

Linux Server Administration (First level full-time studies)

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LAB 5:

Version 0.0-220322

Task1. Managing disks and file system (2 points)

Use these exercises to test your knowledge of creating disk partitions, Logical Volume Manager, and working with file systems. You need a **USB flash drive that is at least 1GB**, which you can erase for these exercises. These tasks assume that you are running a Fedora or Red Hat Enterprise Linux system (although some tasks work on other Linux systems as well). Solutions to the tasks are provided, although in Linux, there are often multiple ways to complete a task).

Note: In case, No USB devices being detected in the guest machine (Debian) in VB, Follow the steps below:

1. Make sure that the Extension Pack is installed on the host. The same version as Virtual Box (VB).
2. In case the Extension Pack is not installed in virtual box, download (via <https://www.virtualbox.org/wiki/Downloads>) and install it.
3. Make sure that at least USB 2.0 or 3.0 is enabled in your VM settings.
4. Create a USB filter in your guest settings while the device is plugged in the VB host.
5. Start your guest. The filter should capture it and pass control of the USB to your guest OS in VB.

1. Run a command as root to watch the system journal in a Terminal as fresh data comes in and insert your USB flash drive. Determine the device name of the USB flash drive.

To determine the device name of a USB flash drive that you want to insert into your computer, enter the following and insert the USB flash drive. (Press Ctrl+C after you have seen the appropriate messages.)

```
# journalctl -f
kernel: [sdb] 15667200 512-byte logical blocks:
      (8.02 GB/7.47 GiB)
Feb 11 21:55:59 cnegus kernel: sd 7:0:0:0:
      [sdb] Write Protect is off
Feb 11 21:55:59 cnegus kernel: [sdb] Assuming
      drive cache: write through
Feb 11 21:55:59 cnegus kernel: [sdb] Assuming
      drive cache: write through
```

2. Run a command to list the partition table for the USB flash drive.

You have to add /sbin to your PATH first

```
# PATH="/sbin:$PATH"
```

```
# command -v fdisk
```

To list partitions on the USB flash drive on a RHEL 6 system, enter the following:

```
# fdisk -c -u -l /dev/sdb
```

To list partitions on a RHEL 7, RHEL 8, or Fedora system, enter the following:

```
# fdisk -l /dev/sdb
```

3. Delete all the partitions on your USB flash drive, save the changes, and make sure the changes were made both on the disk's partition table and in the Linux kernel.

To delete partitions on the USB flash drive, assuming device /dev/sdb, do the following:

```
# fdisk /dev/sdb
```

```
Command (m for help): d
Partition number (1-6): 6
Command (m for help): d
Partition number (1-5): 5
Command (m for help): d
Partition number (1-5): 4
Command (m for help): d
Partition number (1-4): 3
Command (m for help): d
Partition number (1-4): 2
Command (m for help): d
Selected partition 1
Command (m for help): w
```

```
# partprobe /dev/sdb
```

4. Add three partitions to the USB flash drive: 100MB Linux partition, 200MB swap partition, and 500MB LVM partition. Save the changes.

To add a 100MB Linux partition, 200MB swap partition, and 500MB LVM partition to the USB flash drive, enter the following:

```
# fdisk /dev/sdb
```

```
Command (m for help): n
Command action
    e extended
    p primary partition (1-4)


p


Partition number (1-4): 1
First sector (2048-15667199, default 2048): <ENTER>
Last sector, +sectors or +size{K,M,G} (default 15667199): +100M
Command (m for help): n
Command action
    e extended
    p primary partition (1-4)


p


Partition number (1-4): 2
First sector (616448-8342527, default 616448): <ENTER>
Last sector, +sectors or +size{K,M,G} (default 15667199): +200M
Command (m for help): n
```

```
Command action
  e extended
  p primary partition (1-4)
p
Partition number (1-4): 3
First sector (616448-15667199, default 616448): <ENTER>
Using default value 616448
Last sector, +sectors or +size{K,M,G} (default 15667199): +500M
Command (m for help): t
Partition number (1-4): 2
Hex code (type L to list codes): 82
Changed system type of partition 2 to 82 (Linux swap / Solaris)
Command (m for help): t
Partition number (1-4): 3
Hex code (type L to list codes): 8e
Changed system type of partition 3 to 8e (Linux LVM)
Command (m for help): w
# partprobe /dev/sdb
# grep sdb /proc/partitions
      8      16    7833600   sdb
      8      17     102400   sdb1
      8      18     204800   sdb2
      8      19     512000   sdb3
#ls /dev/sdb*
```

5. Put an ext4 file system on the Linux partition.

To put an ext4 filesystem on the Linux partition, enter the following:

```
# dd if=/dev/zero of=/dev/sdb1 bs=512 count=10000
# mkfs -t ext4 -L data /dev/sdb1
```

6. Create a mount point called /mnt/mypart and mount the Linux partition on it.

To create a mount point called /mnt/mypart and mount the Linux partition on it, do the following:

```
# mkdir /mnt/mypart
# mount -t ext4 /dev/sdb1 /mnt/mypart
```

(reboot)

7. Enable the swap partition and turn it on so that additional swap space is immediately available.

To enable the swap partition and turn it on so that additional swap space is immediately available, enter the following:

```
#su -
# mkswap /dev/sdb2
# swapon /dev/sdb2
```

8. Create a volume group called abc from the LVM partition, create a 200MB logical volume from that group called data, add a VFAT partition, and then temporarily mount the logical volume on a new directory named /mnt/test. Check that it was successfully mounted.

