CompTIA Linux+

Maintain the Integrity of Filesystems

Introduction

Welcome to the **Maintain the Integrity of Filesystems** Practice Lab. In this module you will be provided with the instructions and devices needed to develop your hands-on skills.

Integrity
Filesystems
Linux System

Learning Outcomes

In this module, you will complete the following exercise:

- Exercise 1 - Maintain the Integrity of Filesystems

After completing this lab, you will be able to:

- Monitor free disk-space
- Verify the integrity of a filesystem
- Repair simple filesystem problems

Exam Objectives

The following exam objectives are covered in this lab:

- **LPI:** 110.1 Perform security administration tasks
- **CompTIA:** 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership.

> **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

PLABLINUX01
CentOS Server
192.168.0.2

PLABLINUX02
Ubuntu Server
192.168.0.3

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)

Exercise 1 - Maintain the Integrity of Filesystems

A Linux system stores everything in the form of a file. Everything includes data, drivers, and whatever other information on the system, which is not running as a process. These files are normally saved in a collapsible-tree structure. To maintain the integrity of the system, the system administrator ensures that the files are being saved as planned and that there are no unauthorized changes to the filesystem. Unauthorized changes can indicate a security compromise and might lead to data corruption.

In this exercise, you will understand how to maintain the integrity of filesystems.

Learning Outcomes

After completing this exercise, you will be able to:

- Log into a Linux System
- Monitor free disk-space
- Verify the integrity of a filesystem
- Repair simple filesystem problems

Your Devices

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

- **PLABLINUX02** (Ubuntu Server)

PLABLINUX02
Ubuntu Server
192.168.0.3

Task 1 - Monitor Free Space and Inode

Inode or the index node is an index to the filesystem. An inode indicates all the details about the files in the filesystem - file size, file type, access permissions, and many more. A system administrator can monitor inode to manage the filesystem integrity. Moreover, monitoring free disk space on the system enables the system administrators to plan file storage on the system. In this task, you will display in various formats the free disk space on the system. To monitor free space and inode, perform the following steps:

Step 1

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

> **Note:** *If you are prompted with the **Software Updater** dialog box, click **Remind Me Later**. This dialog box may occur before or after this step.*
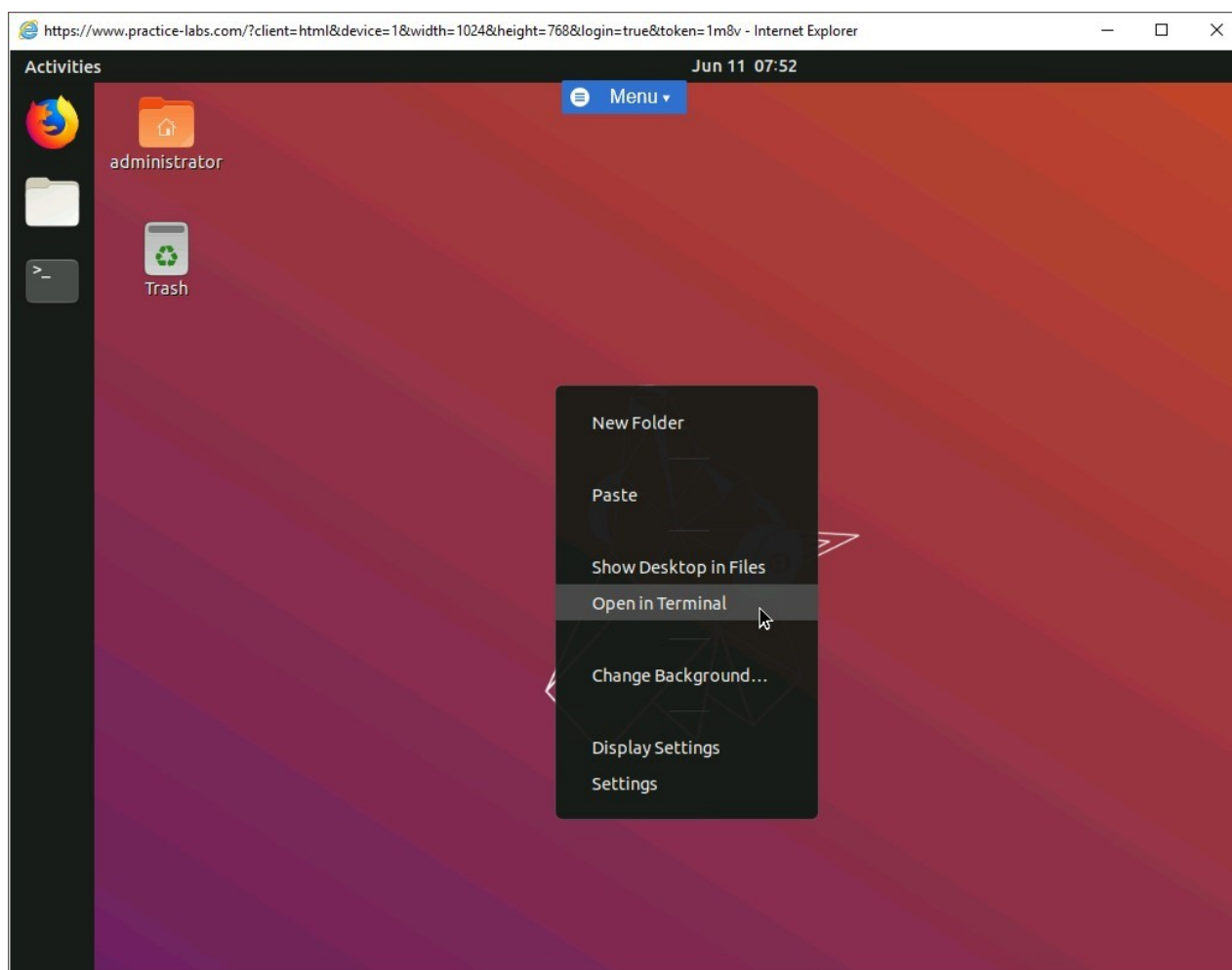
Figure 1.1 Screenshot of PLABLINUX02: Selecting the Open Terminal option from the context menu.
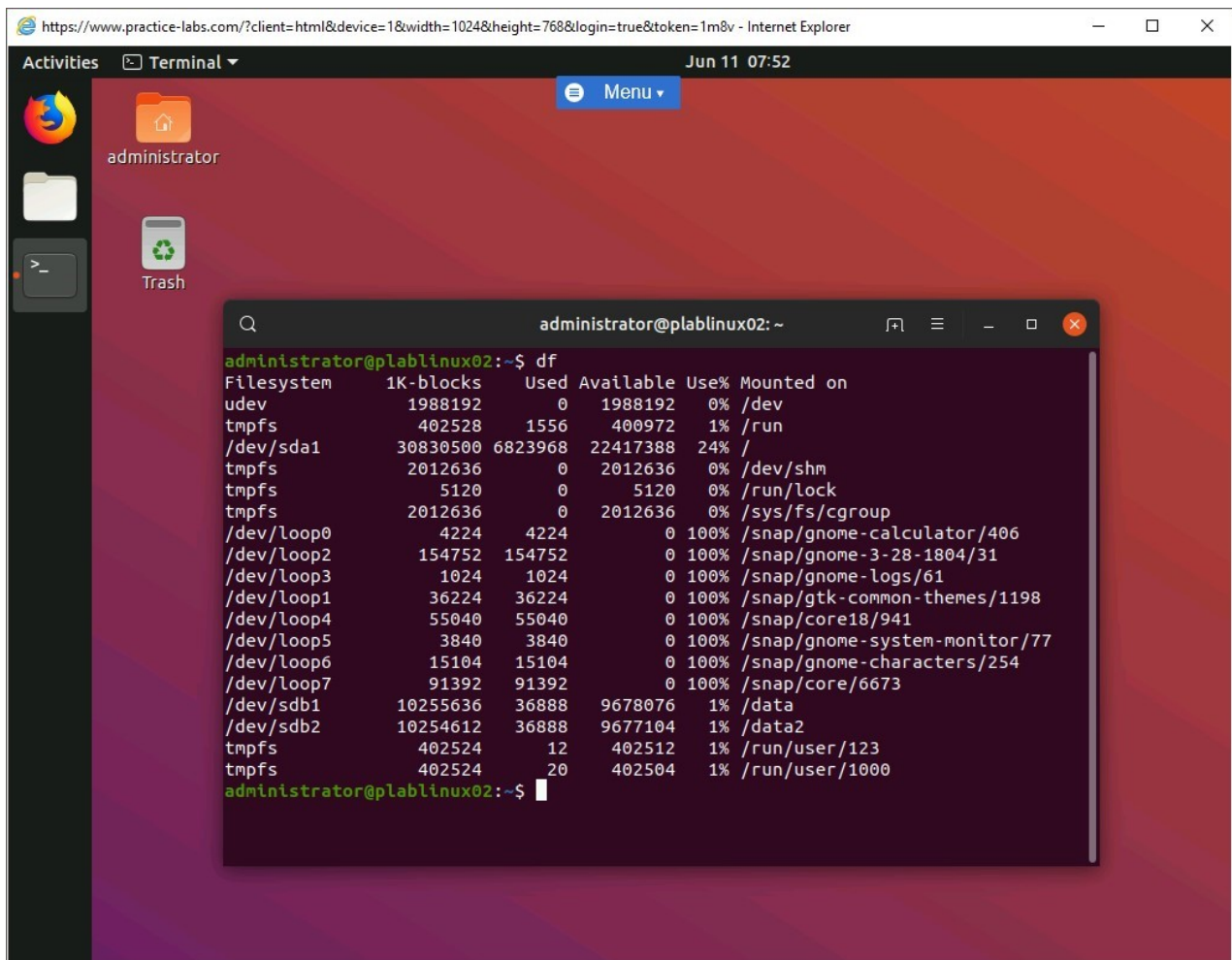
Step 2

The terminal window is displayed.

To monitor the free space and disk size in 1K blocks, type the following command:

```
df
```

Press **Enter**.

Figure 1.2 Screenshot of PLABLINUX02: Monitoring the free space and disk size in 1K blocks.

