

1. More Linux Commands

In this exercise, we will learn a few more Linux commands. For each command, please use `man` to learn what it does and how to use it correctly. First, change your directory to `~`.

- 1.1 [2 points]** Make a link called `data_demo_link` to `data_demo` folder using `ln`.

```
[ese-tianxj@login02 ~]$ ln -s data_demo data_demo_link
[ese-tianxj@login02 ~]$ ls
data_demo      err.log      job.log      longest.sh   t1.py
data_demo_link exam         job.sh       result.log   t2.py
```

- 1.2 [2 points]** Print your home directory using `echo`.

```
[ese-tianxj@login02 ~]$ echo $HOME
/work/ese-tianxj
```

- 1.3 [2 points]** Go to `data_demo/molecules/`, make an empty file `test.pdb` with `touch`.

```
[ese-tianxj@login02 ~]$ cd data_demo/molecules/
[ese-tianxj@login02 molecules]$ touch test.pdb
[ese-tianxj@login02 molecules]$ ls
cubane.pdb  ethane.pdb  methane.pdb  octane.pdb  pentane.pdb  propane.pdb  test.pdb
```

- 1.4 [3 points]** Find how many files in `data_demo/data/elements/` using `find`.

```
[ese-tianxj@login02 molecules]$ cd ~
[ese-tianxj@login02 ~]$ cd data_demo/data/elements/
[ese-tianxj@login02 elements]$ find . -type f -print | wc -l
103
```

- 1.5 [2 points]** Compare `data_demo/data/pdb/ethane.pdb` and `data_demo/data/pdb/ethanol.pdb` with `diff`.

```
[ese-tianxj@login02 elements]$ cd ~
[ese-tianxj@login02 ~]$ cd data_demo/data/pdb/
[ese-tianxj@login02 pdb]$ diff ethane.pdb ethanol.pdb -y -W 50
COMPND      ETHANE      | COMPND      ETHANOL
AUTHOR      DAVE WOOD   | AUTHOR      DAVE WOOD
ATOM        1  C        | ATOM        1  C
ATOM        2  C        | ATOM        2  O
ATOM        3  H        | ATOM        3  H
ATOM        4  H        | ATOM        4  H
ATOM        5  H        | ATOM        5  H
ATOM        6  H        | ATOM        6  C
ATOM        7  H        | ATOM        7  H
ATOM        8  H        | ATOM        8  H
ATOM        9          | ATOM        9  H
TER          > TER      10
END          END
```

- 1.6 [3 points]** Count how many But she string appears in data_demo/writing/data/LittleWomen.txt with grep.

```
[ese-tianxj@login02 data]$ cd ~
[ese-tianxj@login02 ~]$ cd data_demo/writing/data/
[ese-tianxj@login02 data]$ ls
LittleWomen.txt one.txt two.txt
[ese-tianxj@login02 data]$ grep -r "But she" LittleWomen.txt | wc -l
15
```

- 1.7 [2 points]** Check the total file size of the data_demo/data/ folder using du.

```
[ese-tianxj@login02 data]$ cd ~
[ese-tianxj@login02 ~]$ du data_demo/data/ -c
409      data_demo/data/pdb
52       data_demo/data/elements
1        data_demo/data/animal-counts
721      data_demo/data/
721      total
```

- 1.8 [3 points]** Copy the data_demo/writing/ folder to data_demo/writing_new/, compress data_demo/writing_new/ using zip, and decompress the .zip file with unzip.

```
[ese-tianxj@login02 ~]$ cp -f -r data_demo/writing data_demo/writing_new/
```

```
[ese-tianxj@login02 ~]$ cd data_demo
```

```
[ese-tianxj@login02 data_demo]$ ls
creatures  molecules      notes          solar.pdf  writing_new
data       north-pacific-gyre  pizza.cfg     writing
[ese-tianxj@login02 data_demo]$ zip -q -r writing_new.zip writing_new
[ese-tianxj@login02 data_demo]$ ls
creatures  molecules      notes          solar.pdf  writing_new
data       north-pacific-gyre  pizza.cfg     writing     writing_new.zip
[ese-tianxj@login02 data_demo]$ unzip -q -n writing_new.zip
[ese-tianxj@login02 data_demo]$ ls
creatures  molecules      notes          solar.pdf  writing_new
data       north-pacific-gyre  pizza.cfg     writing     writing_new.zip
```

