

Basic Network Troubleshooting

- **Introduction**
 - **Lab Topology**
 - **Exercise 1 - Basic Network Troubleshooting**
 - **Review**
-

Introduction

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

Troubleshooting
Debugging
Network

Learning Outcomes

In this module, you will complete the following exercise:

- Exercise 1 - Basic Network Troubleshooting

After completing this lab, you will be able to:

- Configure client network
- Manage network interfaces
- Debug network configuration issues

Exam Objectives

The following exam objectives are covered in this lab:

- **LPI: 109.3** Basic network troubleshooting
- **LPI: 109.2** Persistent network configuration

- **CompTIA:** 1.3 Given a scenario, configure and verify network connection parameters

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

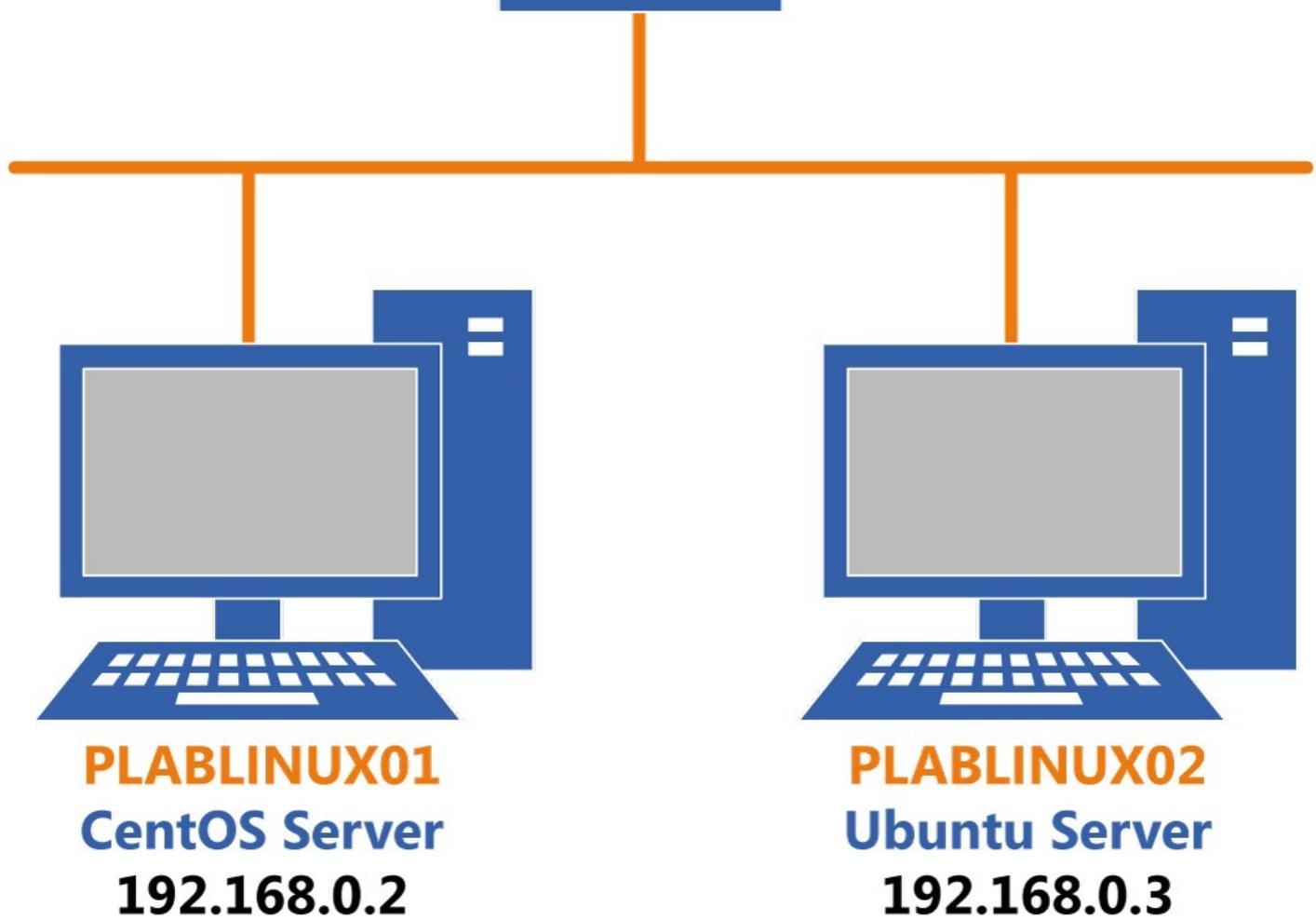
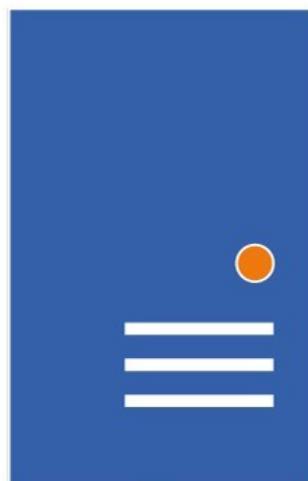
For more information on using Practice Labs, please see our **Help and Support** page. You can also raise a technical support ticket from this page.

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 - Basic Network Troubleshooting

A network can have different types of issues that need to be resolved. In this exercise, you will understand how to perform basic network troubleshooting.

Learning Outcomes

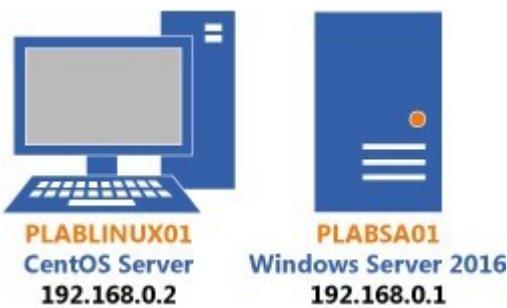
After completing this exercise, you will be able to:

- Log into a Linux System
- Configure client network
- Manage network interfaces
- Debug network configuration issues

Your Devices

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

- **PLABSAo1** (Windows Server 2016)
- **PLABLINUXo1** (CentOS Server)



Task 1 - Configure Client Network

For a client to communicate on the network, it needs to have an IP address. If the client exists on the IPv4 network, then the client must have an IPv4 address. On the IPv6 network, the client must have IPv6 address.

In this task, you will configure an IP address on the client. To do this, perform the following steps:

Step 1

Connect to **PLABLINUX01**.

Click **Applications**, select **System Tools**, and then select **Settings**.

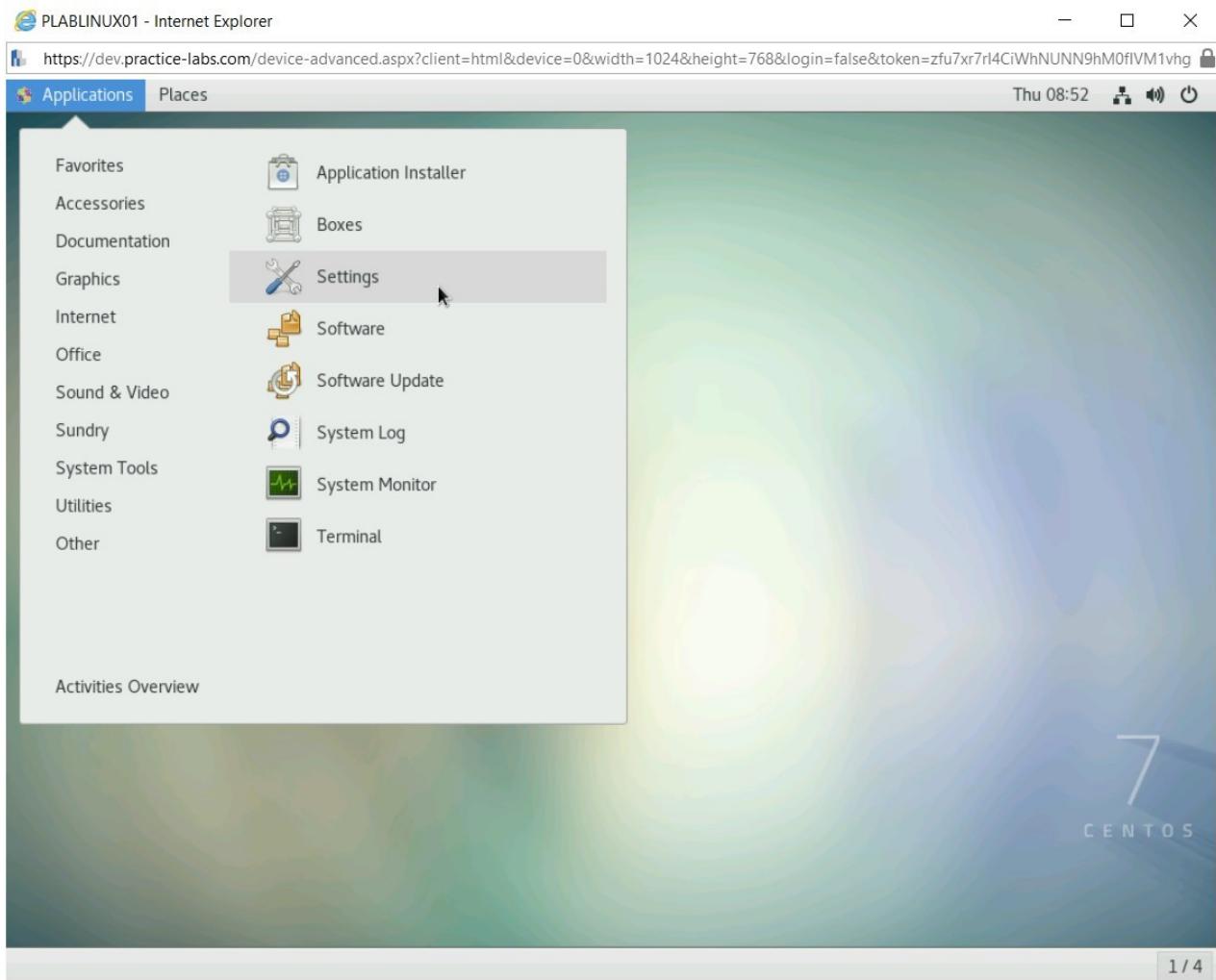


Figure 1.1 Screenshot of PLABLINUX01: Selecting the **Settings** option from the **Applications > System Tools** menu.

Step 2

From the **Settings** window, click **Network** in the left pane and then click the icon next to **ON** in the **Wired** section.

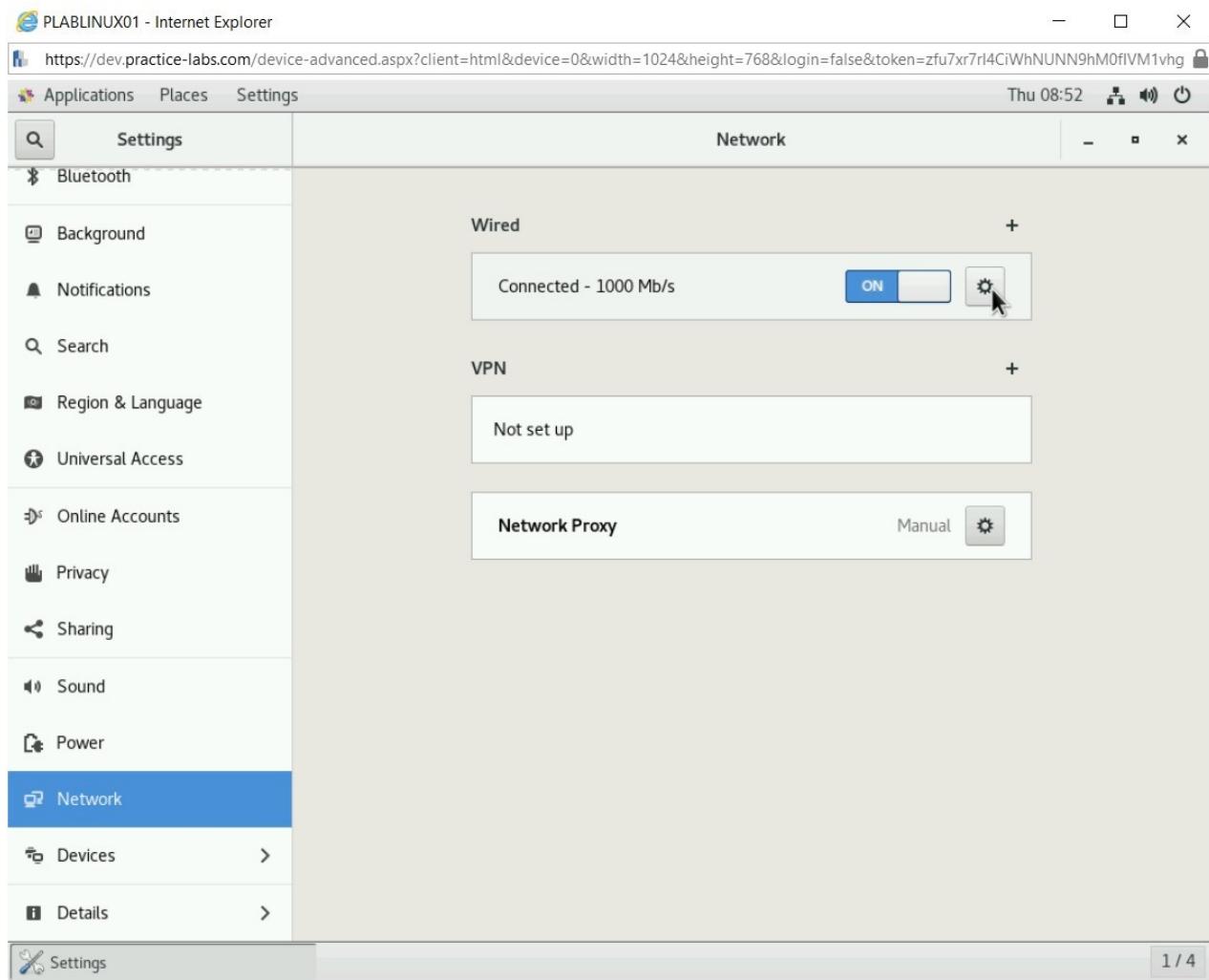


Figure 1.2 Screenshot of PLABLINUX01: Clicking the button to invoke the Wired dialog box.

Step 3

In the **Wired** dialog box, click the **IPv4** tab.

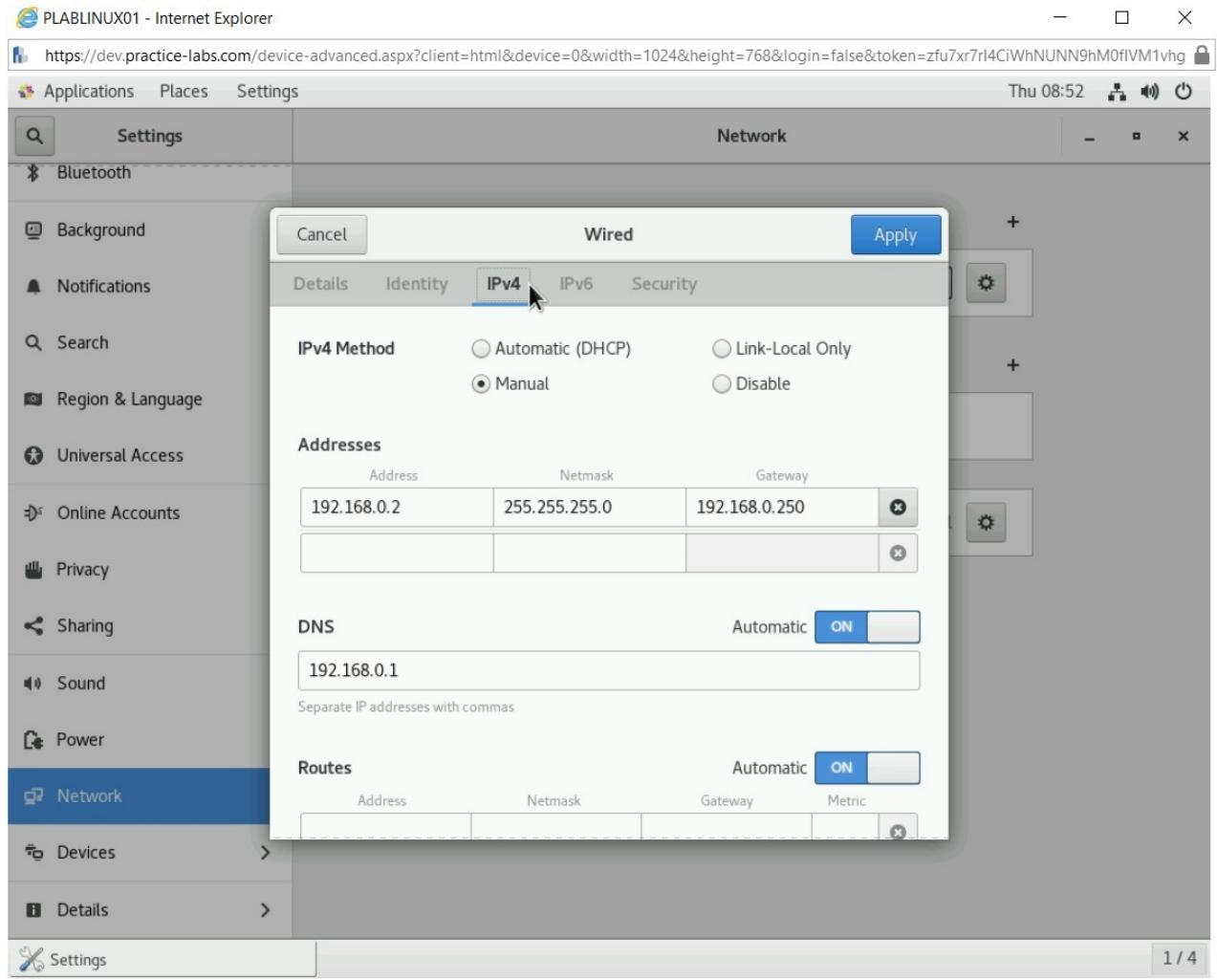


Figure 1.3 Screenshot of PLABLINUX01: Selecting the IPv4 tab in the Wired dialog box.

