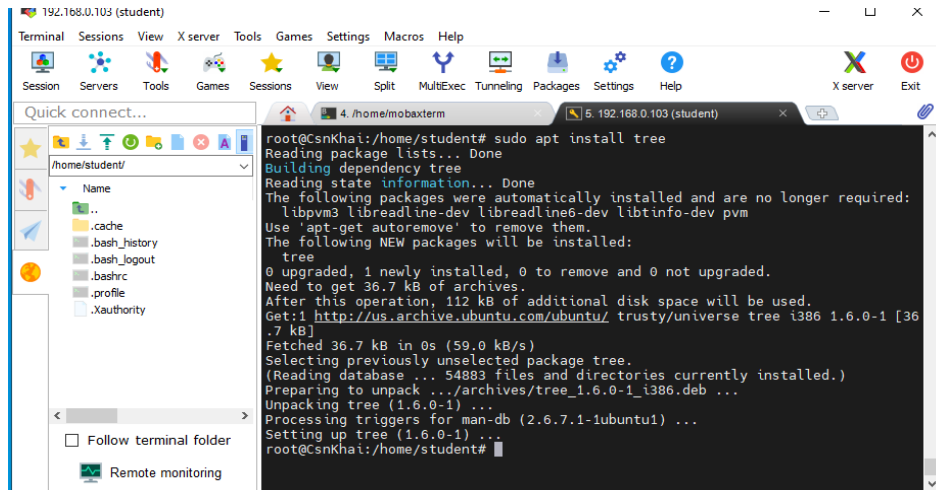


Task1.Part2

1) Examine the tree command. Master the technique of applying a template, for example, display all files that contain a character c, or files that contain a specific sequence of characters. List subdirectories of the root directory up to and including the second nesting level.

The **tree** command is used to recursively output directory structures or display the contents of directories in a tree format. The command outputs the paths to the directories and files in each subdirectory, and reports the total number of subdirectories and files.

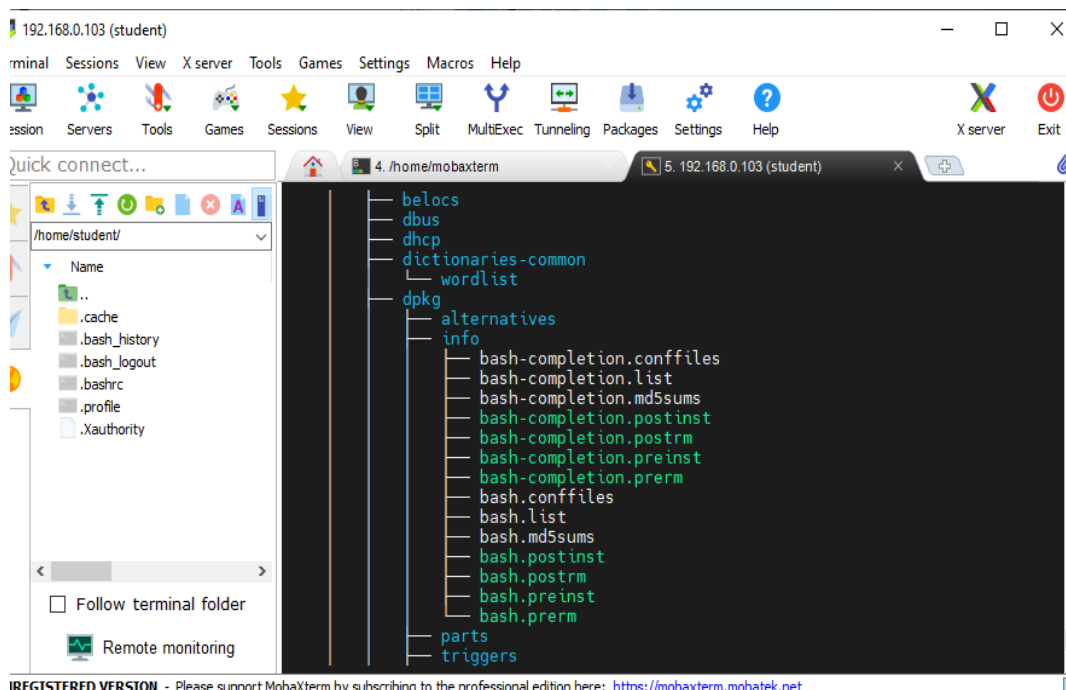


```
root@CsnKhai:/home/student# sudo apt install tree
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libpvm3 libreadline-dev libreadline6-dev libtinfo-dev pvm
Use 'apt-get autoremove' to remove them.
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 36.7 kB of archives.
After this operation, 112 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu/ trusty/universe tree i386 1.6.0-1 [36.7 kB]
Fetched 36.7 kB in 0s (59.0 kB/s)
Selecting previously unselected package tree.
(Reading database ... 54883 files and directories currently installed.)
Preparing to unpack .../archives/tree_1.6.0-1_i386.deb ...
Unpacking tree (1.6.0-1) ...
Processing triggers for man-db (2.6.7.1-1ubuntu1) ...
Setting up tree (1.6.0-1) ...
root@CsnKhai:/home/student#
```

\$ tree -P [[pattern]*/[*[pattern]]/[[*pattern*]].

Files containing the sequence of characters "bash":

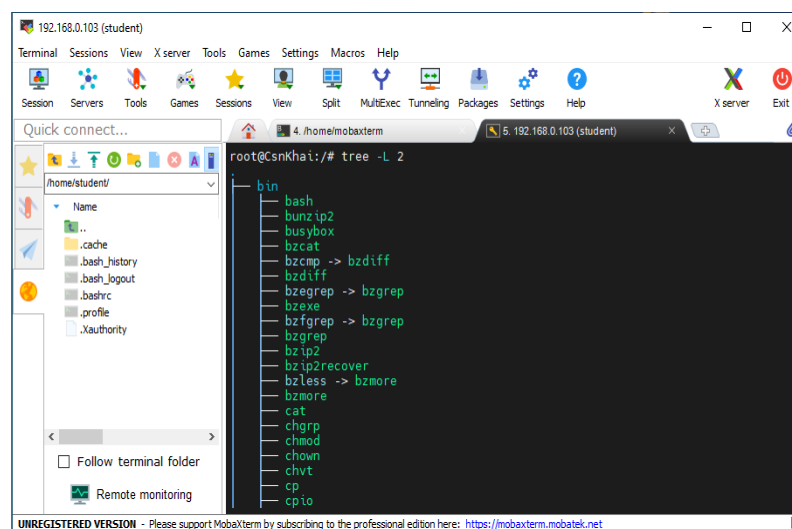
\$ tree -P *bash*



```

|_ belocs
|_ dbus
|_ dhcp
|_ dictionaries-common
|_ wordlist
|_ dpkg
|_ alternatives
|_ info
|_ bash-completion.conf files
|_ bash-completion.list
|_ bash-completion.md5sums
|_ bash-completion.postinst
|_ bash-completion.postrm
|_ bash-completion.preinst
|_ bash-completion.prerm
|_ bash.conf files
|_ bash.list
|_ bash.md5sums
|_ bash.postinst
|_ bash.postrm
|_ bash.preinst
|_ bash.prerm
|_ parts
|_ triggers
```