Step 3

To monitor the free space and disk size in **MBs**, type the following command:
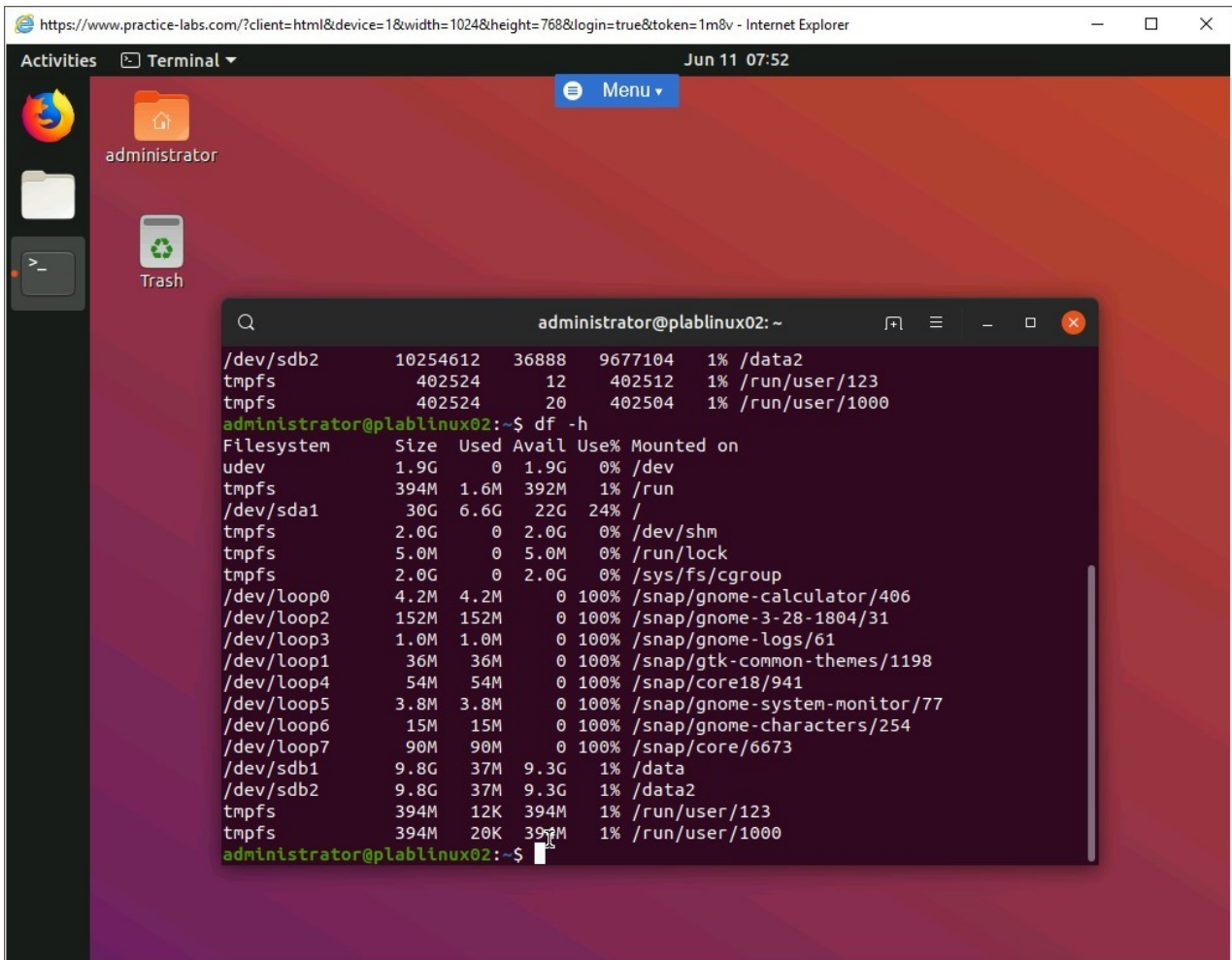
```
df -h
```

Press **Enter**.

Figure 1.3 Screenshot of PLABLINUX02: Monitoring the free space and disk size in MBs.

Step 4

Clear the screen by entering the following command:

```
clear
```

To display the information on the inodes, type the following command:
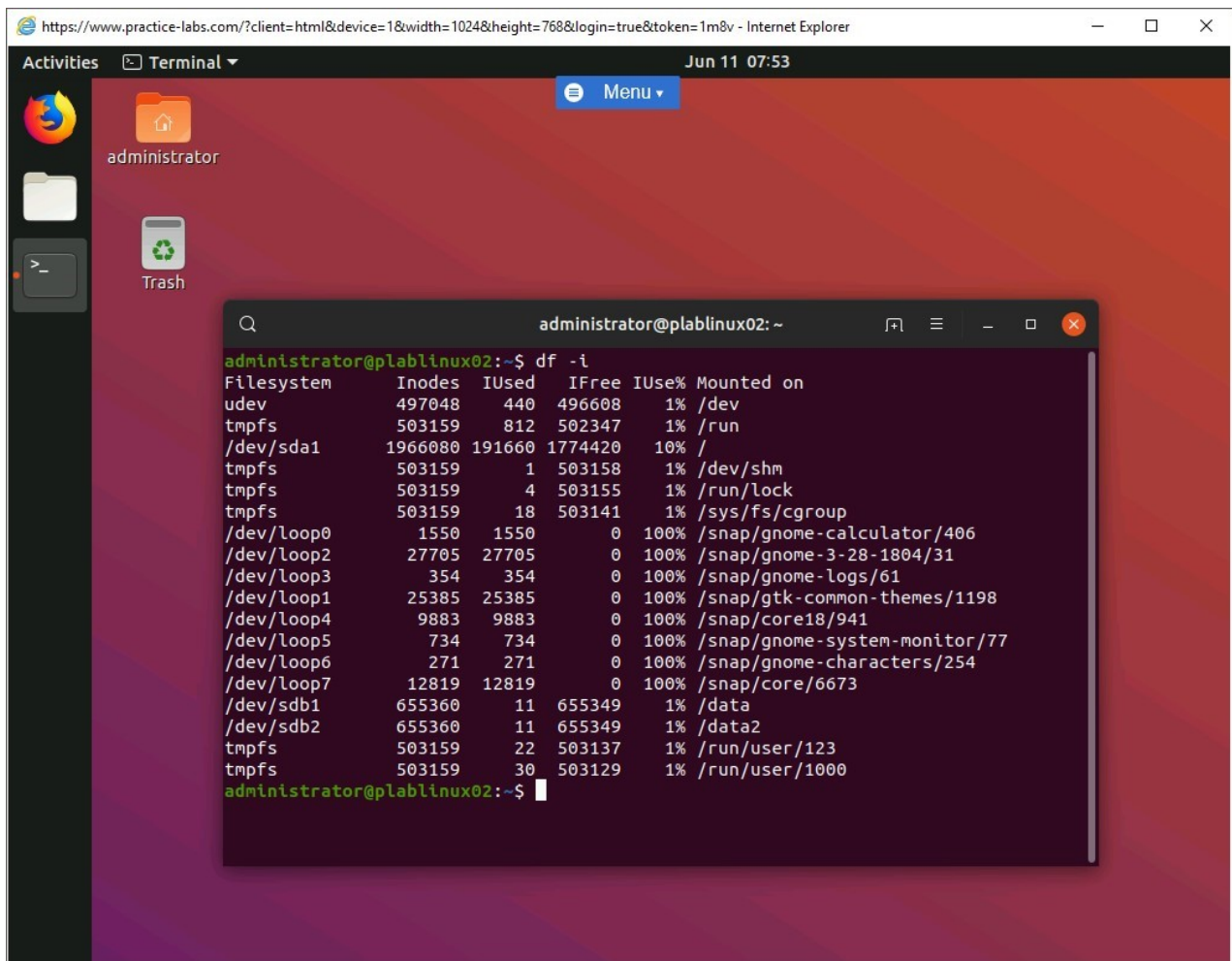
```
df -i
```

Press **Enter**.

Figure 1.4 Screenshot of PLABLINUX02: Displaying the information on the inodes.

Step 5

To determine the partition for the current working directory, type the following command:
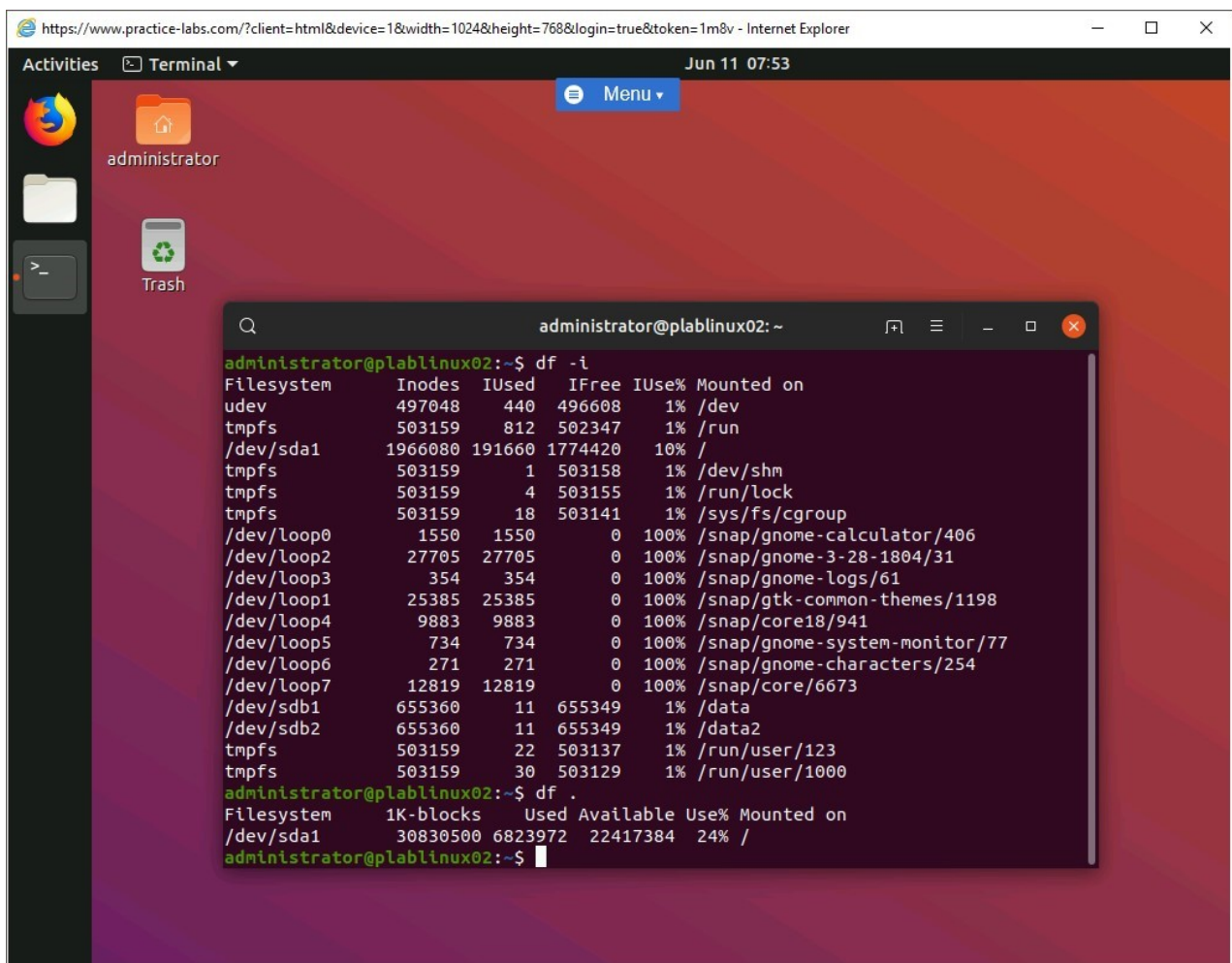
```
df .
```

Press **Enter**.

