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Lab-2

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Use the tree tool to list the content of the /home directory and its sub-directories in a tree-like format.

```
mail -> ../mail
rsyslog [error opening dir]
tmp
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-a
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-c
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-f
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-M
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-p
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-s
systemd-private-f978c0bb63424b108c80e5b3ce44c7b9-u
www
html
  index.html

42888 directories, 454265 files
azzoz@ubuntuoserver:~$
```

When would you use tree over ls?

When we want to see what a directory contains in a tree format, a directory will show with its branches of directories and files.

Create a directory called *code* under your home directory with the following structure.

```
code/
├── my-project
│   ├── LICENSE.txt
│   ├── NOTICE.txt
│   ├── README.txt
│   └── src
│       ├── assembly
│       ├── it
│       ├── main
│       │   ├── filters
│       │   ├── java
│       │   ├── resources
│       │   └── webapp
│       ├── site
│       └── test
│           ├── filters
│           ├── java
│           └── resources
```

```
azzoz@ubuntuoserver:~$ mkdir code/
azzoz@ubuntuoserver:~$ mkdir my-project
azzoz@ubuntuoserver:~$ rmdir my-project/
Command 'rmdir' not found, did you mean:
  command 'rmdir' from deb cannautils (3.7p3-17)
  command 'rmdir' from deb coreutils (8.32-4.1ubuntu1)
Try: sudo apt install <deb name>
azzoz@ubuntuoserver:~$ rmdir my-project/
azzoz@ubuntuoserver:~$ cd code/
azzoz@ubuntuoserver:~/code$ mkdir my-project
azzoz@ubuntuoserver:~/code$ touch LICENSE.txt
azzoz@ubuntuoserver:~/code$ touch NOTICE.txt
azzoz@ubuntuoserver:~/code$ touch README.txt
azzoz@ubuntuoserver:~/code$ mv LICENSE.txt my-project/
azzoz@ubuntuoserver:~/code$ mv NOTICE.txt my-project/
azzoz@ubuntuoserver:~/code$ mv README.txt my-project/
azzoz@ubuntuoserver:~/code$ cd my-project/
azzoz@ubuntuoserver:~/code/my-project$ mkdir src
azzoz@ubuntuoserver:~/code/my-project$ cd src/
azzoz@ubuntuoserver:~/code/my-project/src$ mkdir assembly && mkdir it && mkdir main && mkdir site && mkdir test
azzoz@ubuntuoserver:~/code/my-project/src$ cd main/
azzoz@ubuntuoserver:~/code/my-project/src/main$ mkdir filters && mkdir java && mkdir resources && mkdir webapp
azzoz@ubuntuoserver:~/code/my-project/src/main$ cd ..
azzoz@ubuntuoserver:~/code/my-project/src$ cd test/
azzoz@ubuntuoserver:~/code/my-project/src/test$ mkdir filters && mkdir java && mkdir resources
azzoz@ubuntuoserver:~/code/my-project/src/test$
```

