

Maintain System Time

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Introduction

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

Date and Time

Hardware Clock

Time zone

NTP

Learning Outcomes

In this module, you will complete the following exercise:

- Exercise 1 - Maintain System Time

After completing this lab, you will be able to:

- Set the system date and time
- Set the hardware clock
- Configure the time zone
- Basic NTP configuration
- Run the ntpq command

Exam Objectives

The following exam objectives are covered in this lab:

- **LPI: 108.1** Maintain system time

- **CompTIA:** 2.5 Summarize and explain server roles.

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

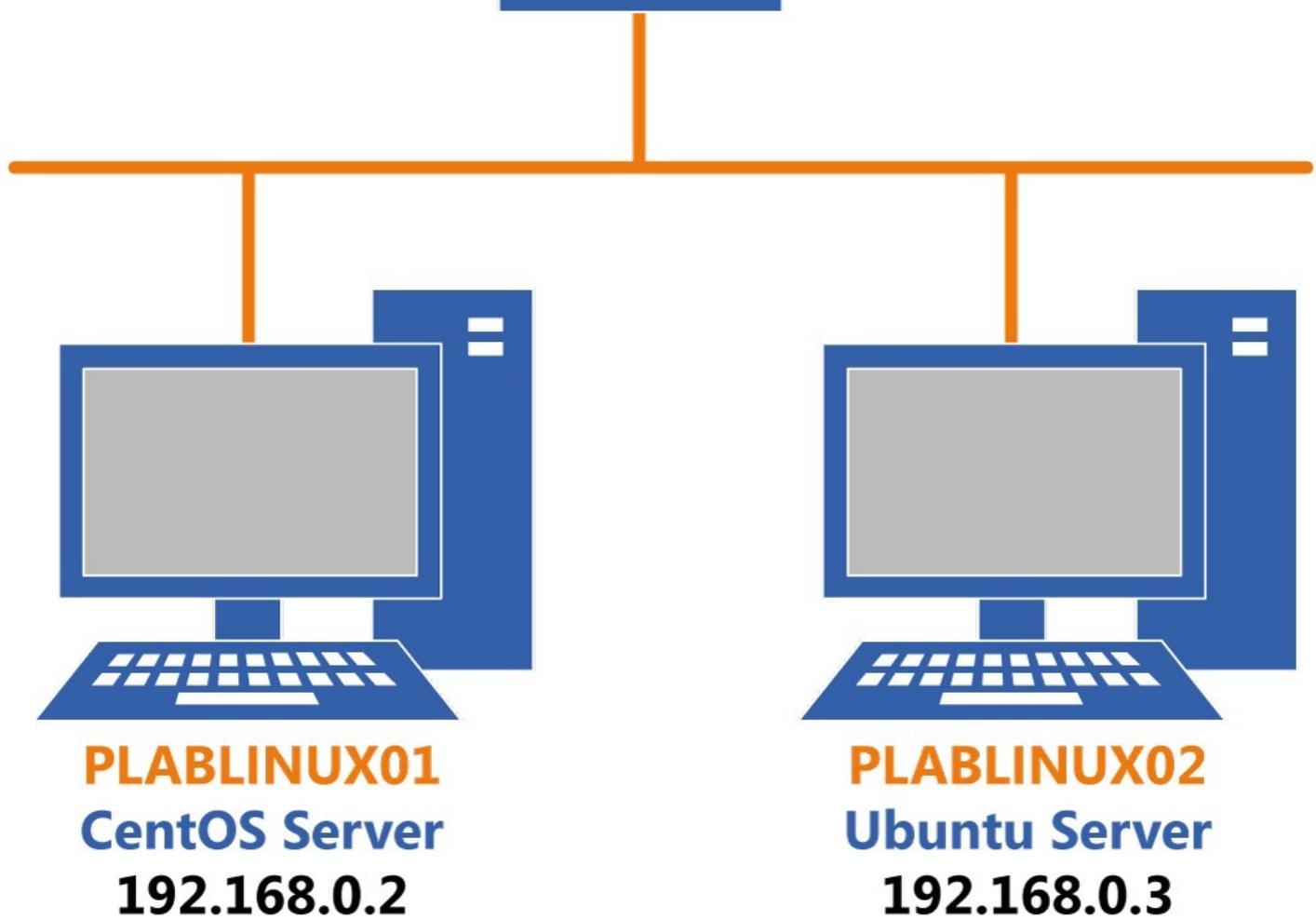
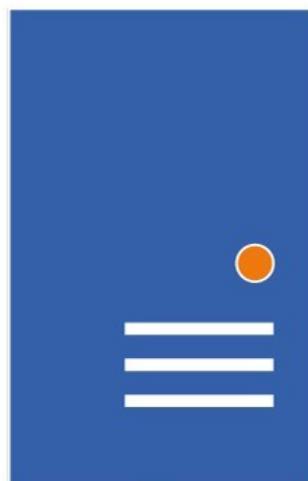
For more information on using Practice Labs, please see our **Help and Support** page. You can also raise a technical support ticket from this page.

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 - Maintain System Time

In this exercise, you will understand how to maintain system time.

Learning Outcomes

After completing this exercise, you will be able to:

- Log into a Linux System
- Set the system date and time
- Set the hardware clock
- Configure the time zone
- Basic NTP configuration
- Run the ntpq command

Your Devices

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

- **PLABLINUX01** (CentOS Server)



Task 1 - Set the System Date and Time

In Linux, you can set system date and time either **by** using the graphical user interface or the command line **interface**. In this task, you will use the command line to set the system date and time.

To set the system date and time, perform the following steps:

Step 1

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

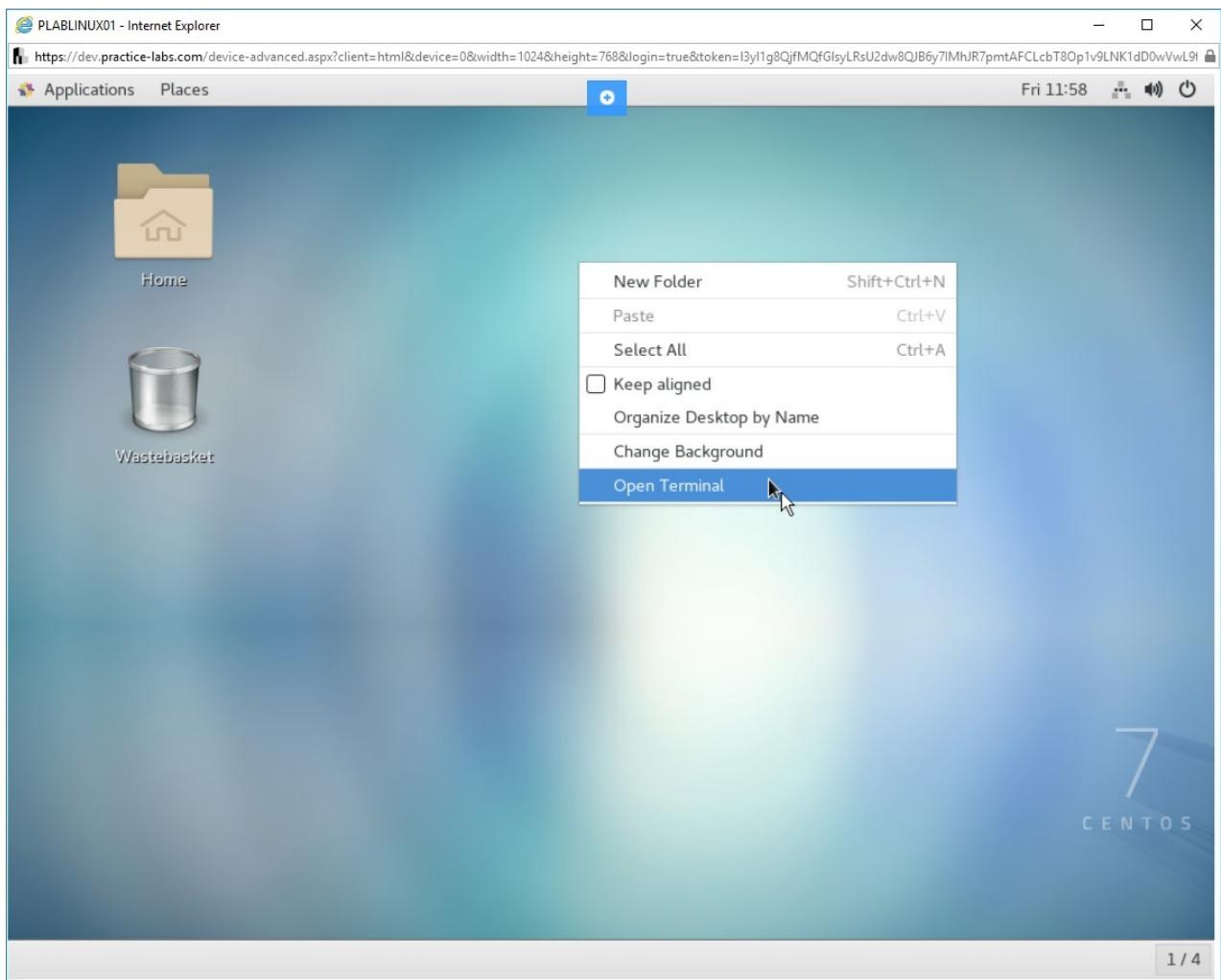


Figure 1.1 Screenshot of PLABLINUX01: Selecting the Open Terminal option from the context menu.

Step 2

The command prompt window is displayed. Type the following command:

```
su -
```

Press **Enter**.

At the **Password** prompt, type the following password:

Passw0rd

Press **Enter**.

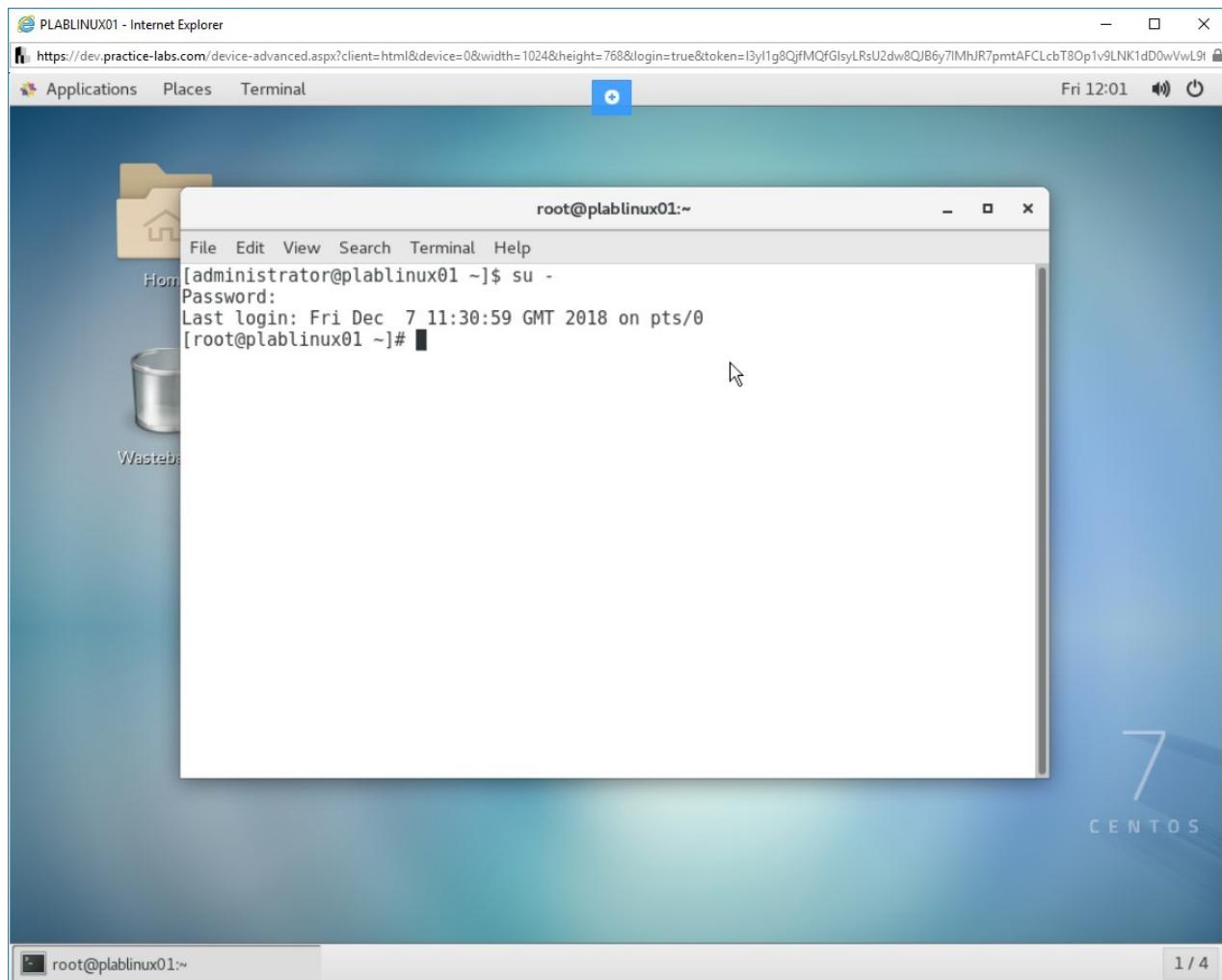


Figure 1.2 Screenshot of PLABLINUX01: Changing to the root account with the su command.

Step 3

Clear the screen by entering the following command:

```
clear
```

To view the current date of the system date, type the following command:

```
date
```

Press **Enter**.

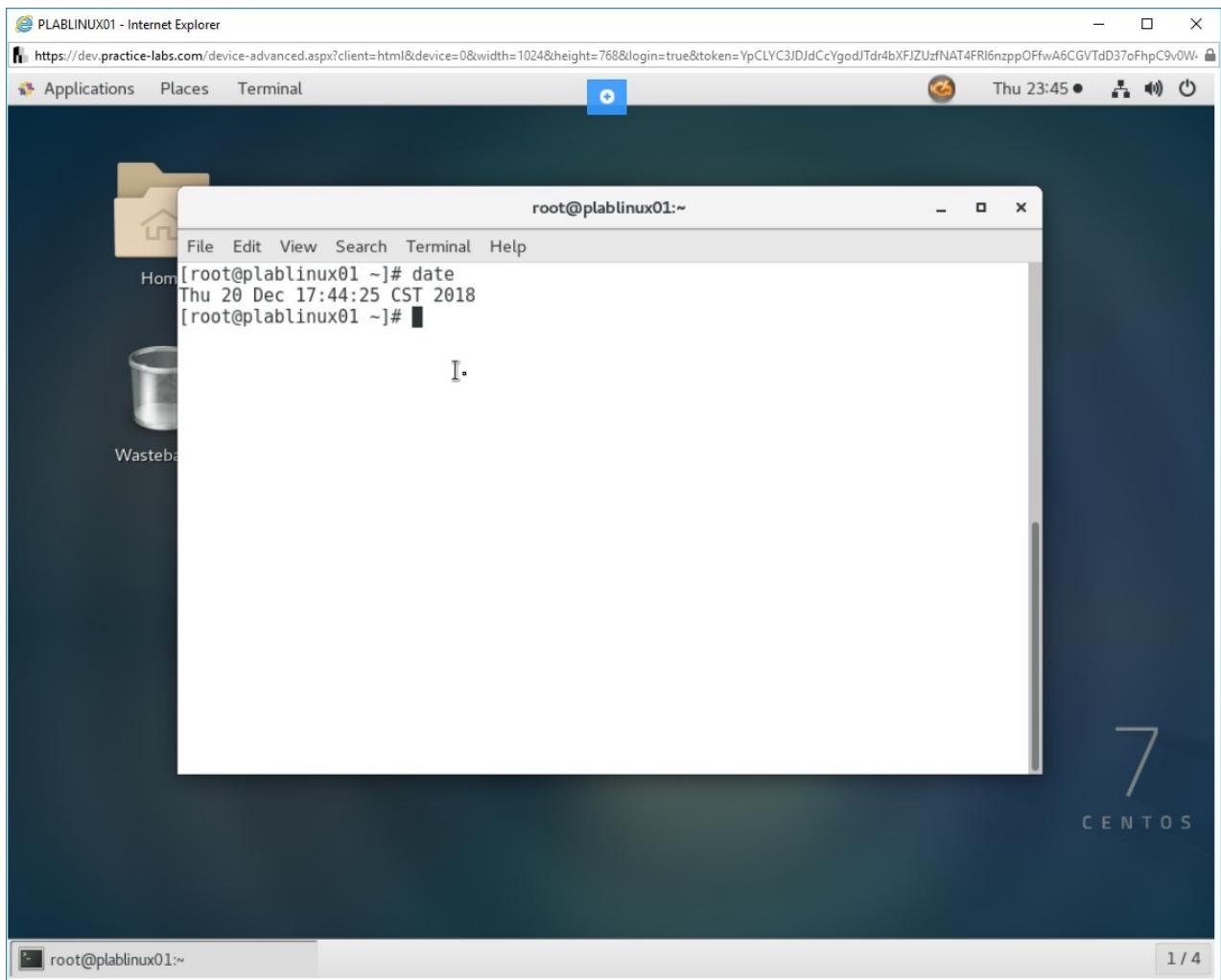


Figure 1.3 Screenshot of PLABLINUX01: Showing the current Date and Time

Step 4

You can manually set the date on a CentOS system. However, if the time is synchronized with an NTP server, then the manual date configuration will fail. To check whether the system has time synchronization enabled with an NTP server, type the following command:

```
timedatectl
```

Press **Enter**.

