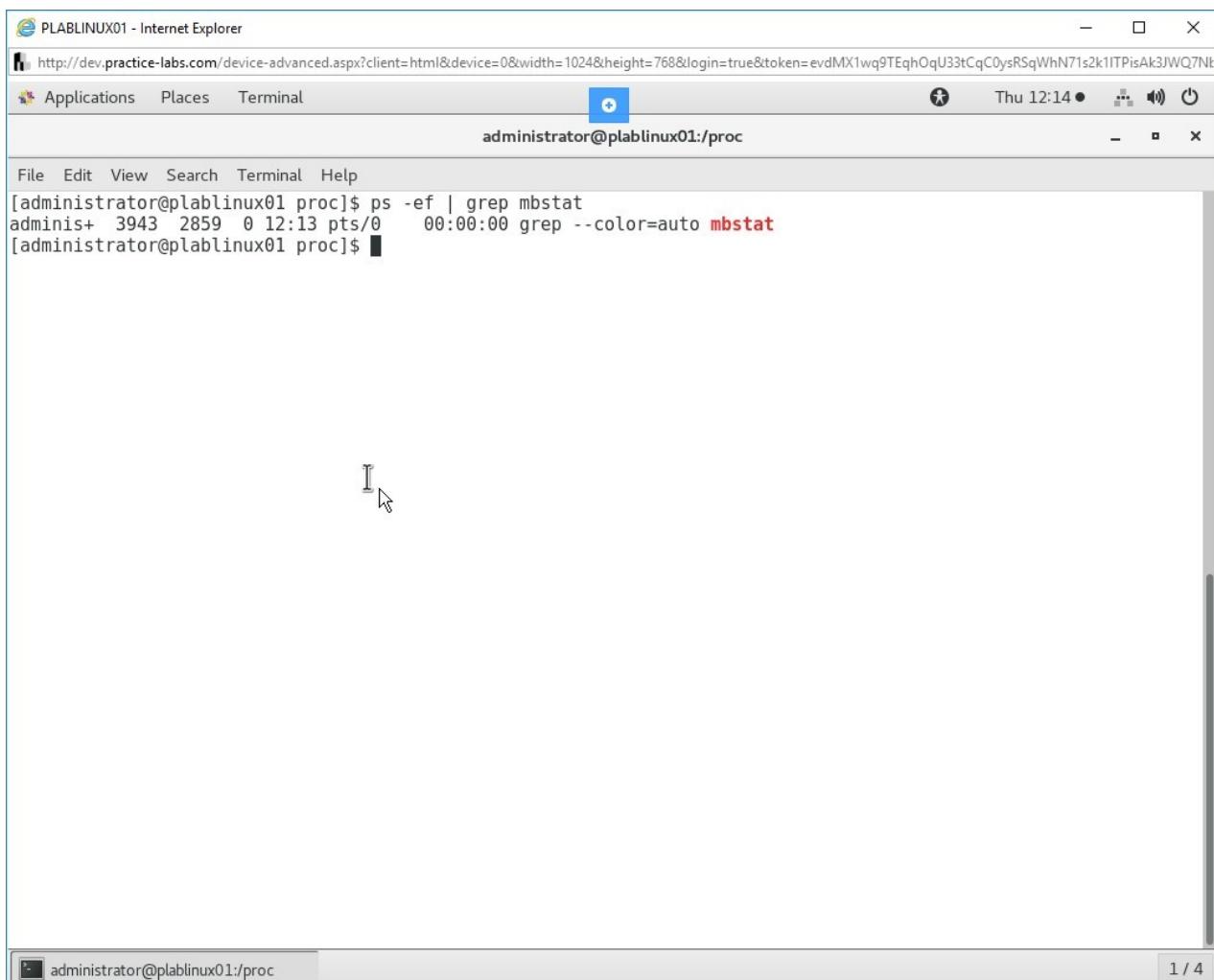
```
clear
```

To find out more information about the process, type the following command:

```
ps -ef | grep mbstat
```

Press **Enter**. You will notice that the details about the process are now displayed. Note that the process ID is **2859**.

Alert: Note that the process IDs in your lab environment will differ from the ones mentioned in the module. You are free to use any process ID from your lab environment. This rule applies throughout the document.



The screenshot shows a terminal window titled "PLABLINUX01 - Internet Explorer" with the URL "http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=evdMX1wq9TEqhOqU33tCqC0ysRSqWhN71s2k1TPisAk3JWQ7Nt". The window title bar also includes "Applications", "Places", "Terminal", and a user icon. The status bar at the bottom right shows "Thu 12:14". The terminal prompt is "administrator@plablinux01:/proc". The command entered was "ps -ef | grep mbstat", which returned the following output:
[administrator@plablinux01 proc]\$ ps -ef | grep mbstat
adminis+ 3943 2859 0 12:13 pts/0 00:00:00 grep --color=auto mbstat
[administrator@plablinux01 proc]\$ █

Figure 1.6 Screenshot of PLABLINUX01: Finding out information about a specific process.

Step 7

Clear the screen by entering the following command:

```
clear
```

Let's view the files in them. To do this, let's view the contents of the **/proc/2859** directory. type the following command:

```
ls -l /proc/2859
```

Press **Enter**.

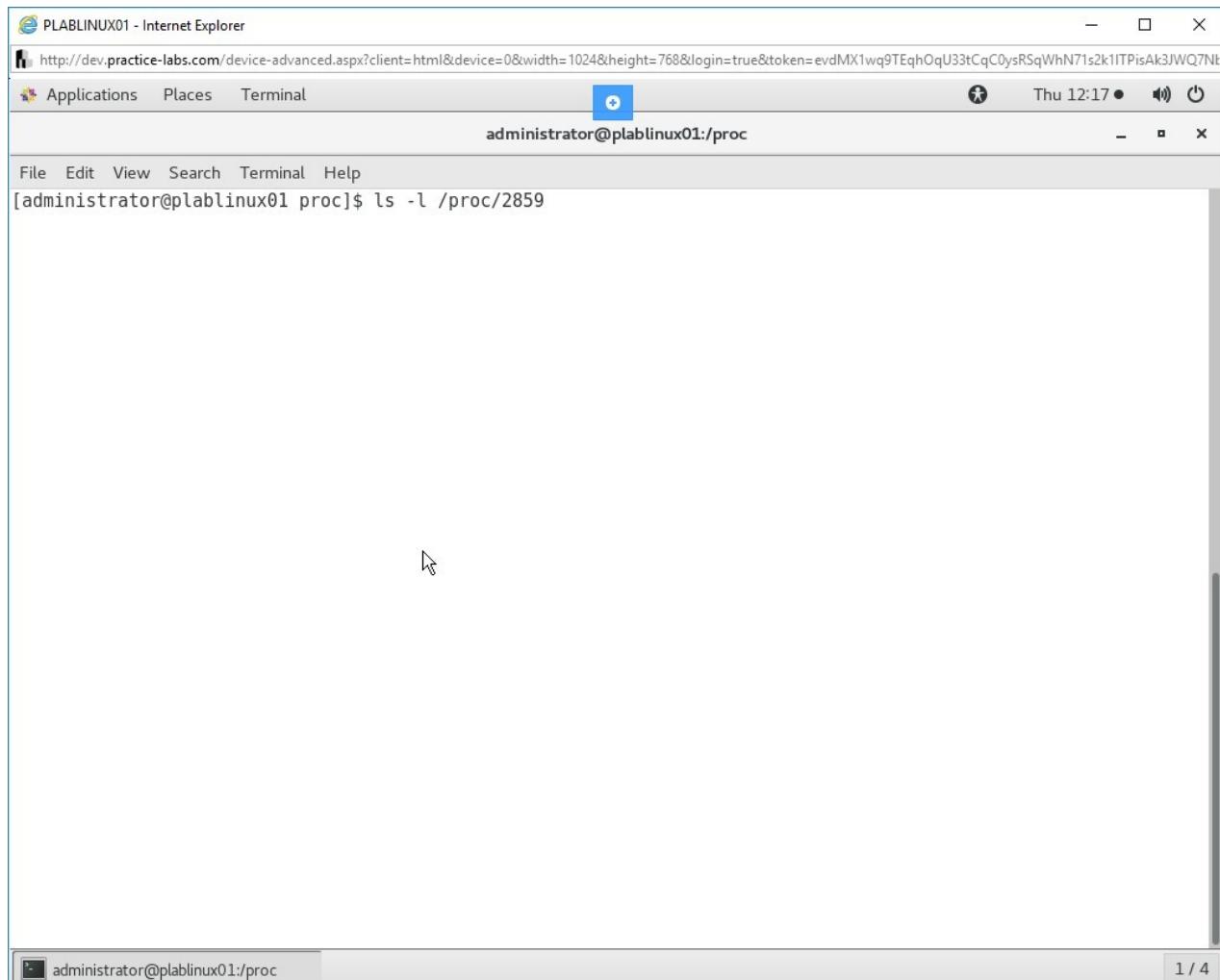
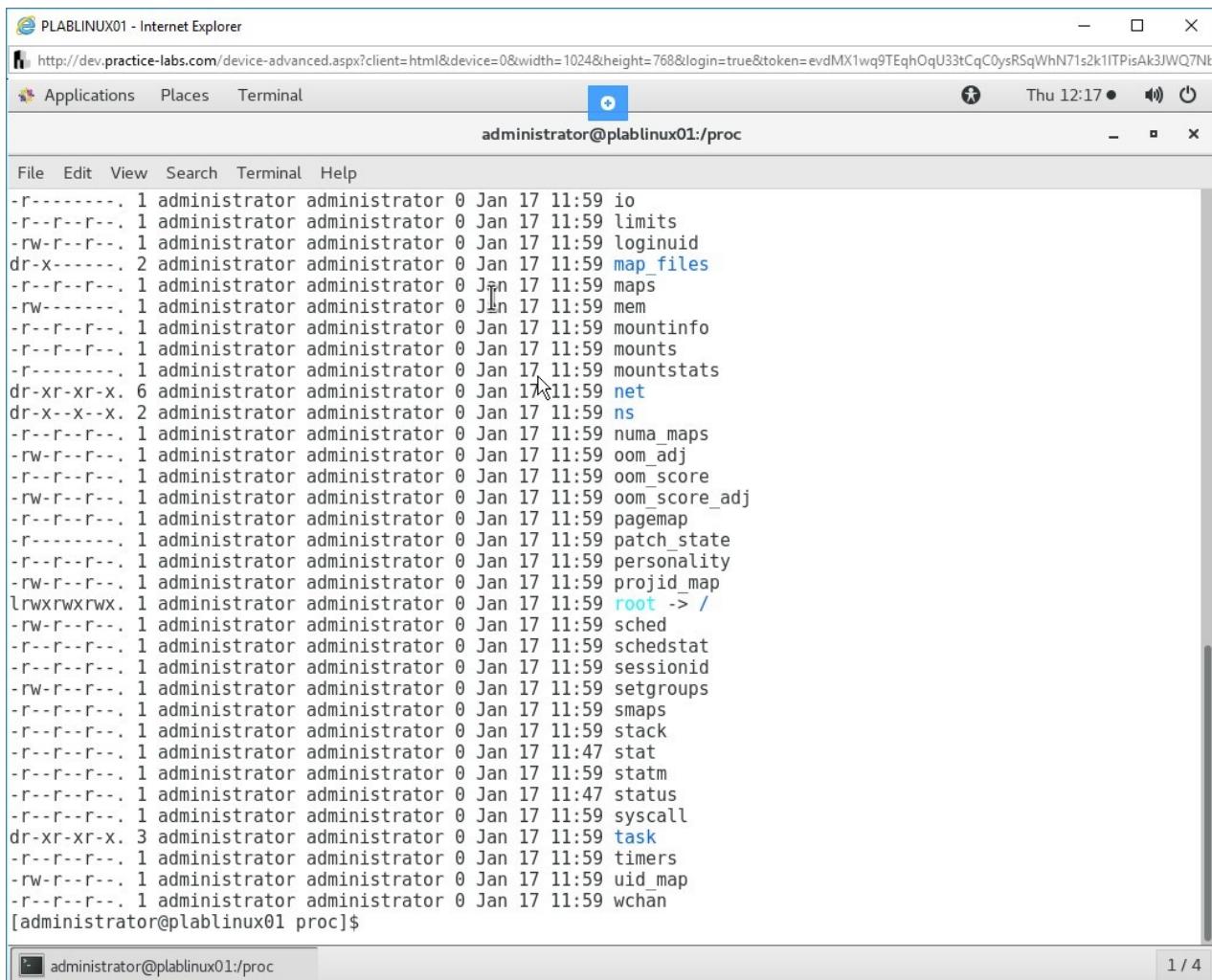


Figure 1.7 Screenshot of PLABLINUX01: Viewing the contents of the /proc/2859 directory.

Step 8

The output of the command is displayed.



The screenshot shows a terminal window titled "administrator@plablinux01:/proc". The window displays a file listing from the /proc directory. The listing includes files like map_files, net, ns, numa_maps, oom_adj, oom_score, oom_score_adj, pagemap, patch_state, personality, projid_map, root, sched, schedstat, sessionid, setgroups, smaps, stack, stat, statm, status, syscall, task, timers, uid_map, and wchan. The "net" file is highlighted with a blue selection bar. The terminal prompt "[administrator@plablinux01 proc]\$" is visible at the bottom.

```
-r----- 1 administrator administrator 0 Jan 17 11:59 io
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 limits
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 loginuid
dr-x----- 2 administrator administrator 0 Jan 17 11:59 map_files
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 maps
-rw----- 1 administrator administrator 0 Jan 17 11:59 mem
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 mountinfo
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 mounts
-r----- 1 administrator administrator 0 Jan 17 11:59 mountstats
dr-xr-xr-x 6 administrator administrator 0 Jan 17 11:59 net
dr-x----- 2 administrator administrator 0 Jan 17 11:59 ns
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 numa_maps
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 oom_adj
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 oom_score
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 oom_score_adj
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 pagemap
-r----- 1 administrator administrator 0 Jan 17 11:59 patch_state
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 personality
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 projid_map
lrwxrwxrwx 1 administrator administrator 0 Jan 17 11:59 root -> /
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 sched
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 schedstat
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 sessionid
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 setgroups
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 smaps
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 stack
-r--r--r-- 1 administrator administrator 0 Jan 17 11:47 stat
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 statm
-r--r--r-- 1 administrator administrator 0 Jan 17 11:47 status
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 syscall
dr-xr-xr-x 3 administrator administrator 0 Jan 17 11:59 task
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 timers
-rw-r--r-- 1 administrator administrator 0 Jan 17 11:59 uid_map
-r--r--r-- 1 administrator administrator 0 Jan 17 11:59 wchan
[administrator@plablinux01 proc]$
```

Figure 1.8 Screenshot of PLABLINUX01: Displaying the output of the /proc/2859 directory.

Step 9

Clear the screen by entering the following command:

```
clear
```

Let's view the process ID of the currently running shell. To do this, type the following command:

```
echo $$
```

Press **Enter**. Notice that the output returns the shell ID.