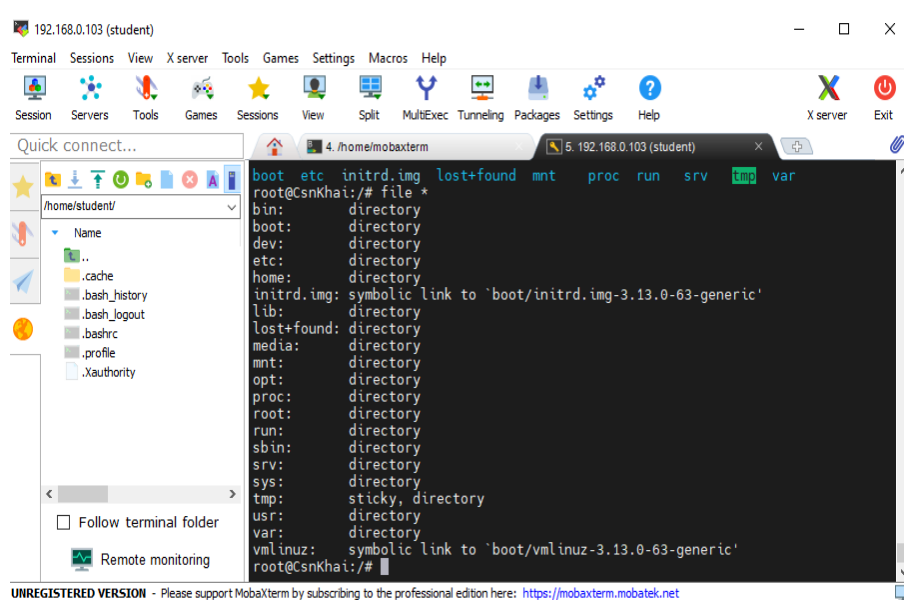
To limit the maximum depth of the directory tree display, the -L option is used with the addition of a digital depth indication:



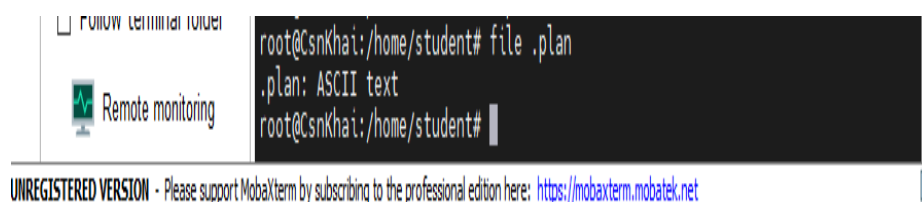
The screenshot shows a MobaXterm window with a terminal session. The terminal displays the output of the command `tree -L 2` executed from the `root@CsnKhai:/#` prompt. The output lists the contents of the `bin` directory, including `bash`, `bunzip2`, `busybox`, `bzcat`, `bzcmp -> bzdiff`, `bzdiff`, `bzegrep -> bzgrep`, `bzexe`, `bzfgrep -> bzgrep`, `bzgrep`, `bzip2`, `bzip2recover`, `bzless -> bzmore`, `bzmore`, `cat`, `chgrp`, `chmod`, `chown`, `chvt`, `cp`, and `cpio`. The MobaXterm interface includes a sidebar with file explorer and a top menu bar.

2) What command can be used to determine the type of file (for example, text or binary)? Give an example.

\$ file [options] file1 ...



The screenshot shows a MobaXterm window with a terminal session. The terminal displays the output of the command `file *` executed from the `root@CsnKhai:/#` prompt. The output lists the file types for various system directories and files, including `boot`, `etc`, `initrd.img`, `lost+found`, `mnt`, `proc`, `run`, `srv`, `tmp`, and `var`. For example, `boot` is a directory, `initrd.img` is a symbolic link to `'boot/initrd.img-3.13.0-63-generic'`, and `tmp` is a sticky directory. The MobaXterm interface includes a sidebar with file explorer and a top menu bar.



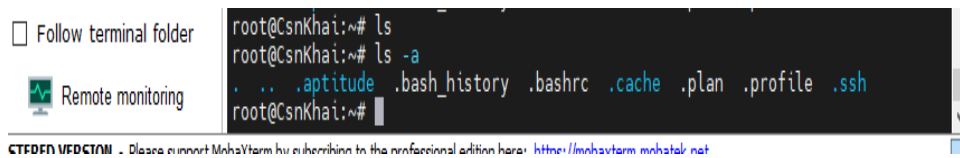
The screenshot shows a MobaXterm window with a terminal session. The terminal displays the output of the command `file .plan` executed from the `root@CsnKhai:/home/student#` prompt. The output indicates that `.plan` is an ASCII text file. The MobaXterm interface includes a sidebar with file explorer and a top menu bar.

3) Master the skills of navigating the file system using relative and absolute paths. How can you go back to your home directory from anywhere in the filesystem?

\$ cd

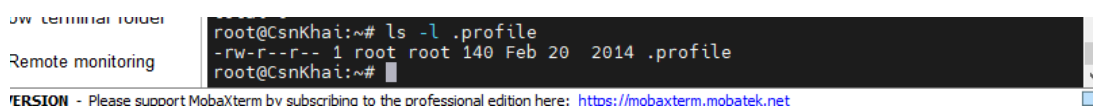
4) Become familiar with the various options for the ls command. Give examples of listing directories using different keys. Explain the information displayed on the terminal using the -l and -a switches.

