**CompTIA Linux+**

# Create, Monitor and Kill Processes

## Introduction

Welcome to the **Create, Monitor and Kill Processes** Practice Lab. In this module you will be provided with the instructions and devices needed to develop your hands-on skills.

Create Processes
Monitor Processes
Kill Processes
Output

## Learning Outcomes

In this module, you will complete the following exercise:

- Exercise 1 - Create, Monitor and Kill Processes

After completing this lab, you will be able to:

- Redirect Output
- Redirect Input
- Discard the Output
- Use the tee Command

## Exam Objectives

The following exam objectives are covered in this lab:

- **LPI:** 103.5 Create, monitor and kill processes

- **CompTIA:** 2.6 Given a scenario, automate and schedule jobs.

> ***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.

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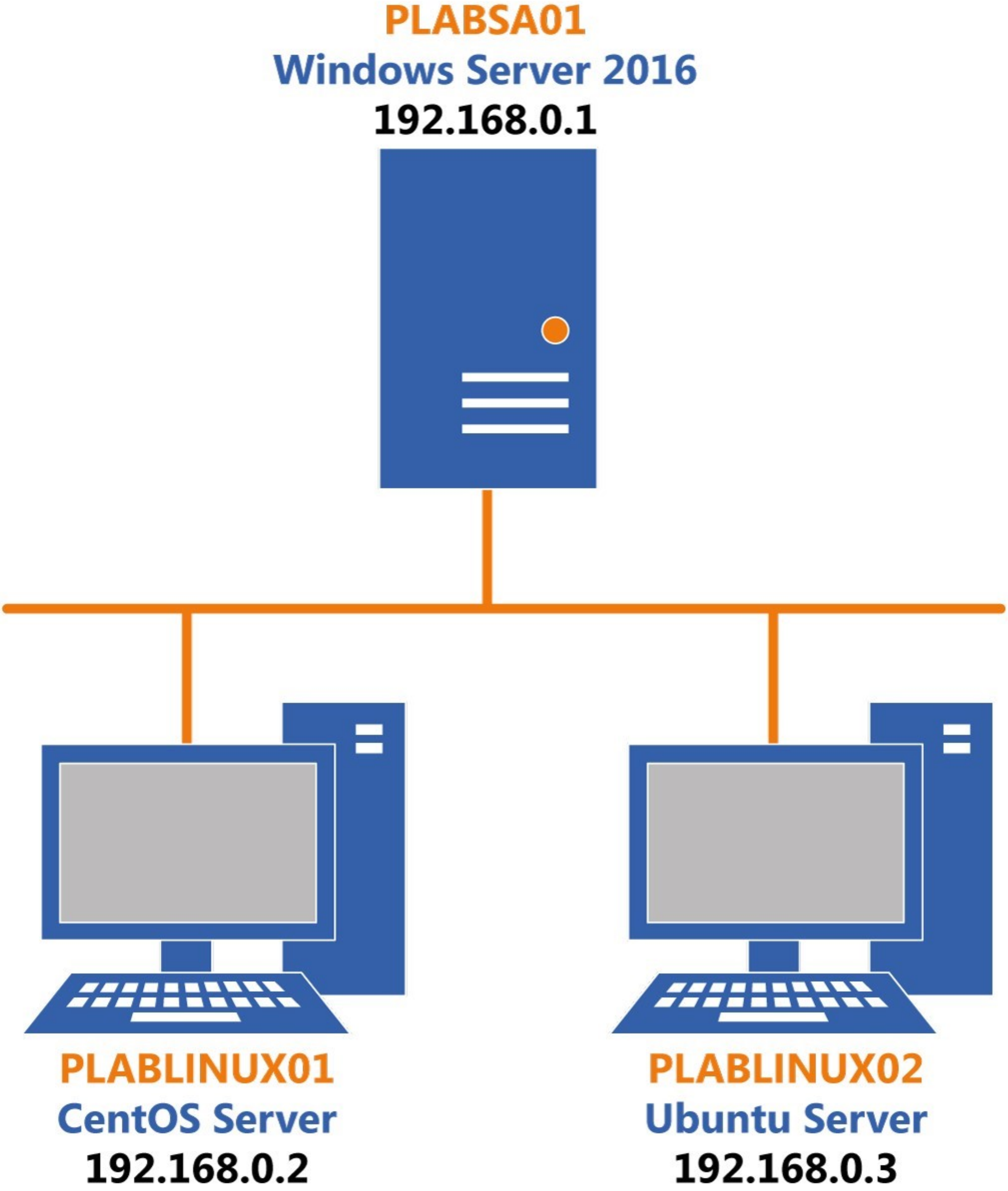
## Lab Topology

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



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 - Create, Monitor and Kill Processes

Normally a system runs a large number of processes. Most of these processes are started with the system boot. However, some of these processes are generated when you execute a command or start an application. You can create, monitor, and also kill processes.

In this exercise, you will understand how to create, monitor, and kill processes.

# Learning Outcomes

After completing this exercise, you will be able to:

- Log into a Linux System
- Redirect Output
- Redirect Input
- Discard the Output
- Use the tee Command

# Your Devices

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

- **PLABLINUX01** (CentOS Server)

### Task 1 - Create Process

Any application running on a Linux system is a process, which has the following attributes:

- Process ID
- Parent process ID
- Current directory PWD
- File descriptor table
- Program that is associated with it
- Environment variables, which are inherited from the parent process
- Stdin, stdout, stderr

To create a process, perform the following steps:

## Step 1

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

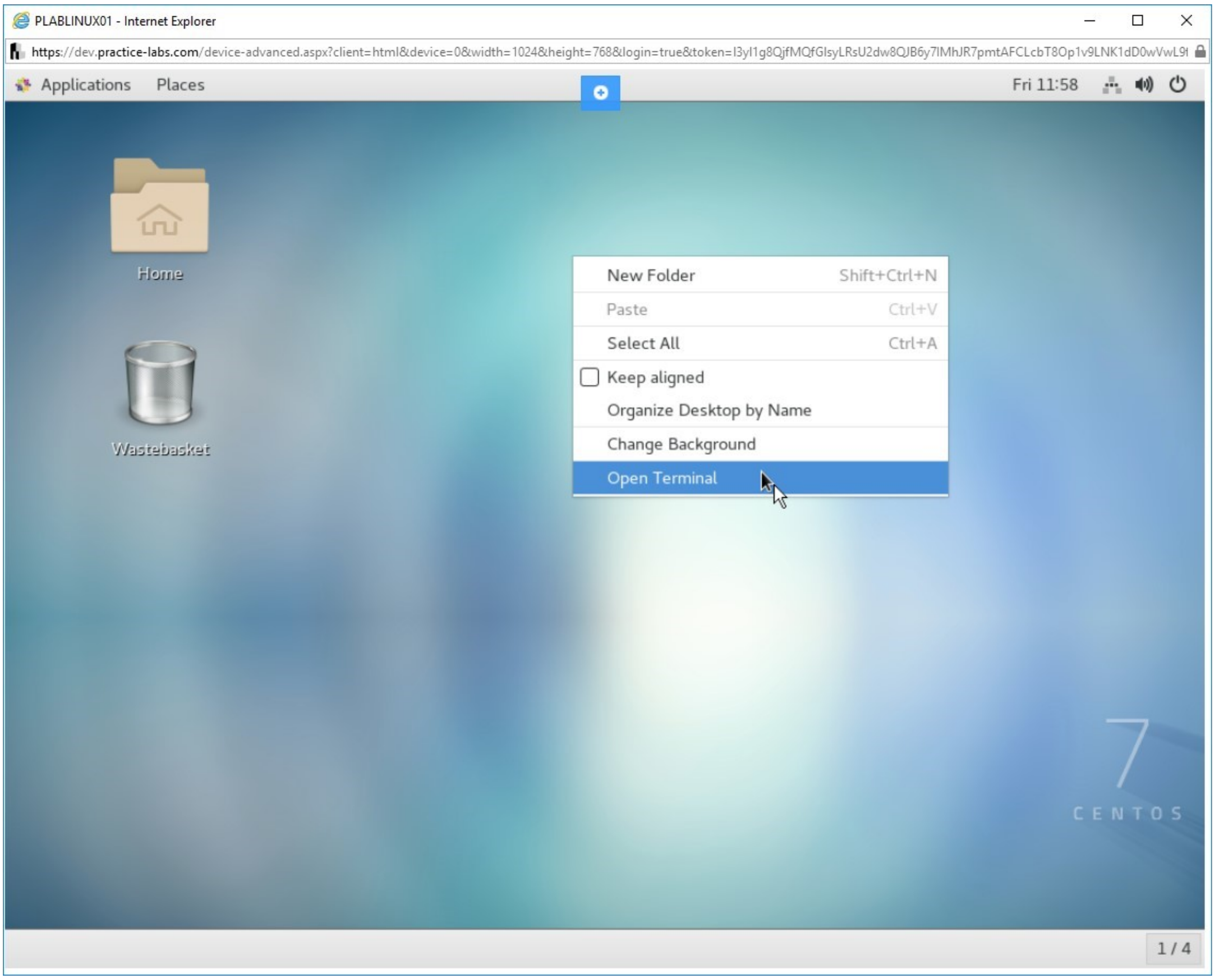

PLABLINUX01 - Internet Explorer
https://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=I3yl1g8QjfMQfGlsyLRsU2dw8QJB6y7IMhJR7pmtAFCLcbT8Op1v9LNK1dD0wVwL9t
Applications
Places
Fri 11:58
Home
Wastebasket
New Folder
Shift+Ctrl+N
Paste
Ctrl+V
Select All
Ctrl+A
□ Keep aligned
Organize Desktop by Name
Change Background
Open Terminal
7
CENTOS
1 / 4

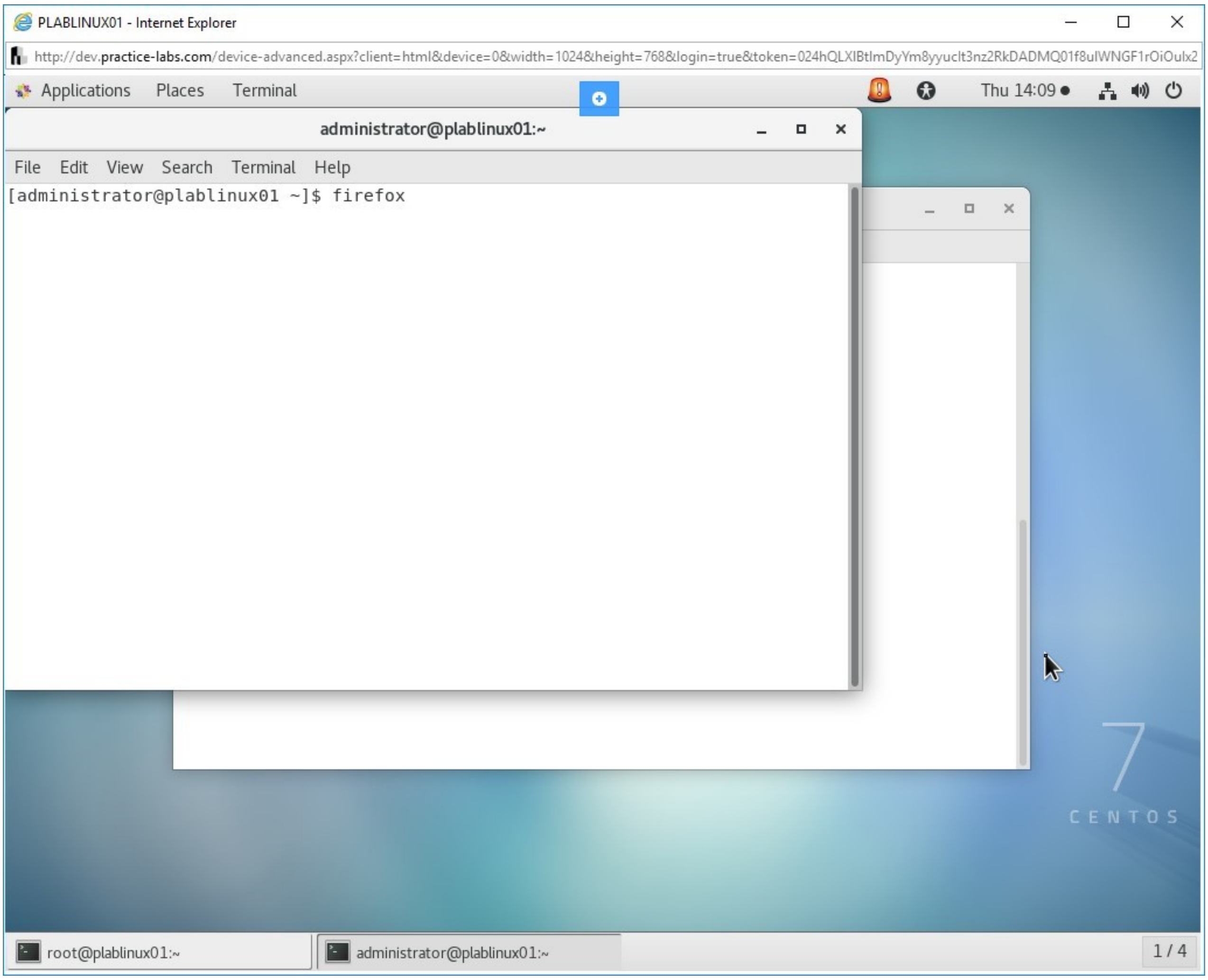
Figure 1.1 Screenshot of PLABLINUX01: Selecting the Open Terminal option from the context menu.

