

*System Admin*

*Training Assignments*

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| --- | --- |
| **Program Code** |  |
| **Issue/Revision** | **x/y** |
| **Effective date** | **04/Aug /2023** |

**Assignment Day 02: Command Line Linux Basic**

**Mục lục:**

[1. Thực hành các khối lệnh quản lý thư mục (Directory) 3](#_Toc36285708)

[2. Thực hành các khối lệnh quản lý tệp (File) 4](#_Toc588204075)

[3. Thực hành các khối lệnh quản lý phân quyền file and folder 5](#_Toc678780282)

[4. Thực hành các khối lệnh quản lý nội dung tệp tin (file contents) 6](#_Toc6569263)

[5. Thực hành các khối lệnh quản lý tệp văn bản vi/vim 7](#_Toc633680530)

[6. Thực hành các khối lệnh quản lý bộ lọc (filter) 8](#_Toc1512622760)

[7. Thực hành các khối lệnh quản lý nén và giải nén ( zip/unzip) 10](#_Toc2136858153)

[8. Thực hành trang hướng dẫn sử dụng (man pages) 11](#_Toc416570338)

[9. Thực hành các khối lệnh tổ chức tệp tin trên linux ( Filesystem hierarchy) 11](#_Toc1043587496)

[10. Thực hành các khối lệnh lọc thông tin trên linux (filters) 12](#_Toc526409256)

[11. Thực hành các khối lệnh cơ bản về Users 13](#_Toc2071812100)

[12. Thực hành các khối lệnh quản lý Users (Users Management) 14](#_Toc840374512)

[13. Thực hành các khối lệnh quản lý Password (Password Management) 15](#_Toc621937738)

[14. Thực hành các khối lệnh quản lý Groups 15](#_Toc381461501)

[15. Thực hành các khối lệnh quản lý tiến trình (Process) 16](#_Toc1007494993)

[16. Thực hành các khối lệnh quản lý Disk 17](#_Toc1182453990)

[17. Thực hành các khối lệnh quản lý Hardware 18](#_Toc336887029)

[18. Thực hành các khối lệnh quản lý Hardware (RAM) 19](#_Toc200070285)

[19. Thực hành các khối lệnh quản lý Network 20](#_Toc1943342451)

[20. Thực hành các khối lệnh quản lý lập lịch Cron(Scheduler) 21](#_Toc546394941)

# Thực hành các khối lệnh quản lý thư mục (Directory)

**Exercise:**

1. Display your current directory.

2. Change to the /etc directory.

3. Now change to your home directory using only three key presses.

4. Change to the /boot/grub directory using only eleven key presses.

5. Go to the parent directory of the current directory.

6. Go to the root directory.

7. List the contents of the root directory.

8. List a long listing of the root directory.

9. Stay where you are, and list the contents of /etc.

10. Stay where you are, and list the contents of /bin and /sbin.

11. Stay where you are, and list the contents of ~.

12. List all the files (including hidden files) in your home directory.

13. List the files in /boot in a human readable format.

14. Create a directory testdir in your home directory.

15. Change to the /etc directory, stay here and create a directory newdir in your home directory.

16. Create in one command the directories ~/dir1/dir2/dir3 (dir3 is a subdirectory from dir2, and dir2 is a subdirectory from dir1 ).

17. Remove the directory testdir.

**Solution:**

1. Display your current directory.

sa@ubuntu:~$ pwd

2. Change to the /etc directory.

sa@ubuntu:~$ cd /etc

3. Now change to your home directory using only three key presses.

sa@ubuntu:~$ cd (and the enter key)

4. Change to the /boot/grub directory using only eleven key presses.

sa@ubuntu:~$ cd /boot/grub (use the tab key)

5. Go to the parent directory of the current directory.

sa@ubuntu:~$ cd .. (with space between cd and ..)

