

## ESE5023 Assignment 05

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### 1. More Linux Commands

1.1 [2 points] Make a link called data\_demo\_link to data\_demo folder using ln.

First attempt:

Create hard links by default

```
[ese-liangsj@login01 ~]$ ln data_demo data_demo_link
```

In: 'data\_demo': hard link not allowed for directory

Second attempt:

Allow the user to attempt to hard link directories (will probably failed)

```
[ese-liangsj@login01 ~]$ ln -d data_demo data_demo_link
```

In: failed to create hard link 'data\_demo\_link' => 'data\_demo': Operation not permitted

Third attempt:

Make symbolic links instead of hard links

```
[ese-liangsj@login01 ~]$ ln -s data_demo data_demo_link
```

```
[ese-liangsj@login01 ~]$ ls  
billing_report  CESM2.1.3  CESM2.2  data_demo  data_demo_link  exam  odd
```

1.2 [2 points] Print your home directory using echo. echo \$HOME,-1

echo: display line of text/string that are passes as an argument<sup>[1]</sup>

```
[ese-liangsj@login01 ~]$ echo '/work/ese-liangsj/work/ese-liangsj'
```

```
/work/ese-liangsj/work/ese-liangsj
```

```
[ese-liangsj@login01 ~]$ echo -e "\\work\\bese-liangsj\\bwork\\bese-liangsj"
```

```
\worese-liangsworese-liangsj
```

```
[ese-liangsj@login01 ~]$ echo -e "\\work\\nese-liangsj\\nwork\\nese-liangsj"
```

```
\work
```

```
ese-liangsj
```

```
work
```

```
ese-liangsj
```

```
[ese-liangsj@login01 ~]$ echo '/work/ese-liangsj/work/ese-liangsj'  
/work/ese-liangsj/work/ese-liangsj  
[ese-liangsj@login01 ~]$ echo -e "\\work\\bese-liangsj\\bwork\\bese-liangsj"  
\worese-liangsworese-liangsj  
[ese-liangsj@login01 ~]$ echo -e "\\work\\nese-liangsj\\nwork\\nese-liangsj"  
\work  
ese-liangsj  
work  
ese-liangsj
```

**1.3 [2 points]** Go to `data_demo/molecules/`, make an empty file `test.pdb` with `touch`.  
**touch:** Update the access and modification times of each file to the current time.

```
[ese-liangs@login01 molecules]$ touch test.pdb
[ese-liangs@login01 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`.

**find:** default expression is `-print`

**wc -l:** print the new line counts

more details see reference [2]

```
[ese-liangs@login01 elements]$ ls
Ac.xml Bk.xml Cs.xml Ga.xml Kr.xml Nb.xml Pd.xml Rn.xml Tb.xml Yb.xml
Ag.xml Br.xml Cu.xml Gd.xml K.xml Nd.xml Pm.xml Ru.xml Tc.xml Y.xml
Al.xml B.xml C.xml Ge.xml La.xml Ne.xml Po.xml Sb.xml Te.xml Zn.xml
Am.xml Ca.xml Dy.xml He.xml Li.xml Ni.xml Pr.xml Sc.xml Th.xml Zr.xml
Ar.xml Cd.xml Er.xml Hf.xml Lr.xml No.xml Pt.xml Se.xml Ti.xml
As.xml Ce.xml Es.xml Hg.xml Lu.xml Np.xml Pu.xml Si.xml Tl.xml
At.xml Cf.xml Eu.xml Ho.xml Md.xml N.xml P.xml Sm.xml Tm.xml
Au.xml Cl.xml Fe.xml H.xml Mg.xml Os.xml Ra.xml Sn.xml U.xml
Ba.xml Cm.xml Fm.xml In.xml Mn.xml O.xml Rb.xml Sr.xml V.xml
Be.xml Co.xml Fr.xml Ir.xml Mo.xml Pa.xml Re.xml S.xml W.xml
Bi.xml Cr.xml F.xml I.xml Na.xml Pb.xml Rh.xml Ta.xml Xe.xml
[ese-liangs@login01 elements]$ find | wc -l
104
```

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

**diff:** compare files line by line

**diff -y:** output in two columns

```
[ese-liangs@login01 pdb]$ diff ethane.pdb ethanol.pdb -y
COMPND      ETHANE                                COMPND      ETHANOL
AUTHOR      DAVE WOODCOCK 95 12 18                     AUTHOR      DAVE WOODCOCK 96 01 03
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
TER          9                                ATOM        9  H
END                                                  > TER      10
END                                                  END
```

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

**grep:** search for PATTERN in each file or standard input

**grep -F:** PATTERN is a set of newline-separated fixed strings

**grep -c:** print only a count of matching lines per file