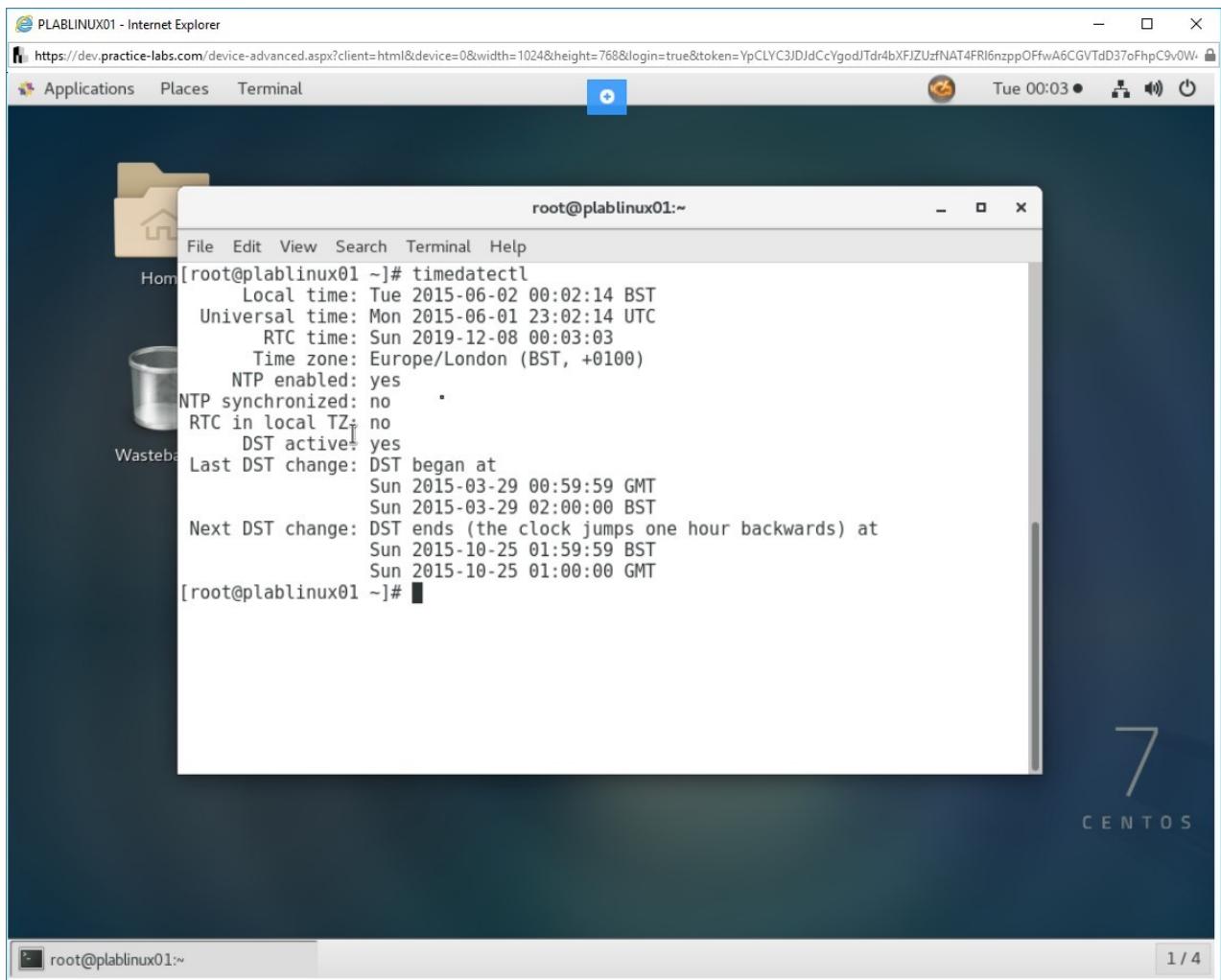


Figure 1.4 Screenshot of PLABLINUX01: Displaying the complete time details with the timedatectl command.

Step 5

To be able to set the date manually, you need to stop the time synchronization with the NTP Server. To do this, type the following command:

```
timedatectl set-ntp no
```

Press **Enter**.

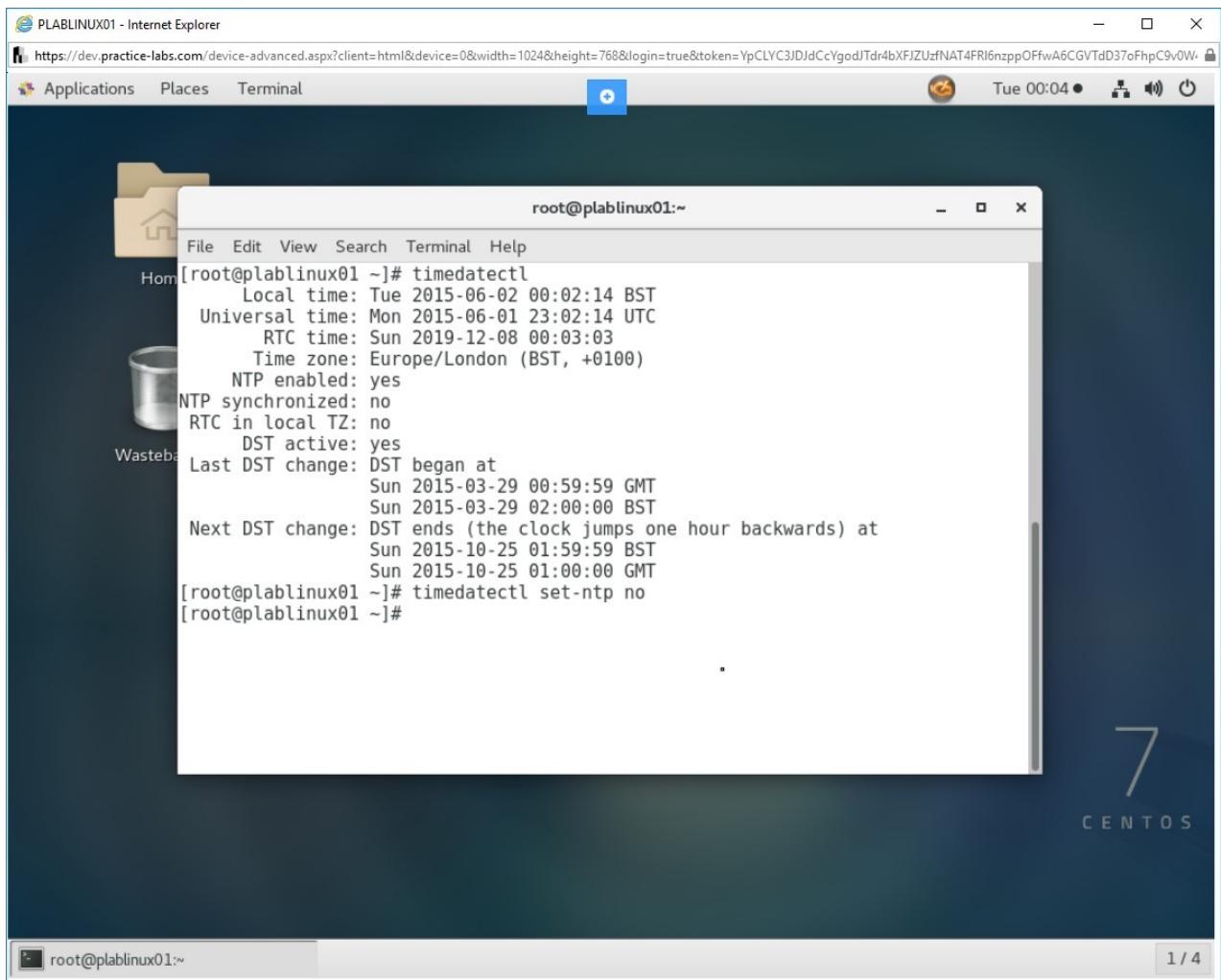


Figure 1.5 Screenshot of PLABLINUX01: Switching off the ntp server synchronization.

Step 6

Clear the screen by entering the following command:

```
clear
```

To set the date, type the following command:

```
date +%D -s 2019-12-20
```

Press **Enter**.

Note: The `+%D` in this command specifies that the command is related to a change of date, which is mentioned in the YYYY-MM-DD format.

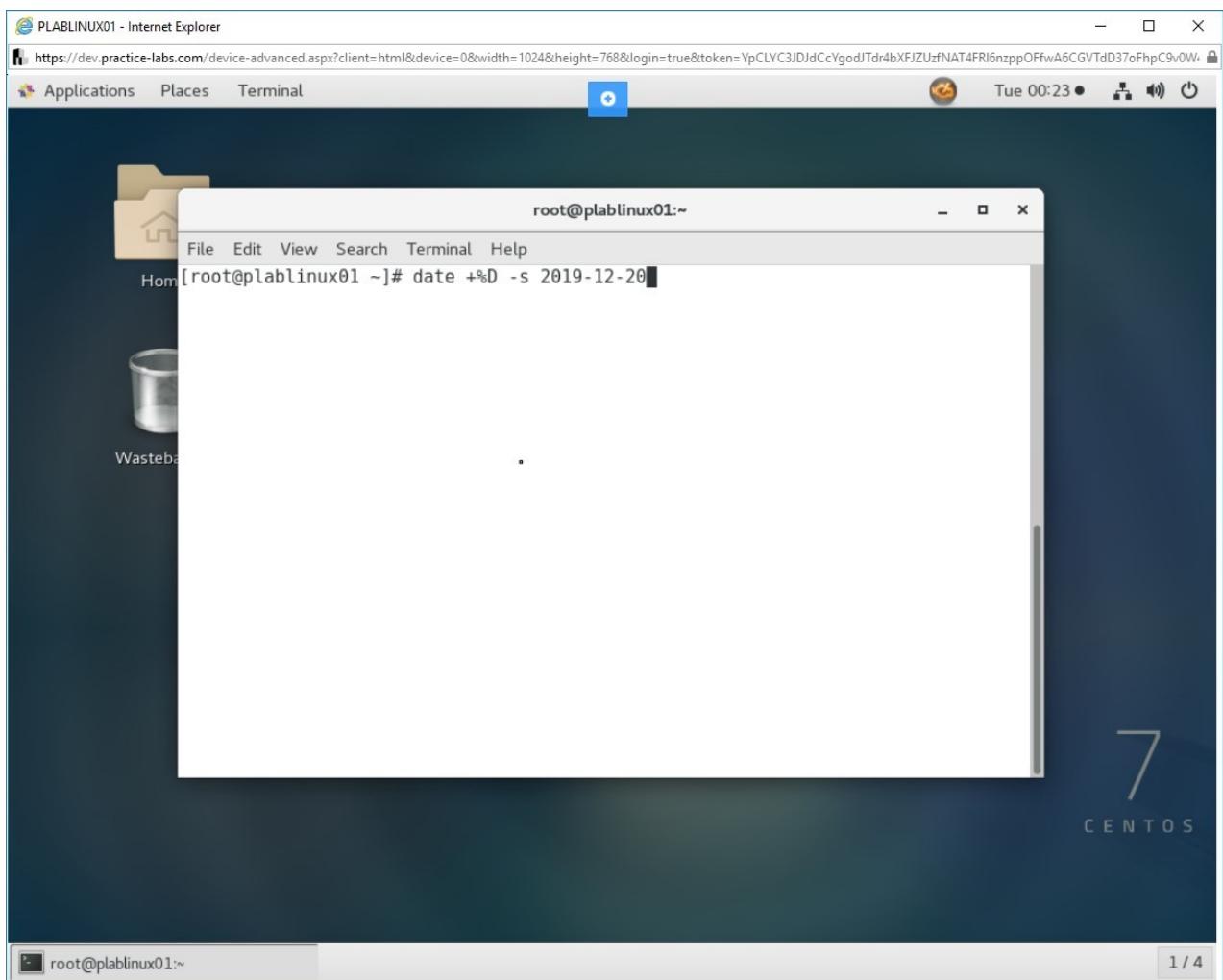


Figure 1.6 Screenshot of PLABLINUX01: Setting a new date manually.

Note that the new date has been set.

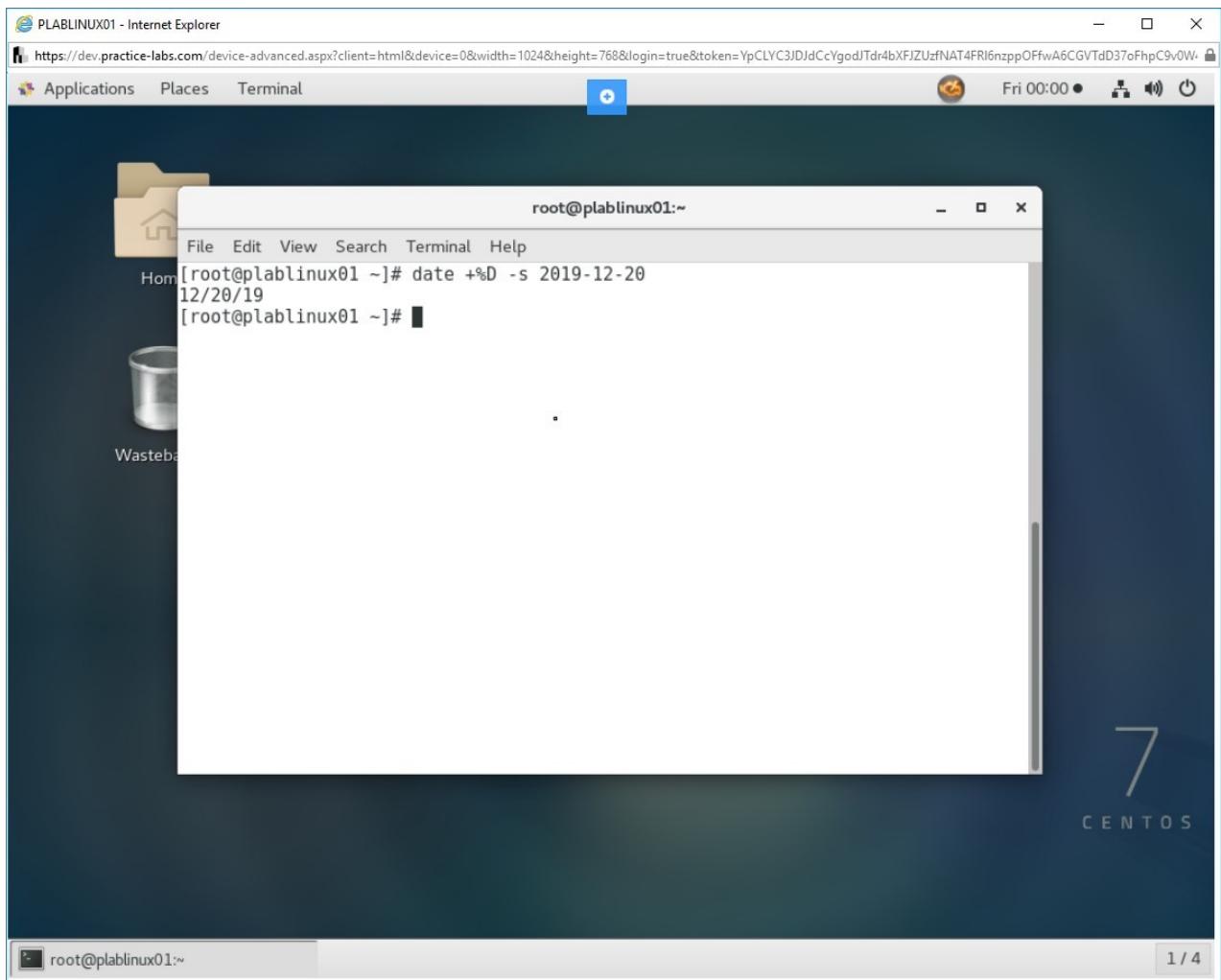


Figure 1.7 Screenshot of PLABLINUX01: Displaying the new date.

Step 7

To verify that the new date has been set, type the following command:

```
date
```

Press **Enter**.

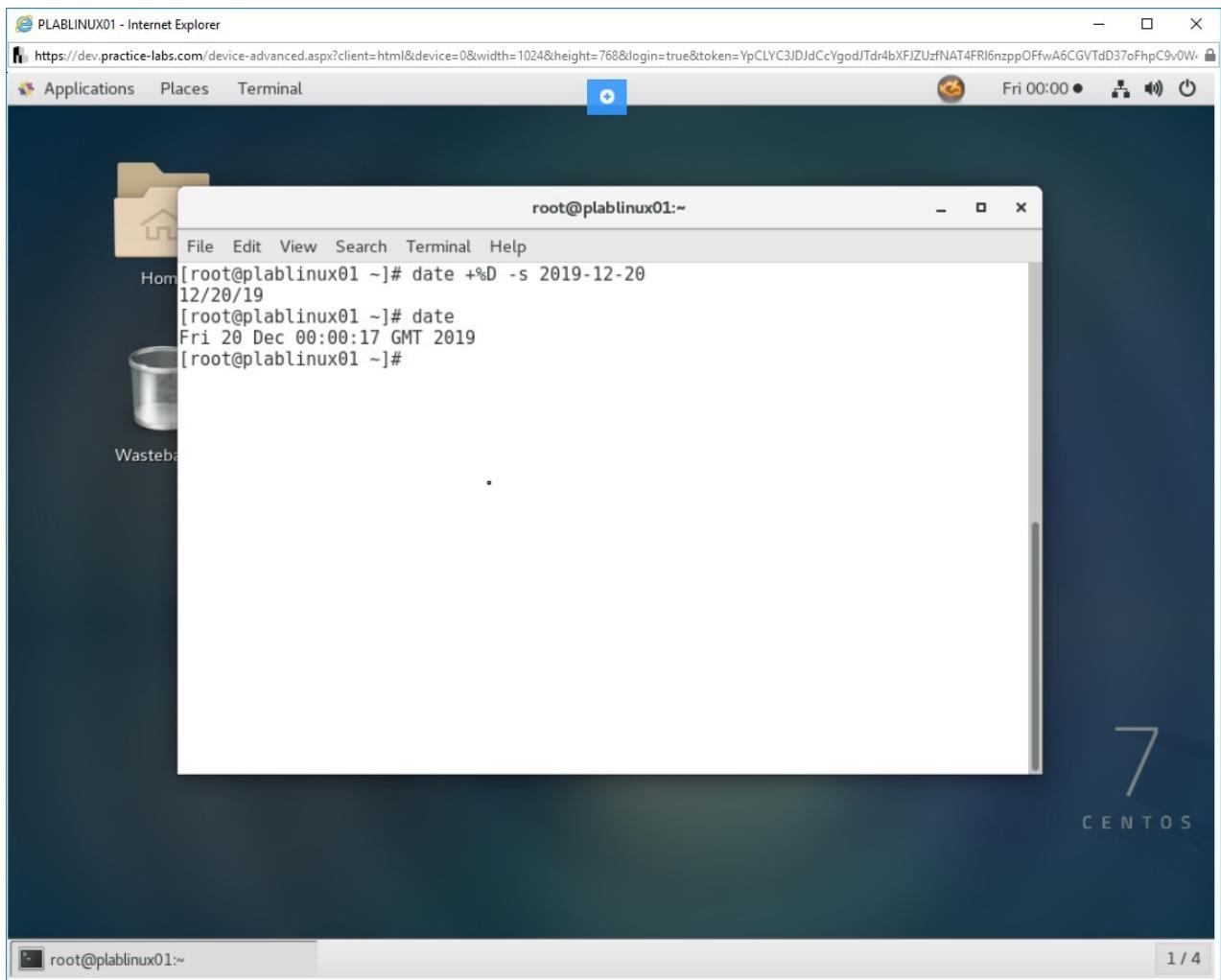


Figure 1.8 Screenshot of PLABLINUX01: Verifying the newly set date.