6. Go to the root directory.

sa@ubuntu:~$ cd /

7. List the contents of the root directory.

sa@ubuntu:~$ ls

8. List a long listing of the root directory.

sa@ubuntu:~$ ls -l

9. Stay where you are, and list the contents of /etc.

sa@ubuntu:~$ ls /etc

10. Stay where you are, and list the contents of /bin and /sbin.

sa@ubuntu:~$ ls /bin /sbin

11. Stay where you are, and list the contents of ~.

sa@ubuntu:~$ ls ~

12. List all the files (including hidden files) in your home directory.

sa@ubuntu:~$ ls -al ~

13. List the files in /boot in a human readable format.

sa@ubuntu:~$ ls -lh /boot

14. Create a directory testdir in your home directory.

sa@ubuntu:~$ mkdir ~/testdir

15. Change to the /etc directory, stay here and create a directory newdir in your home directory.

sa@ubuntu:~$ cd /etc ; mkdir ~/newdir

16. Create in one command the directories ~/dir1/dir2/dir3 (dir3 is a subdirectory from dir2, and dir2 is a subdirectory from dir1 ).

sa@ubuntu:~$ mkdir -p ~/dir1/dir2/dir3

17. Remove the directory testdir.

sa@ubuntu:~$ rmdir testdir

# Thực hành các khối lệnh quản lý tệp (File)

**Exercise:**

1. List the files in the /bin directory

2. Display the type of file of /bin/cat, /etc/passwd and /usr/bin/passwd.

4. Create a directory ~/touched and enter it.

5. Create the files today.txt and yesterday.txt in touched.

6. Change the date on yesterday.txt to match yesterday's date.

7. Copy yesterday.txt to copy.yesterday.txt

8. Rename copy.yesterday.txt to kim

9. Create a directory called ~/testbackup and copy all files from ~/touched into it.

10. Use one command to remove the directory ~/testbackup and all files into it.

11. Create a directory ~/etcbackup and copy all \*.conf files from /etc into it. Did you include all subdirectories of /etc ?

12. Use rename to rename all \*.conf files to \*.backup . (if you have more than one distro available, try it on all!)

/etc into it. Did you includeall subdirectories of /etc ?12. Use rename to rename all \*.conf files to \*.backup . (if you have more than one distroavailable, try it on all!)

**Solution:**

1. List the files in the /bin directory

ls /bin

2. Display the type of file of /bin/cat, /etc/passwd and /usr/bin/passwd.

file /bin/cat /etc/passwd /usr/bin/passwd

4. Create a directory ~/touched and enter it.

mkdir ~/touched ; cd ~/touched

5. Create the files today.txt and yesterday.txt in touched.

touch today.txt yesterday.txt

6. Change the date on yesterday.txt to match yesterday's date.

touch -t 200810251405 yesterday.txt (substitute 20081025 with yesterday)

7. Copy yesterday.txt to copy.yesterday.txt

cp yesterday.txt copy.yesterday.txt

8. Rename copy.yesterday.txt to kim

mv copy.yesterday.txt kim

9. Create a directory called ~/testbackup and copy all files from ~/touched into it.

mkdir ~/testbackup ; cp -r ~/touched ~/testbackup/

10. Use one command to remove the directory ~/testbackup and all files into it.

rm -rf ~/testbackup

11. Create a directory ~/etcbackup and copy all \*.conf files from /etc into it. Did you include all subdirectories of /etc ?

cp -r /etc/\*.conf ~/etcbackupOnly \*.conf files that are directly in /etc/ are copied.

12. Use rename to rename all \*.conf files to \*.backup . (if you have more than one distro available, try it on all!)

On RHEL: touch 1.conf 2.conf ; rename conf backup \*.conf

On Debian: touch 1.conf 2.conf ; rename 's/conf/backup/' \*.conf

# Thực hành các khối lệnh quản lý phân quyền file and folder

**Exercise:**

1. Display the user owner and group owner of the **/var/log/auth.log** file .
2. Change the group owner of the **wolf.png** file to the group **tennis**.
3. Change the user owner of the **wolf.png** file to the user **root**.
4. Change the permissions on the **Linux.pdf** file to **r--r-----** .
5. Change the permissions on the **Linux.pdf** file to **r--r** **using** octal notation.
6. Create a directory **~/newdir** with 700 permissions.
7. Display the **umask**.
8. Does the **~/.profile** script change the **umask**?

