5 ‘chattr’ Commands to Make Important Files IMMUTABLE (Unchangeable) in Linux

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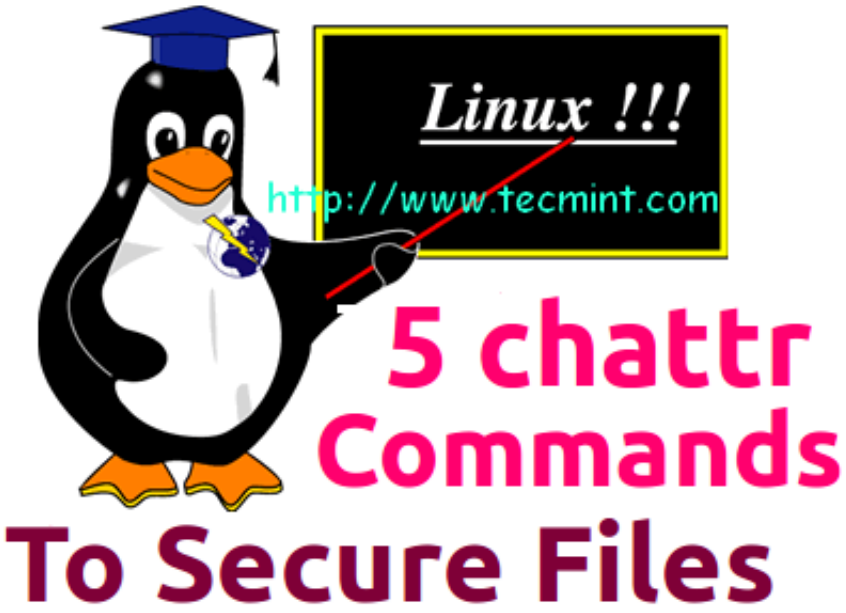
chattr (Change Attribute) is a command line Linux utility that is used to set/unset certain attributes to a file in Linux system to secure accidental deletion or modification of important files and folders, even though you are logged in as a root user.

In Linux native filesystems i.e. ext2, ext3, ext4, btrfs, etc. supports all the flags, though all the flags won’t support to all non-native FS. One cannot delete or modify file/folder once attributes are sets with chattr command, even though one have full permissions on it.



5 chattr command examples

This is very useful to set attributes in system files like passwd and shadow files wherein user's info are contains.

Syntax of chattr

```
# chattr [operator] [flags] [filename]
```

Attributes and Flags

Following are the list of common attributes and associated flags can be set/unset using the chattr command.

- If a file is accessed with 'A' attribute set, its atime record is not updated.
- If a file is modified with 'S' attribute set, the changes are updates synchronously on the disk.
- A file is set with 'a' attribute, can only be open in append mode for writing.
- A file is set with 'i' attribute, cannot be modified (immutable). Means no renaming, no symbolic link creation, no execution, no writable, only superuser can unset the attribute.
- A file with the 'j' attribute is set, all of its information updated to the

ext3 journal before being updated to the file itself.
- A file is set with ‘t‘ attribute, no tail-merging.
- A file with the attribute ‘d‘, will no more candidate for backup when the dump process is run.
- When a file has ‘u‘ attribute is deleted, its data are saved. This enables the user to ask for its undeletion.

Operator

- + : Adds the attribute to the existing attribute of the files.
- - : Removes the attribute to the existing attribute of the files.
- = : Keep the existing attributes that the files have.

Here, we are going to demonstrate some of the chattr command examples to set/unset attributes to a file and folders.

1. How to add attributes on files to secure from deletion

For demonstration purpose, we’ve used folder demo and file important_file.confrespectively. Before setting up attributes, make sure to verify that the existing files have any attributes set using ‘ls -l‘ command. Did you see the results, currently no attribute are set.

```
[root@tecmint tecmint]# ls -l
total 0
drwxr-xr-x. 2 root root 6 Aug 31 18:02 demo
-rwxrwxrwx. 1 root root 0 Aug 31 17:42 important_file.co
nf
```

To set attribute, we use the + sign and to unset use the - sign with the chattr command. So, let’s set immutable bit on the files with +i flags to prevent anyone from deleting a file, even a root user don’t have permission to delete it.

```
[root@tecmint tecmint]# chattr +i demo/
[root@tecmint tecmint]# chattr +i important_file.conf
```

Note: The immutable bit +i can only be set by superuser (i.e root) user or a user with sudo privileges can able to set.