Step 8

Clear the screen by entering the following command:

```
clear
```

To set the time, you again use the **date** command, but with the **+T** parameter.

To set the time of the system, type the following command:

```
date +%T -s 23:00:00 -u
```

Press **Enter**.

Note: The `+%T` parameter in this command specifies that the command is to set the time of the system. The `-u` parameter specifies the UTC format for time, which `HH-MM-SS` format.

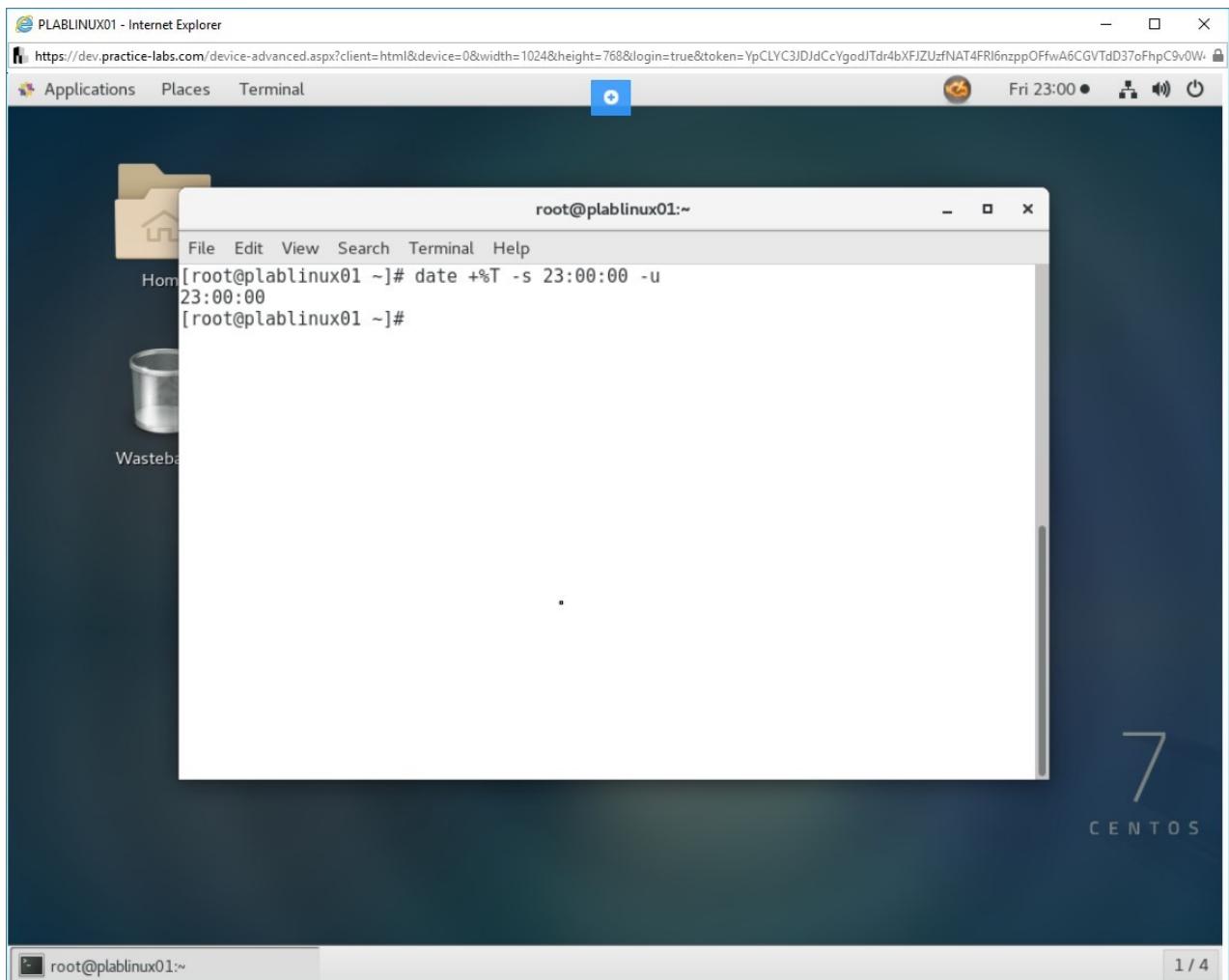


Figure 1.9 Screenshot of PLABLINUX01: Setting the new time.

Step 9

Note that the new time has been set. To view the current time, type the following command:

```
date
```

Press **Enter**.

Note: You will see a slight variation in the number of seconds from the time that you had set. This is simply because the clock is ticking.

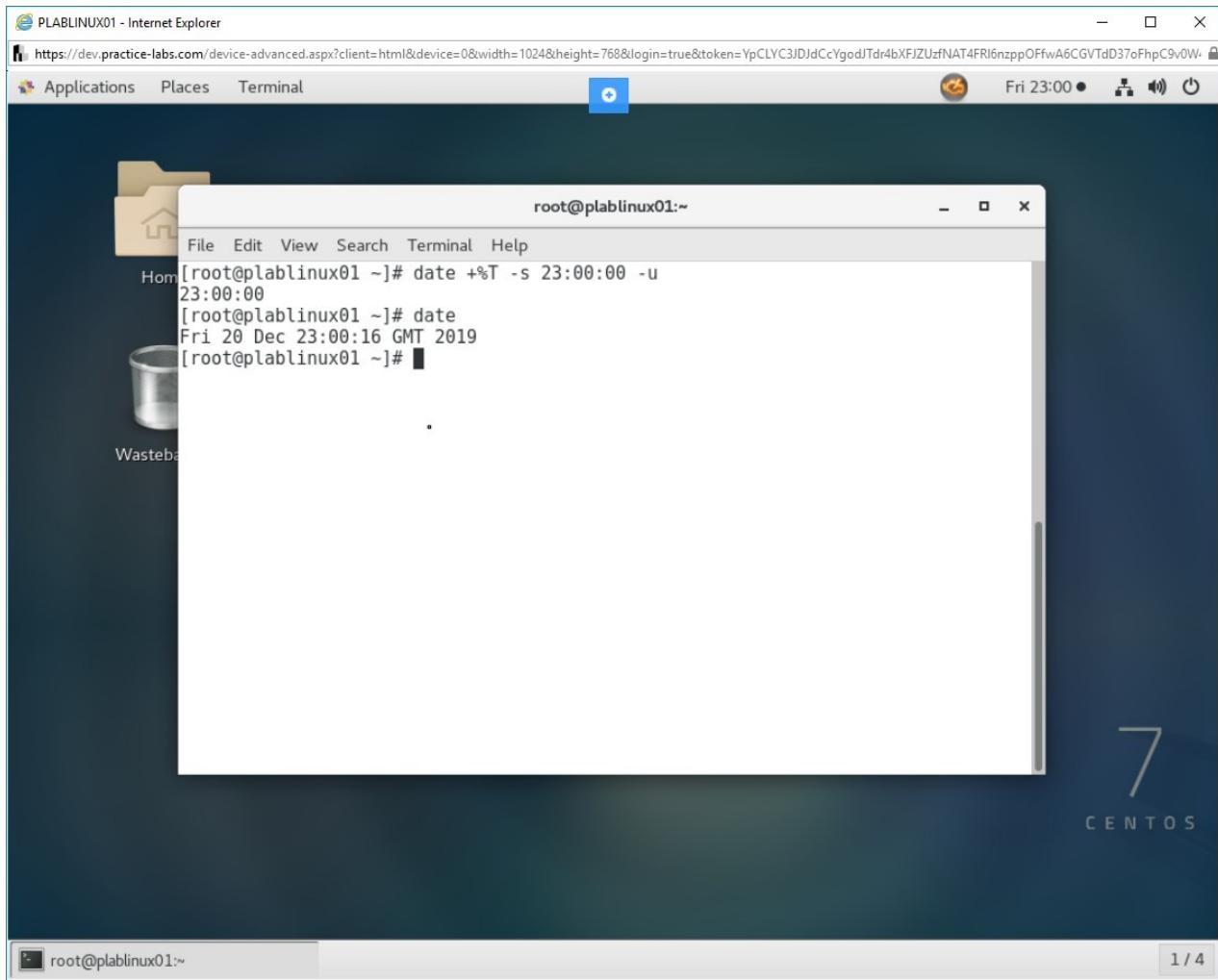


Figure 1.10 Screenshot of PLABLINUX01: Verifying that the new time has been set.

Task 2 - Set the Hardware Clock

A computer has two types of time - hardware time and system time. You can configure the hardware clock while the system time depends on the operating system. The hardware clock keeps running even when the computer is powered off. Each computer has a small battery that is used to power the hardware clock in the system. In this task, you will set the hardware clock of the Linux system on the lab.

To set the hardware clock, perform the following steps:

Step 1

Clear the screen by entering the following command:

```
clear
```

You can use the hwclock command to display the current time that the hardware clock on the computer shows. Type the following command:

```
hwclock
```

Press **Enter**.

Note: You can also use the *-r* or *--show* parameter to get the same output from the **hwclock** command.

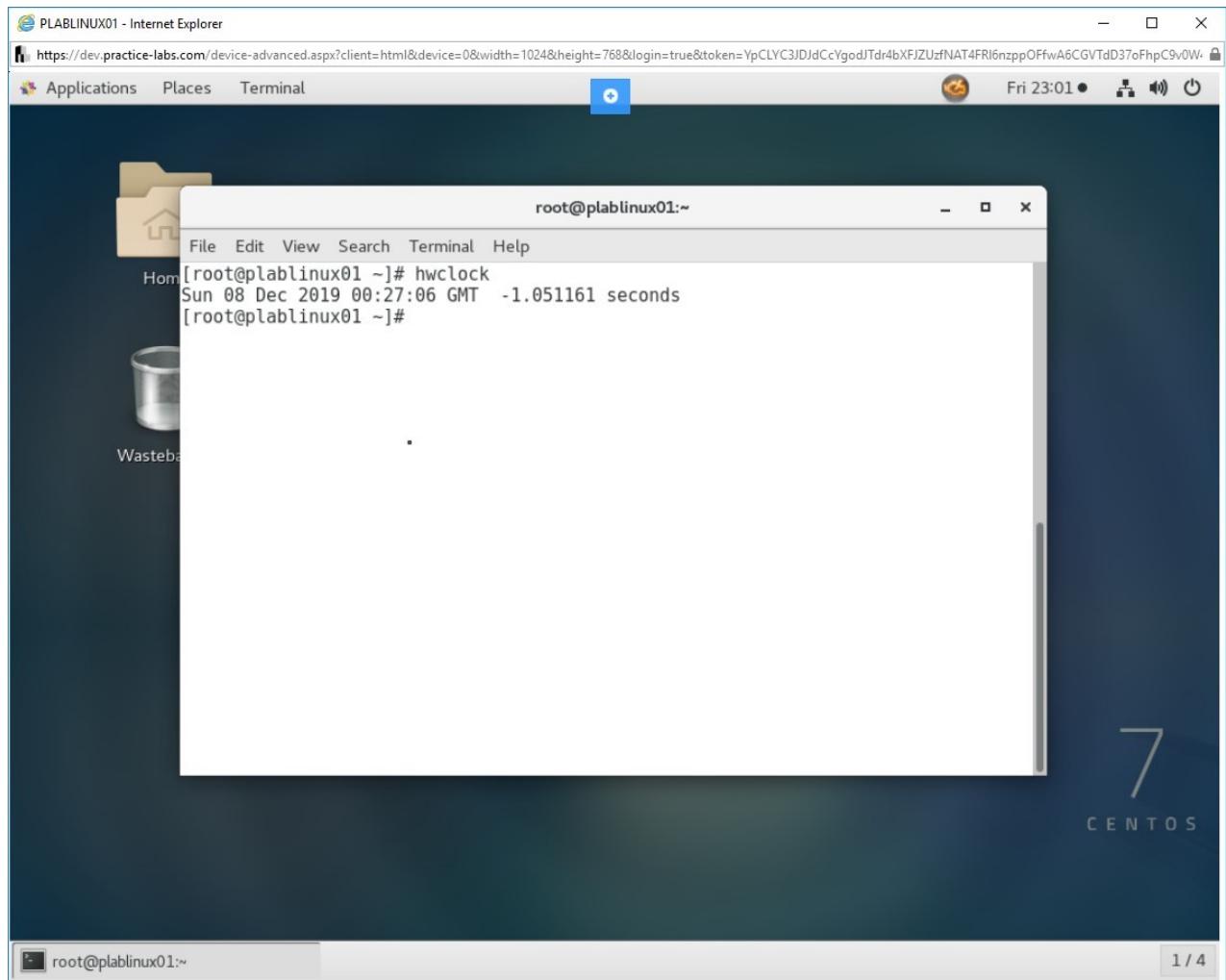


Figure 1.11 Screenshot of PLABLINUX01: Displaying the current time that the hardware clock on the computer shows.

Step 2

To list the time, type the following command:

date

Press **Enter**.

Notice that the time displayed by the date command is at a deviation of about three minutes from the time displayed by the hwclock command. Note that the difference can vary from system to system. The reason for this difference is that the date command gets inputs from the Linux kernel on the date and time.

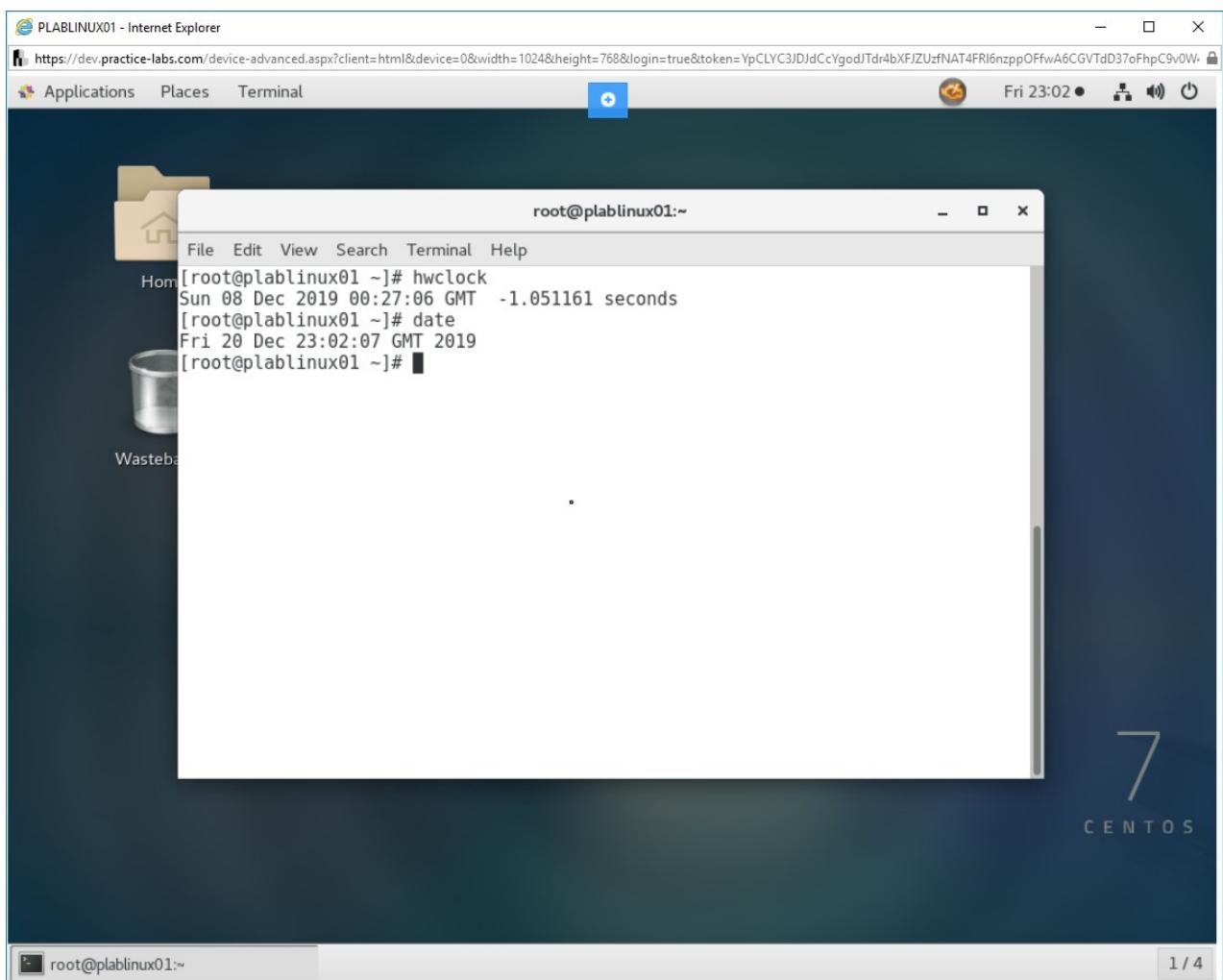


Figure 1.12 Screenshot of PLABLINUX01: Verifying the newly set date.

Step 3

You will want to set the **hwclock** as the system clock. To do this, type the following command:

```
hwclock -w
```

Press **Enter**.