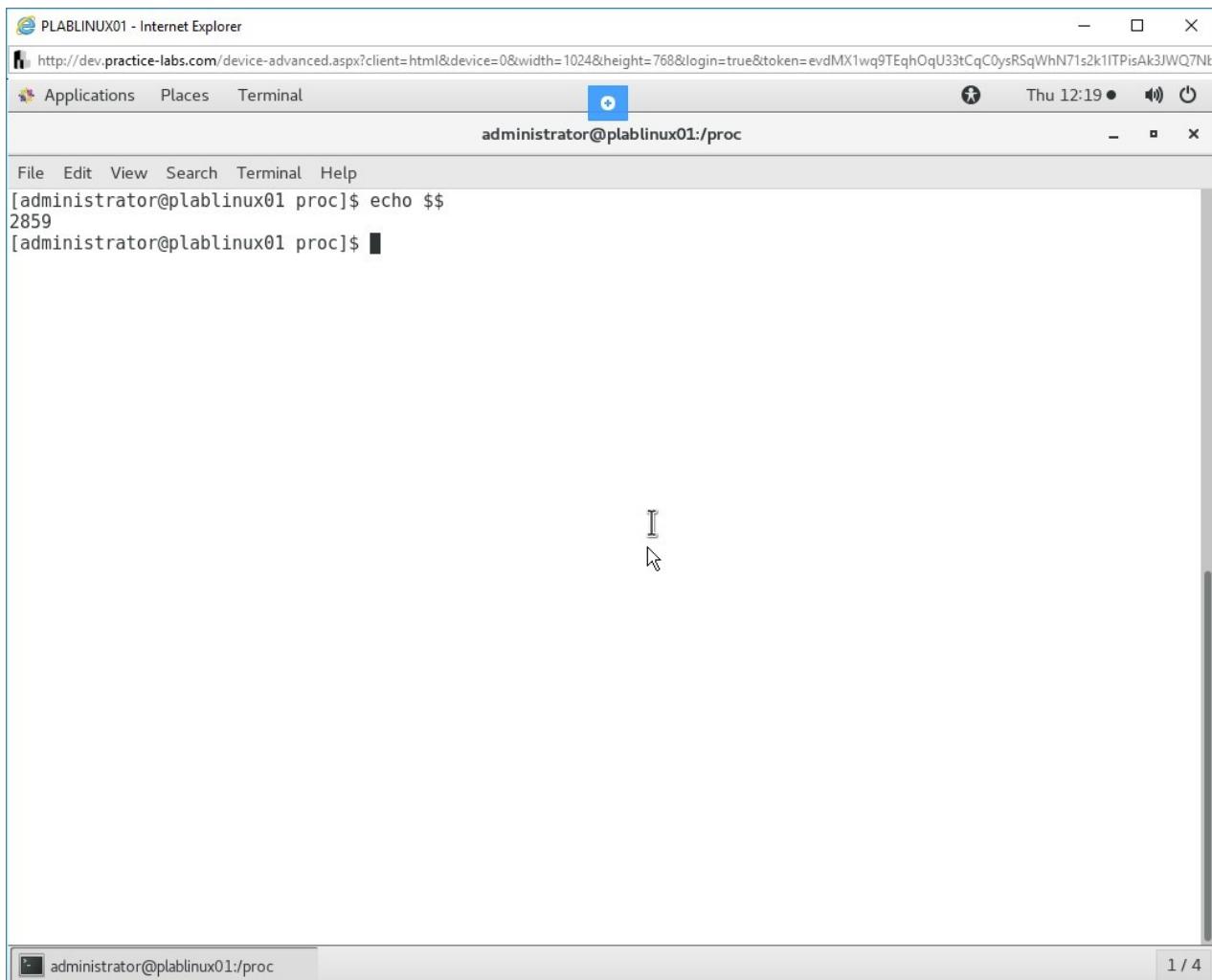


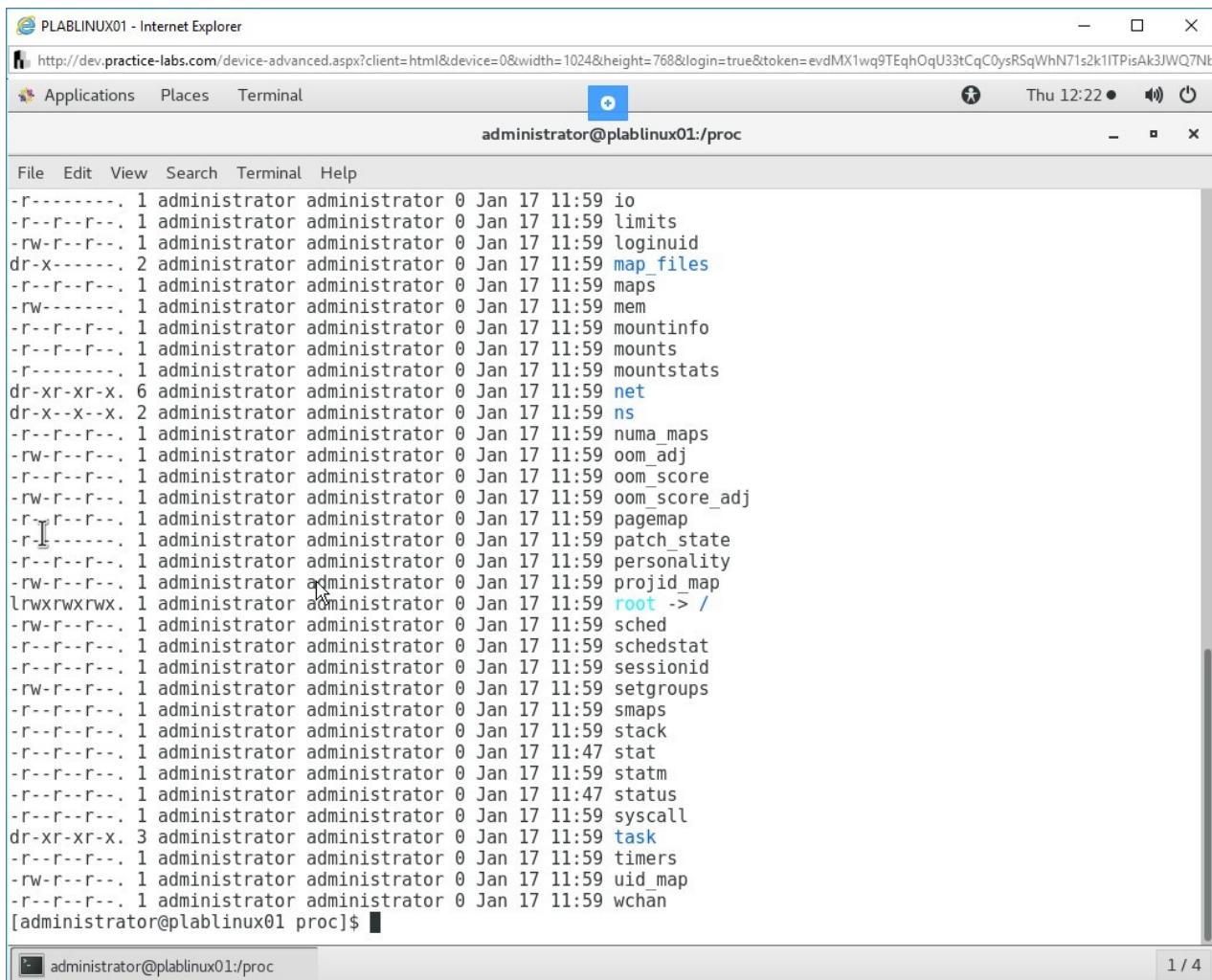
Figure 1.9 Screenshot of PLABLINUX01: Displaying the process ID of the currently running shell.

Step 10

Display the files in the **/proc/2859** directory. To do this, type the following command:

```
ls -l 2859
```

Press **Enter**. Notice that the files are displayed.



The screenshot shows a terminal window titled "administrator@plablinux01:/proc". The terminal displays a long list of files and directories in the /proc directory, including "map_files", "ns", "oom_score", "oom_score_adj", "patch_state", "personality", "projid_map", "root", "sched", "schedstat", "sessionid", "setgroups", "smaps", "stack", "stat", "statm", "status", "syscall", "task", "timers", "uid_map", and "wchan". The terminal prompt "[administrator@plablinux01 proc]\$" is visible at the bottom.

Figure 1.10 Screenshot of PLABLINUX01: Displaying the files in the /proc/2859 directory.

Step 11

Clear the screen by entering the following command:

Clear

To navigate into the /2859 directory, type the following command:

cd 2859

Press **Enter**. You are now inside the /proc/2859 directory.

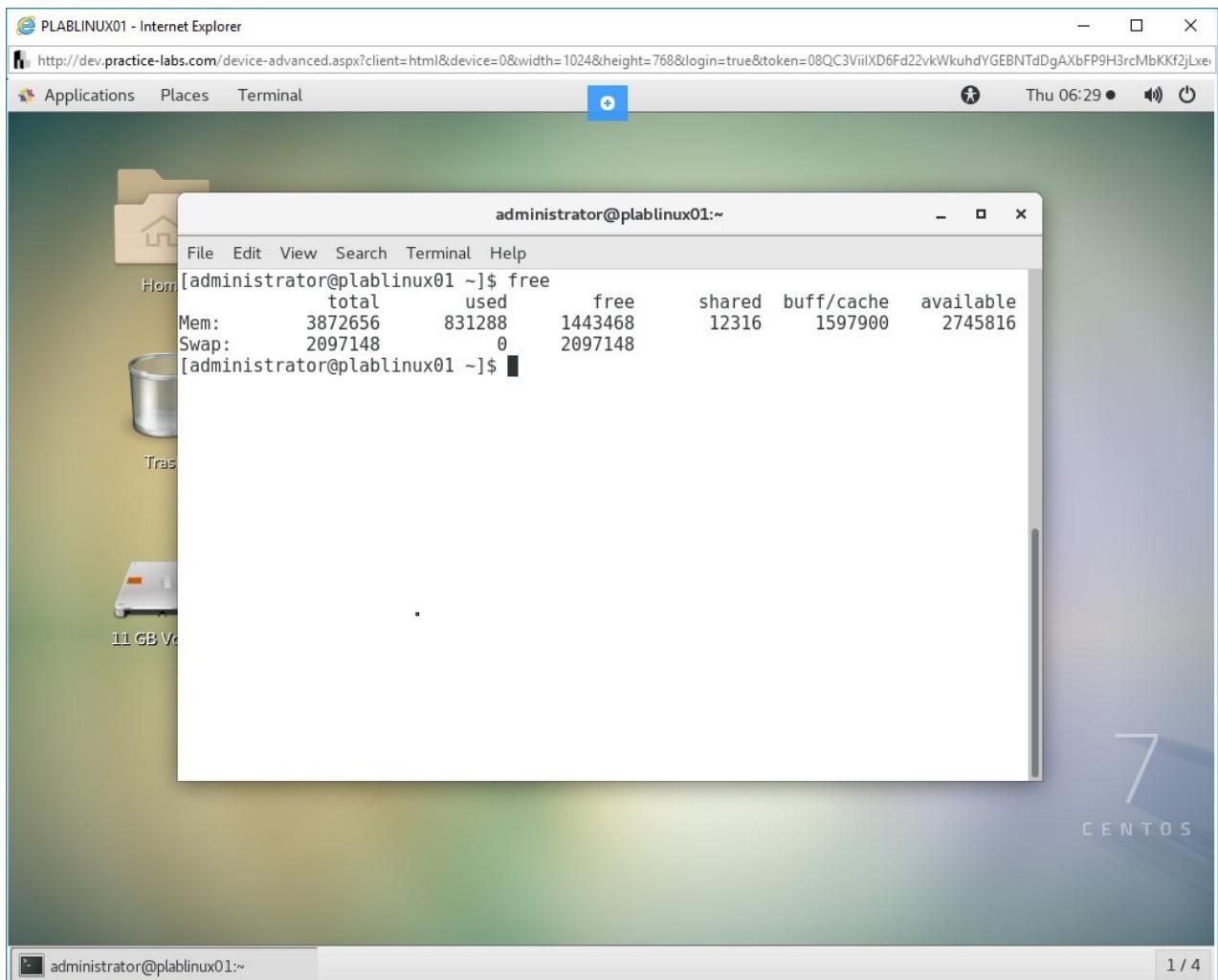


Figure 1.11 Screenshot of PLABLINUX01: Navigating into the /2859 directory.

Step 12

Clear the screen by entering the following command:

```
clear
```

You can view the **stats** file, which provides the process information. Type the following command:

```
cat stat
```

Press **Enter**. Notice that it is not easy to interpret the output of this file.

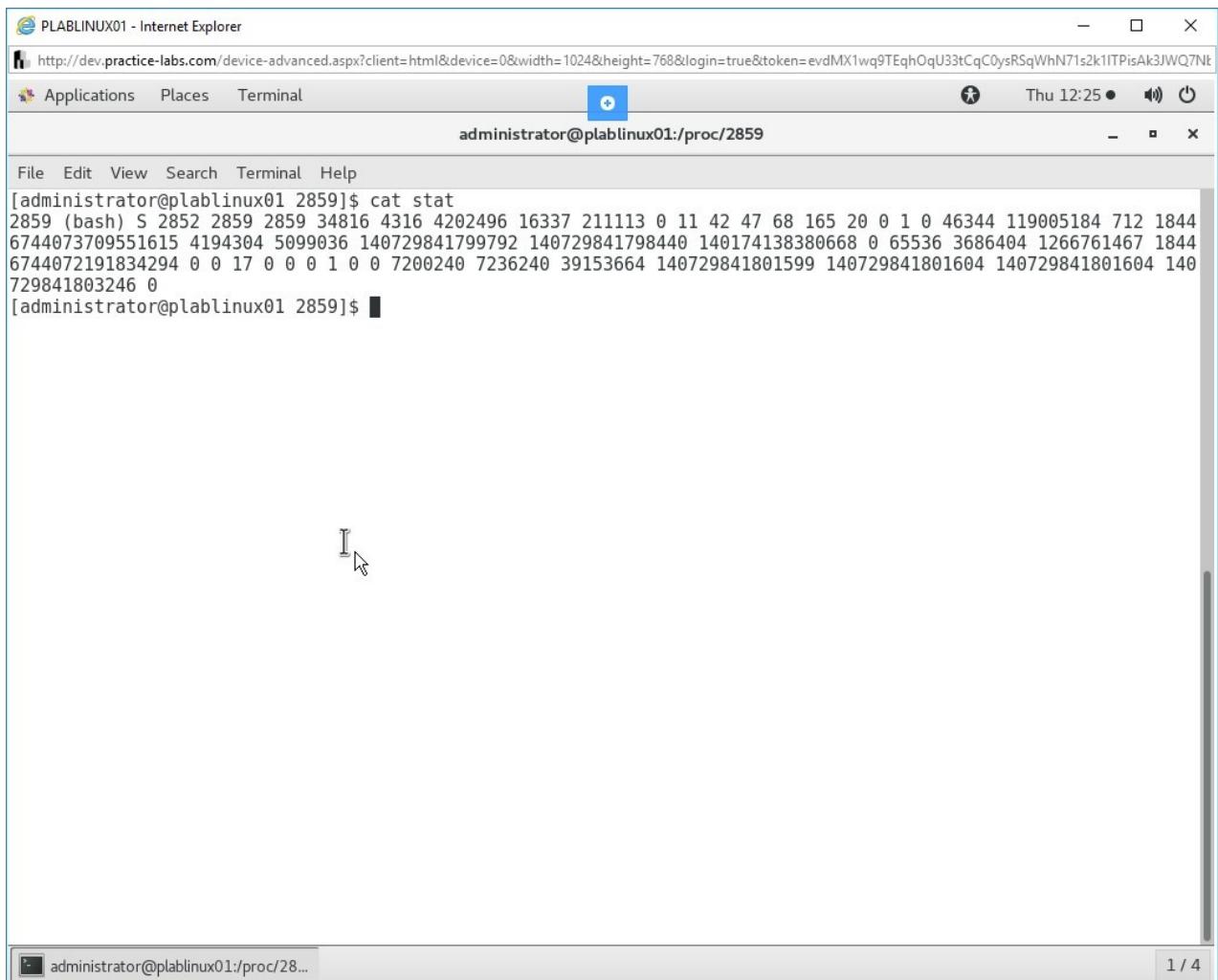


Figure 1.12 Screenshot of PLABLINUX01: Displaying the stats file.

Step 13

Clear the screen by entering the following command:

```
clear
```

Alternatively, you can view the status file, which provides information in a more readable format. Type the following command:

```
cat status
```

Press **Enter**. The output of the file is now displayed. Notice that the information is easy to interpret.

Figure 1.13 Screenshot of PLABLINUX01: Displaying the status file.

Step 14

Clear the screen by entering the following command:

clear

Each process uses a specific region in the virtual memory. To view the virtual regions being used, type the following command:

cat maps

Press Enter.

```

File Edit View Search Terminal Help
006dd000-006de000 r--p 000dd000 fd:00 50427727 /usr/bin/bash
006de000-006e7000 rw-p 000de000 fd:00 50427727 /usr/bin/bash
006e7000-006ed000 rw-p 00000000 00:00 0 [heap]
02557000-0265c000 rw-p 00000000 00:00 0 /usr/lib64/libnss_files-2.17.so
7f7ccf398000-7f7ccf3a4000 r-xp 00000000 fd:00 131628 /usr/lib64/libnss_files-2.17.so
7f7ccf3a4000-7f7ccf5a3000 ---p 0000c000 fd:00 131628 /usr/lib64/libnss_files-2.17.so
7f7ccf5a3000-7f7ccf5a4000 r--p 0000b000 fd:00 131628 /usr/lib64/libnss_files-2.17.so
7f7ccf5a4000-7f7ccf5a5000 rw-p 0000c000 fd:00 131628 /usr/lib64/libnss_files-2.17.so
7f7ccf5a5000-7f7ccf5ab000 rw-p 00000000 00:00 0 /usr/lib/locale/locale-archive
7f7cd5ad4000-7f7cd5c97000 r-xp 00000000 fd:00 131605 /usr/lib64/libc-2.17.so
7f7cd5c97000-7f7cd5e96000 ---p 001c3000 fd:00 131605 /usr/lib64/libc-2.17.so
7f7cd5e96000-7f7cd5e9a000 r--p 001c2000 fd:00 131605 /usr/lib64/libc-2.17.so
7f7cd5e9a000-7f7cd5e9c000 rw-p 001c6000 fd:00 131605 /usr/lib64/libc-2.17.so
7f7cd5e9c000-7f7cd5ea1000 rw-p 00000000 00:00 0 /usr/lib64/libc-2.17.so
7f7cd5ea1000-7f7cd5ea3000 r-xp 00000000 fd:00 131612 /usr/lib64/libc-2.17.so
7f7cd5ea3000-7f7cd60a3000 ---p 00002000 fd:00 131612 /usr/lib64/libc-2.17.so
7f7cd60a3000-7f7cd60a4000 r--p 00002000 fd:00 131612 /usr/lib64/libc-2.17.so
7f7cd60a4000-7f7cd60a5000 rw-p 00003000 fd:00 131612 /usr/lib64/libc-2.17.so
7f7cd60a5000-7f7cd60ca000 r-xp 00000000 fd:00 139553 /usr/lib64/libtinfo.so.5.9
7f7cd60ca000-7f7cd62ca000 ---p 00025000 fd:00 139553 /usr/lib64/libtinfo.so.5.9
7f7cd62ca000-7f7cd62ce000 r--p 00025000 fd:00 139553 /usr/lib64/libtinfo.so.5.9
7f7cd62ce000-7f7cd62cf000 rw-p 00029000 fd:00 139553 /usr/lib64/libtinfo.so.5.9
7f7cd62cf000-7f7cd62f1000 r-xp 00000000 fd:00 58302 /usr/lib64/ld-2.17.so
7f7cd64d8000-7f7cd64db000 rw-p 00000000 00:00 0 /usr/lib64/ld-2.17.so
7f7cd64e6000-7f7cd64e8000 rw-p 00000000 00:00 0 /usr/lib64/ld-2.17.so
7f7cd64e8000-7f7cd64ef000 r--s 00000000 fd:00 50427724 /usr/lib64/gconv/gconv-modules.cache
7f7cd64ef000-7f7cd64f0000 rw-p 00000000 00:00 0 /usr/lib64/ld-2.17.so
7f7cd64f0000-7f7cd64f1000 r--p 00021000 fd:00 58302 /usr/lib64/ld-2.17.so
7f7cd64f1000-7f7cd64f2000 rw-p 00022000 fd:00 58302 /usr/lib64/ld-2.17.so
7f7cd64f2000-7f7cd64f3000 rw-p 00000000 00:00 0 /usr/lib64/ld-2.17.so
7ffe3838d000-7ffe383ae000 rw-p 00000000 00:00 0 [stack]
7ffe383ed000-7ffe383ef000 r-xp 00000000 00:00 0 [vdso]
ffffffffff600000-fffffffff601000 r-xp 00000000 00:00 0 [vsyscall]
[administrator@plablinux01 2859]$ █

```

Figure 1.14 Screenshot of PLABLINUX01: Displaying the virtual regions being used by the processes.

Step 15

Clear the screen by entering the following command:

```
clear
```

To displays the uptime of the process, type the following command:

```
uptime
```

Press **Enter**.

