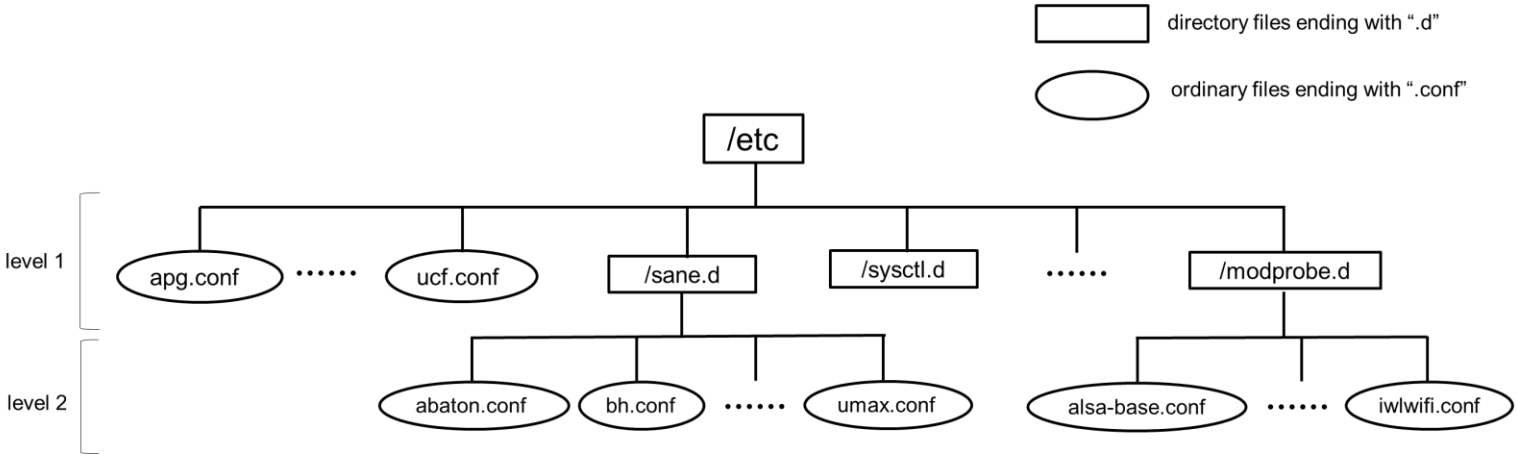
Final Exam

* Screenshot the whole process for every questions!

1. Consider a special file structure under **/etc** which only contains two types of files: ordinary files ending with "**.conf**" and directory files ending with "**.d**". Any other file under **/etc** who does not fulfill the format will be excluded. We can represent the file structure by the following graph:



There are two levels in the graph. The first level consists of not only ordinary files but also directory files. Some directories further contains ordinary files, leading to the second level. Try to answer the questions below.

(a) How many ordinary files ending with ".conf" there are in the first level? Show the number.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ ls -l /etc | egrep "^-" | egrep "\.conf
$" | wc -l
30
```

或下面 find 指令也可接受(但無法排除 link file)

```
cs7109056036@cs7109056036-VirtualBox:~/Desktop$ find /etc/*.conf | wc -l
31
```

(b) How many ordinary files ending with ".conf" there are in the second level? Show the number.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ ls -l /etc/*.d | egrep "^-" | egrep "\.
conf$" | wc -l
104
```

或下面 find 指令也可接受(但無法排除 link file)

```
cs7109056036@cs7109056036-VirtualBox:~/Desktop$ find /etc/*.d/*.conf | wc -l
107
```

(c) Get a list of the top 5 largest ordinary files ending with ".conf" files in both levels. The list should only contain two columns (*file size* and *file name*) and 5 rows.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ ls -l /etc | egrep "^-" | egrep "\.conf
$" > level1
cs7109056036@cs7109056036-VirtualBox:~$ ls -l /etc/*.d | egrep "^-" | egrep "\.
conf$" > level2
cs7109056036@cs7109056036-VirtualBox:~$ cat level1 level2 | tr -s " " | egrep "
^-" | cut -d " " -f5,9 | sort -gr +0 | head -5
25341 brltty.conf
14867 ltrace.conf
10368 sensors3.conf
7792 gt68xx.conf
7649 pnm2ppa.conf
cs7109056036@cs7109056036-VirtualBox:~$
```

2. Construct the following three text files: **name1.txt**, **name2.txt**, **name3.txt**.

name1.txt	name2.txt	name3.txt
Jane	Jill	Tina
Anne	Lena	Molly
Clara	Jane	Anne
Dora	Molly	Jane
Helen	Sara	Zara

(a) Combine the content of the three files and sort the content according to the first letter of the name. For example, the name starting with A should appear at the top, while name starting with Z should appear at the bottom. Save the sorted content into a new file named **names.txt**. Validate that there are **only 15 lines** in **names.txt**.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ cat name1.txt name2.txt name3.txt | sor
t > names.txt
cs7109056036@cs7109056036-VirtualBox:~$ cat names.txt
Anne
Anne
Clara
Dora
Helen
Jane
Jane
Jane
Jill
Lena
Molly
Molly
Sara
Tina
Zara
cs7109056036@cs7109056036-VirtualBox:~$
```

