

# CompTIA Linux+

## Design Hard Disk Layout

- **Introduction**
- **Lab Topology**
- **Exercise 1 - Design Hard Disk Layout**
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## Introduction

Welcome to the Design Hard Disk Layout Practice Lab. In this module you will be provided with the instructions and devices needed to develop your hands-on skills.

Hard Disk  
Design Layout  
Linux  
Architecture

## Learning Outcomes

In this module, you will complete the following exercise:

- Exercise 1 - Design Hard Disk Layout

After completing this lab, you will be able to:

- Ensure the /boot partition conforms to the hardware architecture.

## Exam Objectives

The following exam objectives are covered in this lab:

- LPI: 102.2 Install a boot manager.
- LPI: 102.1 Design hard disk layout.
- LPI: 1.4 Given a scenario, manage storage in a Linux environment.
- CompTIA: 1.1 Explain Linux boot process concepts.

## Exercise 1 - Design Hard Disk Layout

Partitioning a hard disk helps speed-up file-checks, design enhanced data-security, and configure a wider range of file accessibility modes.

In this exercise, you will understand how Linux lays out the directory structure on the hard disk.

## Learning Outcomes

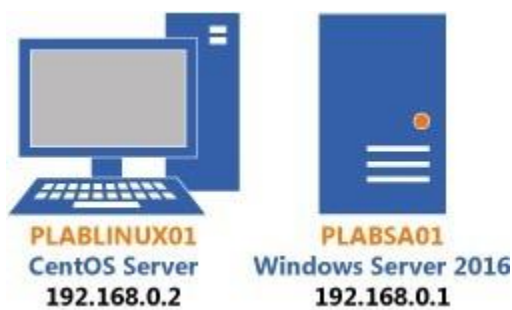
After completing this exercise, you will be able to:

- Log into a Linux system
- Ensure the /boot partition conforms to the hardware architecture

## Your Devices

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

- PLABSA01 (Windows Server 2016)
- PLABLINUX01 (CentOS Server)



## Task 1 - Ensure the /boot partition conforms to the hardware architecture

To perform any operations on the system, you need to log into the system. In this task, you will log into a CentOS Linux system on the lab.

To log into a Linux system, perform the following steps:

### *Step 1*

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

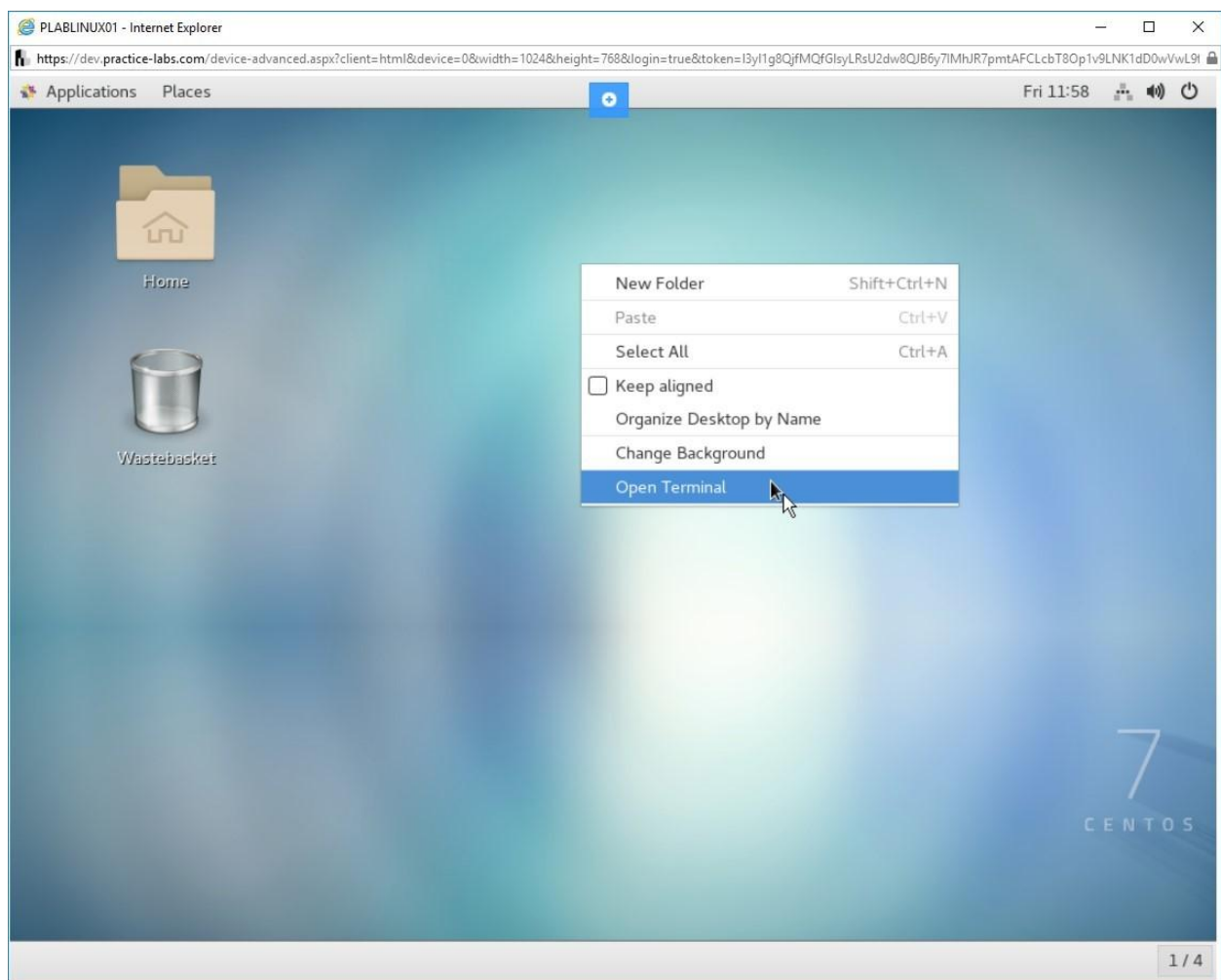


Figure 1.1 Screenshot of PLABLINUX01: Selecting the Open Terminal option from the context menu.