Step 4

Select **Manual** and ensure the following details are entered:

Address:

192.168.0.2

Netmask:

255.255.255.0

Gateway:

192.168.0.250

Click **Apply**.

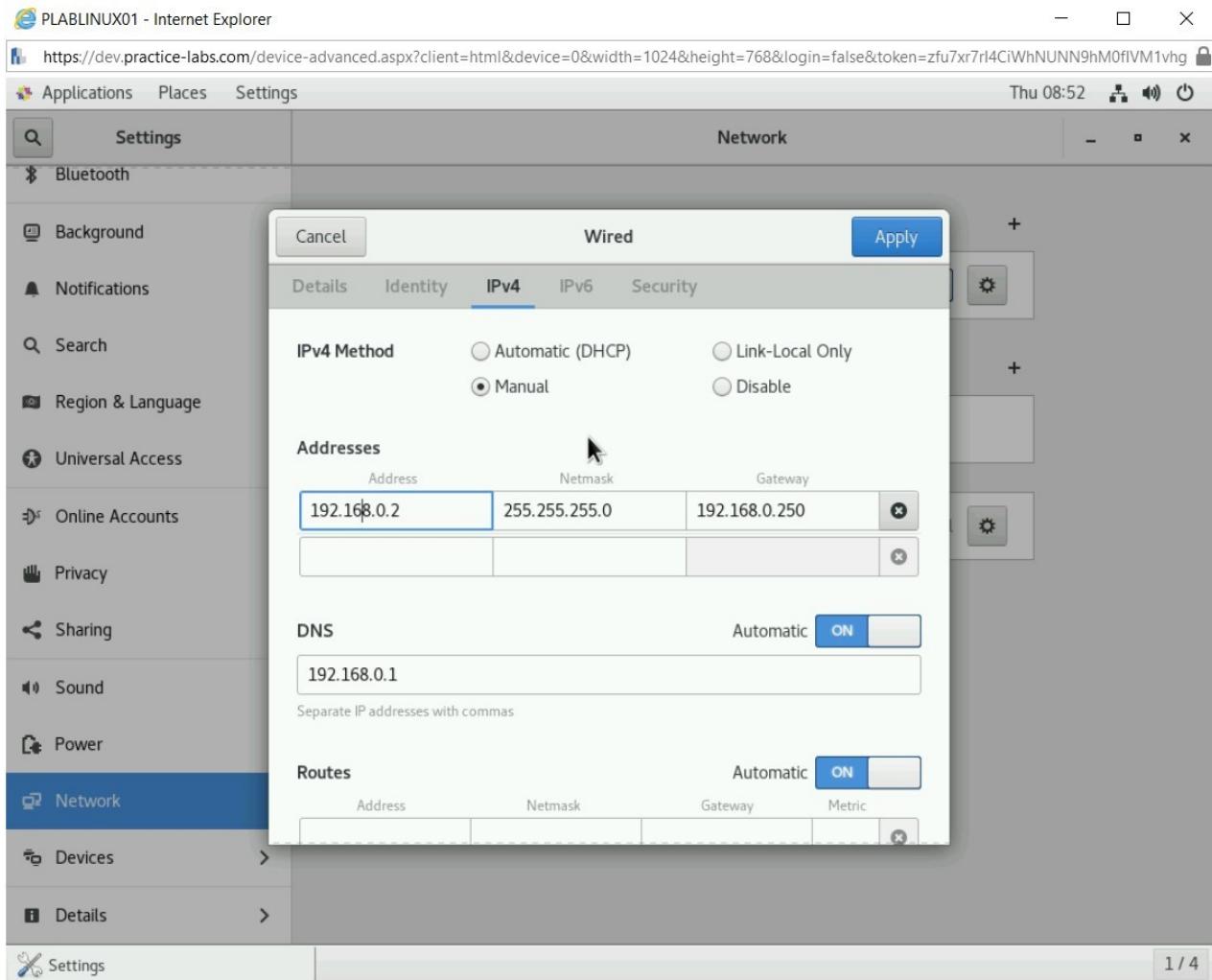


Figure 1.4 Screenshot of PLABLINUX01: Entering the network information and then clicking the **Apply** button.

Step 5

The **Wired** dialog box is closed automatically. Close the **Settings** window.

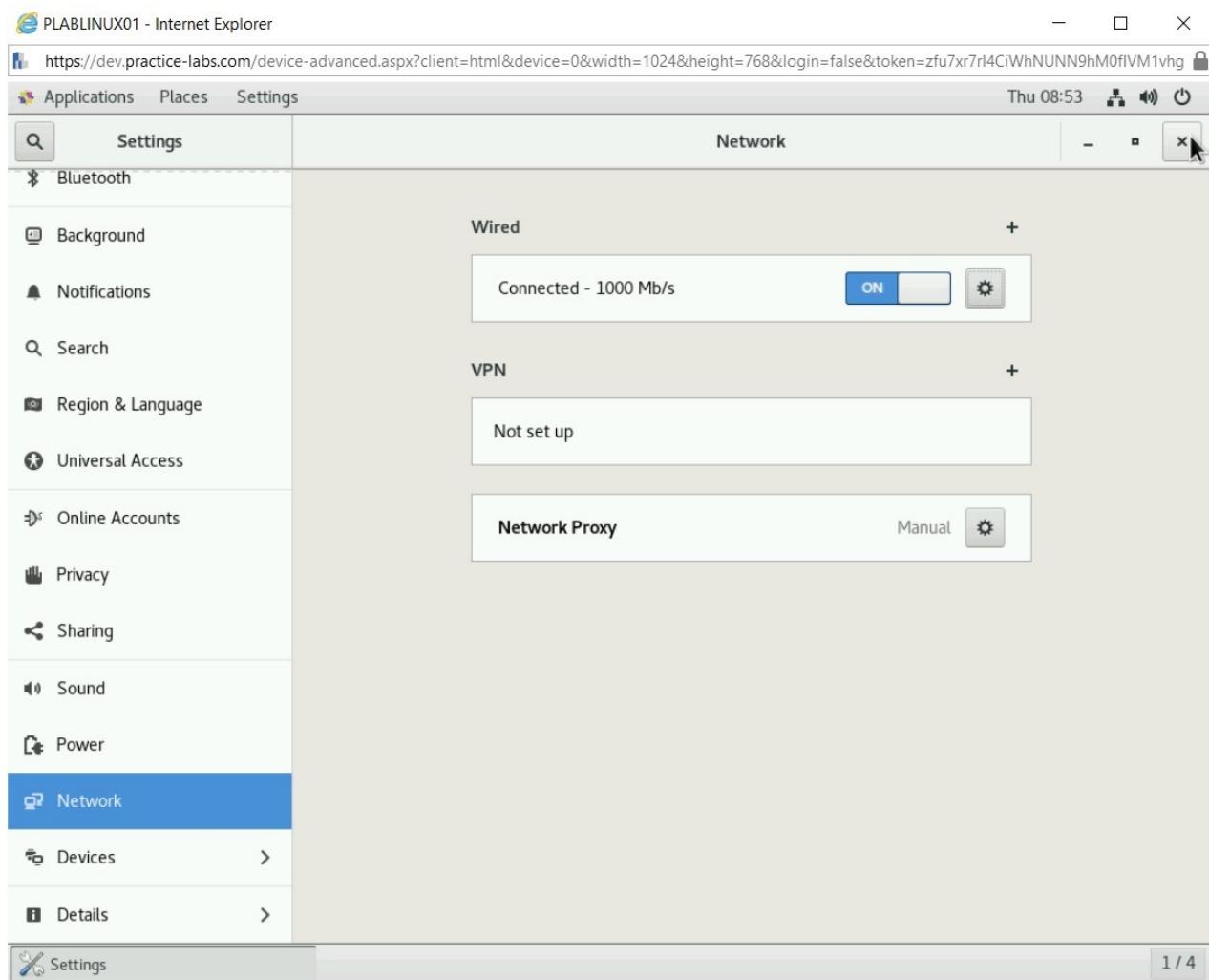


Figure 1.5 Screenshot of PLABLINUX01: Displaying the Settings window.

Task 2 - Manage Network Interfaces

In Linux, you can view, change, and verify network settings on client hosts, in a similar manner you can do in Windows. Linux enables you to manually and automatically configure network interfaces and routing tables to include adding, starting, stopping, restarting, deleting, or reconfiguring network interfaces.

In this task, you will view, change, and verify network configuration settings view.

To manage network interfaces, perform the following steps:

Step 1

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

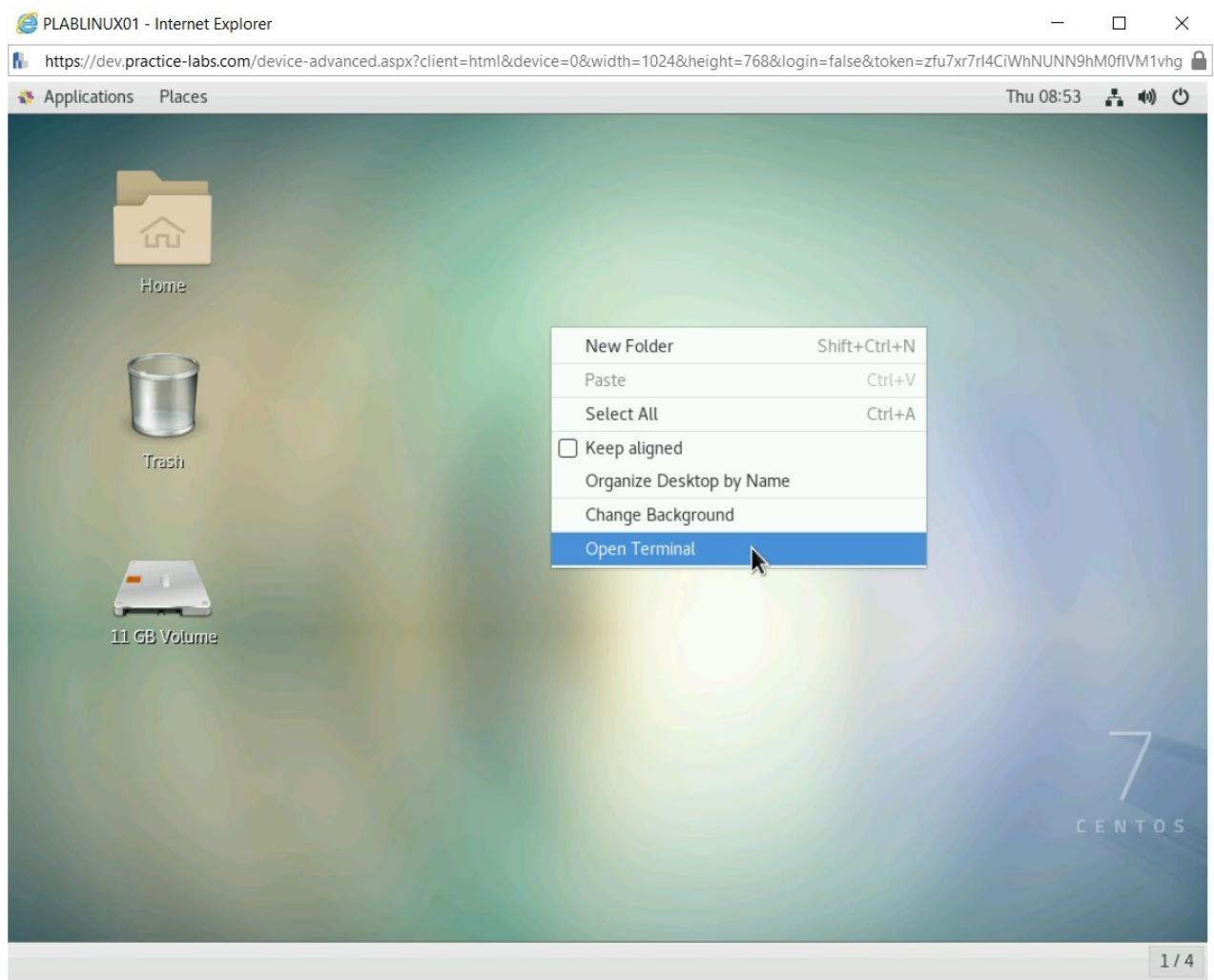


Figure 1.6 Screenshot of PLABLINUX01: Selecting the Open Terminal option from the context menu.

Step 2

The command prompt window is displayed. Type the following command to switch to the root account:

```
su -
```

Press **Enter**.

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

Passw0rd

Press **Enter**.

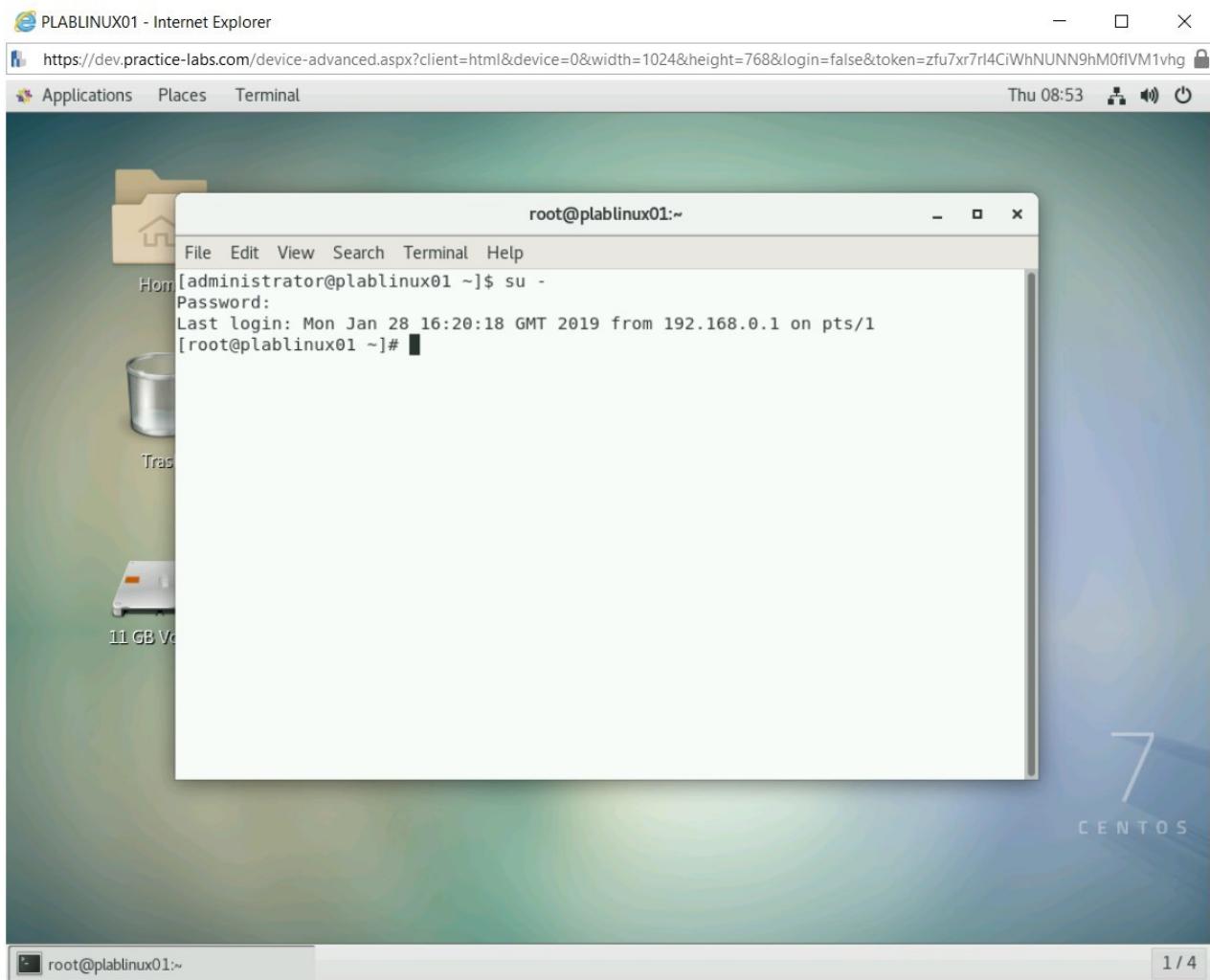


Figure 1.7 Screenshot of PLABLINUX01: Changing the account to the root account with the su command.

Step 3

Type the following command to clear the screen:

```
clear
```

Press **Enter**.

Note: The *clear* command is used before every step to enable the learners to get a clear view of the output of each command. Otherwise, it is not mandatory to use the *clear* command before every command.

To view the routing table on the system, type the following command:

```
ip route
```

Press **Enter**.

Note: The **ip route** command takes a few seconds to display the results as it attempts to resolve the hostnames.

