Assignment 2

Advanced Linux

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CSE DevOps 18

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Q1 Different types of file system

There are basically 3 types of file systems.

- Network based
- Disk based
- Virtual

Disk Based

Disk-based file systems are stored on physical media such as hard disks, CD-ROMs, and diskettes. Disk-based file systems can be written in different formats. The available formats are the following:

Type	**Description**
UDF	The Universal Disk Format (UDF) file system, the industry-standard format for storing information on the optical media technology called DVD (Digital Versatile Disc or Digital Video Disc).
UFS	UNIX file system (based on the BSD Fast File system that was provided in the 4.3 Tahoe release). UFS is the default disk-based file system for the Solaris operating system. Before you can create a UFS file system on a disk, you must format the disk and divide it into slices.
PCFS	PC file system, which allows read and write access to data and programs on DOS-formatted disks that are written for DOS-based personal computers.
HSFS	High Sierra, Rock Ridge, and ISO 9660 file system. High Sierra is the first CD-ROM file system. ISO 9660 is the official standard version of the High Sierra File System. The HSFS file system is used on CD-ROMs, and is a read-only file system. Solaris HSFS supports Rock Ridge extensions to ISO 9660, which, when present on a CD-ROM, provide all UFS file system features and file types, except for writability and hard links.

Each of the disk-based file system is associated with a particular media device like:

- UFS with hard disk
- HSFS with CD-ROM
- PCFS with diskette
- UDF with DVD

Network-Based File Systems

Network-based file systems can be accessed from the network. Typically, network-based file systems reside on one system, typically a server, and are accessed by other systems across the network.

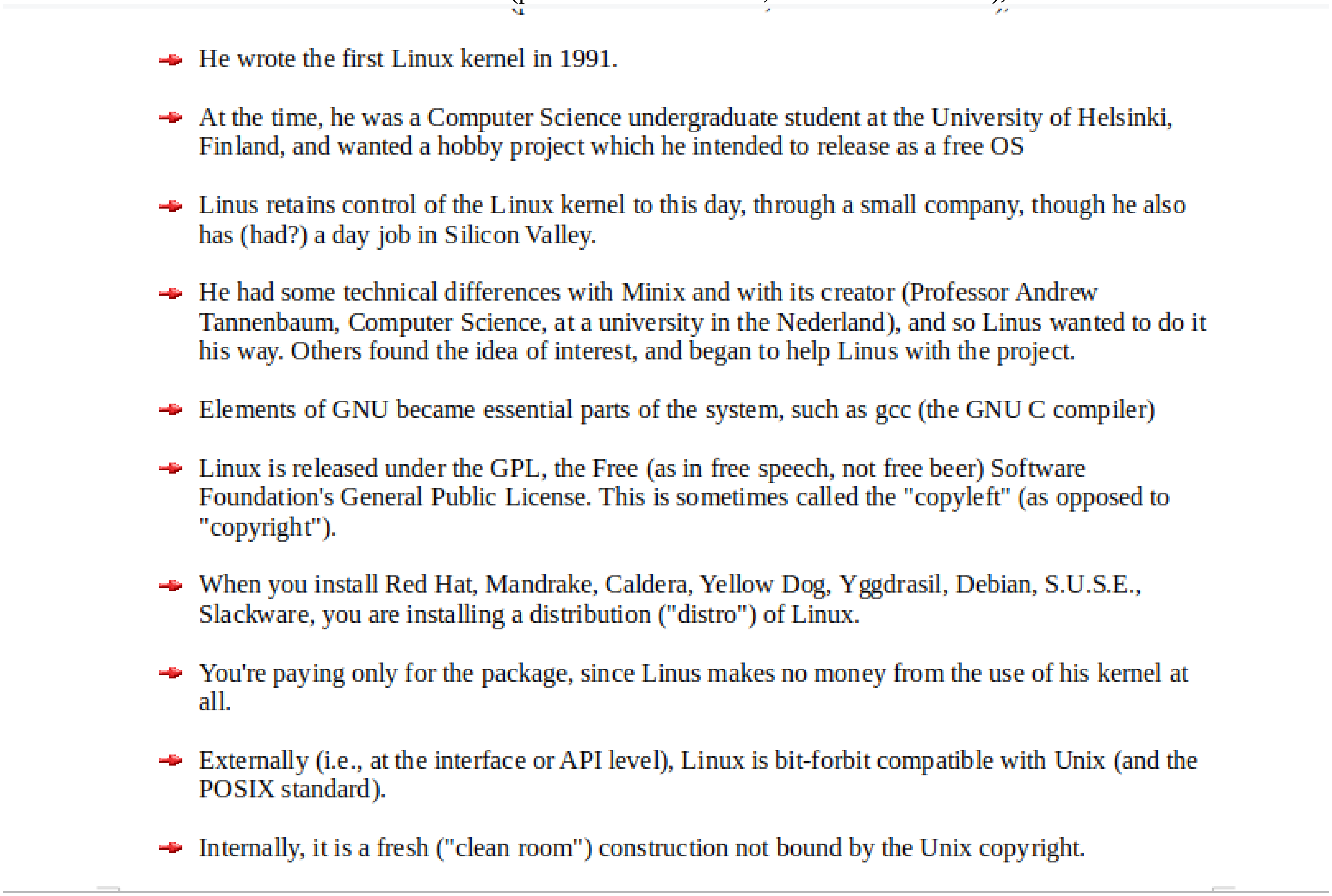
With NFS, you can administer distributed **resources**(files or directories) by exporting them from a server and mounting them on individual clients.