To create a volume group called abc from the LVM partition, create a 200MB logical volume from that group called data, create a VFAT filesystem on it, temporarily mount the logical volume on a new directory named /mnt/test, and

then check that it was successfully mounted, enter the following:

```
# pvcreate /dev/sdb3
# vgcreate abc /dev/sdb3
# lvcreate -n data -L 200M abc
# mkfs -t vfat /dev/mapper/abc-data
# mkdir /mnt/test
# mount /dev/mapper/abc-data /mnt/test
```

NB: Before executing the above, first run **#nano /etc/apt/sources.list** and check if the following lines are not commented.

```
deb http://deb.debian.org/debian/ buster main contrib non-free
deb-src http://deb.debian.org/debian/ buster main contrib non-free
```

```
deb http://security.debian.org/debian-security/ buster/updates main contrib non-free
deb-src http://security.debian.org/debian-security/ buster/updates main contrib non-free
```

```
deb http://deb.debian.org/debian-security/ buster/updates main contrib non-free
deb-src http://deb.debian.org/debian-security/ buster/updates main contrib non-free
```

then:

```
#apt-get update
#apt-get install -y lvm2
```

9.G row the logical volume from 200MB to 300MB.

To grow the logical volume from 200MB to 300MB, enter the following:

```
# lvextend -L +100M /dev/mapper/abc-data
# resize2fs -p /dev/mapper/abc-dat
```

NB: Show the tasks done to the lecturer before proceeding to point 10 of task 1

10. Do what you need to do to remove the USB flash drive safely from the computer: unmount the Linux partition, turn off the swap partition, unmount the logical volume, and delete the volume group from the USB flash drive.

To remove the USB flash drive safely from the computer, do the following:

```
# umount /dev/sdb1
# swapoff /dev/sdb2
# umount /mnt/test
# lvremove /dev/mapper/abc-data
# vgremove abc
# pvremove /dev/sdb3
```

You can now safely remove the USB flash drive from the computer.

NB: To check what is currently mounted use this command.

```
#df -hT
```

Task2. Moving around the file system (2 points)

Use these exercises to test your knowledge of efficient ways to get around the Linux file system and work with files and directories. When possible, try to use shortcuts to type as little as possible to get the desired results. These tasks assume that you are running a Fedora or Red Hat Enterprise Linux system (although some tasks work on other Linux systems as well). NB. In Linux, there are often multiple ways to complete a task.

1. Create a directory in your home directory called universities (append your own last 3 digits of your student id to the universities directory name; example. universities655). In that directory, create nine empty files that are named YourFirstName1, YourFirstName2, YourFirstName3, and so on up to YourFirstName9 (Meaning Add 9 files with your really first names, example: muke1 ... up to muke9). Assuming that there are lots of other files in that directory, come up with a single argument to ls that would **list just those nine files**.
2.
 - a. Create the \$HOME/universities/students/classes/ directory path (append your last 3 digits of your student id to universities created directory name created in that path; EXAMPLE: Create \$HOME/universities123/students/classes/ directory path).
 - b. Create the following empty files within this directory path (try using absolute and relative paths from your home directory):
 \$HOME/universities(+3 last digit of your id)/students/bachelor.txt
 \$HOME/universities(+3 last digit of your id)/students/classes/linux.txt
 \$HOME/universities(+3 last digit of your id)/erasmus/politechnicka/master.txt
3. Copy the files YourFirstName1 and YourFirstName5 to the \$HOME/universities+3last IDdigit/students/ directory.
4. Recursively copy the /usr/share/doc/init* directory to the \$HOME/universities+3last IDdigits/ directory. Maintain the current date/time stamps and permissions.
5. Recursively list the contents of the \$HOME/universities+3last IDdigits/ directory. Pipe the output to the less command so that you can page through the output.
6. Remove the files with YourFirstName6, YourFirstName7, and YourFirstName8 without being prompted.
7. Move the files with YourFirstName3 and YourFirstName4 to the \$HOME/universities+/students/classes/ directory.

Task3. Working with Text Files (2 points)

Use these exercises to test your knowledge of using the nano text editor, commands for finding files (locate and find), and commands for searching files (grep). These tasks assume that you are running a Fedora or Red Hat Enterprise Linux system (although some tasks work on other Linux systems as well). NB. In Linux, there are often multiple ways to complete a task.

1. Copy the /etc/services file to the /tmp directory. Open the /tmp/services file in nano, and search for the term WorldWideWeb. Change that to readable form such as World Wide Web.
2. Find the following paragraph in your /tmp/services file (if it is not there, choose a different paragraph) and move it to the end of that file.
 # Note that it is presently the policy of IANA to assign a single well-known
 # port number for both TCP and UDP; hence, most entries here have two entries
 # even if the protocol doesn't support UDP operations.
 # Updated from RFC 1700, "Assigned Numbers" (October 1994). Not all ports
 # are included, only the more common ones
3. Using ex mode, search for every occurrence of the term tcp (case-sensitive) in your /tmp/services file and change it to WHATEVER.
4. As a regular user, search the /etc directory for every file named passwd. Redirect error messages from your search to /dev/null.

5. Create a directory in your home directory called TEST(+ [append the 3last IDdigits](#)). Create files in that directory named one, two, and three that have full read/write/execute permissions on for everyone (user, group, and other). Construct a find command to find those files and any other files that have write permission open to "others" from your home directory and below.

NB: **After showing the task 3** to the lecturer:

In point 1. Delete the services files copied in the /tmp directory

In point 2. Move back the back the paragraph at is initial place