```
[ese-liangsj@login01 data]$ grep -F 'But she' LittleWomen.txt
"Oh, bless you, no! But she let old Belsham rest, and when I ran back
small quaver in her voice, "I came to thank you, sir, for..." But she
than she went. But she begged so hard, and Sallie had promised to take
    But she does not hunt as our darling did,
    But she only spits at the dogs our pet
    But she is not fair to see,
queer thing for her to do, she doesn't act a bit like herself. But she
aspirant for fame, with philosophic composure. But she made a wry face
her. But she can pet and comfort him after I'm gone, and so cure him
to see signs of hope in the faint color on Beth's cheeks. But she
But she did not get it, for though he joined her and answered all her
sketchbook. But she tucked it under her arm with a sharp...
Amy did any of these fond and foolish things. But she certainly did
But she did show something better than brilliancy or skill, for she
grasshopper. But she would have consented if he had proposed to sing a
[ese-liangsj@login01 data]$ grep -F 'But she' LittleWomen.txt -c
15
```

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

**du:** summarize disk usage of each file, recursively for directories

**du -c:** produce a grand total, size expressed in KB

**du -b:** scale sizes by bytes

```
[ese-liangsj@login02 data]$ du -b -c
100650 ./pdb
35594 ./elements
4251 ./animal-counts
228368 .
228368 total
[ese-liangsj@login02 data]$ du -c
407 ./pdb
52 ./elements
1 ./animal-counts
719 .
719 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.

**cp -r:** copy directories

**zip -r:** recurse into directories

**unzip -d:** extract files into exdir

```
[ese-liangsj@login02 data_demo]$ cp -r writing writing_new
```

```
[ese-liangsj@login02 data_demo]$ zip -r writing_new_zip.zip writing_new
```

```
[ese-liangsj@login02 data_demo]$ unzip -d unzip_test writing_new_zip.zip
```



```
[ese-liangsj@login02 data_demo]$ zip -r writing_new_zip.zip writing_new
adding: writing_new/ (stored 0%)
adding: writing_new/writing/ (stored 0%)
adding: writing_new/writing/haiku.txt (deflated 29%)
adding: writing_new/writing/tools/ (stored 0%)
adding: writing_new/writing/tools/stats (stored 0%)
adding: writing_new/writing/tools/old/ (stored 0%)
adding: writing_new/writing/tools/old/oldtool (stored 0%)
adding: writing_new/writing/tools/format (deflated 13%)
adding: writing_new/writing/data/ (stored 0%)
adding: writing_new/writing/data/one.txt (deflated 53%)
adding: writing_new/writing/data/LittleWomen.txt (deflated 61%)
adding: writing_new/writing/data/two.txt (deflated 59%)
adding: writing_new/writing/thesis/ (stored 0%)
adding: writing_new/writing/thesis/empty-draft.md (stored 0%)
[ese-liangsj@login02 data_demo]$ ls
creatures  molecules  notes      solar.pdf  writing_new
data       north-pacific-gyre  pizza.cfg  writing     writing_new_zip.zip

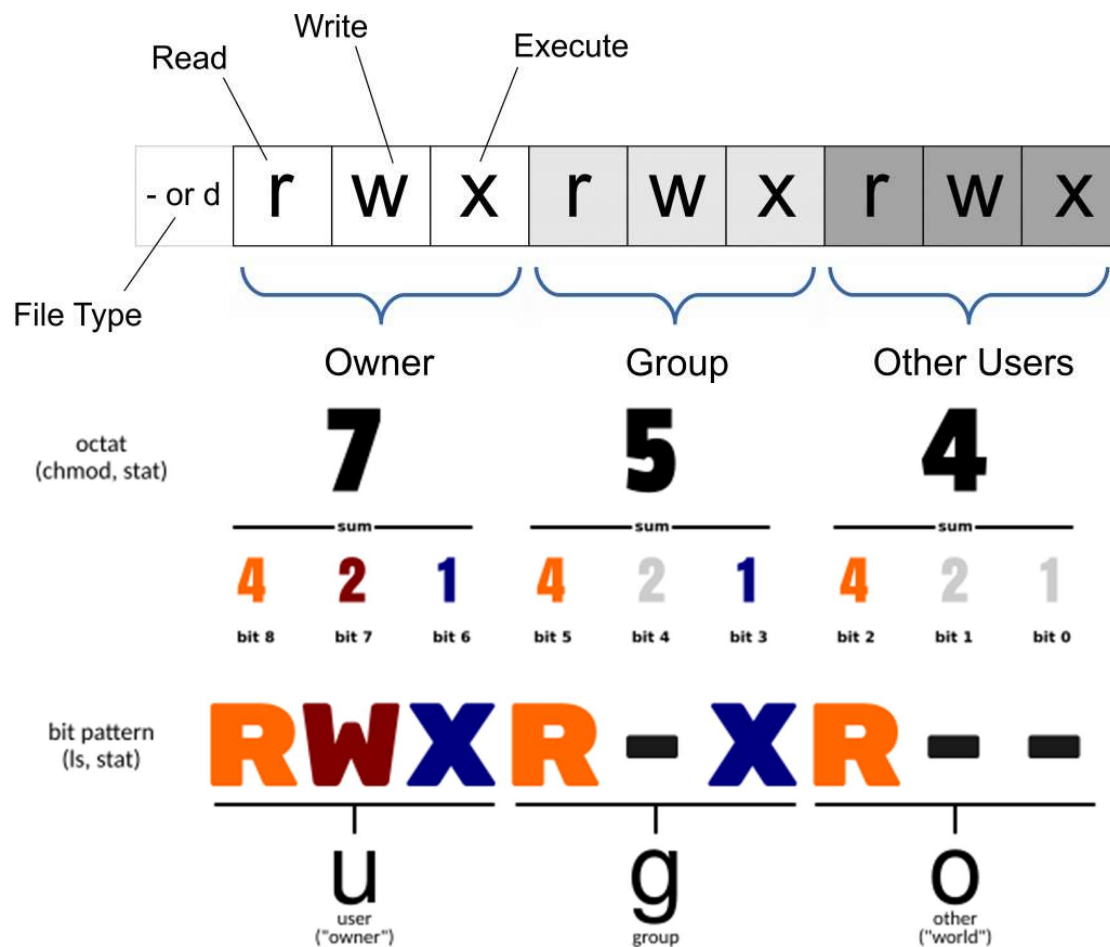
[ese-liangsj@login02 data_demo]$ unzip -d unzip_test writing_new_zip.zip
Archive:  writing_new_zip.zip
  creating: unzip_test/writing_new/
  creating: unzip_test/writing_new/writing/
  inflating: unzip_test/writing_new/writing/haiku.txt
  creating: unzip_test/writing_new/writing/tools/
  extracting: unzip_test/writing_new/writing/tools/stats
  creating: unzip_test/writing_new/writing/tools/old/
  extracting: unzip_test/writing_new/writing/tools/old/oldtool
  inflating: unzip_test/writing_new/writing/tools/format
  creating: unzip_test/writing_new/writing/data/
  inflating: unzip_test/writing_new/writing/data/one.txt
  inflating: unzip_test/writing_new/writing/data/LittleWomen.txt
  inflating: unzip_test/writing_new/writing/data/two.txt
  creating: unzip_test/writing_new/writing/thesis/
  extracting: unzip_test/writing_new/writing/thesis/empty-draft.md
[ese-liangsj@login02 data_demo]$ ls
creatures  north-pacific-gyre  solar.pdf  writing_new
data       notes               unzip_test writing_new_zip.zip
molecules  pizza.cfg           writing
```