## Step 2

Let's first create a process. Remember that a process is created when you run an application. Open a new terminal window and type the following command:

```
firefox
```

Press **Enter**.



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Applications
Places
Terminal
Thu 14:09 ●
administrator@plablinux01:~
File
Edit
View
Search
Terminal
Help
7
CENTOS
root@plablinux01:~
administrator@plablinux01:~
1 / 4

```
[administrator@plablinux01 ~]$ firefox
```

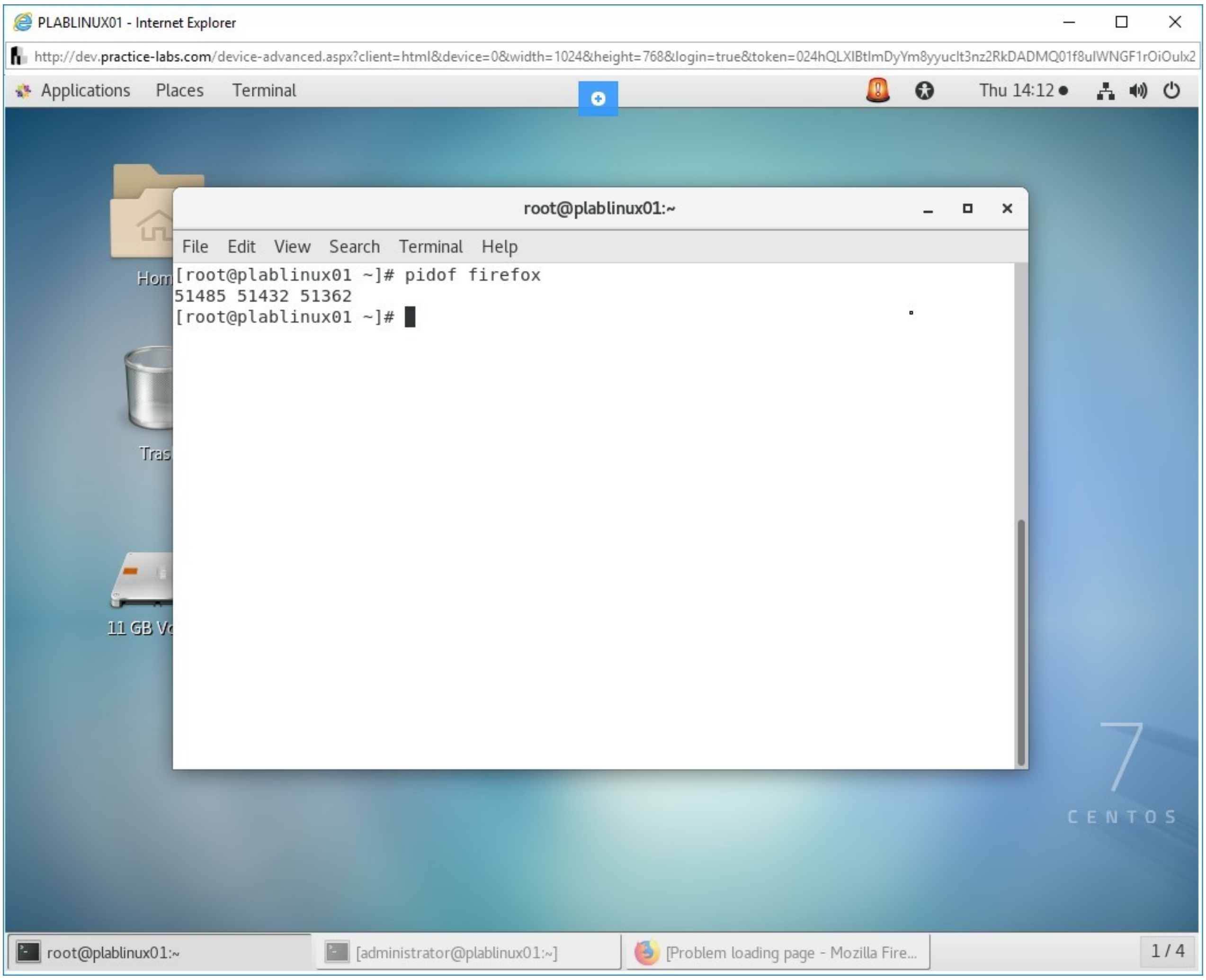
Figure 1.2 Screenshot of PLABLINUX01: Opening a new terminal window and creating the firefox process.

## Step 3

Wait for a minute. The Firefox window is displayed. Minimize the terminal and the Firefox windows. In the other terminal window, type the following command:

```
pidof firefox
```

Press **Enter**. Notice that there are three process IDs.



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Applications
Places
Terminal
Thu 14:12 ●
root@plablinux01:~
File
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View
Search
Terminal
Help
root@plablinux01:~
[administrator@plablinux01:~]
[Problem loading page - Mozilla Fire...
1 / 4

```
[root@plablinux01 ~]# pidof firefox
51485 51432 51362
[root@plablinux01 ~]#
```

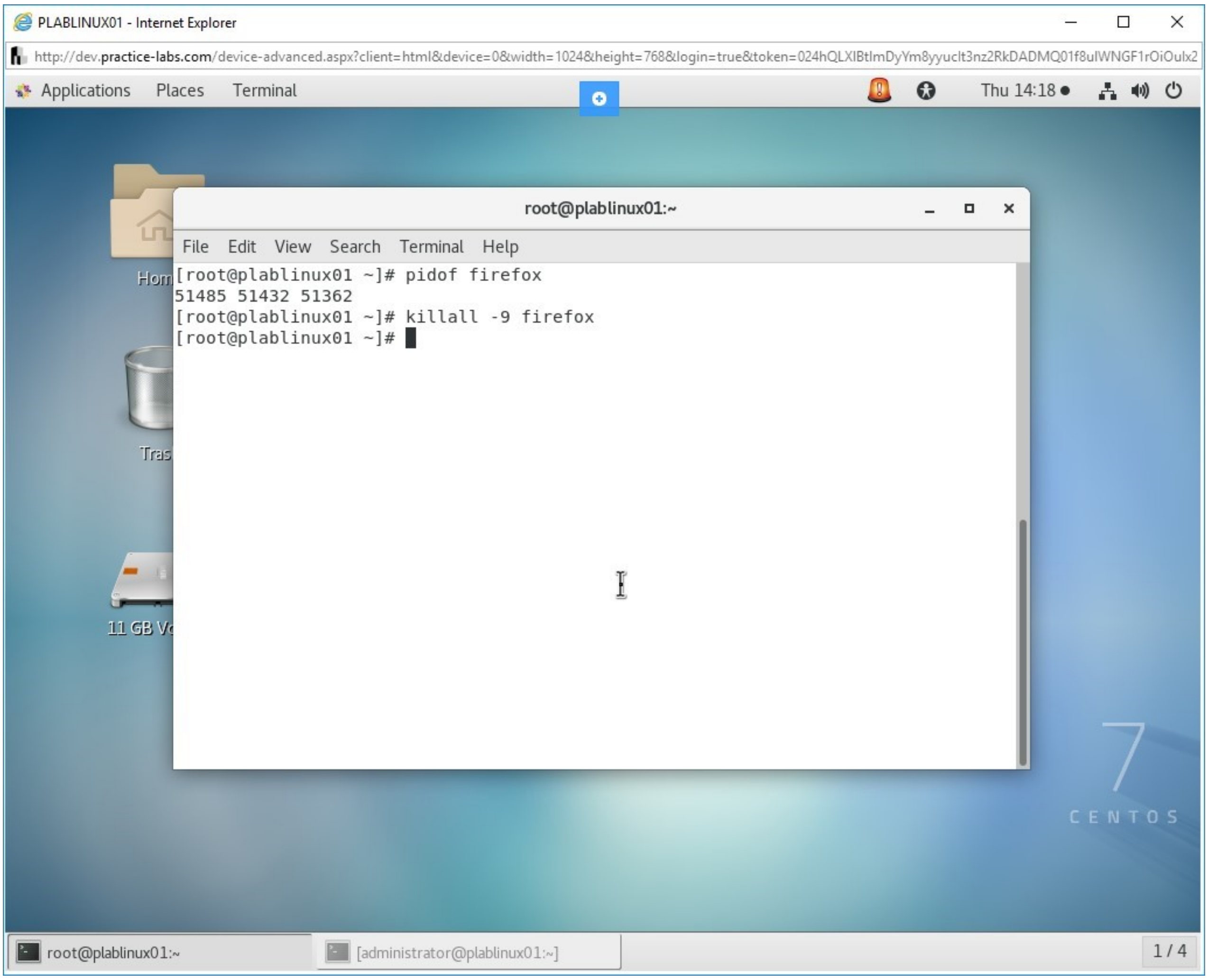
Figure 1.3 Screenshot of PLABLINUX01: Showing the process IDs of firefox.

## Step 4

You can kill all process IDs with a single command. In the other terminal window, type the following command:

```
killall -9 firefox
```

Press **Enter**. You have successfully killed all process IDs.



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Applications
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Thu 14:18 ●
root@plablinux01:~
File
Edit
View
Search
Terminal
Help
root@plablinux01:~
[administrator@plablinux01:~]
1 / 4

```
[root@plablinux01 ~]# pidof firefox
51485 51432 51362
[root@plablinux01 ~]# killall -9 firefox
[root@plablinux01 ~]# 
```

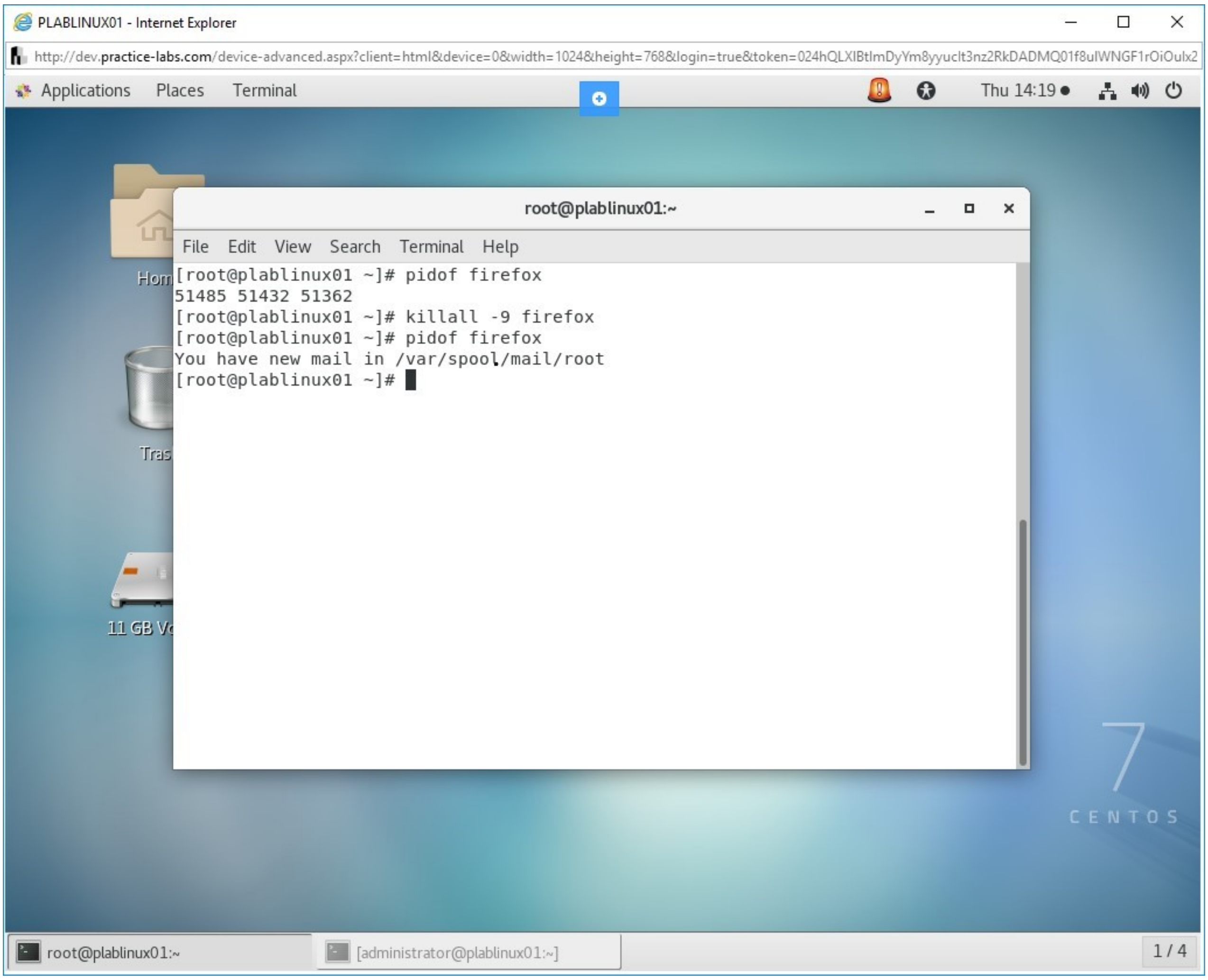
Figure 1.4 Screenshot of PLABLINUX01: Killing all process IDs with a single command.

