

Hard Links and Symbolic Links



What is a Hard link?

Each time we create a file with content in it, we are creating a hard link between the actual filename and the actual data stored on the filesystem, and this is the first hard link of every file on Linux. For creating an additional hard link we need first create a new filename pointed to the exact same data as the old filename that we talked about. This means that both of these files are pointing at the same data. For example, if we create a file `/home/ubuntu/hardlink_example` with this text in it **Hello, I have a hard link with this file**, then we have a single hard link between the file name `hardlink_exemple` and its content, and we can see that using this command:

```
ubuntu@gc-3118-web-01-1616627477:~$ ls -l
total 4
-rw-rw-r-- 1 ubuntu ubuntu 41 Apr  4 06:44 hardlink_example
```

Next, we create a new hard link in `/temp` to our exact same file using the following command:

```
ubuntu@gc-3118-web-01-1616627477:~$ ln hardlink_example new_hardlink
```

Syntax : `ln (original file path) (new file path)`

Now if we check will see that we have 2 hard links:

```
ubuntu@gc-3118-web-01-1616627477:~$ ls -l
total 12
-rw-rw-r-- 2 ubuntu ubuntu 41 Apr 4 06:44 hardlink_example
-rw-rw-r-- 2 ubuntu ubuntu 41 Apr 4 06:44 new_hardlink
drwxrwxr-x 2 ubuntu ubuntu 4096 Apr 4 06:59 temp
```

And we can see that the new file has the same data as our first file:

```
ubuntu@gc-3118-web-01-1616627477:~$ cat temp/new_hardlink
Hello, I have a hard link with this file
```

Also what we need to keep in mind that the changes made to one filename, the other reflect those changes. From permissions to link count, ownership ... but if the original file is deleted the second one will still remain in our directory.

Moreover, if we are unsure if two files have a hard link or no we can use the following command to check the *inode* number, where if those files have a hard link we will share the same *inode* code or number.

```
ubuntu@gc-3118-web-01-1616627477:~$ ls -li
258054 hardlink_example 258054 new_hardlink 258127 temp
```

As we can see in the example above the *inode* number is 258054 which is shared between our hard-linked files.

Symbolic links

They are also called soft links, for this type of link we don't have standard files but a file point at an existing other. And to create a new soft link we use the following command:

```
ubuntu@gc-3118-web-01-1616627477:~$ ln -s soft-link new_soft-link
```

Syntax: `ls -s (original file path to point to) (new file path)`

In the example above a create a file called soft-link with the content " I am a soft content " then i created the soft link with a new file called new_soft-link.

```
ubuntu@gc-3118-web-01-1616627477:~$ ls -l
total 0
lrwxrwxrwx 1 ubuntu ubuntu 9 Apr 4 07:24 new_soft-link -> soft-link
-rw-rw-r-- 1 ubuntu ubuntu 0 Apr 4 07:23 soft-link
```

As we can notice our link count doesn't change it is still 1 also the new_soft-link is pointing to our soft-link file. If we try to see what inside new_soft-link :

```
ubuntu@gc-3118-web-01-1616627477:~$ cat new_soft-link  
I am a soft content
```

We can see the same content we did put in our original file. But here if the original file is deleted the new file will be broken which called a *dangling soft link* situation.

Soft link VS Hard link

While hard links are useful and all, but it has its limitations like: they can only be created for regular files and not directories or special files, also it can span multiple filesystems. They need to be in the same file system. Soft links also have their drawbacks like data loss and data confusion when deleting the original file.

Conclusion

There is no best link type to use, the type that fits your particular situation is the right one for you, and from all what we talked about in this blog you need to keep in mind two simple notions :

- A **Hard link** always points a filename to data on the filesystem
- A **Soft link** always points a filename to another existing filename, which then points to the data in the filesystem.