Summary :

- Background

    The filesystems : How your system knows where your last Game of Thrones episode is ?

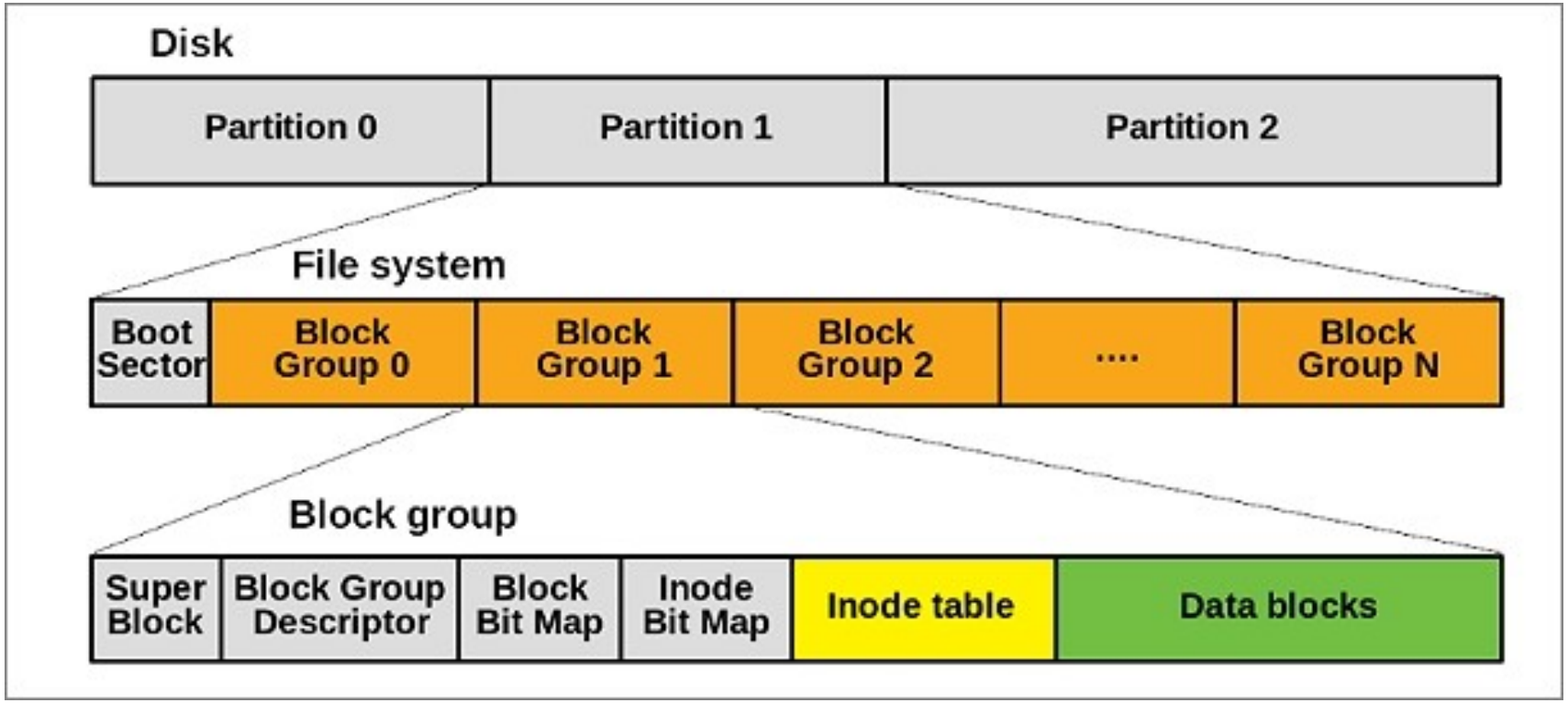
    Exemple of the ext2 filesystem

- Tips and tricks !