Note: . is a dot.

Figure 1.5 Screenshot of PLABLINUX02: Determining the partition for the current working directory.

Step 6

Clear the screen by entering the following command:

```
clear
```

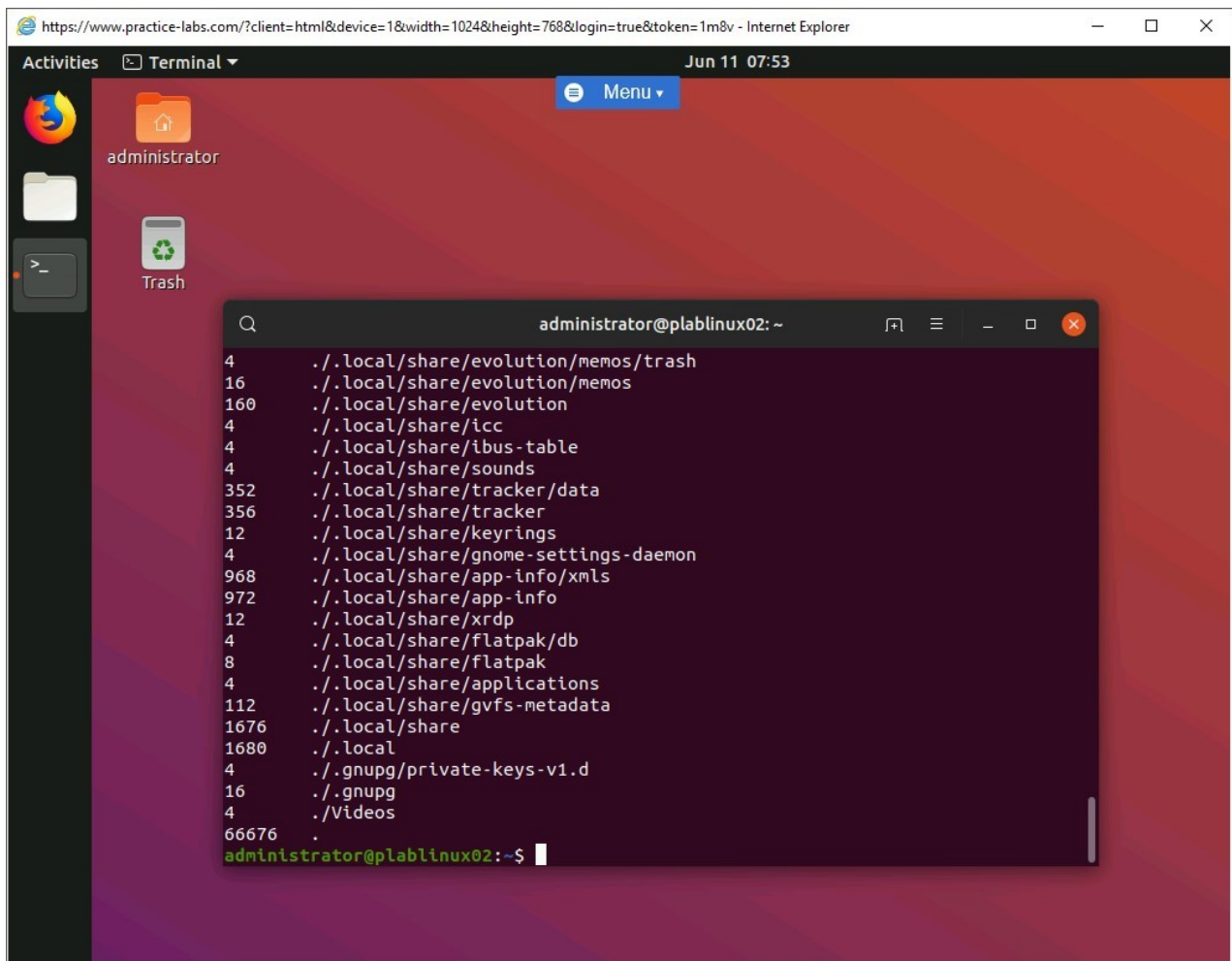To monitor disk usage, type the following command:

```
du
```

Press **Enter.**

Figure 1.6 Screenshot of PLABLINUX02: Monitoring the disk usage.

Step 7

To get the size of the directory in **Kilobytes**, **Megabytes**, or **Gigabytes**, type the following command:

```
du -ah Downloads
```

Press **Enter**.

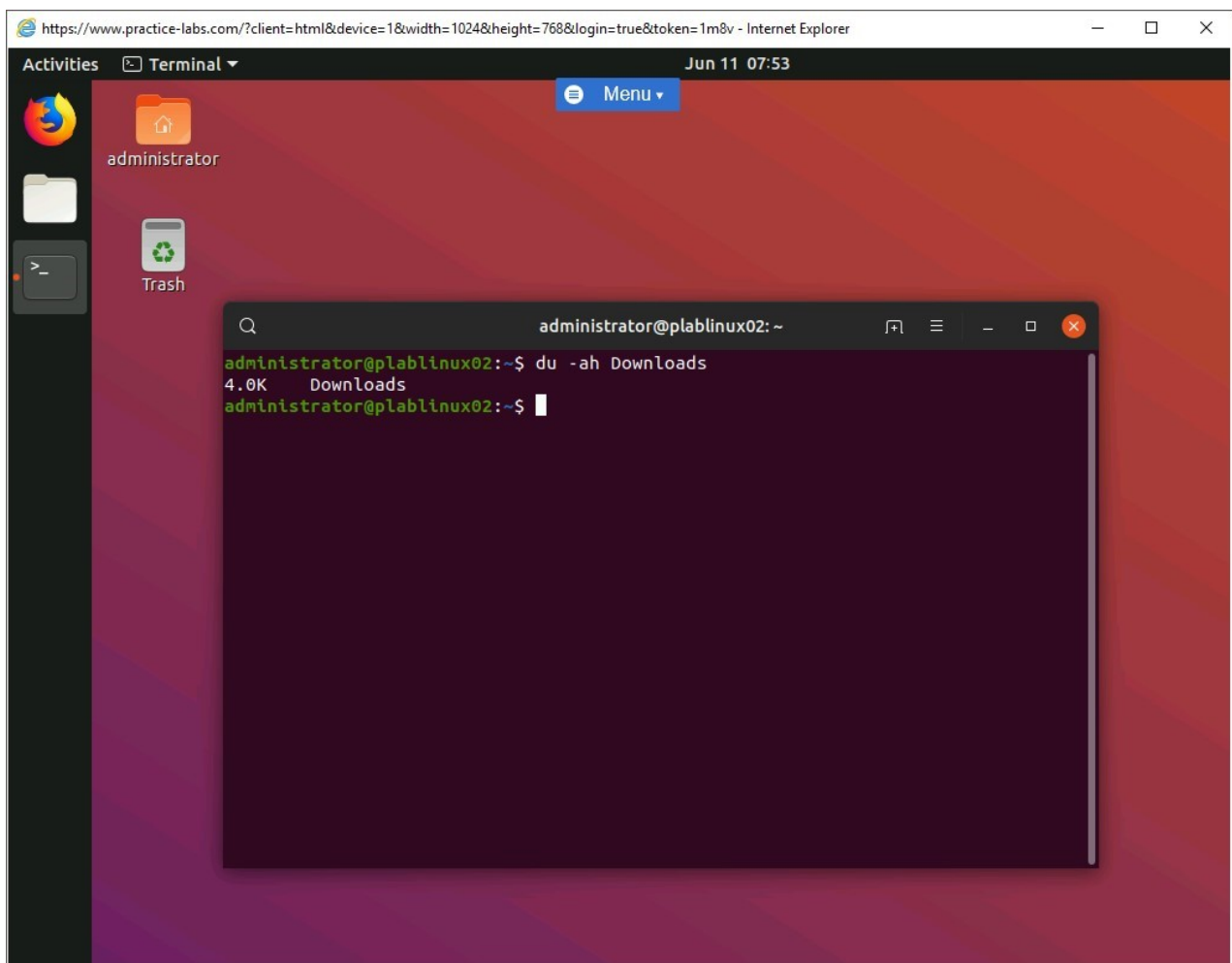> *Note: the -ah parameter displays the disk usage information in human readable format.*

Figure 1.7 Screenshot of PLABLINUX02: Displaying the size of the directory in Kilobytes, Megabytes, or Gigabytes.

Step 8

To get the summary of disk usage of directories and subdirectories in Megabytes (MB), type the following command:

```
du -mh /etc/
```

Press **Enter**.