After setting immutable bit, let's verify the attribute with command 'lsattr'.

```
[root@tecmint tecmint]# lsattr
----i----------- ./demo
----i----------- ./important_file.conf
```

Now, tried to delete forcefully, rename or change the permissions, but it won't allowed says "Operation not permitted".

```
[root@tecmint tecmint]# rm -rf demo/
rm: cannot remove âdemo/â: Operation not permitted
```

```
[root@tecmint tecmint]# mv demo/ demo_alter
mv: cannot move âdemo/â to âdemo_alterâ: Operation not p
ermitted
```

```
[root@tecmint tecmint]# chmod 755 important_file.conf
chmod: changing permissions of âimportant_file.confâ: Op
eration not permitted
```

2. How to unset attribute on Files

In the above example, we've seen how to set attribute to secure and prevent files from a accidental deletion, here in this example, we will see how to reset (unset attribute) permissions and allows to make a files changeable or alterable using -iflag.

```
[root@tecmint tecmint]# chattr -i demo/ important_file.c
onf
```

After resetting permissions, verify the immutable status of files using ‘lsattr‘ command.

```
[root@tecmint tecmint]# lsattr
---------------- ./demo
---------------- ./important_file.conf
```

You see in the above results that the ‘-i‘ flag removed, that means you can safely remove all the file and folder reside in tecmint folder.

```
[root@tecmint tecmint]# rm -rf *

[root@tecmint tecmint]# ls -l
total 0
```

3. How to Secure /etc/passwd and /etc/shadow files

Setting immutable attribute on files /etc/passwd or /etc/shadow, makes them secure from an accidental removal or tamper and also it will disable user account creation.

```
[root@tecmint tecmint]# chattr +i /etc/passwd
[root@tecmint tecmint]# chattr +i /etc/shadow
```

Now try to create a new system user, you will get error message saying ‘cannot open /etc/passwd‘.

```
[root@tecmint tecmint]# useradd tecmint
useradd: cannot open /etc/passwd
```

This way you can set immutable permissions on your important files or system configuration files to prevent from deletion.

4. Append data without Modifying existing data on a File

Suppose, you only want to allow everyone to just append data on a file without changing or modifying already entered data, you can use the ‘a‘ attribute as follows.

```
[root@tecmint tecmint]# chattr +a example.txt

[root@tecmint tecmint]# lsattr example.txt
-----a---------- example.txt
```

After setting append mode, the file can be opened for writing data in append mode only. You can unset the append attribute as follows.

```
[root@tecmint tecmint]# chattr -a example.txt
```

Now try to replace already existing content on a file example.txt, you will get error saying ‘Operation not permitted‘.

```
[root@tecmint tecmint]# echo "replace contain on file."
> example.txt
-bash: example.txt: Operation not permitted
```

Now try to append new content on a existing file example.txt and verify it.

```
[root@tecmint tecmint]# echo "replace contain on file."
>> example.txt
```

```
[root@tecmint tecmint]# cat example.txt
Here is the example to test 'a' attribute mean append on
ly.
replace contain on file.
```

5. How to Secure Directories

To secure entire directory and its files, we use ‘-R‘ (recursively) switch with ‘+i‘ flag along with full path of the folder.

```
[root@tecmint tecmint]# chattr -R +i myfolder
```

After setting recursively attribute, try to delete the folder and its files.

```
[root@tecmint tecmint]# rm -rf myfolder/
rm: cannot remove 'myfolder/': Operation not permitted
```

To unset permission, we use same ‘-R’ (recursively) switch with ‘-i’ flag along with full path of the folder.

```
[root@tecmint tecmint]# chattr -R -i myfolder
```

That’s it! To know more about chattr command attributes, flags and options use the man pages.