## Step 5

To verify all process IDs are killed, type the following command:

```
pidof firefox
```

Press **Enter**. Notice that there are no process IDs for firefox.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Applications
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Terminal
Thu 14:19 ●
root@plablinux01:~
File
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root@plablinux01:~
[administrator@plablinux01:~]
1 / 4

```
[root@plablinux01 ~]# pidof firefox
51485 51432 51362
[root@plablinux01 ~]# killall -9 firefox
[root@plablinux01 ~]# pidof firefox
You have new mail in /var/spool/mail/root
[root@plablinux01 ~]# 
```

Figure 1.5 Screenshot of PLABLINUX01: Verifying the termination of PIDs.

## Task 2 - Work with the Foreground and Background Processes

Processes are of two types: foreground processes and background processes. The foreground processes receive input from the keyboard and output is displayed on the screen. Background processes take the input from the keyboard and then free up the terminal to run more commands in parallel.

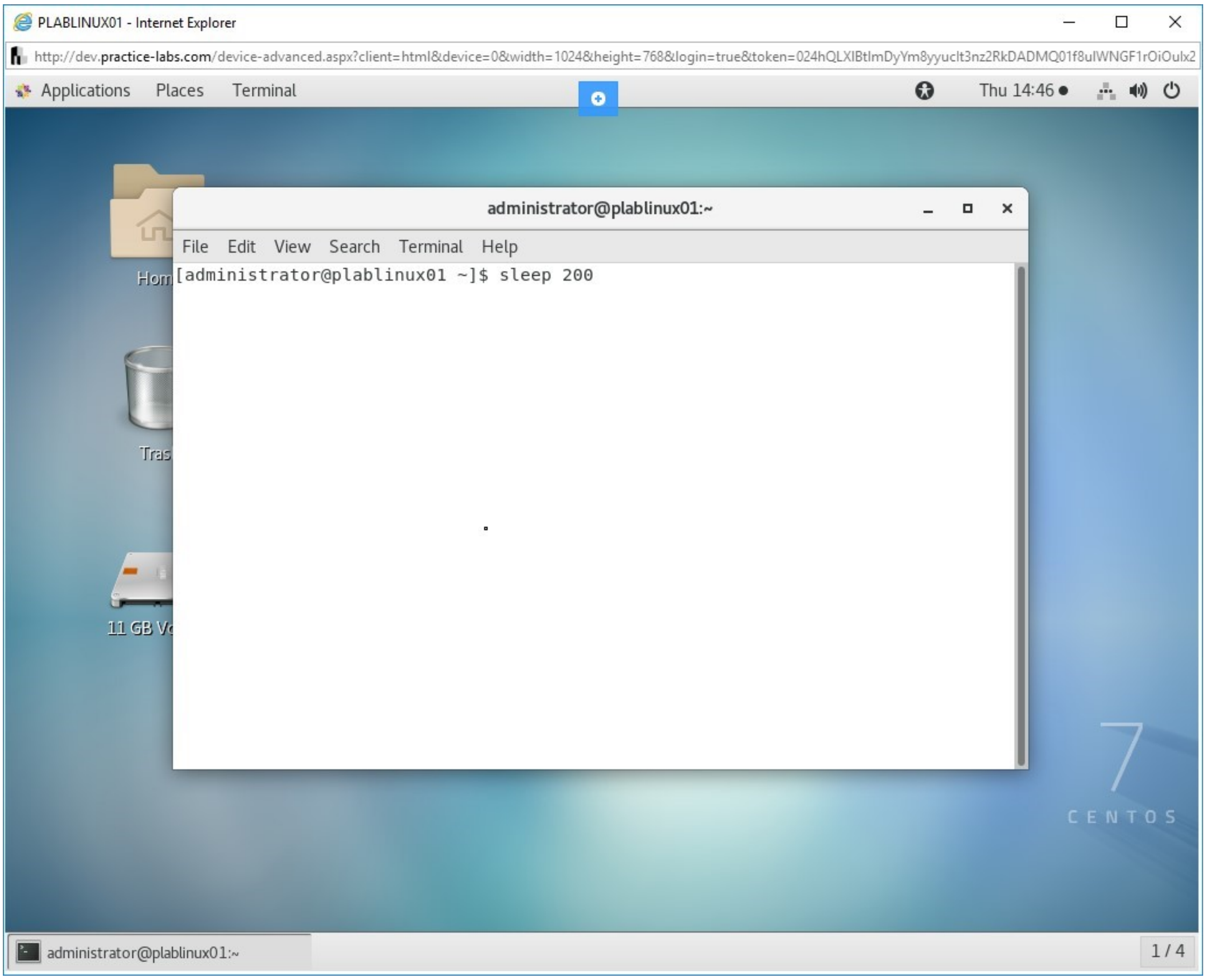
To create a process, perform the following steps:

## *Step 1*

Let’s first create a foreground process. Type the following command:

```
sleep 200
```

Press **Enter**. Notice that a new process is created. The sleep command takes control of the terminal and runs in the foreground. You can get the control on the terminal back by pressing Ctrl + c.



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administrator@plablinux01:~
1 / 4

```
[administrator@plablinux01 ~]$ sleep 200
```

Figure 1.6 Screenshot of PLABLINUX01: Creating a foreground process.

## Step 2

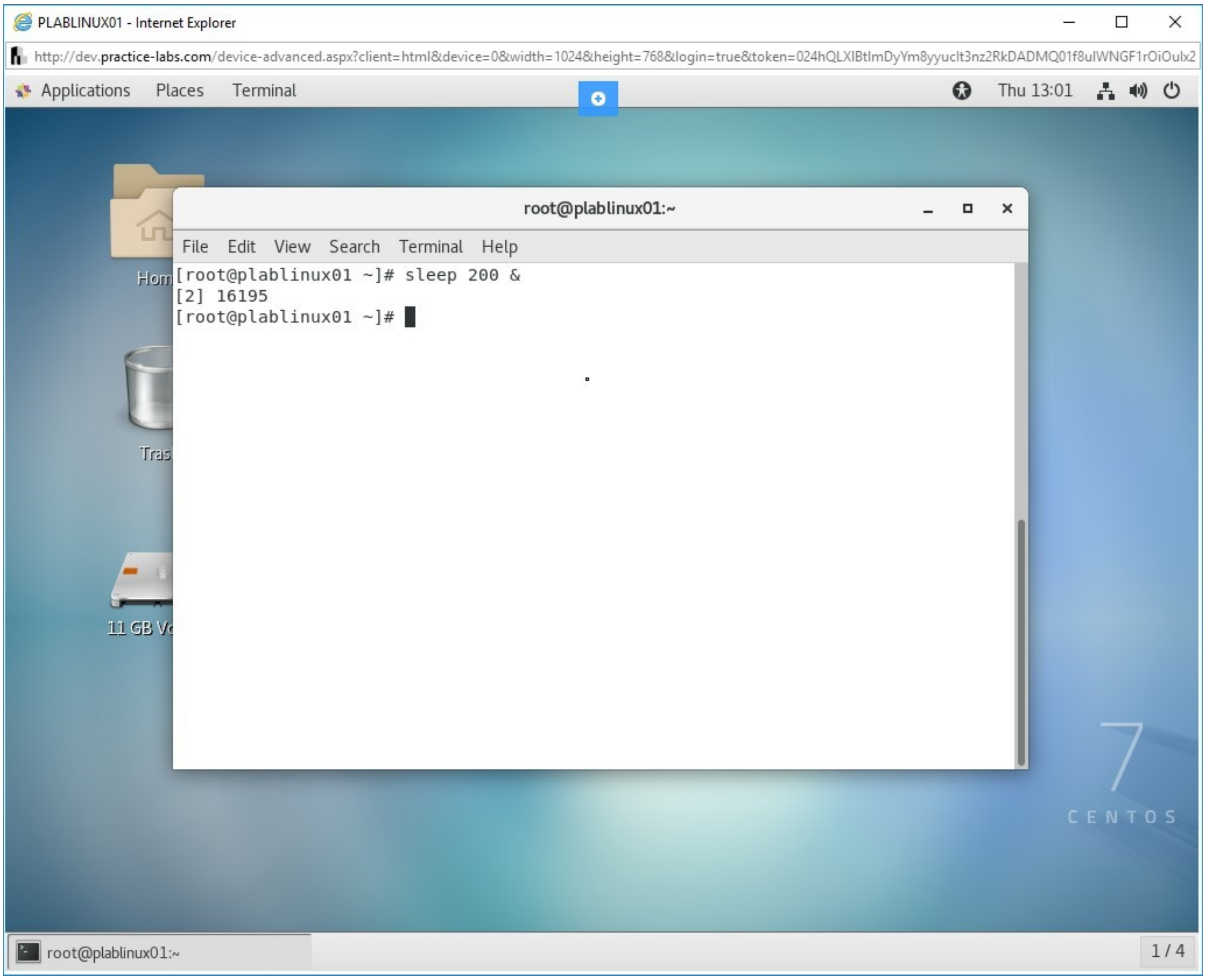
Clear the screen by entering the following command:

```
clear
```

Now, let’s create a background process. Type the following command:

```
sleep 200 &
```

Press **Enter**. Notice that the terminal is freed up immediately. A process ID is displayed, and now the process is running in the background.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1 / 4

```
[root@plablinux01 ~]# sleep 200 &
[2] 16195
[root@plablinux01 ~]# 
```

Figure 1.7 Screenshot of PLABLINUX01: Creating a background process.