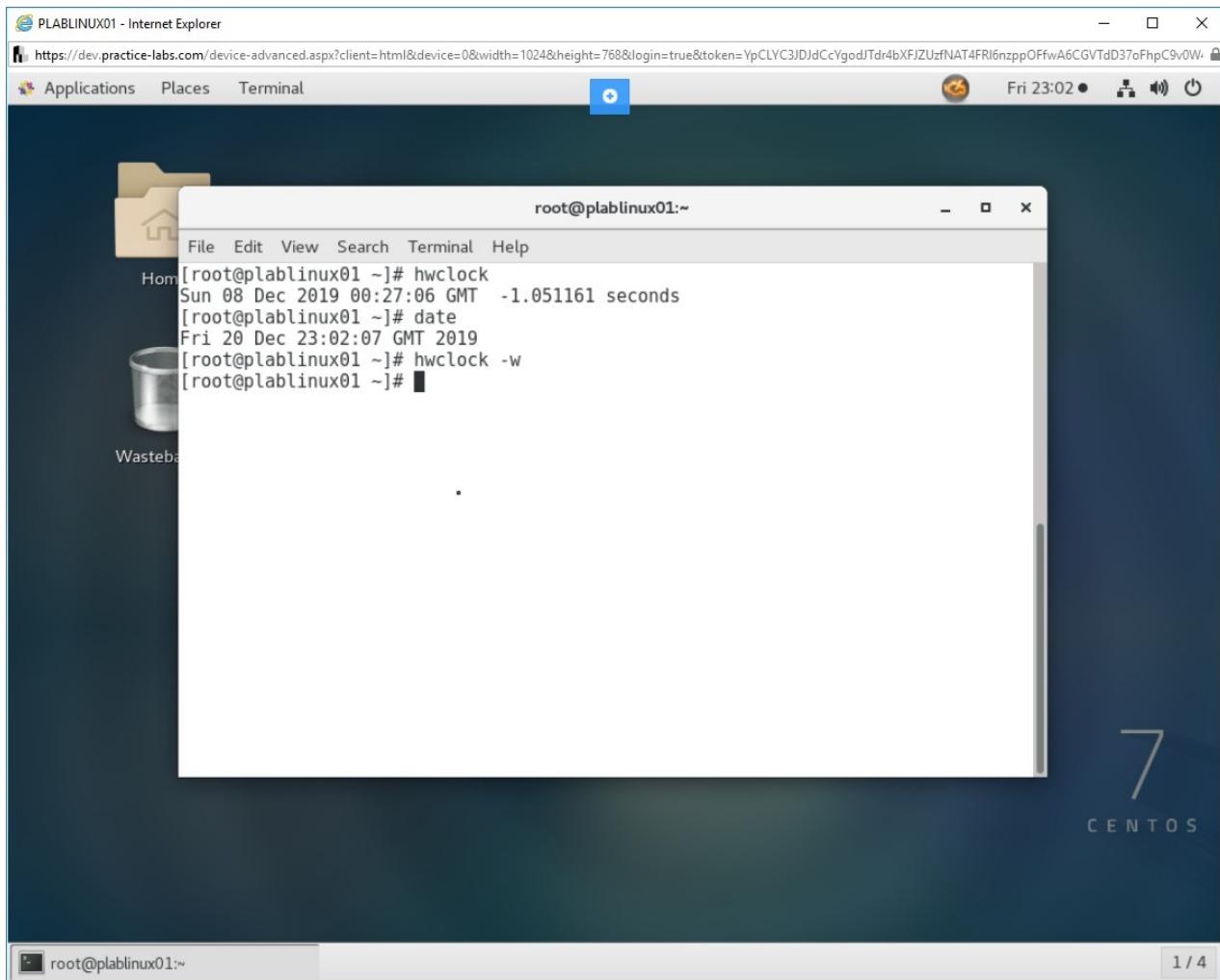


Figure 1.13 Screenshot of PLABLINUX01: Setting the hwclock as the system clock.

Step 4

Clear the screen by entering the following command:

```
clear
```

To verify that the hardware clock is now set as the system clock, type the following commands:

```
date
```

Press Enter.

Now, type the following command:

```
hwclock
```

Press Enter.

Note that the output of both the commands now displays the same time.

Note: Seconds may vary in the output displayed. You can use the **-systohc** parameter instead of **-w** to set the system time as the hardware clock.

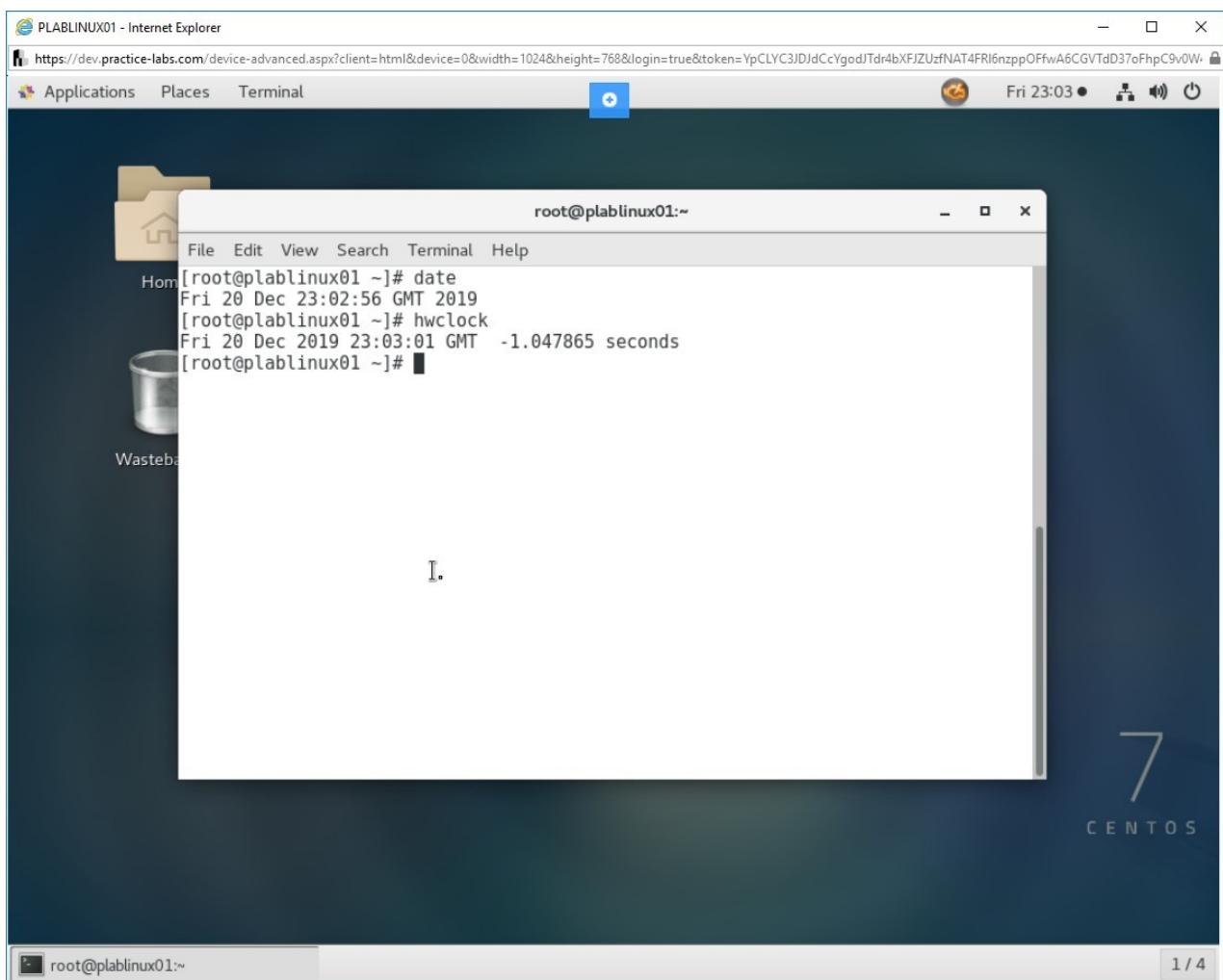


Figure 1.14 Screenshot of PLABLINUX01: Displaying the output of the date and hwclock.

Step 5

You can also set the hardware clock manually. To do so, type the following command:

```
hwclock --set --date 12/19/2018
```

Press **Enter**.

You can verify that the new time is set. To do this, type the following command:

```
hwclock
```

Press **Enter**.

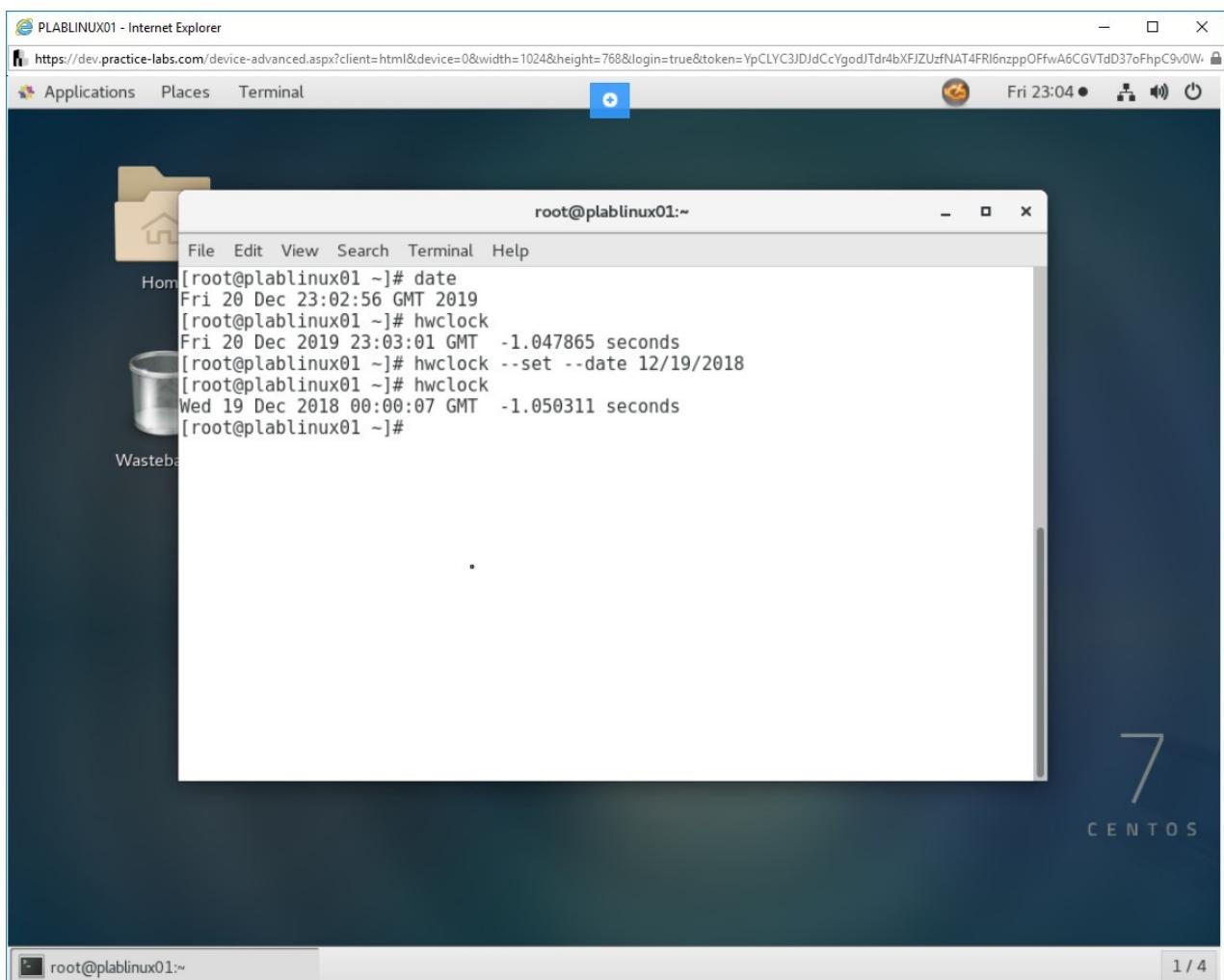


Figure 1.15 Screenshot of PLABLINUX01: Setting and showing the hardware clock

Step 6

Along with setting the date, you can also set the time. Type the following command:

```
hwclock --set --date "12/20/2018 23:10:00"
```

Press **Enter**.

You should now verify the new setting. Type the following command:

```
hwclock
```

Press **Enter**.

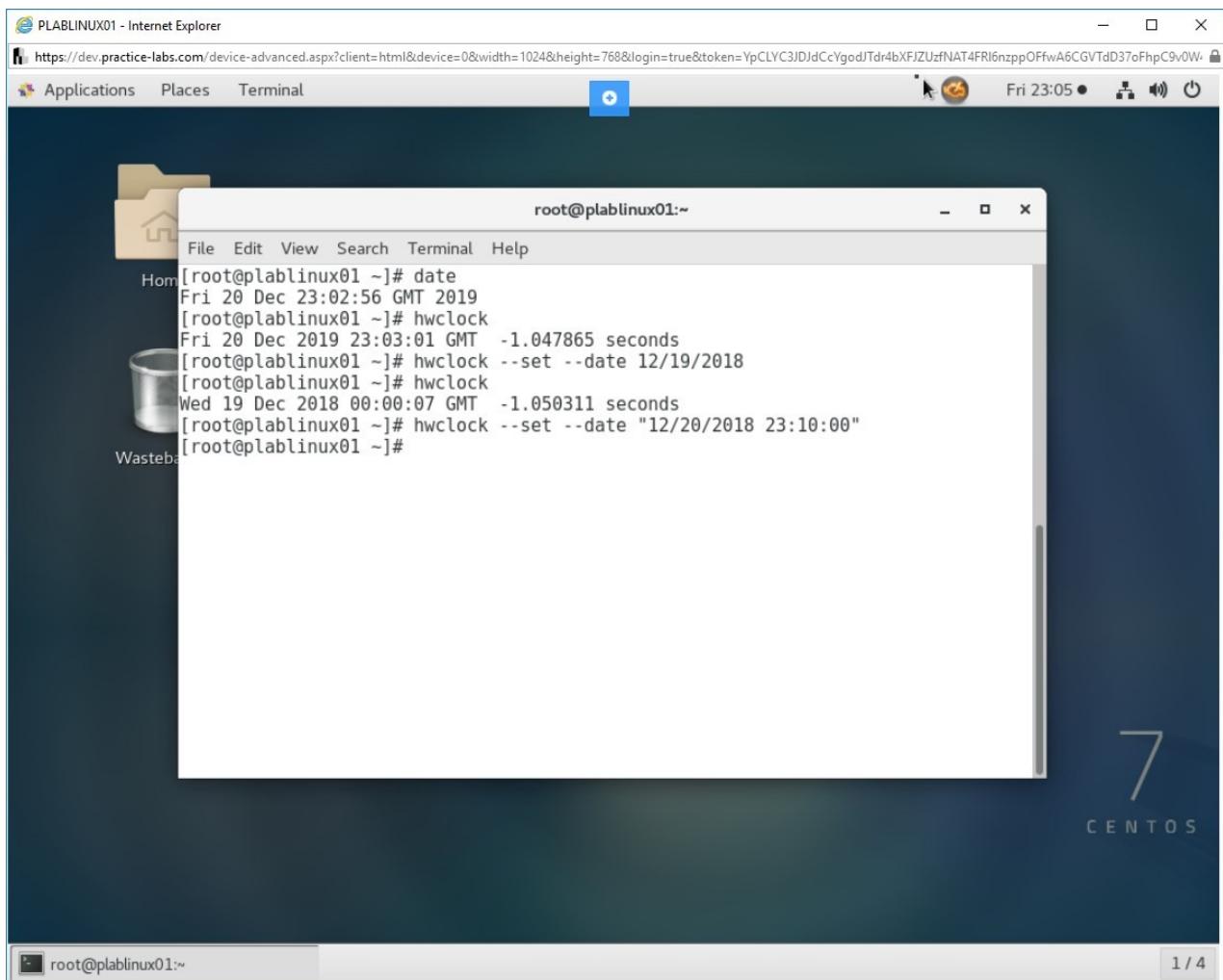


Figure 1.16 Screenshot of PLABLINUX01: Setting the new time with the hwclock command.

Step 7

You can also copy the hardware time to system time. To do this, type the following command:

```
hwclock -s
```

Press **Enter**.

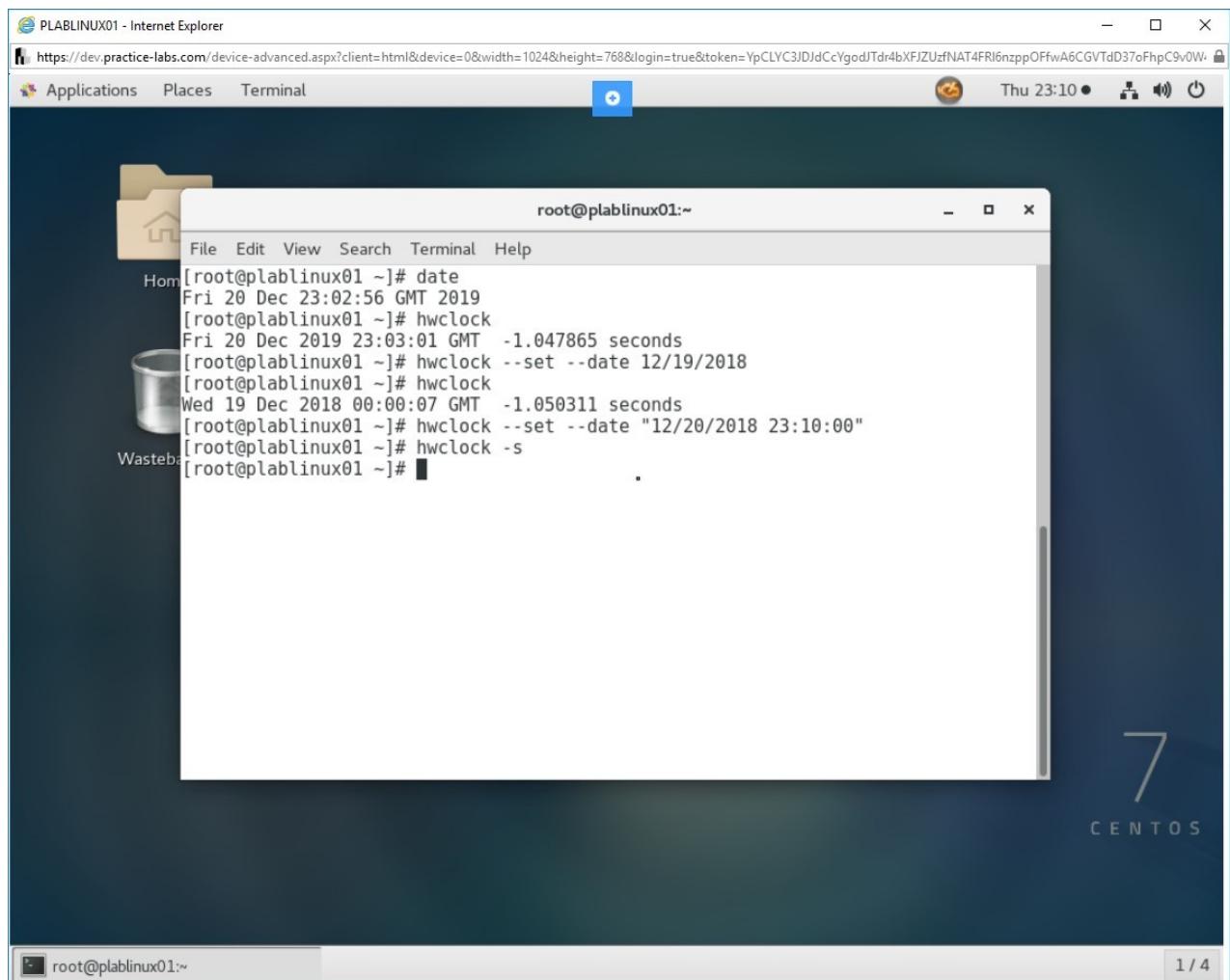


Figure 1.17 Screenshot of PLABLINUX01: Copying the hardware time to the system time.

