

Lab No : 04
Name of the Lab : File Operation and Permission
ID : IT-16062

Objective:- The file system is the most obvious aspect of any OS. This provides users the method for storage and access to data as well as programs of the operating system.

At the end of this lab we will learn about how file operation and file permission works on linux operating system.

➤ **What is File Operation and File Permission in Linux Operating System?**

File Operation : A file is an abstract data type. For defining a file properly, we need to consider the operations that can be performed on files. The operating system can provide system calls to create, write, read, reposition, delete, and truncate files. There are six basic file operations within an Operating system. **These are:-**

- a) Creating a file
- b) Writing a file
- c) Reading a file
- d) Repositioning inside a file
- e) Deleting a file
- f) Truncating a file

File Permissions: Linux is a multi-user operating system, so it has security to prevent people from accessing each other's confidential files. Every file and directory in your UNIX/Linux system has following 3 permissions.

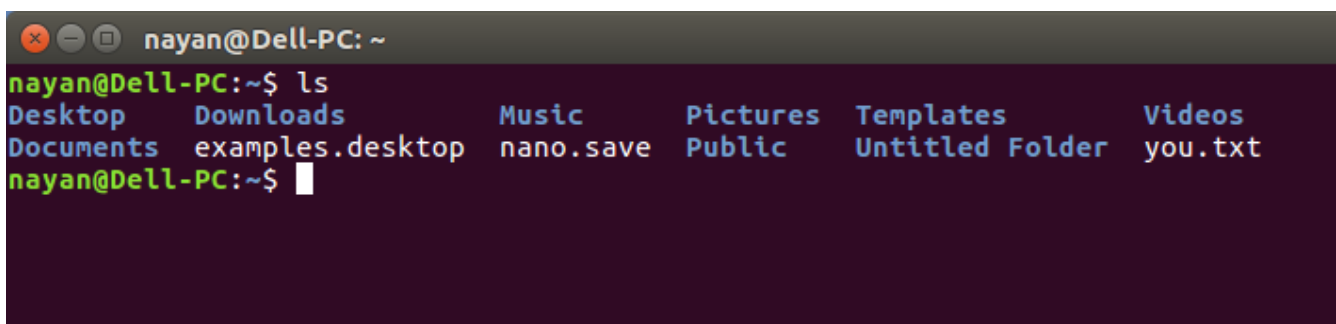
- ❖ **Read:** This permission gives us the authority to open and read a file. Read permission on a directory gives us the ability to lists its content.
- ❖ **Write:** The write permission gives us the authority to modify the contents of a file. The write permission on a directory gives us the authority to add, remove and rename files stored in the directory. Consider a scenario where we have to write permission on file but do not have write permission on the directory where the file is stored. We will be able to modify the file contents. But we will not be able to rename, move or remove the file from the directory.

- ❖ **Execute:** In Windows, an executable program usually has an extension ".exe" and which we can easily run. In Unix/Linux, we cannot run a program unless the execute permission is set. If the execute permission is not set, we might still be able to see/modify the program code(provided read & write permissions are set), but not run it.

➤ Implementation of File operation and permission:

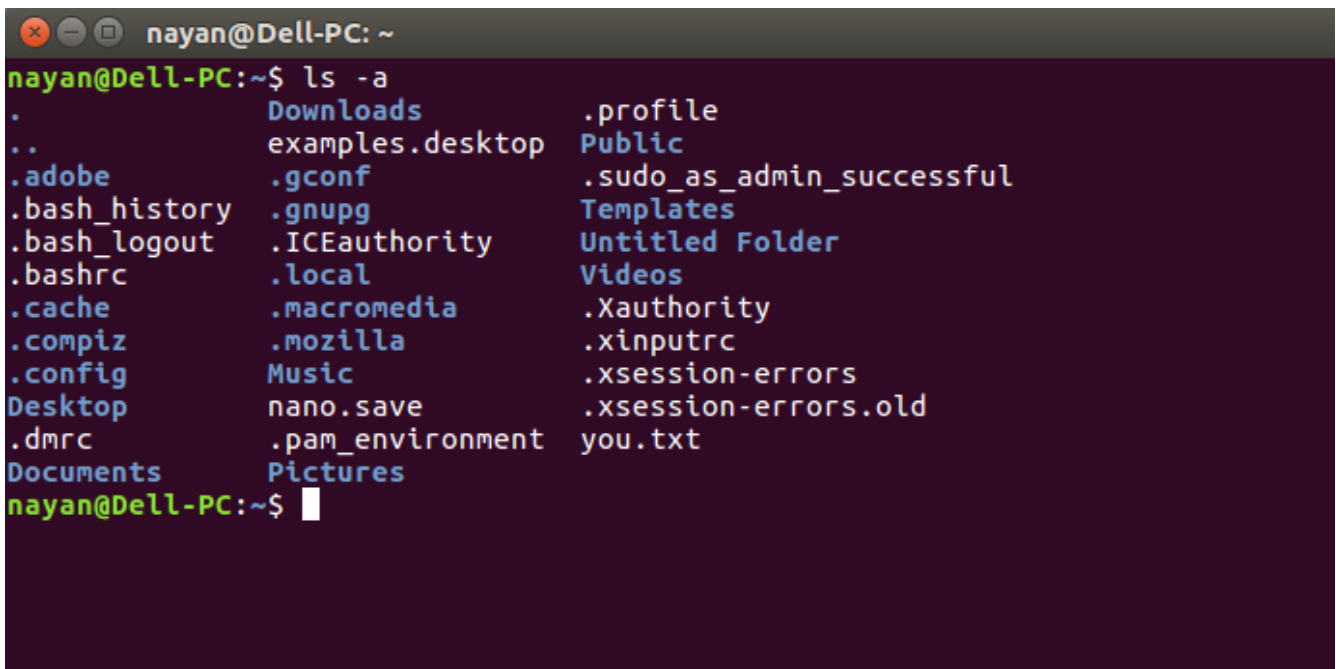
File operations :

(a) List directories and Files: \$ ls



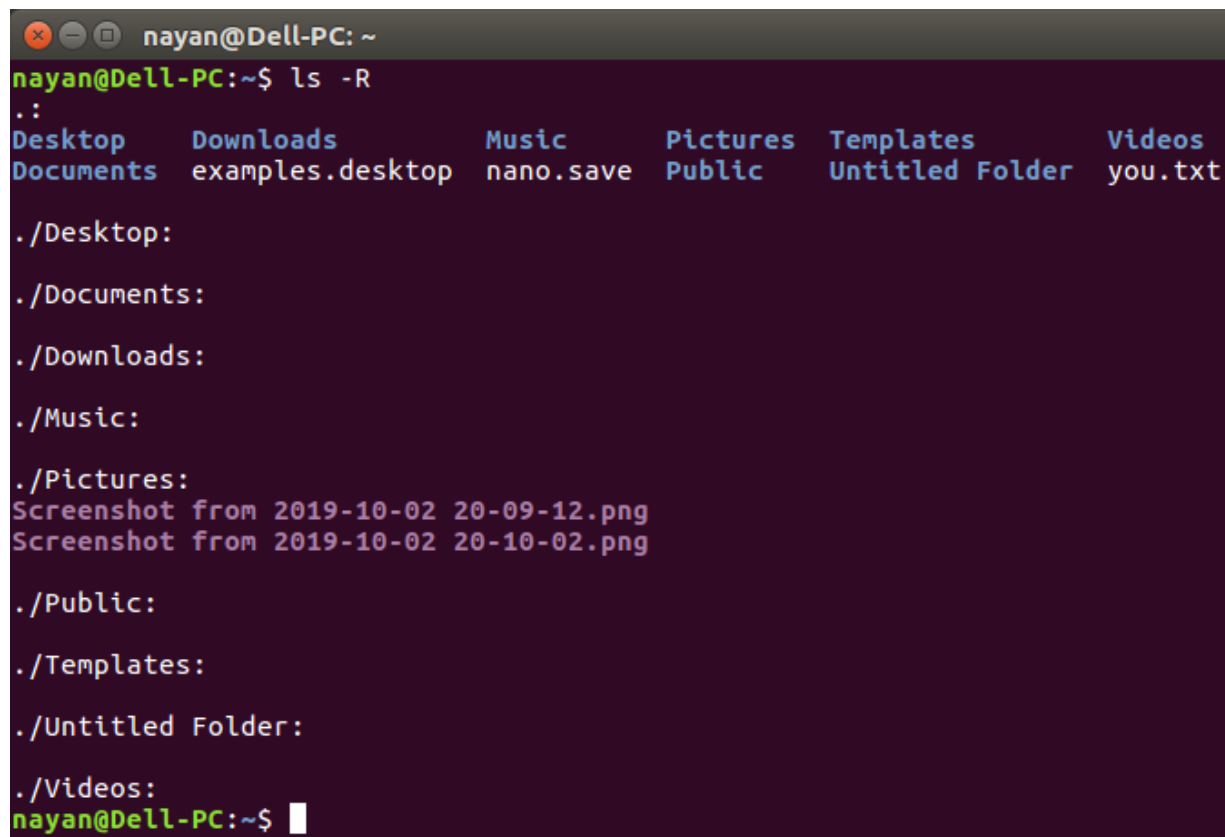
```
nayan@Dell-PC: ~  
nayan@Dell-PC:~$ ls  
Desktop      Downloads      Music          Pictures        Templates      Videos  
Documents    examples.desktop  nano.save      Public          Untitled Folder  you.txt  
nayan@Dell-PC:~$
```