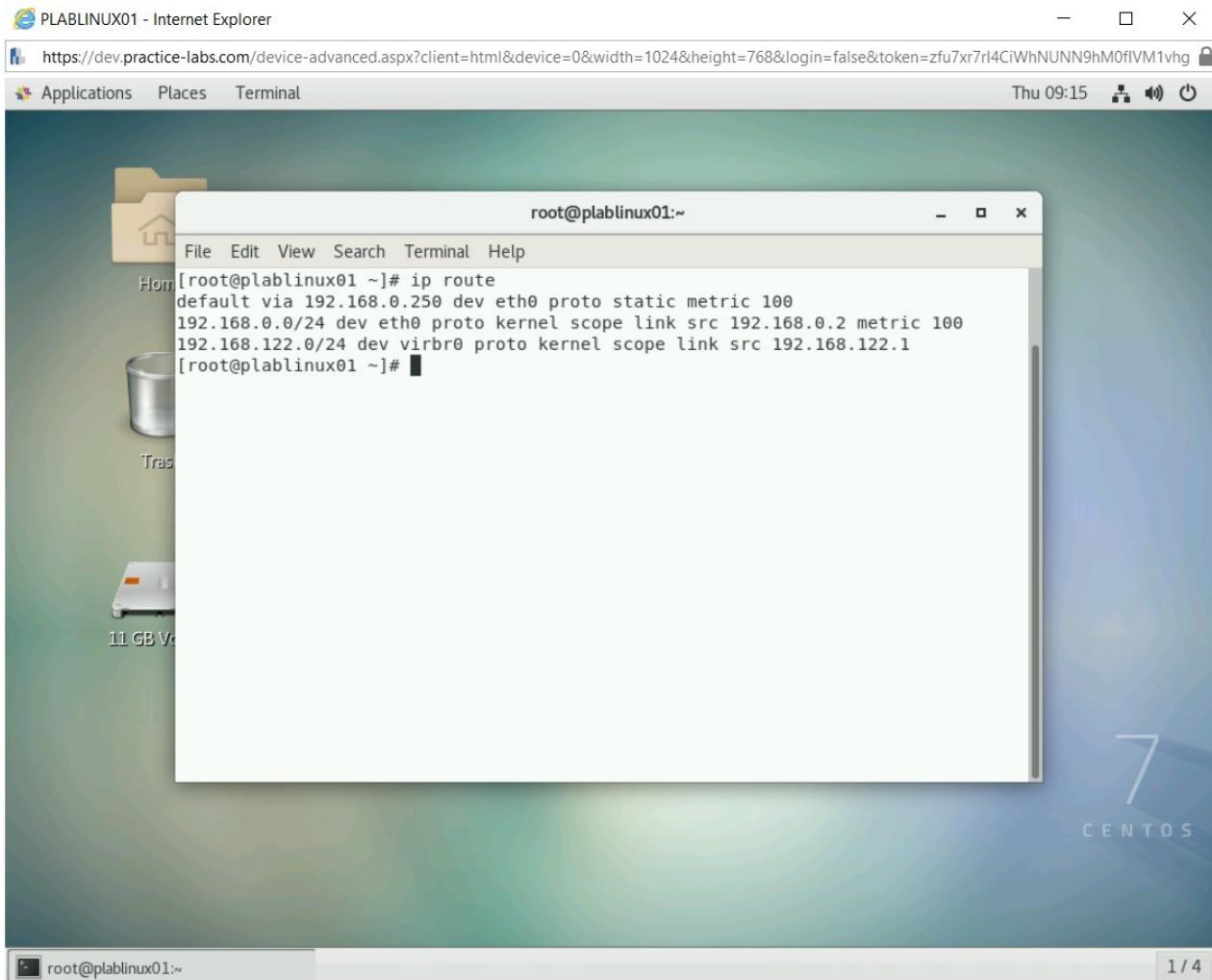


Figure 1.8 Screenshot of PLABLINUX01: Executing the ip route command.

Step 4

You can also use the **route** command with its parent directory. Type the following command:

```
/sbin/ip route
```

Press Enter.

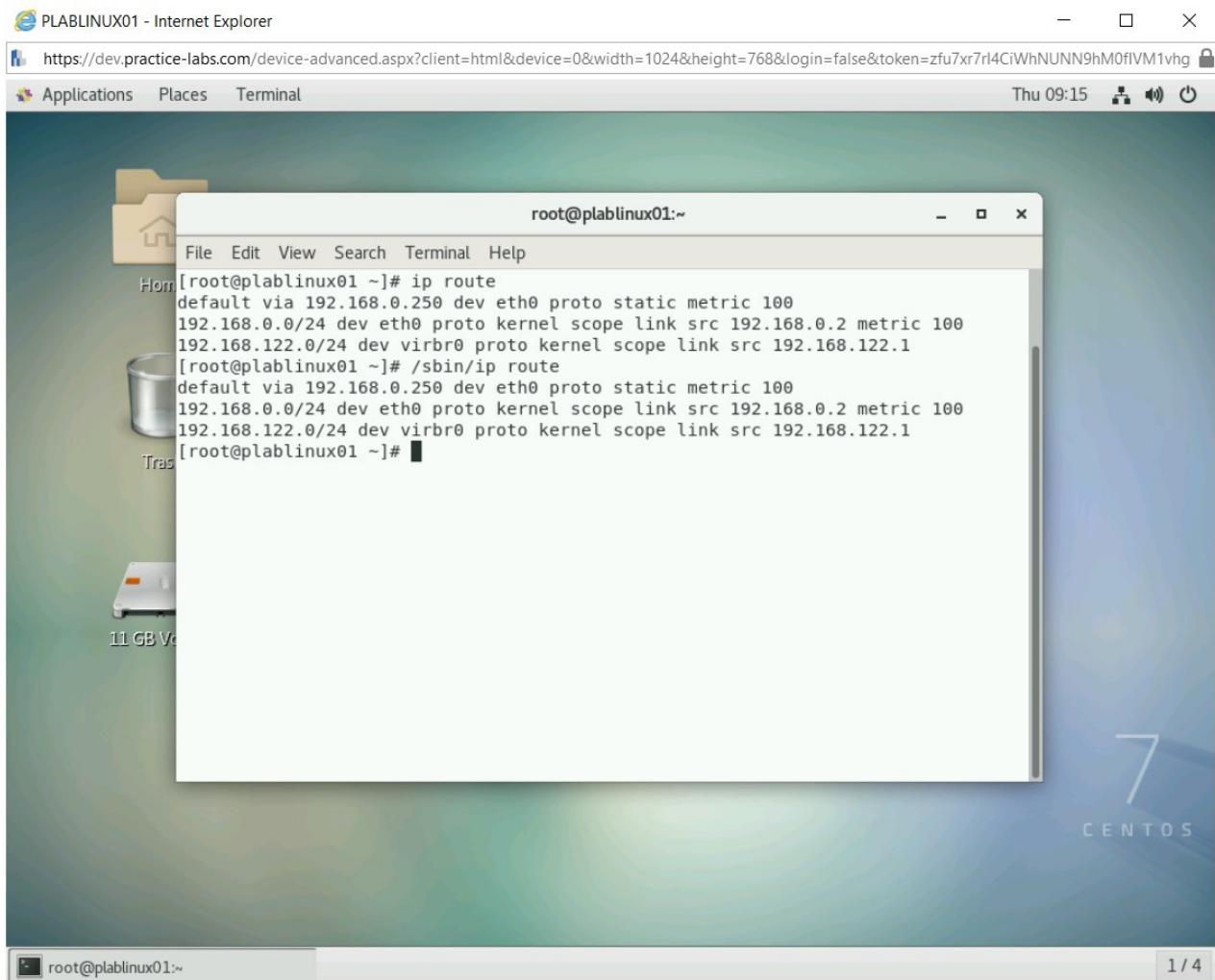


Figure 1.9 Screenshot of PLABLINUX01: Executing the /sbin/ip route command.

Step 5

Clear the screen by entering the following command:

```
clear
```

You can also add a route to a specific host. Type the following command:

```
ip route add 192.168.0.250 dev eth0
```

Press **Enter**.

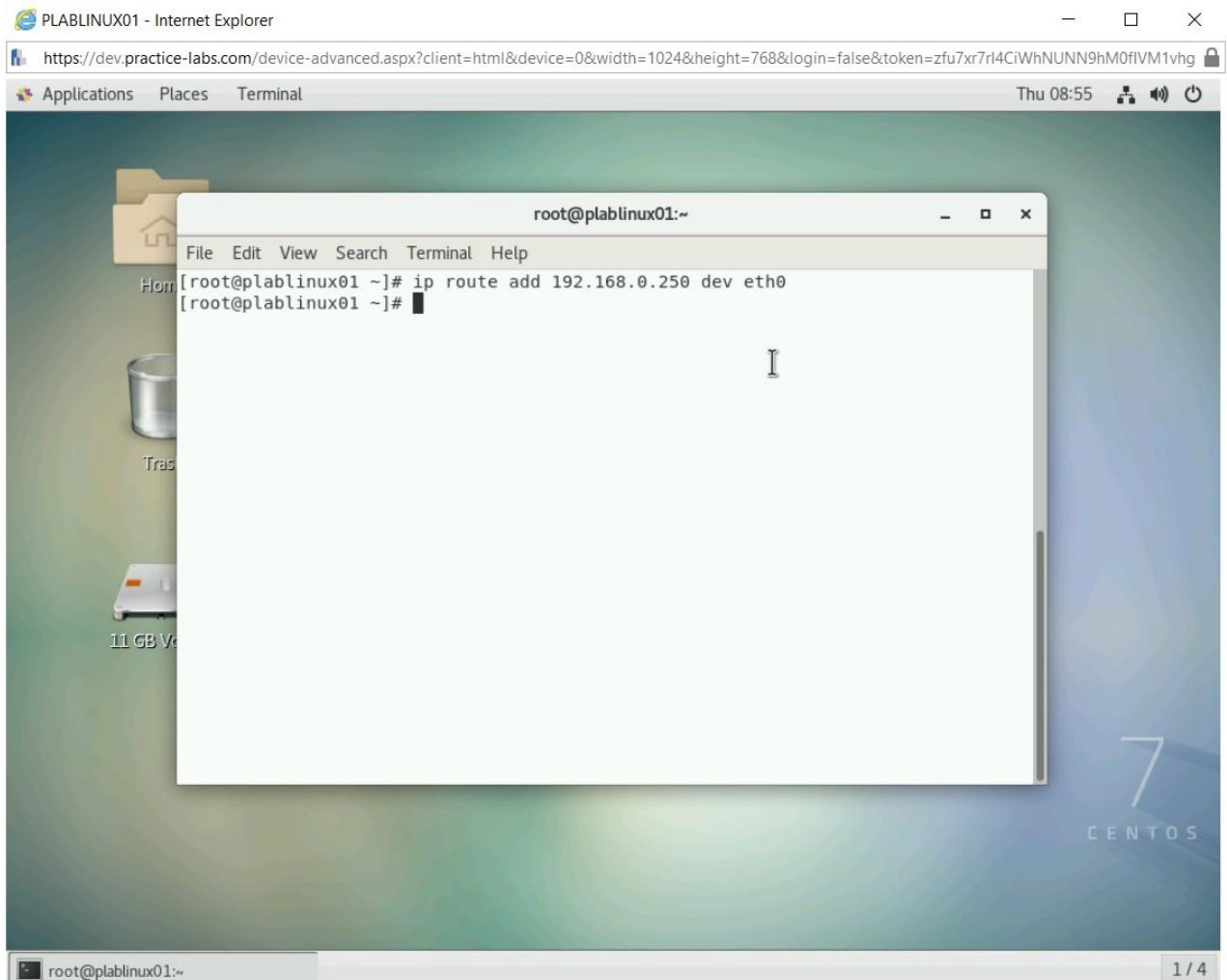


Figure 1.10 Screenshot of PLABLINUX01: Adding a new route in the routing table.

Step 6

Type the following command to verify whether the route has been added:

```
ip route
```

Press **Enter**.

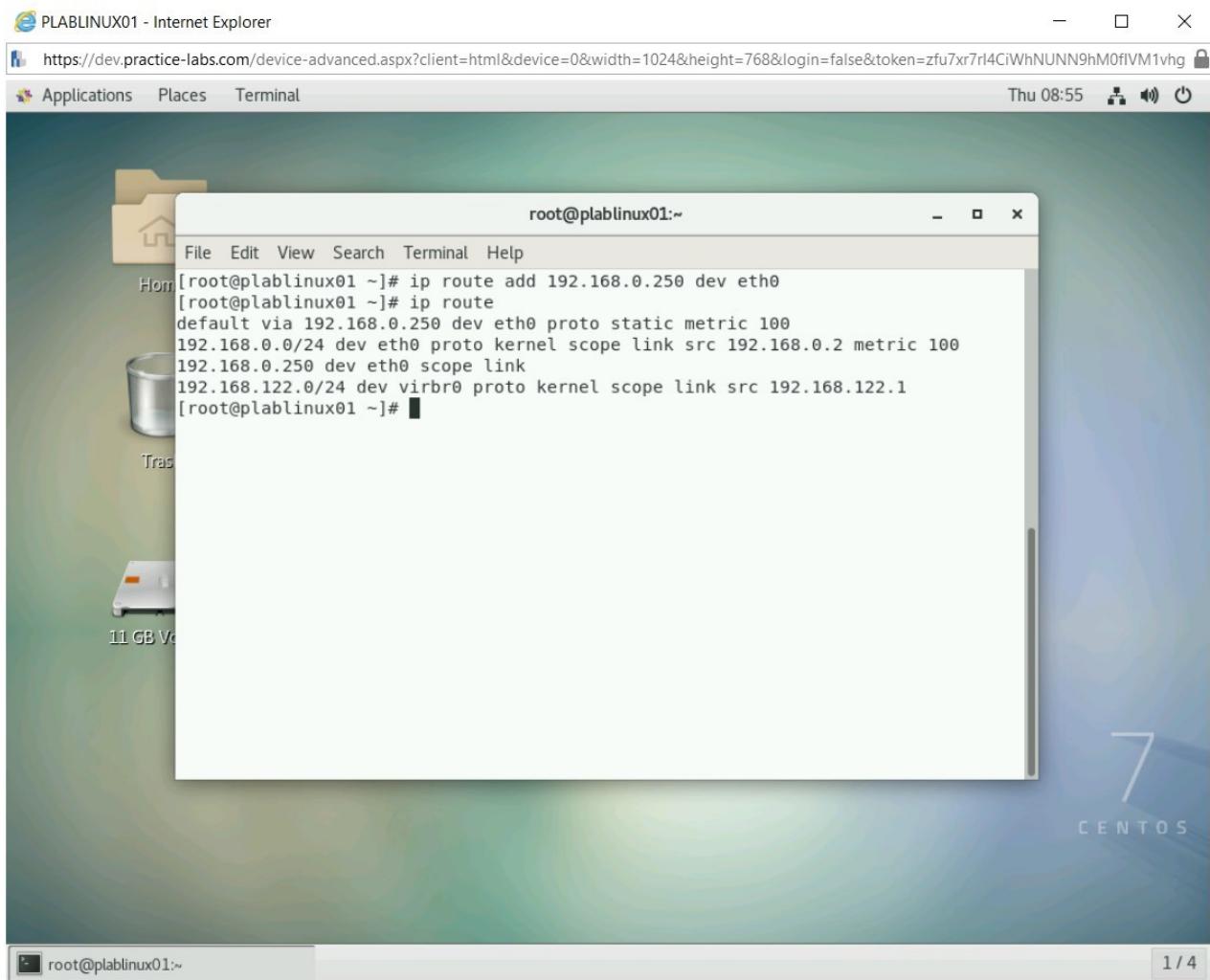


Figure 1.11 Screenshot of PLABLINUX01: Displaying the route.

Step 7

You can also remove a specific route from the routing table. Type the following command:

```
ip route del 192.168.0.250 dev eth0
```

Press **Enter**.

Type the following command to verify whether the route has been removed:

```
ip route
```

Press **Enter**.

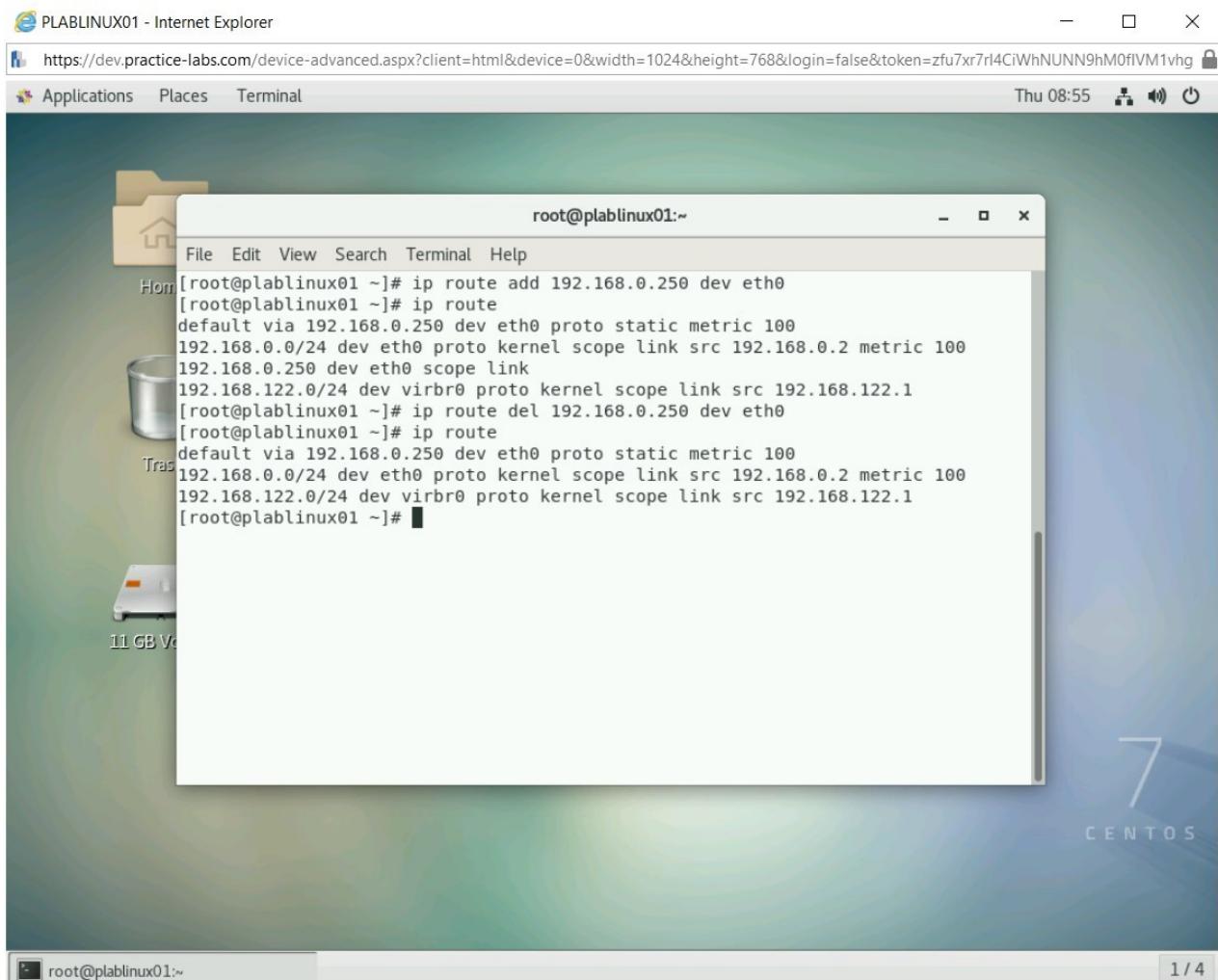


Figure 1.12 Screenshot of PLABLINUX01: Deleting the route and then displaying the routing table.