By default, the ls command does not show hidden files (files whose names begin with a dot .). To show all files, including hidden ones, use the -a option:



```
root@CsnKhai:~# ls
root@CsnKhai:~# ls -a
.  .. .aptitude .bash_history .bashrc .cache .plan .profile .ssh
root@CsnKhai:~#
```

The output will contain information about the file type, permissions, number of references to it, owner, group, size, date, and file name:



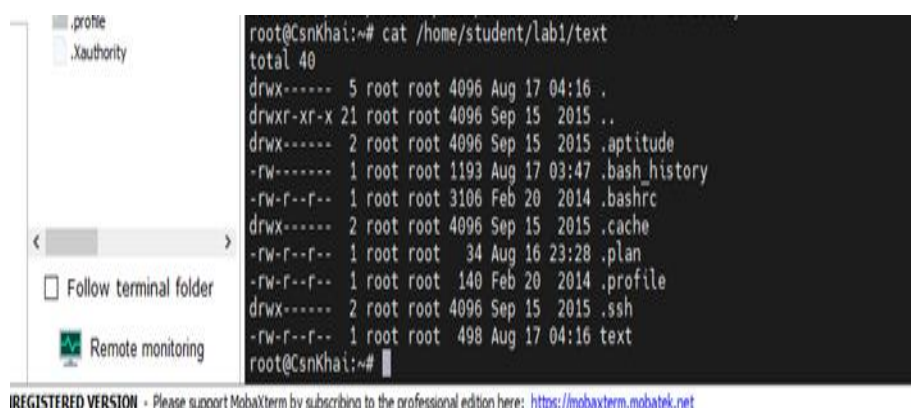
```
root@CsnKhai:~# ls -l .profile
-rw-r--r-- 1 root root 140 Feb 20 2014 .profile
root@CsnKhai:~#
```

5) Perform the following sequence of operations:

- create a subdirectory in the home directory;
- in this subdirectory create a file containing information about directories located in the root directory (using I/O redirection operations):

```
root@CsnKhai:~# ls -a -l > /home/student/lab1/text
```

- view the created file:



```
root@CsnKhai:~# cat /home/student/lab1/text
total 40
drwx----- 5 root root 4096 Aug 17 04:16 .
drwxr-xr-x 21 root root 4096 Sep 15 2015 ..
drwx----- 2 root root 4096 Sep 15 2015 .aptitude
-rw----- 1 root root 1193 Aug 17 03:47 .bash_history
-rw-r--r-- 1 root root 3106 Feb 20 2014 .bashrc
drwx----- 2 root root 4096 Sep 15 2015 .cache
-rw-r--r-- 1 root root 34 Aug 16 23:28 .plan
-rw-r--r-- 1 root root 140 Feb 20 2014 .profile
drwx----- 2 root root 4096 Sep 15 2015 .ssh
-rw-r--r-- 1 root root 498 Aug 17 04:16 text
root@CsnKhai:~#
```

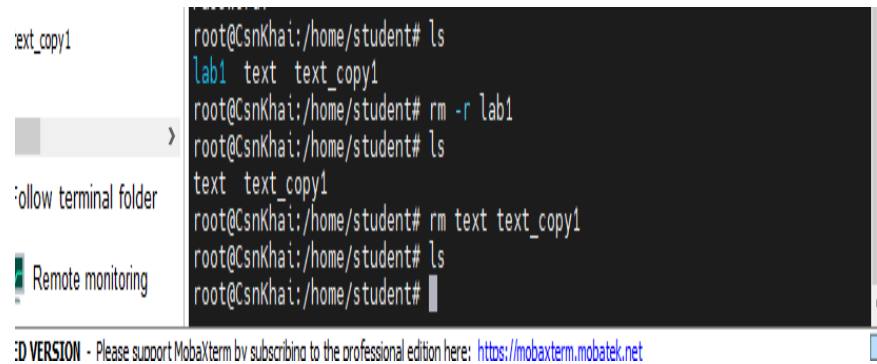
- copy the created file to your home directory using **relative** and **absolute** addressing:

```
$ cp text /home/student/text_copy1
```

```
$ cp text ..
```

- delete the previously created subdirectory with the file requesting removal;

- delete the file copied to the home directory:



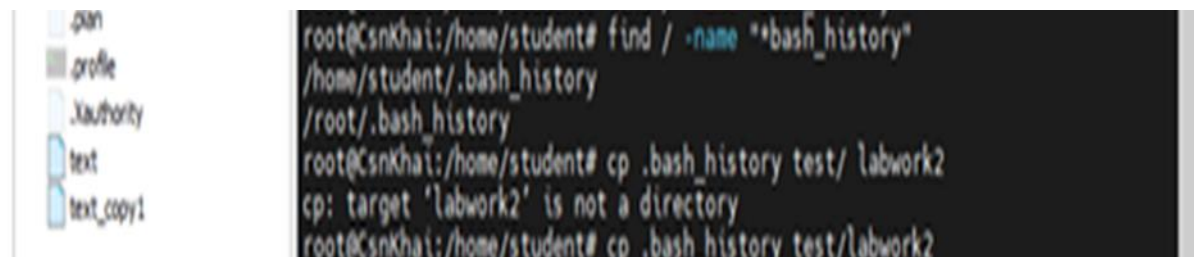
```
root@CsnKhai:/home/student# ls
lab1 text text_copy1
root@CsnKhai:/home/student# rm -r lab1
root@CsnKhai:/home/student# ls
text text_copy1
root@CsnKhai:/home/student# rm text text_copy1
root@CsnKhai:/home/student# ls
root@CsnKhai:/home/student#
```

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6) Perform the following sequence of operations:

- create a subdirectory **test** in the home directory;
- copy the **.bash_history** file to this directory while changing its name to **labwork2**;

\$ cp .bash_history test/labwork2

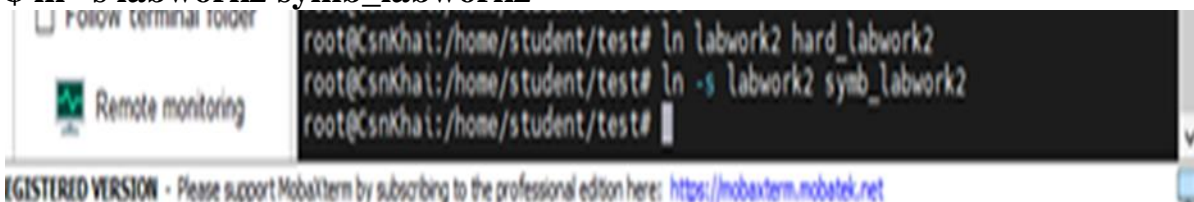


```
root@CsnKhai:/home/student# find / -name ".*bash_history"
/home/student/.bash_history
/root/.bash_history
root@CsnKhai:/home/student# cp .bash_history test/ labwork2
cp: target 'labwork2' is not a directory
root@CsnKhai:/home/student# cp .bash history test/labwork2
```

- create a hard and soft link to the labwork2 file in the test subdirectory;