Step 8

Clear the screen by entering the following command:

```
clear
```

Verify whether both the system and hardware clock time are same. Type the following command:

```
date
```

Press **Enter**.

Then, type the following command:

```
hwclock
```

Press **Enter**.

Note: The *-s* parameter and *-hctosys* parameters are same.

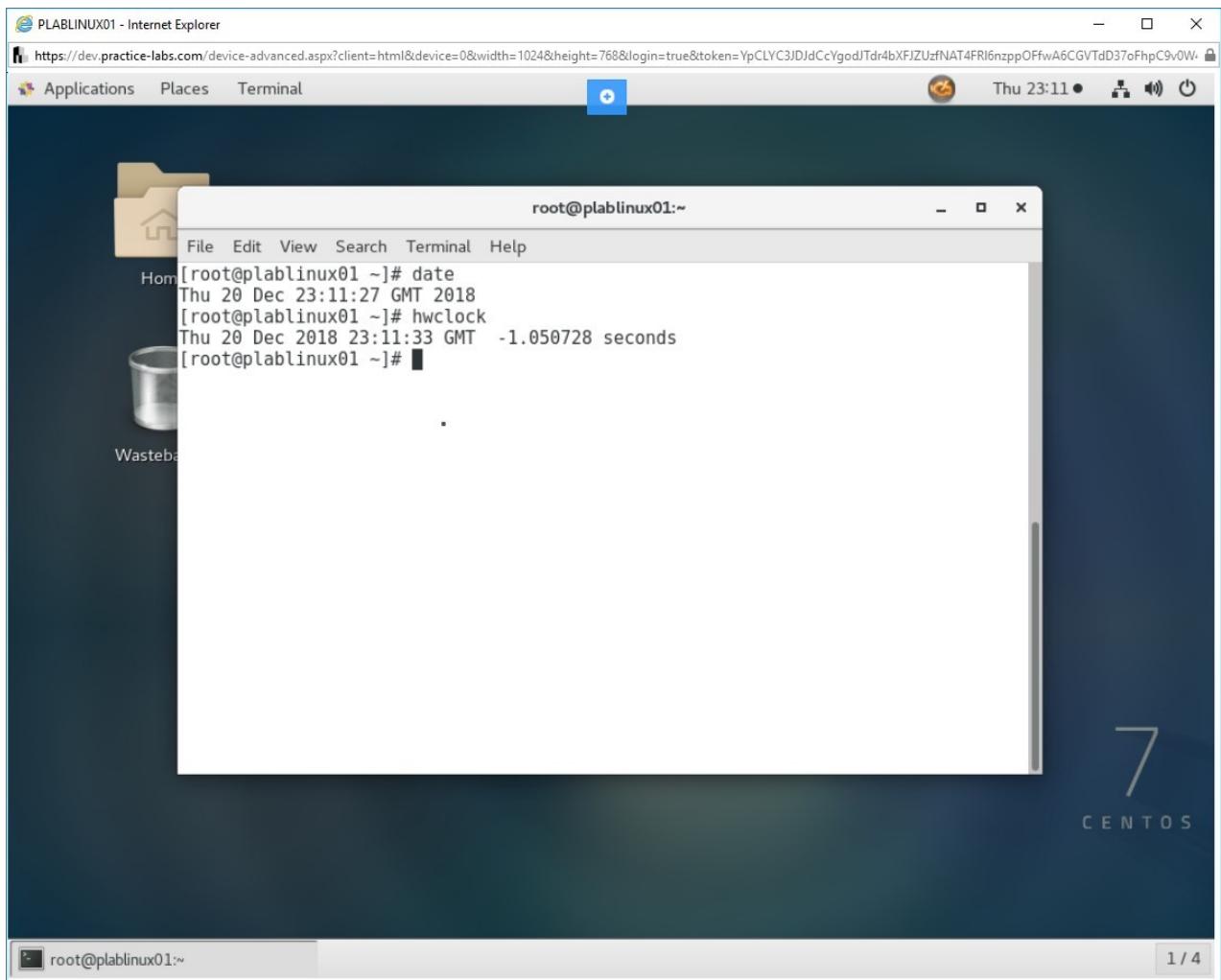


Figure 1.18 Screenshot of PLABLINUX01: Verifying whether both the system and hardware clock time are same.

Task 3 - Configure the Time Zone

Fedora uses UTC as the default time zone. However, you can change it to any other time zone that you desire. In this task, you will configure the Chicago time zone on a Fedora Linux system.

To configure the time zone on a Fedora Linux system, perform the following steps:

Step 1

Clear the screen by entering the following command:

```
clear
```

You can obtain the complete listing about the various time zones available from the **/usr/share/zoneinfo** directory. To do this, type the following command:

```
ls /usr/share/zoneinfo/
```

Press **Enter**.

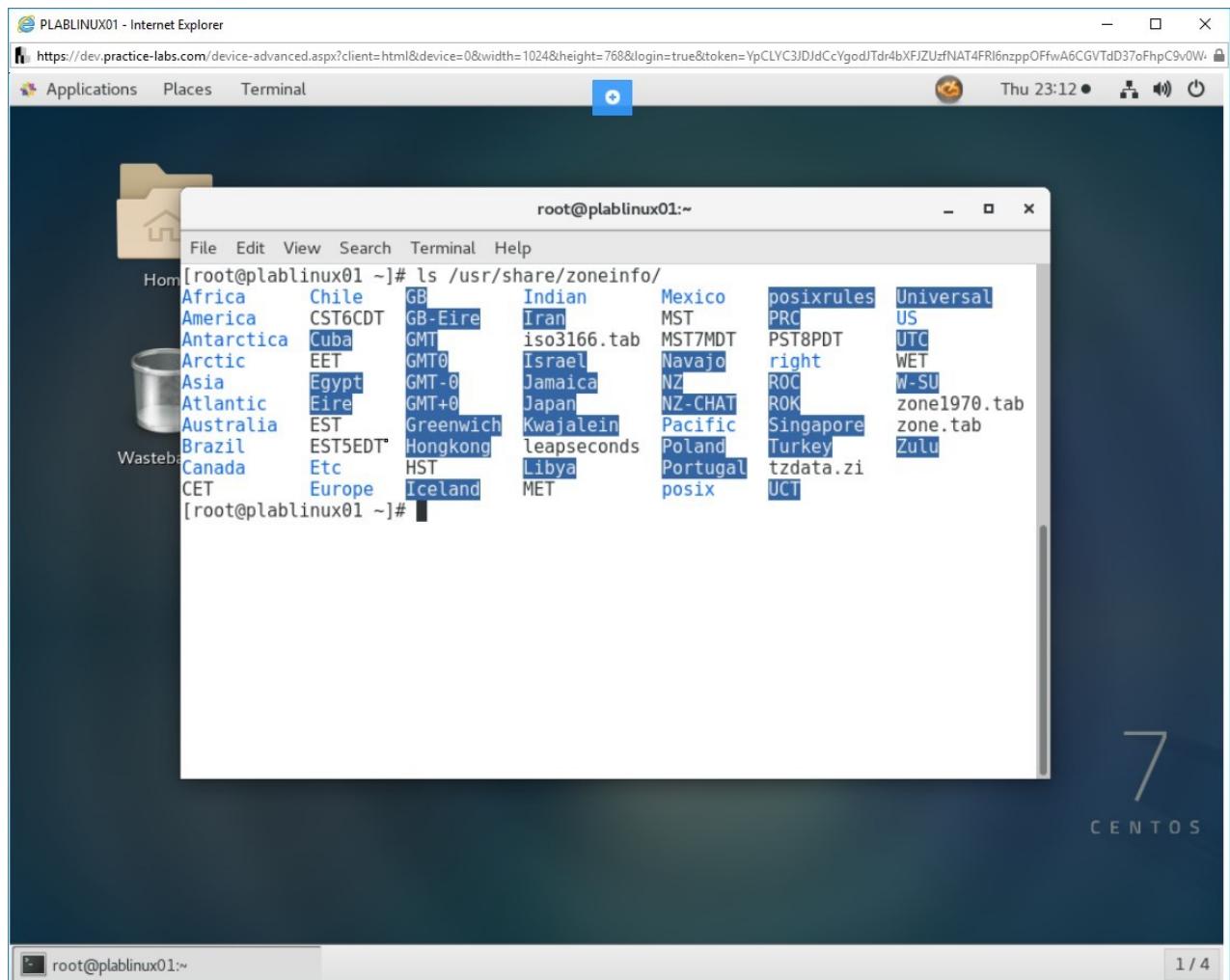


Figure 1.19 Screenshot of PLABLINUX01: Listing the various time zones available from the **/usr/share/zoneinfo** directory.

Step 2

Clear the screen by entering the following command:

```
clear
```

You will now copy the **Chicago** file into your **/etc/localtime** file. To do this, type the following commands:

```
cd /usr/share/zoneinfo/  
ls  
cd America/  
ls
```

Press **Enter** after each command.

Note that there are a number of files in this folder.

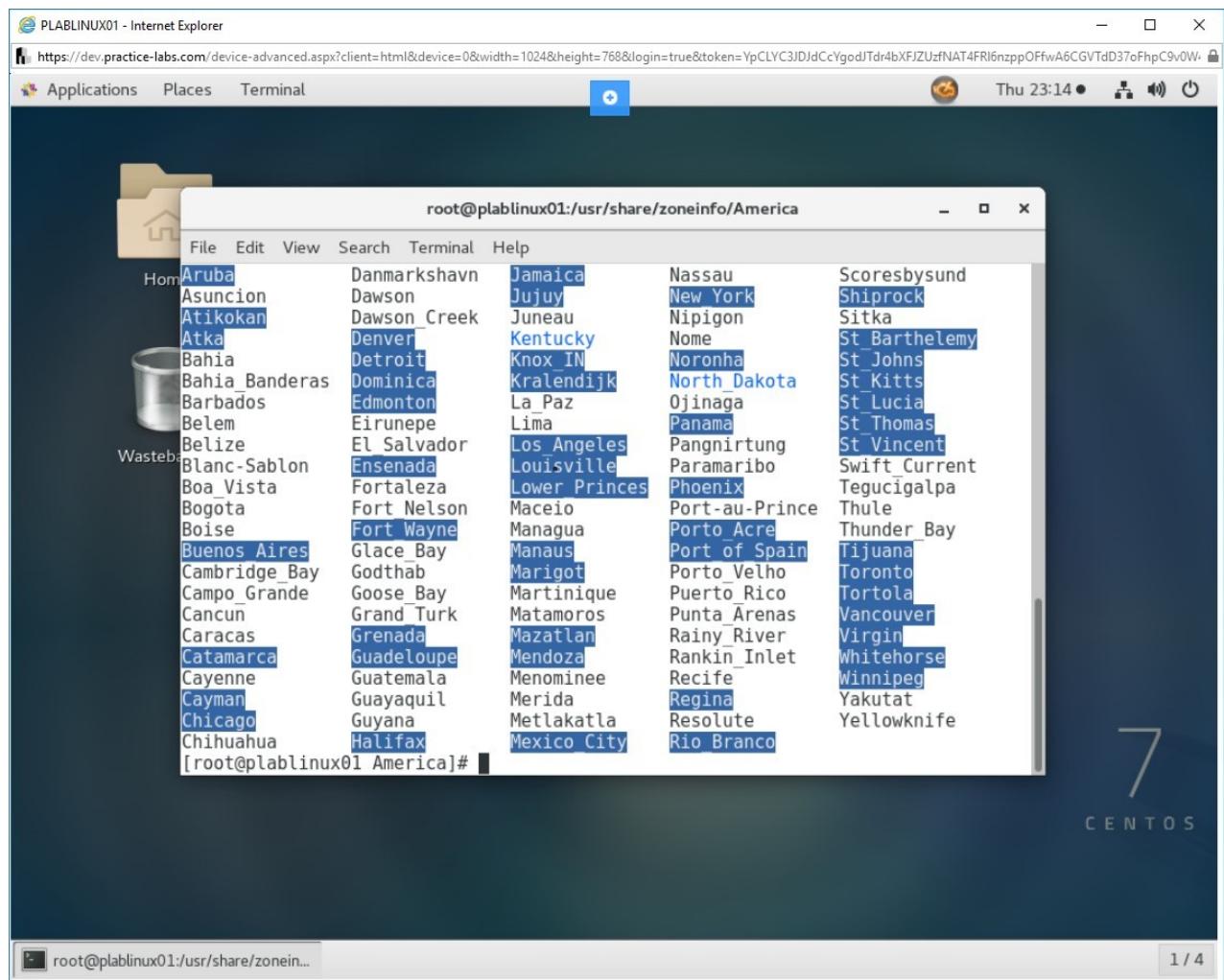


Figure 1.20 Screenshot of PLABLINUX01: Displaying the zone files in the /America directory.

Step 3

Before you change the time zone, make a note of the existing time zone. Type the following command:

```
date
```

Press **Enter**.

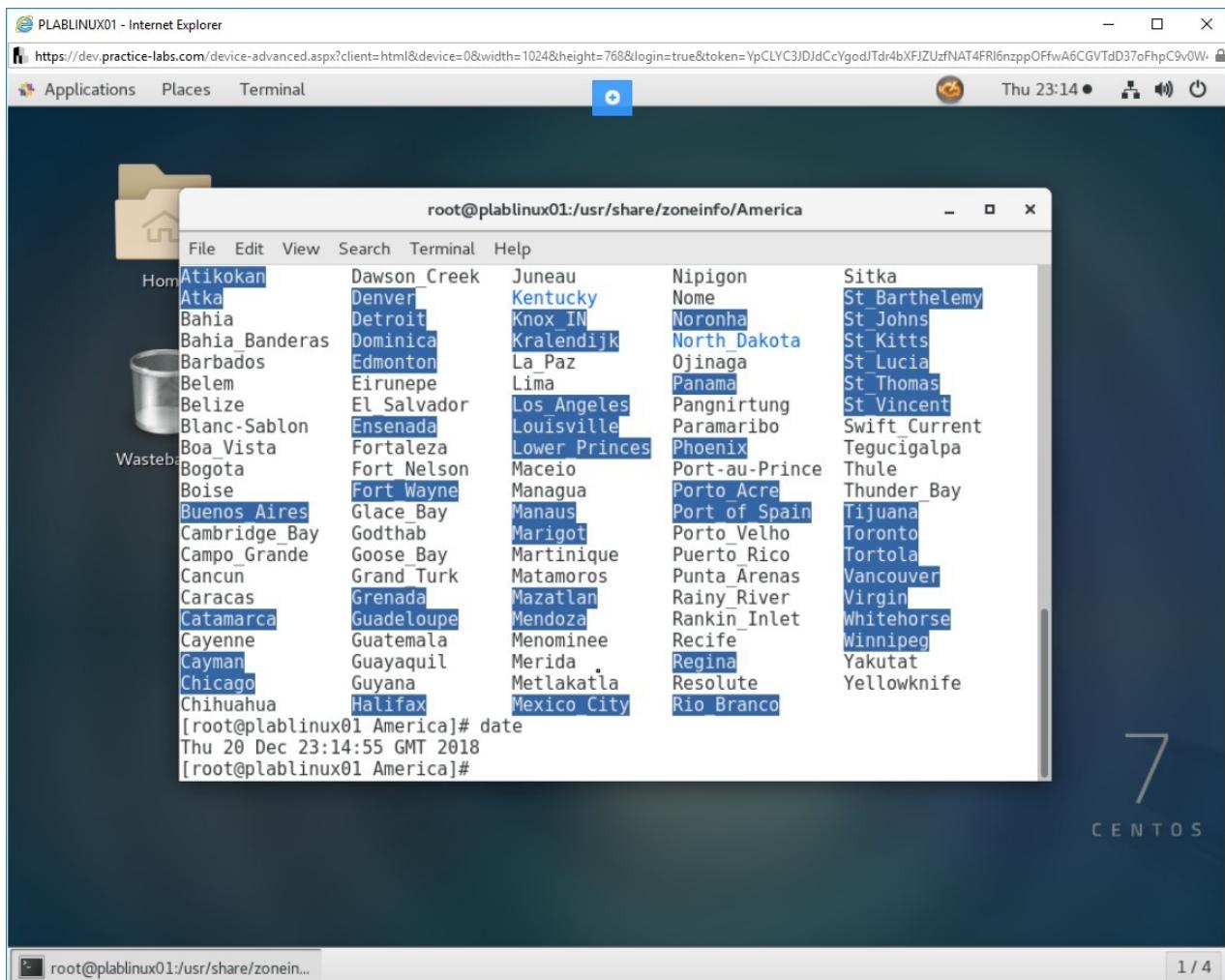


Figure 1.21 Screenshot of PLABLINUX01: Displaying the date.