- Find the owner and group owner of the file README.txt?
- Edit the file *README.txt* using a text editor and write your name inside it.
- Use the command **chmod** to change the write permission of the owner, so the owner can't write to the file. Keep the write permission for the group. List the permissions using **ls -l code/my-project/README.txt** to inspect it. Now, edit the file and save it. What happens?
- Change the write permission of both the owner and group owner, so they can't write to the file. Now, edit the file and save it. What happens?
- Create a new directory called *project-2* under */home/<your-user-name>/code*. **mkdir code/project-2**.
- Copy the content of *code/my-project* into *code/project-2* using one command using: **cp -r code/my-project/* code/project-2**.
- Rename *project-2* directory into *java-starter*.
- Remove the directory *code/my-project* and its content.

```

azzoz@ubuntoserver:~/code/my-project$ nano README.txt
azzoz@ubuntoserver:~/code/my-project$ ls -l README.txt
-rw-rw-r-- 1 azzoz azzoz 20 Feb  7 12:02 README.txt
azzoz@ubuntoserver:~/code/my-project$ chmod 464 README.txt
azzoz@ubuntoserver:~/code/my-project$ ls -l README.txt
-r--rw-r-- 1 azzoz azzoz 20 Feb  7 12:02 README.txt
azzoz@ubuntoserver:~/code/my-project$ chmod 444 README.txt
azzoz@ubuntoserver:~/code/my-project$ ls -l README.txt
-r--r--r-- 1 azzoz azzoz 20 Feb  7 12:02 README.txt
azzoz@ubuntoserver:~/code/my-project$ cd ../../
azzoz@ubuntoserver:~$ mkdir /home/azzoz/code/project-2
azzoz@ubuntoserver:~$ cp -r code/my-project/* code/project-2/
azzoz@ubuntoserver:~$ cd code/
azzoz@ubuntoserver:~/code$ mv project-2/ java-starter
azzoz@ubuntoserver:~/code$ rm -r my-project/
rm: remove write-protected regular file 'my-project/README.txt'? y
azzoz@ubuntoserver:~/code$

```

- Create a new directory */home/<your-user-name>/backup*
- Run **rsync -r /home/<your-user-name>/code/ /home/<your-user-name>/backup/**

```

azzoz@ubuntoserver:~$ mkdir /home/azzoz/backup
azzoz@ubuntoserver:~$ rsync -r /home/azzoz/code/ /home/azzoz/backup/

```

- What happens to the directory at */home/<your-user-name>/backup/java-starter/src/main/java/* ? List it?

```

azzoz@ubuntoserver:/home$ touch azzoz/code/java-starter/src/main/java/file{1..100}.java
azzoz@ubuntoserver:/home$ tree /home/azzoz/code/
/home/azzoz/code/
├── java-starter
│   ├── LICENSE.txt
│   ├── NOTICE.txt
│   └── README.txt
└── src
    ├── assembly
    ├── it
    └── main
        ├── filters
        └── java
            ├── file100.java
            ├── file10.java
            ├── file11.java
            ├── file12.java
            ├── file13.java
            ├── file14.java
            ├── file15.java
            └── file16.java

```

- Now run rsync again, `rsync -r /home/<your-user-name>/code/ /home/<your-user-name>/backup/`.
- What happens to the directory at `/home/<your-user-name>/backup/java-starter/src/main/java/`? List it?

```

azzoz@ubuntuoserver:/home$ rsync -r /home/azzoz/code/ /home/azzoz/backup/
azzoz@ubuntuoserver:/home$ ls /home/azzoz/backup/java-starter/src/main/java
file100.java  file20.java  file31.java  file42.java  file53.java  file64.java  file75.java  file86.java  file97.java
file101.java  file21.java  file32.java  file43.java  file54.java  file65.java  file76.java  file87.java  file98.java
file102.java  file22.java  file33.java  file44.java  file55.java  file66.java  file77.java  file88.java  file99.java
file103.java  file23.java  file34.java  file45.java  file56.java  file67.java  file78.java  file89.java  file90.java
file104.java  file24.java  file35.java  file46.java  file57.java  file68.java  file79.java  file91.java  file92.java
file105.java  file25.java  file36.java  file47.java  file58.java  file69.java  file80.java  file93.java  file94.java
file106.java  file26.java  file37.java  file48.java  file59.java  file70.java  file81.java  file95.java  file96.java
file107.java  file27.java  file38.java  file49.java  file60.java  file71.java  file82.java  file96.java
file108.java  file28.java  file39.java  file50.java  file61.java  file72.java  file83.java  file97.java
file109.java  file29.java  file40.java  file51.java  file62.java  file73.java  file84.java  file98.java
file110.java  file30.java  file41.java  file52.java  file63.java  file74.java  file85.java  file99.java
azzoz@ubuntuoserver:/home$