> *Note: The parameter -m displays the information in Megabytes and -h displays the information in human readable format.*
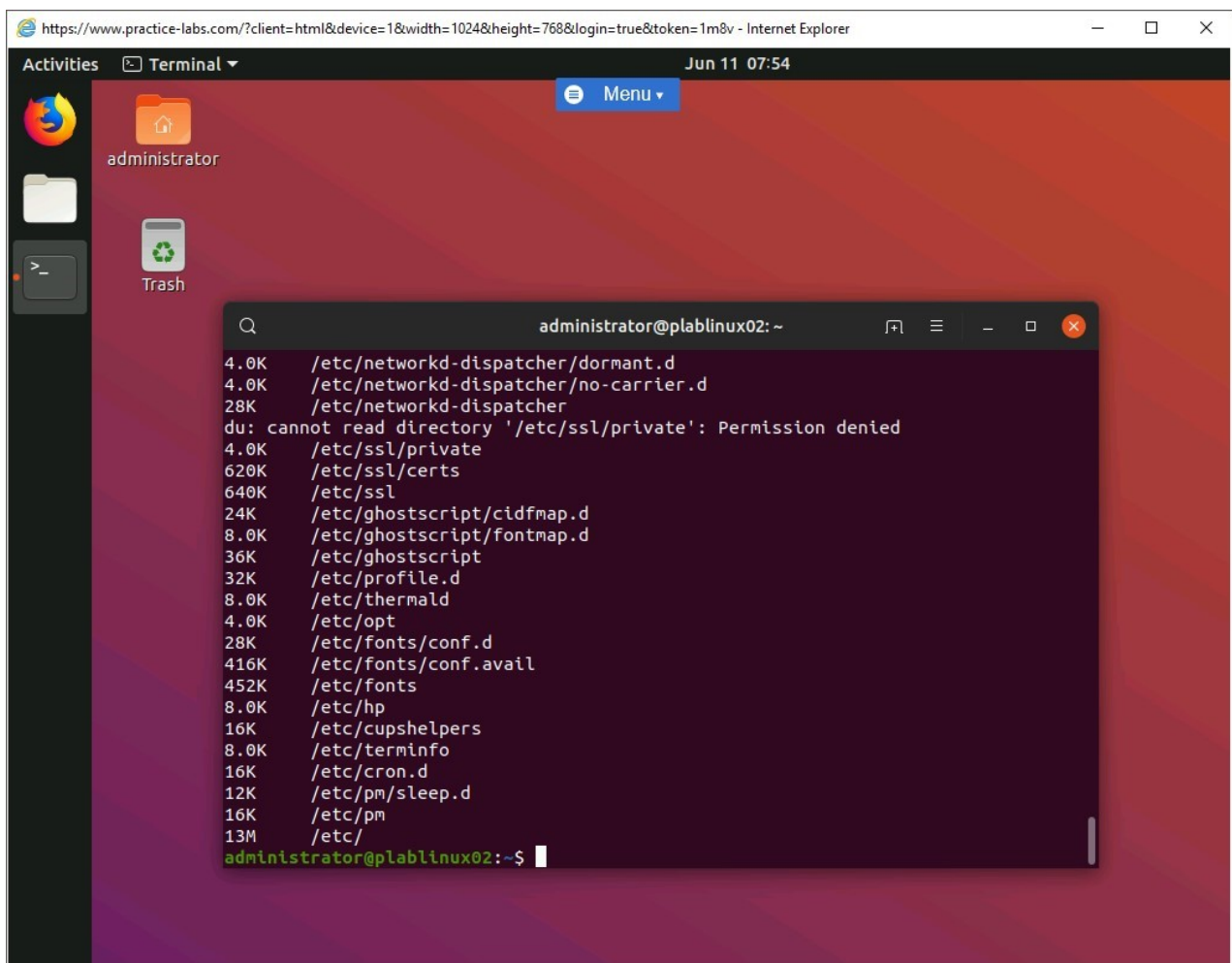
Figure 1.8 Screenshot of PLABLINUX02: Displaying the summary of disk usage of directories and subdirectories in Megabytes (MB).

Task 2 - Verify the Integrity of Filesystems

You can verify the integrity of a file system using the fsck command. However, do note that the filesystem must not be mounted or the fsck command will fail to run. In this task, you will use the **fsck** command to monitor the integrity of the tempfs filesystem on the /dev/sda1 device.

To verify the integrity of filesystems, perform the following steps:

Step 1

Clear the screen by entering the following command:
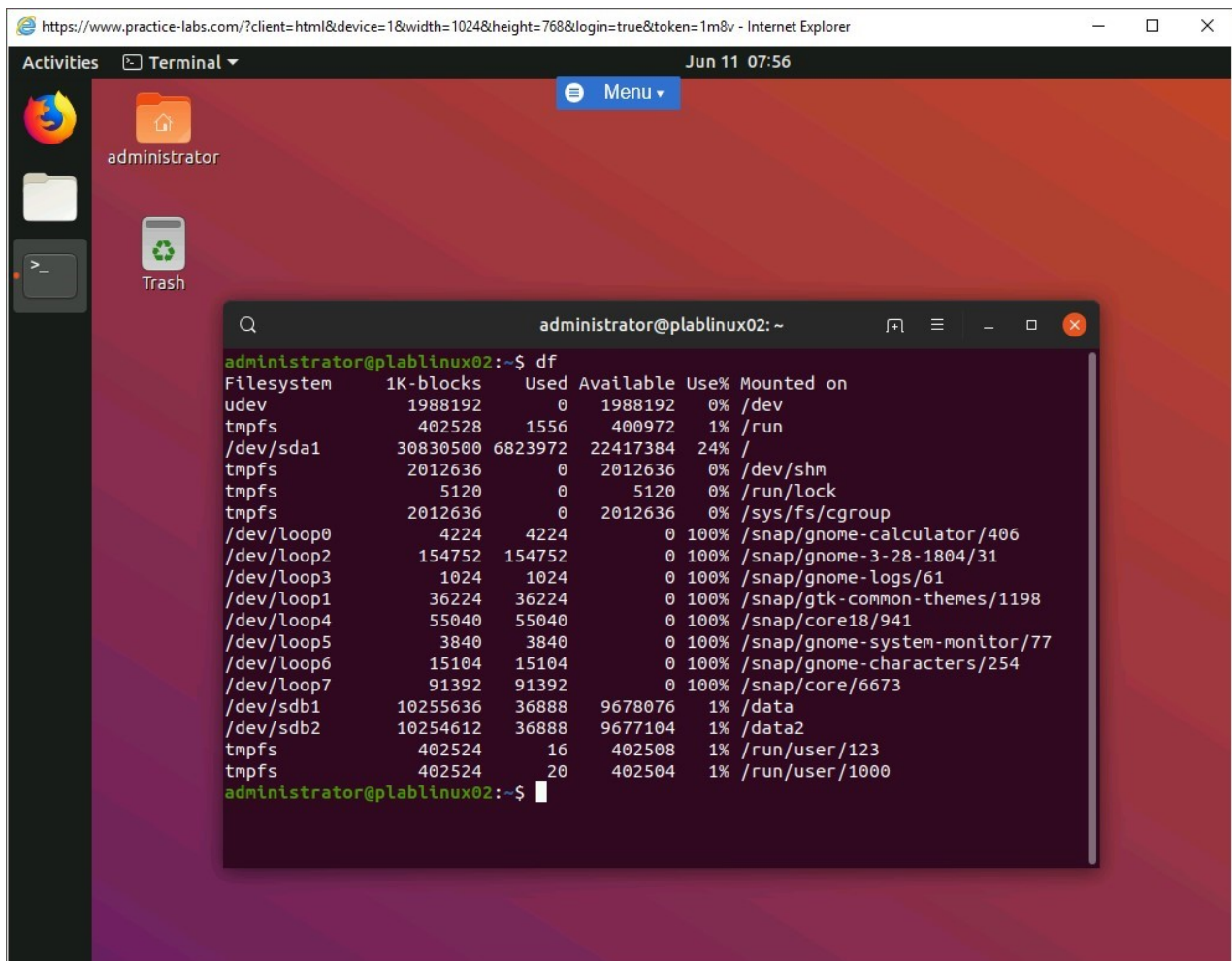
```
clear
```

Let's first list the filesystems. Type the following command:

```
df
```

Press **Enter**.

Note that the display indicates all the files are mounted.

Figure 1.9 Screenshot of PLABLINUX02: Listing the filesystems.

Step 2

For this task, you will check the integrity of the **tempfs** filesystem on the **/dev/sda1** device.

To check its integrity, you first unmount the filesystem.

To unmount the filesystem, enter the following command:

```
sudo umount /dev/sdb1
```

When prompted, type the following password:

`Passw0rd`

Press **Enter**.

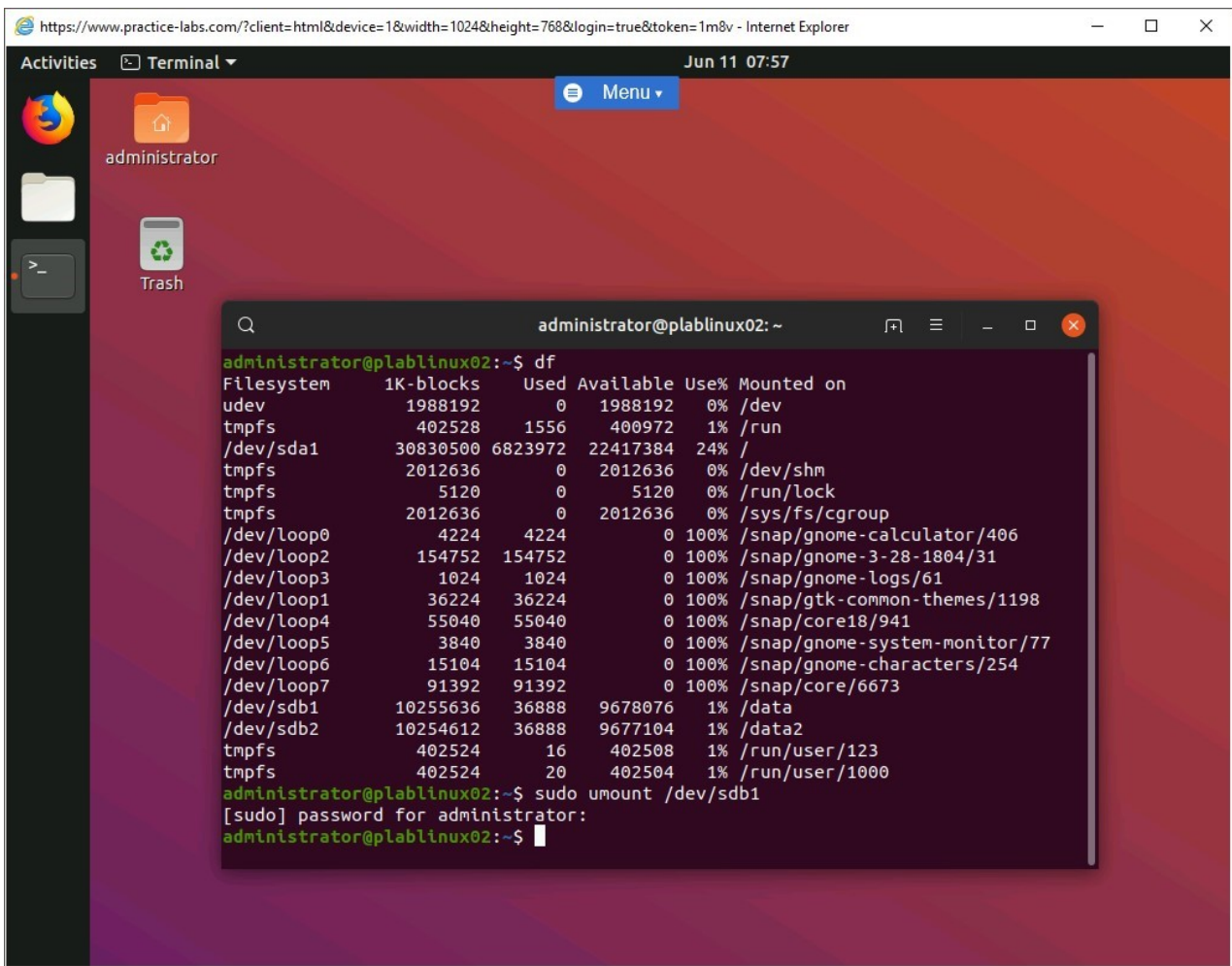> *Note: You can mount the filesystem back with the **mount <filesystem name>** command.*

Figure 1.10 Screenshot of PLABLINUX02: Unmounting the /dev/sdb1 filesystem.