Step 4

Clear the screen by entering the following command:

```
clear
```

Now, copy the **Chicago** file into the **/etc/localtime** file. Type the following command:

```
cp Chicago /etc/localtime
```

Press **Enter**.

When prompted for confirmation, type:

```
yes
```

Press **Enter**.

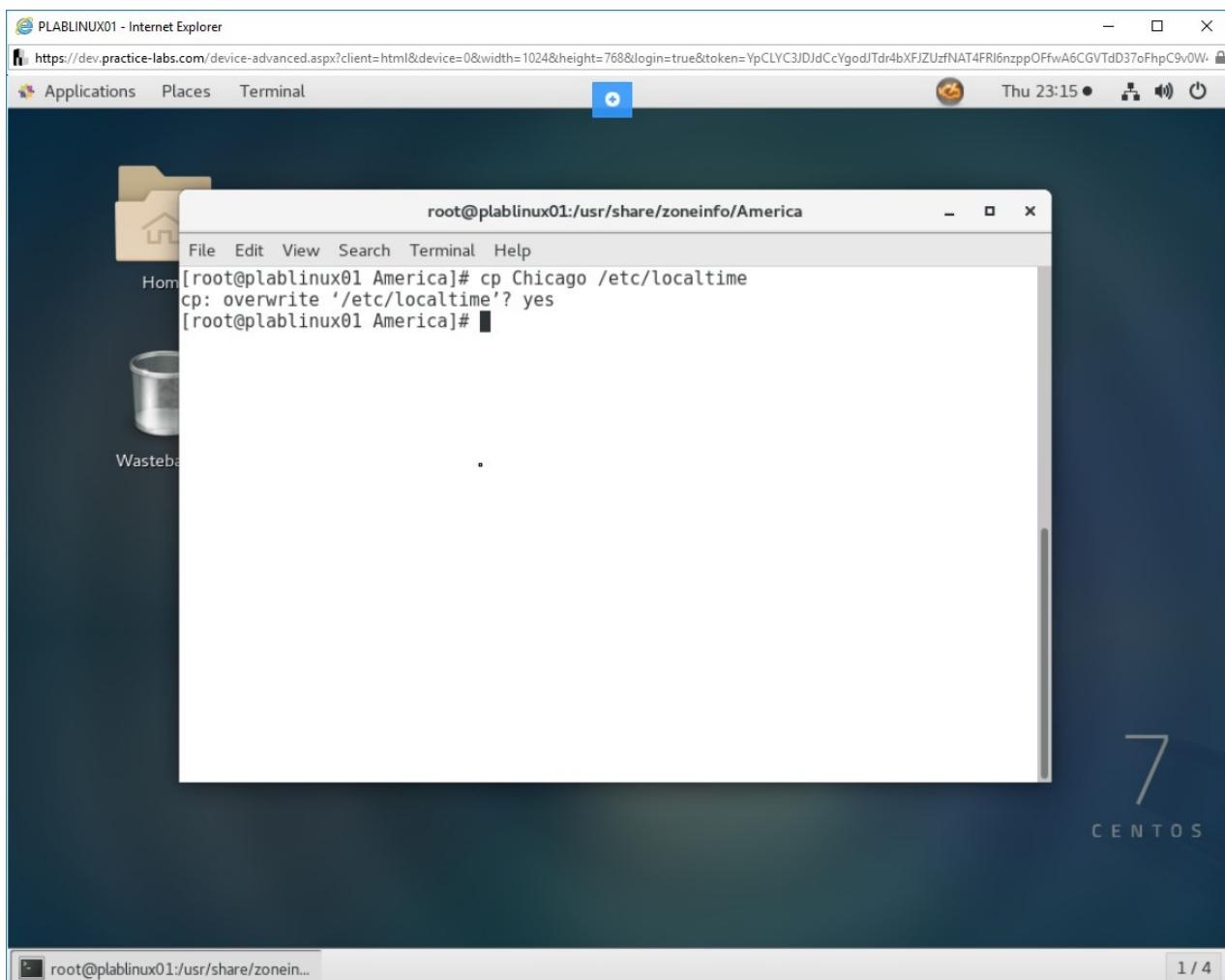


Figure 1.22 Screenshot of PLABLINUX01: Copying the Chicago file into the **/etc/localtime** file.

Step 5

You can verify whether the **time zone** has changed. Type the following command:

```
date
```

Press **Enter**.

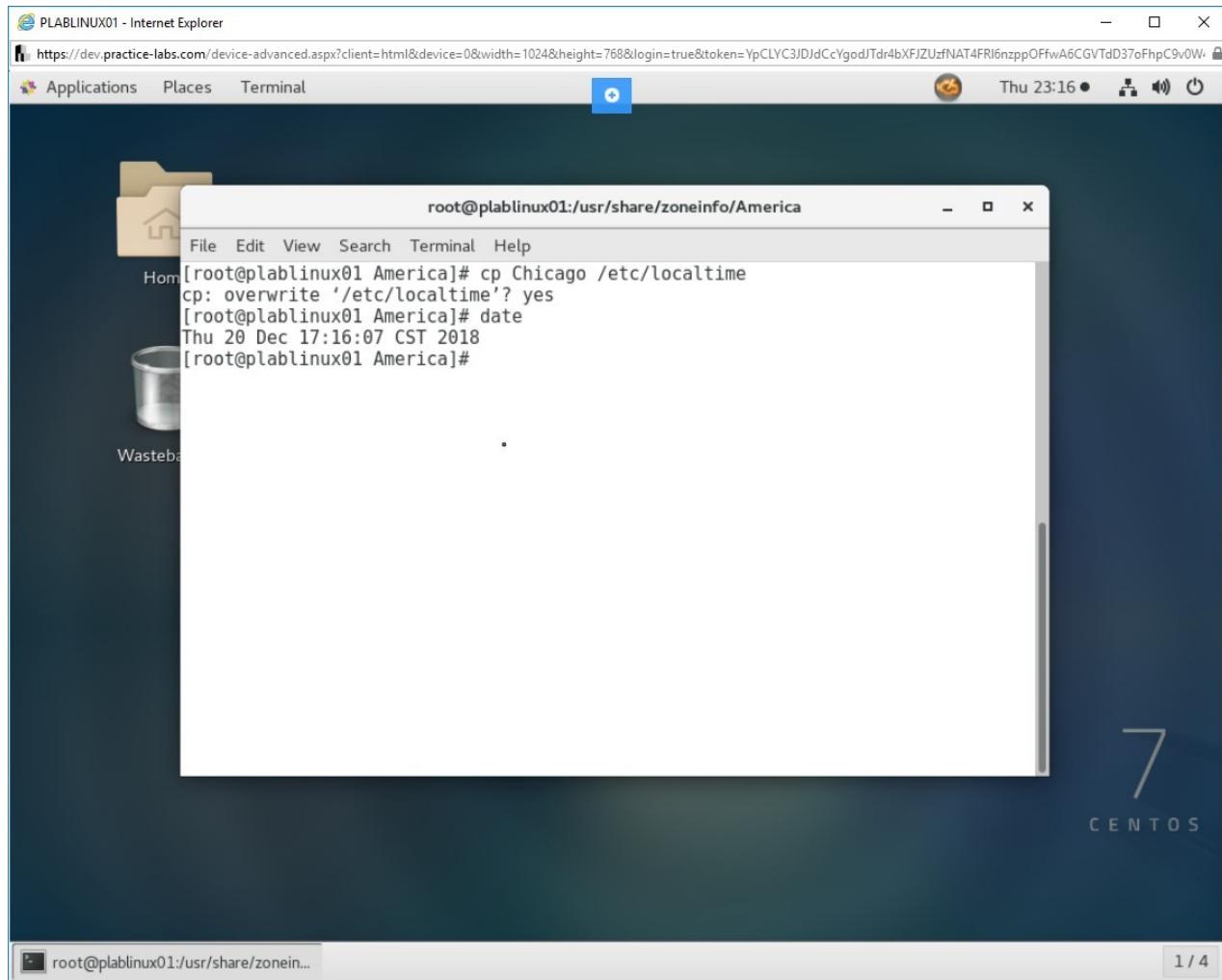


Figure 1.23 Screenshot of PLABLINUX01: Displaying the changed time zone.

Task 4 - Basic NTP configuration

Network Time Protocol (NTP) is used to set and synchronize the clocks of one or more systems that are on a network. You can configure an internal NTP server and allow the network systems to synchronize their time with it. The internal NTP server can, in turn, synchronize with an external NTP server. In this task, you will configure the time of the local system to synchronize with the remote NTP host. To perform the basic NTP configuration, perform the following steps:

Step 1

Clear the screen by entering the following command:

```
clear
```

First, change to the home directory. Type the following command:

```
cd \
```

Press **Enter** twice.

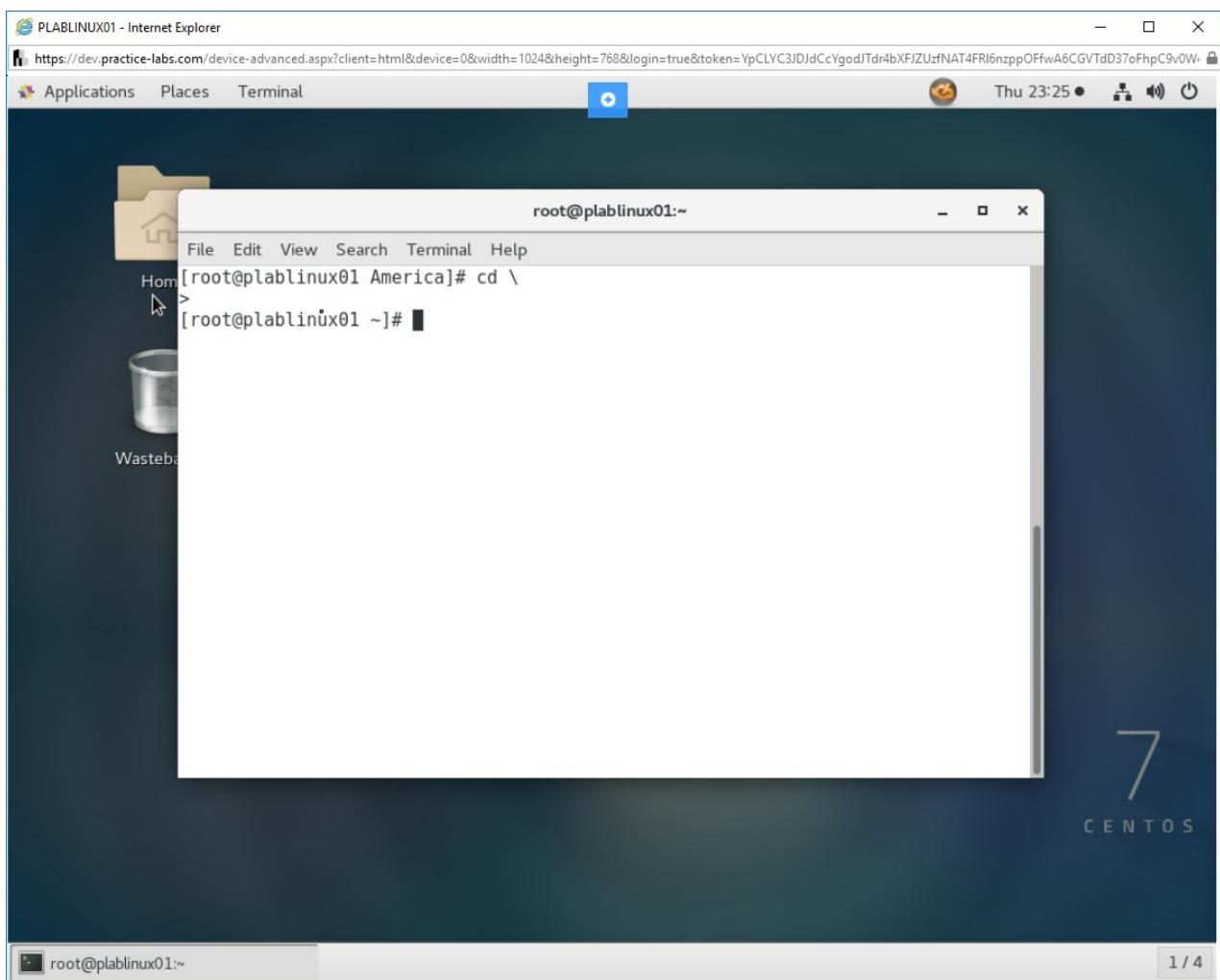


Figure 1.24 Screenshot of PLABLINUX01: Changing to the home directory.

Step 2

You will need to install the ntp daemon on this system to configure synchronization with the NTP servers. To install the ntp daemon, type the following command:

```
yum install ntp
```

Press **Enter**.

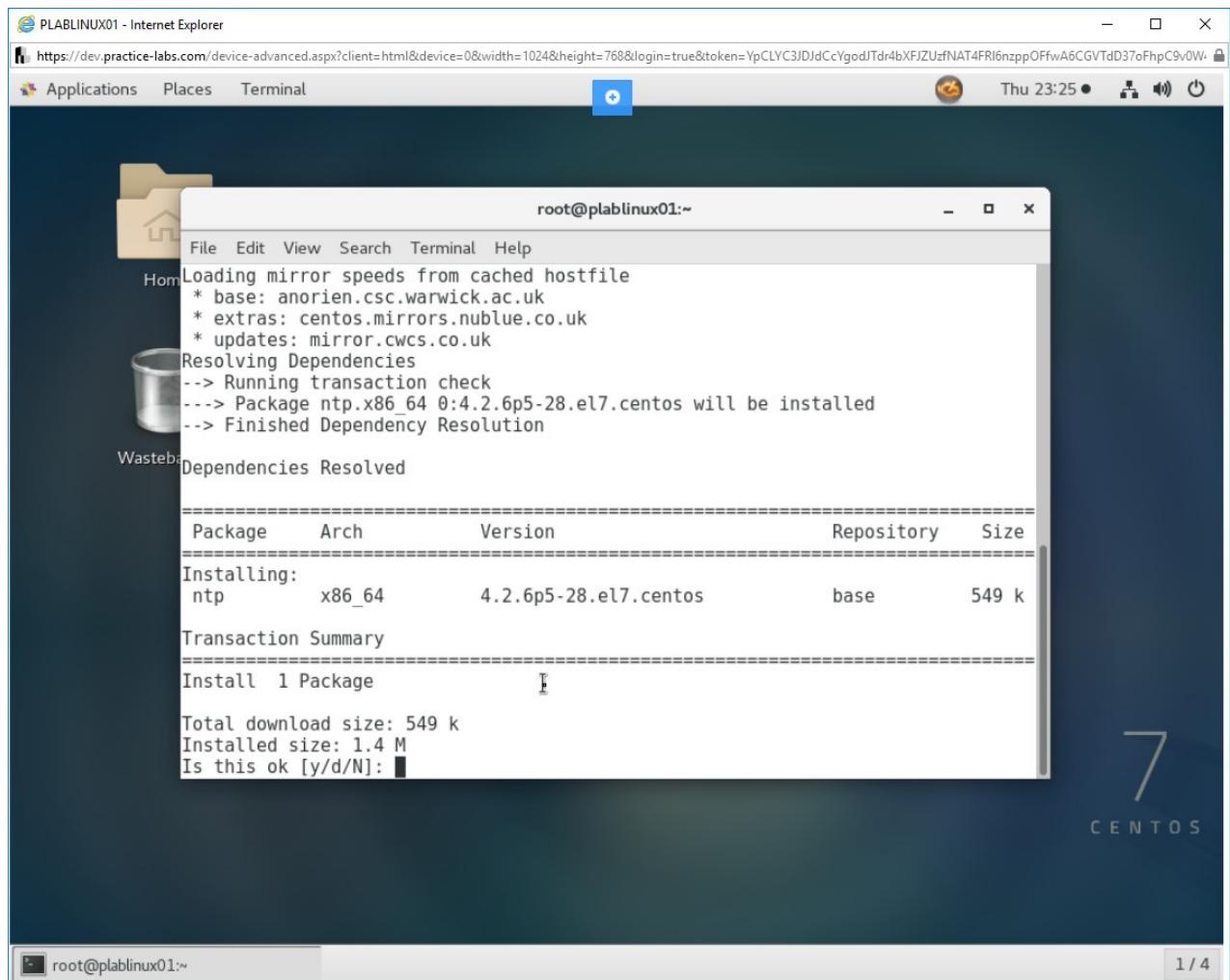


Figure 1.25 Screenshot of PLABLINUX01: Installing the ntp daemon.

Step 3

Press the following to proceed with the installation:

```
y
```

Press **Enter**.

