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

ln: ‘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

ln: 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: display line of text/string that are passes as an argument[1]

[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-liangsj@login01 molecules]$ touch test.pdb
[ese-liangsj@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-liangsj@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-liangsj@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-liangsj@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           1      -0.752   0.001  -0.141  1.00  | ATOM      1  C           1      -0.426  -0.115  -0.147  1.00
ATOM      2  C           1       0.752  -0.001   0.141  1.00  | ATOM      2  O           1      -0.599   1.244  -0.481  1.00
ATOM      3  H           1      -1.158   0.991   0.070  1.00  | ATOM      3  H           1      -0.750  -0.738  -0.981  1.00
ATOM      4  H           1      -1.240  -0.737   0.496  1.00  | ATOM      4  H           1      -1.022  -0.351   0.735  1.00
ATOM      5  H           1      -0.924  -0.249  -1.188  1.00  | ATOM      5  H           1      -1.642   1.434  -0.689  1.00
ATOM      6  H           1       1.158  -0.991  -0.070  1.00  | ATOM      6  C           1       1.047  -0.383   0.147  1.00
ATOM      7  H           1       0.924   0.249   1.188  1.00  | ATOM      7  H           1       1.370   0.240   0.981  1.00
ATOM      8  H           1       1.240   0.737  -0.496  1.00  | ATOM      8  H           1       1.642  -0.147  -0.735  1.00
TER       9              1                                     | ATOM      9  H           1       1.180  -1.434   0.405  1.00
                                                               > TER      10              1
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
```

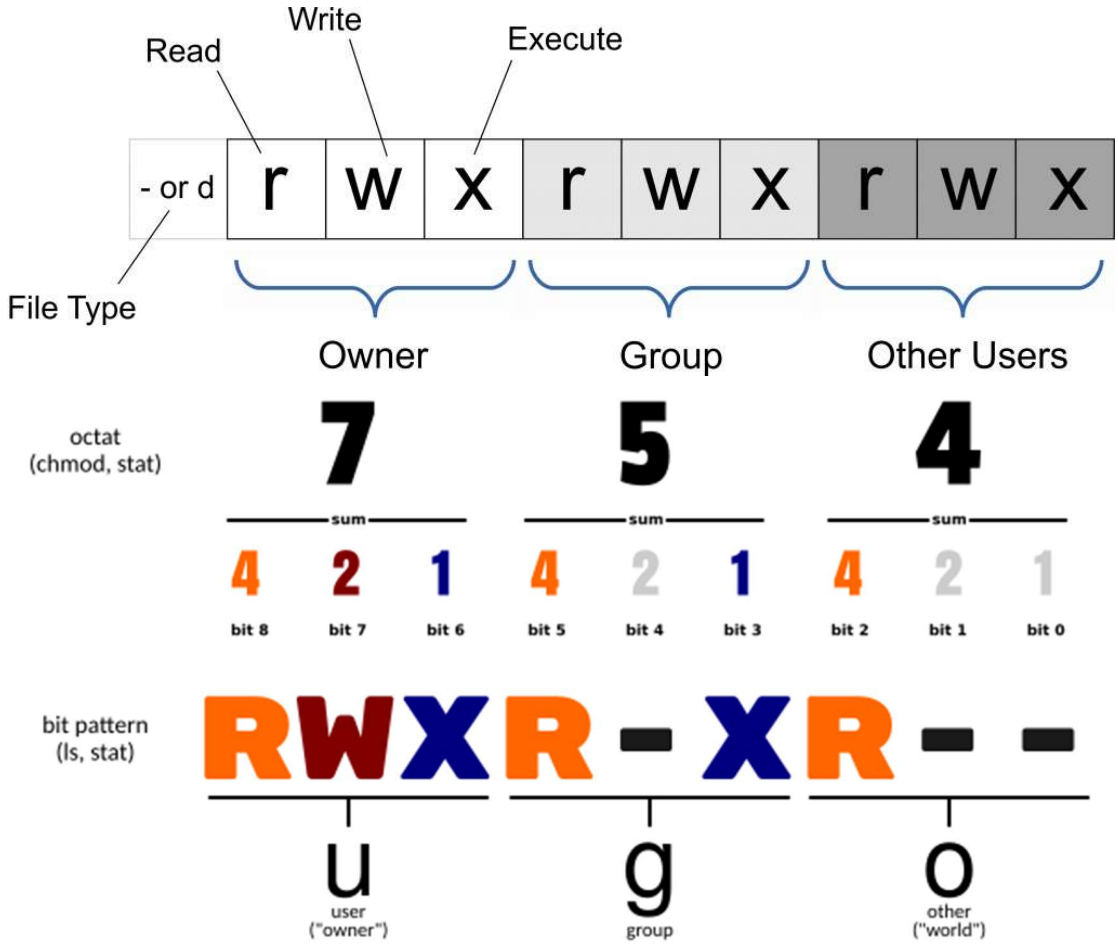
```
[ese-liangsj@login02 data_demo]$ unzip -d unzip_test writing_new_zip.zip
Archive:  writing_new_zip.zip
   creating: unzip_test/writing_new/
   creating: unzip_test/writing_new/writing/
  inflating: unzip_test/writing_new/writing/haiku.txt
   creating: unzip_test/writing_new/writing/tools/
 extracting: 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--- 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