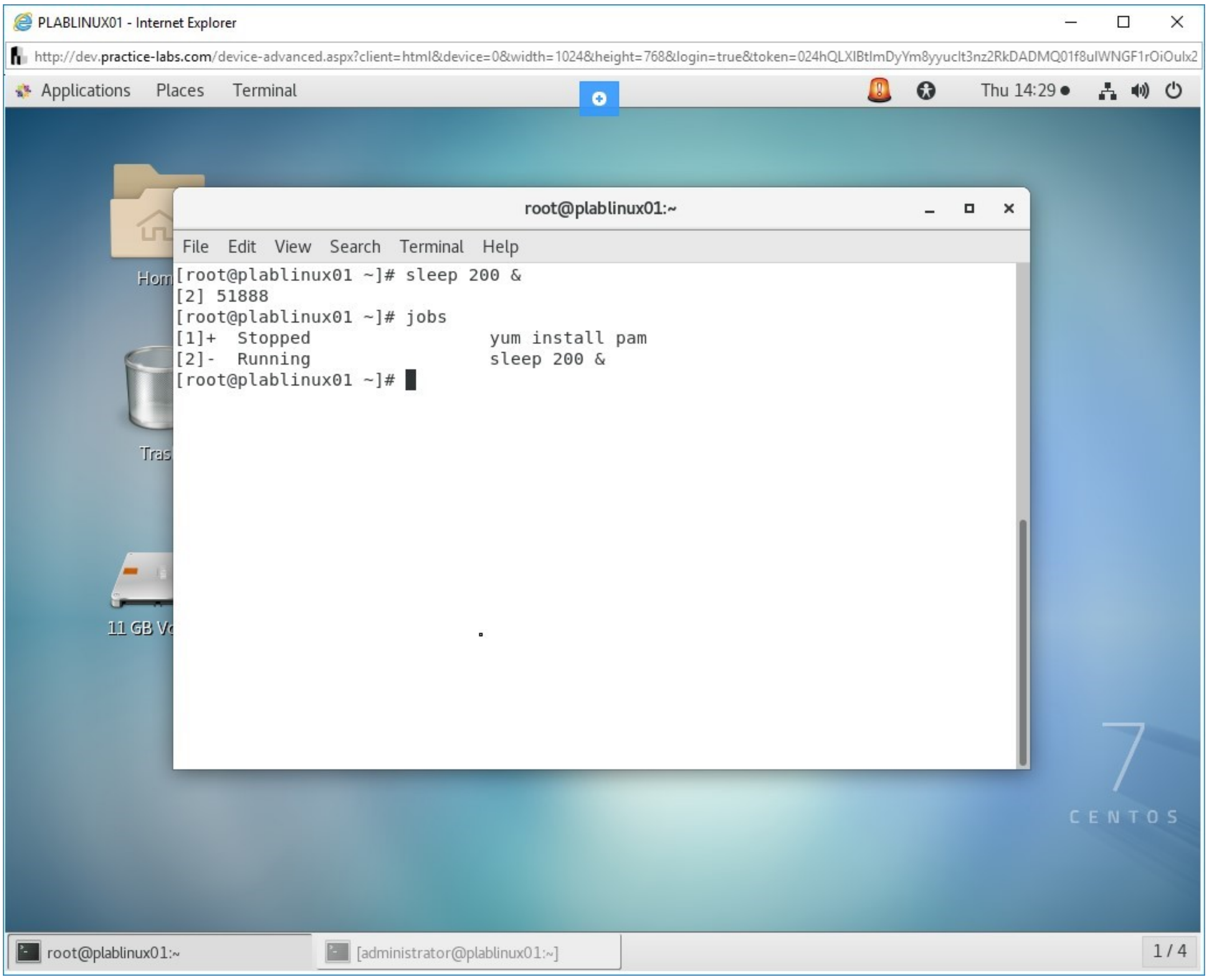
## Step 3

To verify the processes are running in the background, type the following command:

```
jobs
```

Press **Enter**. Notice that you get to see the processes that are running in the background.

***Note:*** *The output of this command may differ in your lab environment.*



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Applications
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Terminal
Thu 14:29 ●
root@plablinux01:~
File
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root@plablinux01:~
[administrator@plablinux01:~]
1 / 4

```
[root@plablinux01 ~]# sleep 200 &
[2] 51888
[root@plablinux01 ~]# jobs
[1]+  Stopped                 yum install pam
[2]-  Running                 sleep 200 &
[root@plablinux01 ~]# 
```

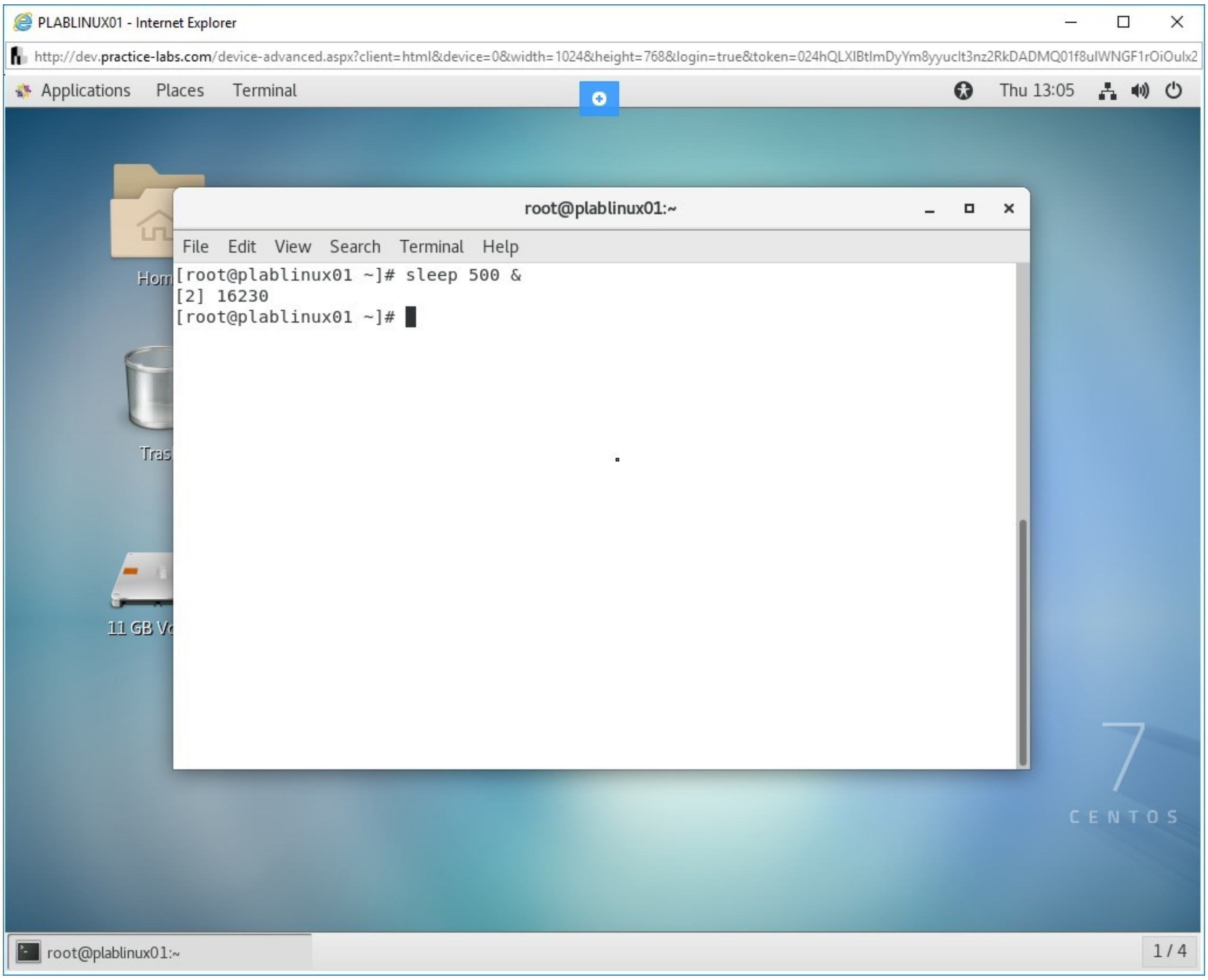
Figure 1.8 Screenshot of PLABLINUX01: Showing the running background processes

## Step 4

You can add multiple background processes. Type the following command:

```
sleep 500 &
```

Press **Enter**. Notice that a new process ID has been created.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CENTOS
root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# sleep 500 &
[2] 16230
[root@plablinux01 ~]# 
```

Figure 1.9 Screenshot of PLABLINUX01: Creating another background process.

## Step 5

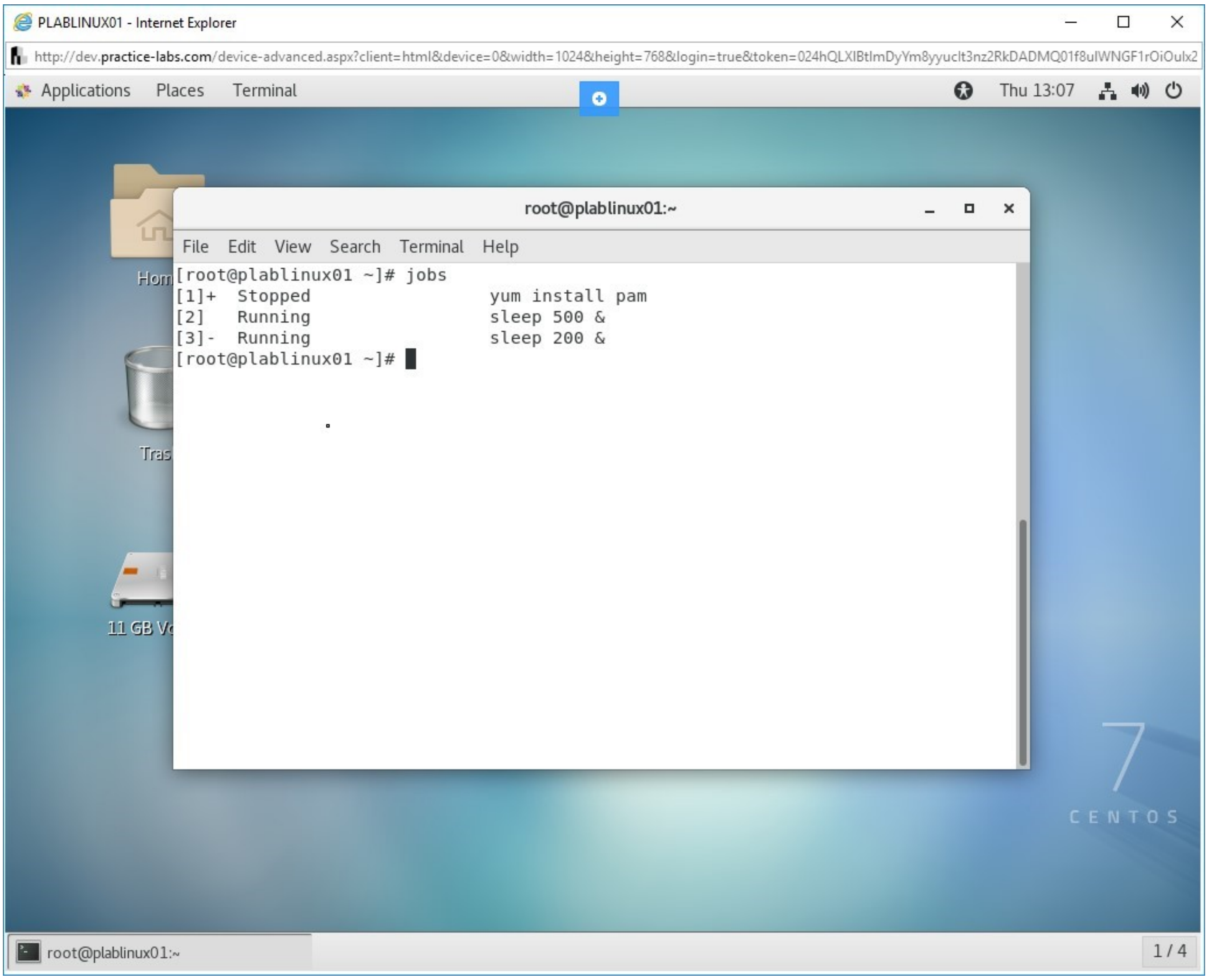
Clear the screen by entering the following command:

```
clear
```

You should verify if both the sleep processes are running in the background. Type the following command:

```
jobs
```

Press **Enter**.



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root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# jobs
[1]+  Stopped                 yum install pam
[2]   Running                 sleep 500 &
[3]-  Running                 sleep 200 &
[root@plablinux01 ~]#
```