**Solution:**

1. Display the user owner and group owner of the **/var/log/auth.log** file .

ls -l /var/log/auth.log

1. Change the group owner of the **wolf.png** file to the group **tennis**.

su -

chgrp tennis wolf.png

1. Change the user owner of the **wolf.png** file to the user **root**.

su -

chown root wolf.png

1. Change the permissions on the **Linux.pdf** file to **r--r-----** .

chmod ug=r,o= Linux.pdf

1. Change the permissions on the **Linux.pdf** file to **r--r** **using** octal notation.

chmod 440 Linux.pdf

1. Create a directory **~/newdir** with 700 permissions.

mkdir -m 700 ~/newdir

1. Display the **umask**.

umask

1. Does the **~/.profile** script change the **umask**?

grep umask ~/.profile

# Thực hành các khối lệnh quản lý nội dung tệp tin (file contents)

**Exercise:**

1. Display the first 12 lines of **/etc/services**.

2. Display the last line of **/etc/passwd**.

3. Use cat to create a file named **count.txt** that looks like this:

One  
Two  
Three  
Four  
Five

4. Use **cp** to make a backup of this file to **cnt.txt**.

5. Use **cat** to make a backup of this file to **catcnt.txt**.

6. Display **catcnt.txt**, but with all lines in reverse order (the last line first).

7. Use more to display **/etc/services**.

8. Display the readable character strings from the **/usr/bin/passwd** command.

9. Use **ls** to find the biggest file in **/etc**.

10. Open two terminal windows (or tabs) and make sure you are in the same directory in both. Type **echo this is the first line > tailing.txt** in the first terminal, then issue **tail -f tailing.txt** in the second terminal. Now go back to the first terminal and type **echo This is another line >> tailing.txt** (note the double >>), verify that the **tail -f** in the second terminal shows both lines. Stop the **tail -f** with **Ctrl-C**.

11. Use **cat** to create a file named **tailing.txt** that contains the contents of **tailing.txt** followed by the contents of **/etc/passwd**.

12. Use **cat** to create a file named **tailing.txt** that contains the contents of **tailing.txt** preceded by the contents of **/etc/passwd**.

**Solution:**

1. Display the first 12 lines of **/etc/services**.

head -12 /etc/services

2. Display the last line of **/etc/passwd**.

tail -1 /etc/passwd

3. Use cat to create a file named **count.txt** that looks like this:

cat > count.txt  
One  
Two  
Three  
Four  
Five (followed by Ctrl-d)

4. Use **cp** to make a backup of this file to **cnt.txt**.

cp count.txt cnt.txt

5. Use **cat** to make a backup of this file to **catcnt.txt**.

cat count.txt > catcnt.txt

6. Display **catcnt.txt**, but with all lines in reverse order (the last line first).

tac catcnt.txt

7. Use more to display **/etc/services**.

more /etc/services

8. Display the readable character strings from the **/usr/bin/passwd** command.

strings /usr/bin/passwd

9. Use **ls** to find the biggest file in **/etc**.

ls -lrS /etc

10. Open two terminal windows (or tabs) and make sure you are in the same directory in both. Type **echo this is the first line > tailing.txt** in the first terminal, then issue **tail -f tailing.txt** in the second terminal. Now go back to the first terminal and type **echo This is another line >> tailing.txt** (note the double >>), verify that the **tail -f** in the second terminal shows both lines. Stop the **tail -f** with **Ctrl-C**.

11. Use **cat** to create a file named **tailing.txt** that contains the contents of **tailing.txt** followed by the contents of **/etc/passwd**.

cat /etc/passwd >> tailing.txt

12. Use **cat** to create a file named **tailing.txt** that contains the contents of **tailing.txt** preceded by the contents of **/etc/passwd**.

mv tailing.txt tmp.txt ; cat /etc/passwd tmp.txt > tailing.txt

# Thực hành các khối lệnh quản lý tệp văn bản vi/vim

**Exercise:**

1. Start the vimtutor and do some or all of the exercises. You might need to run **aptitude install vim** on xubuntu.

2. What 3 key sequence in command mode will duplicate the current line.

3. What 3 key sequence in command mode will switch two lines' place (line five becomes line six and line six becomes line five).

4. What 2 key sequence in command mode will switch a character's place with the next one.

5. vi can understand macro's. A macro can be recorded with q followed by the name of the macro. So qa will record the macro named a. Pressing q again will end the recording. You can recall the macro with @ followed by the name of the macro. Try this example: i 1 'Escape Key' qa yyp 'Ctrl a' q 5@a (Ctrl a will increase the number with one).

6. Copy /etc/passwd to your ~/passwd. Open the last one in vi and press Ctrl v. Use the arrow keys to select a Visual Block, you can copy this with y or delete it with d. Try pasting it.