Virtual File Systems

Virtual file systems are memory-based file systems that provide access to special kernel information and facilities. Most virtual file systems do not use file system disk space. However, the CacheFS file system uses a file system on the disk to contain the cache. Also, some virtual file systems, such as the temporary file system (TMPFS), use the swap space on a disk.

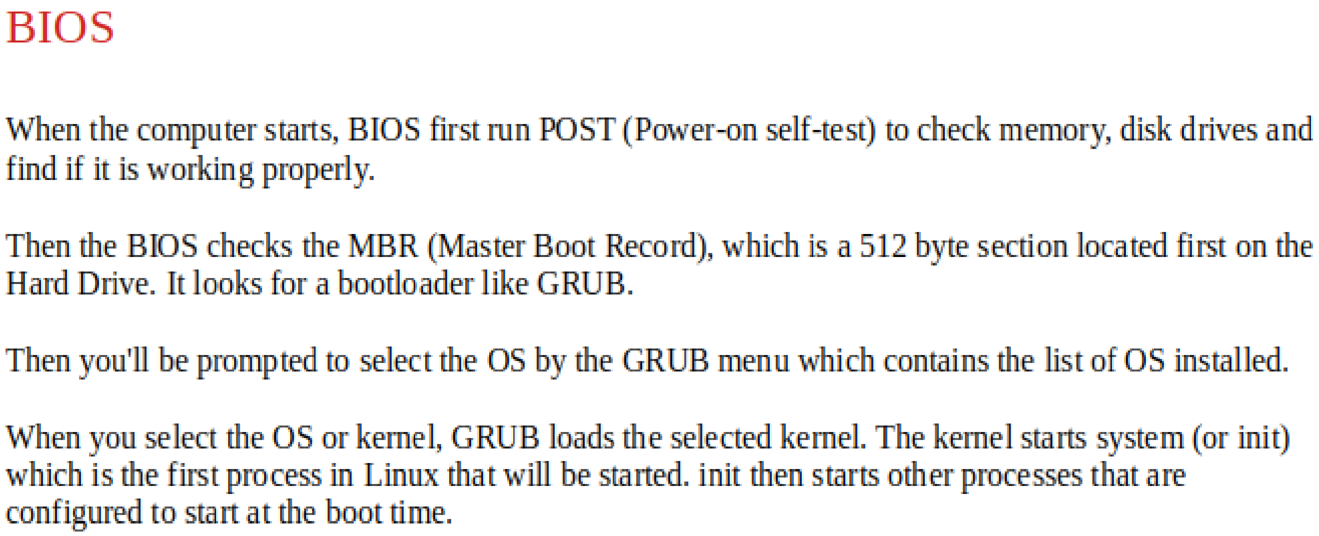
Q2 history of linux operating system

Linux is named after Linus Torvalds (pronounced "LYNNus", hence "LYNN-ucks"),



- He wrote the first Linux kernel in 1991.
- At the time, he was a Computer Science undergraduate student at the University of Helsinki, Finland, and wanted a hobby project which he intended to release as a free OS
- Linus retains control of the Linux kernel to this day, through a small company, though he also has (had?) a day job in Silicon Valley.
- He had some technical differences with Minix and with its creator (Professor Andrew Tannenbaum, Computer Science, at a university in the Nederland), and so Linus wanted to do it his way. Others found the idea of interest, and began to help Linus with the project.
- Elements of GNU became essential parts of the system, such as gcc (the GNU C compiler)