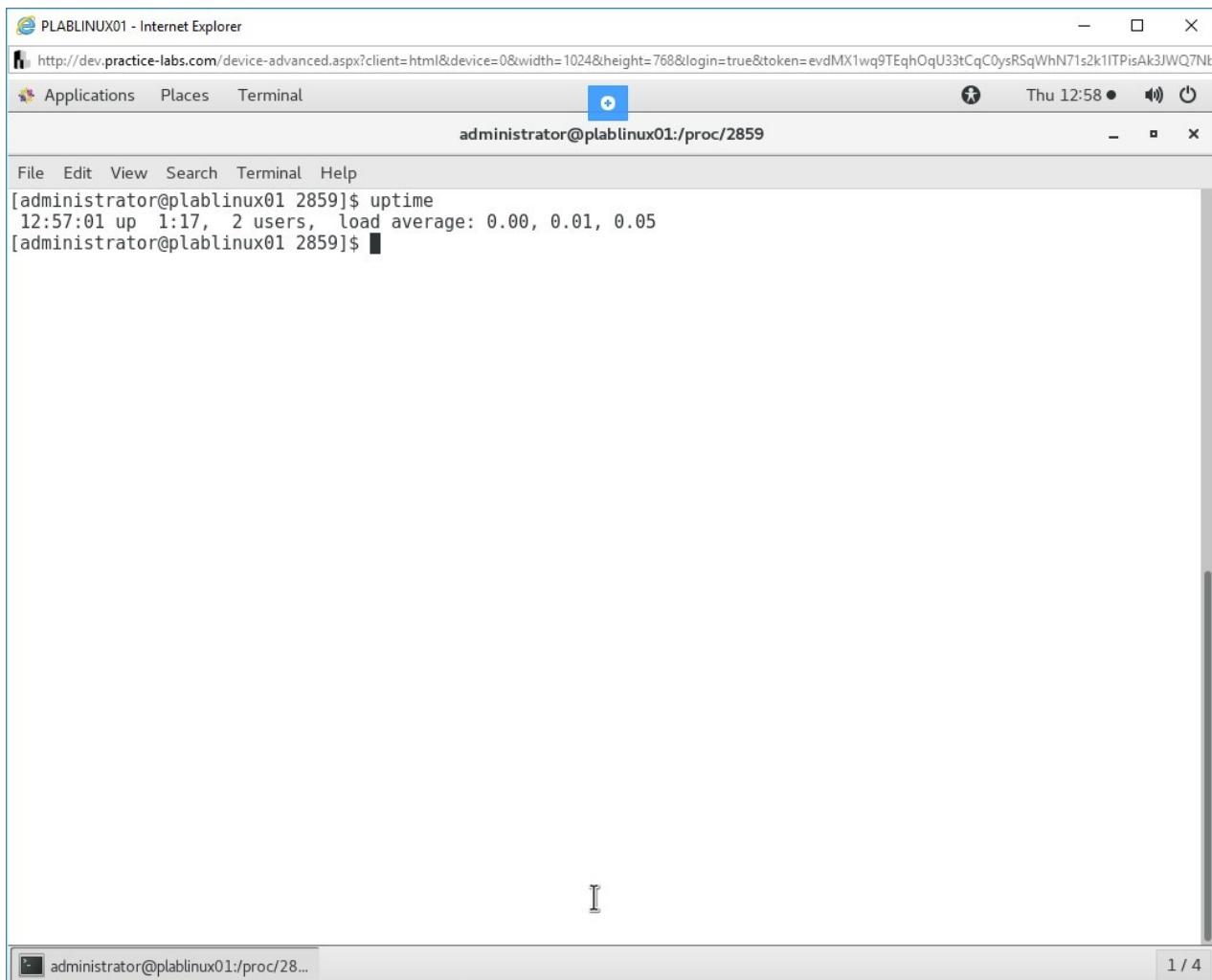


Figure 1.15 Screenshot of PLABLINUX01: Displaying the uptime of a process.

Task 2 -Work With the Process Monitoring Commands (ps, pstree, top)

There are multiple tools that are available to monitor processes in CentOS. In this task, you will learn to monitor processes using various tools. To monitor processes, perform the following steps:

Step 1

Clear the screen by entering the following command:

```
clear
```

To display the processes for the current shell, type the following command:

```
ps
```

Press **Enter**.

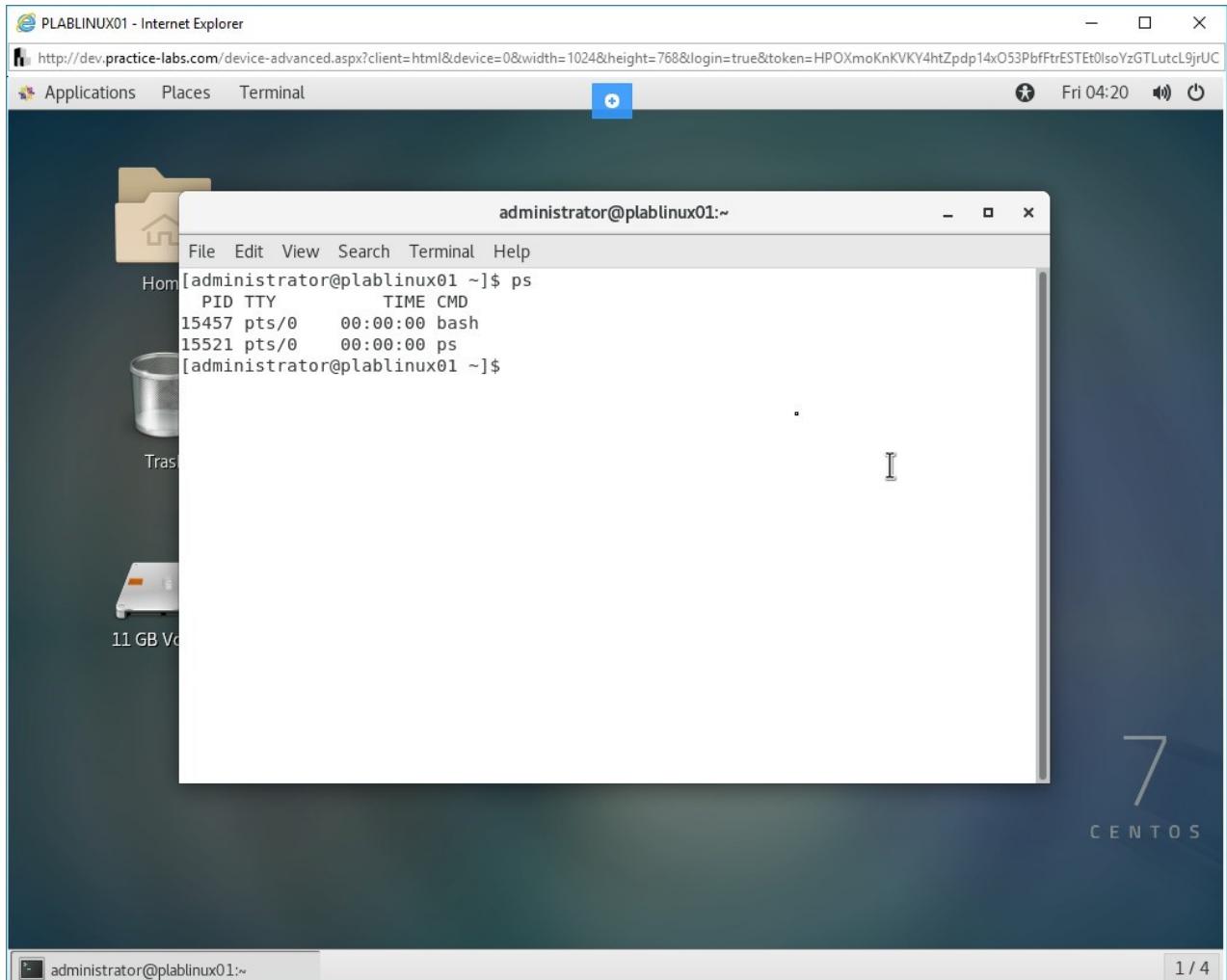


Figure 1.16 Screenshot of PLABLINUX01: Displaying the processes for the current shell.

Step 2

To display active processes in the system, type the following command:

```
ps -A
```

Press **Enter**.

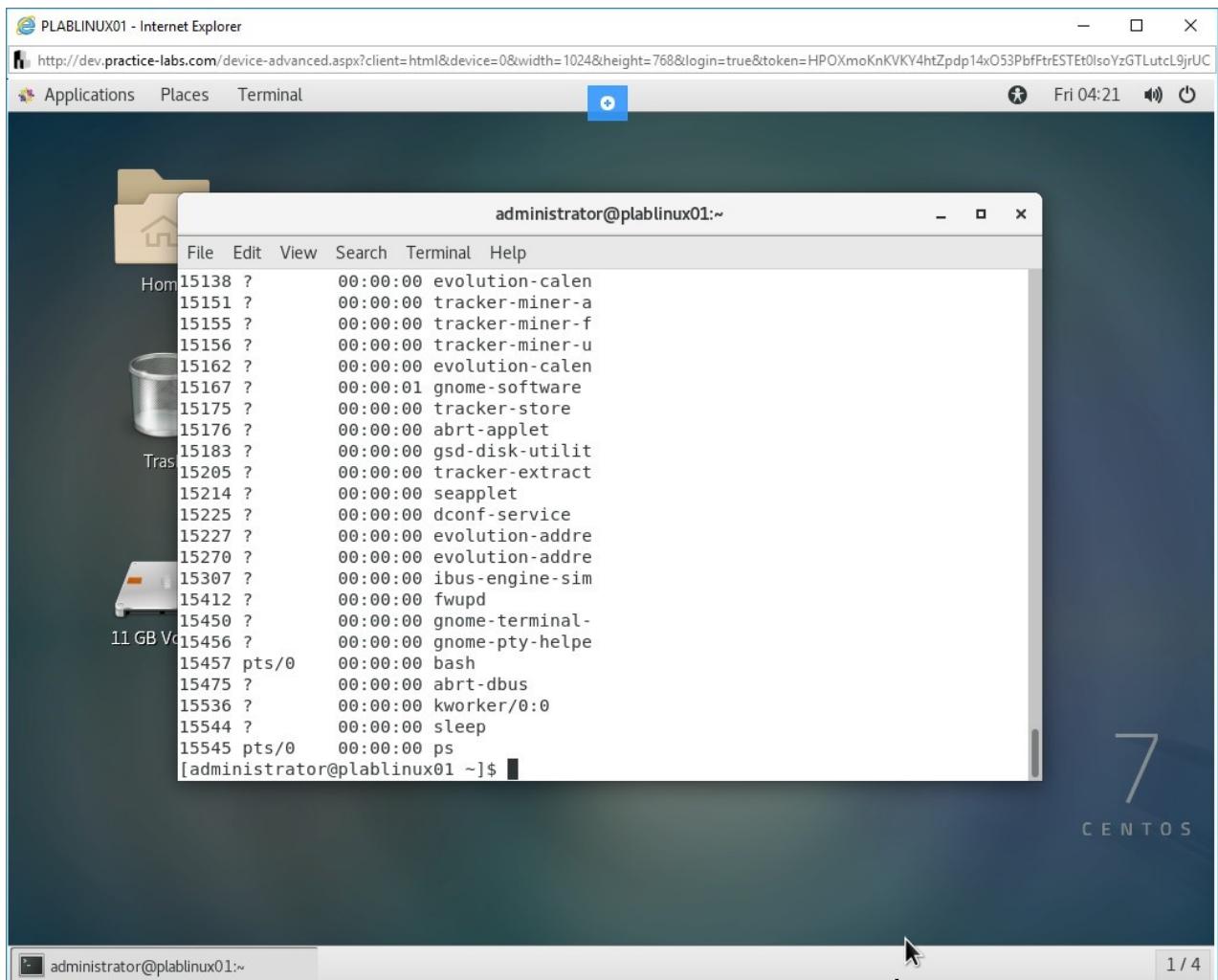


Figure 1.17 Screenshot of PLABLINUX01: Displaying the active processes in the system.

Step 3

Similar to **ps -A** command, the **ps -e** command will also provide the same output. Type the following command:

```
ps -e
```

Press **Enter**.

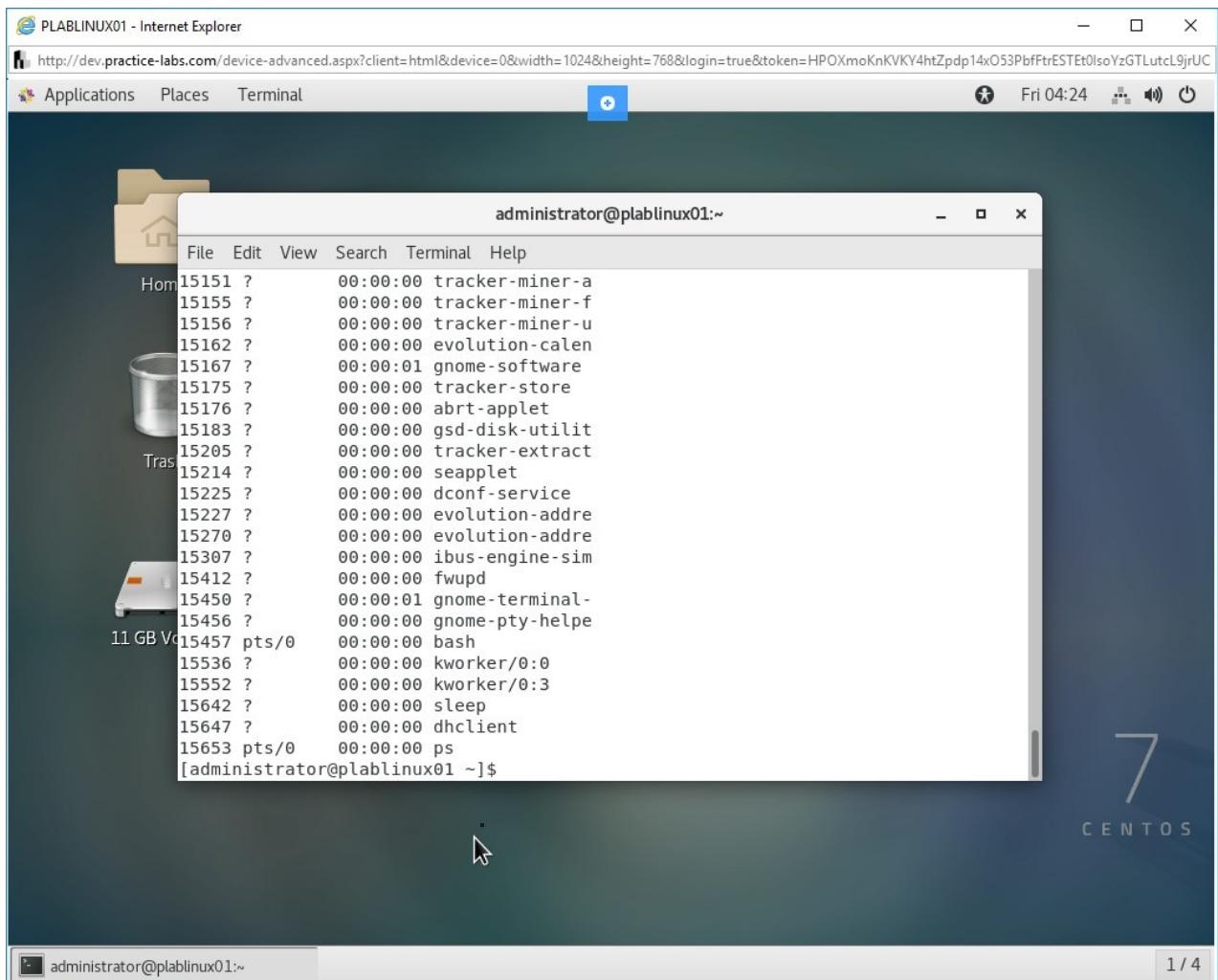


Figure 1.18 Screenshot of PLABLINUX01: Displaying the active processes in the system.

Step 4

Clear the screen by entering the following command:

```
clear
```

To display the processes in the BSD format, type the following command:

```
ps au
```

Press **Enter**.

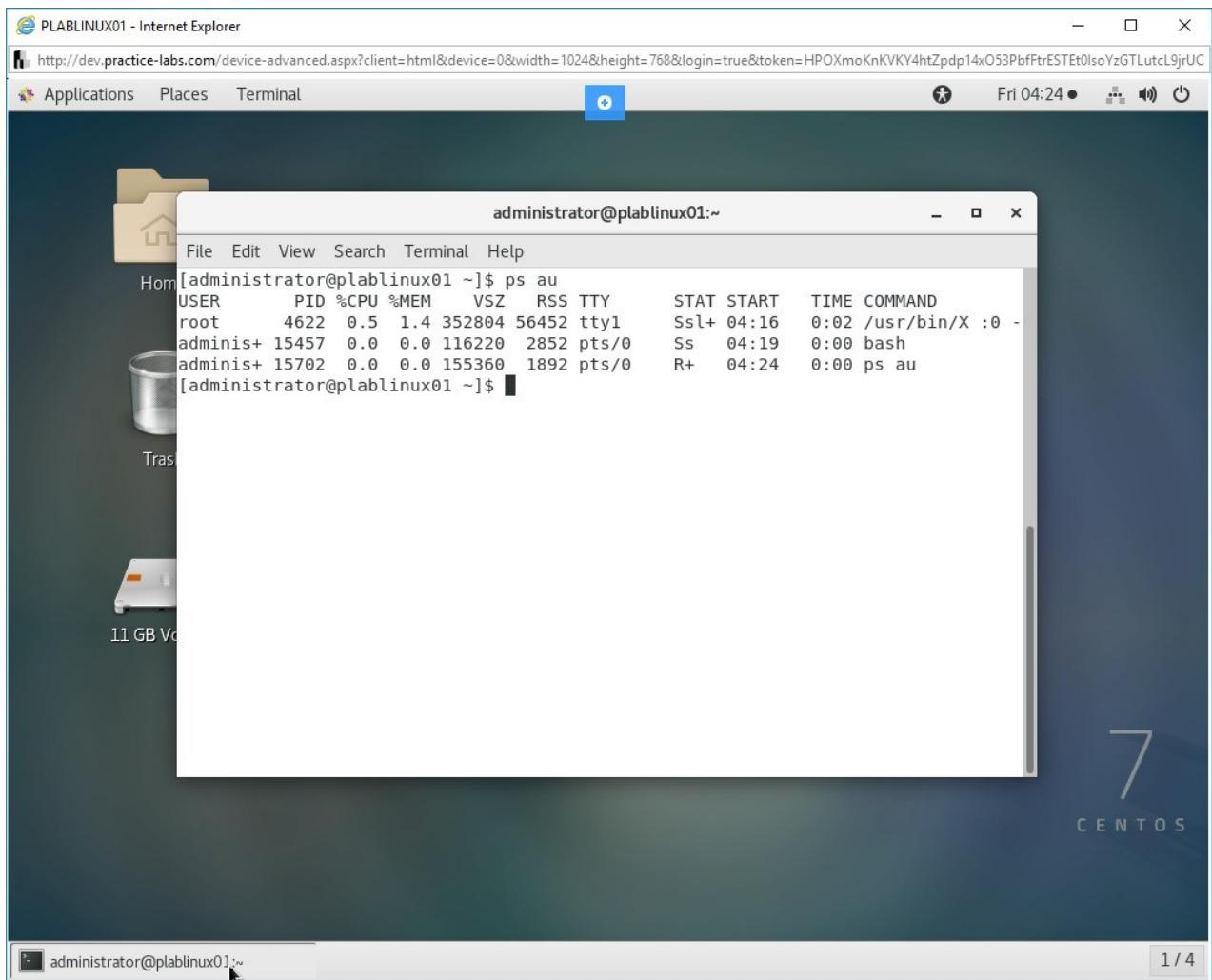


Figure 1.19 Screenshot of PLABLINUX01: Displaying the processes in the BSD format.