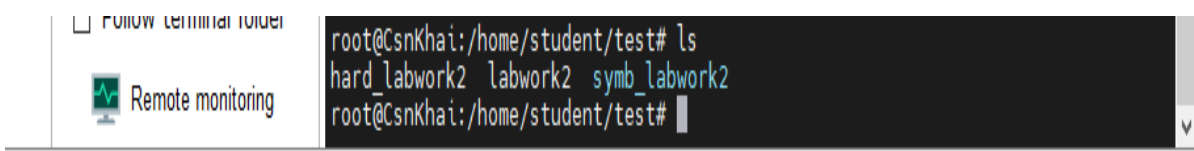
\$ ln labwork2 hard_labwork2

\$ ln -s labwork2 symb_labwork2



```
root@CsnKhai:/home/student/test# ln labwork2 hard_labwork2
root@CsnKhai:/home/student/test# ln -s labwork2 symb_labwork2
root@CsnKhai:/home/student/test#
```

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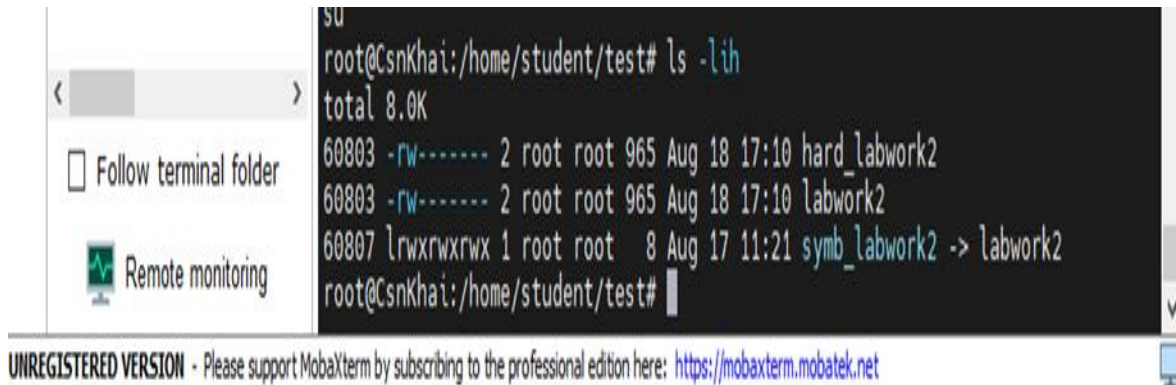


```
root@CsnKhai:/home/student/test# ls
hard_labwork2 labwork2 symb_labwork2
root@CsnKhai:/home/student/test#
```

- how to define soft and hard link, what do these concepts;

Hard links are another name for the same file (one file can have different names). Once a hard link is created, it's impossible to tell which is the original file name and which is the link. The link will have exactly the same identifier (inode) as the target file.

A **symbolic link** is a file of a certain type that acts as a link to another object. A symbolic link does not contain data, but only serves as a pointer, similar to a Windows shortcut.

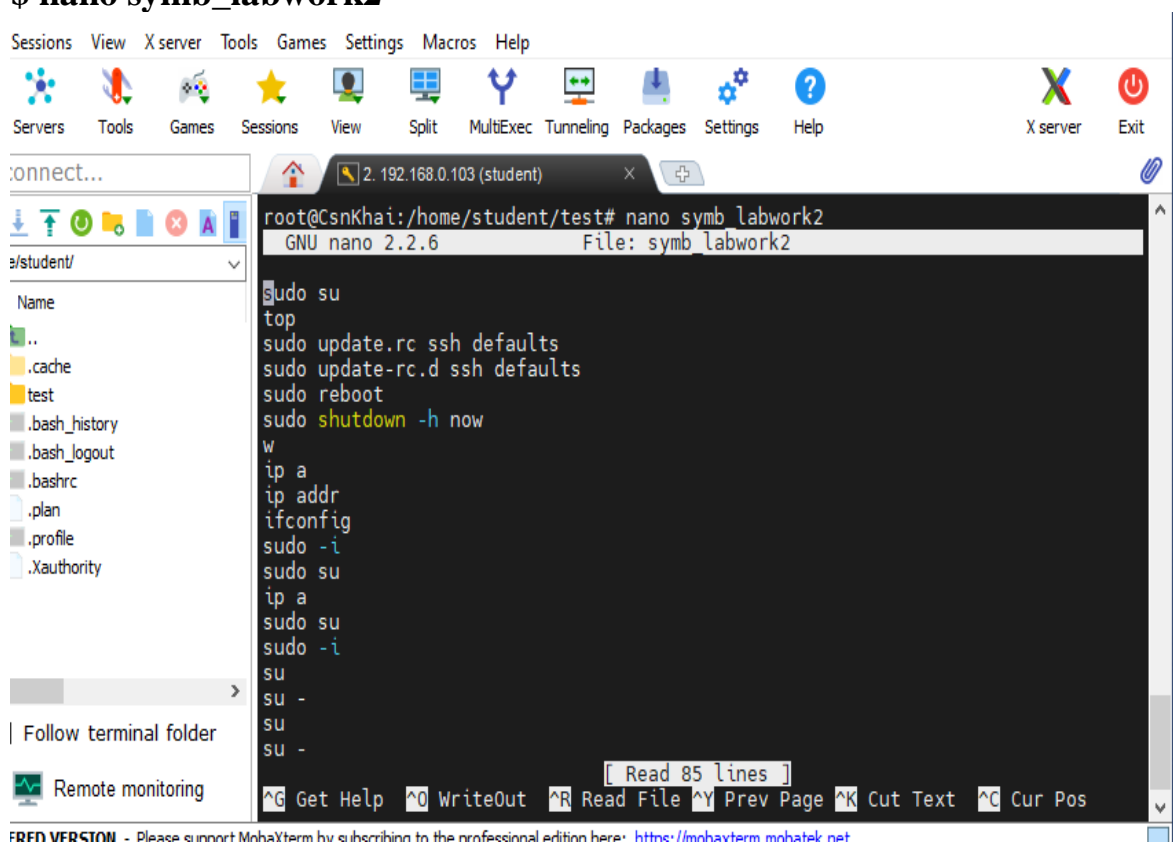


```

root@CsnKhai:/home/student/test# ls -li
total 8.0K
60803 -rw----- 2 root root 965 Aug 18 17:10 hard_labwork2
60803 -rw----- 2 root root 965 Aug 18 17:10 labwork2
60807 lrwxrwxrwx 1 root root 8 Aug 17 11:21 symb_labwork2 -> labwork2
root@CsnKhai:/home/student/test#