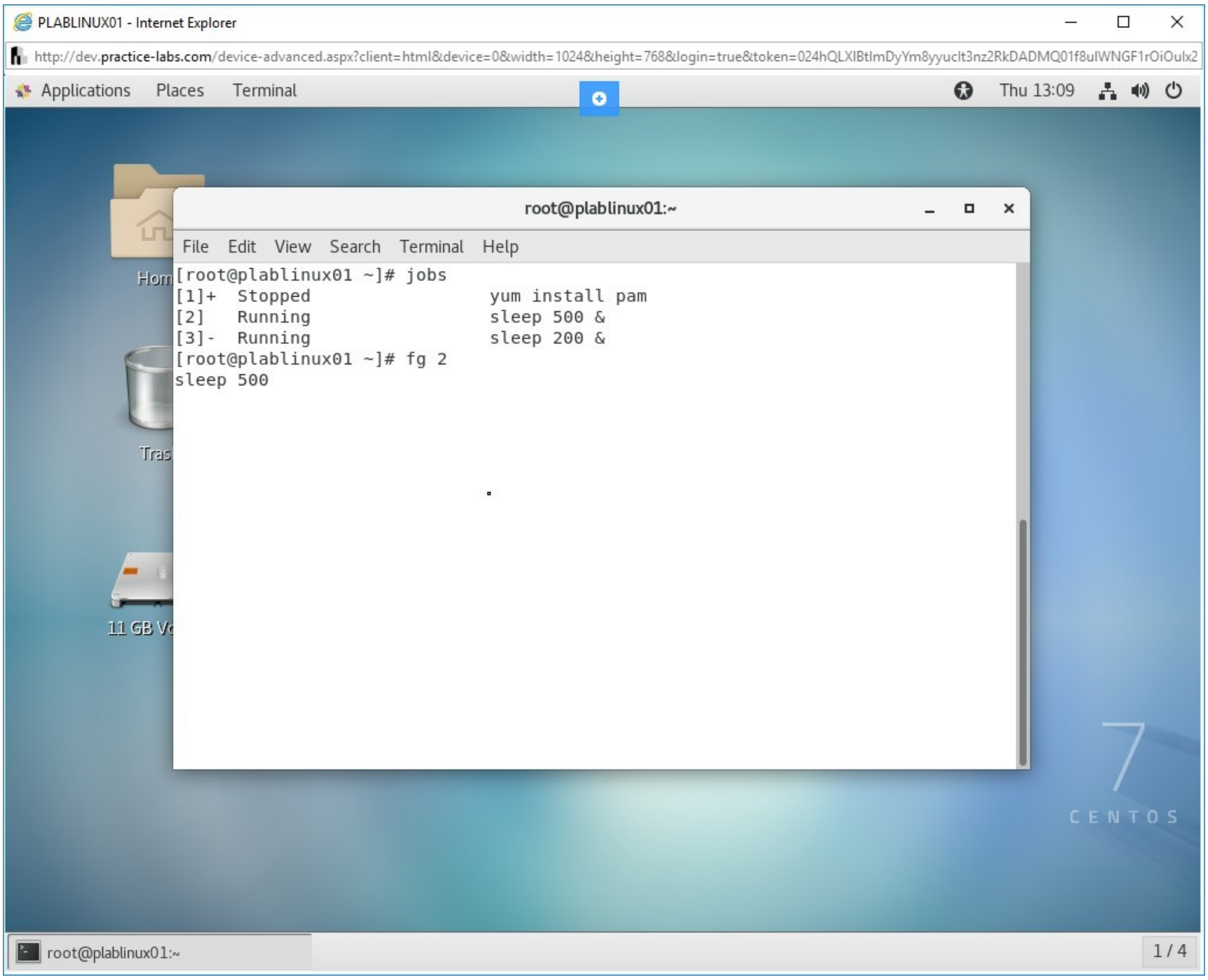
Figure 1.10 Screenshot of PLABLINUX01: Displaying the background processes.

## *Step 6*

You can also bring a process to the foreground from the background. Type the following command:

```
fg 2
```

Press **Enter**. Notice that the number denotes the process number that is displayed when you run the **jobs** command. The moment process comes to the foreground, the terminal is controlled by the process. You will not be able to perform any task until either the process is complete, or you kill it by **Ctrl** + **c**. Press **Ctrl** + **c** to break the process.



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root@plablinux01:~
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```
[root@plablinux01 ~]# jobs
[1]+  Stopped                 yum install pam
[2]   Running                 sleep 500 &
[3]-  Running                 sleep 200 &
[root@plablinux01 ~]# fg 2
sleep 500
```

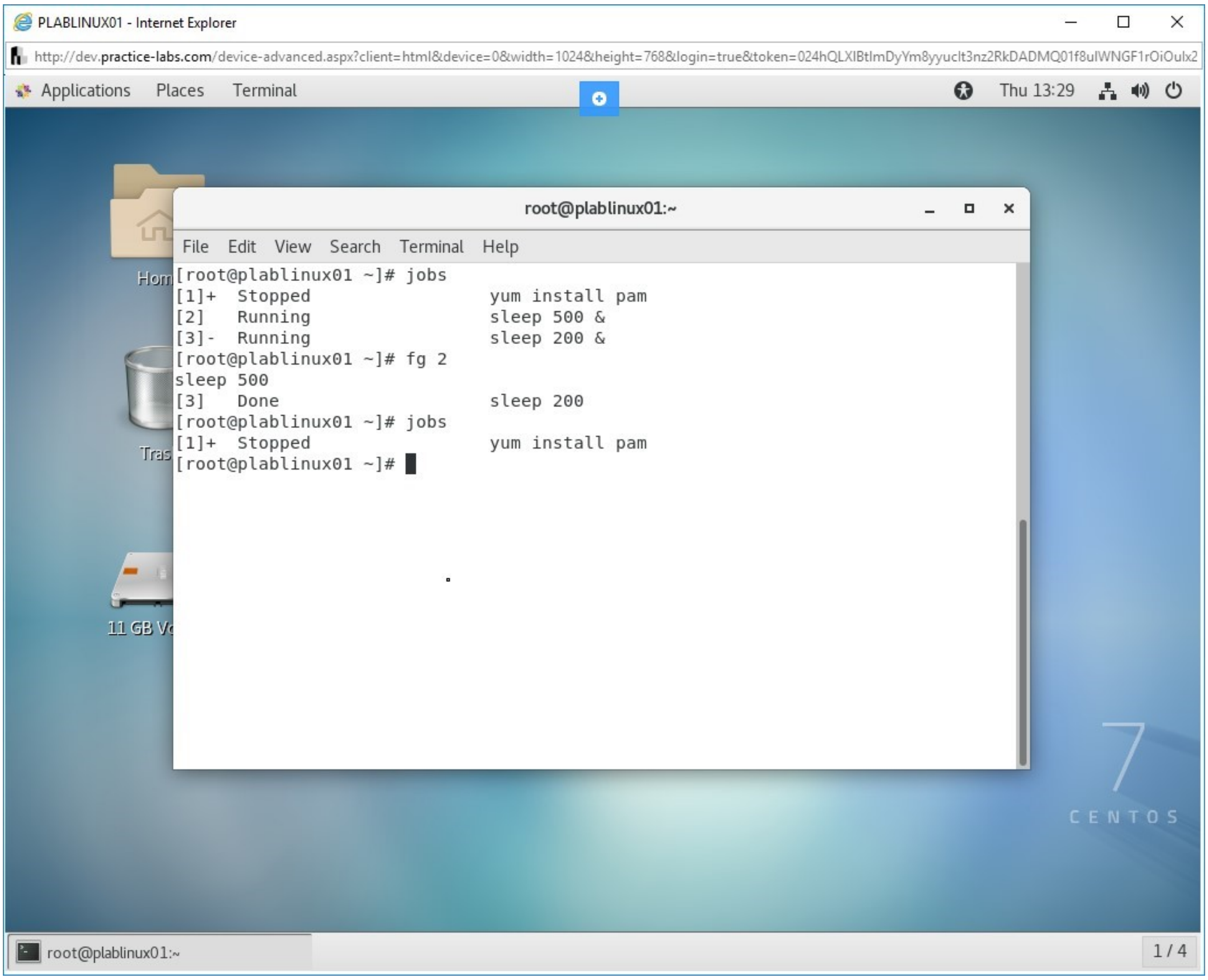
Figure 1.11 Screenshot of PLABLINUX01: Bringing a process in the foreground.

## Step 7

Wait for about 6-8 minutes. Type the following command:

```
jobs
```

Press **Enter**. Notice that the sleep process is no longer visible. After its timer got over, the process was killed automatically even in the background.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Help
CENTOS
root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# jobs
[1]+  Stopped                 yum install pam
[2]   Running                 sleep 500 &
[3]-  Running                 sleep 200 &
[root@plablinux01 ~]# fg 2
sleep 500
[3]   Done                    sleep 200
[root@plablinux01 ~]# jobs
[1]+  Stopped                 yum install pam
[root@plablinux01 ~]# 
```

Figure 1.12 Screenshot of PLABLINUX01: Displaying the background processes.

## Task 3 - Monitor and Manage Processes

Several processes run in a Linux system. Some of them are started by default when the system boots up, and some are started when applications start or commands are executed. You can use commands like top and ps. You can also use the ps aux command, which is being covered in this task.

To monitor, perform the following steps:

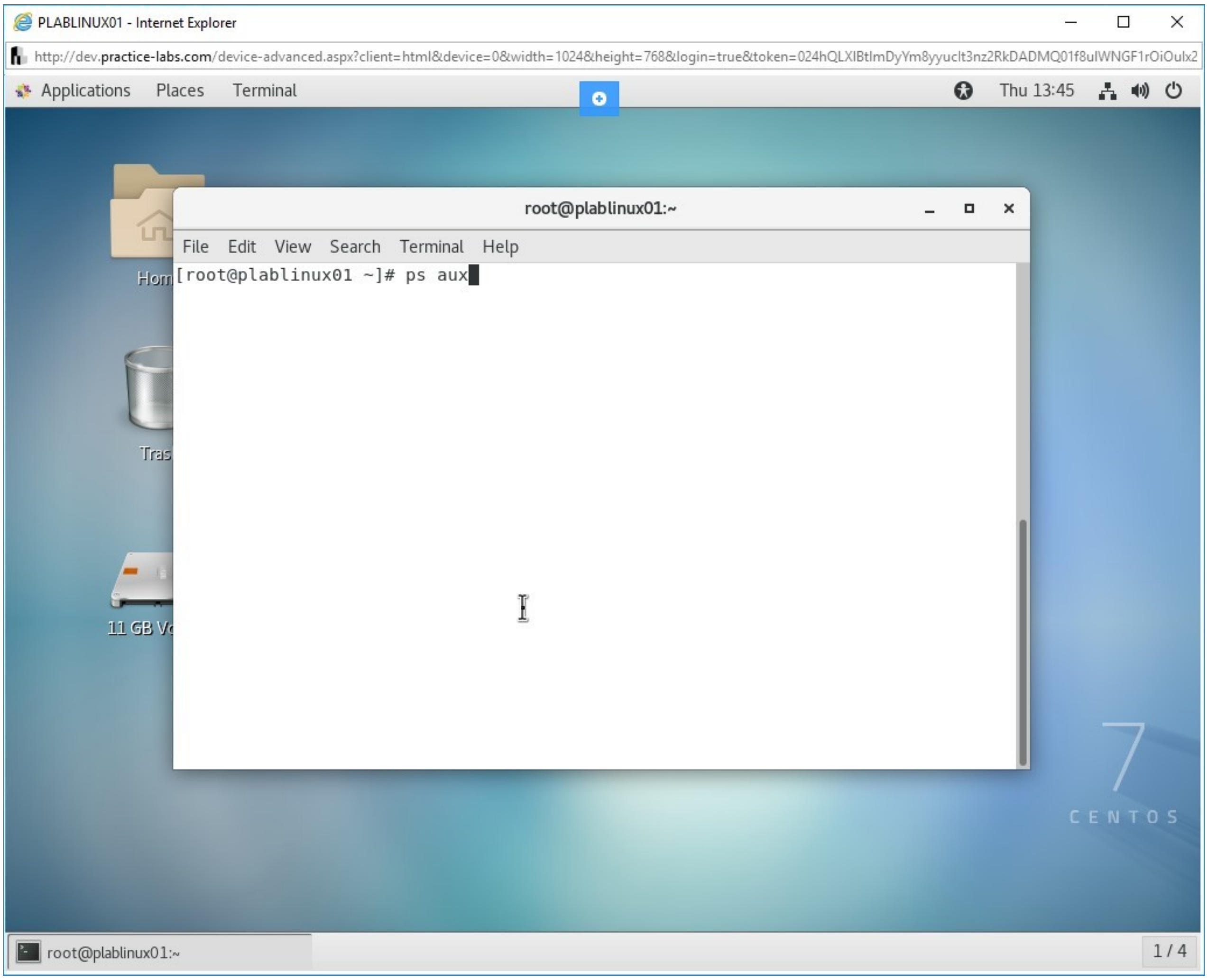
## *Step 1*

Let’s view all the processes that are running. Type the following command:

```
ps aux
```

Press **Enter**. The aux parameters are as follows:

- -a: Lists all running processes
- -u: Lists the user who is running the process
- -x: Lists all running processes even if they are not part of the current terminal session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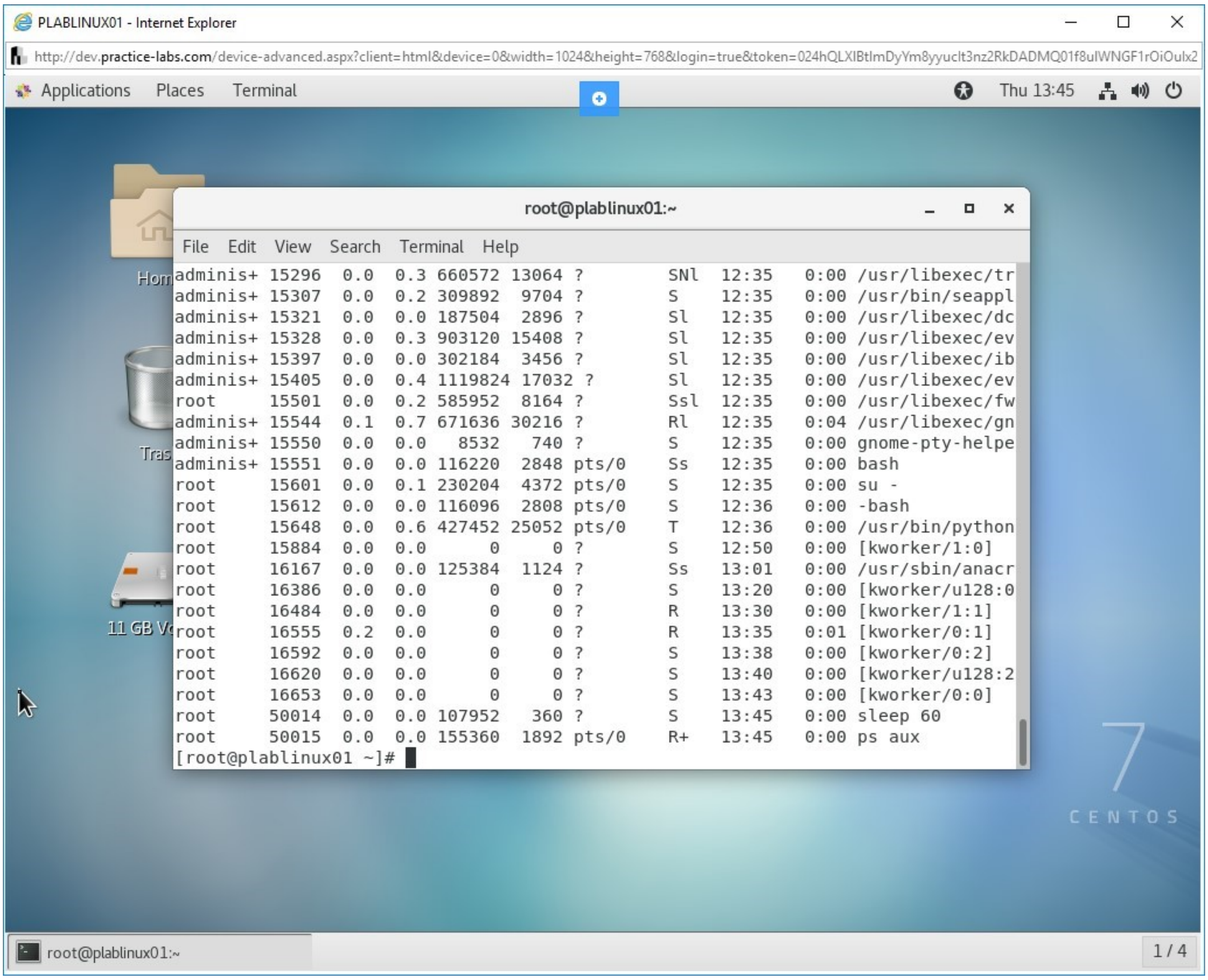
root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# ps aux
```

Figure 1.13 Screenshot of PLABLINUX01: Viewing all the processes that are running.

## Step 2

The output of the command is displayed.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root@plablinux01:~
File
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View
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Terminal
Help
root@plablinux01:~
1 / 4

```
adminis+ 15296  0.0  0.3 660572 13064 ?        SNl  12:35   0:00 /usr/libexec/tr
adminis+ 15307  0.0  0.2 309892  9704 ?        S    12:35   0:00 /usr/bin/seappl
adminis+ 15321  0.0  0.0 187504  2896 ?        Sl   12:35   0:00 /usr/libexec/dc
adminis+ 15328  0.0  0.3 903120 15408 ?        Sl   12:35   0:00 /usr/libexec/ev
adminis+ 15397  0.0  0.0 302184  3456 ?        Sl   12:35   0:00 /usr/libexec/ib
adminis+ 15405  0.0  0.4 1119824 17032 ?       Sl   12:35   0:00 /usr/libexec/ev
root     15501  0.0  0.2 585952  8164 ?        Ssl  12:35   0:00 /usr/libexec/fw
adminis+ 15544  0.1  0.7 671636 30216 ?        Rl   12:35   0:04 /usr/libexec/gn
adminis+ 15550  0.0  0.0   8532   740 ?        S    12:35   0:00 gnome-pty-helpe
adminis+ 15551  0.0  0.0 116220  2848 pts/0    Ss   12:35   0:00 bash
root     15601  0.0  0.1 230204  4372 pts/0    S    12:35   0:00 su -
root     15612  0.0  0.0 116096  2808 pts/0    S    12:36   0:00 -bash
root     15648  0.0  0.6 427452 25052 pts/0    T    12:36   0:00 /usr/bin/python
root     15884  0.0  0.0      0     0 ?        S    12:50   0:00 [kworker/1:0]
root     16167  0.0  0.0 125384  1124 ?        Ss   13:01   0:00 /usr/sbin/anacr
root     16386  0.0  0.0      0     0 ?        S    13:20   0:00 [kworker/u128:0
root     16484  0.0  0.0      0     0 ?        R    13:30   0:00 [kworker/1:1]
root     16555  0.2  0.0      0     0 ?        R    13:35   0:01 [kworker/0:1]
root     16592  0.0  0.0      0     0 ?        S    13:38   0:00 [kworker/0:2]
root     16620  0.0  0.0      0     0 ?        S    13:40   0:00 [kworker/u128:2
root     16653  0.0  0.0      0     0 ?        S    13:43   0:00 [kworker/0:0]
root     50014  0.0  0.0 107952   360 ?        S    13:45   0:00 sleep 60
root     50015  0.0  0.0 155360  1892 pts/0    R+   13:45   0:00 ps aux
[root@plablinux01 ~]#
```

Figure 1.14 Screenshot of PLABLINUX01: Displaying all the processes that are running.

## *Step 3*

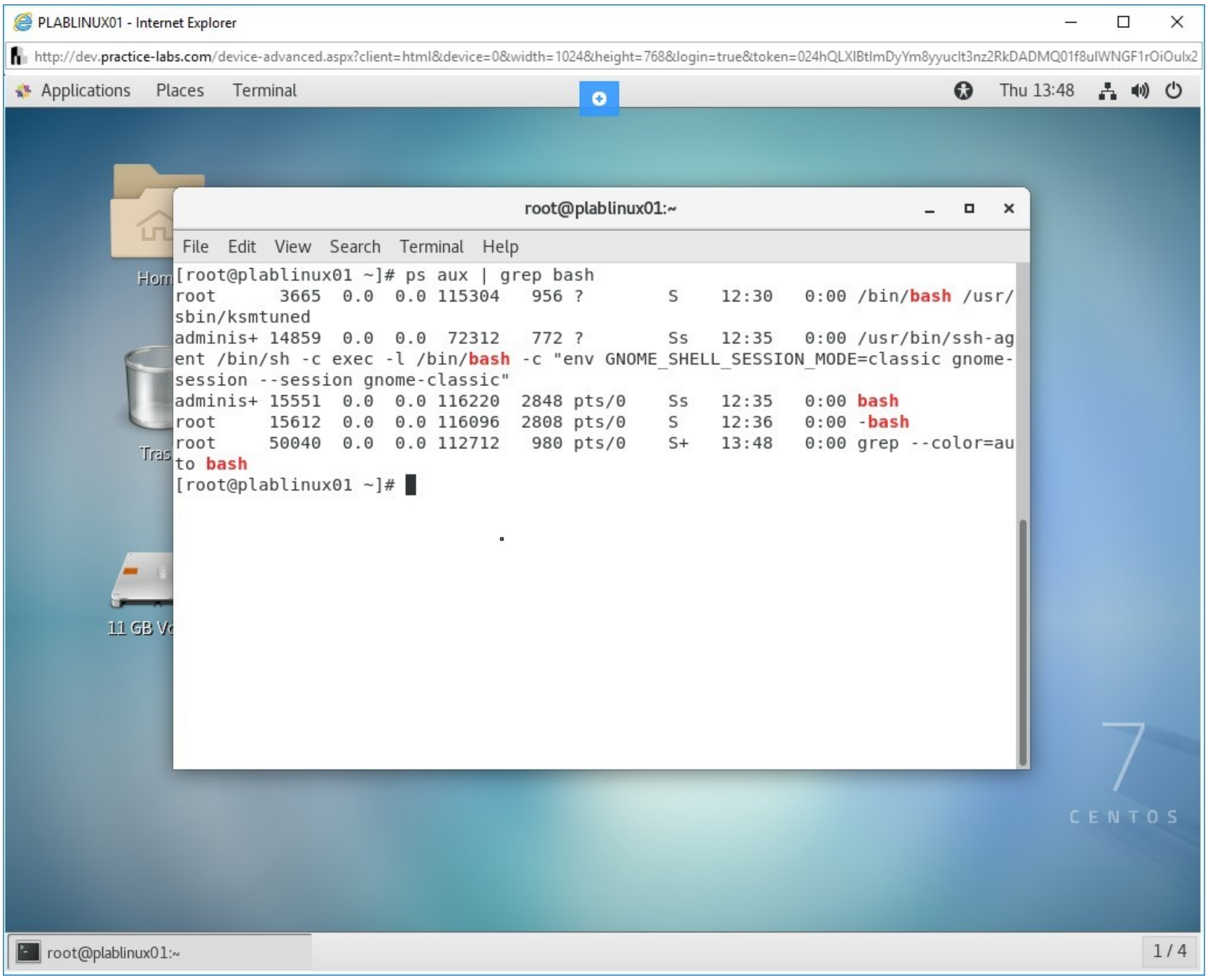
Clear the screen by entering the following command:

```
clear
```

You can use the **ps aux** command along with the **grep** command to list a specific process. Type the following command:

```
ps aux | grep bash
```

Press **Enter**. Minimize the terminal window.



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http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=024hQLXIBtlmDyYm8yyuclt3nz2RkDADMQ01f8ulWNGF1rOiOulx2
Applications
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Terminal
Thu 13:48
root@plablinux01:~
File
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Help
root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# ps aux | grep bash
root      3665  0.0  0.0 115304   956 ?        S    12:30   0:00 /bin/bash /usr/
sbin/ksmtuned
adminis+ 14859  0.0  0.0  72312   772 ?        Ss   12:35   0:00 /usr/bin/ssh-ag
ent /bin/sh -c exec -l /bin/bash -c "env GNOME_SHELL_SESSION_MODE=classic gnome-
session --session gnome-classic"
adminis+ 15551  0.0  0.0 116220  2848 pts/0    Ss   12:35   0:00 bash
root     15612  0.0  0.0 116096  2808 pts/0    S    12:36   0:00 -bash
root     50040  0.0  0.0 112712   980 pts/0    S+   13:48   0:00 grep --color=au
to bash
[root@plablinux01 ~]#
```

Figure 1.15 Screenshot of PLABLINUX01: Using the ps aux command along with the grep command to list a specific process.

## Step 4

Click **Applications** and then select **Firefox**.