Step 5

Clear the screen by entering the following command:

```
clear
```

To display the complete details of the processes, type the following command:

```
ps -ef
```

Press **Enter**. You can also use the ps -eF command to get the same output.

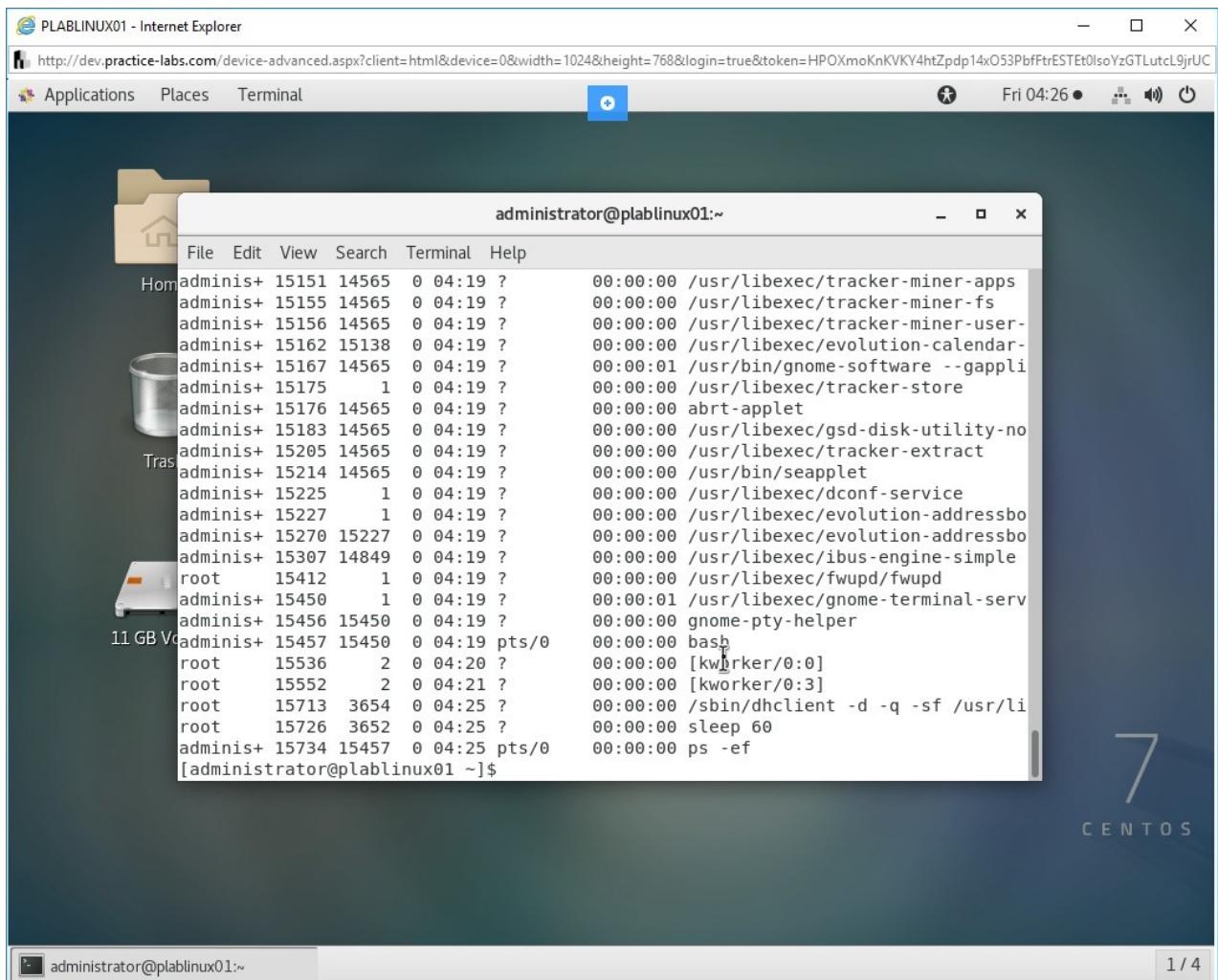


Figure 1.20 Screenshot of PLABLINUX01: Displaying the complete details of the processes.

Step 6

Clear the screen by entering the following command:

```
clear
```

To display the processes that are owned by the current user, which is Administrator, type the following command:

```
ps -x
```

Press **Enter**.

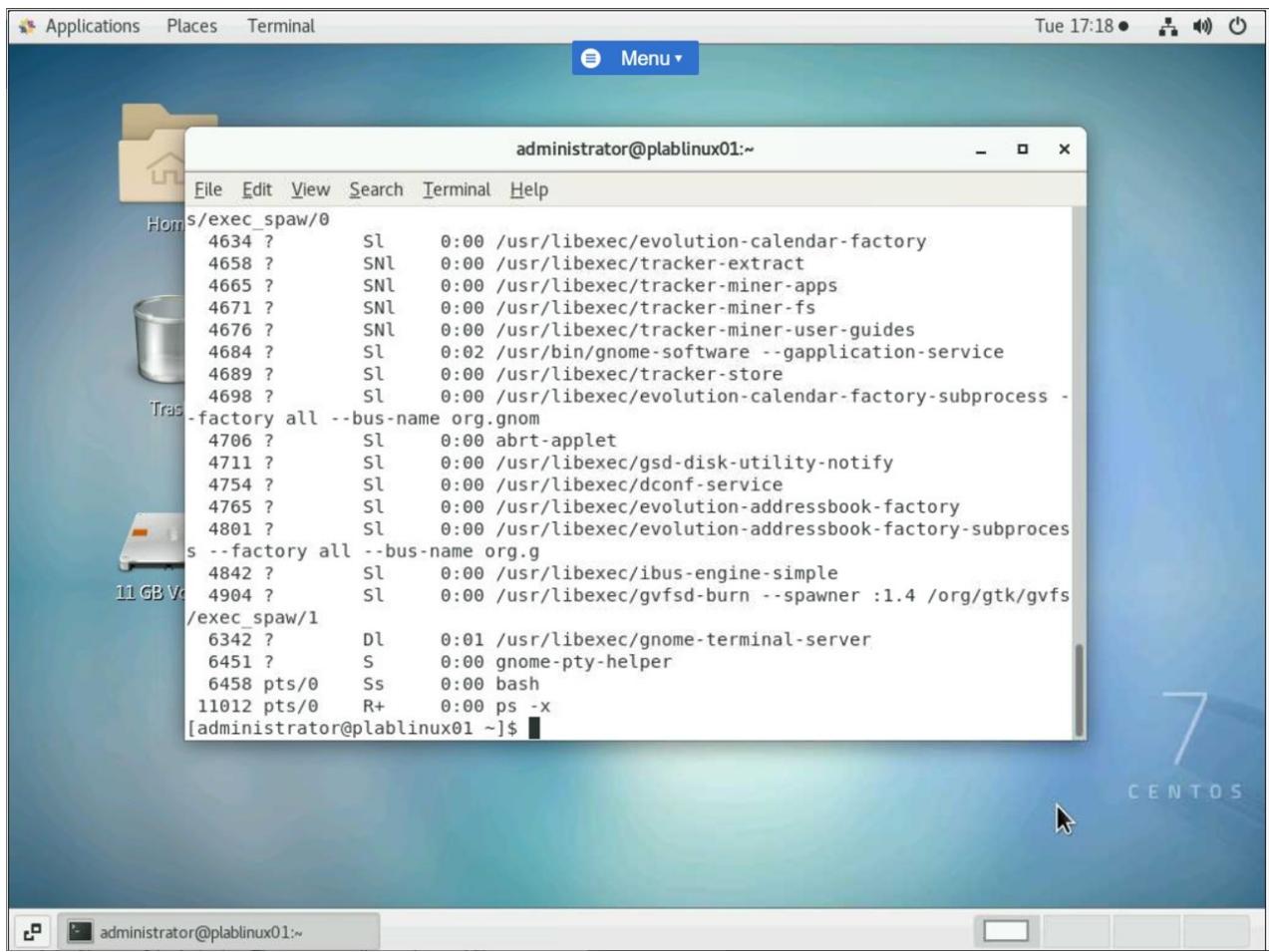


Figure 1.21 Screenshot of PLABLINUX01: Displaying the processes that are owned by the current user.

Step 7

Clear the screen by entering the following command:

```
clear
```

To display the processes by a specific user, type the following command:

```
ps -fu root
```

Press **Enter**.

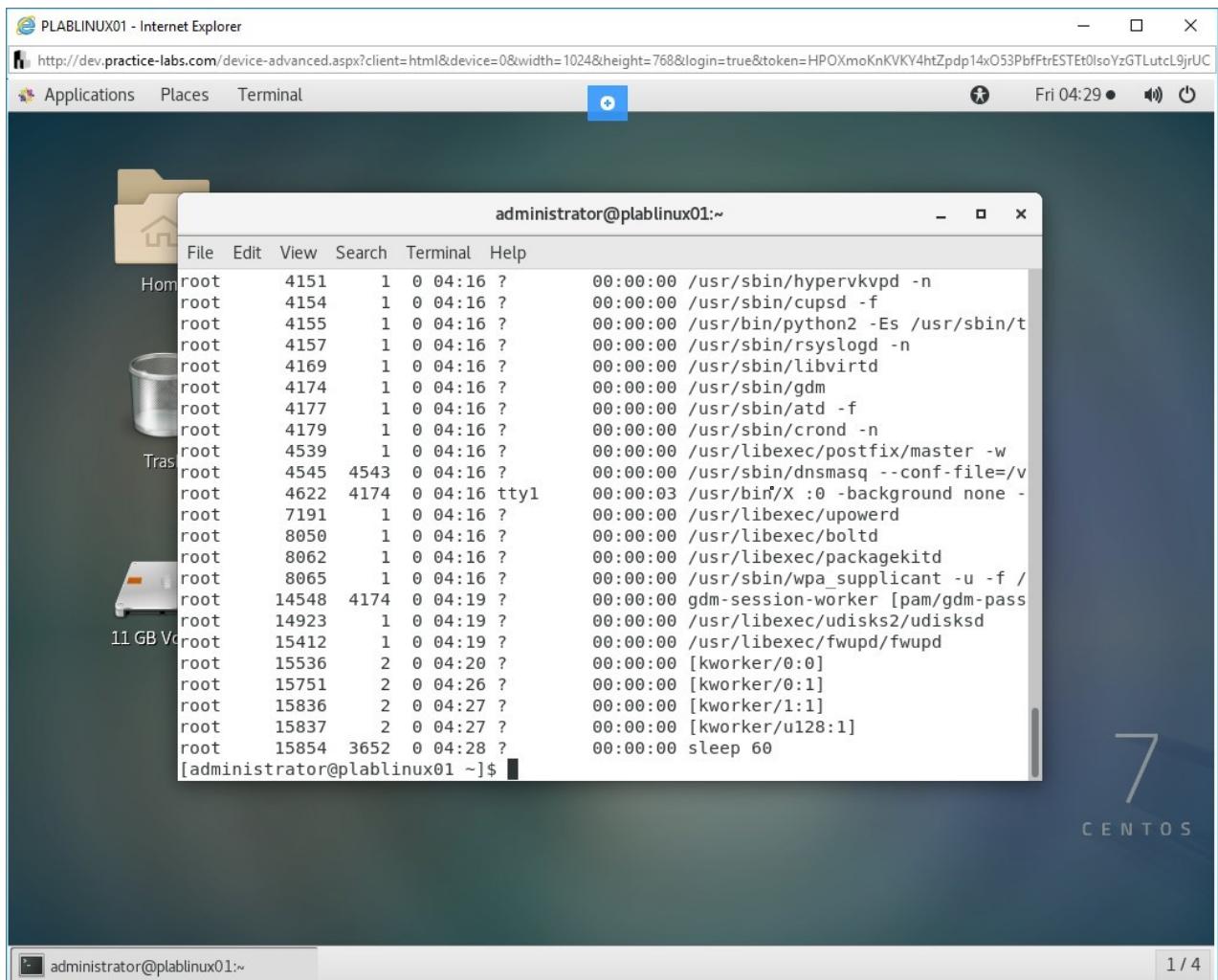


Figure 1.22 Screenshot of PLABLINUX01: Displaying the processes by a specific user.

Step 8

Clear the screen by entering the following command:

```
clear
```

To display a specific process with its process ID, type the following command:

```
ps -fp 4155
```

Press **Enter**.

Note: The process IDs may differ in your lab environment.

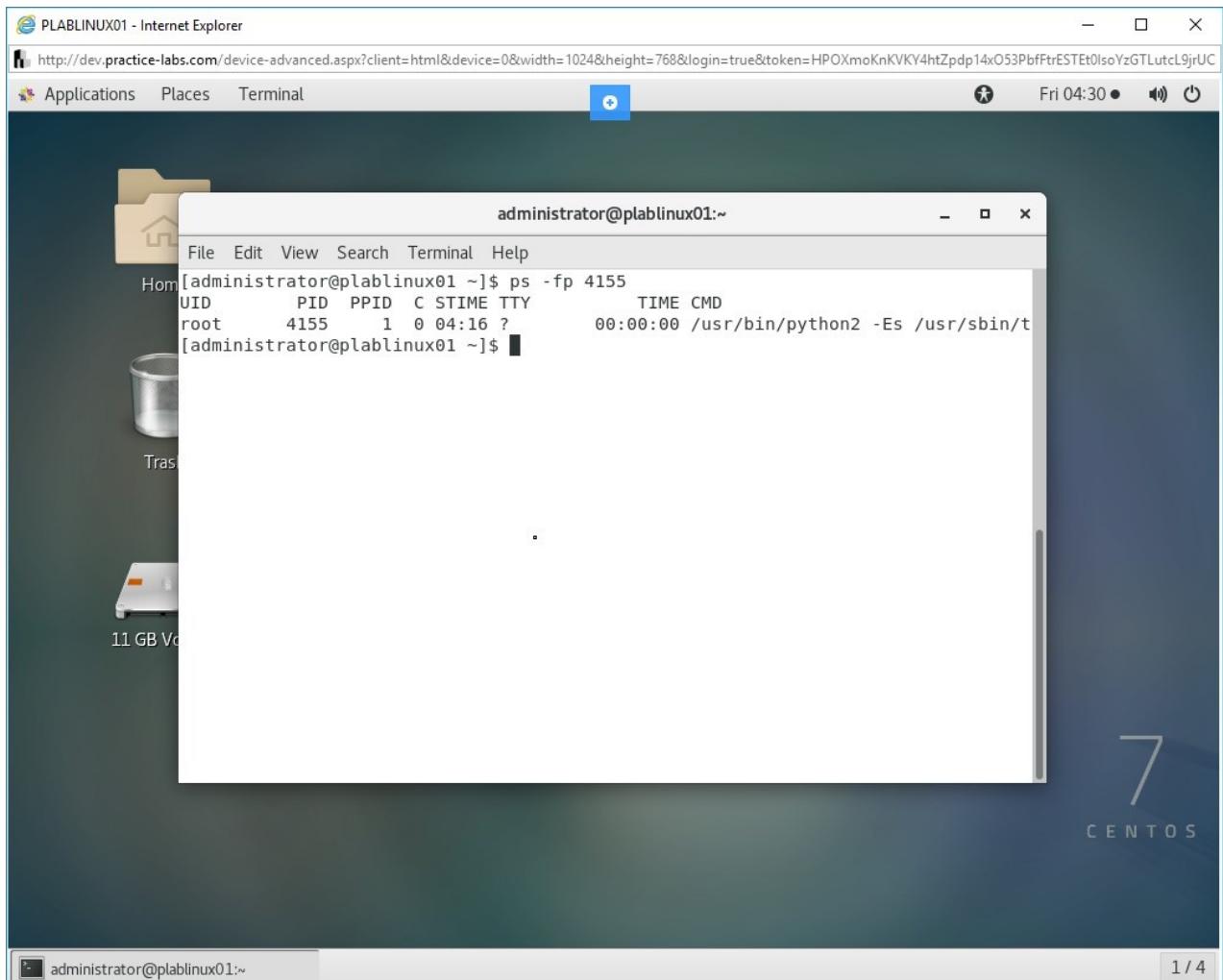


Figure 1.23 Screenshot of PLABLINUX01: Displaying a specific process with its process ID.

Step 9

Clear the screen by entering the following command:

```
clear
```

To display processes using multiple process IDs at once, type the following command:

```
ps -fp 4151,4154,4155
```

Press **Enter**.

Note: The process IDs may differ in your lab environment.