```

- change the data by opening a symbolic link. What changes will happen and why
\$ **nano symb_labwork2**



```

root@CsnKhai:/home/student/test# nano symb_labwork2
GNU nano 2.2.6 File: symb_labwork2

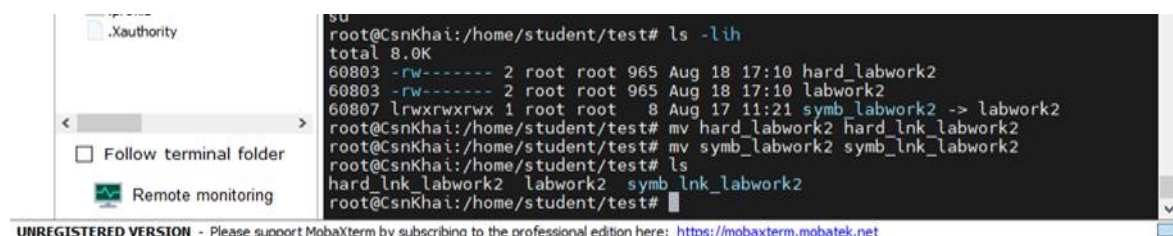
sudo su
top
sudo update.rc ssh defaults
sudo update-rc.d ssh defaults
sudo reboot
sudo shutdown -h now

w
ip a
ip addr
ifconfig
sudo -i
sudo su
ip a
sudo su
sudo -i
su
su -
su
su -

```

Data will change in all files.

- rename the hard link file to **hard_lnk_labwork2**;
- rename the soft link file to **symb_lnk_labwork2** file;

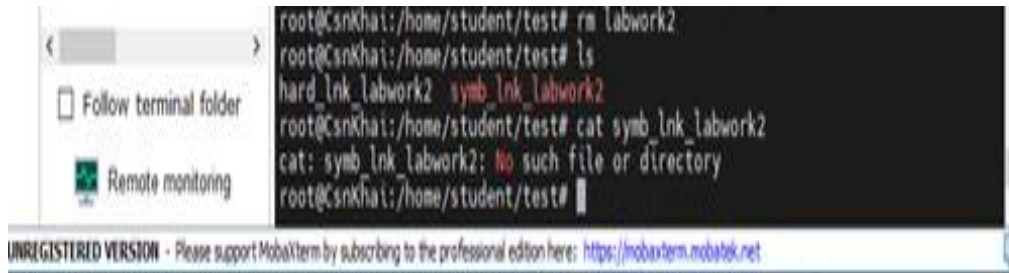


```

root@CsnKhai:/home/student/test# ls -li
total 8.0K
60803 -rw----- 2 root root 965 Aug 18 17:10 hard_lnk_labwork2
60803 -rw----- 2 root root 965 Aug 18 17:10 labwork2
60807 lrwxrwxrwx 1 root root 8 Aug 17 11:21 symb_lnk_labwork2 -> labwork2
root@CsnKhai:/home/student/test# mv hard_labwork2 hard_lnk_labwork2
root@CsnKhai:/home/student/test# mv symb_labwork2 symb_lnk_labwork2
root@CsnKhai:/home/student/test# ls
hard_lnk_labwork2 labwork2 symb_lnk_labwork2
root@CsnKhai:/home/student/test#

```

- then delete the **labwork2**. What changes have occurred and why?

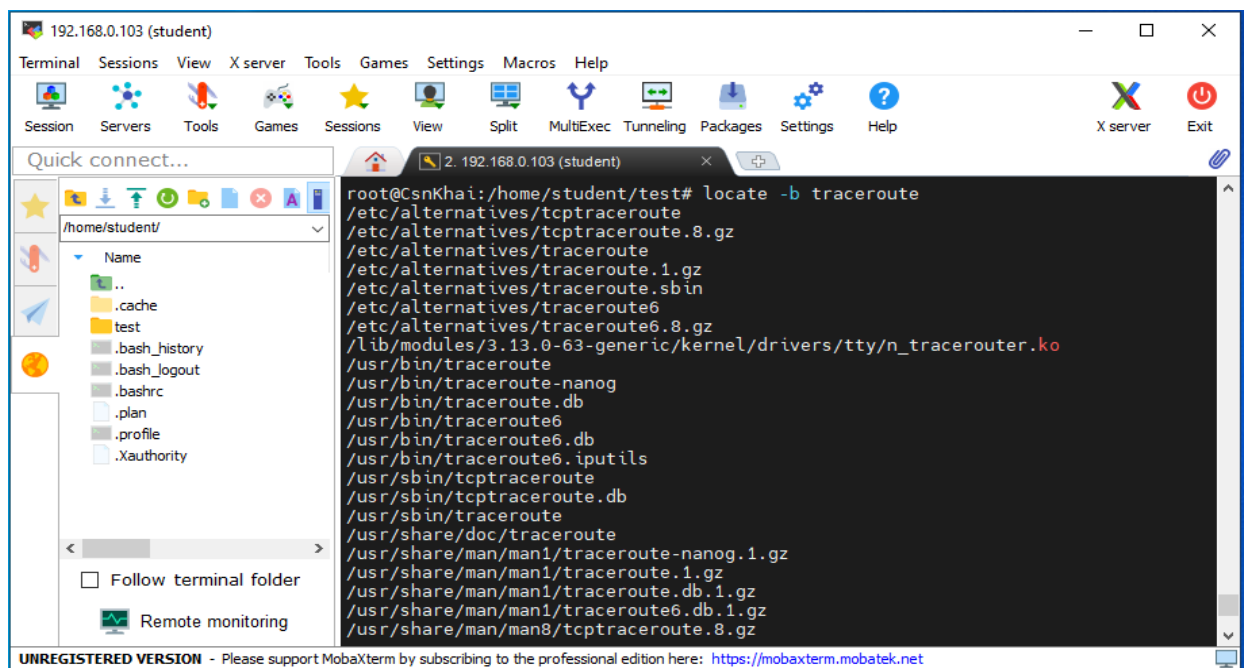


```
root@CsnKhai:/home/student/test# rm labwork2
root@CsnKhai:/home/student/test# ls
hard_lnk_labwork2  symb_lnk_labwork2
root@CsnKhai:/home/student/test# cat symb_lnk_labwork2
cat: symb_lnk_labwork2: No such file or directory
root@CsnKhai:/home/student/test#
```

The symbolic link will become invalid, because the object to which the link refers (labwork2) will disappear.

The hard link will be valid, because file exists in the file system if a hard link exists.