Step 3

Clear the screen by entering the following command:

```
clear
```

To monitor the integrity of the **tempfs** filesystem on **/dev/sda1** device, type the following command:

```
sudo fsck -t tempfs /dev/sdb1
```

Press **Enter**.

Note that the output of the command displays various information including the type of file, size of the file, number of files in the directory, and many more.

> **Note**: When you run the **fsck** command, the **e2fsck** command runs in interactive mode.
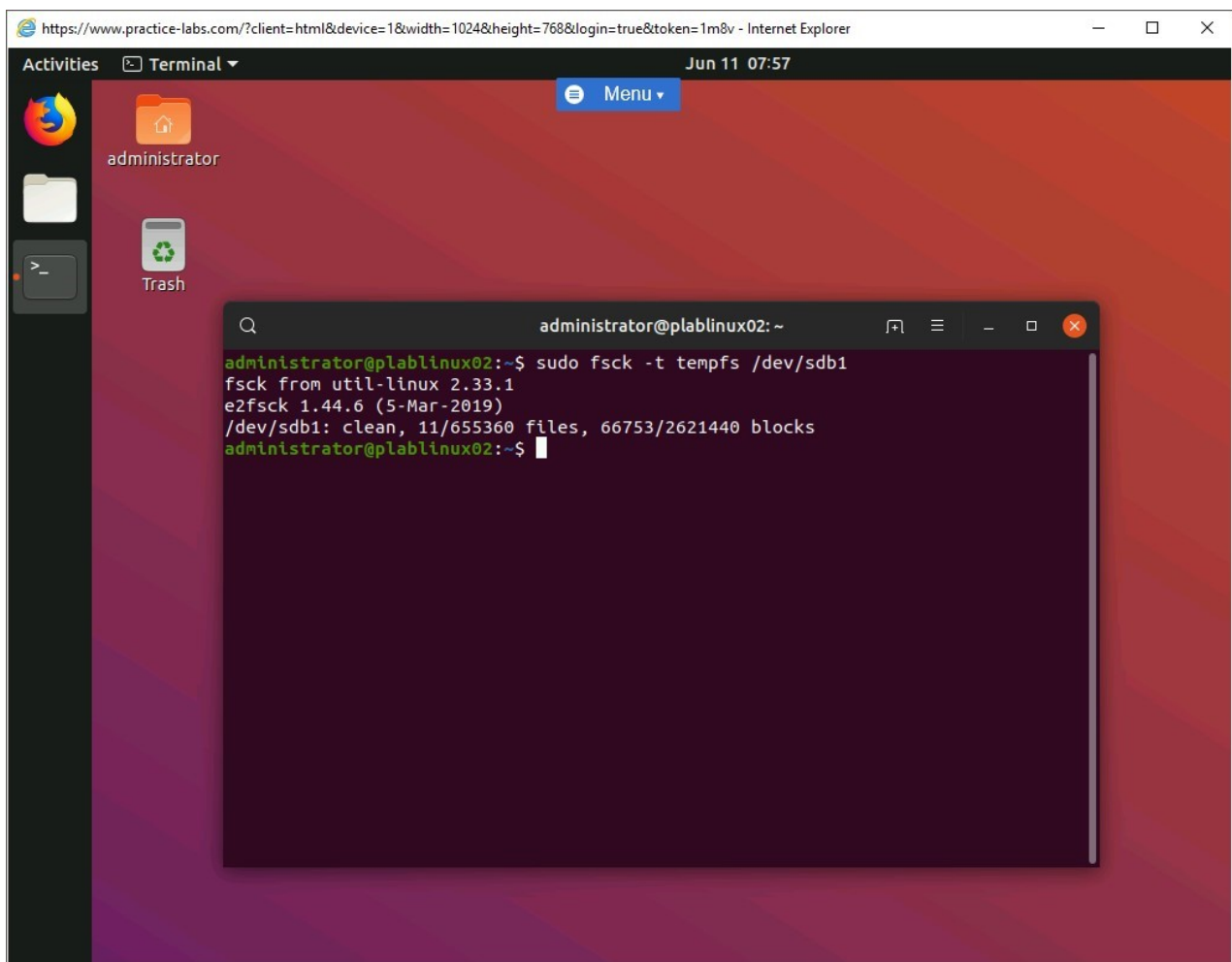

Figure 1.11 Screenshot of PLABLINUX02: Monitoring the integrity of the tempfs filesystem on /dev/sda1 device.

Step 4

To verify the integrity of the complete filesystem, type the following command:

```
sudo fsck
```

Press **Enter**.

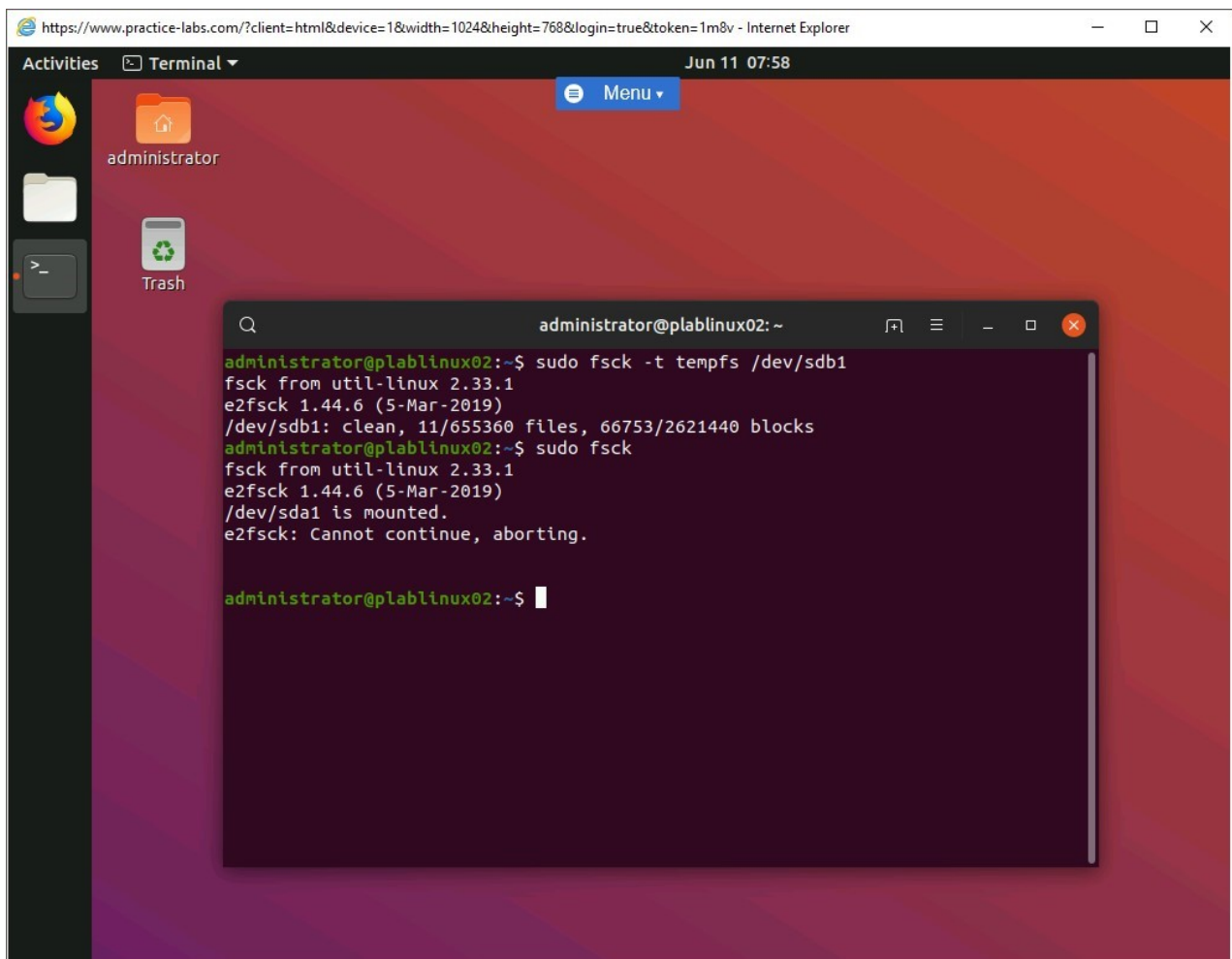Note that the command fails because other filesystems are mounted.

Figure 1.12 Screenshot of PLABLINUX02: Verifying the integrity of the complete filesystem.