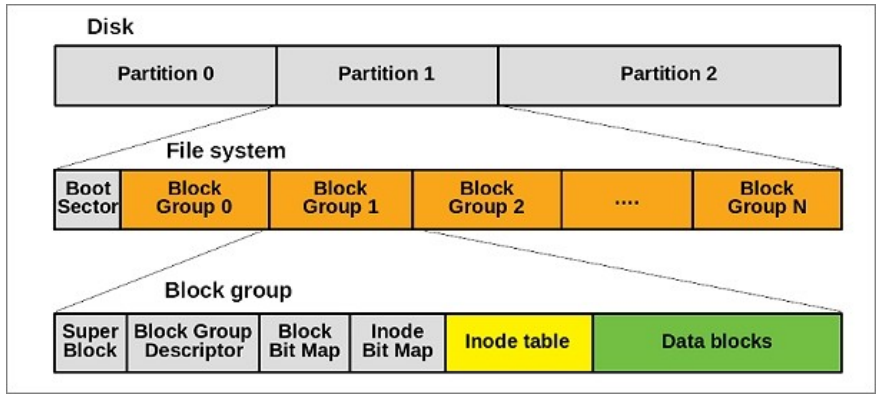
- Continue the labs

How is it possible for the system to store, write, retrieve data from the hard disk ?

How the filesystem is divided ?



Filesystem partitions are divided into a Boot sector (where the MBR is located) and Block groups



Each block groups are divided into severals blocks or groups

Inode : metadata and pointers to data blocks for each files

Super Block

The Superblock contains a description of the basic size and shape of this file system, which contains for instance Block Size, Blocks per Group, Free Blocks, Free Inodes…

Block Group Descriptor

In the blocks immediately following the super-block reside the list of block-group descriptors. This list contains a **descriptor for each block group (block and inode bit maps, inode table…)** on the disk.

Block and Inode Bit Maps

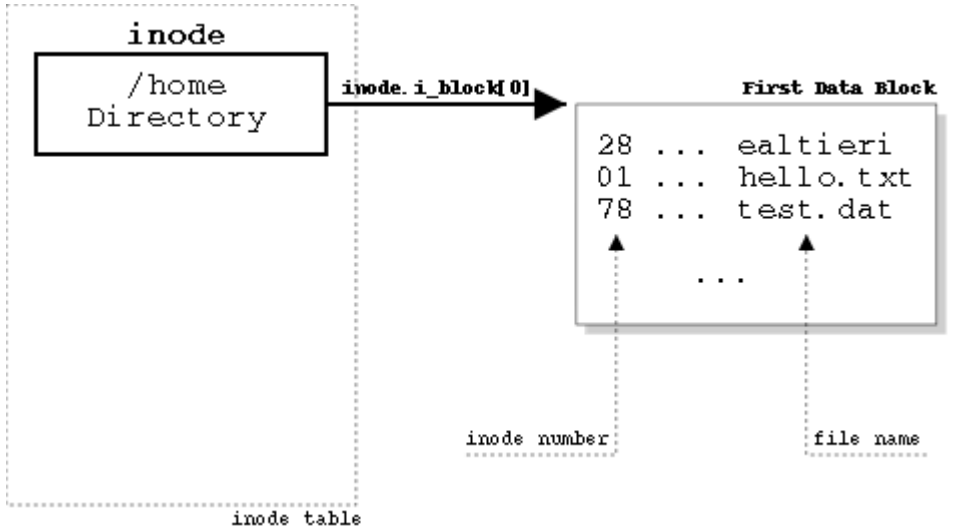
A bitmap is a **sequence of bits**. Each bit represents a specific block (blocks bitmap) or inode (inode bitmap) in the block group. A bit value of **0 indicates that the block/inode is free**, while a value of **1 indicates that the block/inode is being used**. A bitmap always refers to the block-group it belongs to, and its size must fit in one block.