7. What does dwwP do when you are at the beginning of a word in a sentence ?

**Solution:**

1. Start the vimtutor and do some or all of the exercises. You might need to run **aptitude install vim** on xubuntu.

vimtutor

2. What 3 key sequence in command mode will duplicate the current line.

yyp

3. What 3 key sequence in command mode will switch two lines' place (line five becomes line six and line six becomes line five).

ddp

4. What 2 key sequence in command mode will switch a character's place with the next one.

xp

5. vi can understand macro's. A macro can be recorded with q followed by the name of the macro. So qa will record the macro named a. Pressing q again will end the recording. You can recall the macro with @ followed by the name of the macro. Try this example: i 1 'Escape Key' qa yyp 'Ctrl a' q 5@a (Ctrl a will increase the number with one).

6. Copy /etc/passwd to your ~/passwd. Open the last one in vi and press Ctrl v. Use the arrow keys to select a Visual Block, you can copy this with y or delete it with d. Try pasting it.

cp /etc/passwd ~  
vi passwd  
(press Ctrl-V)

7. What does **dwwP** do when you are at the beginning of a word in a sentence ?

**dwwP** can switch the current word with the next word.

# Thực hành các khối lệnh quản lý bộ lọc (filter)

**Exercise:**

1. Put a sorted list of all bash users in bashusers.txt.

2. Put a sorted list of all logged on users in onlineusers.txt.

3. Make a list of all filenames in **/etc** that contain the string **conf** in their filename.

4. Make a sorted list of all files in **/etc** that contain the case insensitive string **conf** in their filename.

5. Look at the output of **/sbin/ifconfig**. Write a line that displays only ip address and the subnet mask.

6. Write a line that removes all non-letters from a stream.

7. Write a line that receives a text file, and outputs all words on a separate line.

8. Write a spell checker on the command line. (There may be a dictionary in **/usr/share/dict/** .)

**Solution:**

1. Put a sorted list of all bash users in bashusers.txt.

grep bash /etc/passwd | cut -d: -f1 | sort > bashusers.txt

2. Put a sorted list of all logged on users in onlineusers.txt.

who | cut -d' ' -f1 | sort > onlineusers.txt

3. Make a list of all filenames in **/etc** that contain the string **conf** in their filename.

ls /etc | grep conf

4. Make a sorted list of all files in **/etc** that contain the case insensitive string **conf** in their filename.

ls /etc | grep -i conf | sort

5. Look at the output of **/sbin/ifconfig**. Write a line that displays only ip address and the subnet mask.

/sbin/ifconfig | head -2 | grep 'inet ' | tr -s ' ' | cut -d' ' -f3,5

6. Write a line that removes all non-letters from a stream.

paul@deb503:~$ cat text  
This is, yes really! , a text with ?&\* too many str$ange# characters ;-)  
paul@deb503:~$ cat text | tr -d ',!$?.\*&^%#@;()-'  
This is yes really a text with too many strange characters

7. Write a line that receives a text file, and outputs all words on a separate line.

paul@deb503:~$ cat text2   
it is very cold today without the sun  
  
paul@deb503:~$ cat text2 | tr ' ' '\n'  
it  
is  
very  
cold  
today  
without  
the  
sun

8. Write a spell checker on the command line. (There may be a dictionary in **/usr/share/dict/** .)

paul@rhel ~$ echo "The zun is shining today" > text  
  
paul@rhel ~$ cat > DICT  
is  
shining  
sun  
the  
today  
  
paul@rhel ~$ cat text | tr 'A-Z ' 'a-z\n' | sort | uniq | comm -23 - DICT  
zun

You could also add the solution from question number 6 to remove non-letters, and **tr -s ' '** to remove redundant spaces.

# Thực hành các khối lệnh quản lý nén và giải nén ( zip/unzip)

**Exercise:**

Copy the **/usr/share/dict/words** file to your home directory.

Verify the size of the **~/words** file.

Use **gzip** to compress the **~/words** file.

Again verify the size of the file.

Is the word **evening** present in this compressed file?

Display the last ten lines of **~/words.gz** .

Uncompress the **~/words.gz** file.

Repeat all of the above but use **bzip2** instead of **gzip**.