- 1.9 [3 points]** Change the file permissions flags on `writing_new` to `drwxr-x---` using `chmod`.

```
[ese-tianxj@login02 data_demo]$ chmod 750 writing_new/
[ese-tianxj@login02 data_demo]$ ll
total 644
drwxr-xr-x 2 ese-tianxj ese-ouycc 4096 Nov 24 19:21 creatures
drwxr-xr-x 5 ese-tianxj ese-ouycc 4096 Nov 24 19:21 data
drwxr-xr-x 2 ese-tianxj ese-ouycc 4096 Dec  8 12:36 molecules
drwxr-xr-x 3 ese-tianxj ese-ouycc 4096 Nov 24 19:21 north-pacific-gyre
-rwxr-xr-x 1 ese-tianxj ese-ouycc  69 Nov 24 19:21 notes
-rwxr-xr-x 1 ese-tianxj ese-ouycc  32 Nov 24 19:21 pizza.cfg
-rwxr-xr-x 1 ese-tianxj ese-ouycc 21583 Nov 24 19:21 solar.pdf
drwxr-xr-x 5 ese-tianxj ese-ouycc 4096 Nov 24 19:21 writing
drwxr-x-- 5 ese-tianxj ese-ouycc 4096 Dec  8 12:48 writing_new
-rw-r--r-- 1 ese-tianxj ese-ouycc 422584 Dec  8 12:51 writing_new.zip
```

- 1.10 [3 points]** Print the last 10 commands you made using `history`.

```
[ese-tianxj@login02 data_demo]$ history |tail -10
108  cp -r writing data_demo/writing_new
109  ls
110  zip -q -r writing_new.zip writing_new
111  ls
112  unzip -q -n writing_new.zip
113  ls
114  chmod 750 writing_new/
115  ll
116  history |tail -0
117  history |tail -10
```

2. BASH for Loop

The general syntax of a BASH loop goes like:

```
for thing in list_of_things
do
    operation_using $thing
```

done

[5 points] Write a shell script to print file size (in bytes) of each *.pdb file in data_demo/data/pdb/, line by line.

aa.sh:

```
for pdb in *.pdb
do
    du -b $pdb
done
```

```
[ese-tianxj@login02 pdb]$ cd ~
[ese-tianxj@login02 ~]$ cd data_demo/data/pdb
[ese-tianxj@login02 pdb]$ nano aa.sh
[ese-tianxj@login02 pdb]$ ./aa.sh
1516    aldrin.pdb
306     ammonia.pdb
1444    ascorbic-acid.pdb
1030    benzaldehyde.pdb
1830    camphene.pdb
5049    cholesterol.pdb
1090    cinnamaldehyde.pdb
1694    citronellal.pdb
2452    codeine.pdb
1158    cubane.pdb
895     cyclobutane.pdb
1384    cyclohexanol.pdb
695     cyclopropane.pdb
622     ethane.pdb
690     ethanol.pdb
2396    ethylcyclohexane.pdb
```

765	glycol.pdb
4209	heme.pdb
1064	lactic-acid.pdb
2562	lactose.pdb
11193	lanoxin.pdb
3395	lsd.pdb
2562	maltose.pdb
2164	menthol.pdb
422	methane.pdb
490	methanol.pdb
1869	mint.pdb
2288	morphine.pdb
2123	mustard.pdb
1680	nerol.pdb
2729	norethindrone.pdb
1828	octane.pdb
1226	pentane.pdb
2287	piperine.pdb
825	propane.pdb
1256	pyridoxal.pdb
3303	quinine.pdb
2675	strychnine.pdb
1159	styrene.pdb
2562	sucrose.pdb

2787	testosterone.pdb
2196	thiamine.pdb
1508	tnt.pdb
2395	tuberin.pdb
2103	tyrian-purple.pdb
1361	vanillin.pdb
423	vinyl-chloride.pdb
2894	vitamin-a.pdb