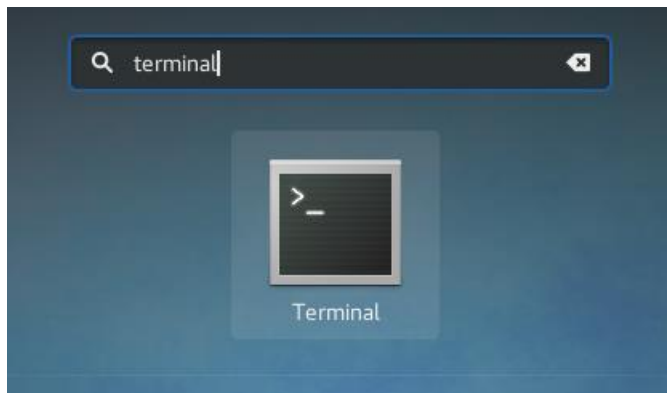


## Lab - Explore Linux Part II - Basic File and Directory Operations

In this lab, you will be introduced to some of the basics of file manipulation. You will create files and directories. You will copy and move files. You will use wildcards to specify multiple files. You will create symbolic links. You will delete files and directories. These are very common Steps for any user of a Linux operating system.

### Step 14

Open a terminal window by clicking on the Activities launcher and in the search bar, typing terminal. You will be logged in as **root** in root's home directory.



### Step 15

The `mkdir` command is used to make new directories. List the contents of the directory. Use the `mkdir` command to create a new directory called **testdir**. List the contents of the directory again, to verify that **testdir** was created.

### Answer

```
root@syberoffense:~  
File Edit View Search Terminal Help  
[root@syberoffense ~]# mkdir testdir  
[root@syberoffense ~]# ls  
anaconda-ks.cfg Documents hello.sh name.sh ps.sh Templates Videos  
Desktop Downloads Music Pictures Public testdir  
[root@syberoffense ~]#
```

Note: If the directories will not display at the root level, it's most likely a permissions user. Type `sudo -su` to view the contents of the root directory, you need to be the super user.

To remove the directory, we just created or any unwanted directory, we can use the `rm -rf` command.

```
root@syberoffense:~
File Edit View Search Terminal Help
[root@syberoffense ~]# rm -rf testdir
[root@syberoffense ~]# ls
anaconda-ks.cfg  Documents  file3      Music     Pictures  Public     Videos
Desktop          Downloads  hello.sh   name.sh   ps.sh     Templates
[root@syberoffense ~]#
```

## Step 16

Empty files can be created with the `touch` command. Change the directory to the new directory **testdir**. Create two new files that are named **file1** and **file2**. Use the `ls` command to verify that they were created.

## Answer

```
root@syberoffense:~/testdir
File Edit View Search Terminal Help
[root@syberoffense ~]# cd testdir
[root@syberoffense testdir]# touch file1
[root@syberoffense testdir]# touch file2
[root@syberoffense testdir]# ls
file1 file2
[root@syberoffense testdir]#
```

## Step 17

The `cp` command is used to copy files. Make a copy of **file1** that is called **file1-2**. Make a copy of **file2** that is named **file2-2**. Use the `ls` command to verify that there are now four files, as expected.

## Answer

```
root@syberoffense:~/testdir
File Edit View Search Terminal Help
[root@syberoffense testdir]# cp file1 file1-2
[root@syberoffense testdir]# cp file2 file2-2
[root@syberoffense testdir]# ls
file1 file1-2 file2 file2-2
[root@syberoffense testdir]#
```

## Step 18

Create a fifth file that is named **file-abc2**. Again, use the `ls` command to verify that it is created.

### Answer

```
root@syberoffense:~/testdir
File Edit View Search Terminal Help
[root@syberoffense testdir]# touch file-abc2
[root@syberoffense testdir]# ls
file1 file1-2 file2 file2-2 file-abc2
[root@syberoffense testdir]#
```

### Step 19

Wildcards are used to match multiple filenames. The `?` is a wildcard for any single character. The `*` is a wildcard for any number (including 0) of any character. Use the `?` wildcard to list the files with names that start with, file, then have a single character, then end with -2. Use the `*` wildcard to list all filenames that start with file and end with 2 and any set of characters between.

Note: You can use the `clear` command to clear the screen and get a fresh prompt.

### Answer

```
root@syberoffense:~/testdir
File Edit View Search Terminal Help
[root@syberoffense testdir]# ls file?-2
file1-2 file2-2
[root@syberoffense testdir]# ls file*2
file1-2 file2 file2-2 file-abc2
[root@syberoffense testdir]#
```

### Step 20

Files can be moved with the `mv` command. The files can simply be moved to a new name, or they can be moved to a new directory. First, use the `mv` command to rename **file-abc2** to **file3**. Use the `ls` command to verify the results.