Step 8

Clear the screen by entering the following command:

```
clear
```

You can either add a single host or a specific network to a route. In this command, consider the following:

- **-net**: specifies the network
- **eth0**: specifies the network interface

To add the network, type the following command:

```
ip route add 192.168.0.0/24 dev eth0
```

Press **Enter**.

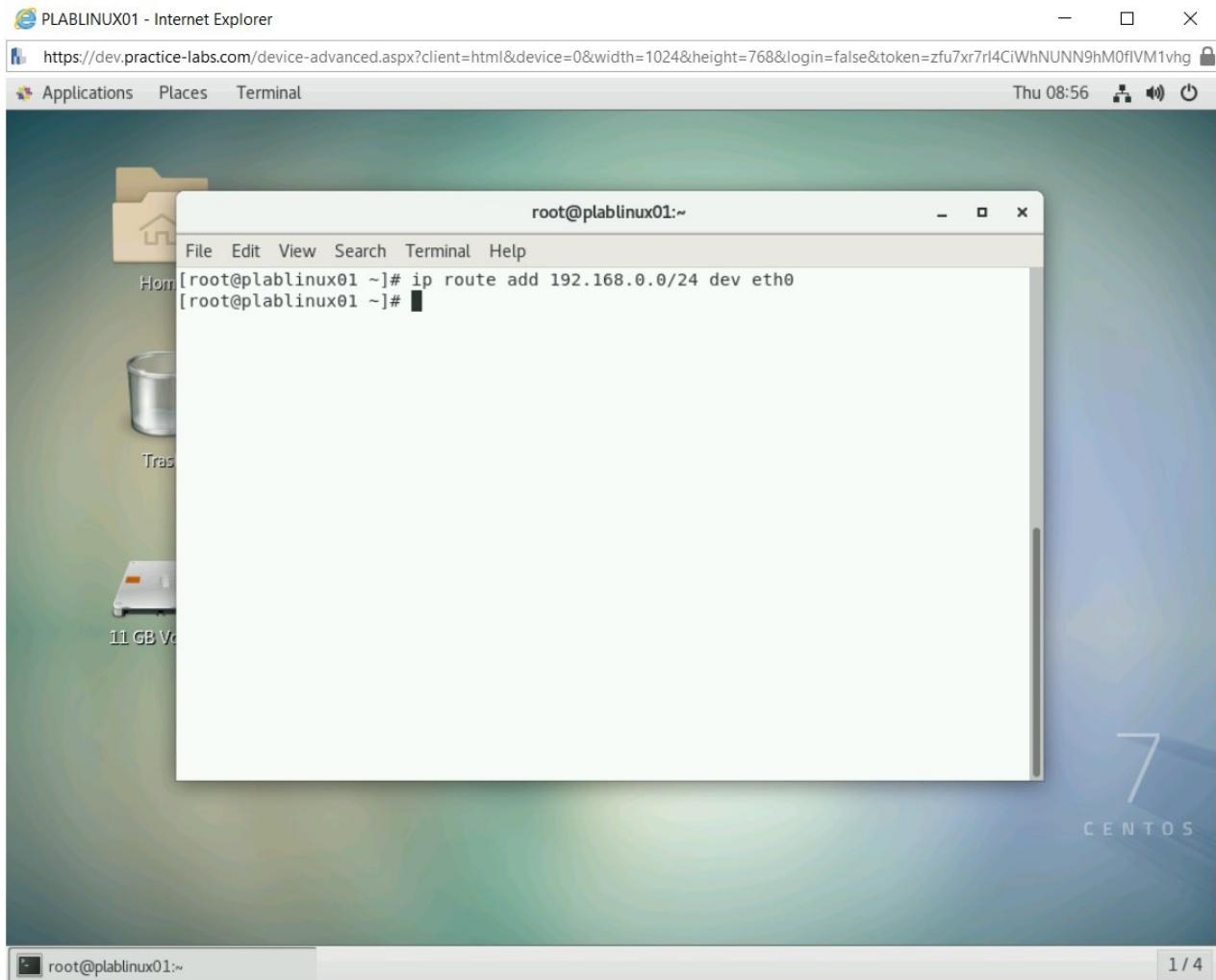


Figure 1.13 Screenshot of PLABLINUX01: Adding a new route with the gateway.

Step 9

Type the following command to clear the screen:

```
clear
```

Press **Enter**.

Type the following command to verify the addition of the new route:

```
ip route
```

Press **Enter**.

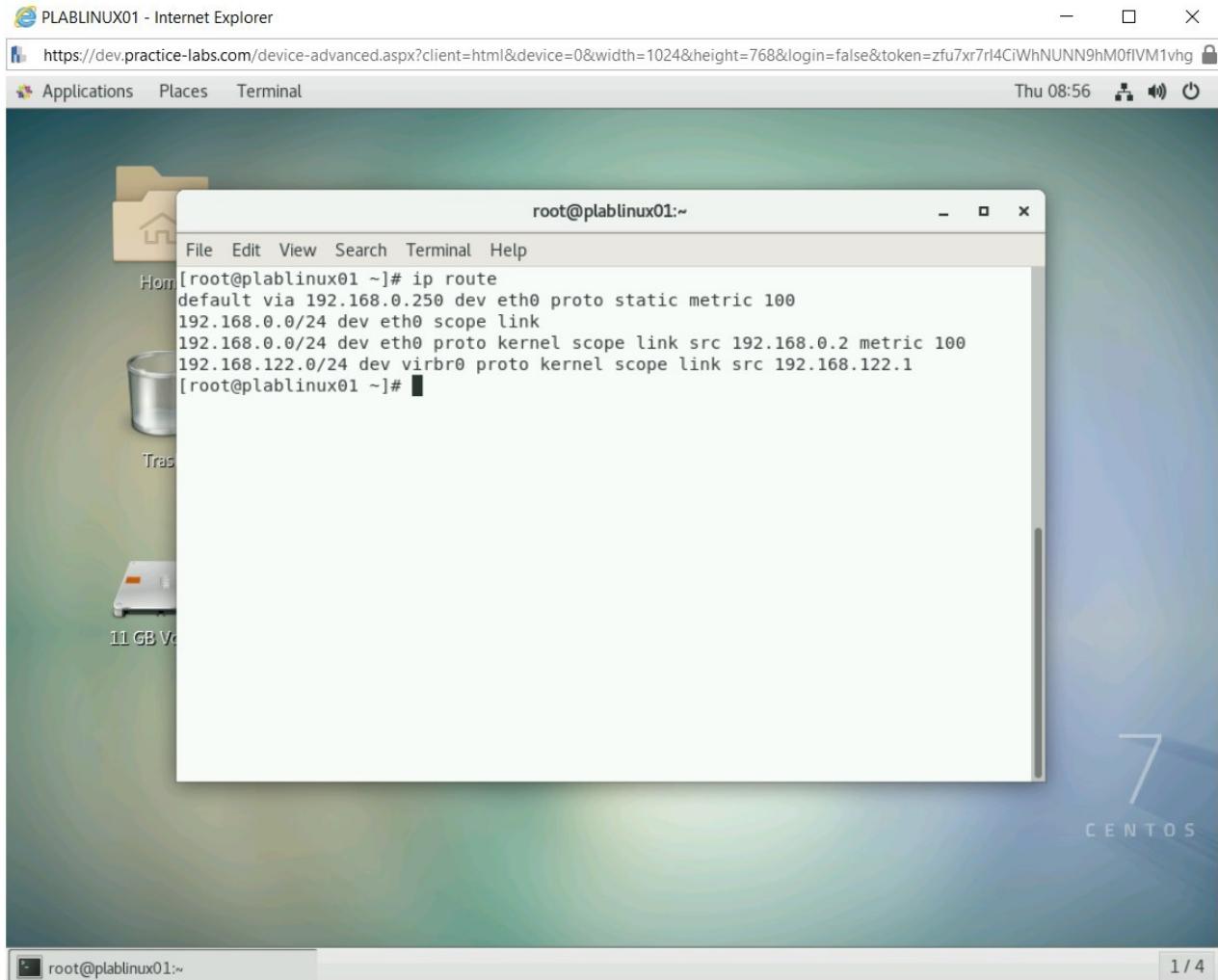


Figure 1.14 Screenshot of PLABLINUX01: Printing the routing table.

Step 10

Now, let's delete the network. Type the following command:

```
ip route del 192.168.0.0/24 dev eth0
```

Press **Enter**.

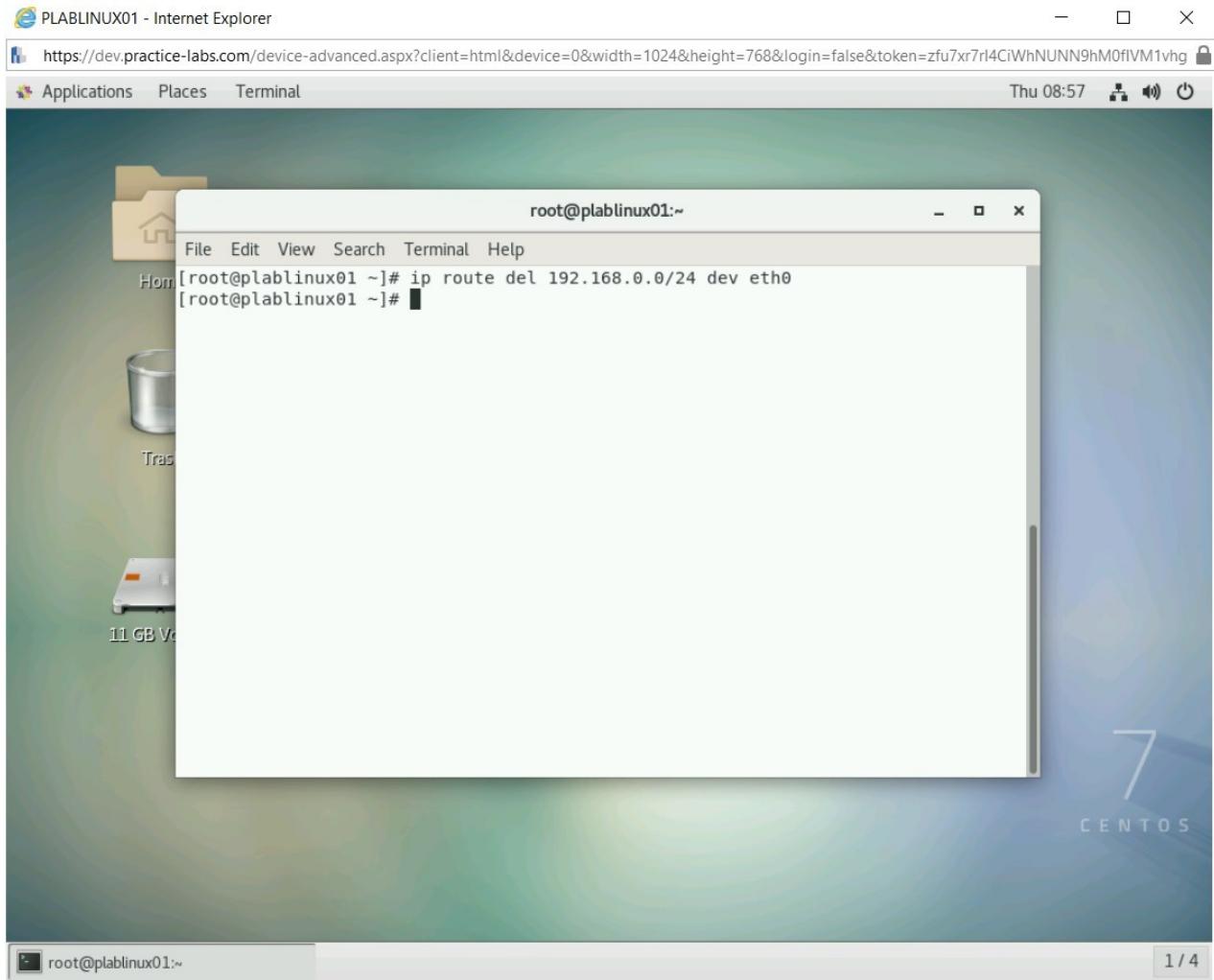


Figure 1.15 Screenshot of PLABLINUX01: Deleting the route.

Step 11

Type the following command to verify the addition of the new route:

```
ip route
```

Press **Enter**.

The route for the specified network is now deleted.

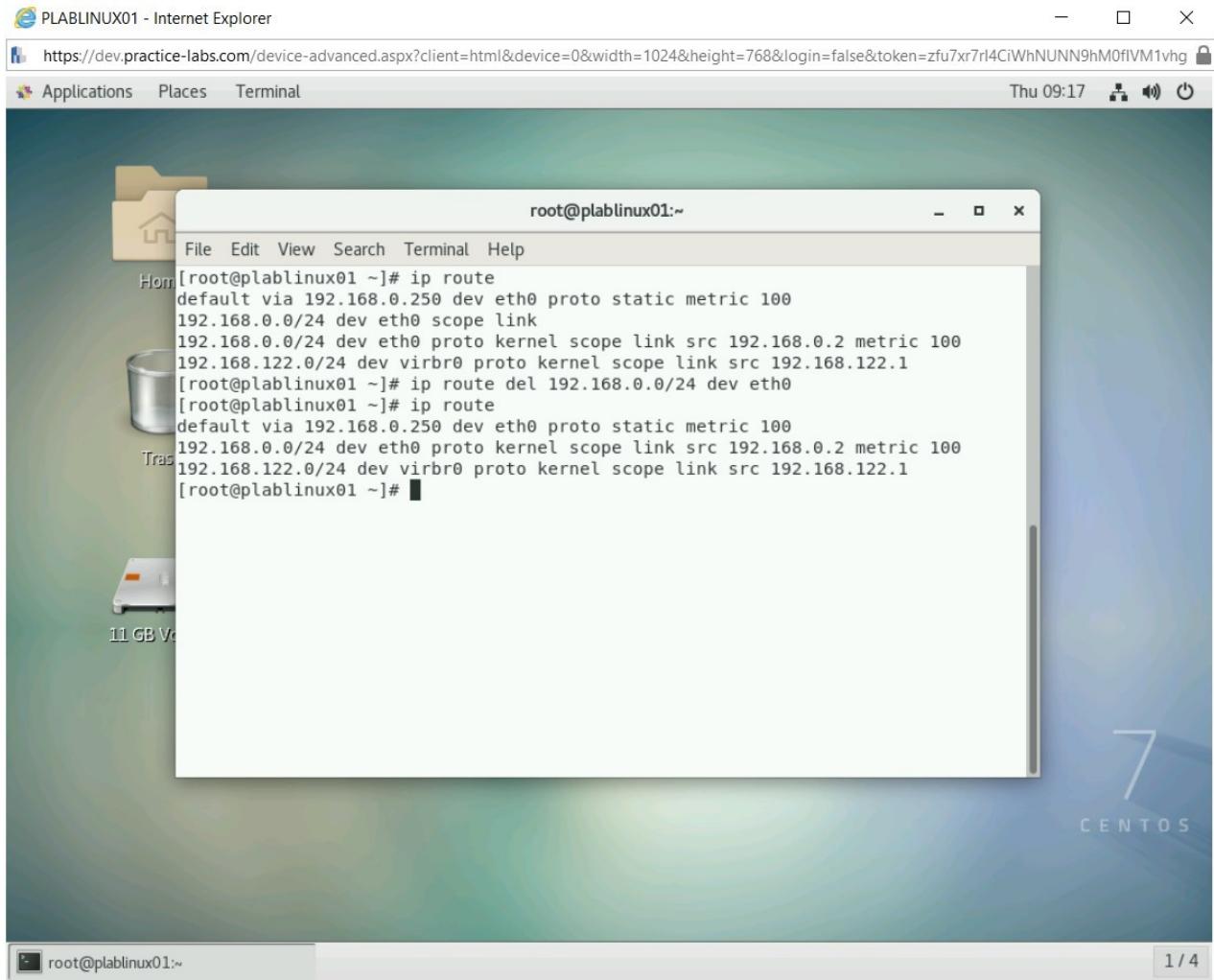


Figure 1.16 Screenshot of PLABLINUX01: Displaying the routing table.

