1. **Create a new file *first.txt* and a new directory *second* to your user's home directory. What are the permissions for newly created file and directory?**

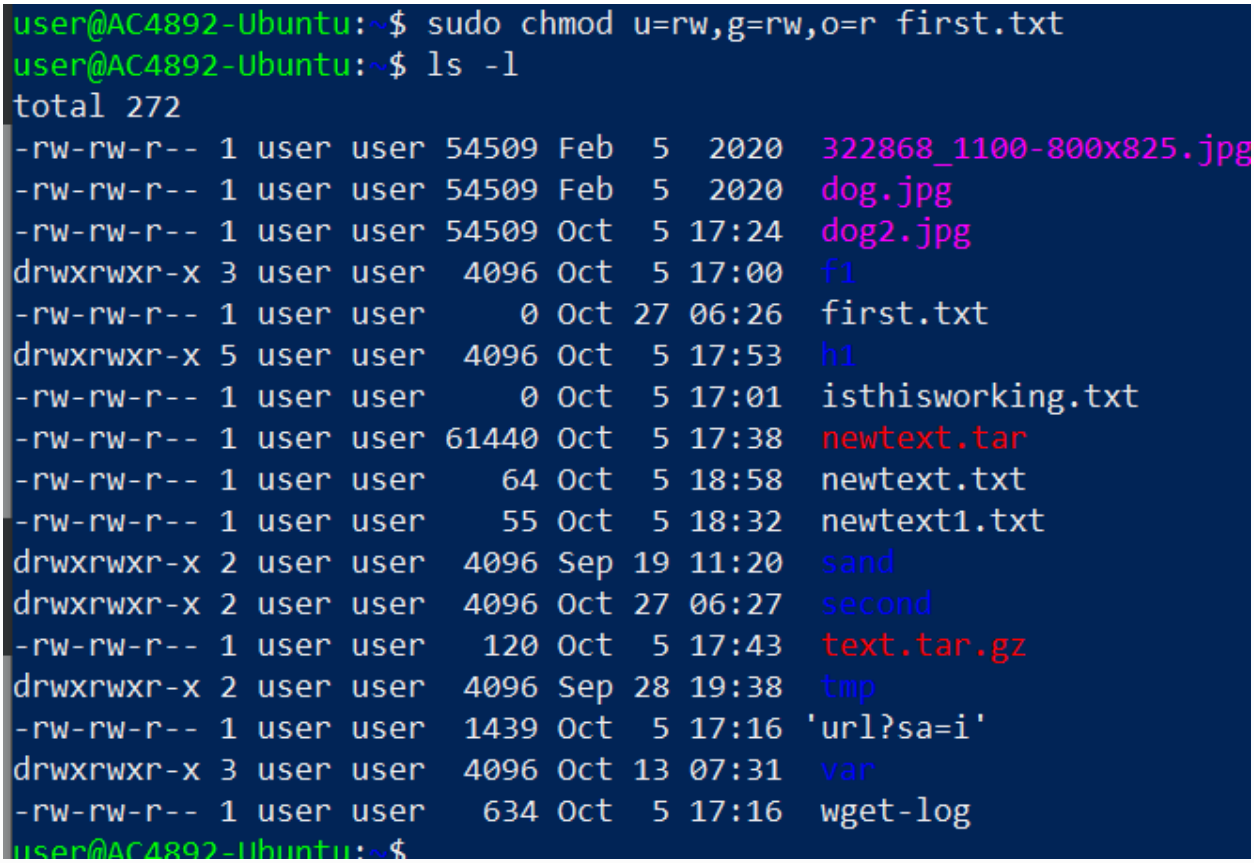
```
user@AC4892-Ubuntu:~$ touch first.txt
```

```
user@AC4892-Ubuntu:~$ mkdir second
```

```
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020  322868_1100-800x825.jpg
-rw-rw-r-- 1 user user 54509 Feb  5  2020  dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24  dog2.jpg
drwxrwxr-x 3 user user  4096 Oct  5 17:00  f1
-rw-rw-r-- 1 user user     0 Oct 27 06:26  first.txt
drwxrwxr-x 5 user user  4096 Oct  5 17:53  h1
-rw-rw-r-- 1 user user     0 Oct  5 17:01  isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38  newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58  newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32  newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20  sand
drwxrwxr-x 2 user user  4096 Oct 27 06:27  second
-rw-rw-r-- 1 user user   120 Oct  5 17:43  text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38  tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31  var
-rw-rw-r-- 1 user user   634 Oct  5 17:16  wget-log
```