(b) List hidden files and directories : \$ ls -a



```
nayan@Dell-PC: ~  
nayan@Dell-PC:~$ ls -a  
.          Downloads      .profile  
..         examples.desktop  Public  
.adobe     .gconf         .sudo_as_admin_successful  
bash_history  .gnupg         Templates  
bash_logout .ICEauthority  Untitled Folder  
bashrc      .local         Videos  
cache       .macromedia    .Xauthority  
compiz      .mozilla       .xinputrc  
config      Music          .xsession-errors  
Desktop     nano.save      .xsession-errors.old  
dmrc        .pam_environment  you.txt  
Documents   Pictures  
nayan@Dell-PC:~$
```

(c)List files and folders recursively : \$ ls -R



A terminal window titled 'nayan@Dell-PC: ~' showing the output of the 'ls -R' command. The output lists the current directory and its subdirectories: Desktop, Downloads, Music, Pictures, Templates, and Videos. Each subdirectory is then listed individually, showing its contents. For example, the 'Pictures' directory contains two screenshot files. The terminal ends with the prompt 'nayan@Dell-PC:~\$'.

```
nayan@Dell-PC: ~$ ls -R
.:
Desktop    Downloads  Music      Pictures   Templates  Videos
Documents  examples.desktop nano.save  Public     Untitled Folder  you.txt

./Desktop:

./Documents:

./Downloads:

./Music:

./Pictures:
Screenshot from 2019-10-02 20-09-12.png
Screenshot from 2019-10-02 20-10-02.png

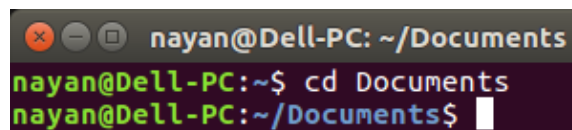
./Public:

./Templates:

./Untitled Folder:

./Videos:
nayan@Dell-PC:~$
```

(d)Change Directory : \$ cd can be used to change to the different directories.



A terminal window titled 'nayan@Dell-PC: ~/Documents' showing the execution of the 'cd Documents' command. The prompt changes from '~\$' to '~/Documents\$', indicating the current directory has been changed. The terminal ends with the prompt 'nayan@Dell-PC:~/Documents\$'.

```
nayan@Dell-PC: ~/Documents
nayan@Dell-PC:~$ cd Documents
nayan@Dell-PC:~/Documents$
```

(e)Go User Home Directory : \$ cd ~

```
nayan@Dell-PC: ~  
nayan@Dell-PC:~$ cd Documents  
nayan@Dell-PC:~/Documents$ cd ~  
nayan@Dell-PC:~$
```

(f) Go upper and Parent directory : \$ cd ..

```
nayan@Dell-PC: /home  
nayan@Dell-PC:~$ cd ..  
nayan@Dell-PC:/home$
```

(g)Go given Path : We can go to the log directory \$ cd /var/log

```
nayan@Dell-PC:/home$ cd /var/log  
nayan@Dell-PC:/var/log$
```

(h) create folder name and make home directory by using `mkdir folder name` and empty file delete by using `rmdir folder name`.

```
nayan@Dell-PC: ~/Linux
nayan@Dell-PC:~$ mkdir Linux
nayan@Dell-PC:~$ rmdir Linux
nayan@Dell-PC:~$ mkdir Linux
nayan@Dell-PC:~$ cd Linux
nayan@Dell-PC:~/Linux$ cat> nayan
i am nayan and i love to work on linux operating system
```