Step 12

The static routes can be defined in a file named **route-<interface>**. In this case, the file will be named as **route-eth0**. The file is stored in the **/etc/sysconfig/network-scripts/** directory.

Let's first view whether this file is present in this directory. Type the following command:

```
ls -l /etc/sysconfig/network-scripts/
```

Press **Enter**.

Note that this file is not present in this directory.

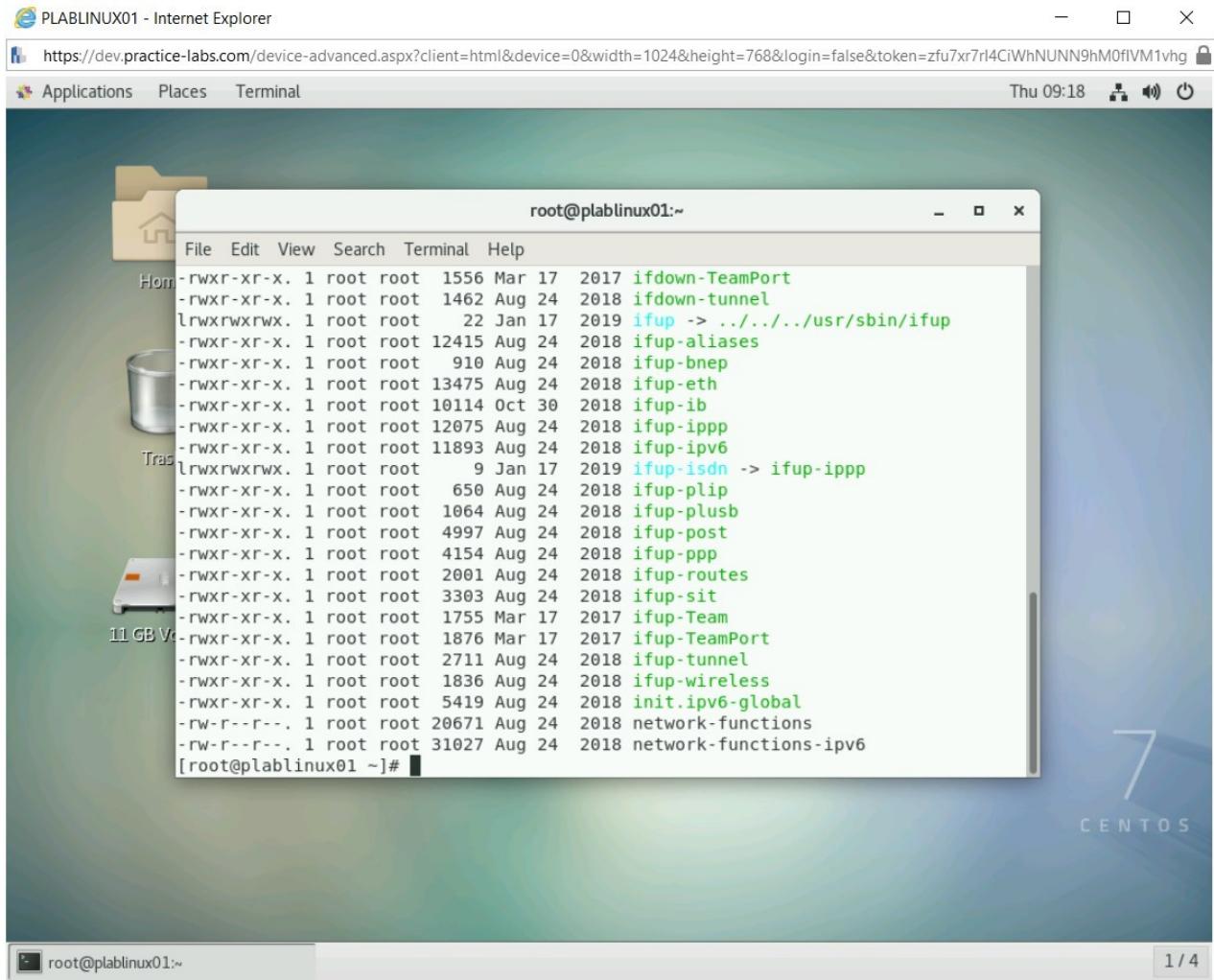


Figure 1.17 Screenshot of PLABLINUX01: Listing the network scripts.

Step 13

Type the following command to clear the screen:

```
clear
```

Press **Enter**.

Let's create this file. Type the following command:

```
vi /etc/sysconfig/network-scripts/route-eth0
```

Press **Enter**.

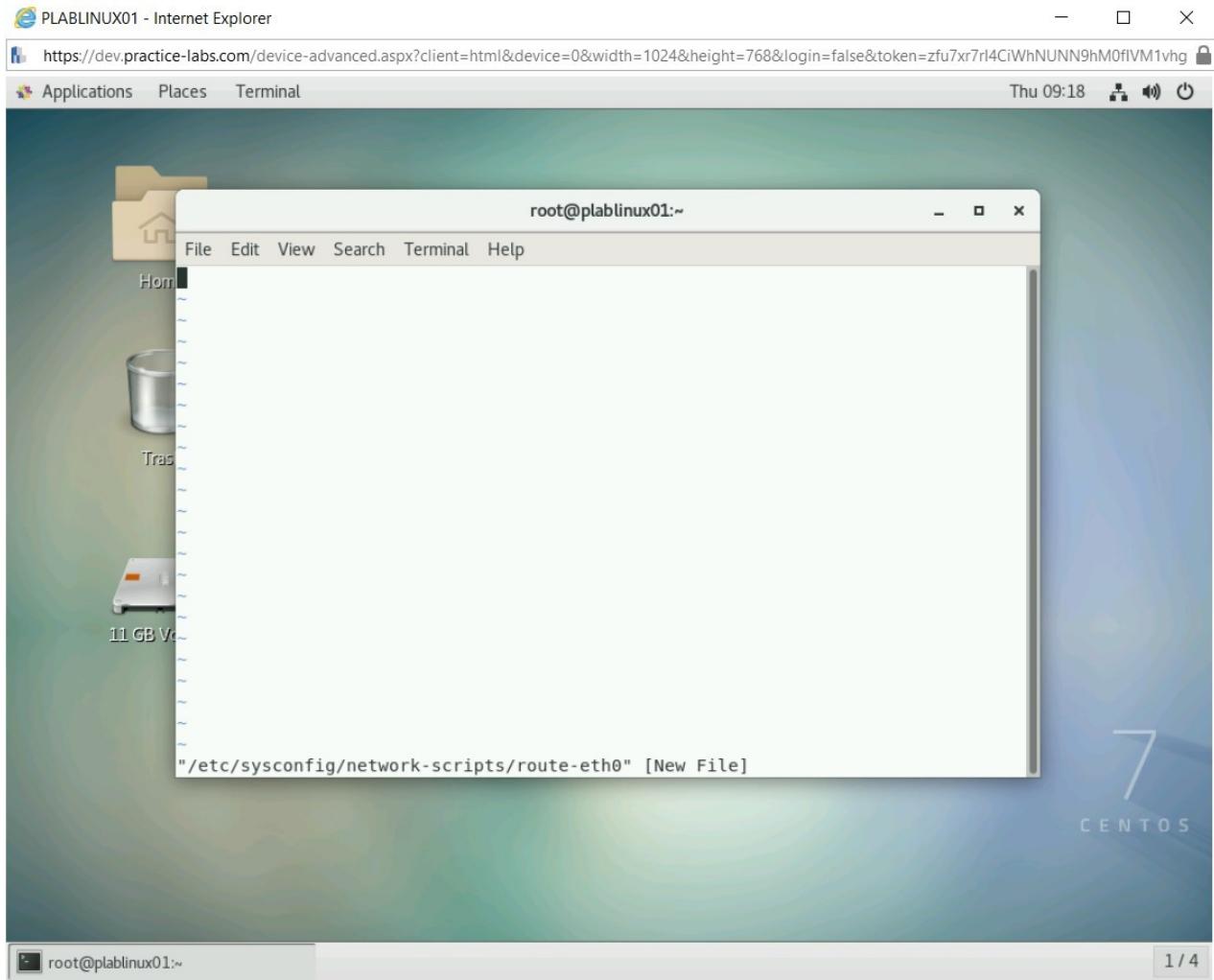


Figure 1.18 Screenshot of PLABLINUX01: Creating a new network script.

Step 14

Note that the **vi** editor is now opened. Press **i** to start the insert mode.

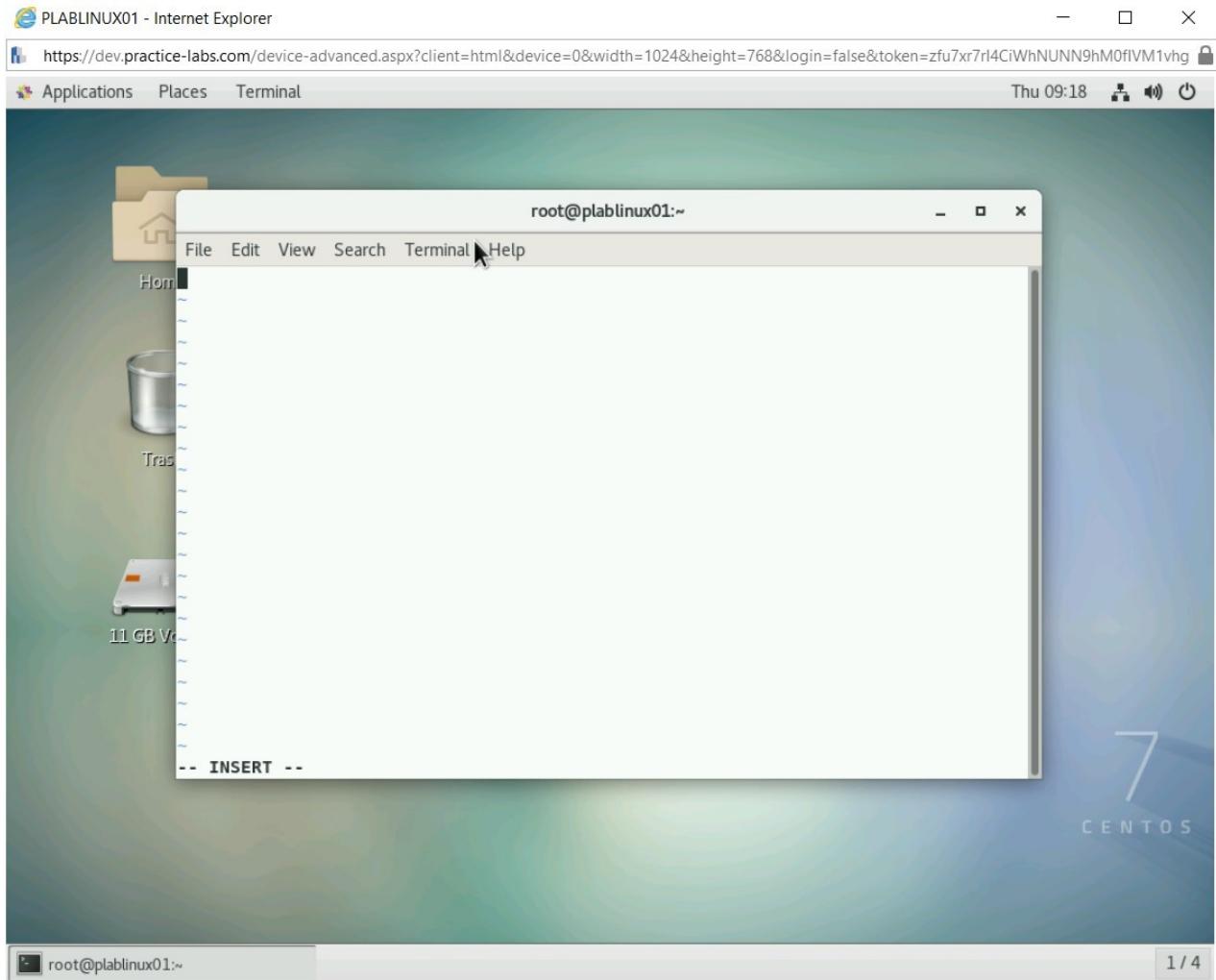


Figure 1.19 Screenshot of PLABLINUX01: Displaying the vi editor in the insert mode.

Step 15

Type the following entries:

```
default 192.168.0.250 dev eth0
10.10.0.0/24 via 192.168.0.250 dev eth0
172.17.1.0/24 via 192.168.0.250 dev eth0
```

Here the default gateway is **192.168.0.250**. The two static routes are for the **10.10.0.0/24** and **172.17.1.0/24** networks.

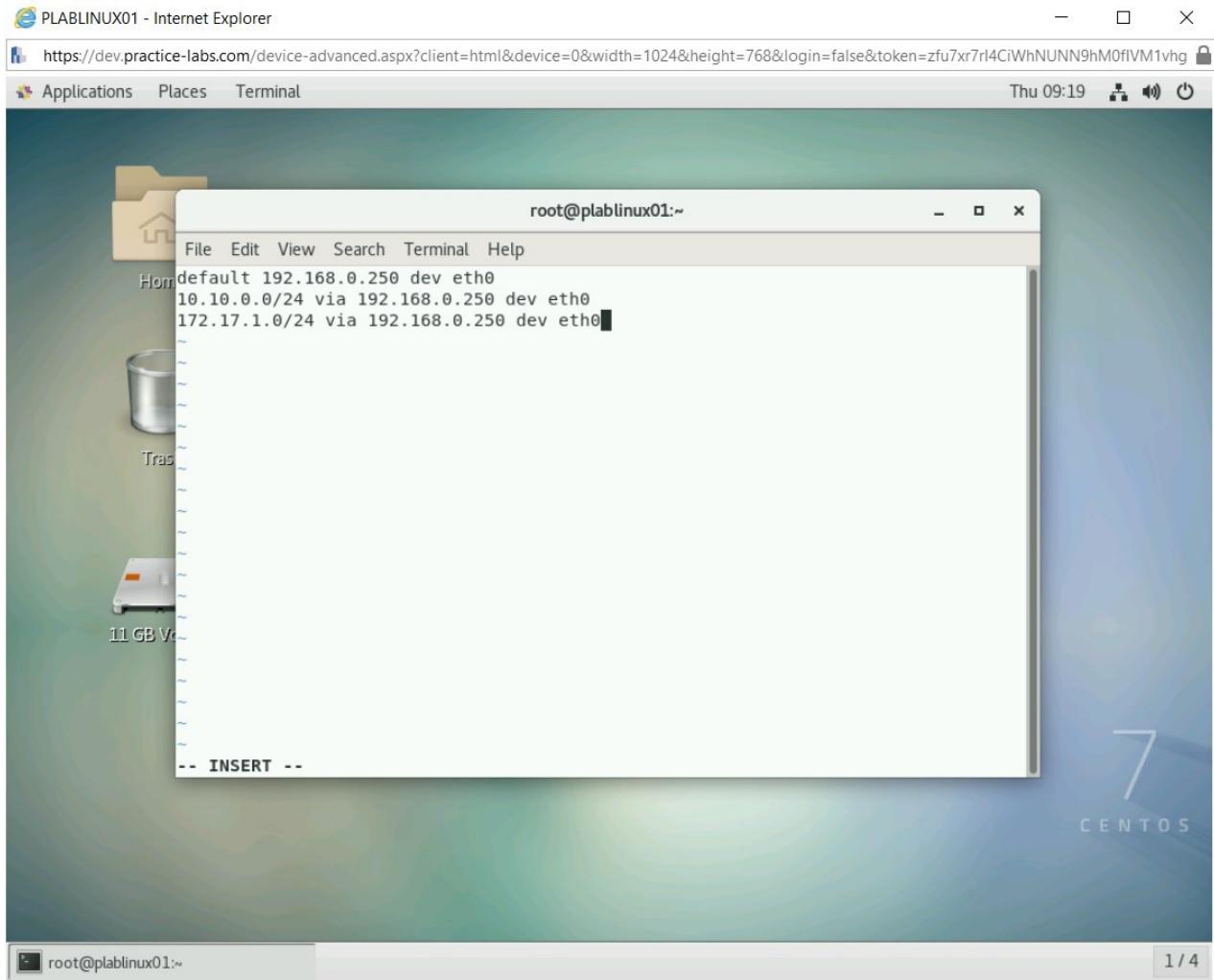


Figure 1.20 Screenshot of PLABLINUX01: Adding the network information in the network script.

Step 16

Press **ESC** and enter **:wq** to save and exit the file.