Step 5

Clear the screen by entering the following command:

```
clear
```

You will now force fsck to check the **/dev/sdb1** filesystem. Type the following command:
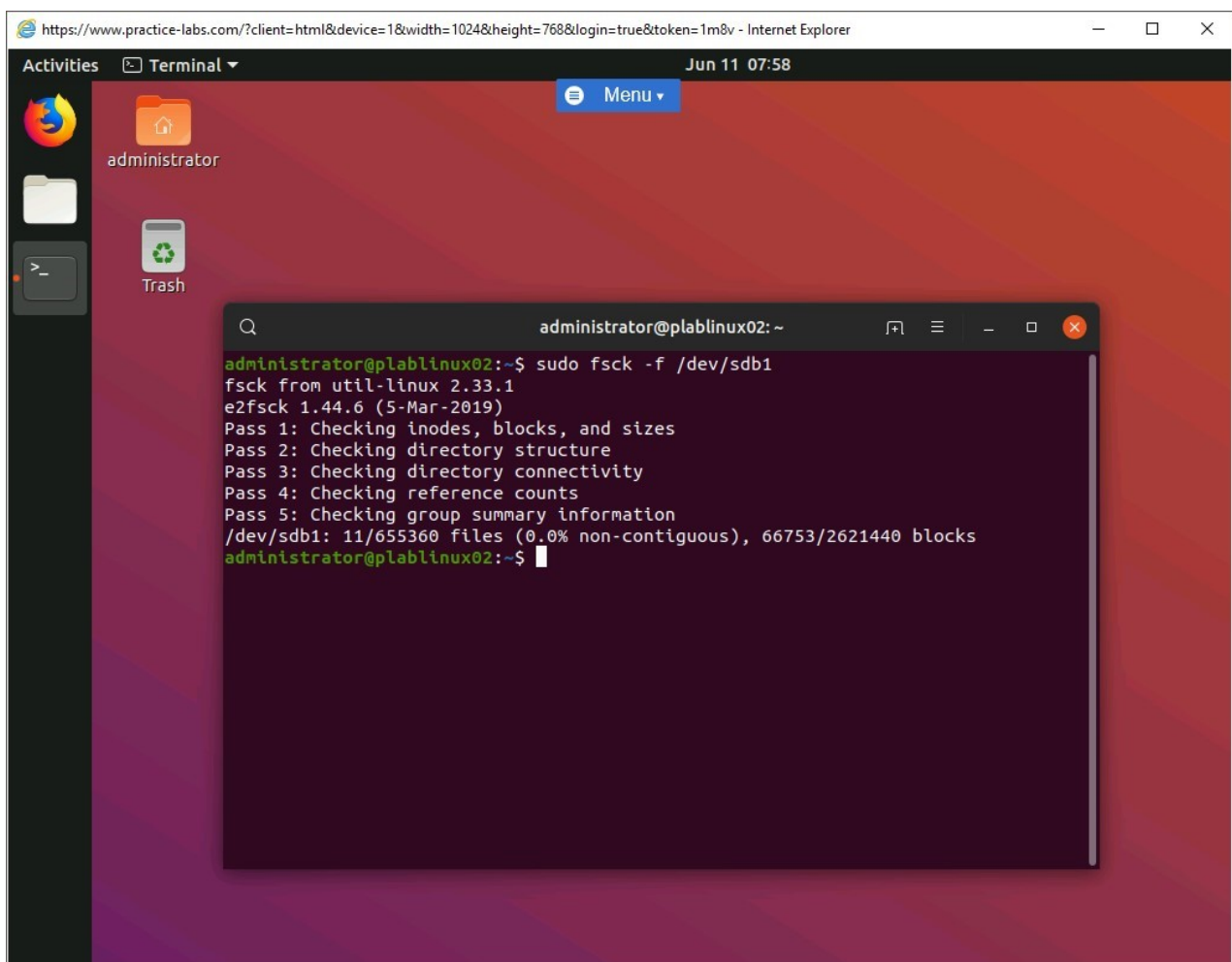
```
sudo fsck -f /dev/sdb1
```

Press **Enter**.

Figure 1.13 Screenshot of PLABLINUX02: Checking the /dev/sdb1 filesystem even if it is mounted.

Step 6

Clear the screen by entering the following command:

```
clear
```

You can also get a verbose output with the fsck command. Type the following command:
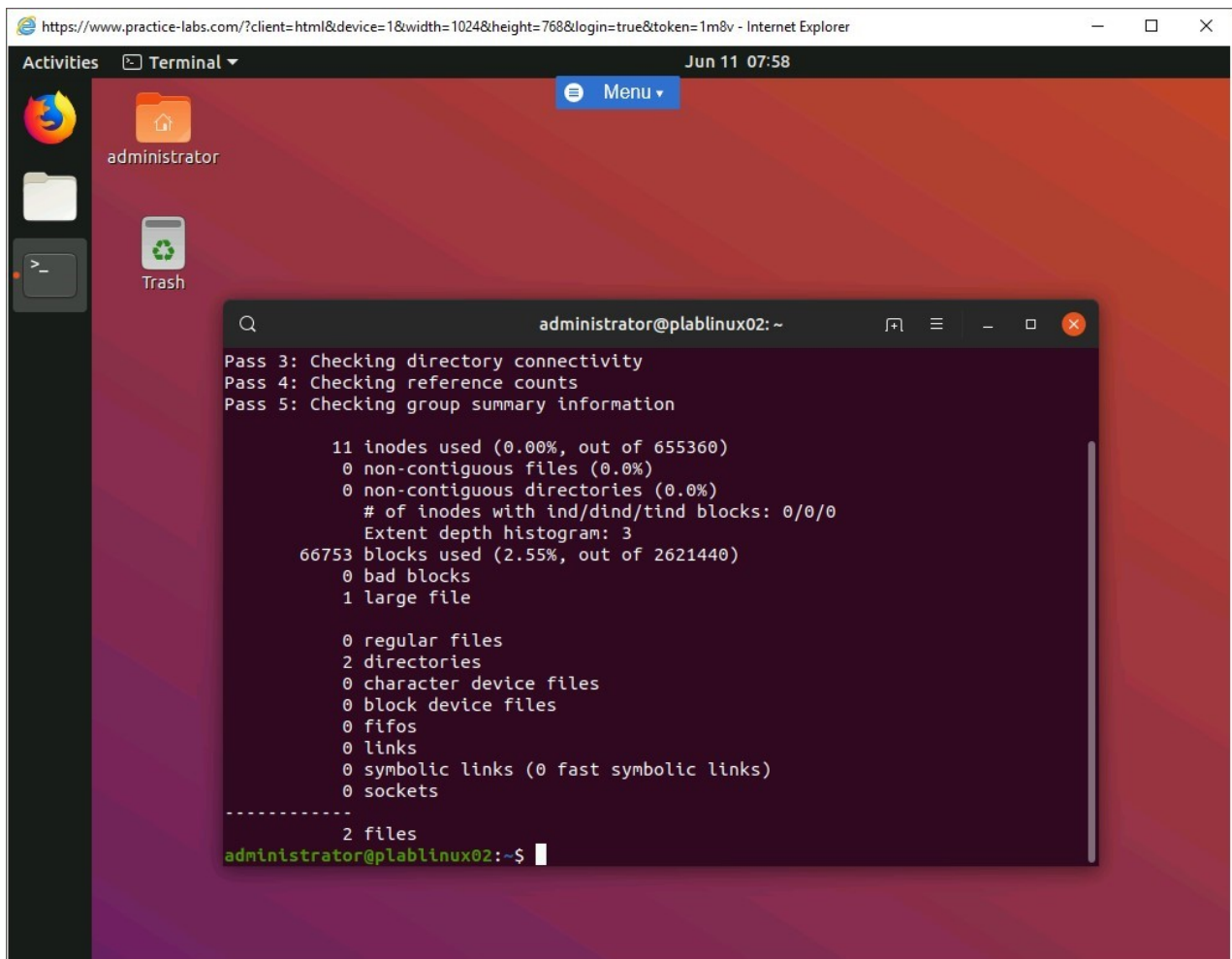
```
sudo fsck -fv /dev/sdb1
```

Press **Enter**.

Figure 1.14 Screenshot of PLABLINUX02: Getting the verbose output with the fsck command.

Task 3 - Repair Simple Filesystem Problems

To repair simple filesystem problems, perform the following steps:

Step 1

Clear the screen by entering the following command:

```
clear
```

To view the super block and blocks group information of an extended filesystem, type the following command:

```
sudo dumpe2fs -h /dev/sdb1
```
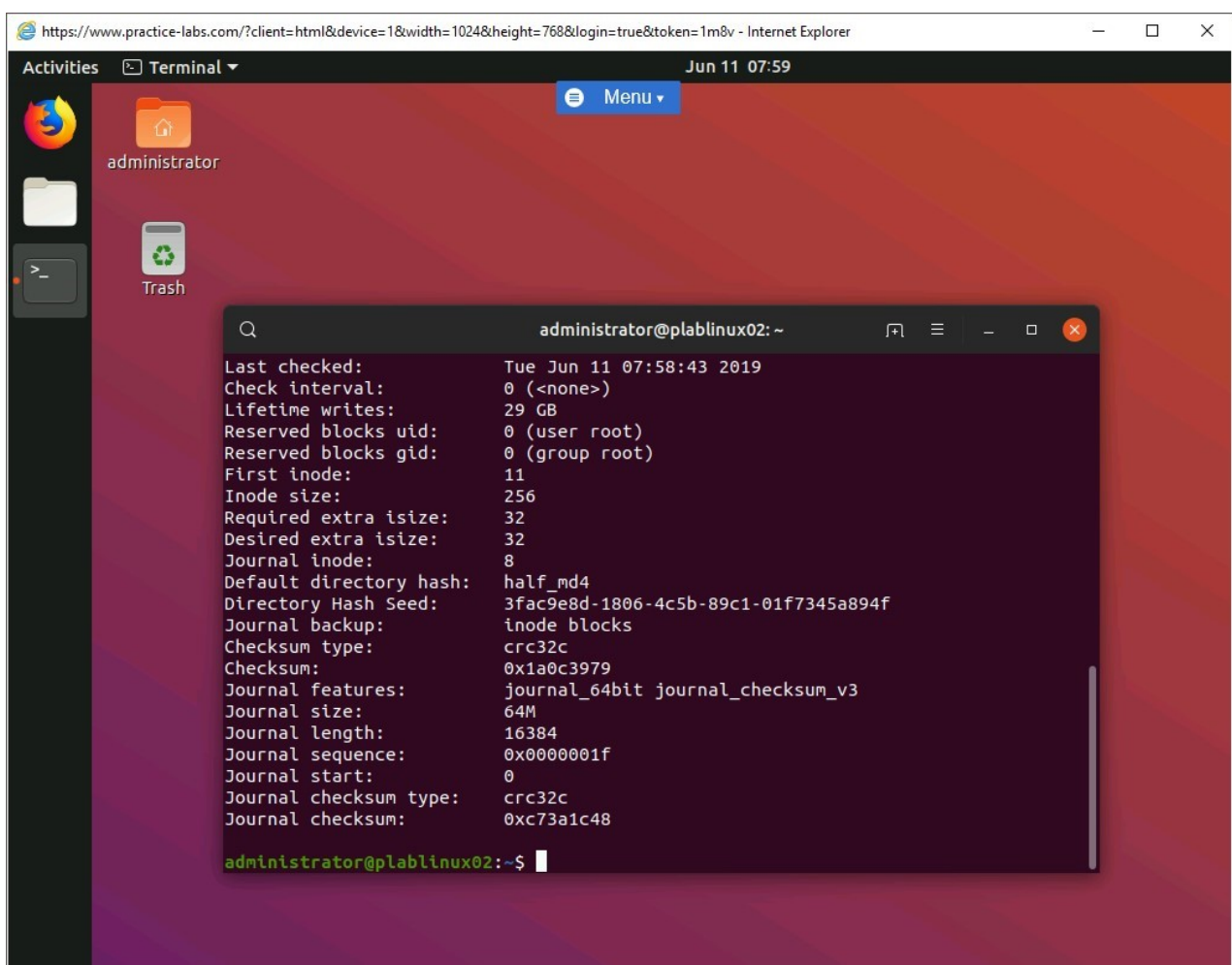
Press **Enter**.