2. **Change file (first.txt) permissions using numerical format in the following way: owner → all permissions, group → read and write permissions and other → no permissions. Return original permissions for the file using symbolic format.**

```
user@AC4892-Ubuntu:~$ sudo chmod 760 first.txt
[sudo] password for user:
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020  322868_1100-800x82
-rw-rw-r-- 1 user user 54509 Feb  5  2020  dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24  dog2.jpg
drwxrwxr-x 3 user user  4096 Oct  5 17:00  f1
-rwxrw---- 1 user user     0 Oct 27 06:26  first.txt
drwxrwxr-x 5 user user  4096 Oct  5 17:53  h1
-rw-rw-r-- 1 user user     0 Oct  5 17:01  isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38  newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58  newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32  newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20  sand
drwxrwxr-x 2 user user  4096 Oct 27 06:27  second
-rw-rw-r-- 1 user user   120 Oct  5 17:43  text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38  tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31  var
-rw-rw-r-- 1 user user   634 Oct  5 17:16  wget-log
```



3. **Change root or other user for the owner for the directory (second).**

```
user@AC4892-Ubuntu:~$ sudo chown root -R second
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020  322868_1100-800x825.j
-rw-rw-r-- 1 user user 54509 Feb  5  2020  dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24  dog2.jpg
drwxrwxr-x 3 user user  4096 Oct  5 17:00  f1
-rw-rw-r-- 1 user user     0 Oct 27 06:26  first.txt
drwxrwxr-x 5 user user  4096 Oct  5 17:53  h1
-rw-rw-r-- 1 user user     0 Oct  5 17:01  isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38  newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58  newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32  newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20  sand
drwxrwxr-x 2 root user  4096 Oct 27 06:27  second
-rw-rw-r-- 1 user user   120 Oct  5 17:43  text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38  tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31  var
-rw-rw-r-- 1 user user   634 Oct  5 17:16  wget-log
user@AC4892-Ubuntu:~$
```

4. **Change directory permissions in a way that only owner has permissions for the directory.**

```
user@AC4892-Ubuntu:~$ sudo chmod 700 h1
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020  322868_1100-800x825.jpg
-rw-rw-r-- 1 user user 54509 Feb  5  2020  dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24  dog2.jpg
-rw-rw-r-- 1 user user     0 Oct 27 06:32  example.txt
drwxrwxr-x 3 user user  4096 Oct  5 17:00  f1
-rw-rw-r-- 1 user user     0 Oct 27 06:26  first.txt
drwx------ 5 user user  4096 Oct  5 17:53  h1
-rw-rw-r-- 1 user user     0 Oct  5 17:01  isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38  newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58  newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32  newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20  sand
drwxrwxr-x 2 root user  4096 Oct 27 06:27  second
-rw-rw-r-- 1 user user   120 Oct  5 17:43  text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38  tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31  var
-rw-rw-r-- 1 user user   634 Oct  5 17:16  wget-log
user@AC4892-Ubuntu:~$
```

5. **Create a new file and set root or other user as a file owner.**

```
user@AC4892-Ubuntu:~$ touch example.txt
user@AC4892-Ubuntu:~$ sudo chown user example.txt
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020 322868_1100-800x825.jpg
-rw-rw-r-- 1 user user 54509 Feb  5  2020 dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24 dog2.jpg
-rw-rw-r-- 1 user user     0 Oct 27 06:32 example.txt
drwxrwxr-x 3 user user  4096 Oct  5 17:00 f1
-rw-rw-r-- 1 user user     0 Oct 27 06:26 first.txt
drwxrwxr-x 5 user user  4096 Oct  5 17:53 h1
-rw-rw-r-- 1 user user     0 Oct  5 17:01 isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38 newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58 newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32 newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20 sand
drwxrwxr-x 2 root user  4096 Oct 27 06:27 second
-rw-rw-r-- 1 user user   120 Oct  5 17:43 text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38 tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31 var
-rw-rw-r-- 1 user user   634 Oct  5 17:16 wget-log
```

6. **Create two files: hard_link.txt and soft_link.txt. Create hard and soft link for these files according to file names. Check the results with ls -l command. What does the output of the command tell about the links and how do links differ? Remove the files you created and recheck the results with ls -l command. What differences do you notice?**

```
user@AC4892-Ubuntu: $ touch hard_link.txt soft_link.txt
user@AC4892-Ubuntu: $ ls
322868_1100-800x825.jpg  example.txt  h1              newtext.tar  sand         text.tar.gz  var
dog.jpg                  f1           hard_link.txt   newtext.txt  second       tmp          wget-log
dog2.jpg                 first.txt    isthisworking.txt  newtext1.txt  soft_link.txt  'url?sa=i'
```

```
user@AC4892-Ubuntu:~$ ln -s soft_link.txt soft.txt
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020  322868_1100-800x825.jpg
-rw-rw-r-- 1 user user 54509 Feb  5  2020  dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24  dog2.jpg
-rw-rw-r-- 1 user user     0 Oct 27 06:32  example.txt
drwxrwxr-x 3 user user  4096 Oct  5 17:00  f1
-rw-rw-r-- 1 user user     0 Oct 27 06:26  first.txt
drwx------ 5 user user  4096 Oct  5 17:53  h1
-rw-rw-r-- 1 user user     0 Oct 27 06:35  hard_link.txt
-rw-rw-r-- 1 user user     0 Oct  5 17:01  isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38  newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58  newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32  newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20  sand
drwxrwxr-x 2 root user  4096 Oct 27 06:27  second
lrwxrwxrwx 1 user user    13 Oct 27 06:36  soft.txt -> soft_link.txt
-rw-rw-r-- 1 user user     0 Oct 27 06:35  soft_link.txt
-rw-rw-r-- 1 user user   120 Oct  5 17:43  text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38  tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31  var
-rw-rw-r-- 1 user user   634 Oct  5 17:16  wget-log
```