**Solution:**

1. Copy the/usr/share/dict/wordsfile to your home directory.

cp /usr/share/dict/words ~

2. Verify the size of the~/wordsfile.

ls -l ~/words

3. Usegzipto compress the~/wordsfile.

gzip ~/words

4. Again verify the size of the file.

ls -l ~/words.gz

5. Is the wordeveningpresent in this compressed file?

zgrep evening ~/words.gz

6. Display the last ten lines of~/words.gz.

zcat ~/words.gz | tail

7. Uncompress the~/words.gzfile.

gunzip ~/words.gz

8. Repeat all of the above but usebzip2tools instead ofgzip.

ls -l ~/words

bzip2 ~/words

ls -l ~/words.bz2

bzgrep evening ~/words.bz2

bzcat ~/words.bz2 | tail

bunzip2 ~/words.bz2

# Thực hành trang hướng dẫn sử dụng (man pages)

**Exercise:**

1. Open the man page for **cp** and search for the option to recursively copy directories.
2. Open the man page for the **passwd** file.
3. Open the man page of **bash** and search for **noclobber**
4. List all the man pages that have something to do with **passwords**.
5. List the location of the **cat** command and its manual page.
6. Display the short description of the **grep** command.

**Solution:**

1. Open the man page for **cp** and search for the option to recursively copy directories.

man cp

The option you were looking for is **-r**.

1. Open the man page for the **passwd** file.

man 5 passwd

1. Open the man page of **bash** and search for **noclobber**

man bash followed by

/noclobbern n n

1. List all the man pages that have something to do with **passwords**.

apropos password

1. List the location of the **cat** command and its manual page.

whereis cat

1. Display the short description of the **grep** command.

whatis grep

# Thực hành các khối lệnh tổ chức tệp tin trên linux ( Filesystem hierarchy)

**Exercise:**

1. List the contents of the ssh configuration directory.
2. List the contents of your home directory.
3. Try to enter the home directory of the root user.
4. List the data directories that are shared on the network by this computer.
5. Create a temporary test directory.
6. List the commands to manage the Linux system.
7. List the man-db libraries.
8. List third party package providers.
9. List the size of the kernel in human readable format.

**Solution:**

1. List the contents of the ssh configuration directory.

ls /etc/ssh

2. List the contents of your home directory.

ls ~

3. Try to enter the home directory of the root user.

cd /root

4. List the data directories that are shared on the network by this computer.

ls /srv

5. Create a temporary test directory.

mkdir /tmp/test

6. List the commands to manage the Linux system.

ls /sbinls /usr/sbin

7. List the man-db libraries.

ls /lib/man-db

8. List third party package providers.

ls /opt

9. List the size of the kernel in human readable format.

ls -lh /boot/vmlinuz\*

# Thực hành các khối lệnh lọc thông tin trên linux (filters)

**Exercise:**

1. Do a case insensitive **grep** for ’Bel’ in the **tennis** file.
2. Filter the lines containing ’Henin’ and the line before and after from the **tennis** file.
3. Filter the surname column from the **tennis** file.
4. Again filter the surname from the **tennis** file, but remove the comma’s.
5. Filter the dates from the **dates.txt** file and put each date on a separate line.
6. Count the number of files and directories in **/etc** .
7. Sort the **cities** file and put the result in **sorted\_cities.txt**
8. Knowing that **/usr/share/dict/words** is a dictionary, write a simple spell checker on the command line.

**Solution:**

1. Do a case insensitivegrepfor ’Bel’ in thetennisfile.

grep -i Bel tennis

2. Filter the lines containing ’Henin’ and the line before and after from thetennisfile.

cat tennis | grep -C1 Henin

3. Filter the surname column from thetennisfile.

cut -d\' ' -f2 tennis

4. Again filter the surname from thetennisfile, but remove the comma’s.

cat tennis | cut -d\ -f2 | tr -d ,

5. Filter the dates from thedates.txtfile and put each date on a separate line.

cat dates.txt | cut -b 20-29,53-63 | tr ' ' '\n'

6. Count the number of files and directories in/etc.

ls /etc | wc –l

7. Sort thecitiesfile and put the result insorted\_cities.txt

sort cities > sorted\_cities.txt

8. Knowing that/usr/share/dict/wordsis a dictionary, write a simple spell checker on the command line.

echo "The zun is shining today!" > text

sort /usr/share/dict/words > dict

cat text | tr -d '!?' | tr 'A-Z' 'a-z' | tr ' ' '\n' | sort | uniq | comm -23 – dict

# Thực hành các khối lệnh cơ bản về Users

**Exercise:**

1. Display a list of logged on users.
2. Display your username.
3. Display your **uid** and the list of groups that you are a member of.
4. If you have the password of another user, then switch to that user.
5. If you have the password of another user, then switch to that user and its environment.