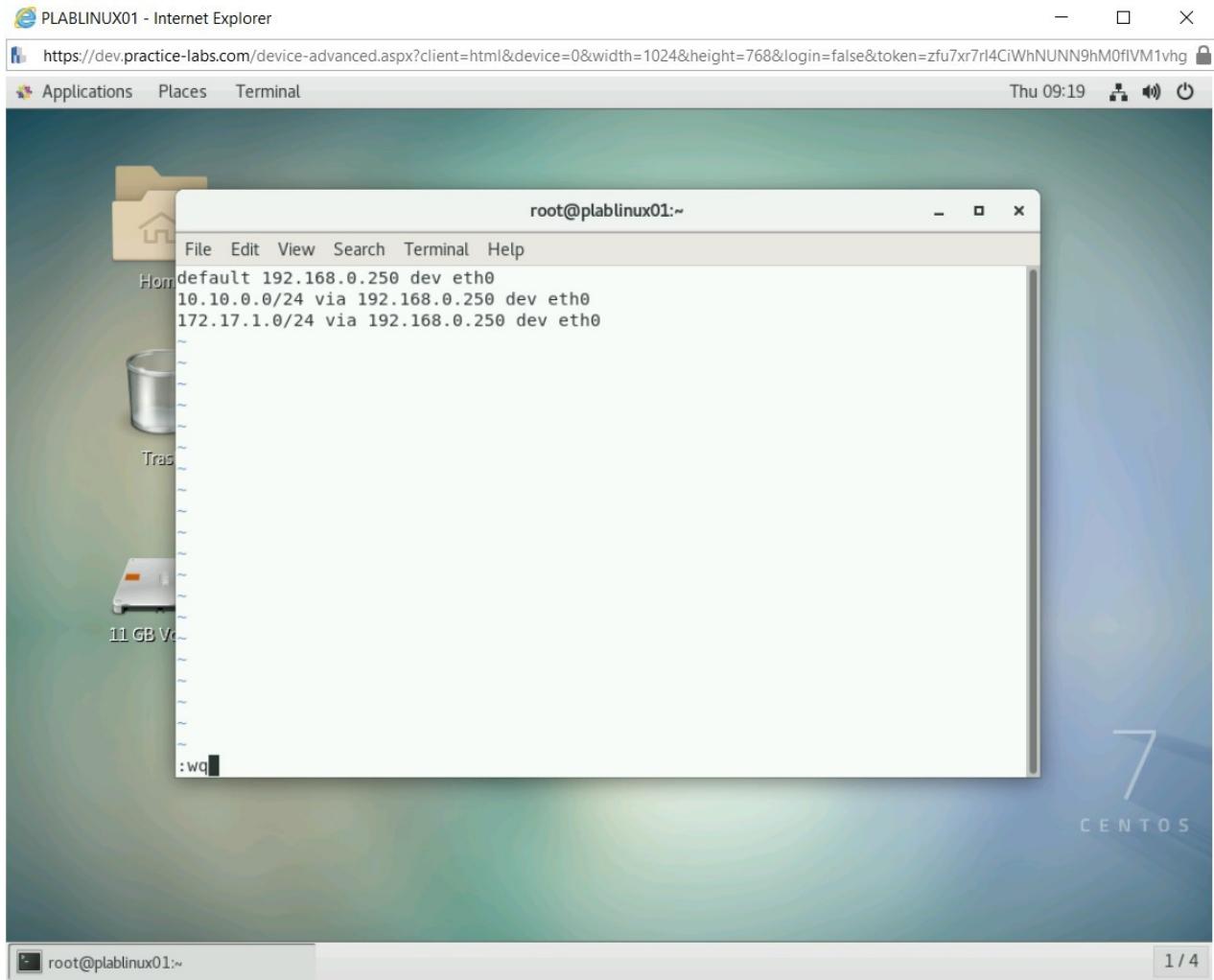


Figure 1.21 Screenshot of PLABLINUX01: Saving and closing the network script.

Step 17

The static route file is now saved. You can edit it as and when required.

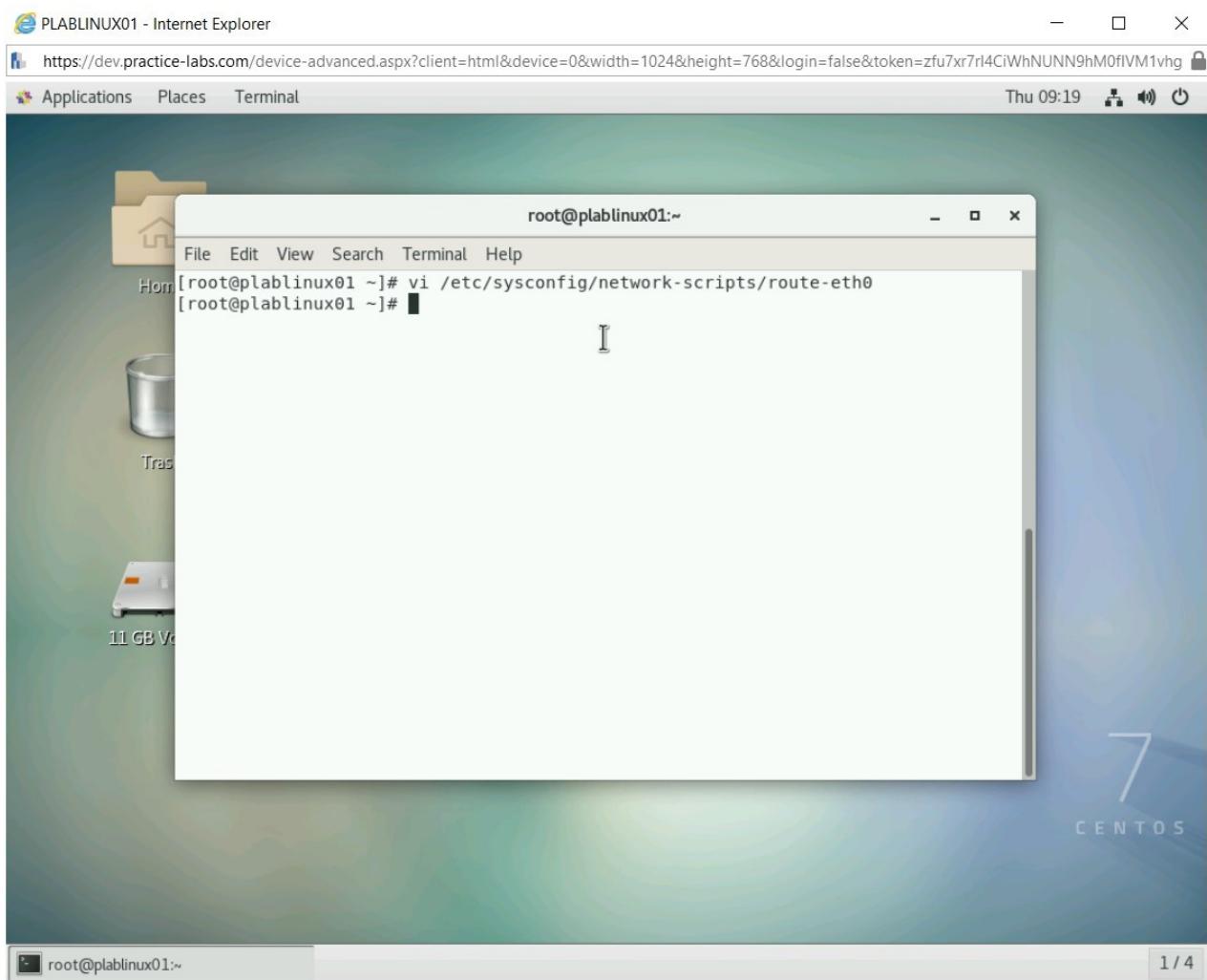


Figure 1.22 Screenshot of PLABLINUX01: Displaying the command prompt.

Task 3 - Debug Network Configuration Issues

Networks can face issues such as loss of connectivity, network not available, or no response from the network. To resolve such issues, you start with pinging a remote system or network and then move on to tracing the route and the number of hops for the packets to reach the destination. In this task, you will ping a system and then trace the route of the packets.

To debug network configuration issues, perform the following steps:

Step 1

When troubleshooting a network problem, ping is the basic command that can be used. It helps you test connectivity between two systems - whether they are on the same network or they are on different networks. For example, your system may be on your company's network, and another system can be a remote system on the Internet.

You can ping the remote system with either the name or the IP address.

To ping the system with the IP address, type the following command:

```
ping 192.168.0.1
```

Press **Enter**.

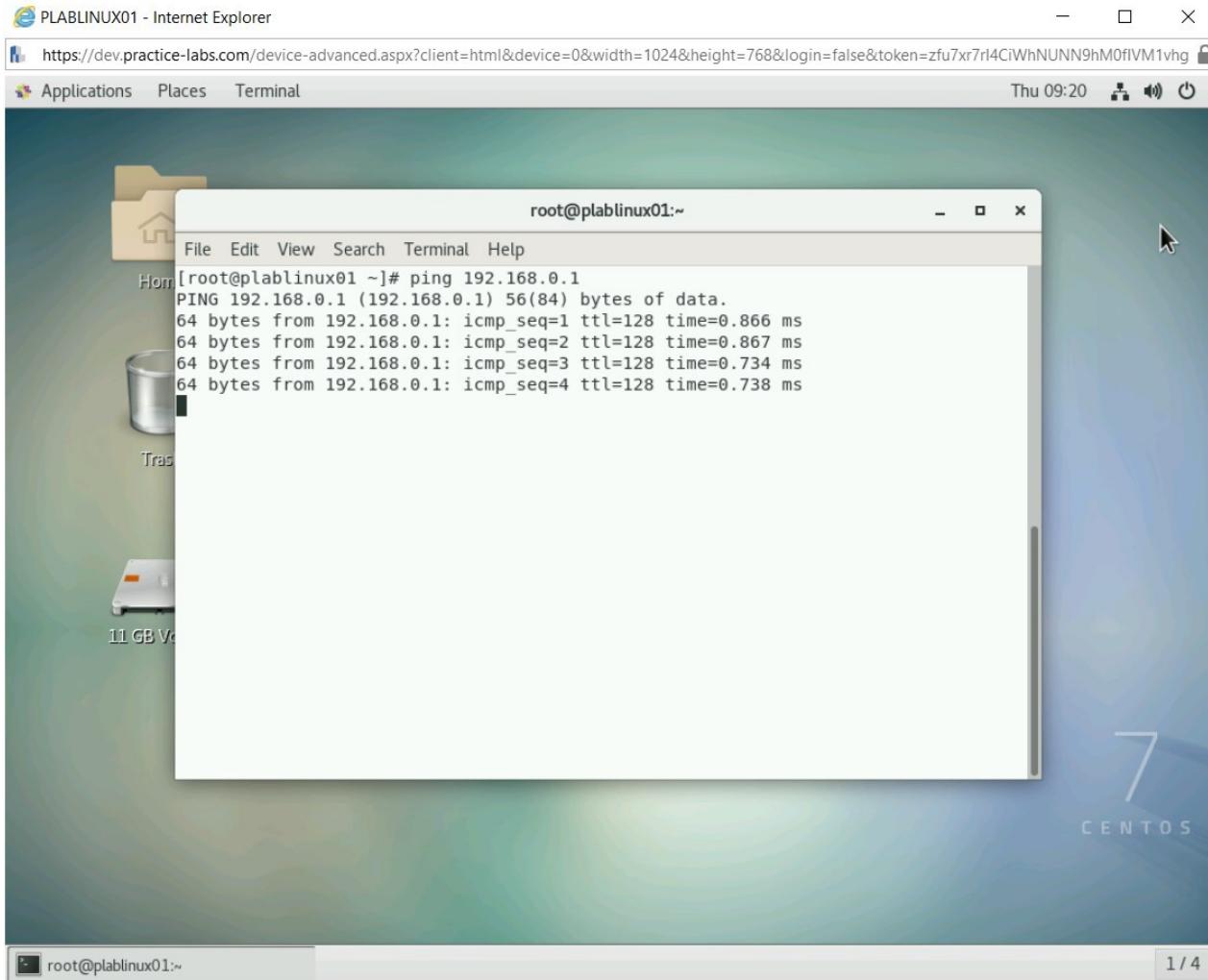


Figure 1.23 Screenshot of PLABLINUX01: Pinging an IP address on the network.

Step 2

Clear the screen by entering the following command:

```
clear
```

The ping command will continue to run till the time you break it using **CTRL + C**. You can simply define the number of times ping command should send requests to the other system. Type the following command:

```
ping -c 5 192.168.0.1
```

Press **Enter**.

Note that with this command, the ping request is sent only five times.

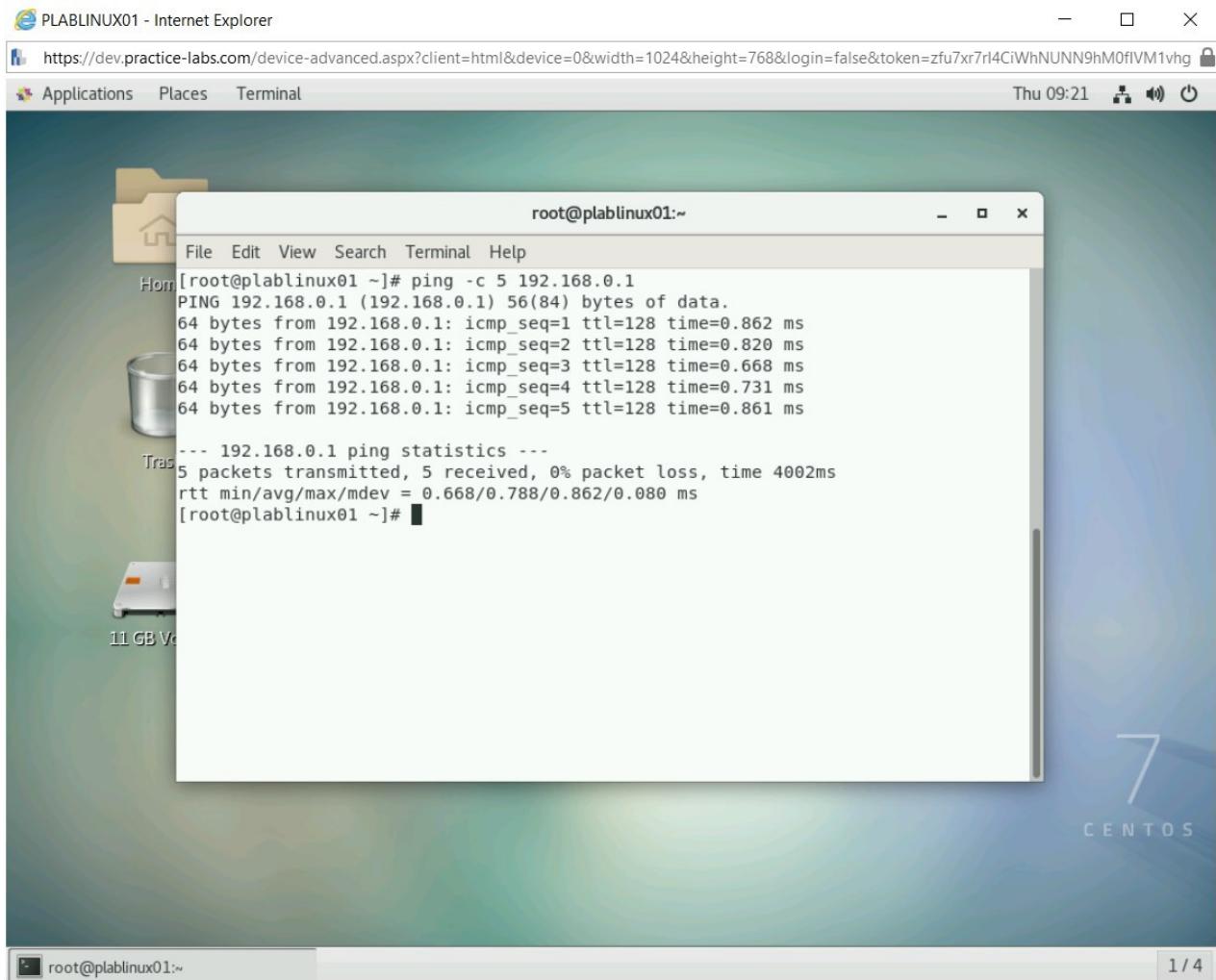


Figure 1.24 Screenshot of PLABLINUX01: Ping a system five times on the network.

Step 3

Clear the screen by entering the following command:

```
clear
```

You can also ping a system with its name. However, you have to note that if the system name is not present in the **/etc/hosts** file or the DNS server, you will receive an error.

Type the following command:

```
ping plabsa01
```

Press **Enter**.

Note that you receive an error.