- Linux is released under the GPL, the Free (as in free speech, not free beer) Software Foundation's General Public License. This is sometimes called the "copyleft" (as opposed to "copyright").
- When you install Red Hat, Mandrake, Caldera, Yellow Dog, Yggdrasil, Debian, S.U.S.E., Slackware, you are installing a distribution ("distro") of Linux.
- You're paying only for the package, since Linus makes no money from the use of his kernel at all.
- Externally (i.e., at the interface or API level), Linux is bit-forbit compatible with Unix (and the POSIX standard).
- Internally, it is a fresh ("clean room") construction not bound by the Unix copyright.

Q3 Explanation of linux loader GRUB AND LILO



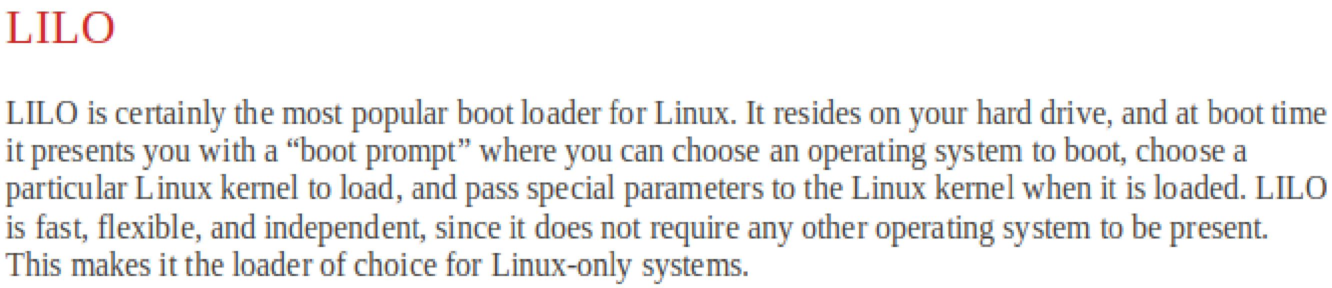
BIOS

When the computer starts, BIOS first run POST (Power-on self-test) to check memory, disk drives and find if it is working properly.

Then the BIOS checks the MBR (Master Boot Record), which is a 512 byte section located first on the Hard Drive. It looks for a bootloader like GRUB.

Then you'll be prompted to select the OS by the GRUB menu which contains the list of OS installed.

When you select the OS or kernel, GRUB loads the selected kernel. The kernel starts system (or init) which is the first process in Linux that will be started. init then starts other processes that are configured to start at the boot time.