### Answer

```
root@syberoffense:~/testdir
File Edit View Search Terminal Help
[root@syberoffense testdir]# mv file-abc2 file3
[root@syberoffense testdir]# ls
file1 file1-2 file2 file2-2 file3
[root@syberoffense testdir]#
```

## Step 21

\*Use the `clear` command to clear the screen

Now move the file that is named **file3** to the current working directory's parent directory. Use the `ls` command to verify that the file is no longer present in **testdir**. Change back to the root home directory and use the `ls` command to verify that **file3** is now in this directory.

## Answer

```
root@syberoffense:~
File Edit View Search Terminal Help
[root@syberoffense testdir]# mv file3 ..
[root@syberoffense testdir]# ls
file1 file1-2 file2 file2-2
[root@syberoffense testdir]# cd ..
[root@syberoffense ~]# ls
anaconda-ks.cfg  Documents  file3      Music      Pictures  Public     testdir
Desktop          Downloads  hello.sh   name.sh    ps.sh     Templates  Videos
[root@syberoffense ~]#
```

## Step 22

Symbolic links allow a file in remote directories to be referenced in alternate directories. The `ln -s` command is used to create symbolic links. Create a symbolic link for the file that is named **file1** in **testdir** in the current working directory. Use the `ls` command to verify that the link has been created. Use `ls -l` (dash lower-case, L) to verify creation of the link. The `-l` argument will list the directory in long format, where it becomes apparent that **link1** is a symbolic link and not a file.

## Answer

```
root@syberoffense:~  
File Edit View Search Terminal Help  
[root@syberoffense ~]# ln -s testdir/file1 link1  
[root@syberoffense ~]# ls  
anaconda-ks.cfg Downloads link1 Pictures Templates  
Desktop file3 Music ps.sh testdir  
Documents hello.sh name.sh Public Videos  
[root@syberoffense ~]# ls -l  
total 52  
-rw----- 1 root root 1301 Jun  5 16:58 anaconda-ks.cfg  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Desktop  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Documents  
drwxr-xr-x. 3 root root 4096 Sep  1 17:31 Downloads  
-rw-r--r-- 1 root root   0 Oct  9 16:32 file3  
-rwxr--r-- 1 root root 162 Oct  3 20:01 hello.sh  
lrwxrwxrwx. 1 root root  13 Oct  9 16:47 link1 -> testdir/file1  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Music  
-rwxr--r-- 1 root root 286 Oct  3 20:27 name.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Pictures  
-rwxr--r-- 1 root root 143 Oct  3 20:16 ps.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Public  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Templates  
drwxr-xr-x. 2 root root 4096 Oct  9 16:43 testdir  
drwxr-xr-x. 3 root root 4096 Sep  3 17:05 Videos  
[root@syberoffense ~]#
```

## Step 23

\*Use the `clear` command to clear the screen

The `rm` command is used to remove files. Remove the file that is named **file3**. Use the `ls` command to verify that the file no longer exists.

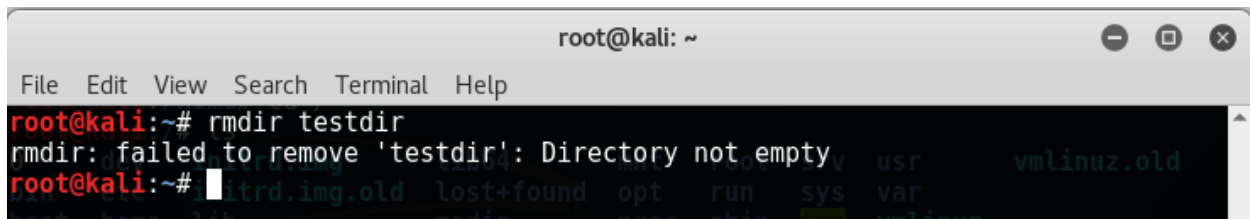
## Answer

```
root@syberoffense:~  
File Edit View Search Terminal Help  
[root@syberoffense ~]# rm file3  
rm: remove regular empty file 'file3'? y  
[root@syberoffense ~]# ls  
anaconda-ks.cfg Documents hello.sh Music Pictures Public testdir  
Desktop Downloads link1 name.sh ps.sh Templates Videos  
[root@syberoffense ~]#
```

## Step 24

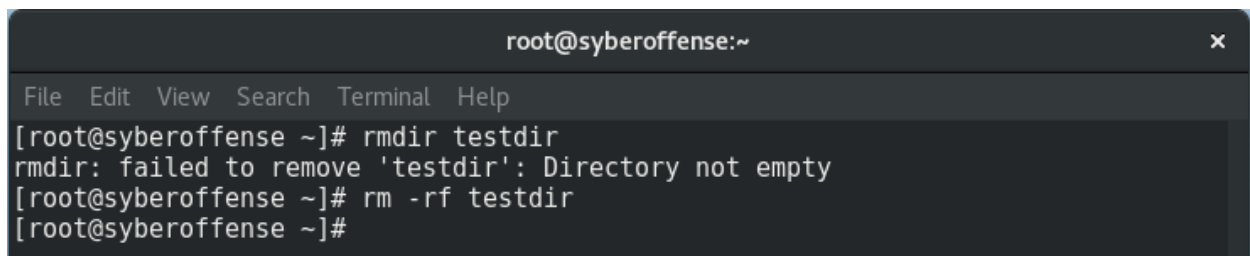
The `rmdir` command is used to remove directories. Attempts to remove the directory that is named **testdir** will fail.