```

- Use the command `ls -l` to find the owner and group owner of the `~/code/java-starter/NOTICE.txt` file.
- Use the command `chown` to change the user owner of the file `~/code/java-starter/NOTICE.txt` into the root user. Now, open the file and edit it? What happens?

```

azzoz@ubuntuoserver:/home$ ls -l /home/azzoz/code/java-starter/NOTICE.txt
-rw-rw-r-- 1 azzoz azzoz 0 Feb  7 12:13 /home/azzoz/code/java-starter/NOTICE.txt
azzoz@ubuntuoserver:/home$ sudo chown root /home/azzoz/code/java-starter/NOTICE.txt
[sudo] password for azzoz:
azzoz@ubuntuoserver:/home$ nano /home/azzoz/code/java-starter/NOTICE.txt
azzoz@ubuntuoserver:/home$

```

The file has edited successfully because the group can read and writer to the file

- Use the command `chown` to change the user owner and group of the directory `~/code/java-starter` into `root` and group `wheel`.

```

azzoz@ubuntuoserver:/home$ sudo chown root:wheel /home/azzoz/code/java-starter

```

```

azzoz@ubuntuoserver:/home$ ls -l /home/azzoz/code
total 4
drwxrwxr-x 3 root wheel 4096 Feb  7 12:47 java-starter

```

- Use the command `chown` to change the user owner and group of the directory `~/code/java-starter` and its subdirectories into `root` and group `wheel`.

```

azzoz@ubuntuoserver:/home$ sudo chown -R root:wheel /home/azzoz/code/java-starter
azzoz@ubuntuoserver:/home$ ls -l /home/azzoz/code/java-starter/
total 12
-rw-rw-r-- 1 root wheel  0 Feb  7 12:13 LICENSE.txt
-rw-rw-r-- 1 root wheel  6 Feb  7 12:47 NOTICE.txt
-r--r--r-- 1 root wheel 20 Feb  7 12:13 README.txt
drwxrwxr-x 7 root wheel 4096 Feb  7 12:13 src
azzoz@ubuntuoserver:/home$

```

- Use the command `ls` to inspect the access permissions of the file `~/code/java-starter/LICENSE.txt`. What can the following user categories do: user owner, group, all others?

User owner can read and write, group can read and write, other can read.

- Use the command `chmod` to change the permissions of the directory `~/code/java-starter` and its subdirectories where you grant read and write permission to the owner user, none to group members, and none to others. What happens when you run `ls` on the `~/code/java-starter` directory ? Why?

```
azzoz@ubuntoserver:/home$ sudo chmod 600 -R /home/azzoz/code/java-starter
azzoz@ubuntoserver:/home$ ls -l /home/azzoz/code/java-starter/
ls: cannot open directory '/home/azzoz/code/java-starter/': Permission denied
azzoz@ubuntoserver:/home$
```

Getting permission denied, because only the root can read the directory, and the owner is root.

- Undo the previous steps by changing the owner and group into your default user name and group name. Also, change the access permissions of the file `~/code/java-starter/LICENSE.txt` to the earliest values you listed in the first step.

```
azzoz@ubuntoserver:/$ sudo -i
root@ubuntoserver:~# sudo chmod 664 -R /home/azzoz/code/java-starter/
root@ubuntoserver:~# sudo chown azzoz:azzoz -R /home/azzoz/code/java-starter/
root@ubuntoserver:~# ls -l /home/azzoz/code/java-starter/
total 12
-rw-rw-r-- 1 azzoz azzoz  0 Feb  7 12:13 LICENSE.txt
-rw-rw-r-- 1 azzoz azzoz  6 Feb  7 12:47 NOTICE.txt
-rw-rw-r-- 1 azzoz azzoz 20 Feb  7 12:13 README.txt
drw-rw-r-- 7 azzoz azzoz 4096 Feb  7 12:13 src
root@ubuntoserver:~#
```