7) Using the locate utility, find all files that contain the squid and traceroute sequence.



```
root@CsnKhai:/home/student/test# locate -b traceroute
/etc/alternatives/tcptraceroute
/etc/alternatives/tcptraceroute.8.gz
/etc/alternatives/traceroute
/etc/alternatives/traceroute.1.gz
/etc/alternatives/traceroute.sbin
/etc/alternatives/traceroute6
/etc/alternatives/traceroute6.8.gz
/lib/modules/3.13.0-63-generic/kernel/drivers/tty/n_tracerouter.ko
/usr/bin/traceroute
/usr/bin/traceroute-nanog
/usr/bin/traceroute.db
/usr/bin/traceroute6
/usr/bin/traceroute6.db
/usr/bin/traceroute6.iputils
/usr/sbin/tcptraceroute
/usr/sbin/tcptraceroute.db
/usr/sbin/traceroute
/usr/share/doc/traceroute
/usr/share/man/man1/traceroute-nanog.1.gz
/usr/share/man/man1/traceroute.1.gz
/usr/share/man/man1/traceroute.db.1.gz
/usr/share/man/man1/traceroute6.db.1.gz
/usr/share/man/man8/tcptraceroute.8.gz
```

8) Determine which partitions are mounted in the system, as well as the types of these partitions.

9) Count the number of lines containing a given sequence of characters in a given file.

\$ fdisk -l

1.0.103 (student)

Sessions View X server Tools Games Settings Macros Help

connect... 2. 192.168.0.103 (student)

Filename root@CsnKhai:~# fdisk -l

Size Used Priority

Disk /dev/sda: 1610 MB, 1610612736 bytes
 175 heads, 43 sectors/track, 418 cylinders, total 3145728 sectors
 Units = sectors of 1 * 512 = 512 bytes
 Sector size (logical/physical): 512 bytes / 512 bytes
 I/O size (minimum/optimal): 512 bytes / 512 bytes
 Disk identifier: 0x0006c3c4

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	3143679	1570816	83	Linux

root@CsnKhai:~# cd /dev
 root@CsnKhai:/dev# ls

autofs	mcelog	sg0	tty3	tty6	ttyS30
block	mem	sg1	tty30	tty60	ttyS31
bsg	net	shm	tty31	tty61	ttyS4
btrfs-control	network_latency	snapshot	tty32	tty62	ttyS5
bus	network_throughput	snd	tty33	tty63	ttyS6
cdrom	null	sr0	tty34	tty7	ttyS7
char	port	stderr	tty35	tty8	ttyS8
console	ppp	stdin	tty36	tty9	ttyS9
core	psaux	stdout	tty37	ttyprintk	uhid
cpu	ptmx	tty	tty38	ttyS0	uinput

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.103 (student)

ssions View X server Tools Games Settings Macros Help

rvers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help

connect... 2. 192.168.0.103 (student)

root@CsnKhai:/dev# cd /
 root@CsnKhai:/# fdisk -l /dev/sda

Disk /dev/sda: 1610 MB, 1610612736 bytes
 175 heads, 43 sectors/track, 418 cylinders, total 3145728 sectors
 Units = sectors of 1 * 512 = 512 bytes
 Sector size (logical/physical): 512 bytes / 512 bytes
 I/O size (minimum/optimal): 512 bytes / 512 bytes
 Disk identifier: 0x0006c3c4

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	3143679	1570816	83	Linux

root@CsnKhai:/# file /dev/sda1
 /dev/sda1: block special

10) Using the find command, find all files in the /etc directory containing the host character sequence.

root@CsnKhai:/etc# find . -name "host*"

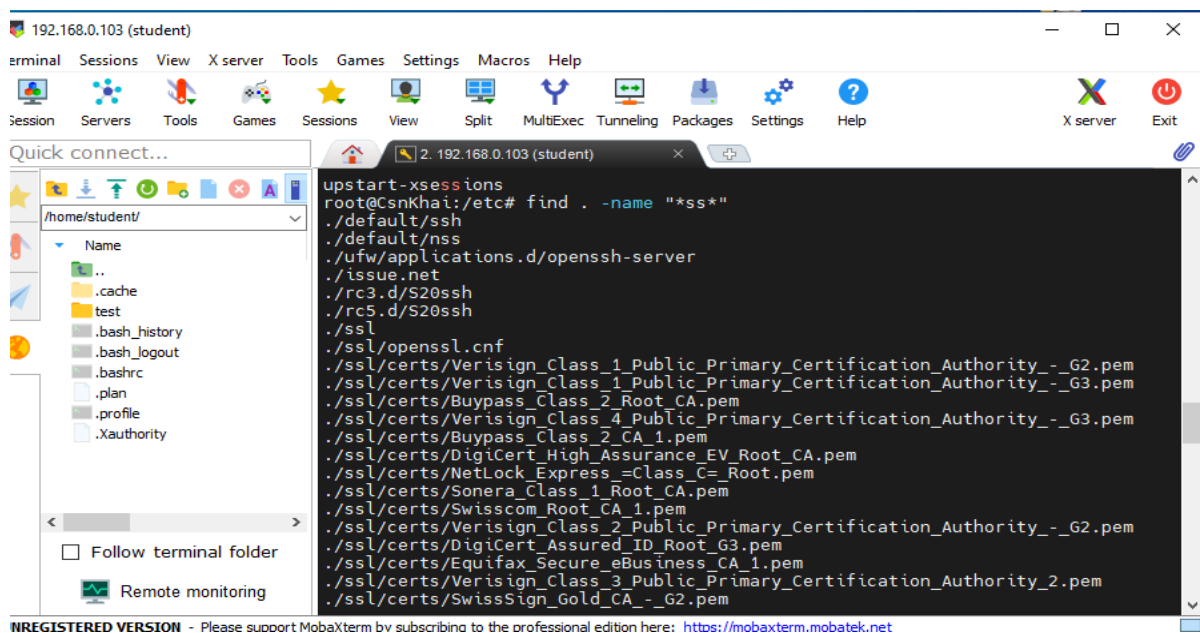
./hosts
 ./hosts.allow
 ./init/hostname.conf
 ./hostname
 ./hosts.deny
 ./host.conf