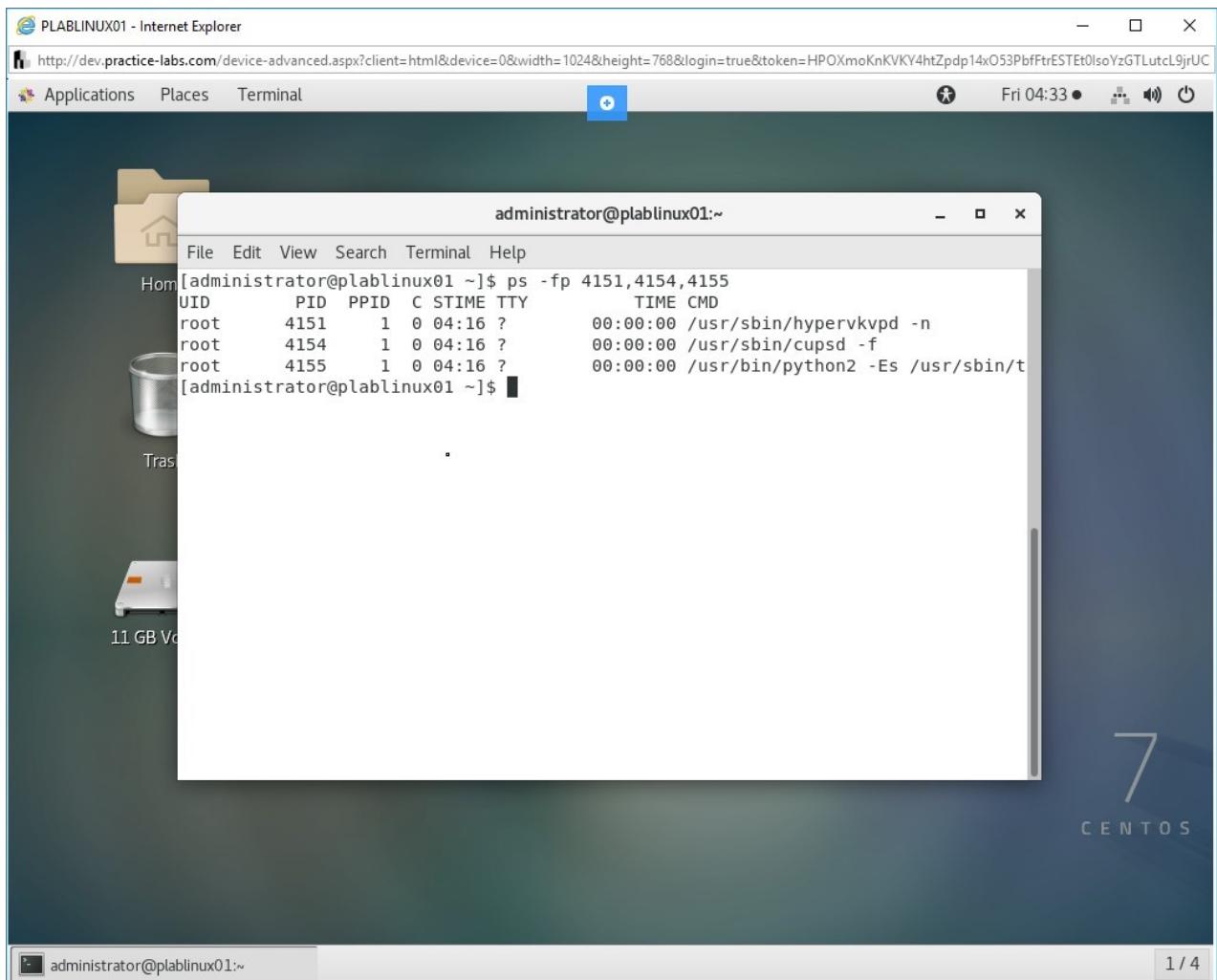


Figure 1.24 Screenshot of PLABLINUX01: Displaying processes using multiple process IDs at once.

Step 10

Clear the screen by entering the following command:

```
clear
```

To display how processes are linked with each other and the parentless process that is adopted by init, type the following command:

```
ps -e --forest
```

Press **Enter**.

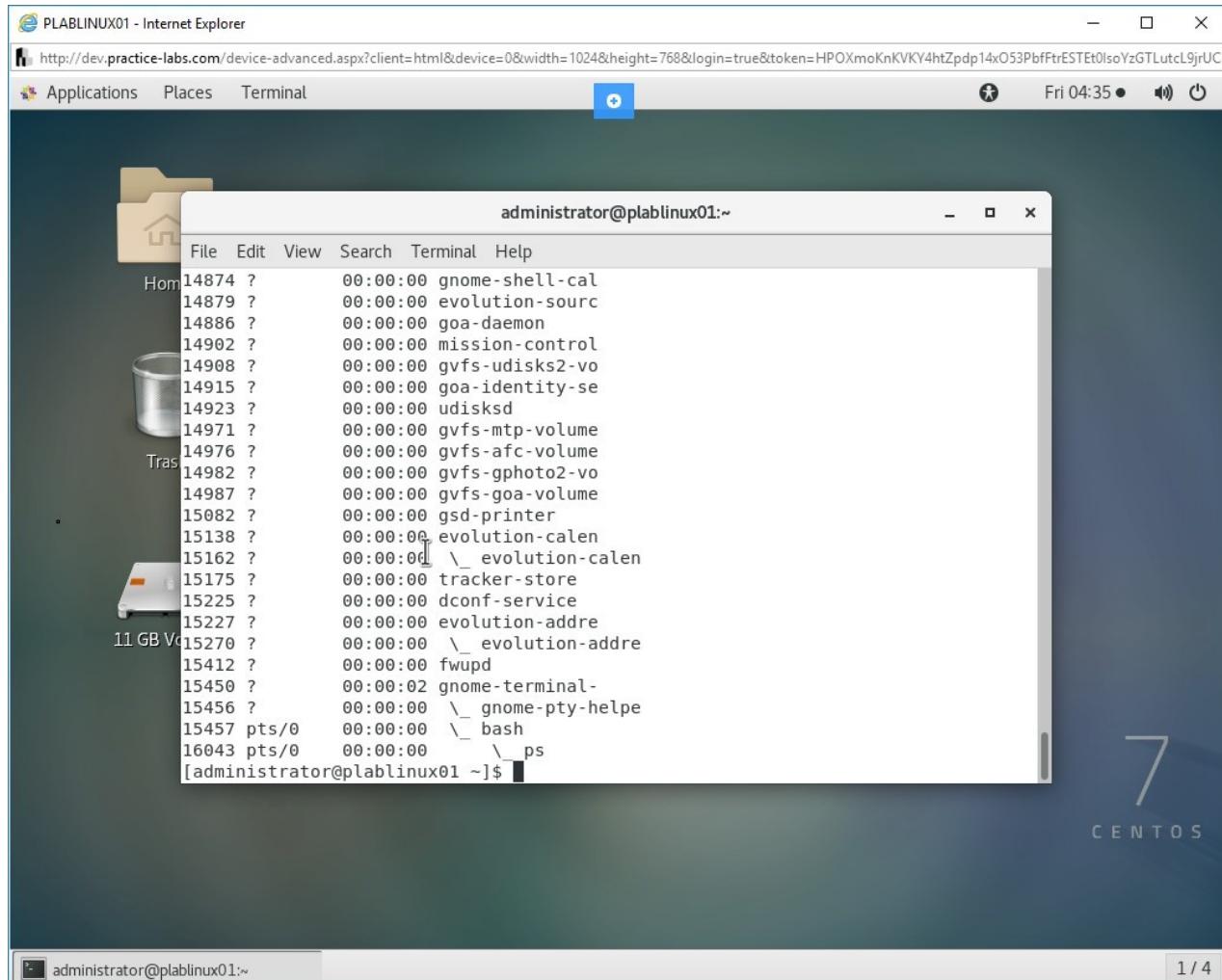


Figure 1.25 Screenshot of PLABLINUX01: Displaying the processes are linked with each other.

Step 11

Clear the screen by entering the following command:

```
clear
```

To display all the process threads of a process, type the following command:

```
ps -fL -C bash
```

Press **Enter**.

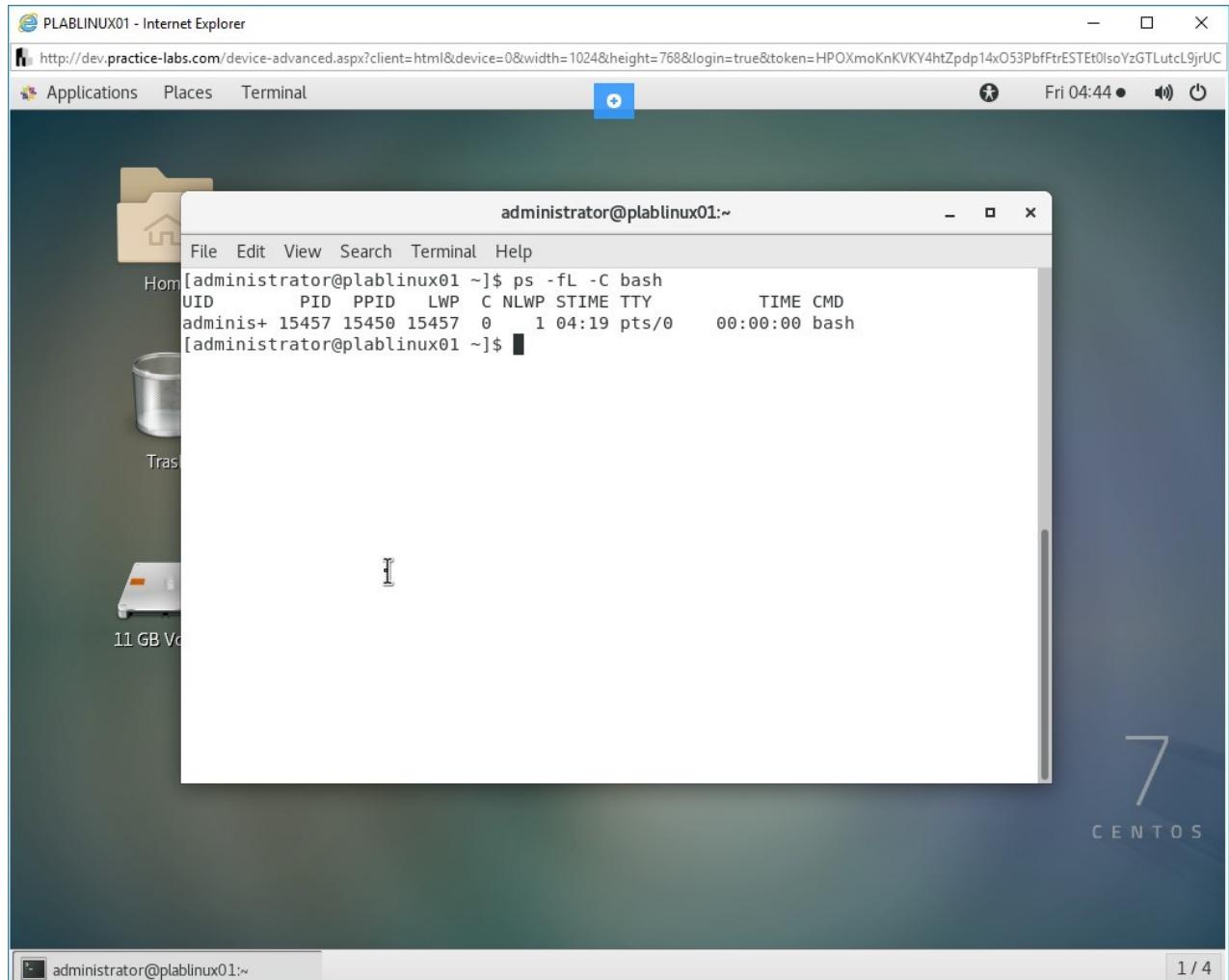


Figure 1.26 Screenshot of PLABLINUX01: Displaying all the process threads of a process.

Step 12

Clear the screen by entering the following command:

```
clear
```

To display the PID, PPID, and filesystem group for a process, type the following command:

```
ps -p 15457 -o pid,ppid,fgroup
```

Press **Enter**.

Note: The process IDs may differ in your lab environment.

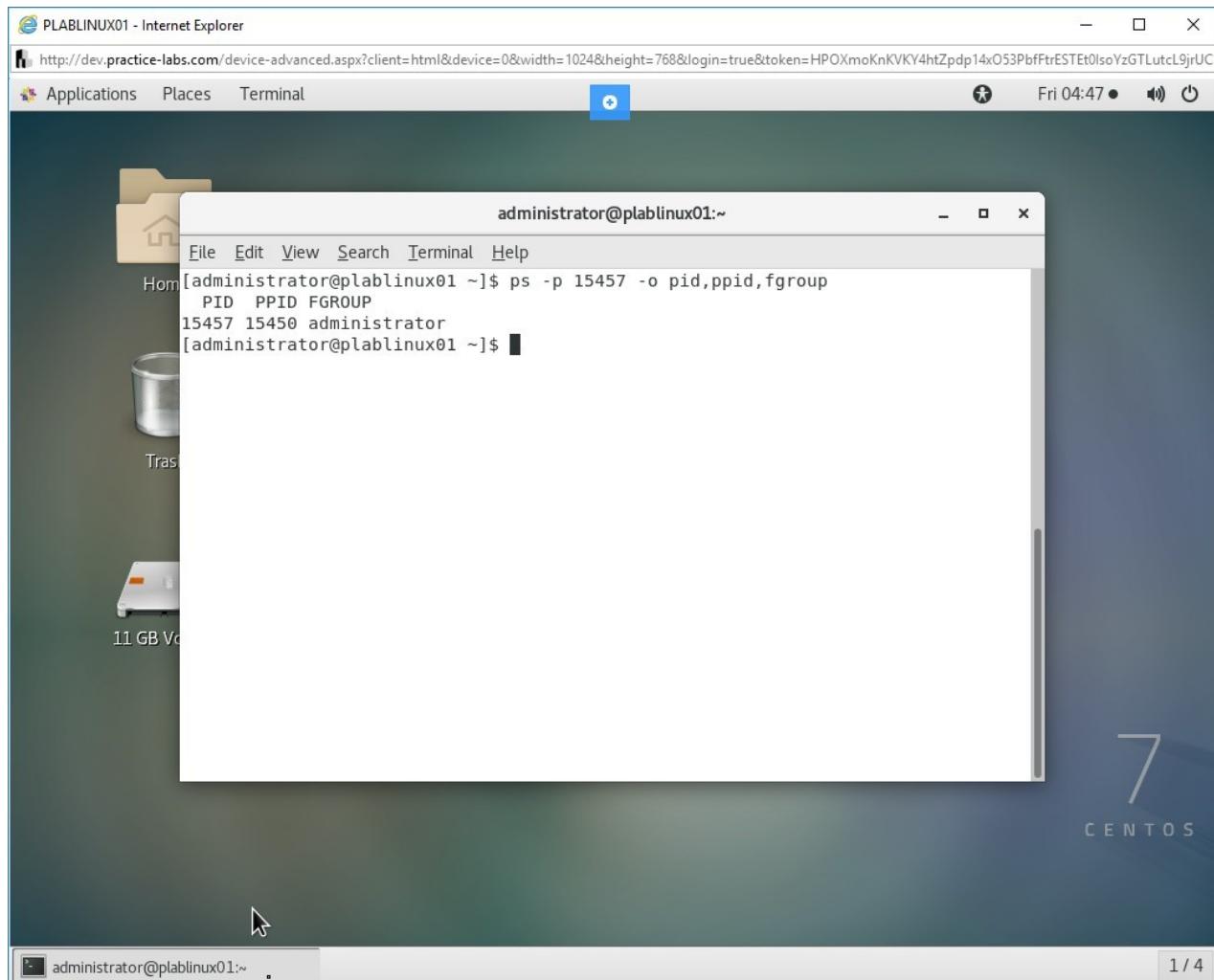


Figure 1.27 Screenshot of PLABLINUX01: Displaying the PID, PPID, and filesystem group for a process.

Step 13

To display the process name by using its PID, type the following command:

```
ps -p 15457 -o comm=
```

Press **Enter**.

Note: The process IDs may differ in your lab environment.

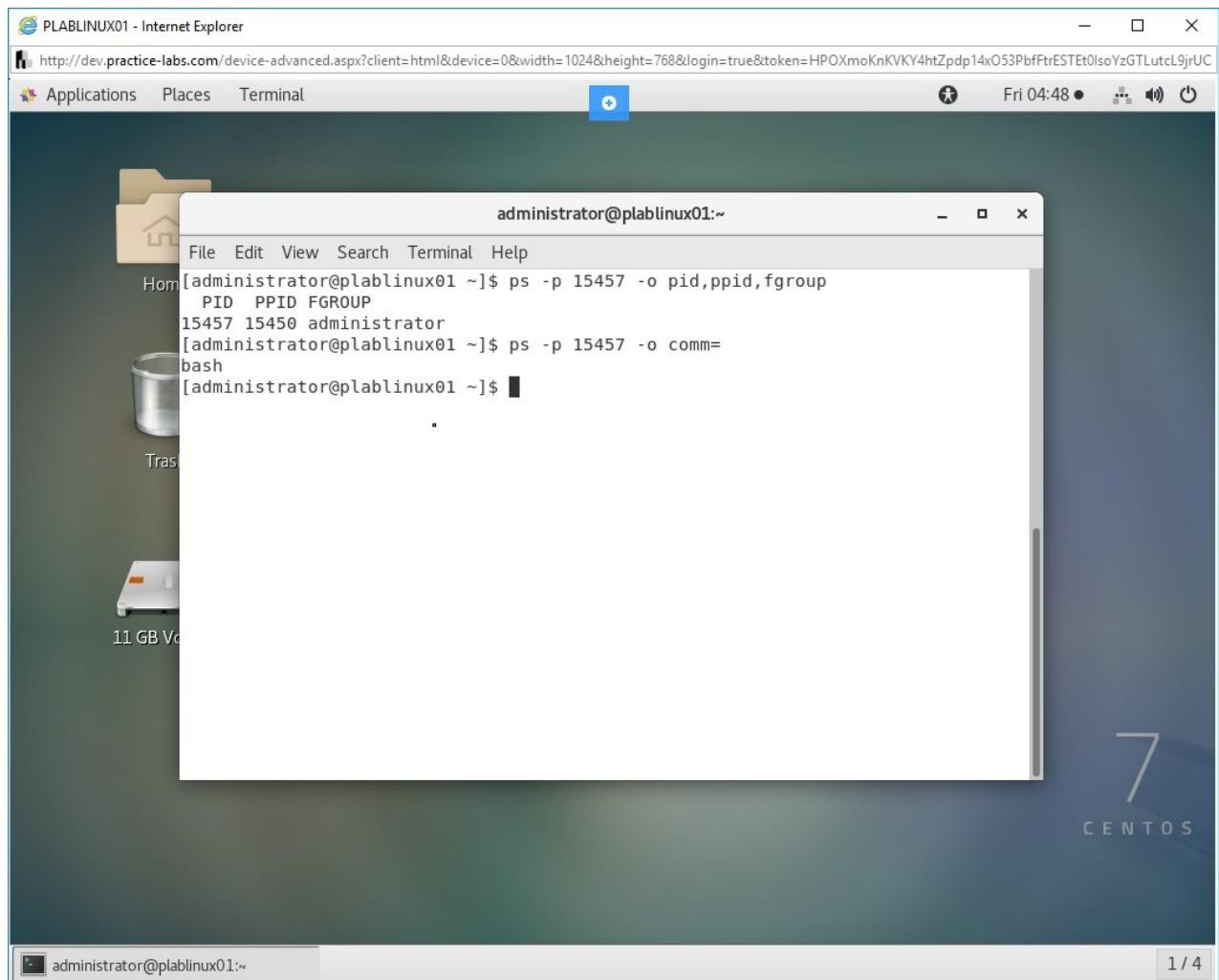


Figure 1.28 Screenshot of PLABLINUX01: Displaying the process name by using its PID.