## ***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.

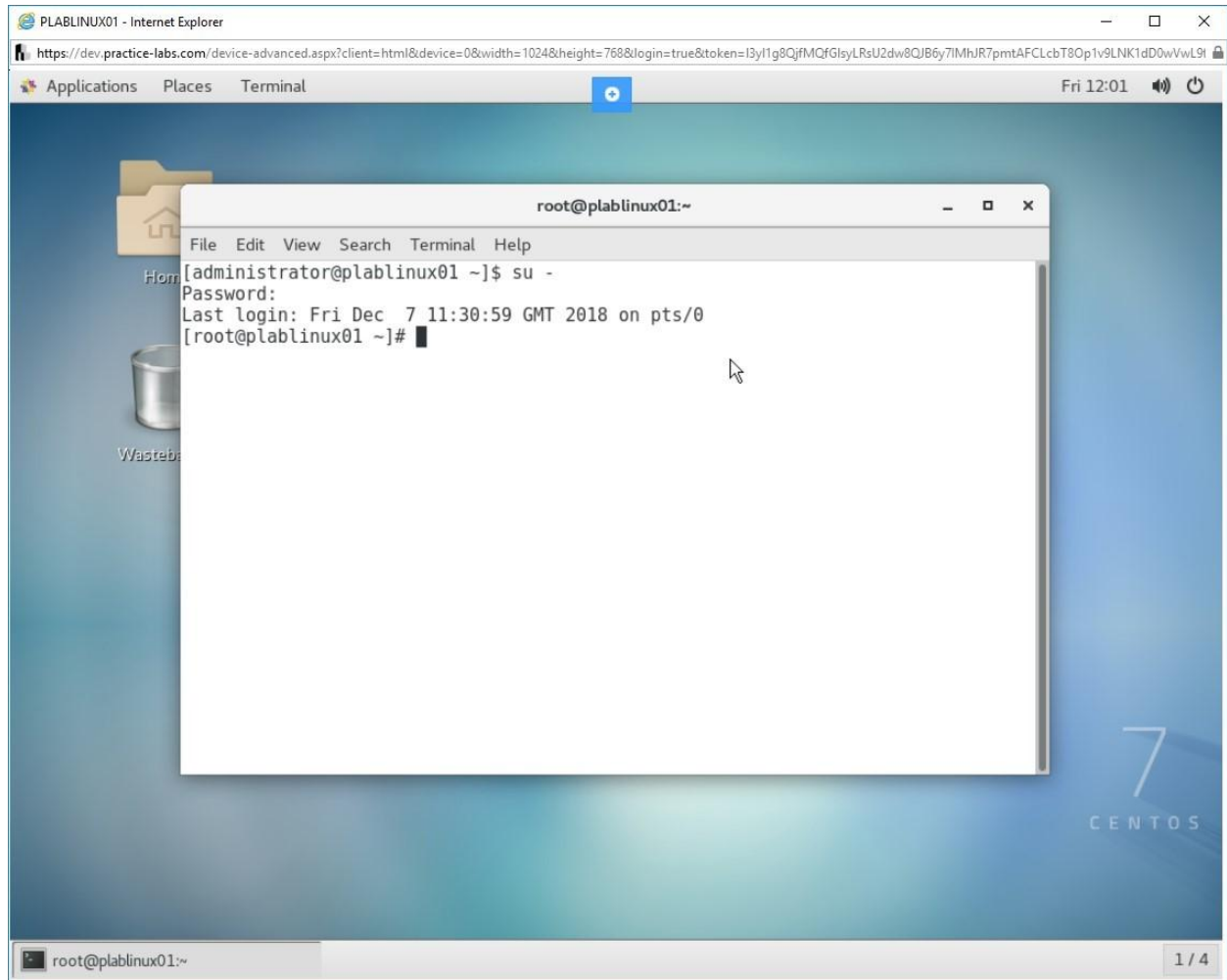


Figure 1.2 Screenshot of PLABLINUX01: Changing the account to the root account with the su - command.