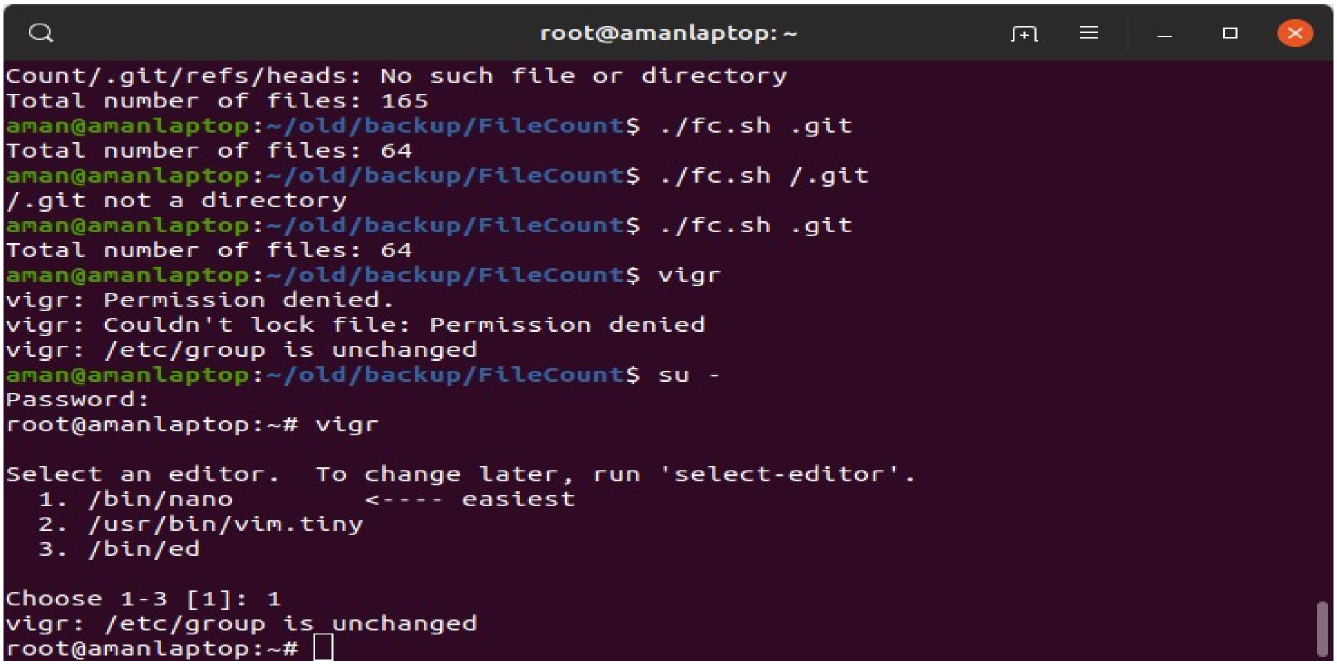


LILO

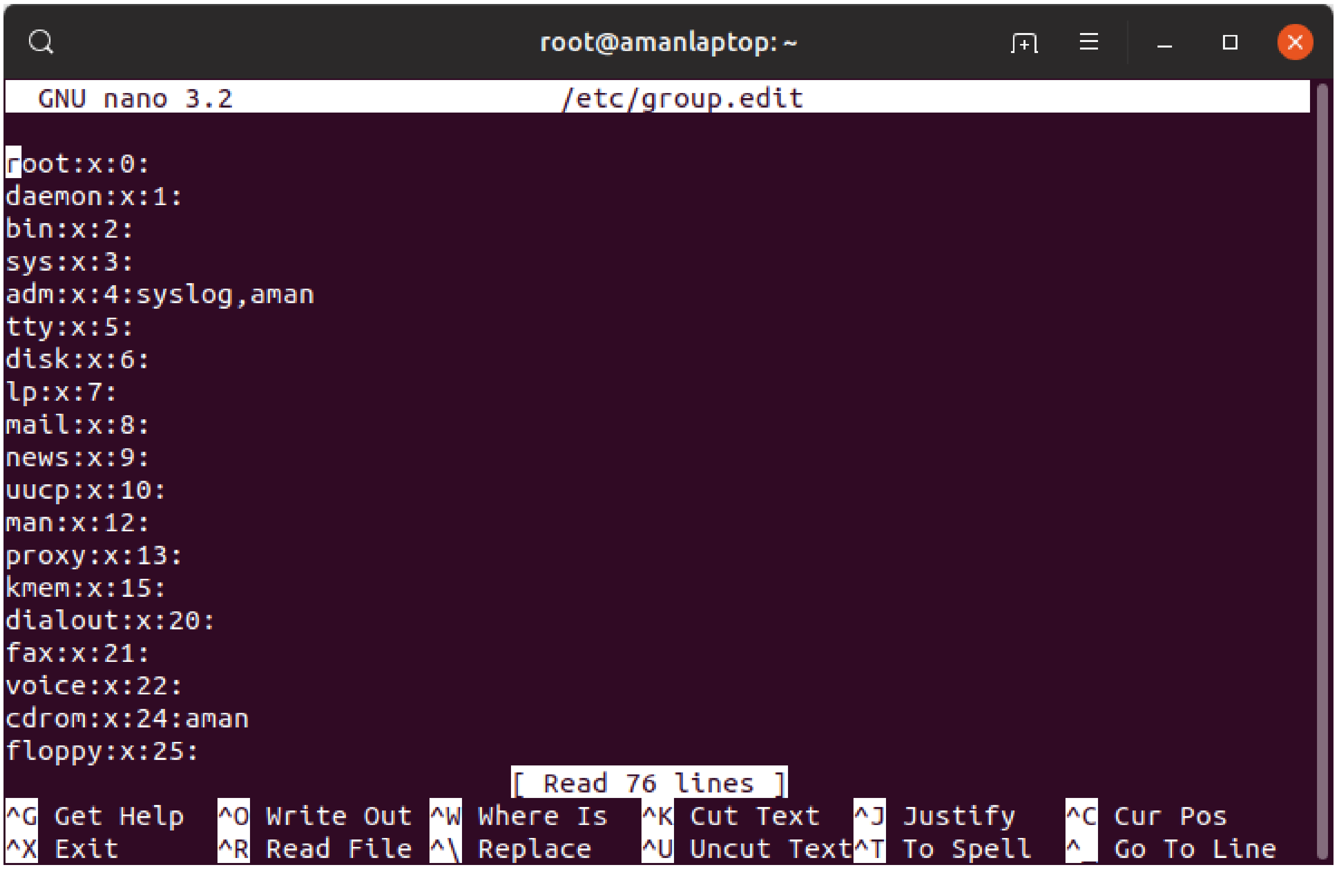
LILO is certainly the most popular boot loader for Linux. It resides on your hard drive, and at boot time it presents you with a “boot prompt” where you can choose an operating system to boot, choose a particular Linux kernel to load, and pass special parameters to the Linux kernel when it is loaded. LILO is fast, flexible, and independent, since it does not require any other operating system to be present. This makes it the loader of choice for Linux-only systems.