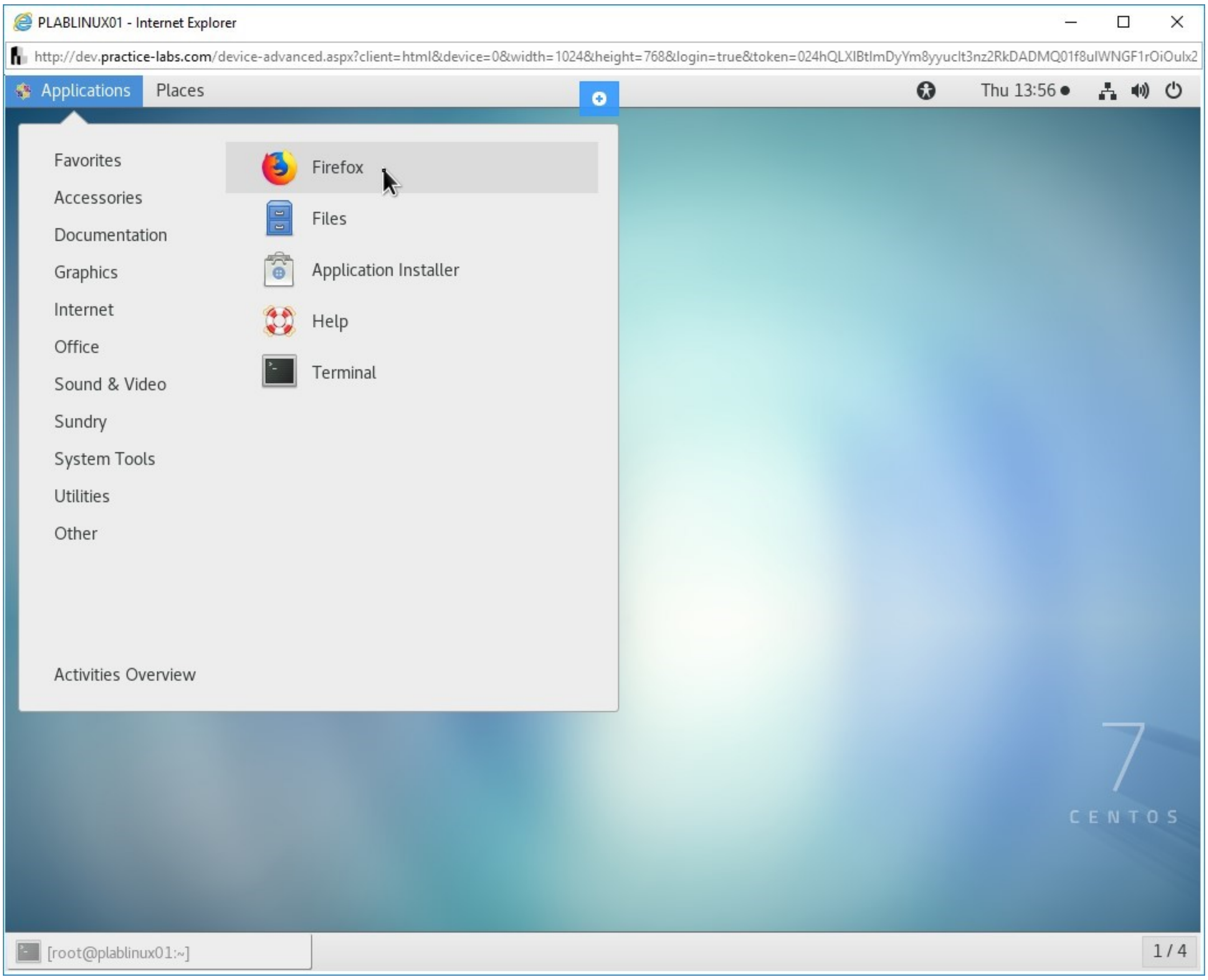
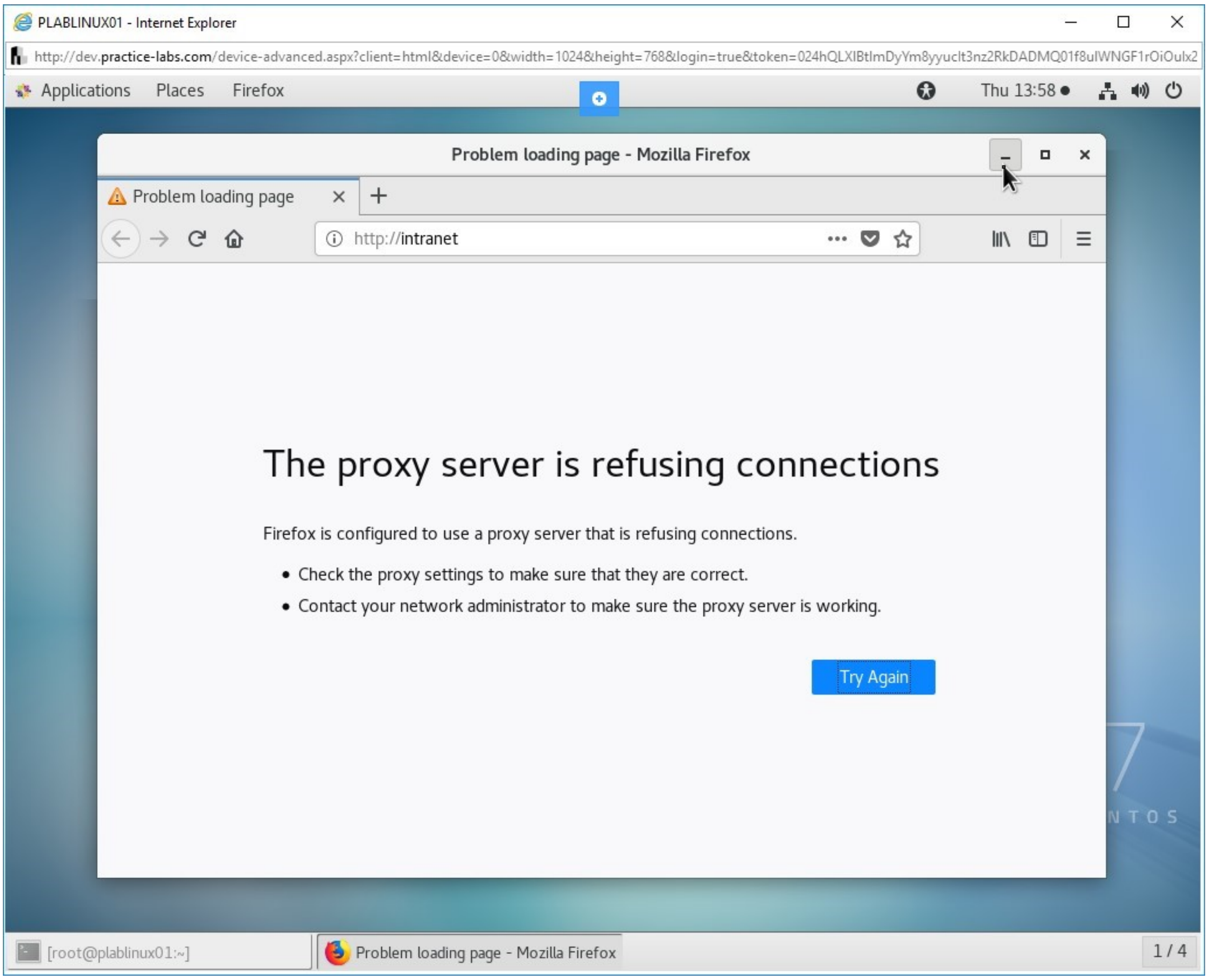


Figure 1.16 Screenshot of PLABLINUX01: Starting Firefox from the Applications menu.

## Step 5

After Firefox window is displayed, minimize it.


PLABLINUX01 - Internet Explorer
http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=024hQLXIBtlmDyYm8yyuclt3nz2RkDADMQ01f8uIWNGF1rOiOulx2
Applications
Places
Firefox
Thu 13:58 ●
Problem loading page - Mozilla Firefox
Problem loading page
http://intranet
Try Again
[root@plablinux01:~]
Problem loading page - Mozilla Firefox
1 / 4

The proxy server is refusing connections

Firefox is configured to use a proxy server that is refusing connections.

- Check the proxy settings to make sure that they are correct.
- Contact your network administrator to make sure the proxy server is working.

Figure 1.17 Screenshot of PLABLINUX01: Minimizing the Firefox window.

## Step 6

Restore the terminal window.

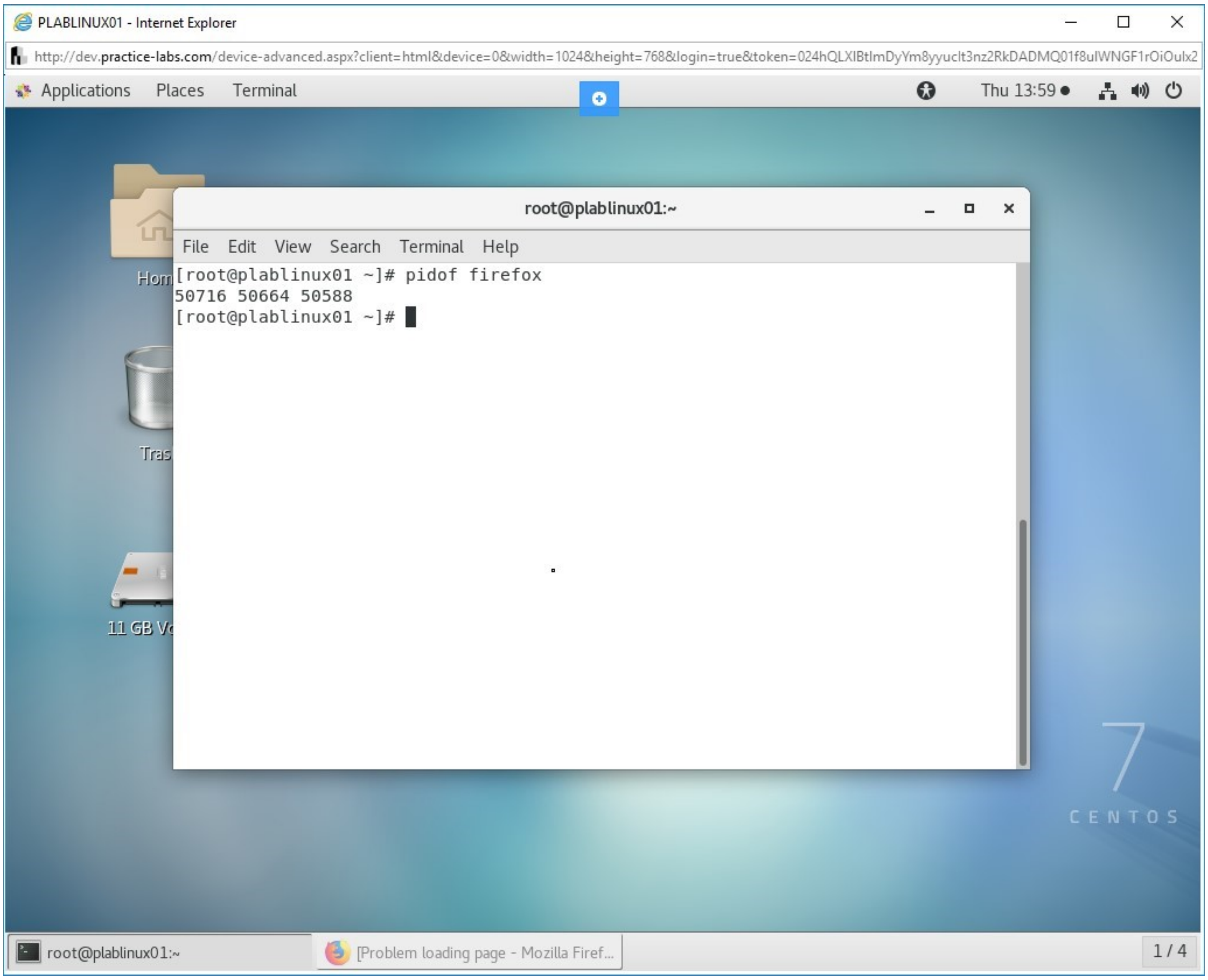
Clear the screen by entering the following command:

```
clear
```

You need to display the process ID of firefox. Type the following command:

```
pidof firefox
```

Press **Enter**.



```
[root@plablinux01 ~]# pidof firefox
50716 50664 50588
[root@plablinux01 ~]#
```

PLABLINUX01 - Internet Explorer
http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=024hQLXIBtlmDyYm8yyuclt3nz2RkDADMQ01f8ulWNGF1rOiOulx2
Applications
Places
Terminal
Thu 13:59 ●
root@plablinux01:~
File
Edit
View
Search
Terminal
Help
7
CENTOS
root@plablinux01:~
[Problem loading page - Mozilla Firef...
1 / 4

Figure 1.18 Screenshot of PLABLINUX01: Displaying the process ID of firefox.