Step 14

To display the execution time of a process, type the following command:

```
ps -eo comm,etime,user | grep bash
```

Press **Enter**.

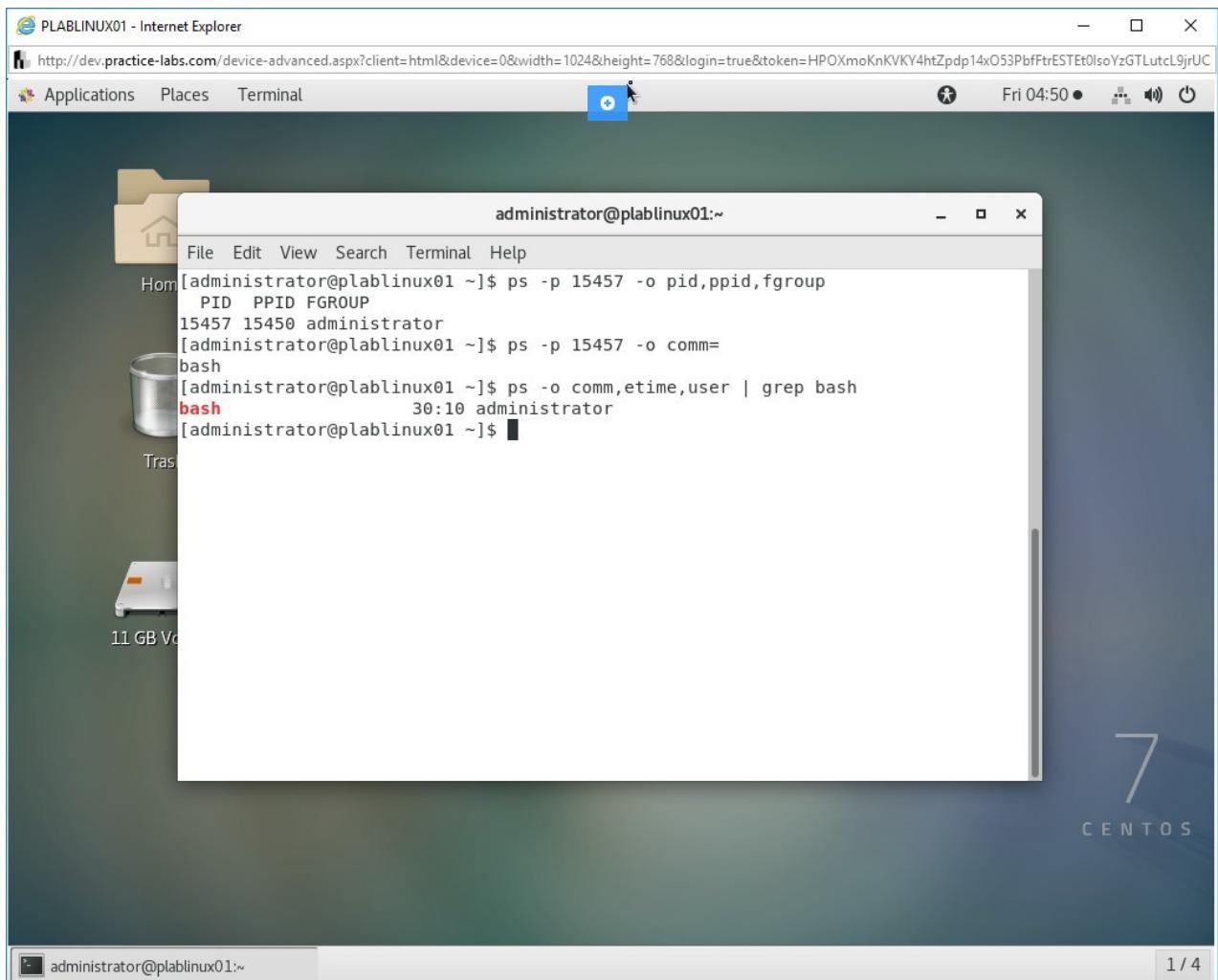


Figure 1.29 Screenshot of PLABLINUX01: Displaying the execution time of a process.

Step 15

The **pstree** command displays the process, both parent and child, in a tree-like structure. Type the following command:

```
pstree
```

Press **Enter**.

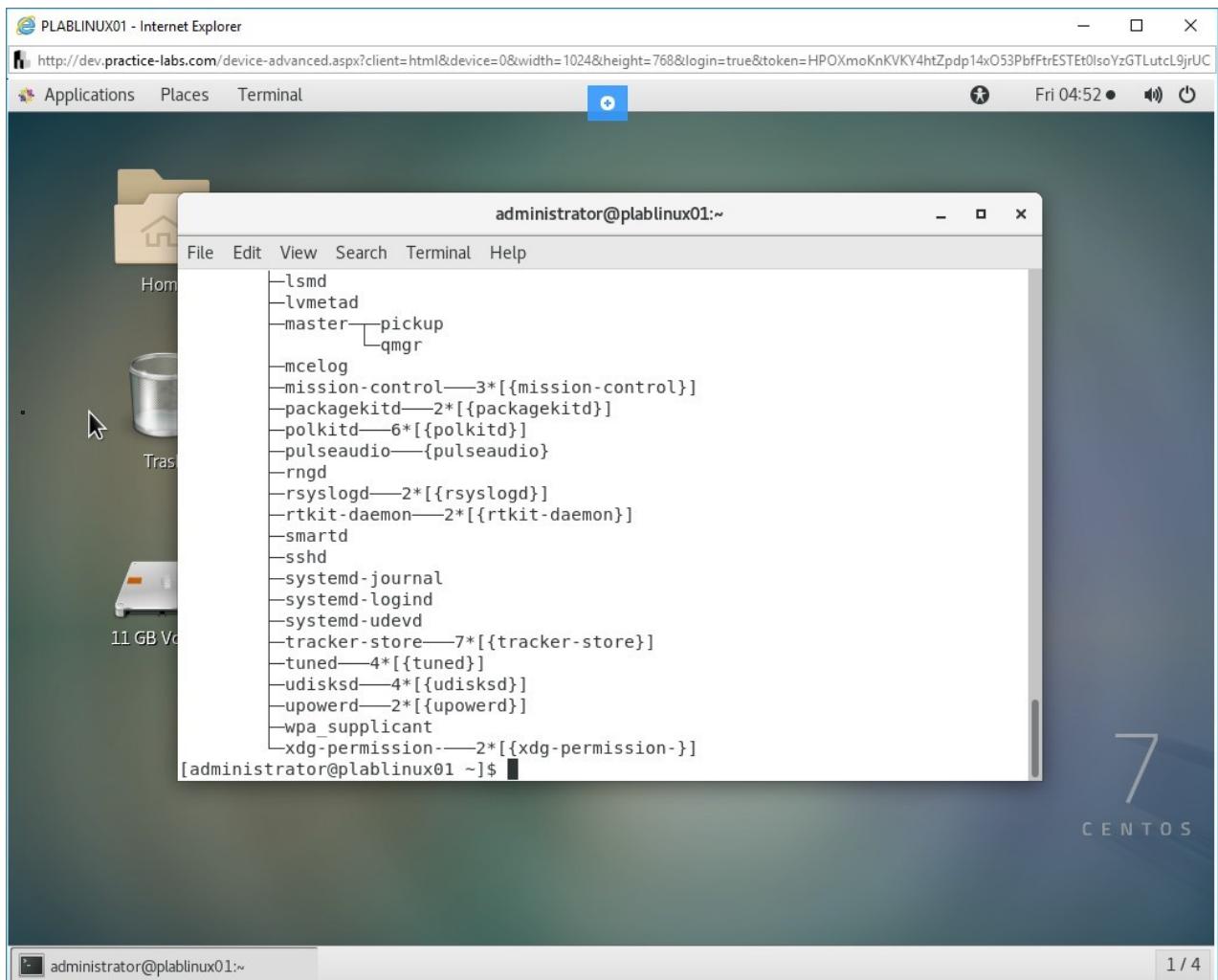


Figure 1.30 Screenshot of PLABLINUX01: Displaying the process, both parent and child, in a tree-like structure.

Step 16

To view the list of arguments for the processes in the process tree, type the following command:

```
pstree -a
```

Press **Enter**.

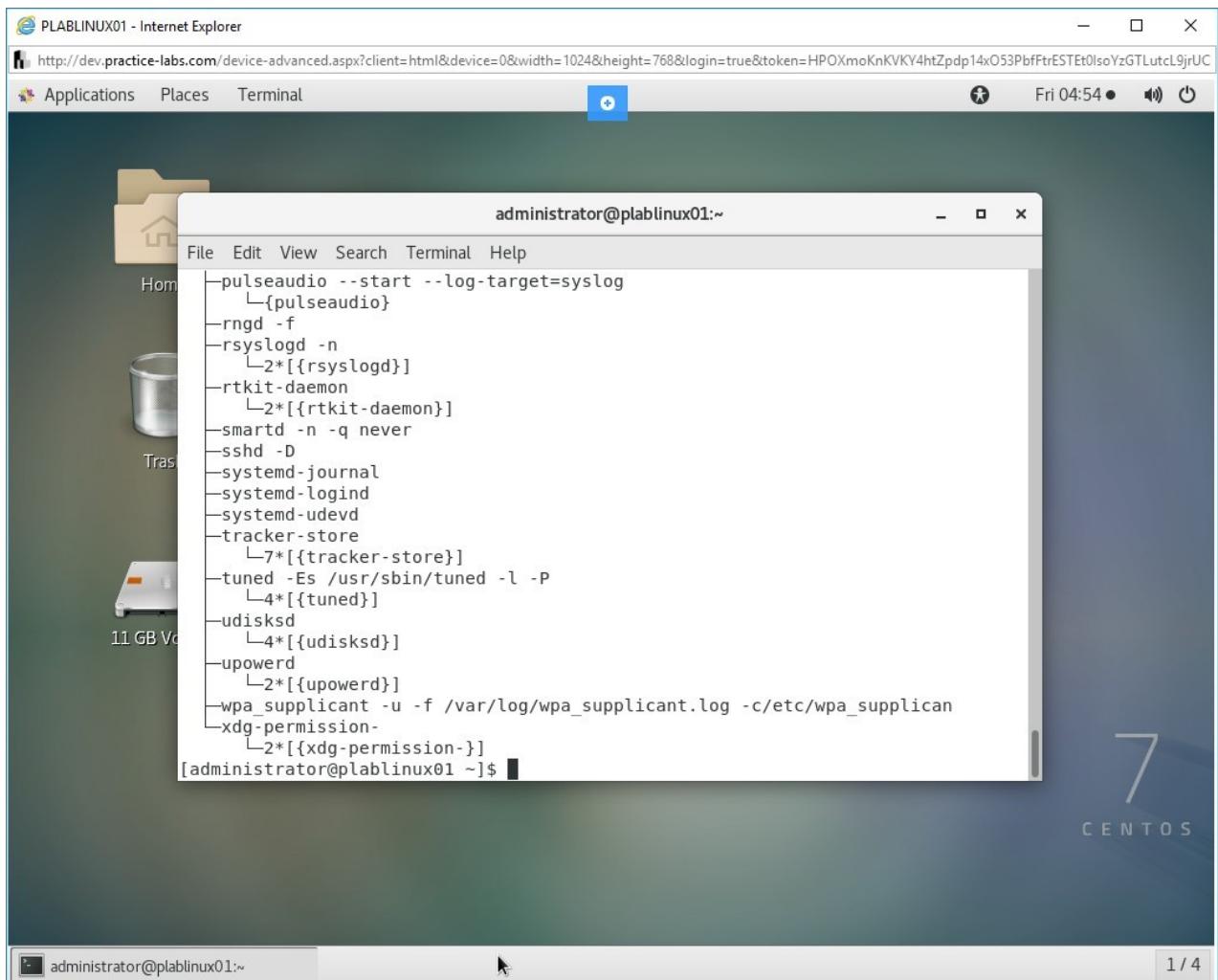


Figure 1.31 Screenshot of PLABLINUX01: Displaying the list of arguments for the processes in the process tree.

Step 17

To display the PID for each process in the process tree, type the following command:

```
pstree -p
```

Press **Enter**.

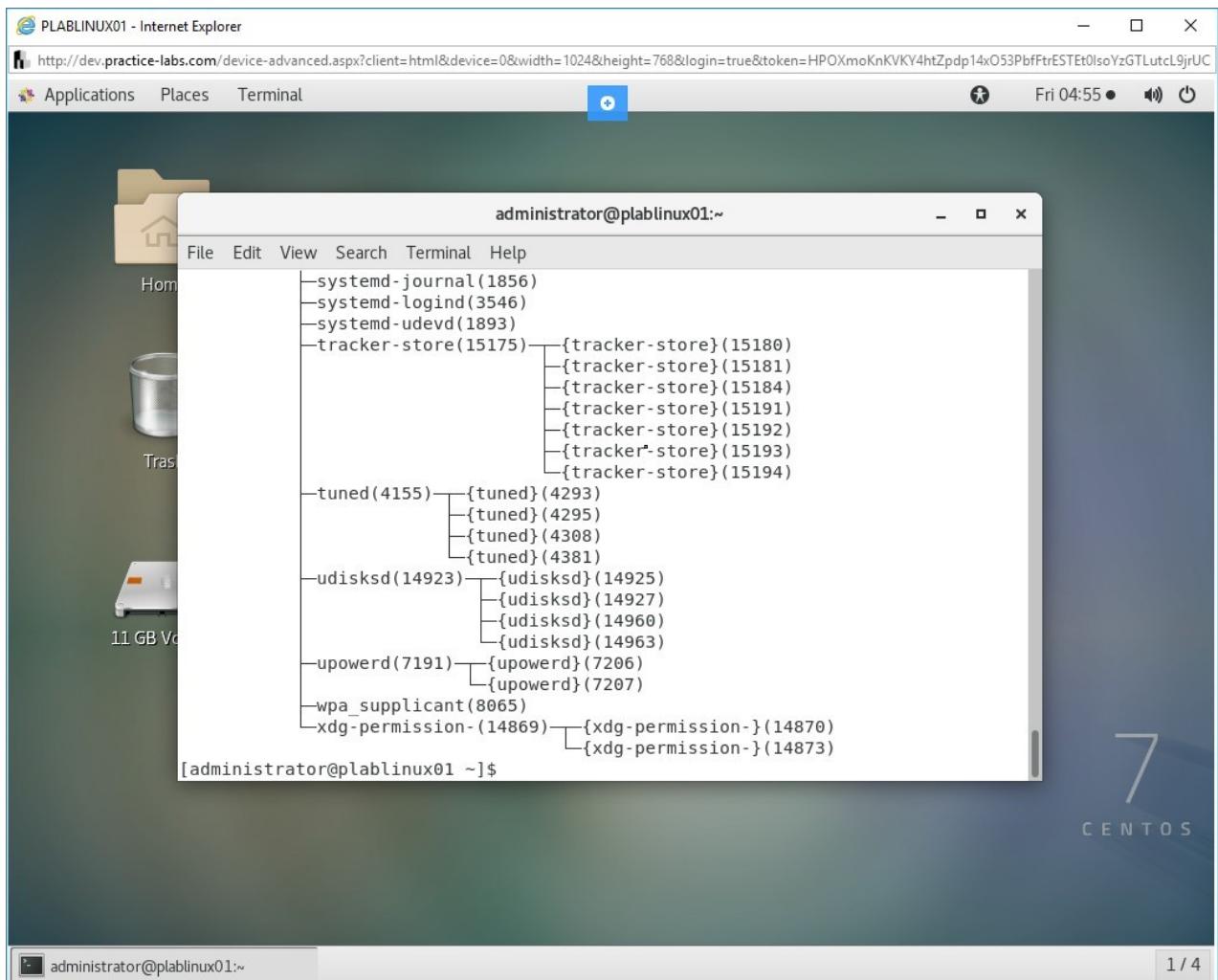


Figure 1.32 Screenshot of PLABLINUX01: Displaying the PID for each process in the process tree.

Step 18

Clear the screen by entering the following command:

```
clear
```

To sort the child processes under the parent PID in the process tree, type the following command:

```
pstree -np
```

Press **Enter**.

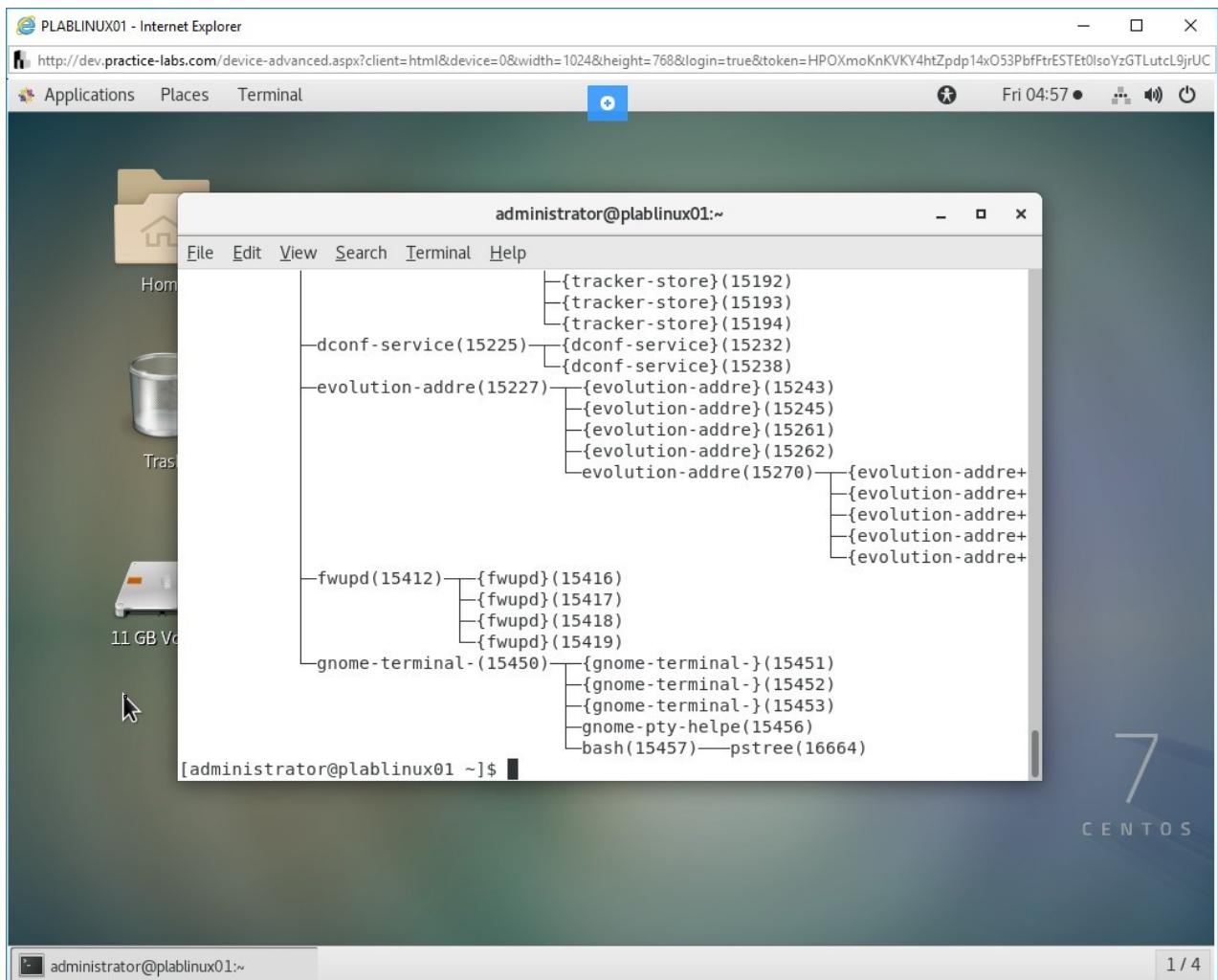


Figure 1.33 Screenshot of PLABLINUX01: Displaying the sorting of the child processes under the parent PID in the process tree.