Q4 Execute the follwing commands

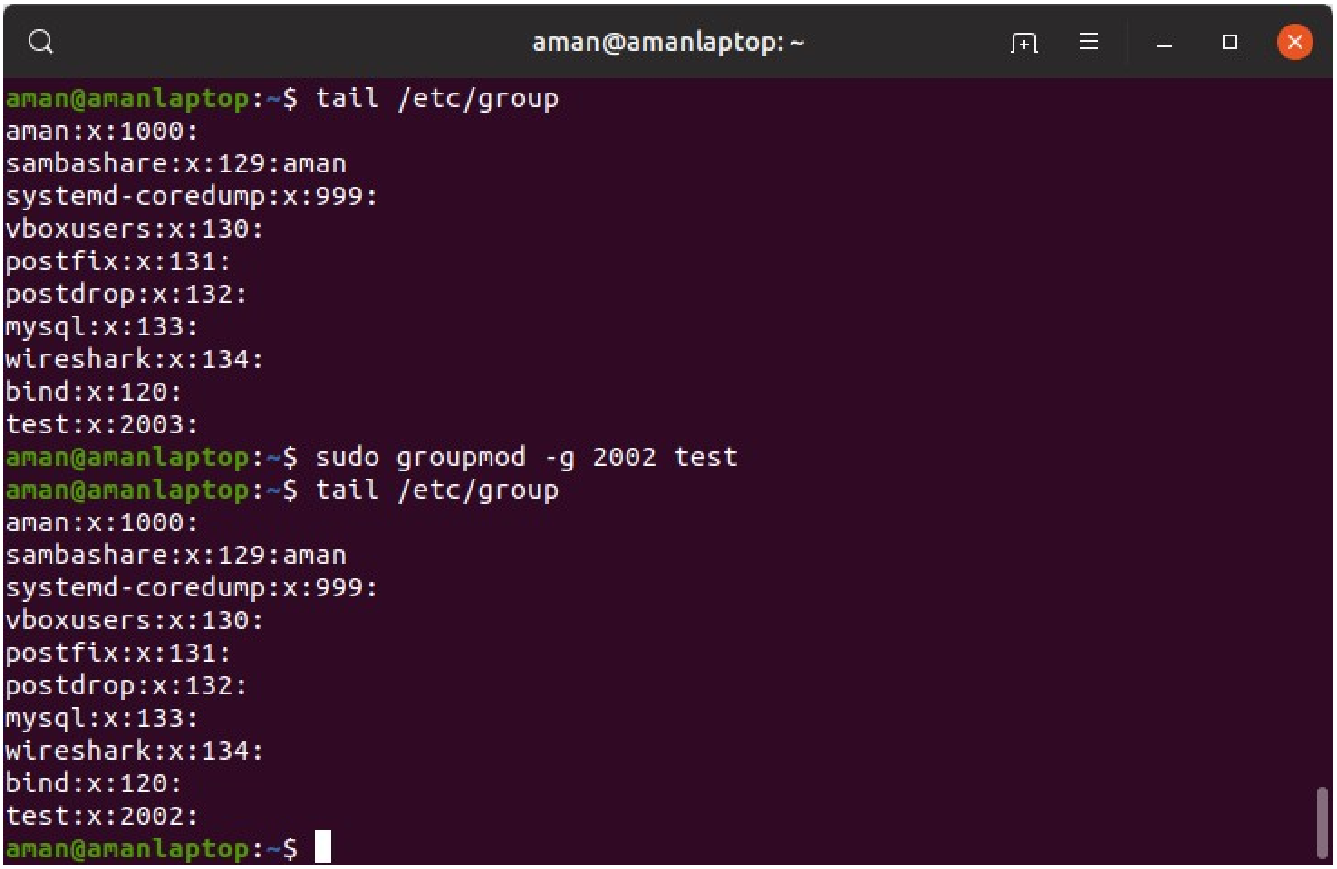
1. vigr
2. groupadd
3. groupdel
4. groupmod
5. chgrp
6. groups
7. newgrp