(b) Following (a), show what name has appeared at least three times in **names.txt**. Save **only** the name as a new file named **the-name.txt**.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ uniq -c name_combine.txt | grep "3" | t
r -s " " | cut -d " " -f3 > the-name.txt
cs7109056036@cs7109056036-VirtualBox:~$ cat the-name.txt
Jane
cs7109056036@cs7109056036-VirtualBox:~$
```

(c) Following (b), show **the line number** of the duplicated name that you've found in each individual text files (**name1.txt**, **name2.txt**, **name3.txt**).
(* Hint: Set specific parameter for **grep** command to match a string pattern from a file)

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ cat -n name1.txt | grep -f the-name.txt
     1  Jane
cs7109056036@cs7109056036-VirtualBox:~$ cat -n name2.txt | grep -f the-name.txt
     3  Jane
cs7109056036@cs7109056036-VirtualBox:~$ cat -n name3.txt | grep -f the-name.txt
     4  Jane
cs7109056036@cs7109056036-VirtualBox:~$
```

3. Following question 2(a), you want to merge the content of **name1.txt**, **name2.txt** and **name3.txt** in a different way. Instead of combining them into a column where there are 15 lines, you want to maintain their structure so that there are 3 columns and 5 rows.

(a) How can you achieve the above-mentioned task? However, you want to swap the columns so the content appears in the following order: **name2.txt**, **name3.txt** and **name1.txt**. Save the data as a new file **name231.data**.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ paste name2.txt name3.txt name1.txt > n
ame213.data
cs7109056036@cs7109056036-VirtualBox:~$ cat name213.data
Jill    Tina    Jane
Lena    Molly   Anne
Jane    Anne    Clara
Molly   Jane    Dora
Sara    Zara    Helen
cs7109056036@cs7109056036-VirtualBox:~$
```

(b) Compress **name213.data**. How can you directly view the content of the compressed data without using **cat**/**more** command.

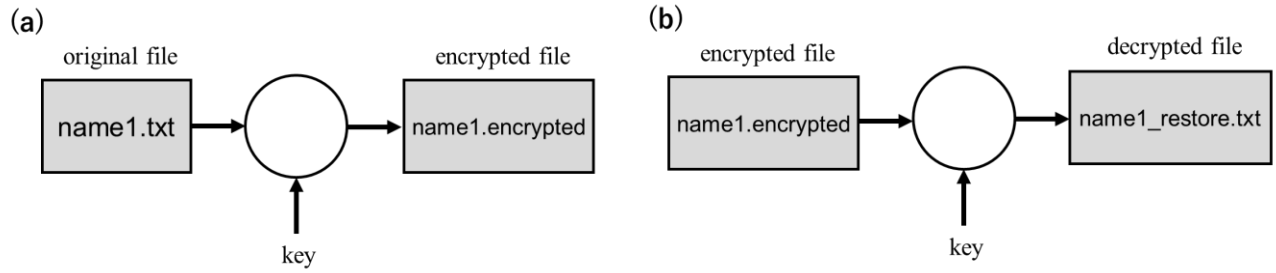
Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ gzip name213.data
```

```
cs7109056036@cs7109056036-VirtualBox:~$ zcat name213.data.gz
Jill    Tina    Jane
Lena    Molly   Anne
Jane    Anne    Clara
Molly   Jane    Dora
Sara    Zara    Helen
cs7109056036@cs7109056036-VirtualBox:~$
```

4. Use the redirection symbol > and < to complete the following encryption process. Before using the

crypt command, you need to install related module by **$ sudo apt install mcrypt**.



While using the **crypt** command, the system will show the following warning:

```
Unix crypt(1) emulation program using mcrypt(1).

Use crypt -h for more help.
Warning: It is insecure to specify keywords in the command line
Stdin was encrypted.
```

(a) Use your **student-ID** as the key to encrypt the text file **name1.txt** that you created in question 2. Name the encrypted file as **name1.encrypted** and save the system warning to another file named **log.txt**.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ cat name1.txt
Jane
Anne
Clara
Dora
Helen
cs7109056036@cs7109056036-VirtualBox:~$ crypt "7109056036" < name1.txt > name1.
encrypted 2> log.txt
cs7109056036@cs7109056036-VirtualBox:~$ cat name1.encrypted
cs7109056036@cs7109056036-VirtualBox:~$ cat log.txt
Unix crypt(1) emulation program using mcrypt(1).