### Step 3

Clear the screen by entering the following command:

```
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.*

Go to the root directory by entering the following command:

```
cd ..
```

Note that this command will change the directory.

*Note: The `cd ..` command is used to navigate 1 directory back which would be the root directory in this scenario while the `cd /` command is used to navigate directly to the root.*

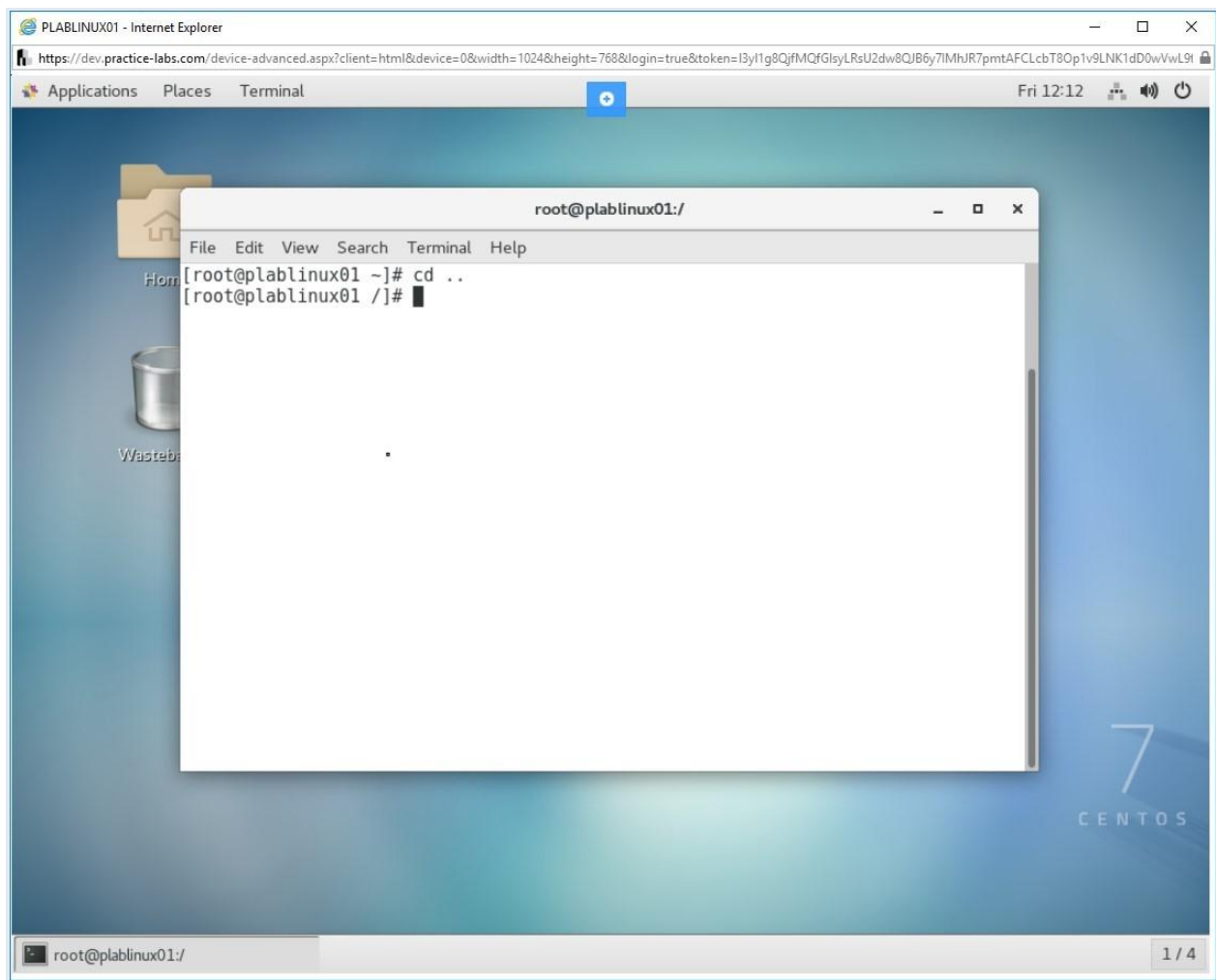


Figure 1.3 Screenshot of PLABLINUX01: Changing the directory using the `cd` command.

## Step 4

Now, list the root directory structure by entering the following command:

```
ls -l
```

Note that the root directory (/) contains some of the following directories:

- boot
- usr
- var
- tmp
- home

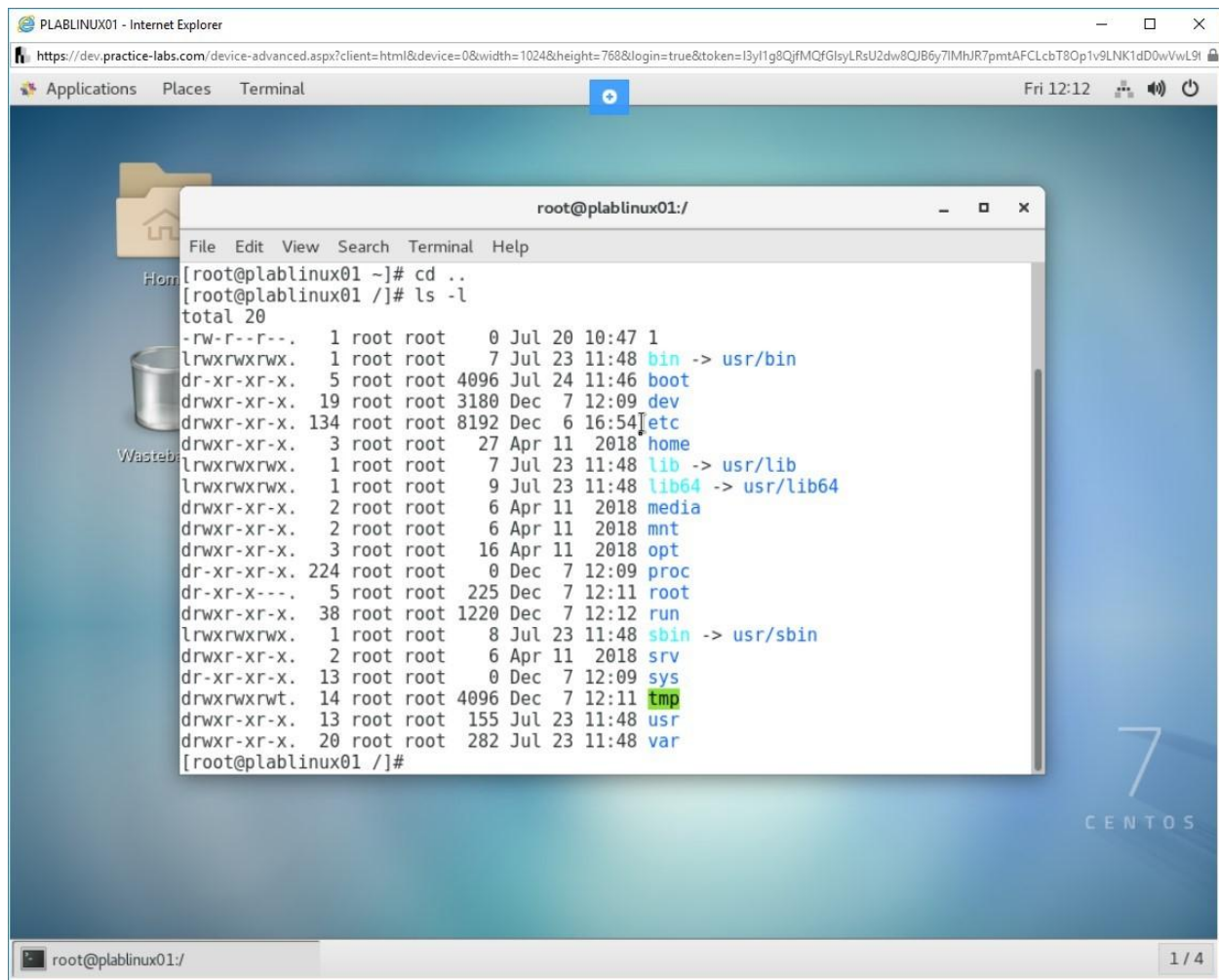


Figure 1.4 Screenshot of PLABINUX01: Using the ls -l command to display the root directory structure.

## ***Step 5***

Clear the screen by entering the following command:

```
clear
```

Press Enter. You can also find the total space taken by each of the directories. To find out this detail, type the following command:

```
du -h --max-depth=1
```

Press Enter.



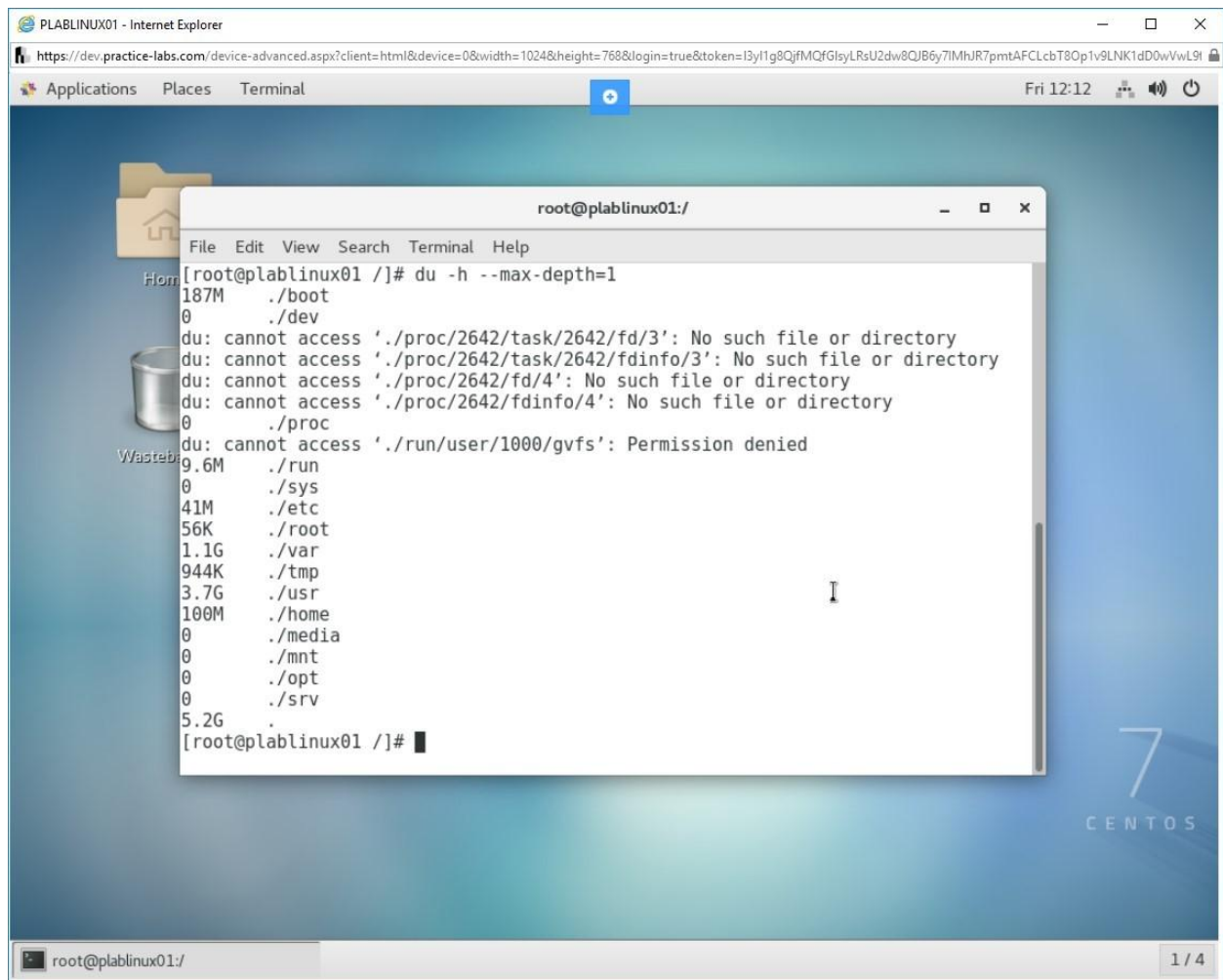


Figure 1.5 Screenshot of PLABLINUX01: Finding the total space taken by each of the directories with the du command.

## Step 6

Clear the screen by entering the following command:

```
clear
```

Press Enter. You can also find the space used up individually by each sub-directory as well as the total space used up by the main directory.

For example, to find out the space taken up individually by the sub-directories and the total space taken up by the /usr directory, enter the following command:

```
du -h --max-depth=1 /usr
```

Press Enter.

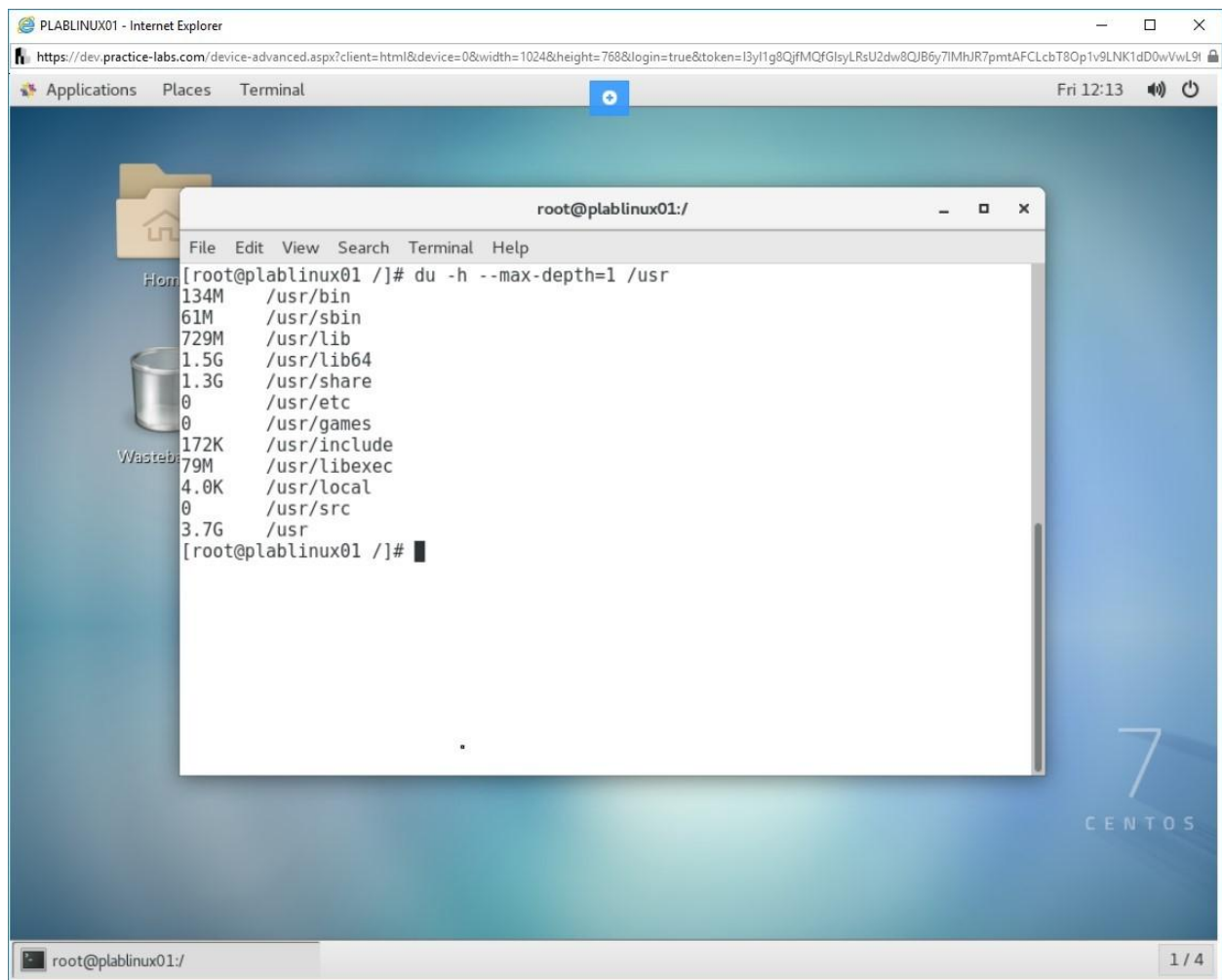


Figure 1.6 Screenshot of PLABLINUX01: Finding out the space taken up individually by the sub-directories and the total space taken up by the /usr directory

## Step 7

Clear the screen by entering the following command:

```
clear
```

Press Enter. The swap partition is a separate partition that moves items from computer memory to its hard drive. You can check for the swap partition and its space in Linux by entering the following command:

```
swapon -s
```

Press Enter.

*Note: The swap partition size depends on the amount of RAM in the system.*

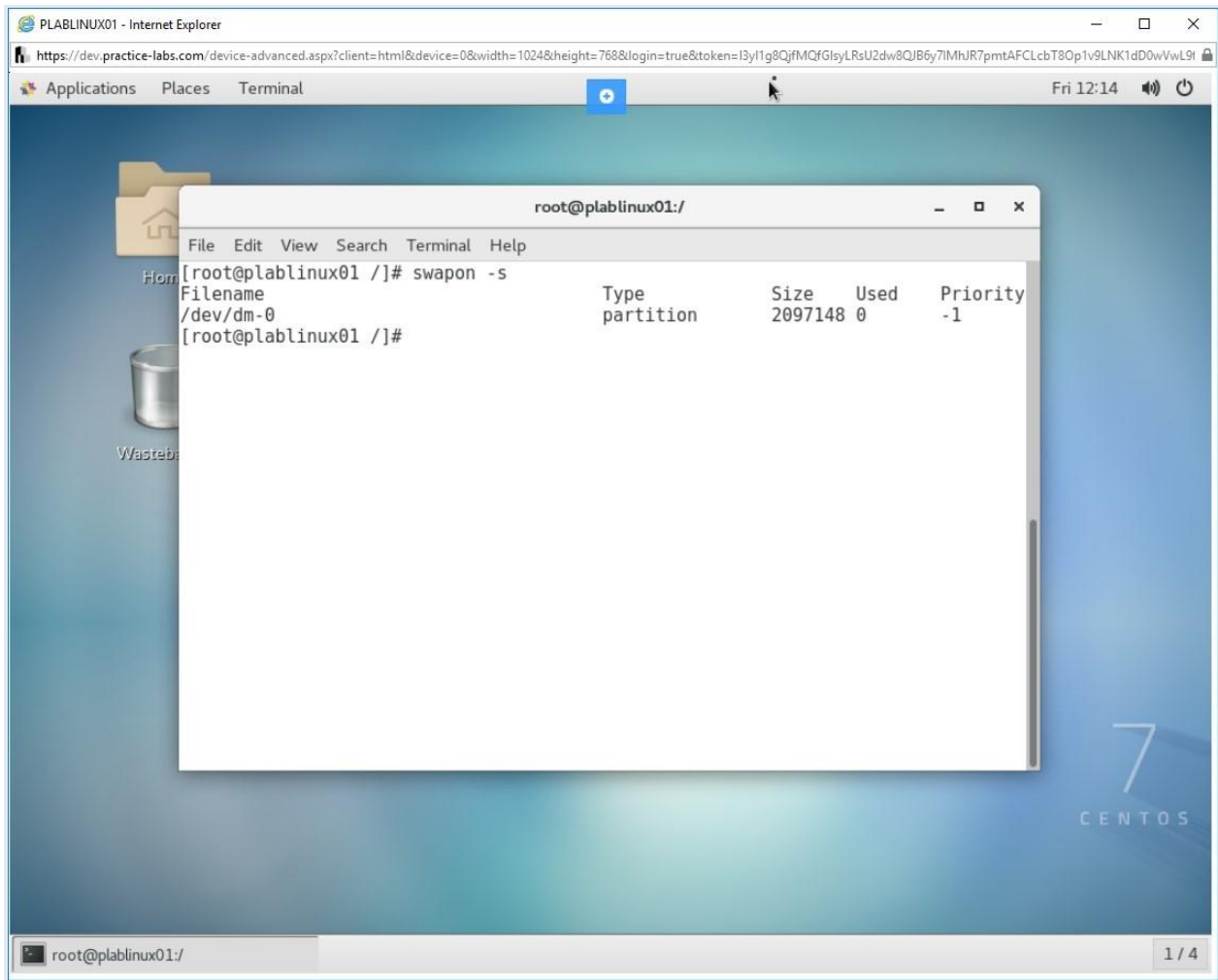


Figure 1.7 Screenshot of PLABLINUX01: Verifying the swapon partition and its space using the swapon -s command.

## Step 8

Clear the screen by entering the following command:

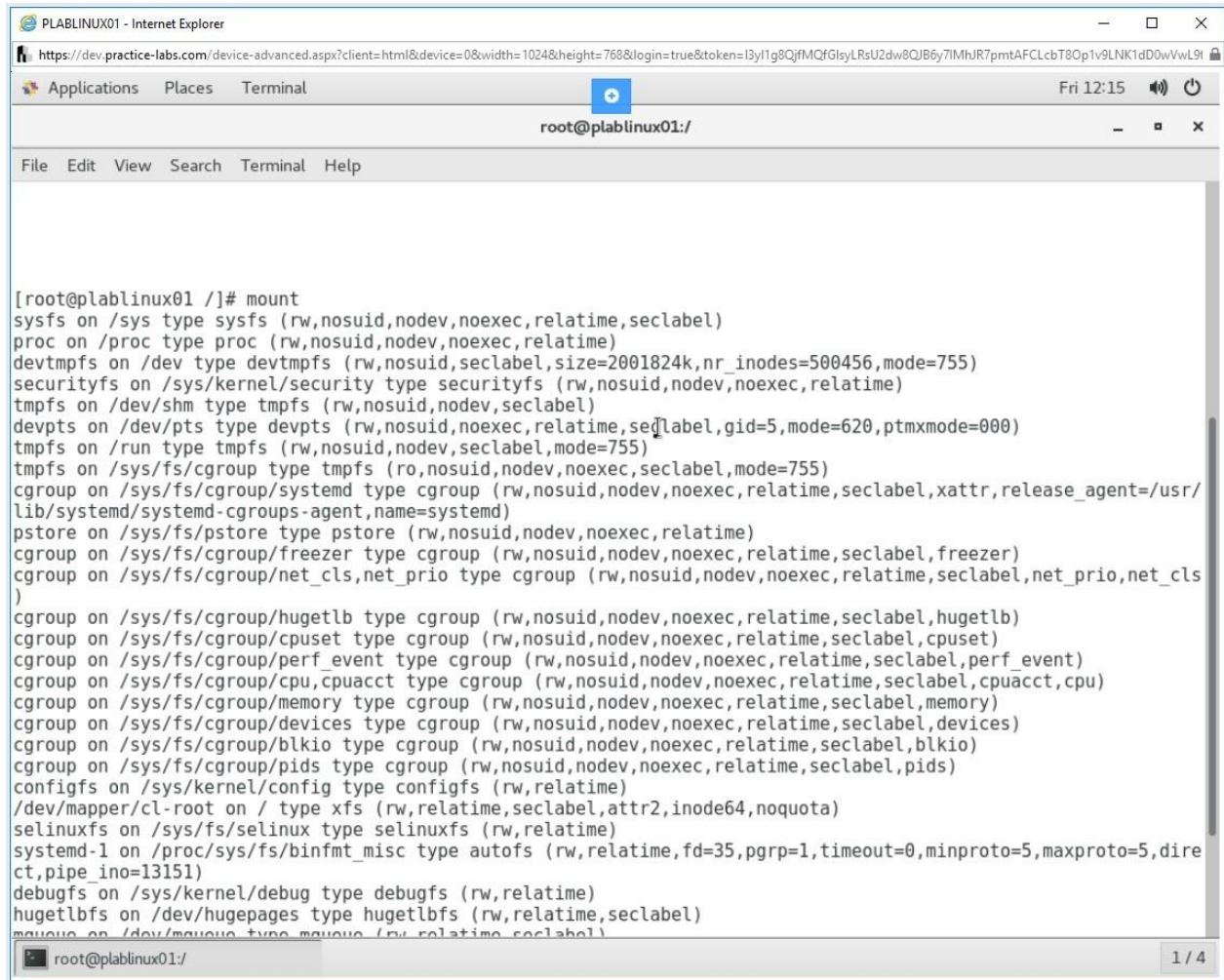
```
clear
```

Press Enter. You can also list all the partitions on the hard disk and their mount points by entering the following command:

```
mount
```

Press Enter.

*Note: Maximize the command terminal window.*

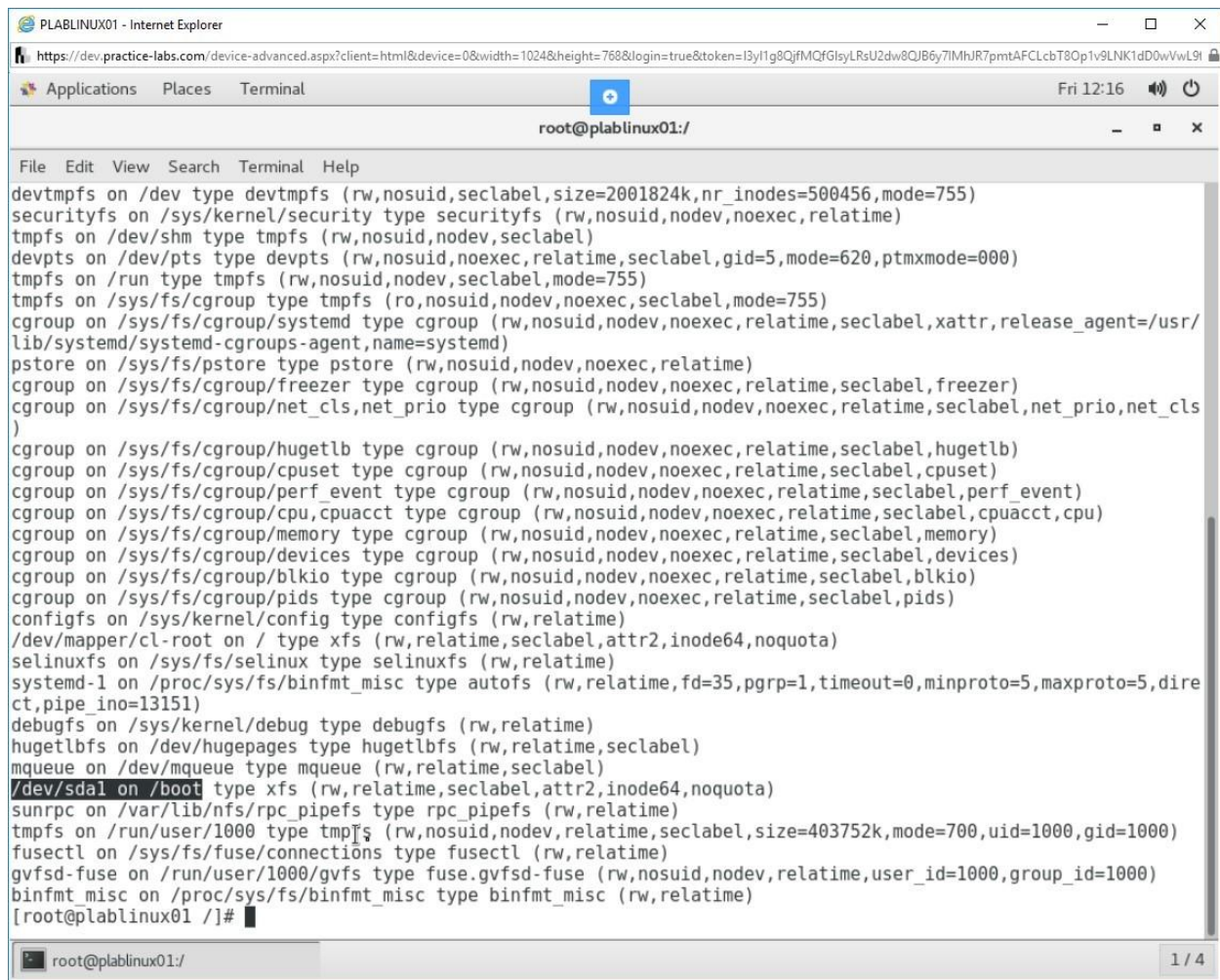
The image shows a web browser window with a terminal application. The browser's address bar shows a URL from 'practice-labs.com'. The terminal window has a title bar 'root@plablinux01:/' and a menu bar with 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The terminal content shows the command 'mount' being executed, followed by a long list of mount points and their configurations. The list includes various filesystems like sysfs, proc, devtmpfs, securityfs, tmpfs, devpts, run, cgroup, pstore, freezer, hugetlb, cpuset, perf\_event, cpuacct, memory, devices, blkio, pids, configfs, xfs, selinuxfs, autofs, debugfs, and hugetlbfs, each with specific mount options. The terminal window is maximized, and the output is scrollable, with a '1 / 4' indicator at the bottom right.