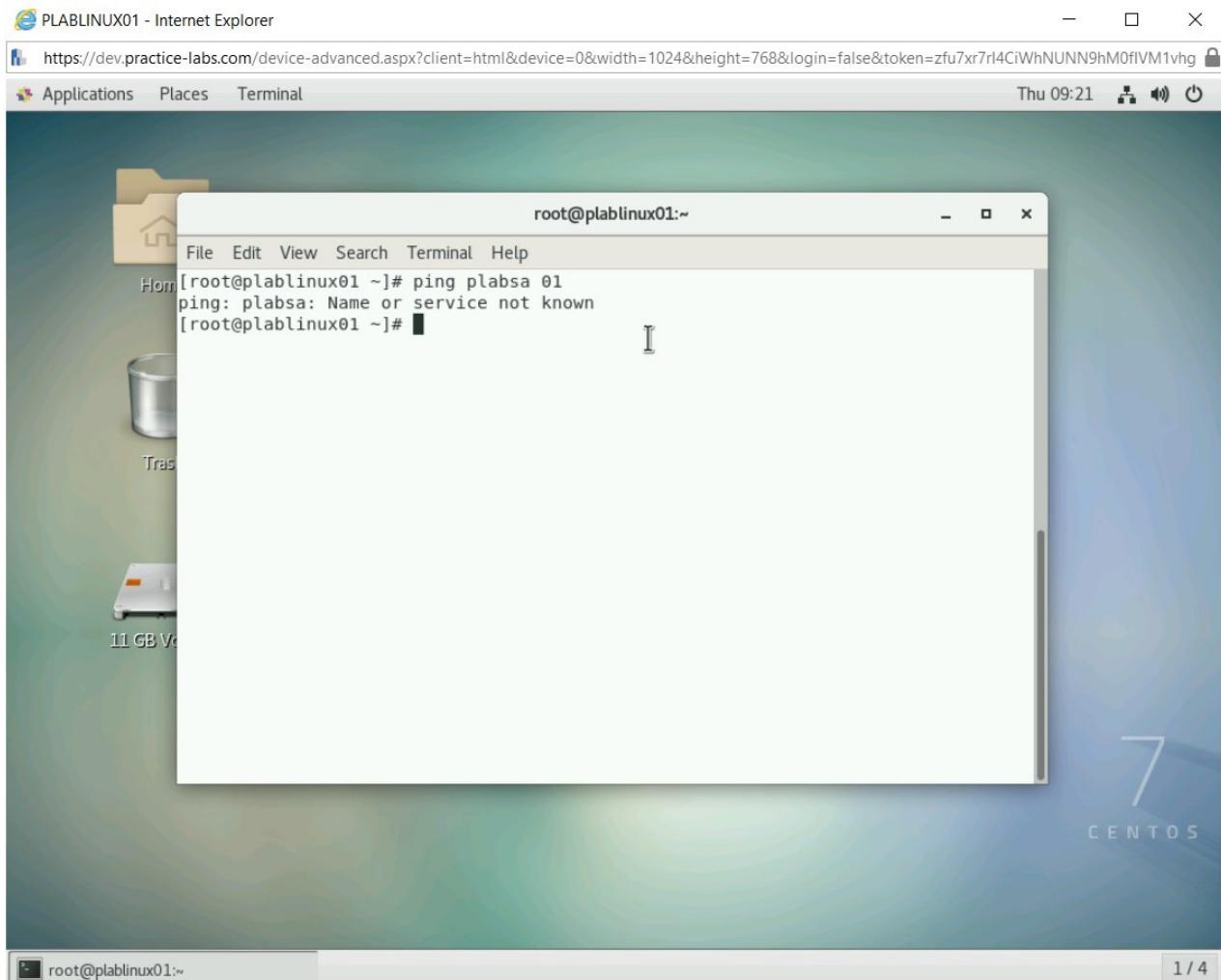


Figure 1.25 Screenshot of PLABLINUX01: Pinging a system name on the network.

Step 4

Clear the screen by entering the following command:

```
clear
```

Let's make the entry in the **/etc/hosts** file so that you are able to ping the system name. Type the following command:

```
vi /etc/hosts
```

Press **Enter**.

After the file is opened, press **i** to enter into the edit mode.

Type the following entry in the file:

```
192.168.0.1 plabsa01
```

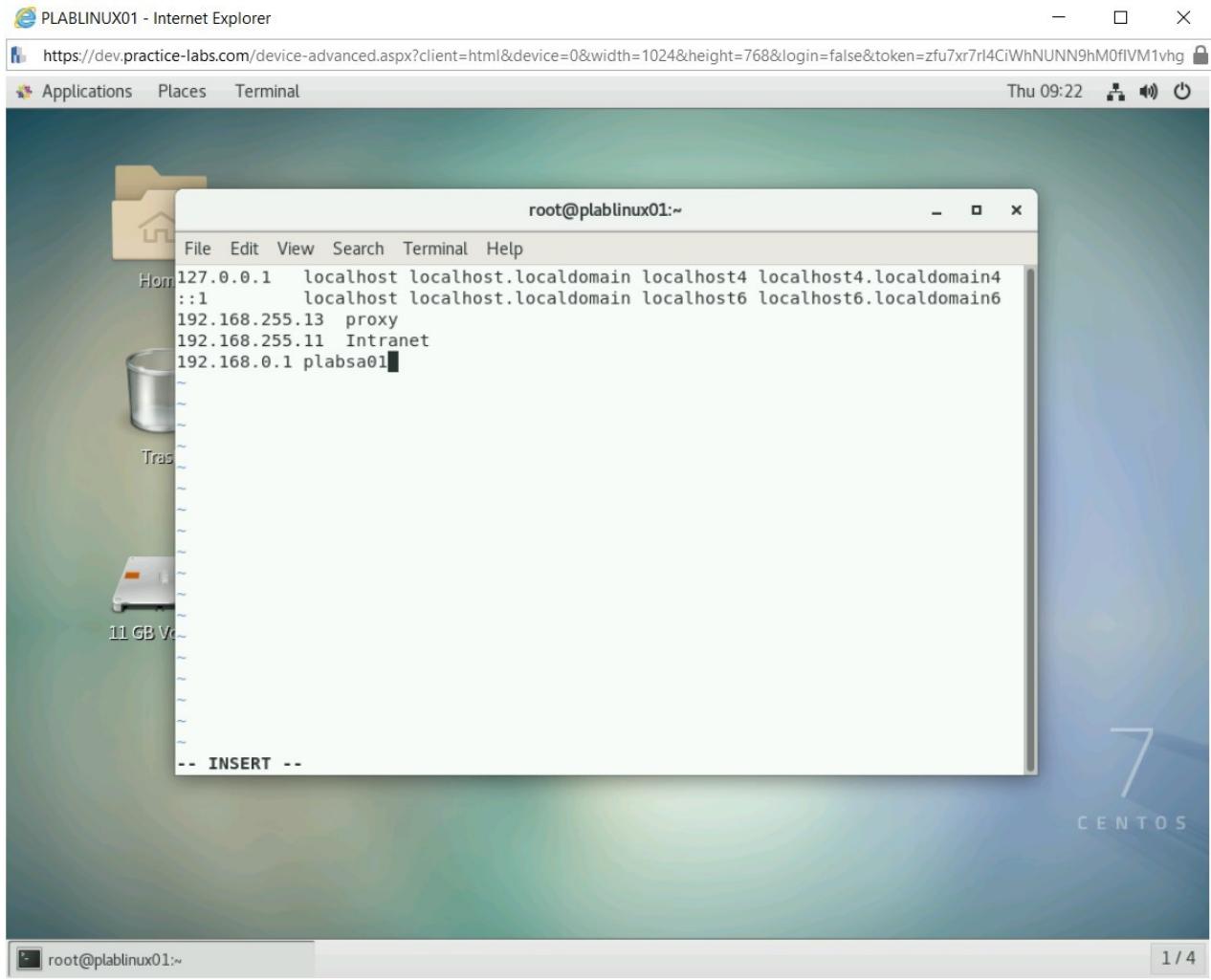


Figure 1.26 Screenshot of PLABLINUX01: Adding a system with IP address in the hosts file.

Step 5

Press **ESC** and then enter the command **:wq** to save and exit the file.

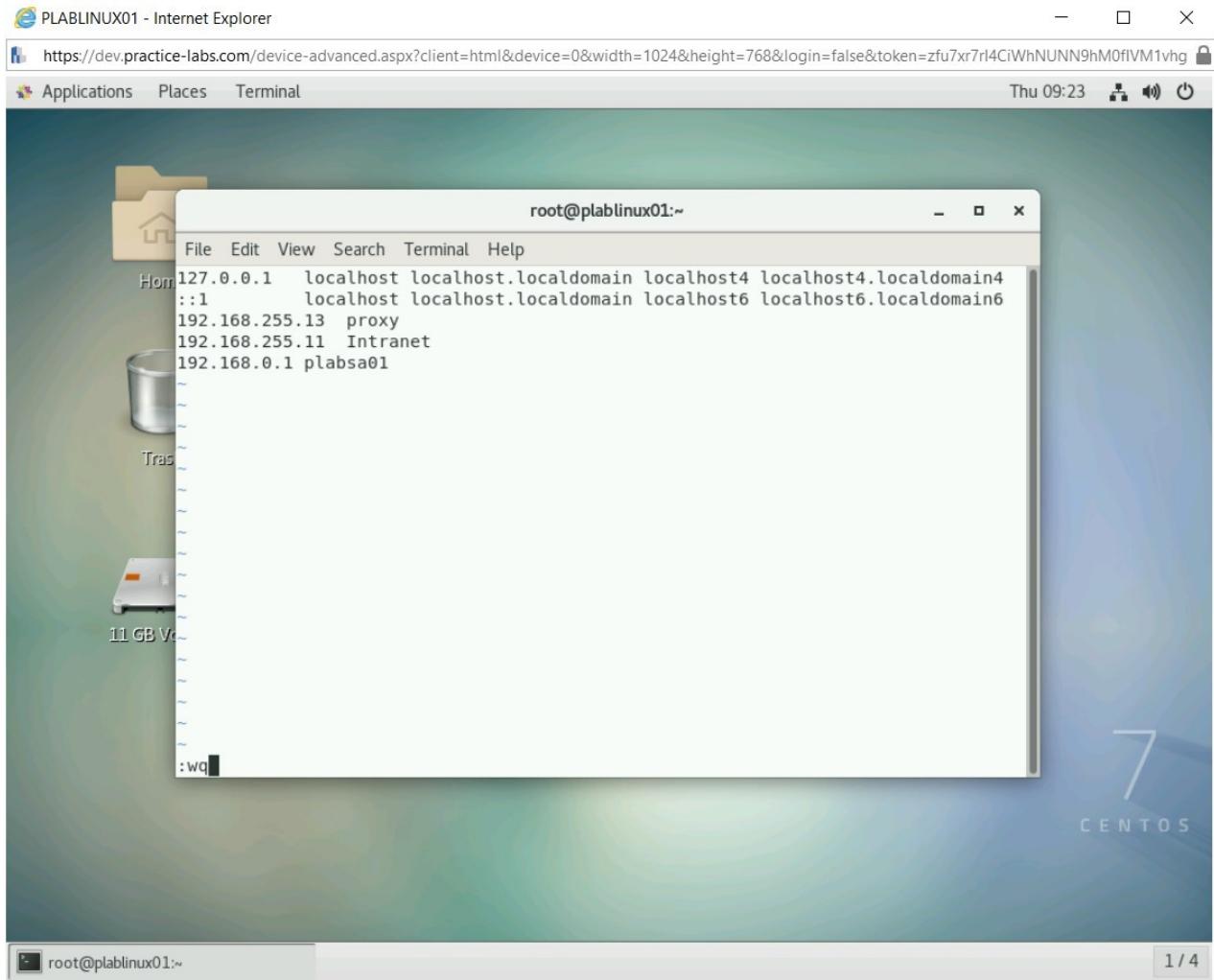


Figure 1.27 Screenshot of PLABLINUX01: Saving and exiting the file.

Step 6

Type the following command:

```
ping plabsa01
```

Note that you are now receiving the response. Press **CTRL + C** to break the command.

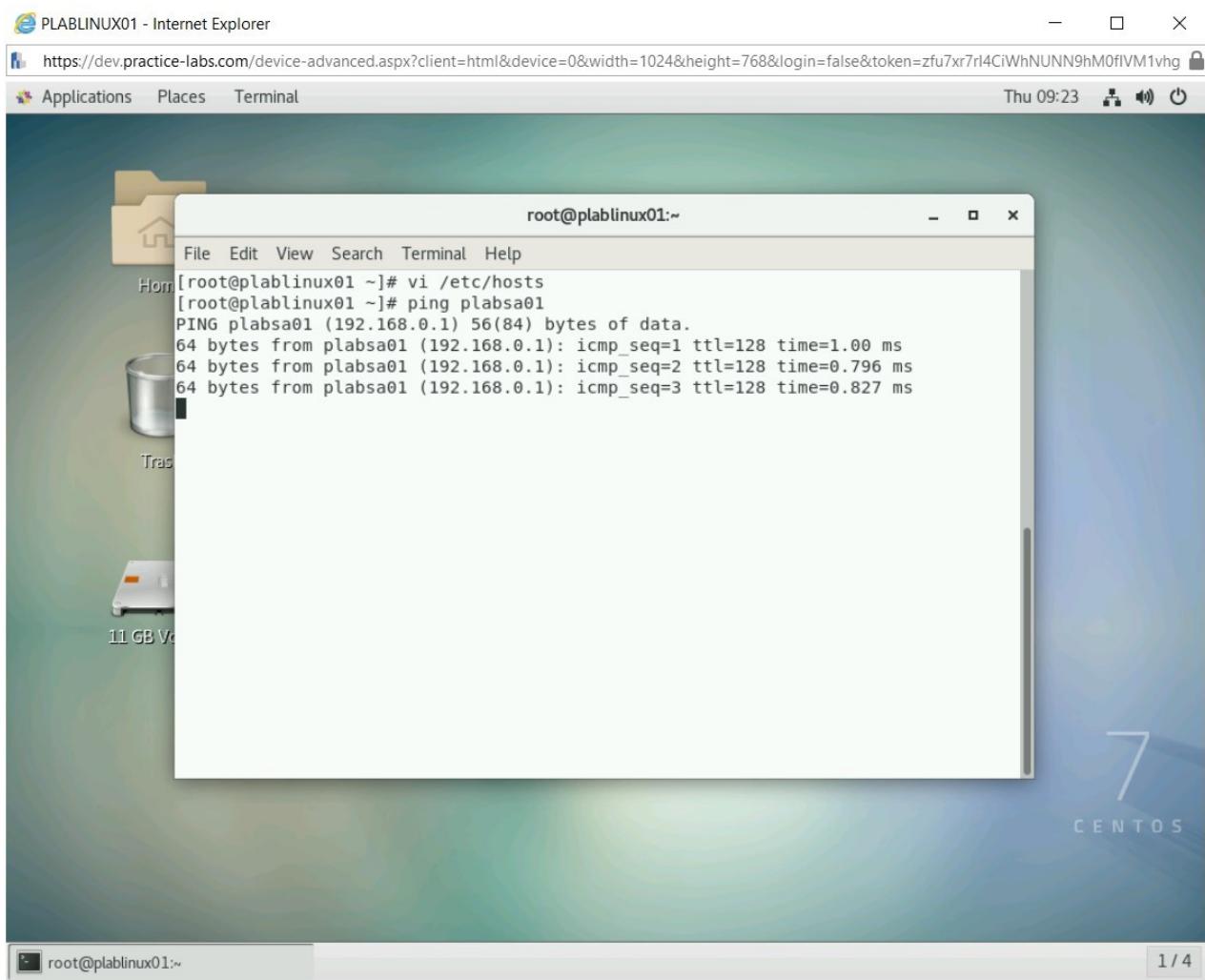


Figure 1.28 Screenshot of PLABLINUX01: Pinging a system name on the network.

Step 7

Press **CTRL + C** to stop the process and type the following command to clear the screen:

```
clear
```

Press **Enter**.

If you know the IPv6 address of a system, you can use it to ping the system. Else, you can also use the system name to ping with the **ping6** command. Let's try this with the system name, **localhost**.

Type the following command:

```
ping6 localhost
```

Press **Enter**.

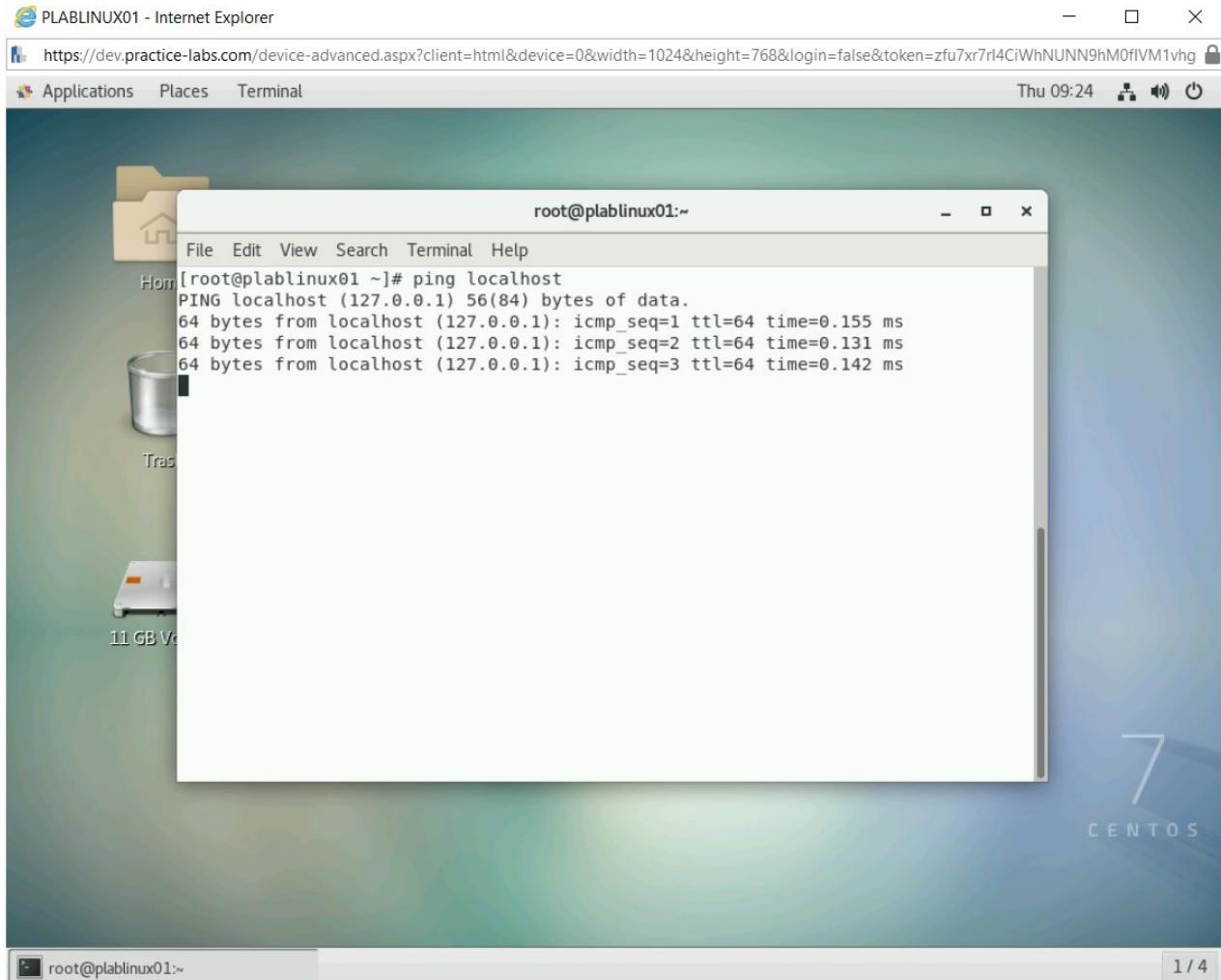


Figure 1.29 Screenshot of PLABLINUX01: Executing the ping6 command.