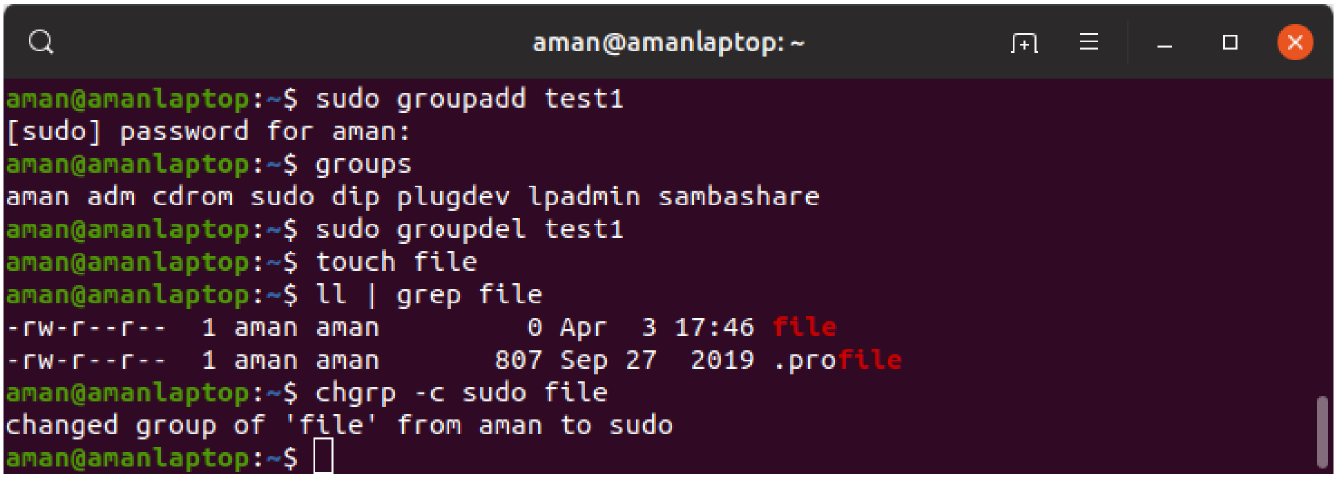
```
Count/.git/refs/heads: No such file or directory
Total number of files: 165
aman@amanlaptop:~/old/backup/FileCount$ ./fc.sh .git
Total number of files: 64
aman@amanlaptop:~/old/backup/FileCount$ ./fc.sh /.git
/.git not a directory
aman@amanlaptop:~/old/backup/FileCount$ ./fc.sh .git
Total number of files: 64
aman@amanlaptop:~/old/backup/FileCount$ vigr
vigr: Permission denied.
vigr: Couldn't lock file: Permission denied
vigr: /etc/group is unchanged
aman@amanlaptop:~/old/backup/FileCount$ su -
Password:
root@amanlaptop:~# vigr

Select an editor.  To change later, run 'select-editor'.
  1. /bin/nano        <---- easiest
  2. /usr/bin/vim.tiny
  3. /bin/ed

Choose 1-3 [1]: 1
vigr: /etc/group is unchanged
root@amanlaptop:~#
```



```
  GNU nano 3.2                    /etc/group.edit

root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,aman
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:aman
floppy:x:25:
                                [ Read 76 lines ]
^G Get Help   ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos
^X Exit       ^R Read File  ^\ Replace    ^U Uncut Text^T To Spell    ^_ Go To Line
```



```
aman@amanlaptop:~$ tail /etc/group
aman:x:1000:
sambashare:x:129:aman
systemd-coredump:x:999:
vboxusers:x:130:
postfix:x:131:
postdrop:x:132:
mysql:x:133:
wireshark:x:134:
bind:x:120:
test:x:2003:
aman@amanlaptop:~$ sudo groupmod -g 2002 test
aman@amanlaptop:~$ tail /etc/group
aman:x:1000:
sambashare:x:129:aman
systemd-coredump:x:999:
vboxusers:x:130:
postfix:x:131:
postdrop:x:132:
mysql:x:133:
wireshark:x:134:
bind:x:120:
test:x:2002:
aman@amanlaptop:~$
```



```
aman@amanlaptop:~$ sudo groupadd test1
[sudo] password for aman:
aman@amanlaptop:~$ groups
aman adm cdrom sudo dip plugdev lpadmin sambashare
aman@amanlaptop:~$ sudo groupdel test1
aman@amanlaptop:~$ touch file
aman@amanlaptop:~$ ll | grep file
-rw-r--r--  1 aman aman          0 Apr  3 17:46 file
-rw-r--r--  1 aman aman        807 Sep 27  2019 .profile
aman@amanlaptop:~$ chgrp -c sudo file
changed group of 'file' from aman to sudo
aman@amanlaptop:~$
```

Q5 Working of RPM

- Working behind the scenes of the package manager is the RPM database, stored in `/var/lib/rpm`.
- It uses Berkeley DB as its back-end.
- It consists of a single database (`Packages`) containing all of the meta information of the installed RPMs.
- Multiple databases are created for indexing purposes, replicating data to speed up queries.
- The database is used to keep track of all files that are changed and created when a user (using RPM) installs a package, thus enabling the user (via RPM) to reverse the changes and remove the package later.
- If the database gets corrupted (which is possible if the RPM client is killed), the index databases can be recreated with the `rpm –rebuilddb` command