## Step 7

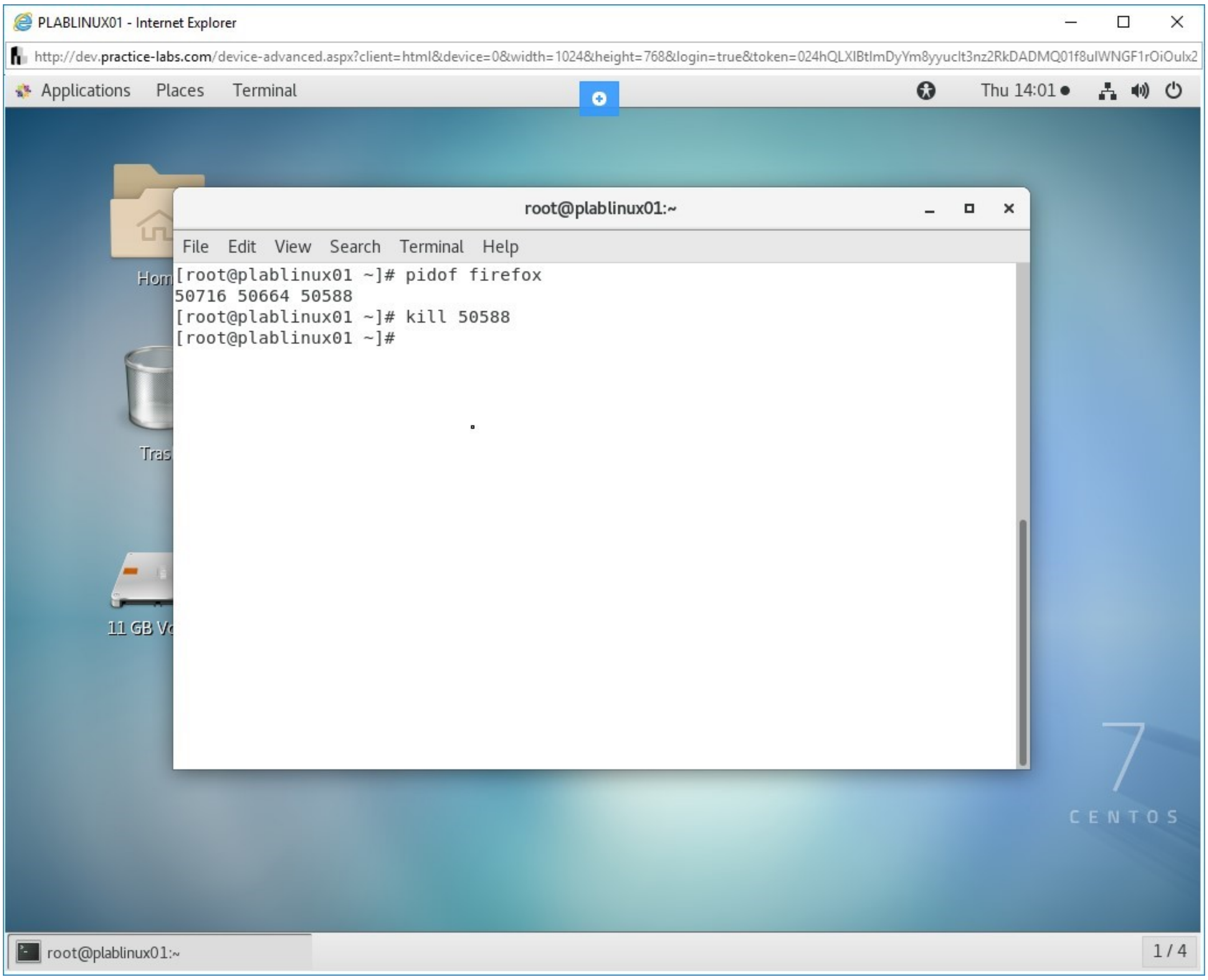
You can simply kill a process with its process id.

Type the following command:

```
kill 50588
```

Press **Enter**.

> ***Note:*** *The process IDs will differ in your lab environment.*



PLABLINUX01 - Internet Explorer
http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=024hQLXIBtlmDyYm8yyuclt3nz2RkDADMQ01f8ulWNGF1rOiOulx2
Applications
Places
Terminal
Thu 14:01 ●
root@plablinux01:~
File
Edit
View
Search
Terminal
Help
Home
Trash
11 GB Vo
7
CENTOS
root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# pidof firefox
50716 50664 50588
[root@plablinux01 ~]# kill 50588
[root@plablinux01 ~]#
```

Figure 1.19 Screenshot of PLABLINUX01: Killing the firefox process.

## *Step 8*

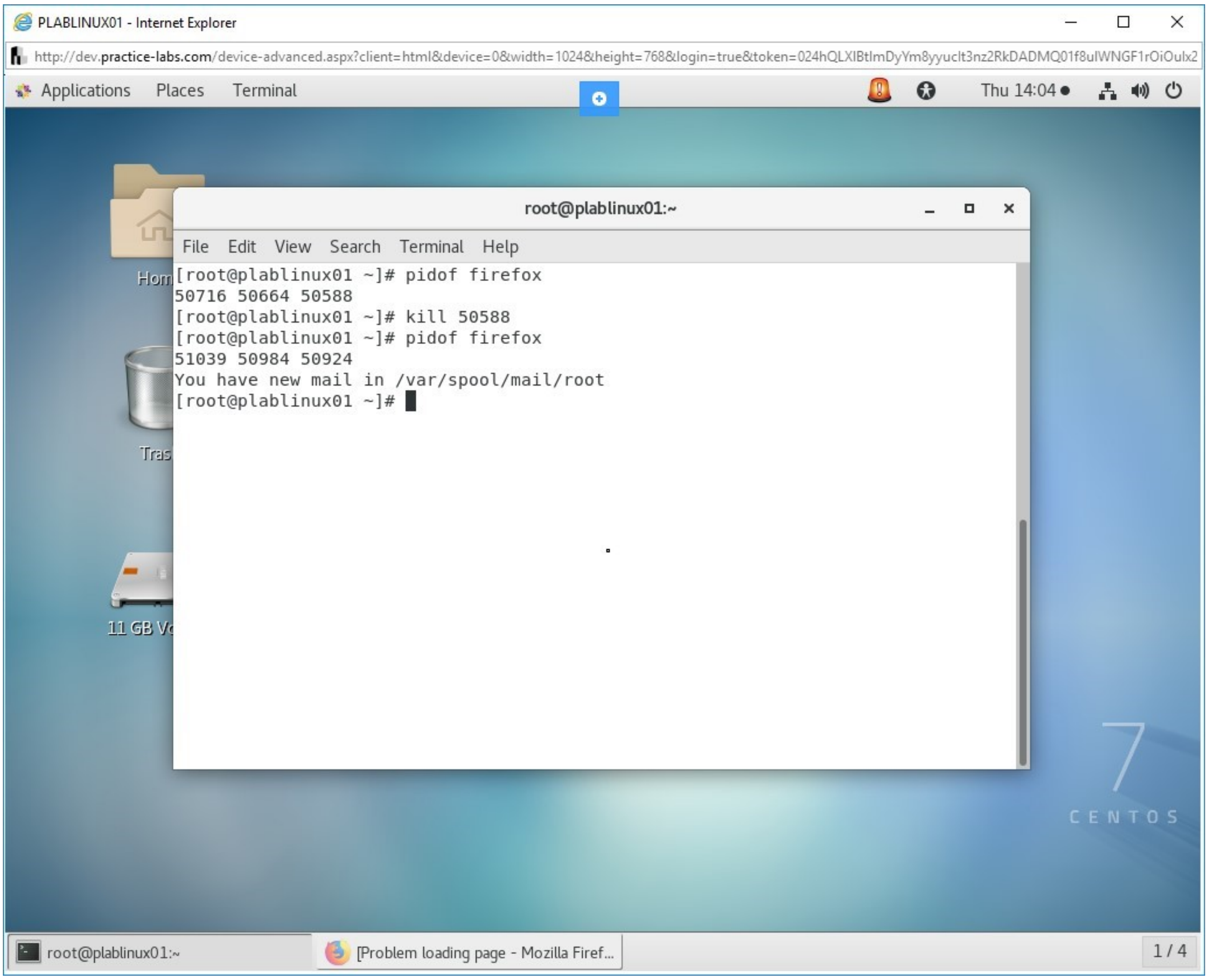
Start Firefox again and then minimize it.

Rather than using kill, you can send a termination signal, which will immediately terminate the process. First, you need to find its process ID.

Type the following command:

```
pidof firefox
```

Press **Enter**.



```
[root@plablinux01 ~]# pidof firefox
50716 50664 50588
[root@plablinux01 ~]# kill 50588
[root@plablinux01 ~]# pidof firefox
51039 50984 50924
You have new mail in /var/spool/mail/root
[root@plablinux01 ~]# 
```

PLABLINUX01 - Internet Explorer
http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=024hQLXIBtlmDyYm8yyuclt3nz2RkDADMQ01f8ulWNGF1rOiOulx2
Applications
Places
Terminal
Thu 14:04 ●
root@plablinux01:~
File
Edit
View
Search
Terminal
Help
root@plablinux01:~
[Problem loading page - Mozilla Firef...
1 / 4
7
CENTOS

Figure 1.20 Screenshot of PLABLINUX01: Displaying the process ID of firefox.

## Step 9

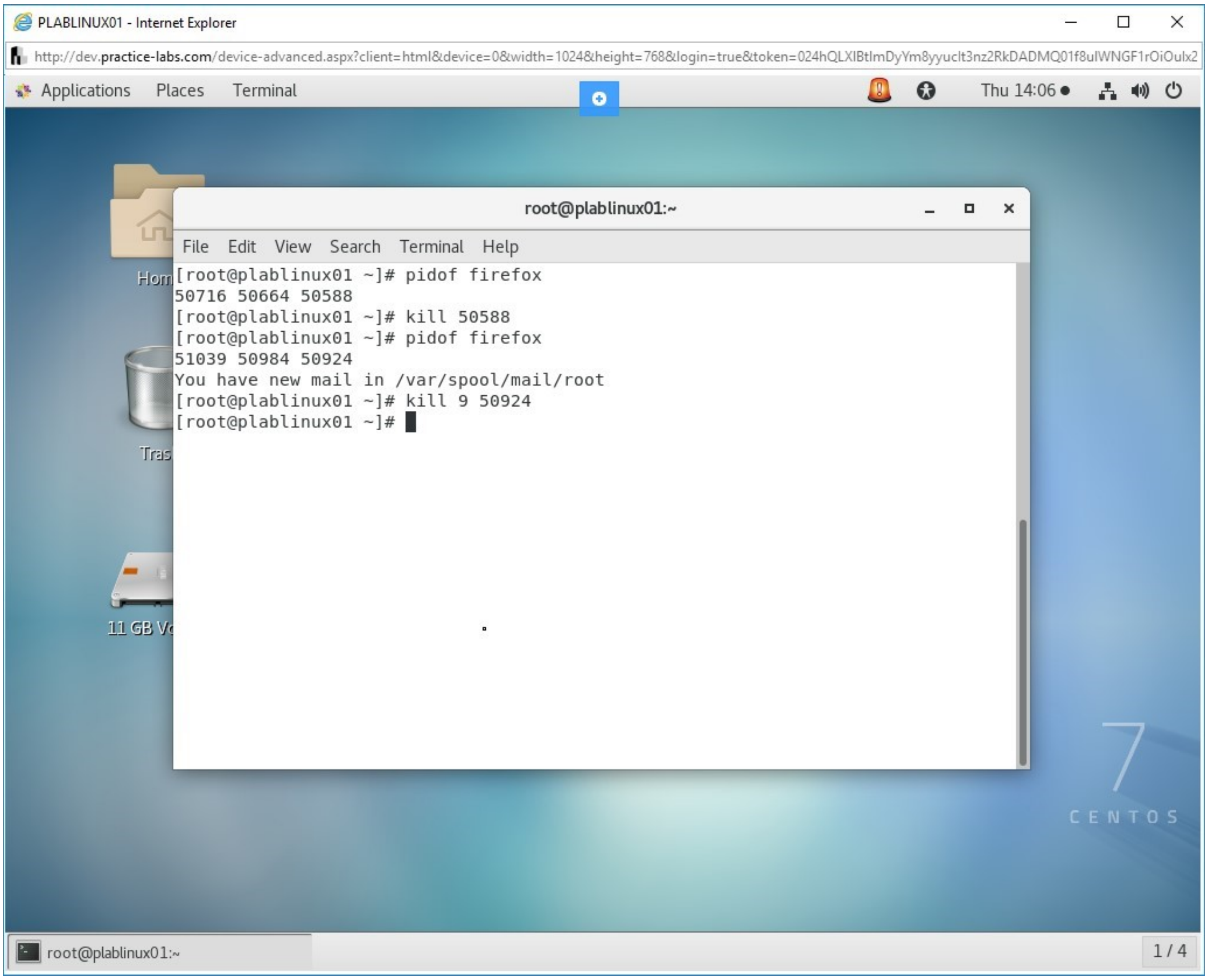
Start Firefox again and then minimize it.

Let’s send a kill signal to the firefox process ID

Type the following command:

```
kill 9 50924
```

Press **Enter**. Notice that Firefox is now terminated.



PLABLINUX01 - Internet Explorer
http://dev.practice-labs.com/device-advanced.aspx?client=html&device=0&width=1024&height=768&login=true&token=024hQLXIBtlmDyYm8yyuclt3nz2RkDADMQ01f8ulWNGF1rOiOulx2
Applications
Places
Terminal
Thu 14:06 ●
root@plablinux01:~
File
Edit
View
Search
Terminal
Help
root@plablinux01:~
1 / 4

```
[root@plablinux01 ~]# pidof firefox
50716 50664 50588
[root@plablinux01 ~]# kill 50588
[root@plablinux01 ~]# pidof firefox
51039 50984 50924
You have new mail in /var/spool/mail/root
[root@plablinux01 ~]# kill 9 50924
[root@plablinux01 ~]# 
```

Figure 1.21 Screenshot of PLABLINUX01: Killing the process ID of firefox.

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

# Review

Well done, you have completed the **Create, Monitor and Kill Processes** Practice Lab.

# Summary

You completed the following exercise:

- Exercise 1 - Create, Monitor and Kill Processes

You should now be able to:

- Redirect Output

- Redirect Input
- Discard the Output
- Use the tee Command

# Feedback

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