root@CsnKhai:/etc#

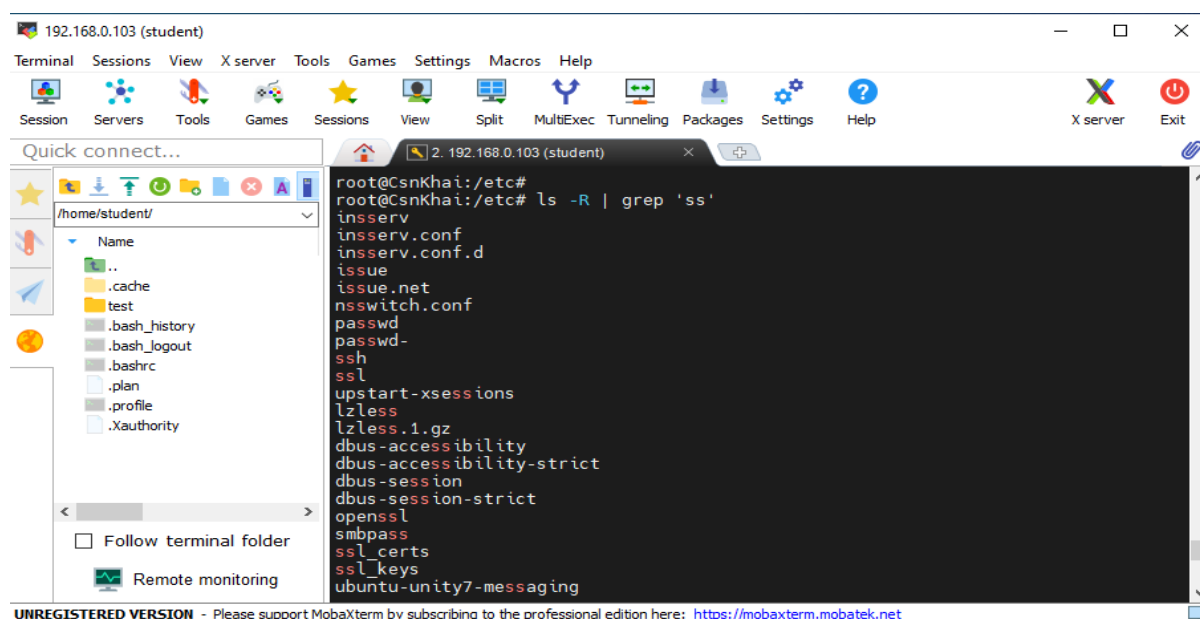
REGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

11) List all objects in /etc that contain the ss character sequence. How can I duplicate a similar command using a bunch of grep?

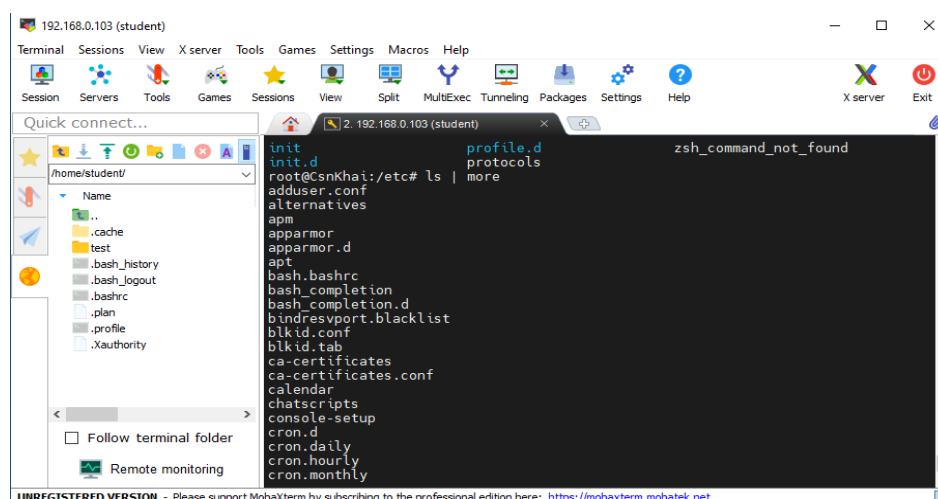
\$ find. -name “*ss*”



\$ ls -R | grep 'ss'



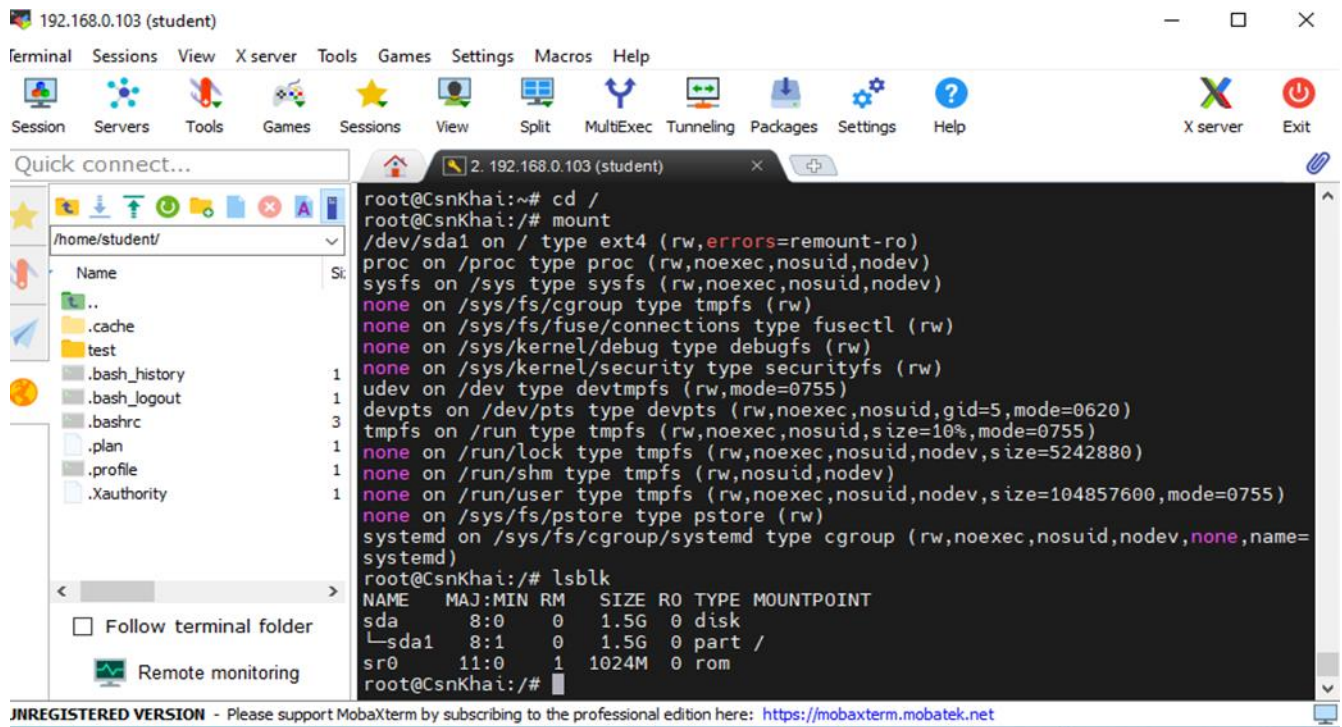
12) Organize a screen-by-screen print of the contents of the /etc directory. Hint: You must use stream redirection operations.