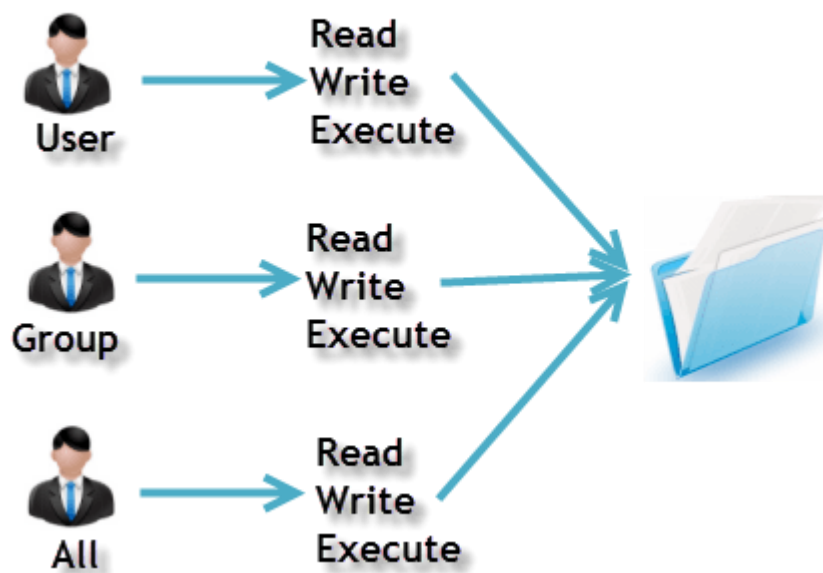
File Permissions: Linux being a multi-user system uses **permissions** and ownership for security. There are three user types on a **Linux** system. User, Group and Other. **Linux** divides the **file permissions** into read, write and execute denoted by r, w, and x.

Understanding the security permissions :

First, you must think of those nine characters as three sets of three characters (see the box at the bottom). Each of the three “**rwX**” characters refers to a different operation you can perform on the file.

---	---	---
rwX	rwX	rwX
user	group	other

Owners assigned Permission On Every File and Directory



The characters are easy to remember :

r = read permissions

w=write permission

x =execute permission

- = no permission



Let's see the `chmod` command in action.

```
Checking Current File Permissions
ubuntu@ubuntu:~$ ls -l sample
-rw-rw-r-- 1 ubuntu ubuntu 15 Sep  6 08:00 sample

chmod 764 and checking permissions again
ubuntu@ubuntu:~$ chmod 764 sample
ubuntu@ubuntu:~$ ls -l sample
-rwxrw-r-- 1 ubuntu ubuntu 15 Sep  6 08:00 sample
```

In the above-given terminal window, we have changed the permissions of the file 'sample' to '764'.



'764' absolute code says the following:

- ❖ Owner can read, write and execute
- ❖ Usergroup can read and write
- ❖ World can only read