Figure 1.15 Screenshot of PLABLINUX02: Viewing the super block and blocks group information of an extended filesystem.

Step 2

Clear the screen by entering the following command:

```
clear
```

The tune2fs command is used to adjust various parameters of the ext2/ext3 filesystems. To tune an extended filesystem, type the following command:

```
sudo tune2fs -L Main /dev/sdb1
```
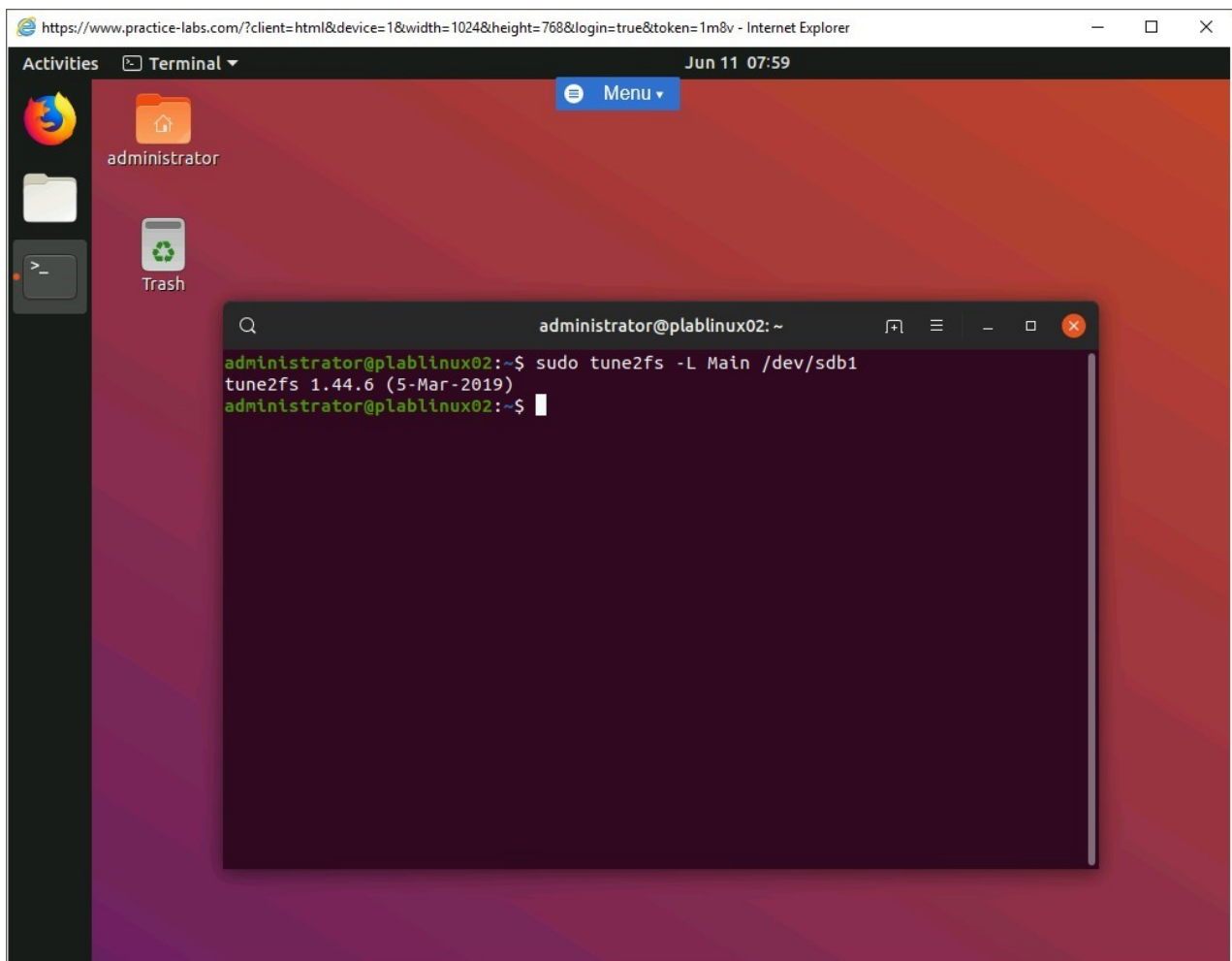
Press **Enter**.

Figure 1.16 Screenshot of PLABLINUX02: Executing the tune2fs command.

Step 3

Clear the screen by entering the following command:

```
clear
```

With the **-l** switch, you have labeled the volume.

To list the contents of the filesystem, type the following command:

```
sudo tune2fs -l /dev/sda1
```

Press **Enter**.

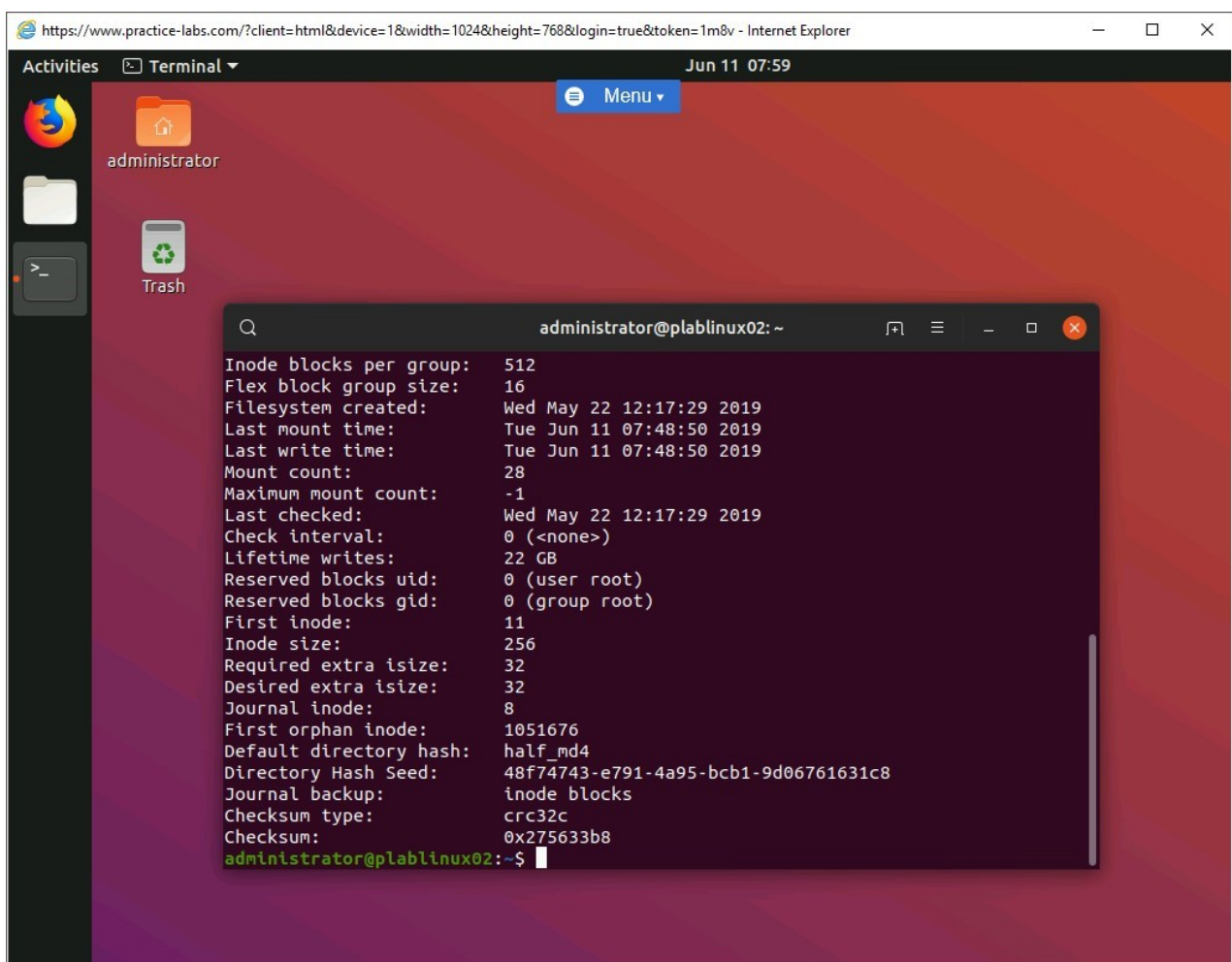*Note: The output is the same as dumpe2fs - h /dev/sda1.*

Figure 1.17 Screenshot of PLABLINUX02: Listing the contents of the filesystem.

Step 4

Clear the screen by entering the following command:

```
clear
```

To switch off the maximum mount count and also perform interval tests on a file system, type the following command:

```
sudo tune2fs -i 0 -c 0 /dev/sdb1
```

Press **Enter**.

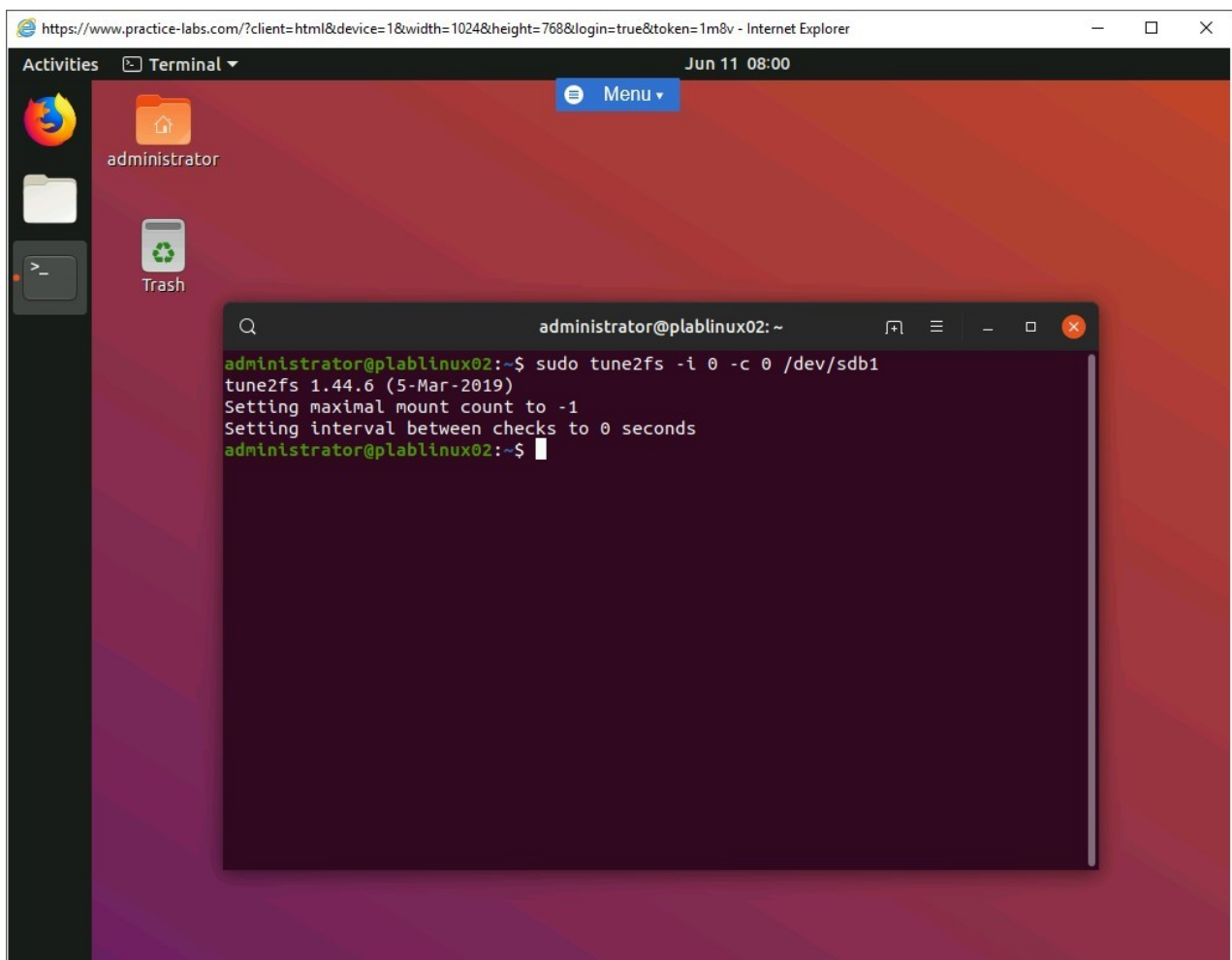Note that **0** is a zero. This parameter sets the interval between checks to **0** seconds.