**Solution:**

1. Display a list of logged on users.

W

Who

who | cut -d' ' -f1

1. Display your username.

whoami

1. Display your **uid** and the list of groups that you are a member of.

id

1. If you have the password of another user, then switch to that user.

su username

1. If you have the password of another user, then switch to that user and its environment.

su – username

# Thực hành các khối lệnh quản lý Users (Users Management)

**Exercise:**

1. Create a user named **serena** with a home directory, a comment and the bash shell.
2. Verify in **/etc/passwd** that this user was created.
3. Use **su -** to verify that this user has the bash shell and a home directory.
4. Change the comment for the **serena** user to **tennis** .
5. Verify that there is a **serena** home directory in **/home** .
6. Delete the **serena** user and the user’s home directory.

**Solution:**

1. Create a user named **serena** with a home directory, a comment and the bash shell.

useradd -m -s /bin/bash -c *Serena Williams* serena

1. Verify in **/etc/passwd** that this user was created.

grep serena /etc/passwd

1. Use **su -** to verify that this user has the bash shell and a home directory.

su – serena

echo $SHELL

ls –la

exit

1. Change the comment for the **serena** user to **tennis** .

usermod -c tennis serena

1. Verify that there is a **serena** home directory in **/home** .

ls -l /home

or

ls -ld /home/serena/

1. Delete the **serena** user and the user’s home directory.

userdel -r serena

# Thực hành các khối lệnh quản lý Password (Password Management)

**Exercise:**

1. Create a user named **tania** with bash shell and home directory.
2. Verify in **/etc/shadow** that **tania** has no password.
3. Set the password for **tania** to **hunter2** .
4. As a normal user, verify that you can use **su - tania** with the password.
5. As **root**, lock the **tania** account.
6. Verify in **/etc/shadow** that the account is locked.
7. Verify that **su - tania** as a normal user no longer works.
8. Unlock the **tania** account.

**Solution:**

1. Create a user namedtaniawith bash shell and home directory.

useradd -m -s /bin/bash tania

2. Verify in/etc/shadowthattaniahas no password.

grep tania /etc/shadow

3. Set the password for taniato hunter 2.

passwd tania

4. As a normal user, verify that you can use su – tania with the password.

su – taniaexit

5. Asroot, lock thetaniaaccount.

passwd -l tania

6. Verify in/etc/shadowthat the account is locked.

grep tania /etc/shadow

7. Verify thatsu - taniaas a normal user no longer works.

su – tania

8. Unlock thetaniaaccount.

passwd -u tania

# Thực hành các khối lệnh quản lý Groups

**Exercise:**

1. Verify your group membership on this computer.
2. Add two groups named **music** and **arts**
3. Verify that both groups were created and contain no members.
4. Modify the **gid** of arts to 3000.
5. Modify the name of the group **music** to **artists**.
6. Delete the group artists.
7. Add the user **tania** to the group **arts**, without removing her from other groups.

**Solution:**

1. Verify your group membership on this computer.

groups

1. Add two groups named **music** and **arts**

su -

groupadd musicgroup

add arts

1. Verify that both groups were created and contain no members.

tail -2 /etc/group

1. Modify the **gid** of arts to 3000.

groupmod -g 3000 arts

1. Modify the name of the group **music** to **artists**.

groupmod -n music artists

1. Delete the group artists.

groupdel artists

1. Add the user **tania** to the group **arts**, without removing her from other groups.

usermod -a -G arts tania

# Thực hành các khối lệnh quản lý tiến trình (Process)

**Exercise:**

1. Issue a **cat /proc/1/cmdline** to see the command that started the first process on this computer.
2. What type of file is this command from question 1.?
3. Display the **PID** of your bash shell.
4. Display the **PID** of all bash shells.
5. Look at the complete process tree, page by page.
6. Are there any zombies on your computer?
7. Press **h** when in top to get some help on shortcuts in top. Can you sort the list by memory usage?