Use crypt -h for more help.
Warning: It is insecure to specify keywords in the command line
Stdin was encrypted.
cs7109056036@cs7109056036-VirtualBox:~$
```

(b) Use your **student-ID** as the key to decrypt the file **name1.encrypted** and name the decrypted file as **name1_restore.txt**. Append the content of the system warning to the end of **log.txt** so that previous content will not be erased. Check if **name1.txt** and **name1_restore.txt** are identical.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ crypt "7109056036" < name1.encrypted >
name1_restore.txt 2>> log.txt
cs7109056036@cs7109056036-VirtualBox:~$ cat log.txt
Unix crypt(1) emulation program using mcrypt(1).

Use crypt -h for more help.
Warning: It is insecure to specify keywords in the command line
Stdin was encrypted.
Unix crypt(1) emulation program using mcrypt(1).

Use crypt -h for more help.
Warning: It is insecure to specify keywords in the command line
Stdin was encrypted.
cs7109056036@cs7109056036-VirtualBox:~$ cat name1_restore.txt
Jane
Anne
Clara
Dora
Helen
cs7109056036@cs7109056036-VirtualBox:~$
```

(c) Following (c), try to use other arbitrary key to decrypt **name1.encrypted** and name the wrongly-decrypted file as **name1_restore2.txt**. Can you successfully restore the original file with wrong key? Check if **name1.txt** and **name1_ restore2.txt** are identical.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ crypt "otherkey" < name1.encrypted > na
me1_restore2.txt 2>> log.txt
cs7109056036@cs7109056036-VirtualBox:~$ cat name1_restore2.txt
◆;▒▒p◆◆◆U◆◆d◆◆◆L◆◆G◆▒▒▒◆cs7109056036@cs7109056036-VirtualBox:~$
```

5. Imagine that you are a writer and you write stories through a Unix system. Now you're going to establish a directory to save your stories. You don't want other users in the system to be able to read or modify the files in case they may steal your ideas.

(a) Establish a new directory named **stories** under your home directory. Use **umask** command to set the default permission that no one can read or modify the files under the directory except you. Create a text file named **storyA.txt** and use **ls -l** to show the detailed information of the file.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~$ mkdir stories
```

```
cs7109056036@cs7109056036-VirtualBox:~$ cd stories
cs7109056036@cs7109056036-VirtualBox:~/stories$ umask
0022
cs7109056036@cs7109056036-VirtualBox:~/stories$ umask 066
cs7109056036@cs7109056036-VirtualBox:~/stories$ umask
0066
cs7109056036@cs7109056036-VirtualBox:~/stories$ touch storyA.txt
cs7109056036@cs7109056036-VirtualBox:~/stories$ ls -l
total 0
-rw------- 1 cs7109056036 cs7109056036 0  六  15 07:15 storyA.txt
cs7109056036@cs7109056036-VirtualBox:~/stories$
```

(b) Create another text file named **storyB.txt** under the directory. Now assume that you are in a writer group. (You don't need to create an actual group.) And you want to share **storyB.txt** to the members belonging to the group so that they can read but cannot modify the story. How

can you change the permission of the file? After changing the permission, use **ls -l** to show the detailed information of **storyB.txt**.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~/stories$ touch storyB.txt
cs7109056036@cs7109056036-VirtualBox:~/stories$ chmod g+r storyB.txt
cs7109056036@cs7109056036-VirtualBox:~/stories$ ls -l
total 0
-rw------- 1 cs7109056036 cs7109056036 0  六  15 07:15 storyA.txt
-rw-r----- 1 cs7109056036 cs7109056036 0  六  15 07:18 storyB.txt
cs7109056036@cs7109056036-VirtualBox:~/stories$
```

(c) You and Tommy are going to work together to co-write a new story. Create a text file named **storyC.txt** under **~/stories** with the following content: "**A great adventure**."

Establish a separate folder **co-stories** for Tommy under your home directory. Then create a link of **storyC.txt** to the directory **~/co-stories**. It can be either a hard link or a soft link. Use **vi** command to add to the content through the link file: "**is about to begin!**"

After saving the file, go back to **~/stories** and check if the original **storyC.txt** is modified.

Ans:

```
cs7109056036@cs7109056036-VirtualBox:~/stories$ vi storyC.txt
cs7109056036@cs7109056036-VirtualBox:~/stories$ cat storyC.txt
A great adventure
```

```
cs7109056036@cs7109056036-VirtualBox:~/stories$ mkdir ~/co-stories
cs7109056036@cs7109056036-VirtualBox:~/stories$ ln ~/stories/storyC.txt ~/co-st
ories/storyC.link
cs7109056036@cs7109056036-VirtualBox:~/stories$ ls ~/co-stories
storyC.link
cs7109056036@cs7109056036-VirtualBox:~/stories$ ls -l ~/co-stories
total 4
-rw------- 2 cs7109056036 cs7109056036 19  六  15 07:49 storyC.link
cs7109056036@cs7109056036-VirtualBox:~/stories$ vi ~/co-stories/storyC.link
```

```
                    cs7109056036@cs7109056036-VirtualBox: ~/stories
 File  Edit  View  Search  Terminal  Help
A great adventure is about to begin
~
~
~
~
~
~
~
```

```
cs7109056036@cs7109056036-VirtualBox:~/stories$ cat storyC.txt
A great adventure is about to begin
```