Softlink does not increases the number of links but hardlink increases the no of links

```
user@AC4892-Ubuntu:~$ rm hard_link.txt soft_link.txt
user@AC4892-Ubuntu:~$ ls -l
total 272
-rw-rw-r-- 1 user user 54509 Feb  5  2020  322868_1100-800x825.jpg
-rw-rw-r-- 1 user user 54509 Feb  5  2020  dog.jpg
-rw-rw-r-- 1 user user 54509 Oct  5 17:24  dog2.jpg
-rw-rw-r-- 1 user user     0 Oct 27 06:32  example.txt
drwxrwxr-x 3 user user  4096 Oct  5 17:00  f1
-rw-rw-r-- 1 user user     0 Oct 27 06:26  first.txt
drwx------ 5 user user  4096 Oct  5 17:53  h1
-rw-rw-r-- 1 user user     0 Oct  5 17:01  isthisworking.txt
-rw-rw-r-- 1 user user 61440 Oct  5 17:38  newtext.tar
-rw-rw-r-- 1 user user    64 Oct  5 18:58  newtext.txt
-rw-rw-r-- 1 user user    55 Oct  5 18:32  newtext1.txt
drwxrwxr-x 2 user user  4096 Sep 19 11:20  sand
drwxrwxr-x 2 root user  4096 Oct 27 06:27  second
lrwxrwxrwx 1 user user    13 Oct 27 06:36  soft.txt -> soft_link.txt
-rw-rw-r-- 1 user user   120 Oct  5 17:43  text.tar.gz
drwxrwxr-x 2 user user  4096 Sep 28 19:38  tmp
-rw-rw-r-- 1 user user  1439 Oct  5 17:16 'url?sa=i'
drwxrwxr-x 3 user user  4096 Oct 13 07:31  var
-rw-rw-r-- 1 user user   634 Oct  5 17:16  wget-log
user@AC4892-Ubuntu:~$
```

When we remove the files hardlink decreases and the softlink turned to red

7. **Use find command to list /etc directory contents including only files with .conf extension and starting with letter l (small l, not capital I). Do not include files from subdirectories!**

```
user@AC4892-Ubuntu:~$ find /etc -maxdepth 1 -name "1*.conf"
```

8. **Below is a presentation of a directory structure where temperature data from sensors s1, s2 and s3 has been saved for log files under sensor specific directories. Create this directory structure with files. Important: Check the location of this directory structure within the Linux filesystem!**

```
user@AC4892-Ubuntu:~$ cd tmp
user@AC4892-Ubuntu:~/tmp$ mkdir sensors
user@AC4892-Ubuntu:~/tmp$ mkdir sensors/s1
user@AC4892-Ubuntu:~/tmp$ mkdir sensors/s2
user@AC4892-Ubuntu:~/tmp$ mkdir sensors/s3
```

```
user@AC4892-Ubuntu:~/tmp$ touch sensors/s1/temp.log
user@AC4892-Ubuntu:~/tmp$ touch sensors/s2/temp.log
user@AC4892-Ubuntu:~/tmp$ touch sensors/s3/temp.log
user@AC4892-Ubuntu:~/tmp$ tree sensors
sensors
├── s1
│   └── temp.log
├── s2
│   └── temp.log
└── s3
    └── temp.log

3 directories, 3 files
```

9. **Users user (regular user) and root have been marked for the directory presentation below. Create the following permissions: user can only access the first sensor's temp.log file and root has access to the whole directory structure. User should have adequate permissions for reading and editing the temp.log file.**

```
user@AC4892-Ubuntu:~/tmp$ sudo chown root:user -R sensors/s1
[sudo] password for user:
user@AC4892-Ubuntu:~/tmp$ sudo chown root:user -R sensors/s2
user@AC4892-Ubuntu:~/tmp$ sudo chown root:user -R sensors/s3
```

```
user@AC4892-Ubuntu:~/tmp$ sudo chmod o-rx sensors/s1
user@AC4892-Ubuntu:~/tmp$ sudo chmod o-rx sensors/s1/temp.log
user@AC4892-Ubuntu:~/tmp$
user@AC4892-Ubuntu:~/tmp$ sudo chmod o-rx sensors/s2
user@AC4892-Ubuntu:~/tmp$ sudo chmod o-rx sensors/s3
```

```
user@AC4892-Ubuntu:~/tmp$ ls -l sensors
total 12
drwxrwx--- 2 root user 4096 Oct 27 06:47 s
drwxrwx--- 2 root user 4096 Oct 27 06:48 s
drwxrwx--- 2 root user 4096 Oct 27 06:48 s
```