Step 19

Clear the screen by entering the following command:

```
clear
```

To display the owner of a process in the process tree, type the following command:

```
pstree -u
```

Press **Enter**.

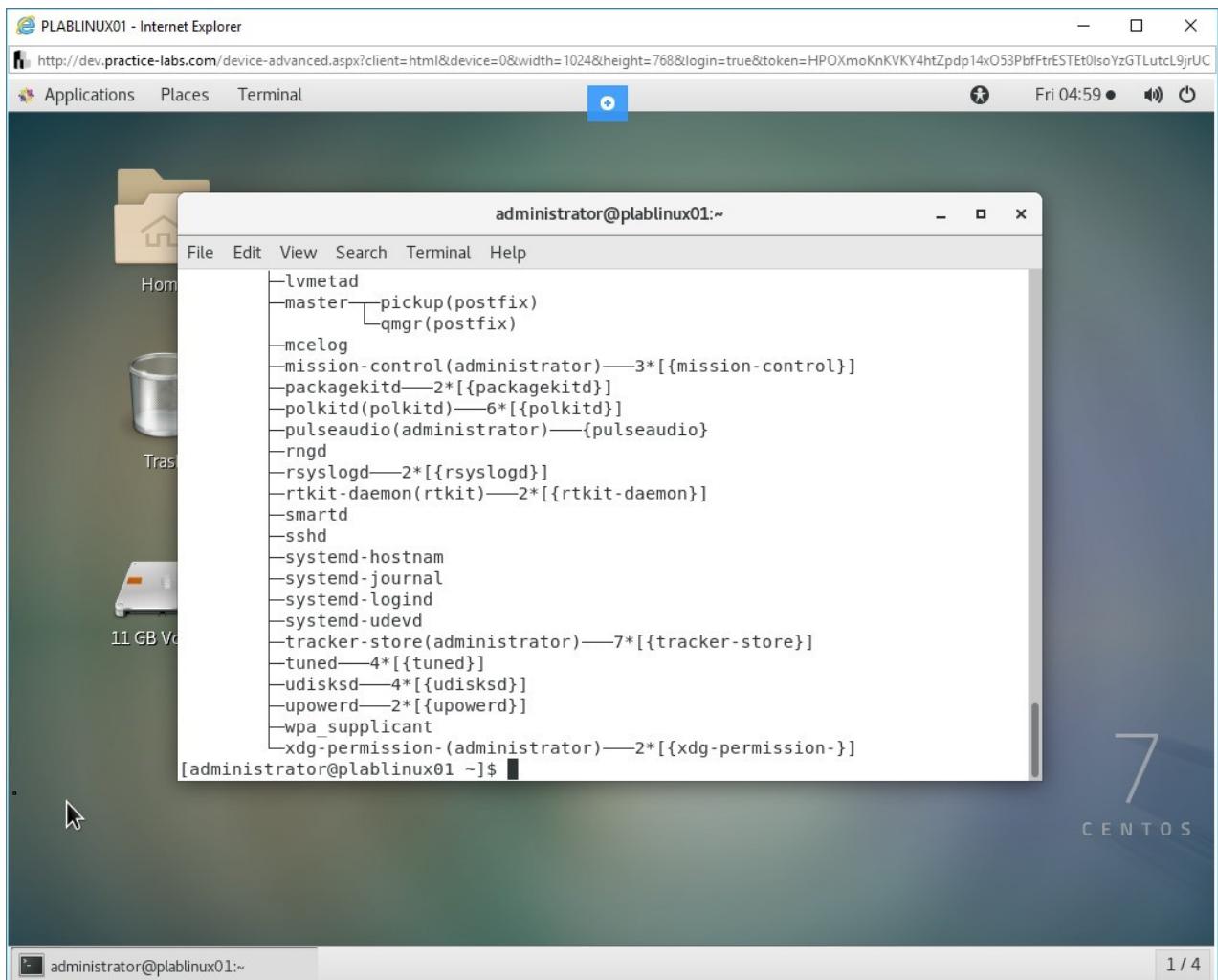


Figure 1.34 Screenshot of PLABLINUX01: Displaying the owner of a process in the process tree.

Step 20

Clear the screen by entering the following command:

```
clear
```

To highlight the process in the process tree, type the following command:

```
pstree -H 15457
```

Press **Enter**. You may have to scroll up in the window to find the highlighted process.

Note: The process IDs may differ in your lab environment.

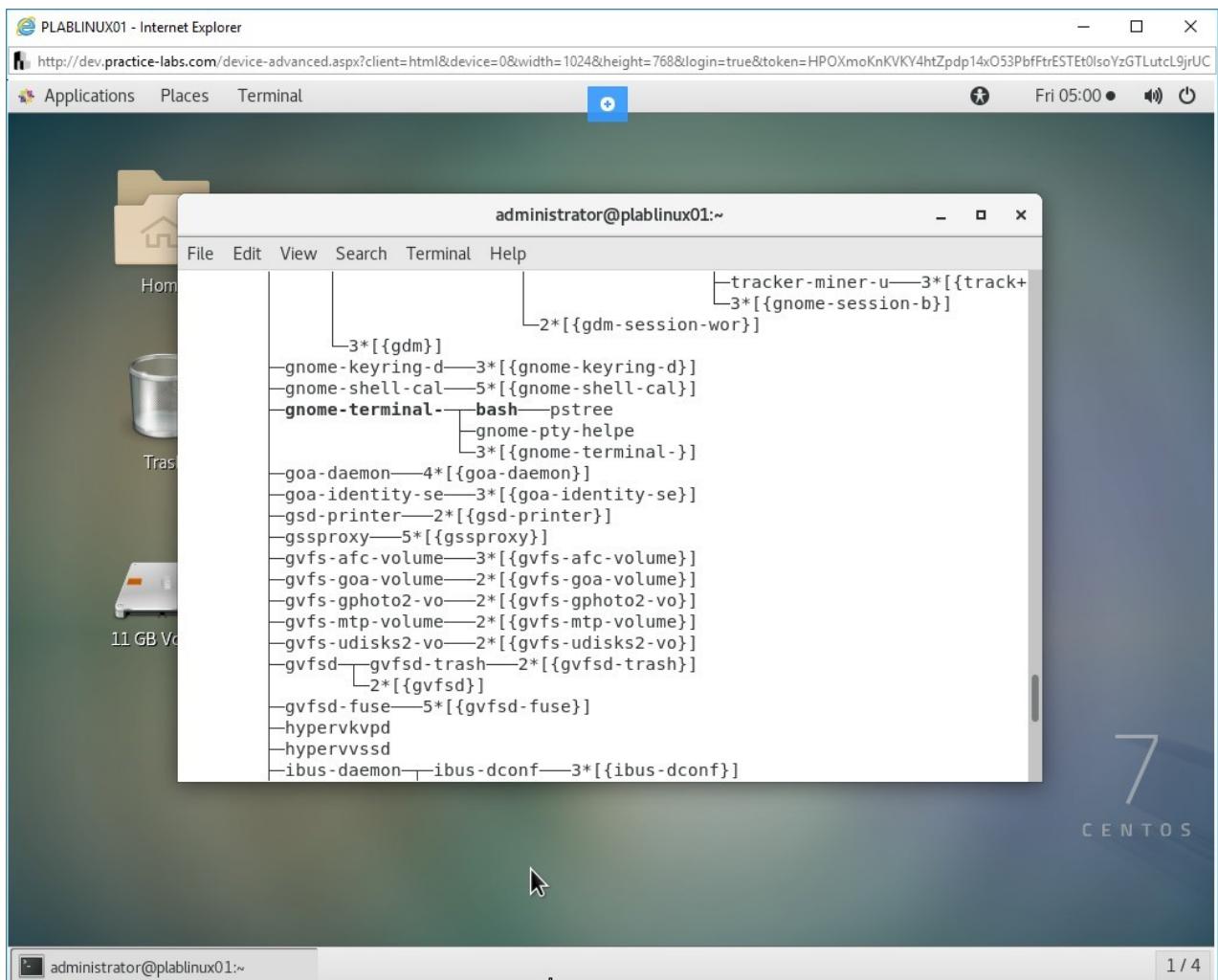


Figure 1.35 Screenshot of PLABLINUX01: Displaying the highlighted process in the process tree.

Step 21

Clear the screen by entering the following command:

```
clear
```

The **top** command displays the process related information in real-time. Type the following command:

```
top
```

Press **Enter**. Notice that you are getting updated information as the output.

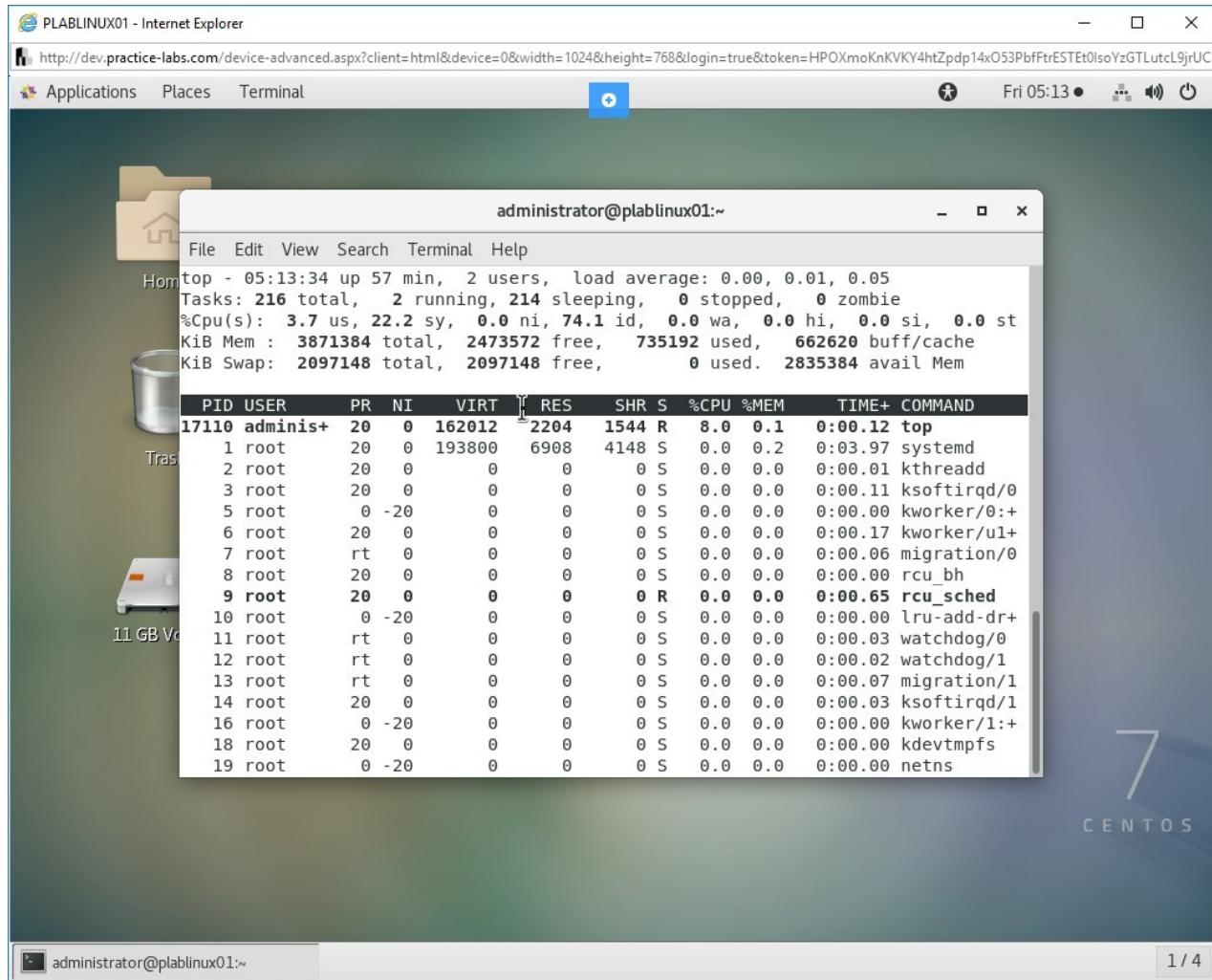


Figure 1.36 Screenshot of PLABLINUX01: Displaying the process related information in real-time.

Step 22

You can also manually refresh the screen. The default refresh rate of the top command is 3 seconds. Press either **Enter** or **Space Bar**. You will have to keep pressing either of them to refresh the display. Press **Ctrl + C** to break the command.

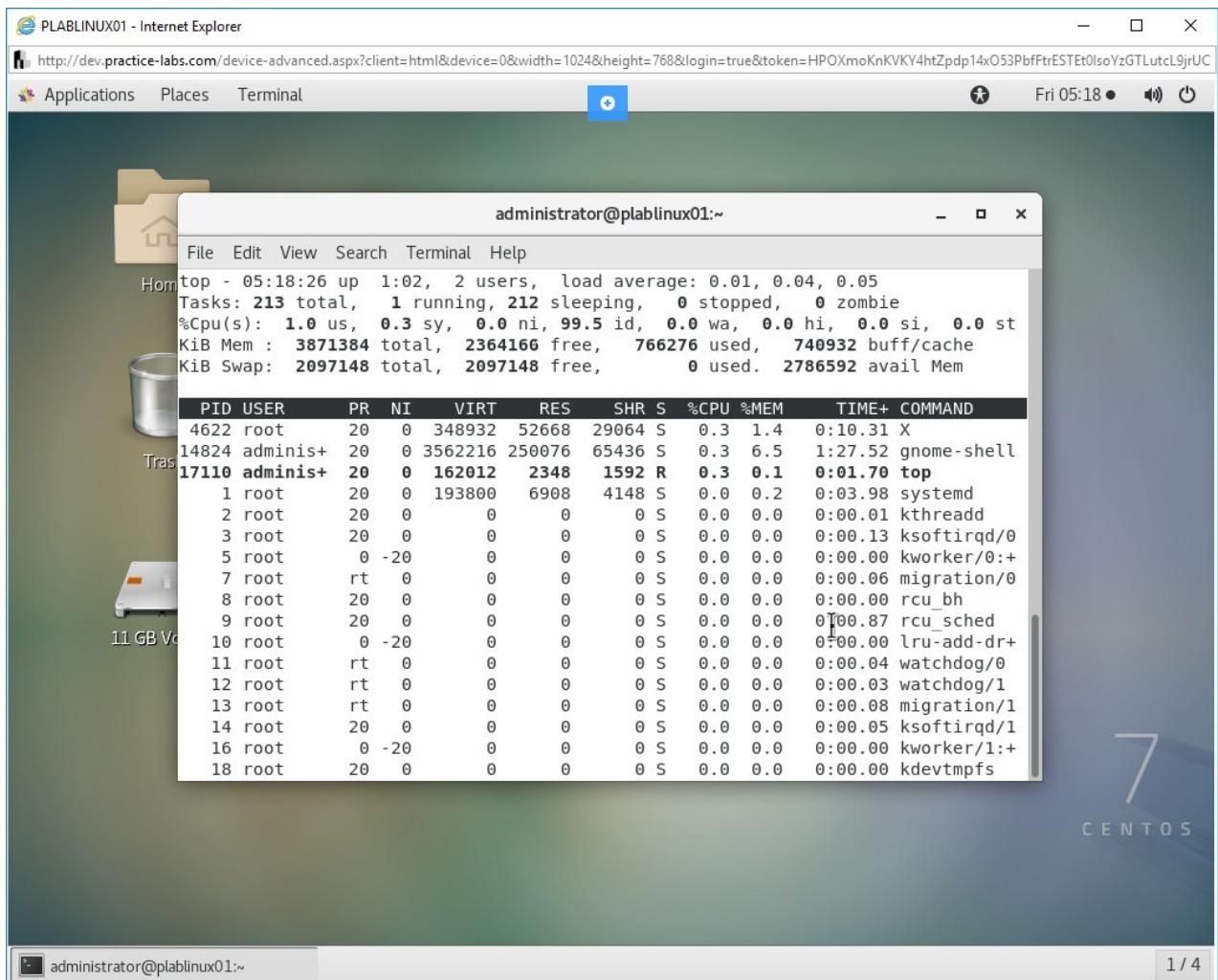


Figure 1.37 Screenshot of PLABLINUX01: Manually refreshing the output of the top command.

Step 23

Clear the screen by entering the following command:

```
clear
```

Then bring back the processes window by typing:

```
top
```

Press **Enter**.

You can press **z** to switch from mono to color.