Step 8

As before, press **CTRL + C** and type the following command to clear the screen:

```
clear
```

Press **Enter**.

traceroute is a network troubleshooting utility that performs two key tasks:

- showing the number of hops that were taken to reach a specific destination or a system
- determining the traveling path for packets that are being sent to the destination

Type the following command:

```
traceroute 192.168.0.250
```

Press **Enter**. Note that there was only one hop.

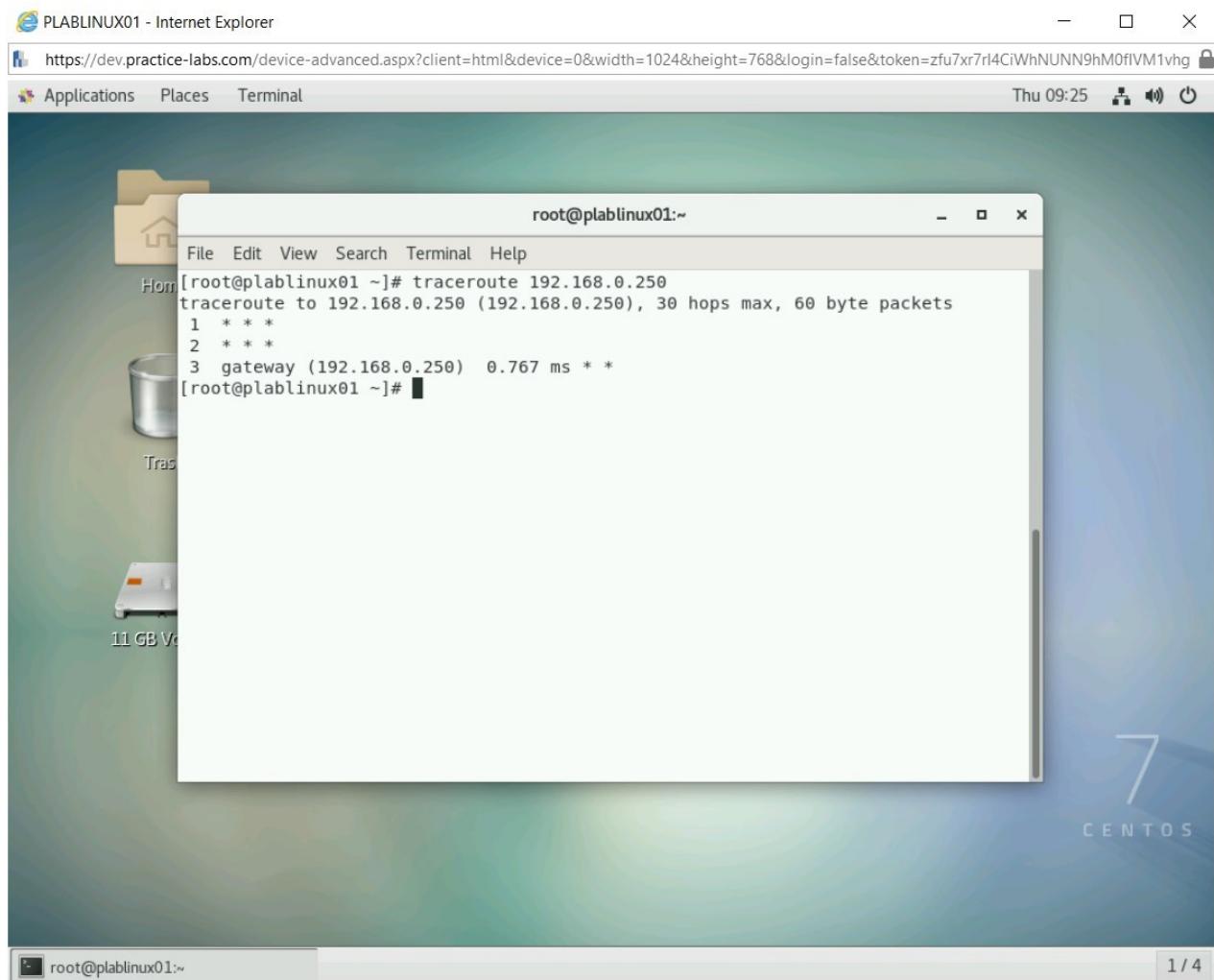


Figure 1.30 Screenshot of PLABLINUX01: Performing a traceroute.

Step 9

You can even determine the path for a destination that is outside the network.

For example, to determine the path for **4.2.2.2**, type the following command:

traceroute 4.2.2.2

Press **Enter**.

You will receive an error because the firewall is blocking the packets and does not allow them to go out of the network.

Note: You can attempt this command to find the path for 4.2.2.2 from your home system.

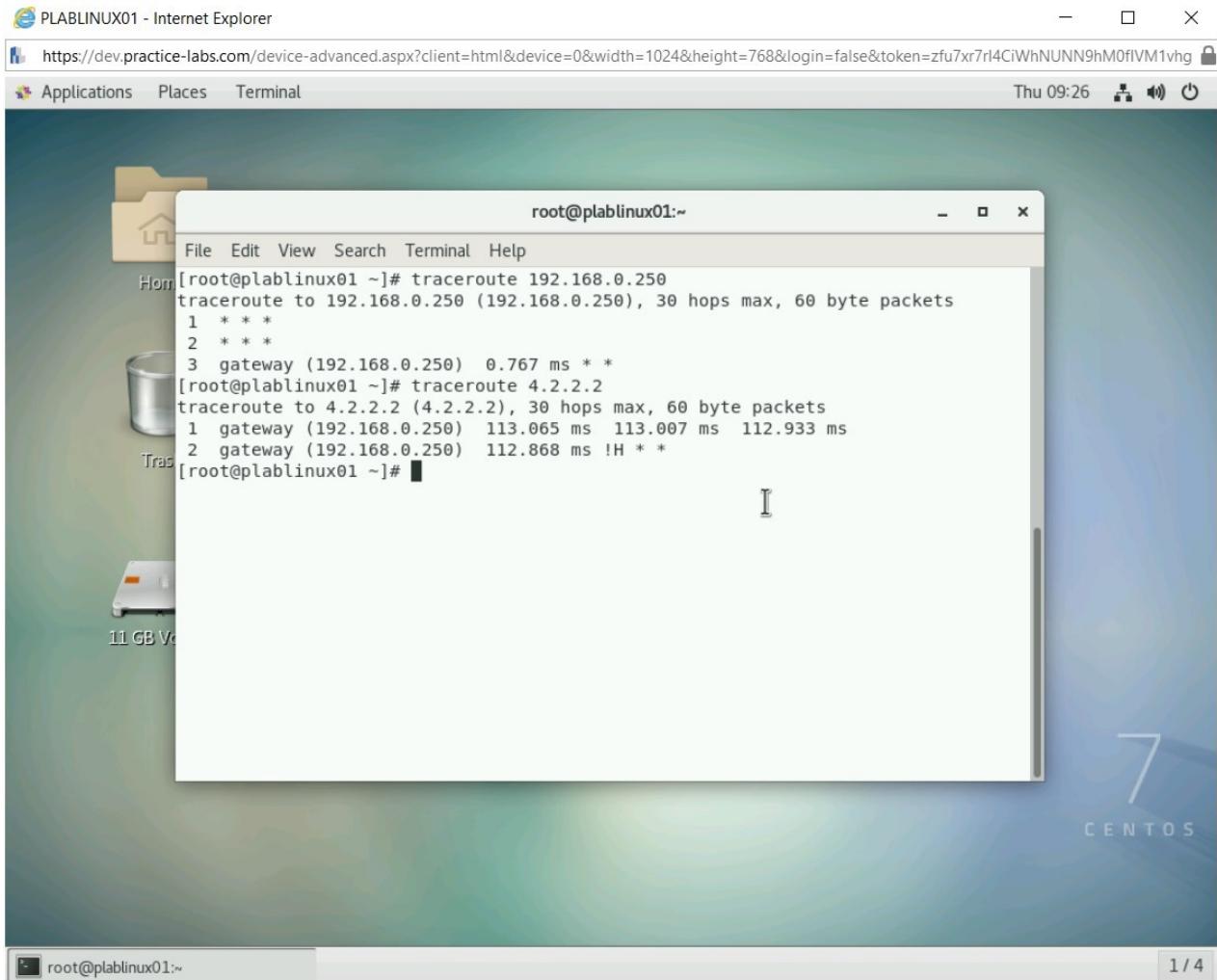


Figure 1.31 Screenshot of PLABLINUX01: Performing a traceroute to an external system.

Step 10

Similar to the **ping6** command, **traceroute6** works with the IPv6 and performs the same tasks as the **traceroute** command.

Type the following command:

```
traceroute6 localhost
```

Press **Enter**.

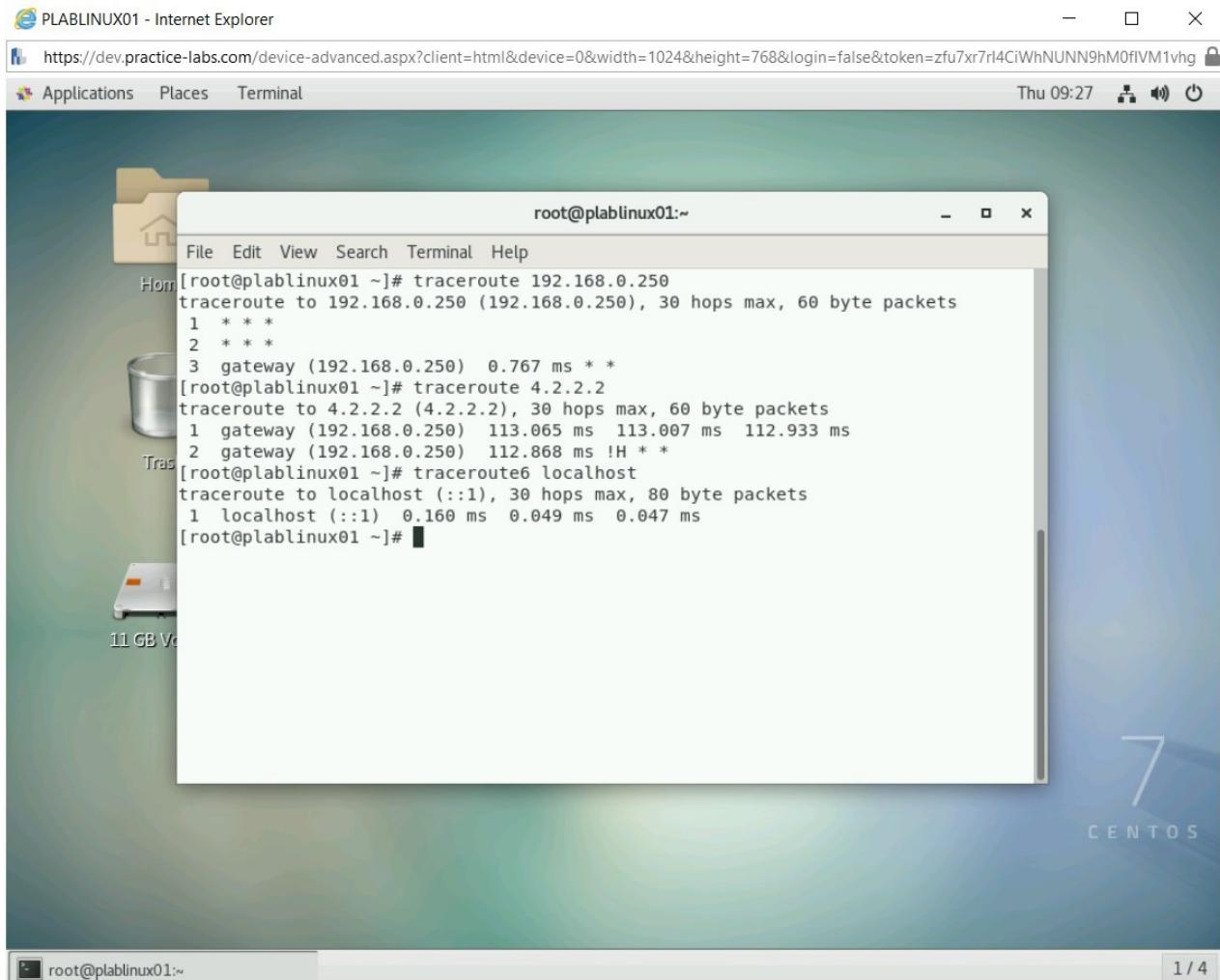


Figure 1.32 Screenshot of PLABLINUX01: Executing the traceroute6 command.

Step 11

Clear the screen by entering the following command:

```
clear
```

The **tracepath** command similar to the **traceroute** command. However, the **traceroute** command requires root privileges for execution. On the other hand, the

tracepath command does not require root privileges.

Type the following command:

```
tracepath 192.168.0.250
```

Press **Enter**.

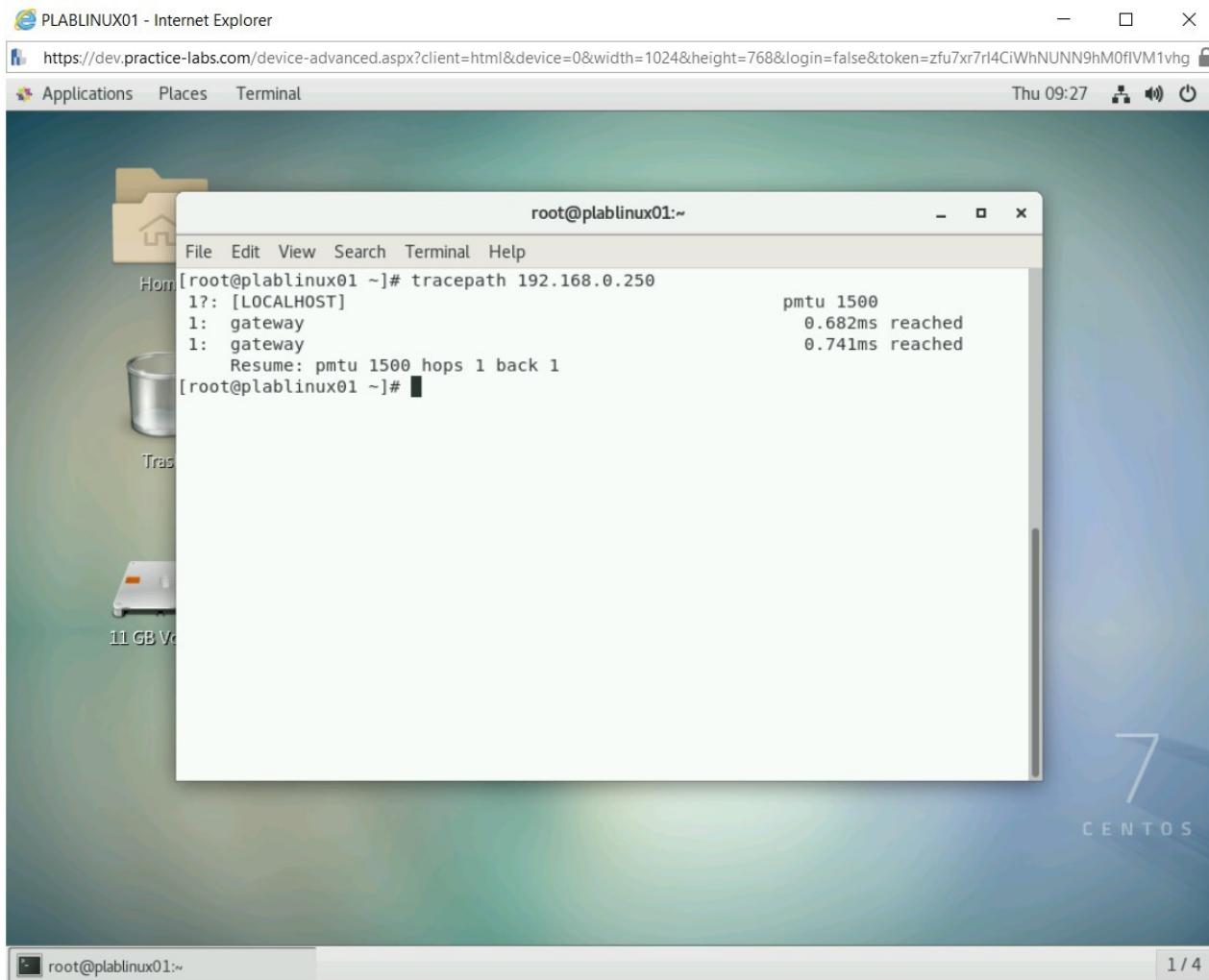


Figure 1.33 Screenshot of PLABLINUX01: Executing the tracepath command.

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

Review

Well done, you have completed the **Basic Network Troubleshooting** Practice Lab.

Summary

You completed the following exercise:

- Exercise 1 - Basic Network Troubleshooting

You should now be able to:

- Configure client network
- Manage network interfaces
- Debug network configuration issues

Feedback

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