Let's look into an example

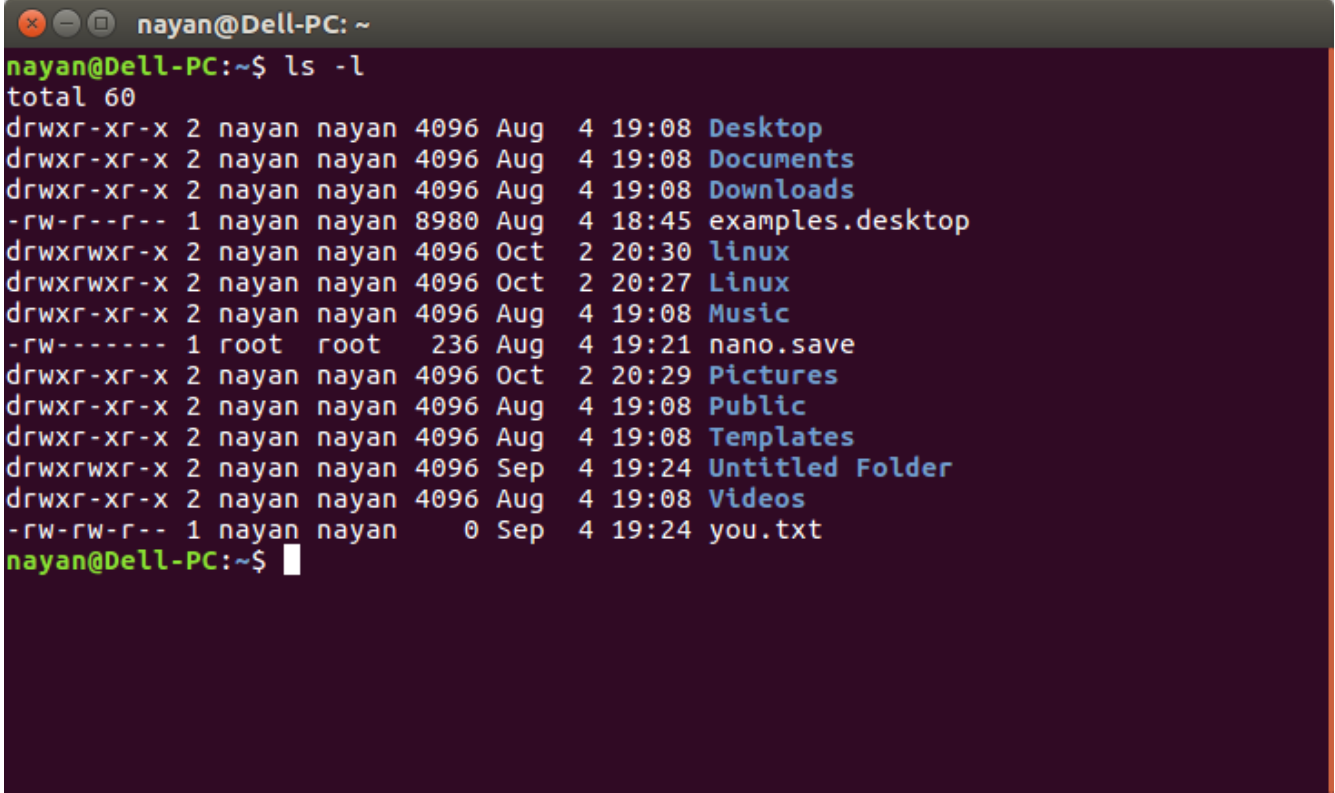
```
Current File Permissions
home@VirtualBox:~$ ls -l sample
-rw-rw-r-- 1 home home 55 2012-09-10 10:59 sample

Setting permissions to the 'other' users
home@VirtualBox:~$ chmod o=rwx sample
home@VirtualBox:~$ ls -l sample
-rw-rw-rwx 1 home home 55 2012-09-10 10:59 sample

Adding 'execute' permission to the usergroup
home@VirtualBox:~$ chmod g+x sample
home@VirtualBox:~$ ls -l sample
-rw-rwxrwx 1 home home 55 2012-09-10 10:59 sample

Removing 'read' permission for 'user'
home@VirtualBox:~$ chmod u-r sample
home@VirtualBox:~$ ls -l sample
--w-rwxrwx 1 home home 55 2012-09-10 10:59 sample
```

Adding permission:



```
nayan@Dell-PC: ~  
nayan@Dell-PC:~$ ls -l  
total 60  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Desktop  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Documents  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Downloads  
-rw-r--r-- 1 nayan nayan 8980 Aug  4 18:45 examples.desktop  
drwxrwxr-x 2 nayan nayan 4096 Oct  2 20:30 linux  
drwxrwxr-x 2 nayan nayan 4096 Oct  2 20:27 Linux  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Music  
-rw----- 1 root  root   236 Aug  4 19:21 nano.save  
drwxr-xr-x 2 nayan nayan 4096 Oct  2 20:29 Pictures  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Public  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Templates  
drwxrwxr-x 2 nayan nayan 4096 Sep  4 19:24 Untitled Folder  
drwxr-xr-x 2 nayan nayan 4096 Aug  4 19:08 Videos  
-rw-rw-r-- 1 nayan nayan    0 Sep  4 19:24 you.txt  
nayan@Dell-PC:~$
```

Conclusion :- File management system is very important part of any operating system. Linux is one of the most secured operating system available. In linux file operation and permission of any user is securely granted. We have learnt from today's lab that how linux does this two most important operation.