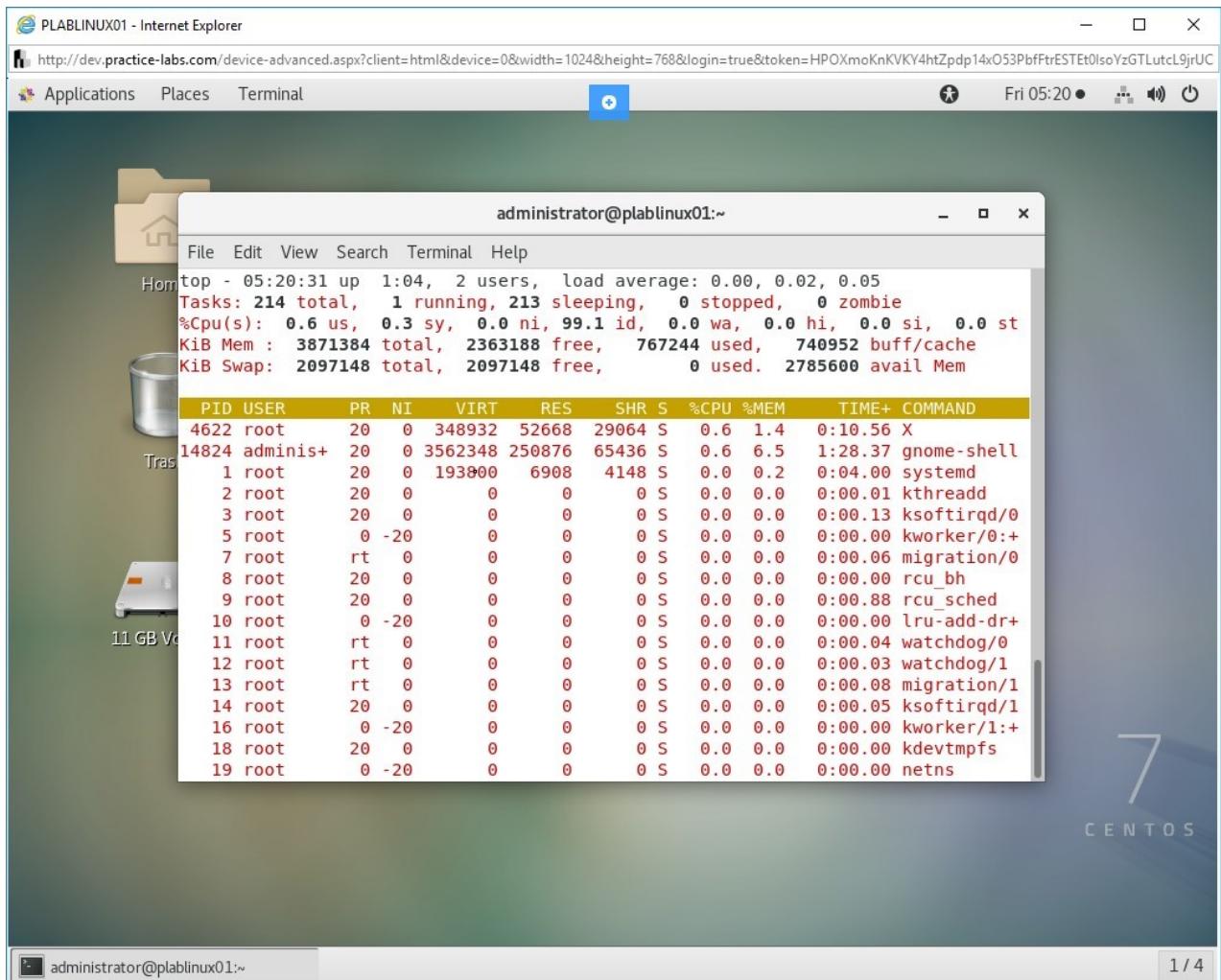


Figure 1.38 Screenshot of PLABLINUX01: Displaying the running processes on the top of the list.

Step 24

While the **top** command is running, you can choose to display the absolute path for the processes. Press **c** to display the absolute path.

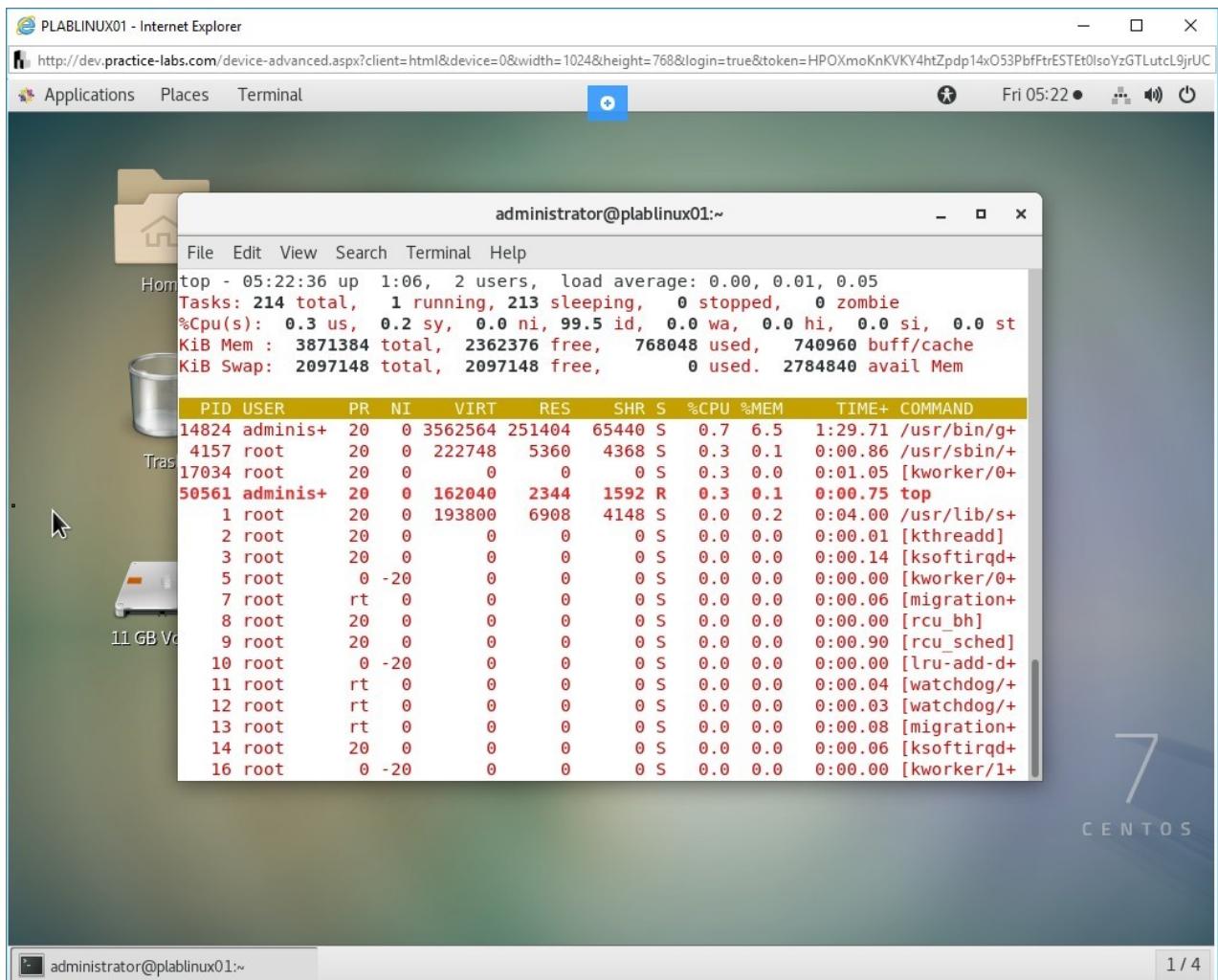


Figure 1.39 Screenshot of PLABLINUX01: Displaying the absolute path for the processes.

Step 25

You can also change the refresh interval for the **top** command. Press **d**. Notice that you are prompted to enter a value. Type the following value:

5

Press **Enter**.

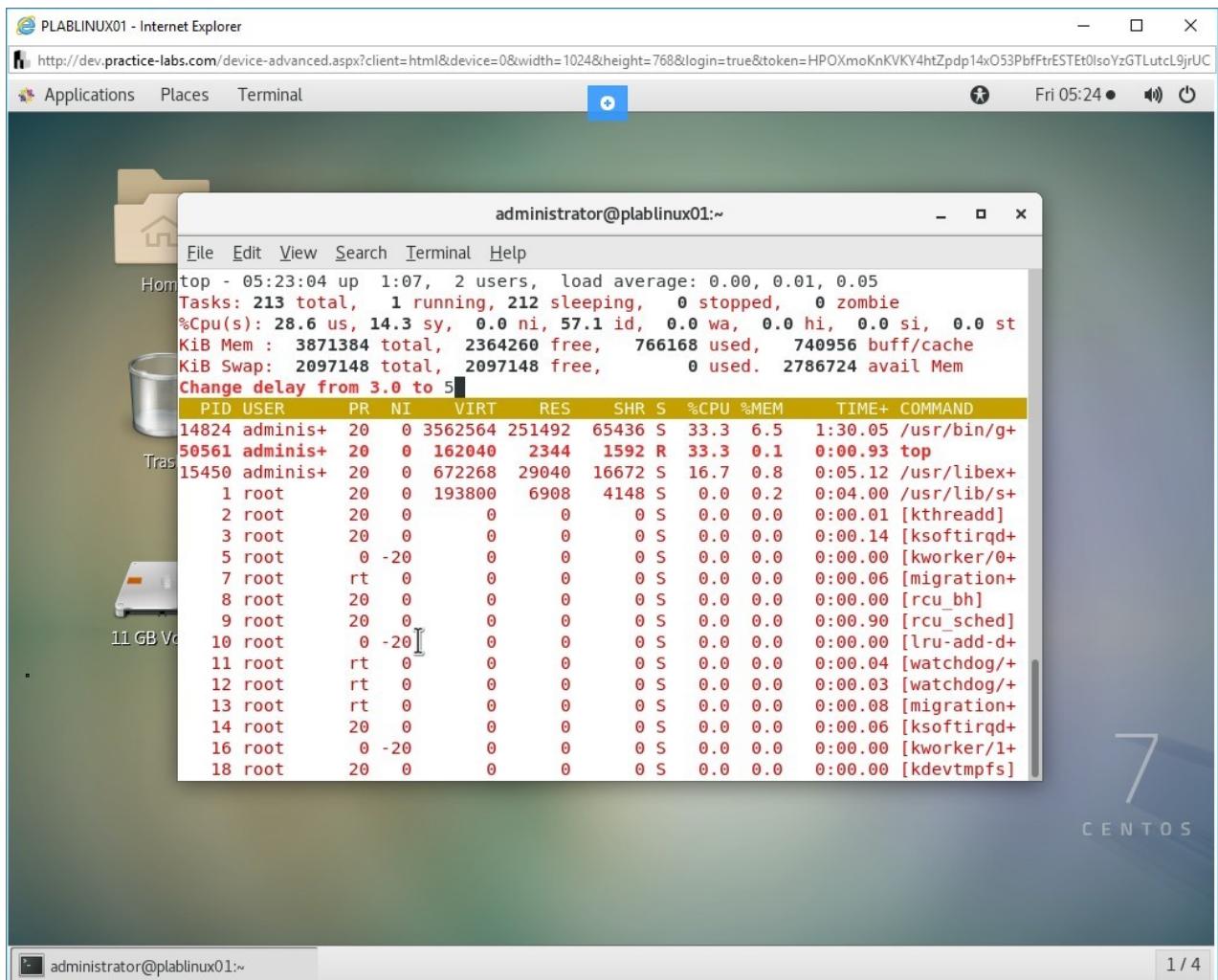


Figure 1.40 Screenshot of PLABLINUX01: Changing the refresh rate of the top command.

Step 26

You can kill a process while the top command is running. Press **k**. Notice that you are prompted to enter a value. Type the following value:

14824

Press **Enter** twice.

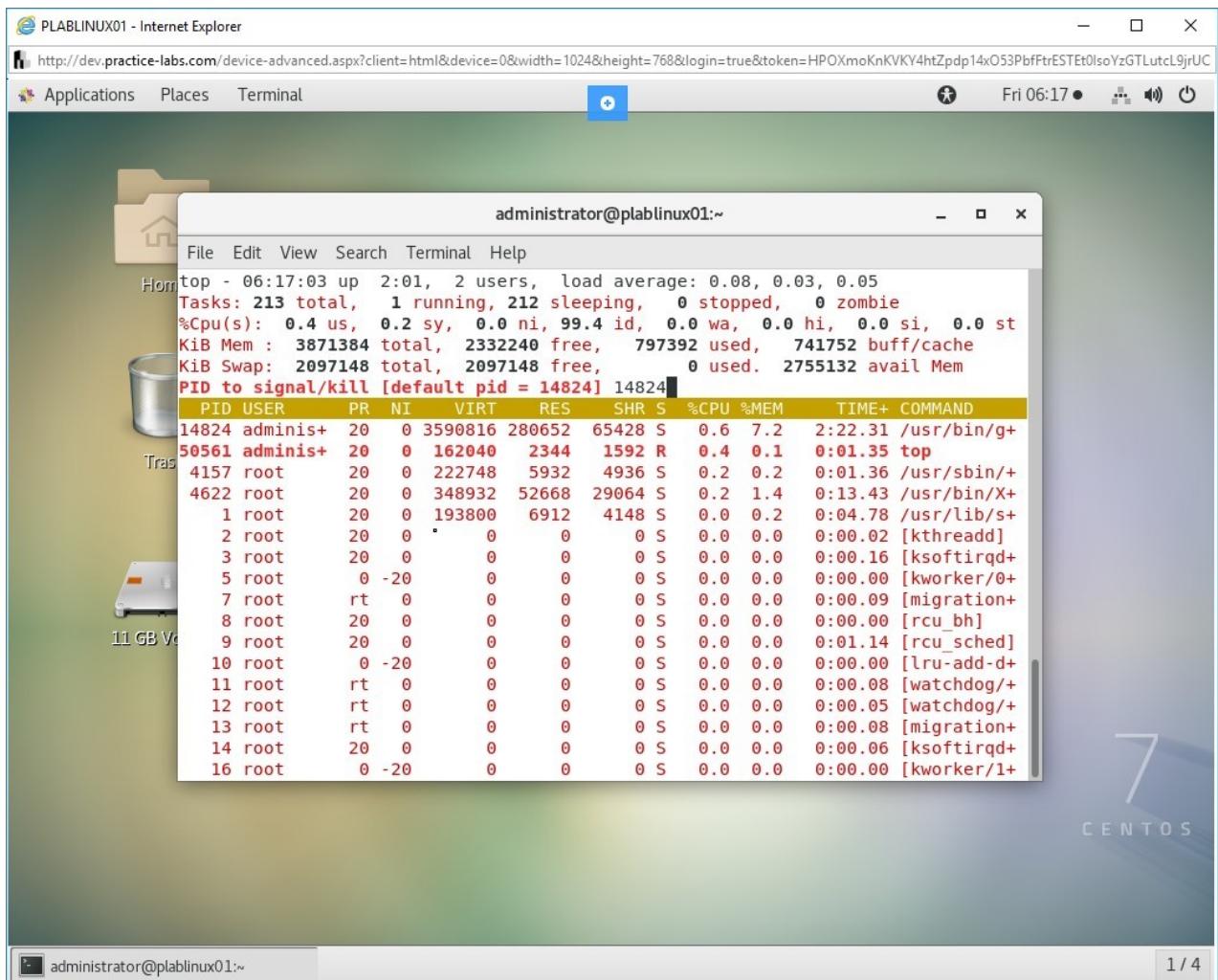


Figure 1.41 Screenshot of PLABLINUX01: Killing a process.

Step 27

Notice the output of this command.

```
top - 06:17:35 up 2:01, 2 users,  load average: 0.05, 0.03, 0.05
Tasks: 212 total, 2 running, 210 sleeping, 0 stopped, 0 zombie
%Cpu(s): 15.0 us, 11.0 sy, 0.0 ni, 73.7 id, 0.1 wa, 0.0 hi, 0.1 si, 0.0 st
Mem: 3871384 total, 2560616 free, 584328 used, 726440 buff/cache
Swap: 2097148 total, 2097148 free, 0 used. 2983700 avail Mem

      PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
1856 root      20   0  40620  7484  6500 S 25.2  0.2  0:04.05 /usr/lib/s+
4157 root      20   0 222748  7128  6032 S  5.4  0.2  0:01.63 /usr/sbin/+...
4622 root      20   0 337460 42940 14936 S  3.0  1.1  0:13.68 /usr/bin/X+
3558 dbus      20   0  70156  4172  1940 S  1.0  0.1  0:05.22 /usr/bin/d+
50561 adminis+ 20   0 162040 2344  1592 R  0.6  0.1  0:01.40 top
15450 adminis+ 20   0 672268 29200 16692 S  0.4  0.8  0:05.62 /usr/libexec...
9 root       20   0      0      0      0 R  0.2  0.0  0:01.15 [rcu_sched]
1782 root      20   0      0      0      0 S  0.2  0.0  0:02.77 [xfsailld/d+...
3555 polkitd   20   0 616512 15084  5172 S  0.2  0.4  0:03.49 /usr/lib/p...
3586 root      20   0 225720  4824  3348 S  0.2  0.1  0:00.26 /usr/bin/a...
14585 adminis+ 20   0  69308  2628  1168 S  0.2  0.1  0:01.02 /usr/bin/d...
14849 adminis+ 20   0 453008  5380  3356 S  0.2  0.1  0:00.38 ibus-daemon...
15098 adminis+ 20   0 1005392 30312 17460 S  0.2  0.8  0:01.31 nautilus-d...
15167 adminis+ 20   0 1435708 62128 19936 S  0.2  1.6  0:03.02 /usr/bin/g...
15175 adminis+ 20   0 525704 14232  5916 S  0.2  0.4  0:00.19 /usr/libexec...
51620 root      20   0      0      0      0 S  0.2  0.0  0:00.16 [kworker/0+...
1 root       20   0 193800  6912  4148 S  0.0  0.2  0:04.79 /usr/lib/s+
```

Figure 1.42 Screenshot of PLABLINUX01: Displaying that the process is now killed and is no longer in the list.

Keep all devices in their current state and proceed to the next exercise.

Review

Well done, you have completed the **Perform Process Monitoring** Practice Lab.

Summary

You completed the following exercise:

- Exercise 1 - Perform Process Monitoring

You should now be able to:

- View processes using /proc

- Work with the process monitoring commands (ps, pstree, top)

Feedback

Shutdown all virtual machines used in this lab. Alternatively, you can log out of the lab platform.