

# Inode

## Introduction

### Hard Disk Partitions :

- Standard Hard Disk has 4 Primary Partitions And We Can turn one of them into extended Partition (can be divided into number of logical partitions works as a container)
- The main difference between Extended and Primary Partition that there is Some Operating Systems must be installed on Primary partition like windows , unix ...etc.

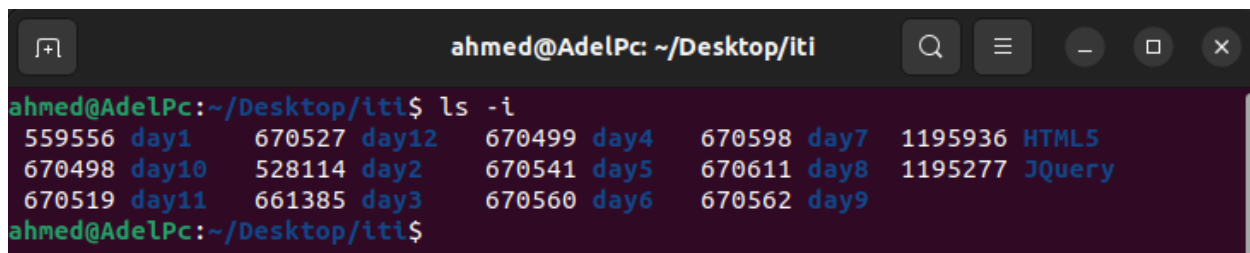
## Definition

- Linux see all files as numbers called “inodes” , or index nodes each number is unique for each partition.
- within each filesystem is and inode table , in which all of the used inodes are mapped to particular files .

The information stored in this table for each entry includes the following:

- 1 - the type of the file .
- 2 - the file`s permissions .
- 3 - the group owner`s GID.
- 4 - the number of links .
- 5 - the file owner`s user ID.
- 6 - when the file was created .
- 7 - when the file was last changed .
- 8 - when the file was last accessed .
- 9 - where the file is on the media .

Example for how to know inode number for a file



```
ahmed@AdelPc: ~/Desktop/iti
ahmed@AdelPc:~/Desktop/iti$ ls -li
559556 day1      670527 day12    670499 day4     670598 day7     1195936 HTML5
670498 day10    528114 day2     670541 day5     670611 day8     1195277 JQuery
670519 day11    661385 day3     670560 day6     670562 day9
```

## Soft Links (Symbolic Link)

- New entry is made to the inode table for the link .
- The content of this entry is the path to the original file .
- this allows you to use symbolic links across partition boundaries
- if you delete the original file , you end up with an “orphaned link”
- every command u make on soft link it applied to the original file but remove command .
- the best permission for soft link to work perfectly is rwxrwxrwx .
- **Disadvantages** the soft link and the original file have different inode numbers , so you may run out of inode numbers If you create more soft links then you will have to recreate your filesystem with special options to increase the number of inodes.

## Creating Soft Link

```
ahmed@AdelPC: ~/Desktop
ahmed@AdelPC:~$ touch ~/Music/testFile
ahmed@AdelPC:~$ ln -s ~/Music/testFile ~/Desktop/testFileSoft
ahmed@AdelPC:~$ cd Desktop
ahmed@AdelPC:~/Desktop$ ls -l
total 20
drwxr-xr-x  3 ahmed ahmed 4096 May 31 18:26 Ahmed_Adel
-rwxr-xr-x  1 ahmed ahmed  319 Jun 22 17:08 brave-cifhbcnohmdccbgoicgdjpfamggdegmo-Default.desktop
-rwxr-xr-x  1 ahmed ahmed  316 Jun 22 17:09 brave-hnpfjngllnobngcgfapefoaidbinmjnm-Default.desktop
-rwxr-xr-x  1 ahmed ahmed  316 Jun 25 20:07 brave-kippjfofjhjlfjecoapiogbkgbpmgej-Default.desktop
drwxr-xr-x 16 ahmed ahmed 4096 Jul  6 20:04 itl
lrwxrwxrwx  1 ahmed ahmed   26 Jul  6 20:14 testFileSoft -> /home/ahmed/Music/testFile
ahmed@AdelPC:~/Desktop$

ahmed@AdelPC:~/Desktop$ ls -li testFileSoft ~/Music/testFile
561084 -rw-rw-r-- 1 ahmed ahmed  0 Jul  6 20:13 /home/ahmed/Music/testFile
561062 lrwxrwxrwx 1 ahmed ahmed 26 Jul  6 20:14 testFileSoft -> /home/ahmed/Music/testFile
ahmed@AdelPC:~/Desktop$ cat ~/Music/testFile
I Love Linux
we Hate Windows

ahmed@AdelPC:~/Desktop$ cat Desktop/testFileSoft
cat: Desktop/testFileSoft: No such file or directory
ahmed@AdelPC:~/Desktop$ cat testFileSoft
I Love Linux
we Hate Windows

ahmed@AdelPC:~/Desktop$
```

## Hard Links

- Each hard-linked file is assigned to the same inode value as the origins file, indicating that they point to  
The same physical location on the disk .

```
ahmed@AdelPC:~/Desktop$ ln ~/Music/testFile testFileHard
ahmed@AdelPC:~/Desktop$ ls -li ~/Music/testFile testFileHard testFileSoft
561071 -rw-rw-r-- 2 ahmed ahmed 30 Jul  6 20:17 /home/ahmed/Music/testFile
561071 -rw-rw-r-- 2 ahmed ahmed 30 Jul  6 20:17 testFileHard
561062 lrwxrwxrwx 1 ahmed ahmed 26 Jul  6 20:14 testFileSoft -> /home/ahmed/Music/testFile
ahmed@AdelPC:~/Desktop$ rm ~/Music/testFile
ahmed@AdelPC:~/Desktop$ ls -li ~/Music/testFile testFileHard testFileSoft
ls: cannot access '/home/ahmed/Music/testFile': No such file or directory
561071 -rw-rw-r-- 1 ahmed ahmed 30 Jul  6 20:17 testFileHard
561062 lrwxrwxrwx 1 ahmed ahmed 26 Jul  6 20:14 testFileSoft -> /home/ahmed/Music/testFile
ahmed@AdelPC:~/Desktop$ cat testFileSoft
cat: testFileSoft: No such file or directory
ahmed@AdelPC:~/Desktop$ cat testFileHard
I Love Linux
we Hate Windows

ahmed@AdelPC:~/Desktop$
```

```
ahmed@AdelPc:~/Desktop$ mkdir testdir
ahmed@AdelPc:~/Desktop$ ls -ld testdir
drwxrwxr-x 2 ahmed ahmed 4096 Jul  6 20:35 testdir
ahmed@AdelPc:~/Desktop$ ls -la testdir
.  ..
ahmed@AdelPc:~/Desktop$ mkdir testdir/dir1
ahmed@AdelPc:~/Desktop$ ls -ld testdir
drwxrwxr-x 3 ahmed ahmed 4096 Jul  6 20:36 testdir
ahmed@AdelPc:~/Desktop$
```

No of the links by Default is 2 For Directory if Empty .