13) What are the types of devices and how to determine the type of device? Give examples.

The main types of devices in Linux: symbolic and block devices.

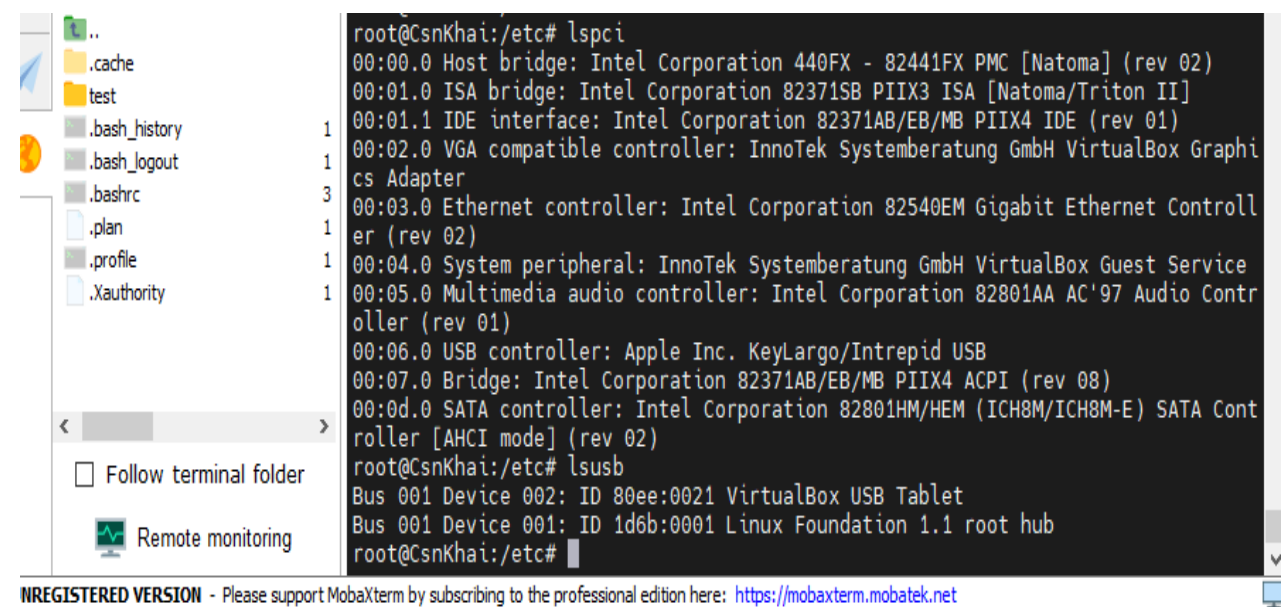
Running the **mount** command without any parameters allows you to display all mounted file systems.



The screenshot shows a MobaXterm window with a terminal session. The terminal output for the `mount` command lists various file systems and their types. The output for the `lsblk` command shows a table of block devices.

```
root@CsnKhai:~# cd /
root@CsnKhai:~# mount
/dev/sda1 on / type ext4 (rw,errors=remount-ro)
proc on /proc type proc (rw,noexec,nosuid,nodev)
sysfs on /sys type sysfs (rw,noexec,nosuid,nodev)
none on /sys/fs/cgroup type tmpfs (rw)
none on /sys/fs/fuse/connections type fusectl (rw)
none on /sys/kernel/debug type debugfs (rw)
none on /sys/kernel/security type securityfs (rw)
udev on /dev type devtmpfs (rw,mode=0755)
devpts on /dev/pts type devpts (rw,noexec,nosuid,gid=5,mode=0620)
tmpfs on /run type tmpfs (rw,noexec,nosuid,size=10%,mode=0755)
none on /run/lock type tmpfs (rw,noexec,nosuid,nodev,size=5242880)
none on /run/shm type tmpfs (rw,nosuid,nodev)
none on /run/user type tmpfs (rw,noexec,nosuid,nodev,size=104857600,mode=0755)
none on /sys/fs/pstore type pstore (rw)
systemd on /sys/fs/cgroup/systemd type cgroup (rw,noexec,nosuid,nodev,none,name=systemd)
root@CsnKhai:~# lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda           8:0    0   1.5G  0 disk
└─sda1        8:1    0   1.5G  0 part /
sr0          11:0    1  1024M  0 rom
```

The **lspci** command allows you to use the utility of the same name, which is intended for displaying information about PCI buses and devices connected to them.



The screenshot shows a MobaXterm window with a terminal session. The terminal output for the `lspci` command lists PCI devices. The output for the `lsusb` command lists USB devices.

```
root@CsnKhai:/etc# lspci
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:02.0 VGA compatible controller: InnoTek Systemberatung GmbH VirtualBox Graphics Adapter
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02)
root@CsnKhai:/etc# lsusb
Bus 001 Device 002: ID 80ee:0021 VirtualBox USB Tablet
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
root@CsnKhai:/etc#
```

14) How to determine the type of file in the system, what types of files are there?

Description of the 7 different file types in Linux:

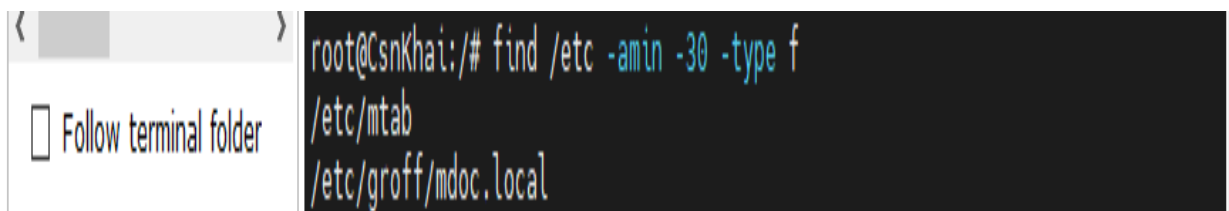
- — a regular file;
- d — directory;
- c — symbolic device;
- b — block device;
- s — (local) socket;
- p — named channel;
- l —symbolic link

You can determine the file type using the **file utility**.

15) * List the first 5 directory files that were recently accessed in the /etc directory.

An example of a command that shows the files that have been accessed in the last 30 minutes:

\$ find /etc -amin -30 -type f



```
root@CsnKhai:/# find /etc -amin -30 -type f
/etc/mtab
/etc/groff/mdoc.local
```