Figure 1.18 Screenshot of PLABLINUX02: Switching off the maximum mount count and performing interval tests on a file system.

Step 5

Clear the screen by entering the following command:

```
clear
```

You can use the **debugfs** command to debug the filesystem. To enter into troubleshooting mode, type the following command:

```
sudo debugfs /dev/sdb1
```

Press **Enter**.

A new prompt is displayed:

```
debugfs:
```

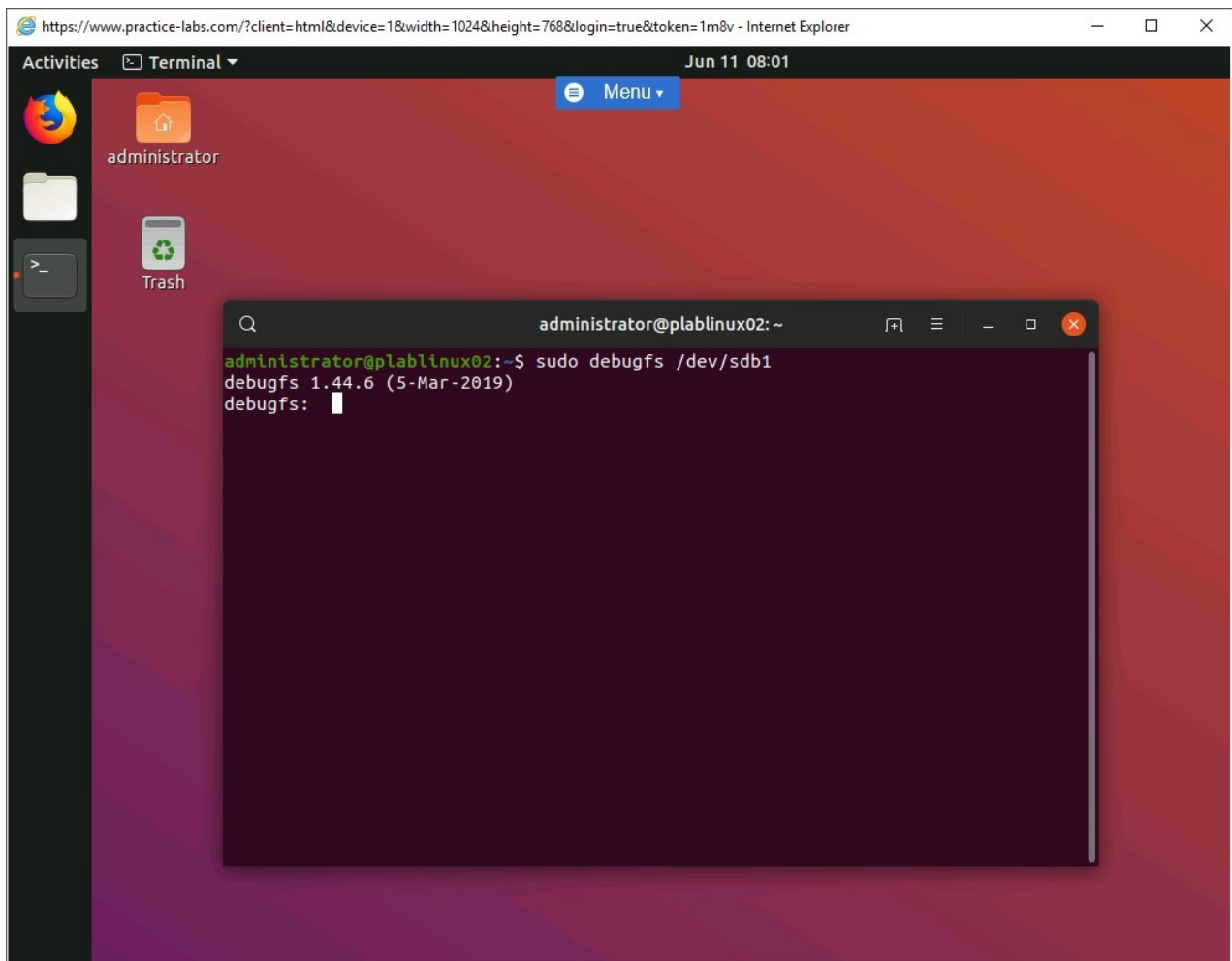You can enter a number of commands here to debug the file system.

Figure 1.19 Screenshot of PLABLINUX02: executing the debugfs command to debug the /dev/sdb1 filesystem.

Step 6

To understand the commands that can be entered at the **debugfs:** prompt, type the following:

```
?
```

Press **Enter**.

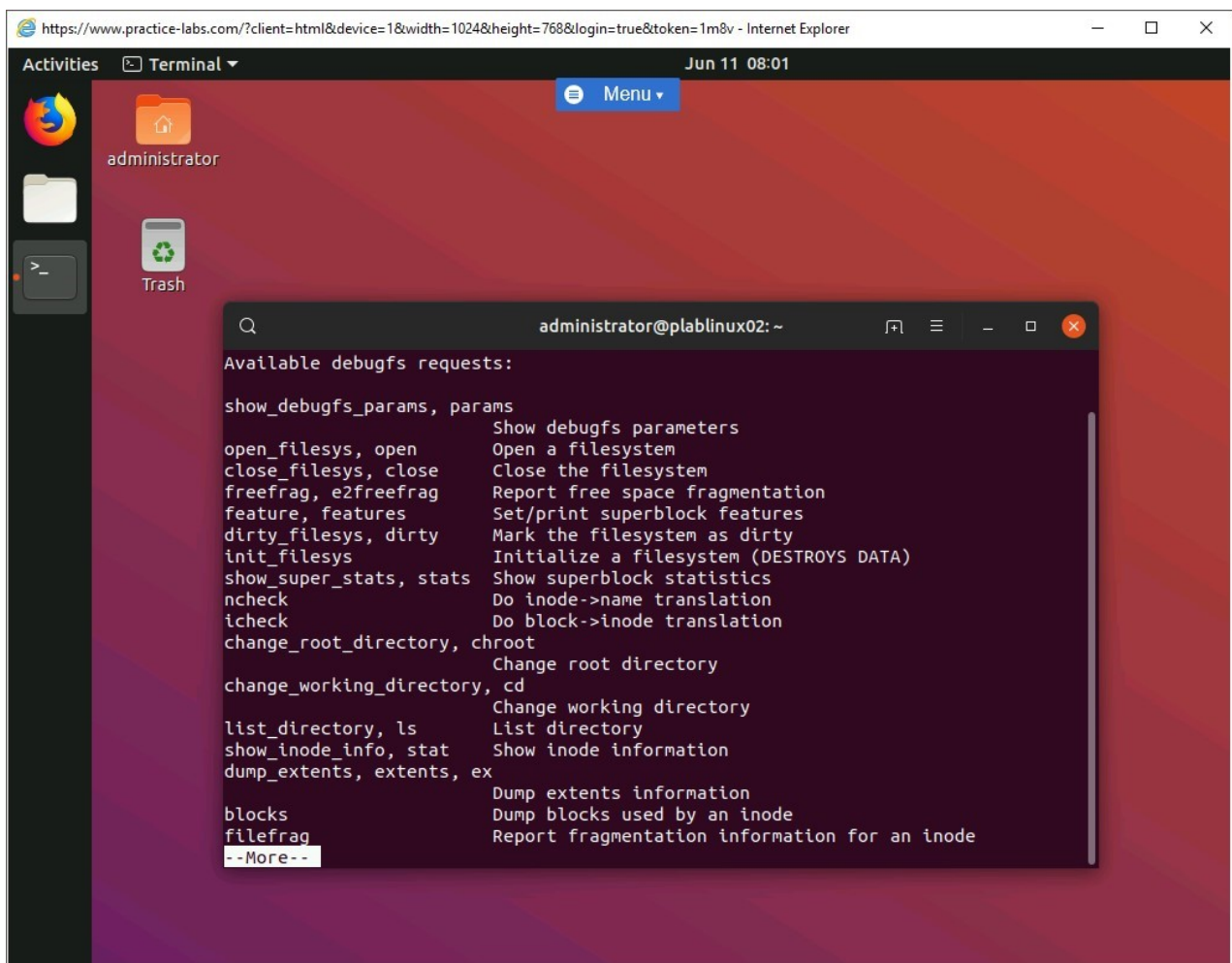Press **CTRL + z** to break the command and return to the command prompt.

Figure 1.20 Screenshot of PLABLINUX02: Viewing the options of the debugfs command.

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

Review

Well done, you have completed the **Maintain the Integrity of Filesystems** Practice Lab.

Summary

You completed the following exercises:

- Exercise 1 - Maintain the Integrity of Filesystems

You should now be able to:

- Monitor free disk-space
- Verify the integrity of a filesystem
- Repair simple filesystem problems

Feedback

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