**1.9 [3 points]** Change the file permissions flags on writing\_new to drwxr-x--  
- using chmod.

```
[ese-liangsj@login02 data_demo]$ chmod 710 writing_new

[ese-liangsj@login02 data_demo]$ ll
total 645
drwxr-xr-x 2 ese-liangsj ese-zengzz 4096 Nov 24 19:21 creatures
drwxr-xr-x 5 ese-liangsj ese-zengzz 4096 Nov 24 19:21 data
drwxr-xr-x 2 ese-liangsj ese-zengzz 4096 Nov 30 19:51 molecules
drwxr-xr-x 3 ese-liangsj ese-zengzz 4096 Nov 24 19:21 north-pacific-gyre
-rwxr-xr-x 1 ese-liangsj ese-zengzz 69 Nov 24 19:21 notes
-rwxr-xr-x 1 ese-liangsj ese-zengzz 32 Nov 24 19:21 pizza.cfg
-rwxr-xr-x 1 ese-liangsj ese-zengzz 21583 Nov 24 19:21 solar.pdf
drwxr-xr-x 3 ese-liangsj ese-zengzz 4096 Nov 30 22:05 unzip_test
drwxr-xr-x 5 ese-liangsj ese-zengzz 4096 Nov 24 19:21 writing
drwx-x-x--- 3 ese-liangsj ese-zengzz 4096 Nov 30 21:54 writing_new
-rw-r--r-- 1 ese-liangsj ese-zengzz 422944 Nov 30 22:00 writing_new_zip.zip
```

Figures below obtained from reference 3:



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

[ese-liangsj@login02 data\_demo]\$ history | tail -n 10

```
[ese-liangsj@login02 data_demo]$ history | tail -n 10
1074  chmod drwxr-x--- writing_newwriting_new
1075  chmod drwxr-x--- writing_new
1076  chmod 710 writing_new
1077  ll
1078  history --help
1079  history
1080  history -tail 10
1081  history -tail -n 10
1082  history | -tail -n 10
1083  history | tail -n 10
```

## 2. BASH for Loop

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

```
[ese-liangsj@login02 pdb]$ vim bash_loop.sh
[ese-liangsj@login02 pdb]$ ./bash_loop.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
```

Inside the `bash_loop.sh` file, print following lines:

```
##print file size in bytes for each *.pdb in data_demo/data/pdb/

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

## References

- [1] <https://www.geeksforgeeks.org/echo-command-in-linux-with-examples/>
- [2] <https://stackoverflow.com/questions/15663607/what-is-the-best-way-to-count-find-results>
- [3] <https://www.runoob.com/linux/linux-comm-chmod.html>