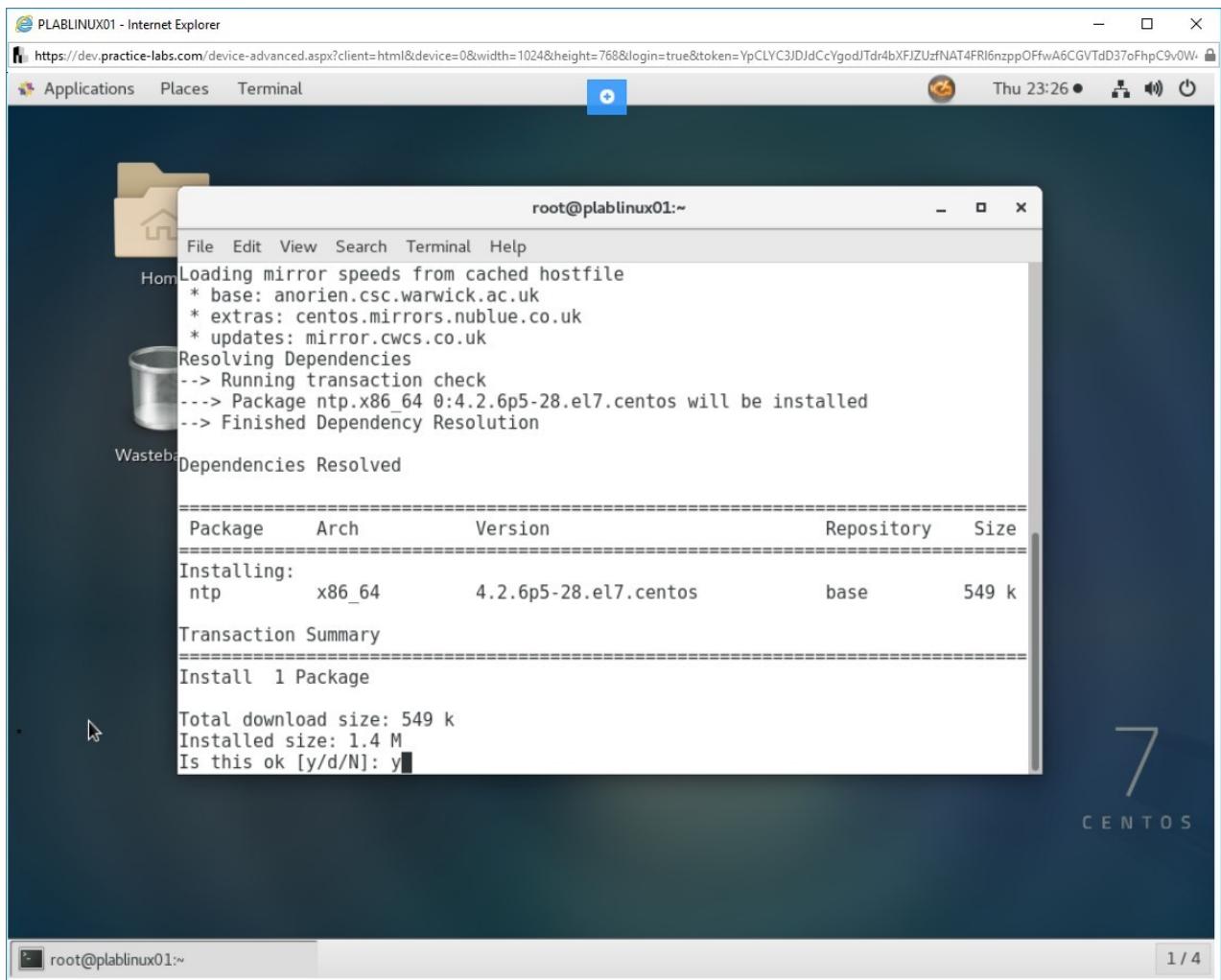


Figure 1.26 Screenshot of PLABLINUX01: Confirming the installation.

Step 4

The installation process begins. After successful installation, you will see the **Completed** message.

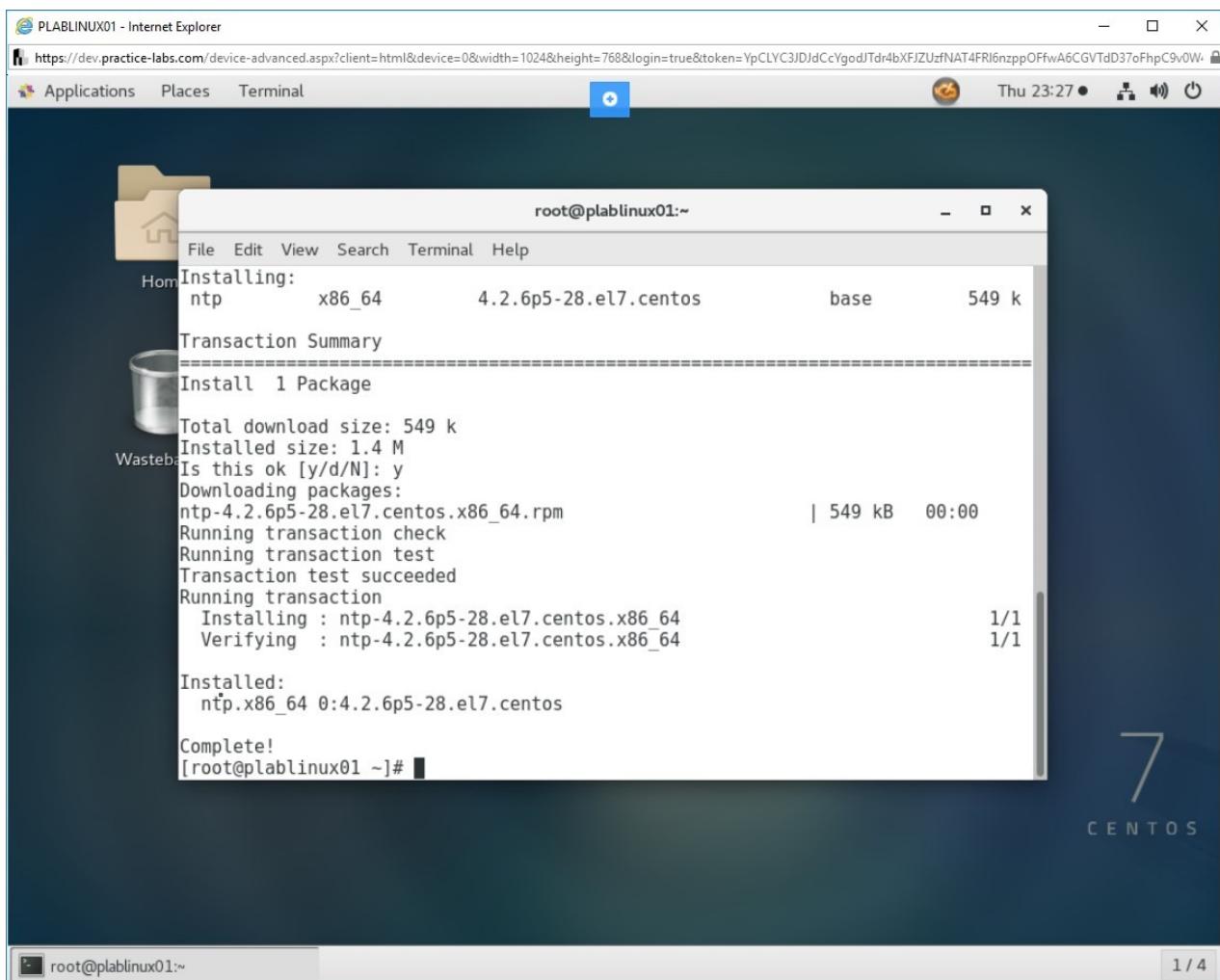


Figure 1.27 Screenshot of PLABLINUX01: Showing the completed status of the installation.

Step 5

Clear the screen by entering the following command:

```
clear
```

ntpd is the core daemon referenced in the **/etc/ntp.conf** file. This daemon:

- Synchronizes the PC clock with local or NTP servers
- Adjusts the rate of the kernel's clock-tick to track time accurately
- Synchronizes time with the other NTP clients

The **/etc/ntp.conf** file contains a list of servers that **ntpd** connects to.

To view the **/etc/ntp.conf** file, type the following command:

```
cat /etc/ntp.conf
```

Press **Enter**.

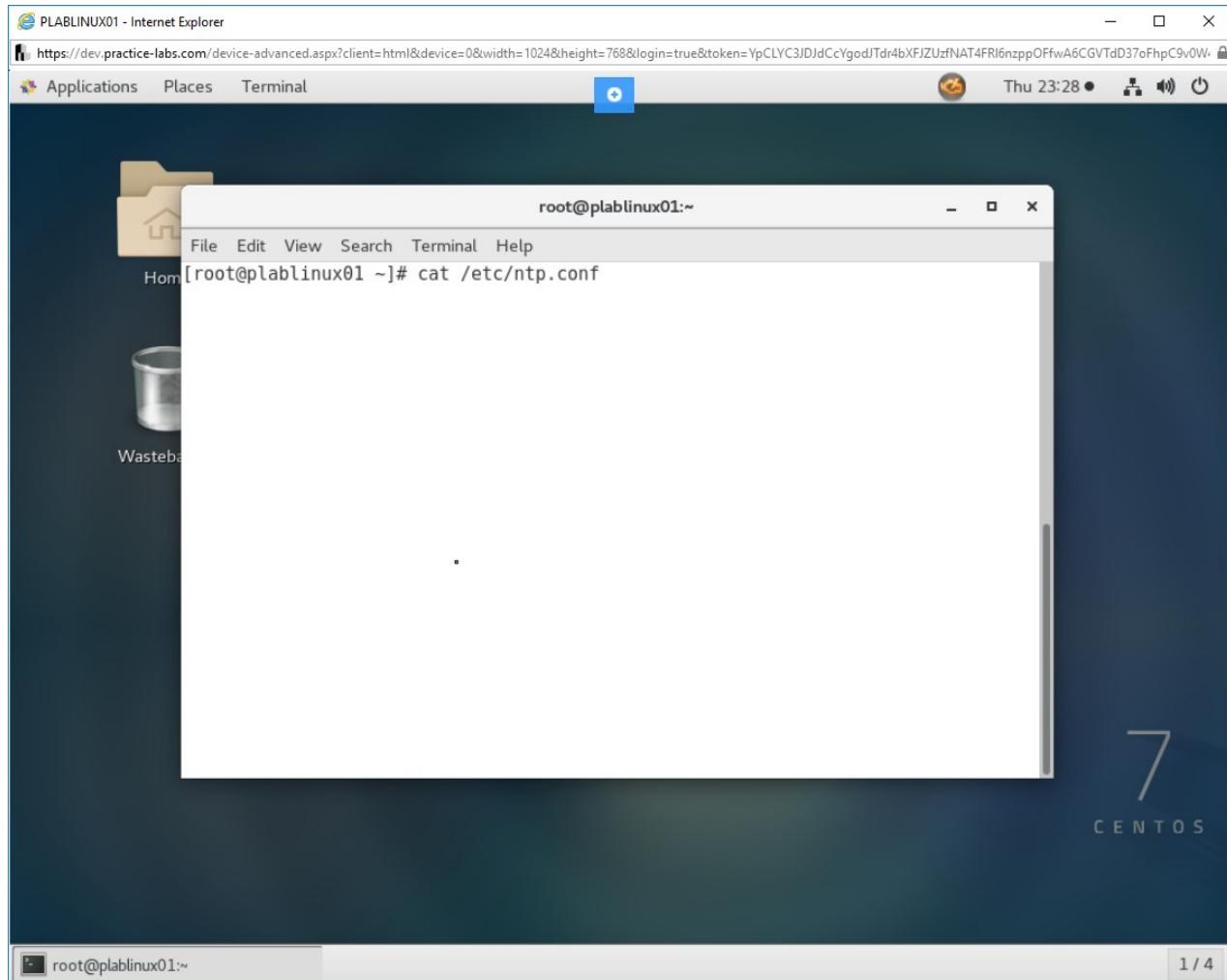


Figure 1.28 Screenshot of PLABLINUX01: Viewing the /etc/ntp.conf file.

The content of the **/etc/ntp.conf** file is displayed.

```
root@plablinux01:~
```

```
File Edit View Search Terminal Help
```

```
Hon includefile /etc/ntp/crypto/pw
```

```
# Key file containing the keys and key identifiers used when operating
# with symmetric key cryptography.
keys /etc/ntp/keys
```

```
# Specify the key identifiers which are trusted.
#trustedkey 4 8 42
```

```
Wastebe# Specify the key identifier to use with the ntpdc utility.
#requestkey 8
```

```
# Specify the key identifier to use with the ntpq utility.
#controlkey 8
```

```
# Enable writing of statistics records.
#statistics clockstats cryptostats loopstats peerstats
```

```
# Disable the monitoring facility to prevent amplification attacks using ntpdc
# monlist command when default restrict does not include the noquery flag. See
# CVE-2013-5211 for more details.
# Note: Monitoring will not be disabled with the limited restriction flag.
disable monitor
```

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

Figure 1.29 Screenshot of PLABLINUX01: Displaying the contents of the /etc/ntp.conf file.

Step 6

Navigate to the server section. You may have to scroll up. Note the servers section displays a list of servers configured as NTP servers.

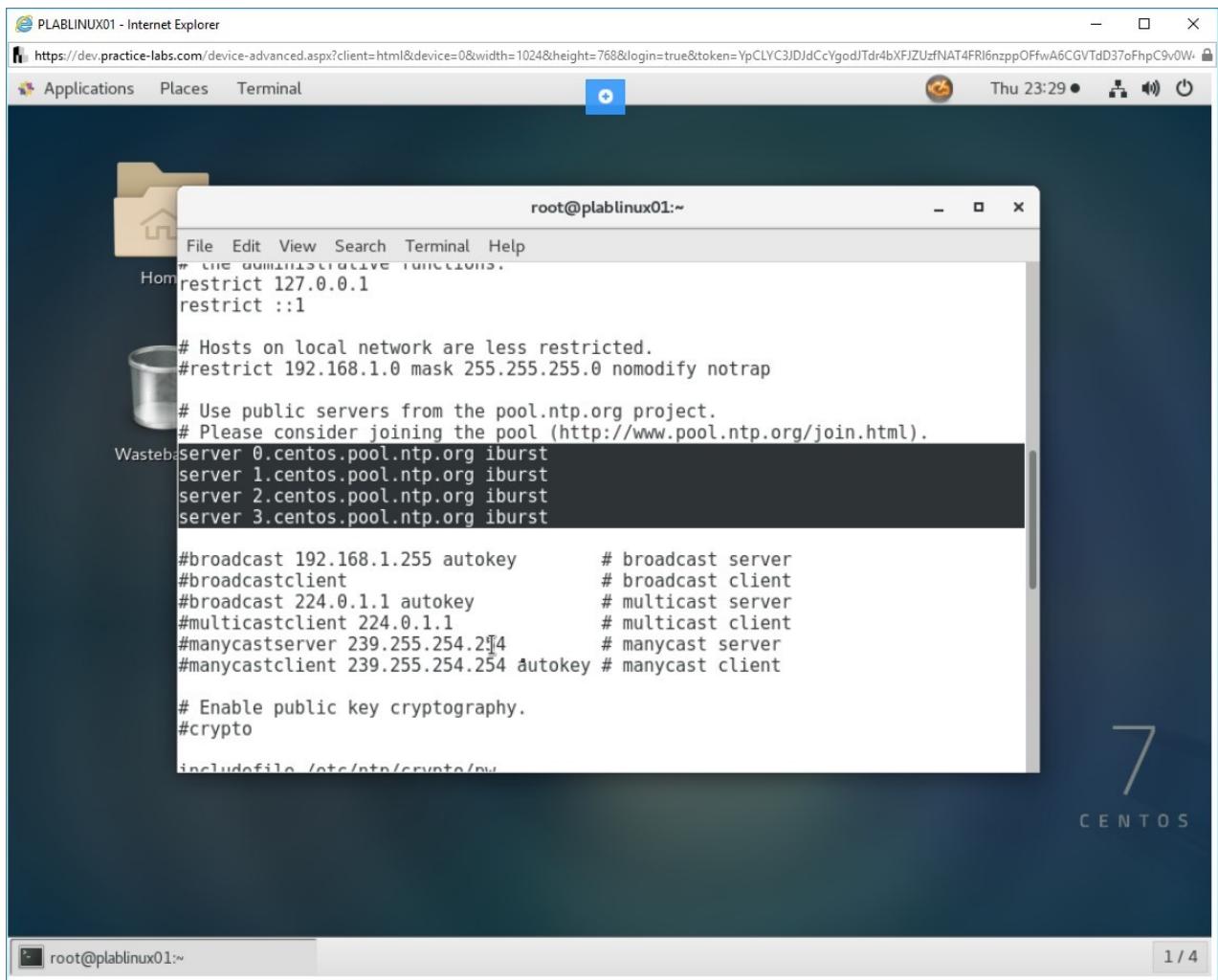


Figure 1.30 Screenshot of PLABLINUX01: Displaying the list of ntp servers in the /etc/ntp.conf file.

Task 5 - Run the ntpq Command

The **ntpq** command is the NTP query program that sends NTP messages to the NTP host. If no host is available, then it sends the messages to the localhost. In this task, you will use the **ntpq** command to list the peers.

To use the **ntpq** command, perform the following steps:

Step 1

Clear the screen by entering the following command:

```
clear
```

You will need to print the list of known peers. Type the following commands:

```
ntpq -n pool.ntp.org
```

Press **Enter**.

The ntpq command prompt is displayed.

Note: The name **pool.ntp.org** is not resolved. Therefore, you will need to use the **host** command to connect with the IP address.