**Solution:**

1. Issue a **cat /proc/1/cmdline** to see the command that started the first process on this computer.

cat /proc/1/cmdline

1. What type of file is this command from question 1.?

ls -l /sbin/init

or

file /sbin/init

1. Display the **PID** of your bash shell.

echo $$

1. Display the **PID** of all bash shells.

pidof bash

1. Look at the complete process tree, page by page.

ps fax | more

ps -ef | more

1. Are there any zombies on your computer?

top

1. Press **h** when in top to get some help on shortcuts in top. Can you sort the list by memory usage?

>

# Thực hành các khối lệnh quản lý Disk

**Exercise:**

1. Prepare a (virtual) server with at least three extra disks.
2. List all block devices in **/dev**.
3. List all block devices on the computer (not using ls).
4. Verify that the block devices use the **sd** driver.
5. Use **fdisk** to list all disks.
6. Use **lsscsi** to list all SCSI devices.
7. Use **lshw** and look at the complete device tree.

**Solution:**

1. Prepare a (virtual) server with at least three extra disks.

If you don't have a real server then you can use Vmware or Virtualbox,and add three extra virtual disks.Or use a Raspberry Pi with three old USB sticks.

1. List all block devices in **/dev**.

ls -l /dev | grep ^b

1. List all block devices on the computer (not using ls).

lsblk

1. Verify that the block devices use the **sd** driver.

Check the major number (probably 8) in **cat /proc/devices**.

1. Use **fdisk** to list all disks.

fdisk -l

1. Use **lsscsi** to list all SCSI devices.

apt-get install lsscsi

1. Use **lshw** and look at the complete device tree.

apt-get install lshwlshw

# Thực hành các khối lệnh quản lý Hardware

**Exercise:**

1. Start a disk-intensive command in background and then monitor the disk(s) with **iostat** every five seconds.
2. Start a disk intensive command in background and monitor the processes that do most of the I/O with **iotop**.
3. Start a read-intensive task in background and monitor it with **vmstat**.
4. Mount a filesystem on /srv/pro33. Copy a file (for example /etc/services) to /srv/pro33. Open the file (for example with **more /srv/pro33/services**). Open a second terminal and list all processes that have files open on **/srv/pro33** . You should find one or two processes, list the command of those two processes.
5. Kill the above processes with **fuser**.
6. (In the other terminal) open the file again with **more**. Then use **lsof** to find who has the file open and with which command.
7. Verify the amount of free **inodes** on /dev/sdd1.
8. Install **pydf** and list all mounted partitions with it.
9. If you have a real (non virtual) server, then install **hddtemp**, **hwinfo** and **smartctl** and discover your hardware with these tools.

**Solution:**

1. Start a disk-intensive command in background and then monitor the disk(s) withiostatevery five seconds.

mount /dev/sdd1 /srv/pro33

find /usr/ -exec cp {} /srv/pro33/tmp \; >/dev/null 2>&1 &

iostat -d 5 /dev/sdd1

2. Start a disk intensive command in background and monitor the processes that do most of the I/O withiotop.

find /usr/ -exec cp {} /srv/pro33/tmp \; >/dev/null 2>&1 &iotop –oa

3. Start a read-intensive task in background and monitor it withvmstat.

find /usr/ -exec cat {} \; >/dev/null 2>&1 &

vmstat 2 100 # You should see a lot of bi = read

4. Mount a filesystem on /srv/pro33. Copy a file (for example /etc/services) to /srv/pro33. Open the file (for example withmore /srv/pro33/services). Open a second terminal and list all processes that have files open on/srv/pro33. You shouldfind one or two processes, list the command of those two processes.

fuser -u /srv/pro33/

ps f 2779 2818 ## replace with the processes you received from fuser.

5. Kill the above processes withfuser.

fuser -uk /src/pro33/

6. (In the other terminal) open the file again withmore. Then uselsofto find who has the file open and with which command.

lsof /srv/pro33/

7. Verify the amount of freeinodeson /dev/sdd1.

df -i /dev/sdd1

8. Installpydfand list all mounted partitions with it.

apt-get install pydfpydf

9. If you have a real (non virtual) server, then install hddtemp, hwinfo

And smartctl and discover your hardware with thesetools.

apt-get install hddtemp hwinfo smartmontools

# Thực hành các khối lệnh quản lý Hardware (RAM)

**Exercise:**

1. If you are on a bare metal server, then run **dmidecode** to see the installed memory modules.
2. Display the total amount of memory, the used memory, the free memory and the cached memory.
3. Same as the previous question, but adding the **Total** line.
4. Display the memory map of the **init** process.
5. Display the currently activated swap space.
6. Create and activate a swap partition on an extra disk.
7. Create and activate a two gibibyte swap file.
8. Optional: Search a memory allocating script on the internet and watch your memory being consumed. Maybe also watch swap space being used.
9. Deactivate your swap file and swap partition.
10. Optional: use top, atop, htop and glances to look at memory usage.