## Answer

A terminal window titled 'root@kali: ~' with a menu bar (File, Edit, View, Search, Terminal, Help). The command 'rmdir testdir' is entered, and the output is 'rmdir: failed to remove 'testdir': Directory not empty'. The prompt is now 'root@kali:~#'.

```
root@kali:~# rmdir testdir
rmdir: failed to remove 'testdir': Directory not empty
root@kali:~#
```

To remove a directory with contents, you can use the `rm -rf` command.

A terminal window titled 'root@syberoffense:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The command 'rmdir testdir' is entered and fails with the message 'rmdir: failed to remove 'testdir': Directory not empty'. Then, the command 'rm -rf testdir' is entered and succeeds. The prompt is now 'root@syberoffense ~#'.

```
root@syberoffense:~# rmdir testdir
rmdir: failed to remove 'testdir': Directory not empty
root@syberoffense ~# rm -rf testdir
root@syberoffense ~#
```

## Step 25

The `rmdir` command can only work on empty directories. Use the `rm` command to delete all the files in the **testdir** directory. Use `ls` to verify that the directory is now empty. Now remove the **testdir** directory using the `rmdir` command. Use the `ls` command to verify that **testdir** has been removed.

## Answer

```
root@syberoffense:~  
File Edit View Search Terminal Help  
[root@syberoffense ~]# rmdir testdir  
rmdir: failed to remove 'testdir': Directory not empty  
[root@syberoffense ~]# rm -rf testdir  
[root@syberoffense ~]# ls -l  
total 48  
-rw----- 1 root root 1301 Jun  5 16:58 anaconda-ks.cfg  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Desktop  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Documents  
drwxr-xr-x. 3 root root 4096 Sep  1 17:31 Downloads  
-rwxr--r-- 1 root root 162 Oct  3 20:01 hello.sh  
lrwxrwxrwx. 1 root root 13 Oct  9 16:47 link1 -> testdir/file1  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Music  
-rwxr--r-- 1 root root 286 Oct  3 20:27 name.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Pictures  
-rwxr--r-- 1 root root 143 Oct  3 20:16 ps.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Public  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Templates  
drwxr-xr-x. 3 root root 4096 Sep  3 17:05 Videos  
[root@syberoffense ~]#
```

Note the following:

- The directory **testdir** is, indeed, removed.
- The link to **file1** in **testdir** is not removed. It is colored red in the `ls -l` output, indicating that the link is no longer valid.
- An alternative to removing all the files in a directory and then using the `rmdir` command to remove the directory is to remove files recursively. The command `rm -rf testdir` would have removed all the contents of the directory **testdir**, and then removed the directory itself, which works with nested directory structures as well. Care must be used with recursive removes.

## Step 26

Use the `rm` command to remove the now orphaned link that is named **link1**. Use the `ls` command to verify that it has been removed.

## Answer

```
root@syberoffense:~  
File Edit View Search Terminal Help  
[root@syberoffense ~]# rm link1  
rm: remove symbolic link 'link1'? y  
[root@syberoffense ~]# ls  
anaconda-ks.cfg  Documents  hello.sh  name.sh  ps.sh  Templates  
Desktop          Downloads  Music     Pictures  Public  Videos  
[root@syberoffense ~]# ls -l  
total 48  
-rw-----. 1 root root 1301 Jun  5 16:58 anaconda-ks.cfg  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Desktop  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Documents  
drwxr-xr-x. 3 root root 4096 Sep  1 17:31 Downloads  
-rwxr--r--. 1 root root 162 Oct  3 20:01 hello.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Music  
-rwxr--r--. 1 root root 286 Oct  3 20:27 name.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Pictures  
-rwxr--r--. 1 root root 143 Oct  3 20:16 ps.sh  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Public  
drwxr-xr-x. 2 root root 4096 Jun  5 17:06 Templates  
drwxr-xr-x. 3 root root 4096 Sep  3 17:05 Videos  
[root@syberoffense ~]#
```

## Summary

In this lab, you were introduced to the basics of file and directory operations. These are some of the most fundamental skills every Linux user needs to know. A major take away for this lab should be there is more than one way to complete any Linux task. The great thing about Linux is how well everything is documented and how well the Linux community comes together to provide a solution. Let Google be a job saver!

End of the lab!