```
[root@plablinux01 /]# mount
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime,seclabel)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
devtmpfs on /dev type devtmpfs (rw,nosuid,seclabel,size=2001824k,nr_inodes=500456,mode=755)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev,seclabel)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,seclabel,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,nodev,seclabel,mode=755)
tmpfs on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,seclabel,mode=755)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,xattr,release_agent=/usr/lib/systemd/systemd-cgroups-agent,name=systemd)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime)
cgroup on /sys/fs/cgroup/freezer type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,freezer)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,net_prio,net_cls)
cgroup on /sys/fs/cgroup/hugetlb type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,hugetlb)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,cpuset)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,perf_event)
cgroup on /sys/fs/cgroup/cpu,cpuacct type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,cpuacct,cpu)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,memory)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,devices)
cgroup on /sys/fs/cgroup/blkio type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,blkio)
cgroup on /sys/fs/cgroup/pids type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,pids)
configfs on /sys/kernel/config type configfs (rw,relatime)
/dev/mapper/cl-root on / type xfs (rw,relatime,seclabel,attr2,inode64,noquota)
selinuxfs on /sys/fs/selinux type selinuxfs (rw,relatime)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=35,pgrp=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=13151)
debugfs on /sys/kernel/debug type debugfs (rw,relatime)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,seclabel)
mqueue on /dev/mqueue type mqueue (rw,relatime,seclabel)
```

Figure 1.8 Screenshot of PLABLINUX01: Listing all the partitions on the hard disk and their mount points by using the mount command.

## Step 9

In the output of the command, note that /dev/sda1 is mounted on the /boot partition.



```
devtmpfs on /dev type devtmpfs (rw,nosuid,seclabel,size=2001824k,nr_inodes=500456,mode=755)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev,seclabel)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,seclabel,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,nodev,seclabel,mode=755)
tmpfs on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,seclabel,mode=755)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,xattr,release_agent=/usr/lib/systemd/systemd-cgroups-agent,name=systemd)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime)
cgroup on /sys/fs/cgroup/freezer type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,freezer)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,net_prio,net_cls)
cgroup on /sys/fs/cgroup/hugetlb type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,hugetlb)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,cpuset)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,perf_event)
cgroup on /sys/fs/cgroup/cpu,cpuacct type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,cpuacct,cpu)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,memory)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,devices)
cgroup on /sys/fs/cgroup/blkio type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,blkio)
cgroup on /sys/fs/cgroup/pids type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,pids)
configfs on /sys/kernel/config type configfs (rw,relatime)
/dev/mapper/cl-root on / type xfs (rw,relatime,seclabel,attr2,inode64,noquota)
selinuxfs on /sys/fs/selinux type selinuxfs (rw,relatime)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=35,pgrp=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=13151)
debugfs on /sys/kernel/debug type debugfs (rw,relatime)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,seclabel)
mqueue on /dev/mqueue type mqueue (rw,relatime,seclabel)
/dev/sda1 on /boot type xfs (rw,relatime,seclabel,attr2,inode64,noquota)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw,relatime)
tmpfs on /run/user/1000 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=403752k,mode=700,uid=1000,gid=1000)
fusectl on /sys/fs/fuse/connections type fusectl (rw,relatime)
gvfsd-fuse on /run/user/1000/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime,user_id=1000,group_id=1000)
binfmt_misc on /proc/sys/fs/binfmt_misc type binfmt_misc (rw,relatime)
[root@plablinux01 /]#
```

Figure 1.9 Screenshot of PLABLINUX01: Verifying that /dev/sda1 is mounted on the /boot partition.

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

## Review

Well done, you have completed the Design Hard Disk Layout Practice Lab.

## Summary

You completed the following exercise:

- Exercise 1 - Design Hard Disk Layout

You should now be able to:

- Ensure the /boot partition conforms to the hardware architecture