**Solution:**

1. If you are on a bare metal server, then run **dmidecode** to see the installed memory modules.

dmidecode -t memory

1. Display the total amount of memory, the used memory, the free memory and the cached memory.

free -m

1. Same as the previous question, but adding the **Total** line.

free -mt

1. Display the memory map of the **init** process.

pmap -x 1

1. Display the currently activated swap space.

cat /proc/swaps

swapon -s

1. Create and activate a swap partition on an extra disk.

fdisk /dev/sdbmkswap /dev/sdb1swapon /dev/sdb1

1. Create and activate a two gibibyte swap file.

fallocate -l 2G /swapfile

chmod 600 /swapfile

mkswap /swapfile

swapon /swapfile

1. Optional: Search a memory allocating script on the internet and watch your memory being consumed. Maybe also watch swap space being used.

watch free -omvmstat 2 100

Deactivate your swap file and swap partition.

swapoff /swapfileswapoff /dev/sdb1

1. Optional: use top, atop, htop and glances to look at memory usage.

Top

Atop

Htop

Glances

# Thực hành các khối lệnh quản lý Network

**Exercise:**

1. List the names of the network adapters on your server.
2. List the IP and MAC address of each of your network adapters.
3. List the cache of MAC-IP addresses of your server.
4. List the routing table of your server.
5. Display the configuration of the network adapters.
6. Which DNS server is being used on your server?
7. Display the list of TCP and UDP protocols.
8. Test your connection to 8.8.8.8.
9. Display the hops between you and 8.8.8.8.
10. List the open TCP ports on your server.

**Solution:**

1. List the names of the network adapters on your server.

ls /sys/class/net/

2. List the IP and MAC address of each of your network adapters.

ip a/sbin/ifconfig

3. List the cache of MAC-IP addresses of your server.

ip n/sbin/arp

4. List the routing table of your server.

ip r/sbin/route

5. Display the configuration of the network adapters.

more /etc/network/interfaces

6. Which DNS server is being used on your server?

cat /etc/resolv.conf

7. Display the list of TCP and UDP protocols.

more /etc/services

8. Test your connection to 8.8.8.8.

ping 8.8.8.8

9. Display the hops between you and 8.8.8.8.

traceroute 8.8.8.8

10. List the open TCP ports on your server.

ss –napt

# Thực hành các khối lệnh quản lý lập lịch Cron(Scheduler)

**Exercise:**

1. Install the **at** command and verify the contents of **at.deny**.
2. Deny all users the use of **at** and **cron**.
3. Schedule an **at** job that writes to a log file, at noon tomorrow. Verify that your job is in the **at queue**.
4. Remove your job from the **at** queue and then remove **at** from your system.
5. Make sure only root and paul can use **cron** .
6. Schedule a cron job (backup.sh) to run every half hour.
7. Schedule a cron job to run during weekdays at 22h00.
8. Remove your **crontab** and restore the help comments.
9. Read and understand the **/etc/cron.daily/passwd** .

**Solution:**

1. Install theatcommand and verify the contents ofat.deny.

apt-get install at

more /etc/at.deny

2. Deny all users the use ofatandcron.

touch /etc/at.allowtouch /etc/cron.allow

3. Schedule anatjob that writes to a log file, at noon tomorrow. Verify that your job is in theat queue.

root@debian10:~#at noon tomorrow

warning: commands will be executed using /bin/sh

at>echo hello > noonjob.log

at> <EOT>job 7 at Sun Sep 8 12:00:00 2019

root@debian10:~#atq

7 Sun Sep 8 12:00:00 2019 a root4 Fri Sep 13 07:00:00 2019 a paul

root@debian10:~#

4. Remove your job from theatqueue and then removeatfrom your system.

atrm 7apt-get remove at

5. Make sure only root and paul can usecron.

echo paul > /etc/cron.allow

6. Schedule a cron job (backup.sh) to run every half hour.

crontab -e1,31\* \* \* \*backup.sh

7. Schedule a cron job to run during weekdays at 22h00.

crontab -e0 22\* \*1-5 backup.sh

8. Remove yourcrontaband restore the help comments.

crontab -r

9. Read and understand the/etc/cron.daily/passwd.  
more /etc/cron.daily/passwd