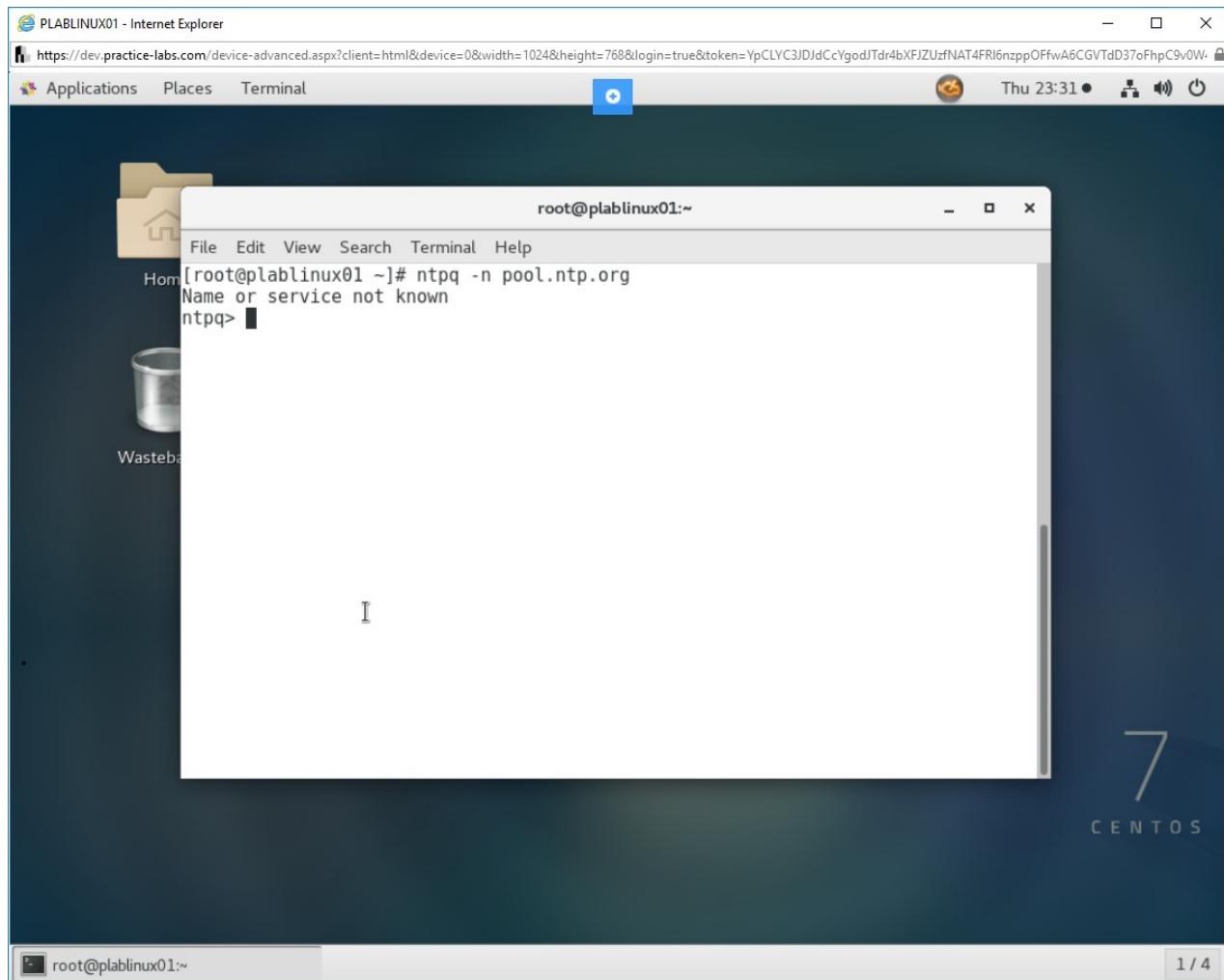


Figure 1.31 Screenshot of PLABLINUX01: Printing the list of known peers.

Step 2

To set the current host, type the following command:

```
host 202.71.136.67
```

Press **Enter**.

The host is now set to **202.71.136.67**. This command performs a reverse lookup on the IP address **202.71.136.67**.

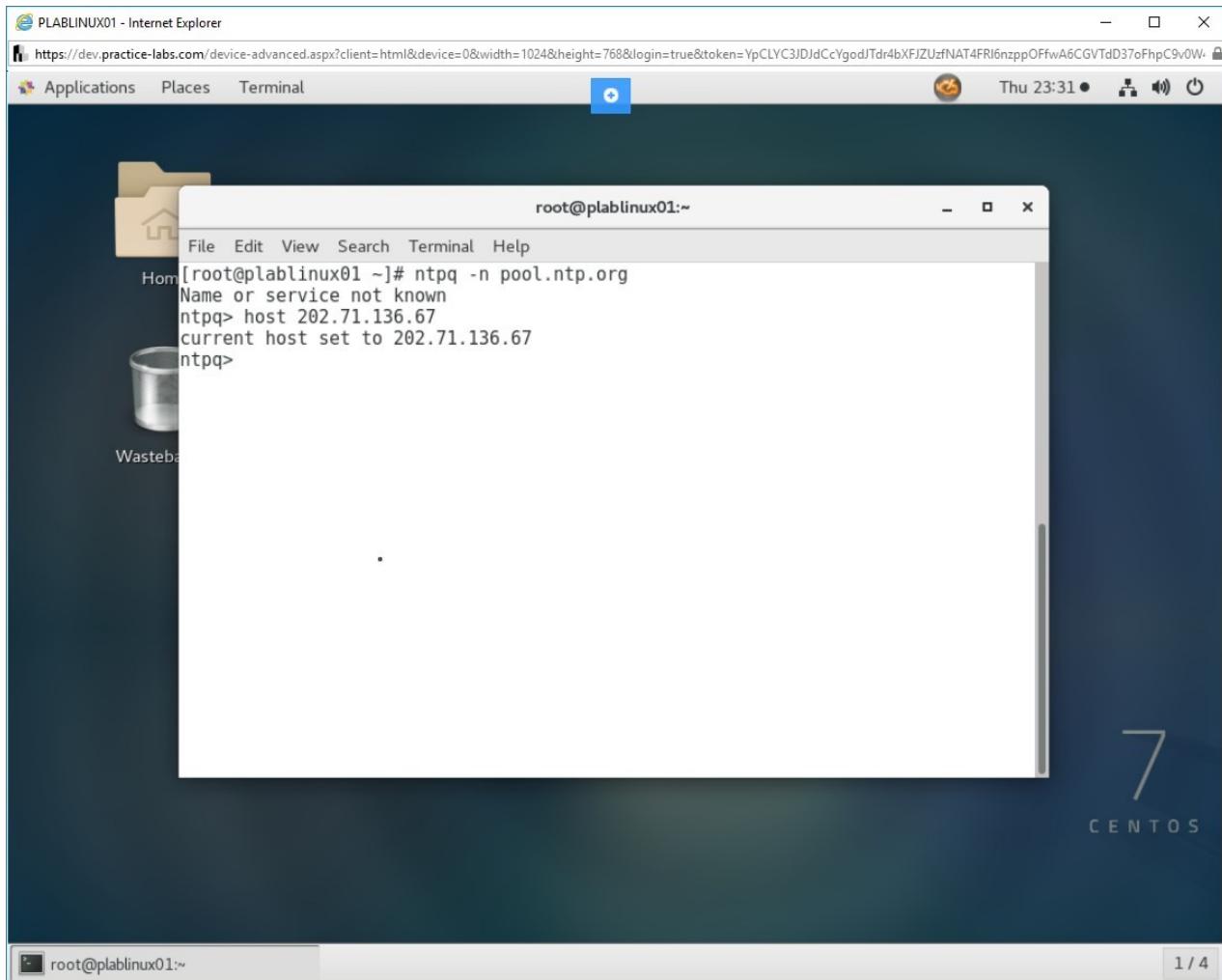


Figure 1.32 Screenshot of PLABLINUX01: Setting the current host.

Step 3

You need to list the known peers. Type the following command:

```
peers
```

Press **Enter**.

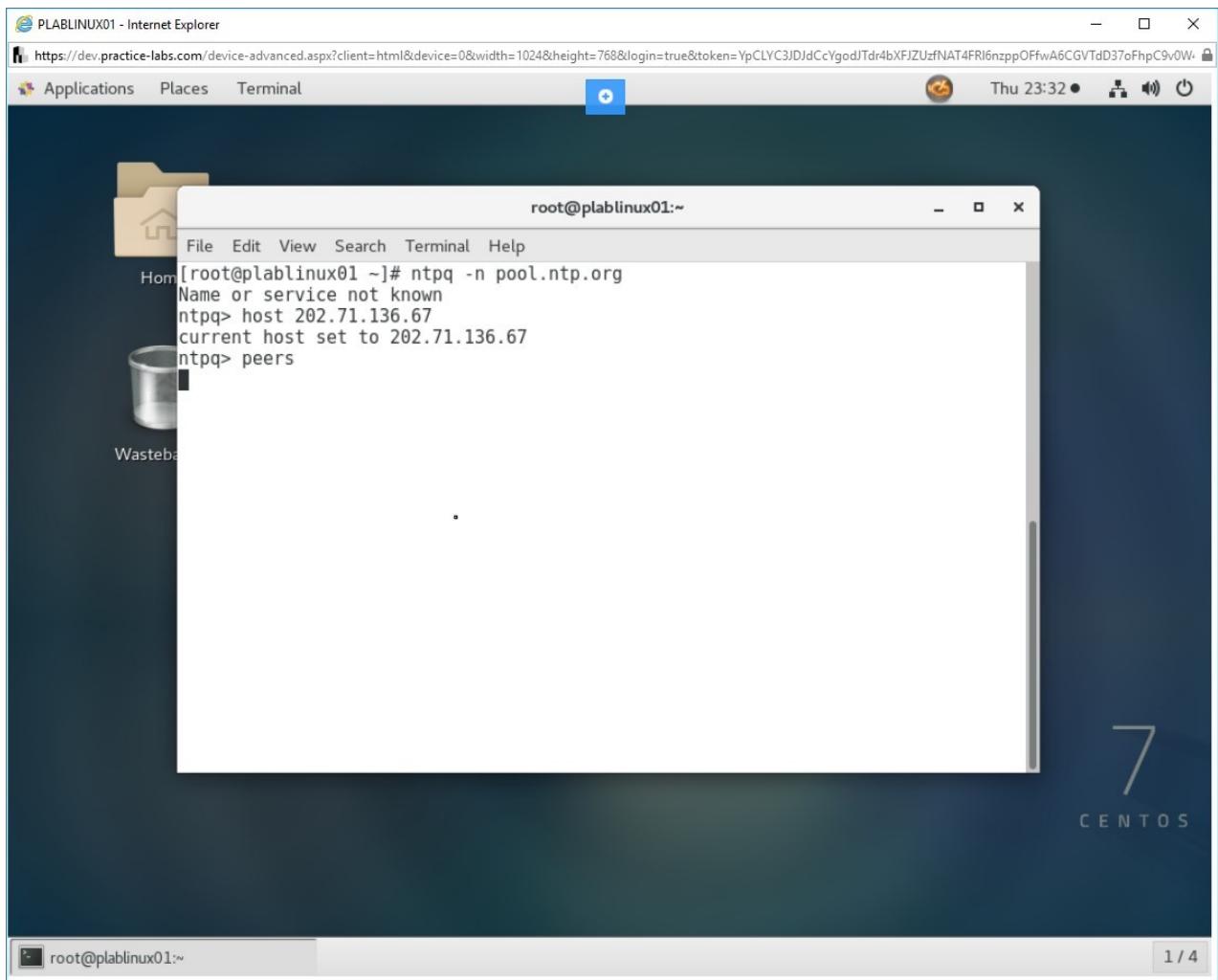


Figure 1.33 Screenshot of PLABLINUX01: Listing the known peers.

Due to firewall restrictions, you may not receive a list. You will see an error. If there are no firewall restrictions, then you will see the peers.

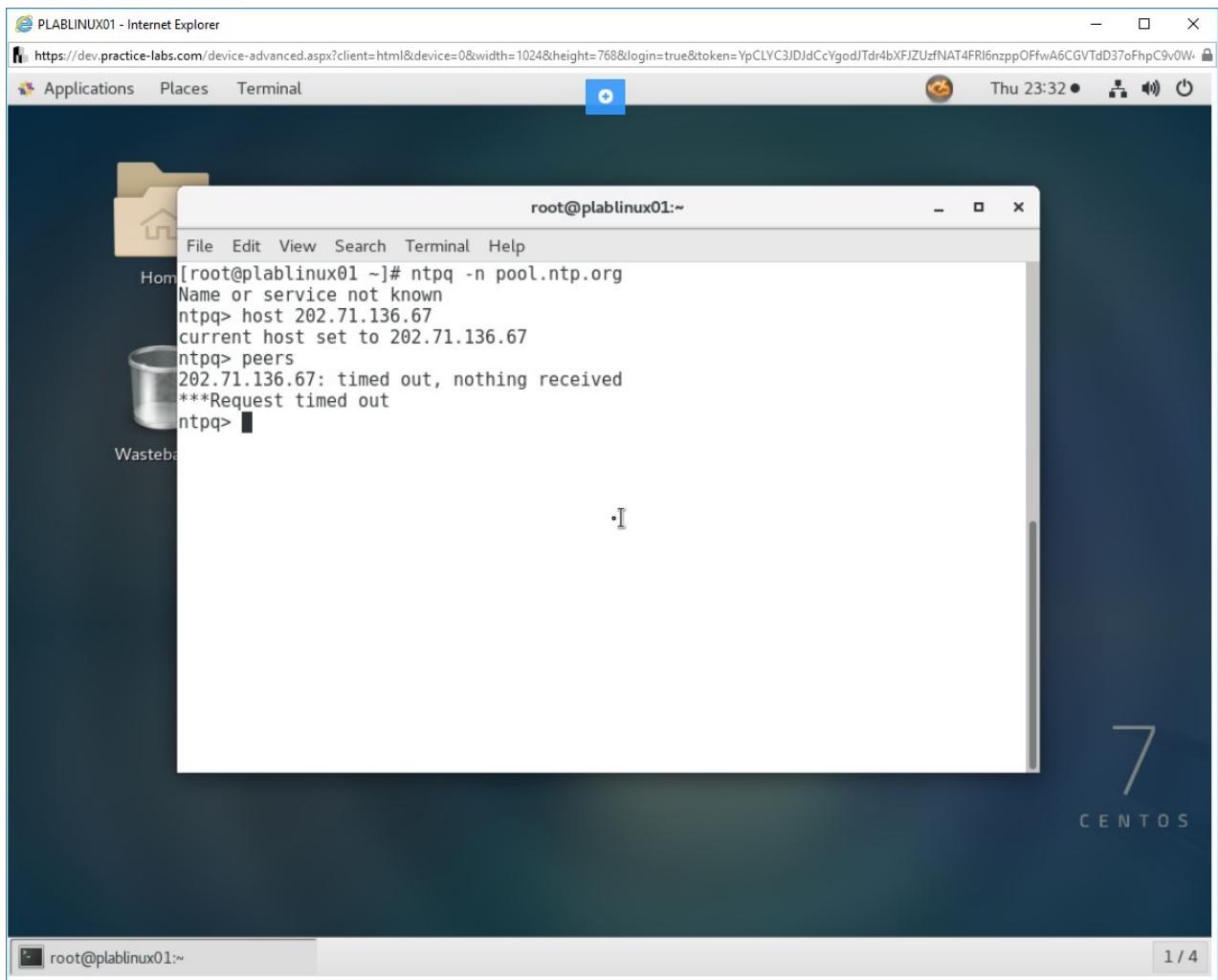


Figure 1.34 Screenshot of PLABLINUX01: Displaying the firewall error.

Step 4

To quit the ntpq command, type the following command:

```
quit
```

Press **Enter**.

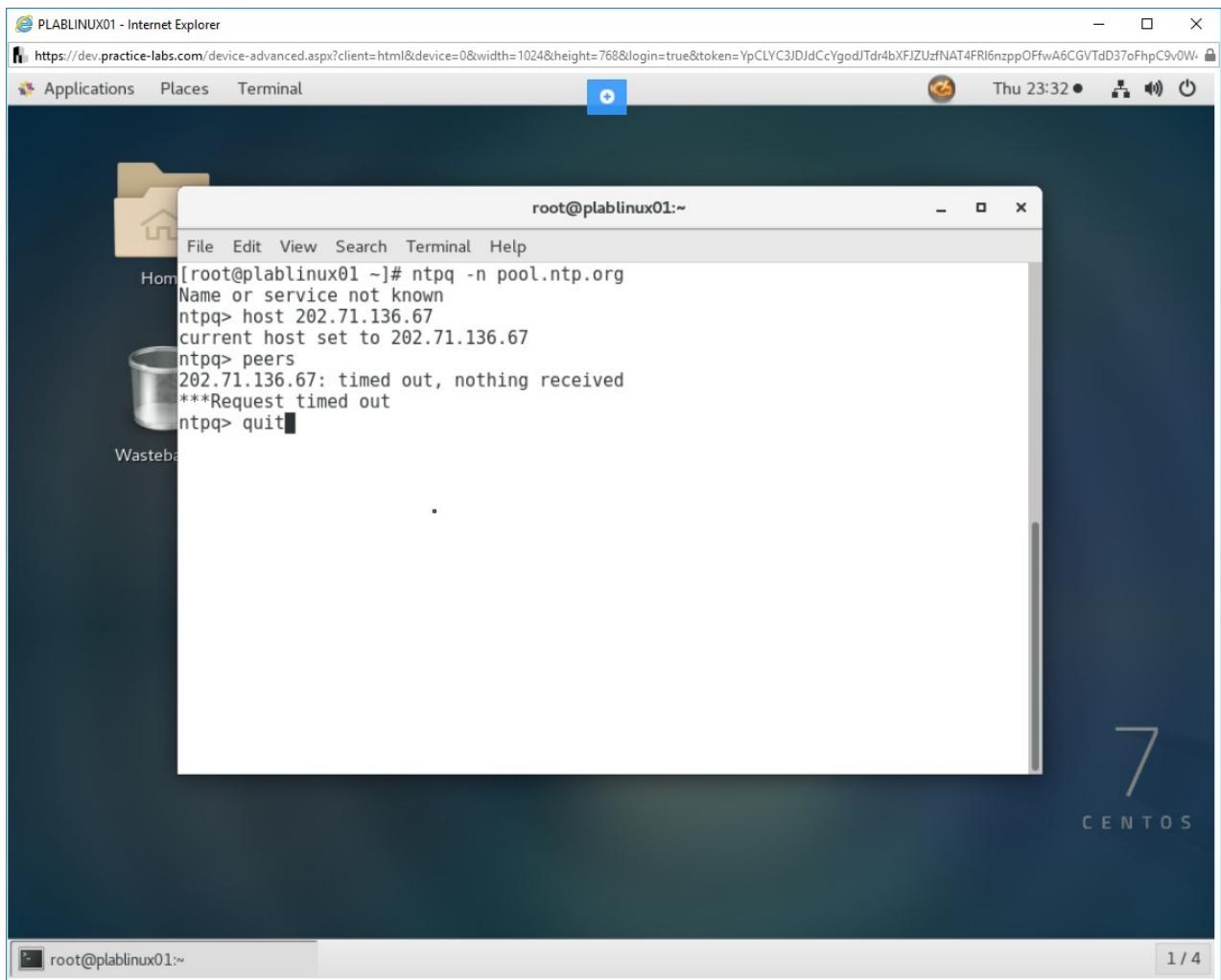


Figure 1.35 Screenshot of PLABLINUX01: Quitting from the ntpq command line.

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

Review

Well done, you have completed the **Maintain System Time** Practice Lab.

Summary

You completed the following exercise:

- Exercise 1 - Maintain System Time

You should now be able to:

- Set the system date and time

- Set the hardware clock
- Configure the time zone
- Basic NTP configuration
- Run the ntpq command

Feedback

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