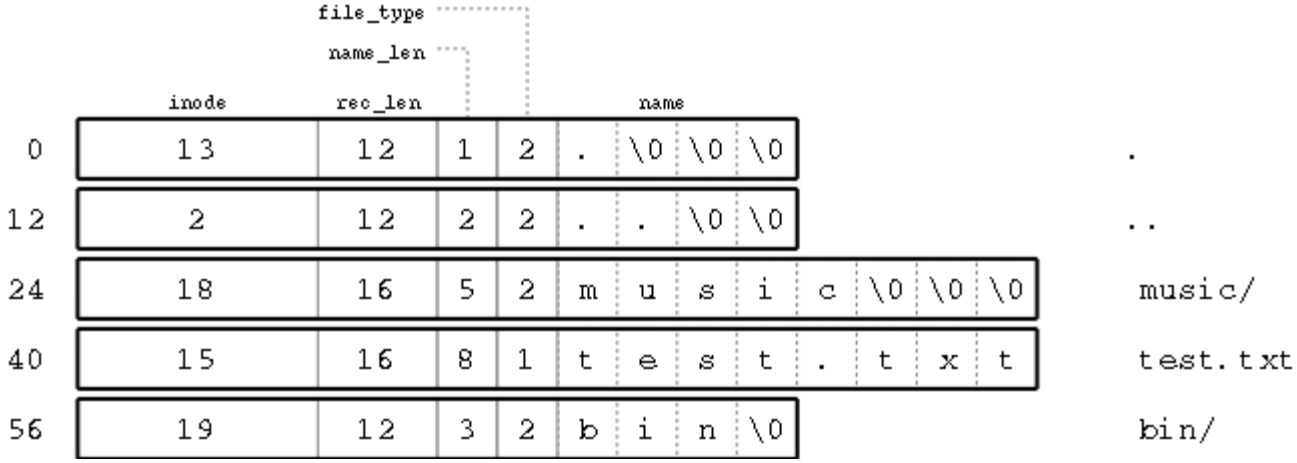
If the block size is 4096 bytes, since 1 byte is 8 bits, how many blocks can a block map can address ?

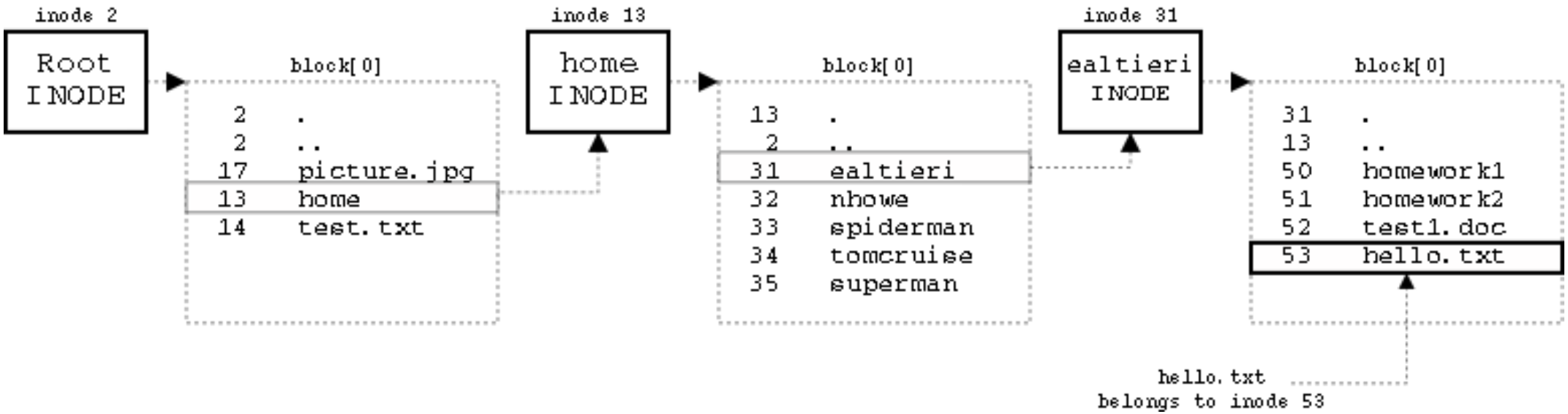
Inode table

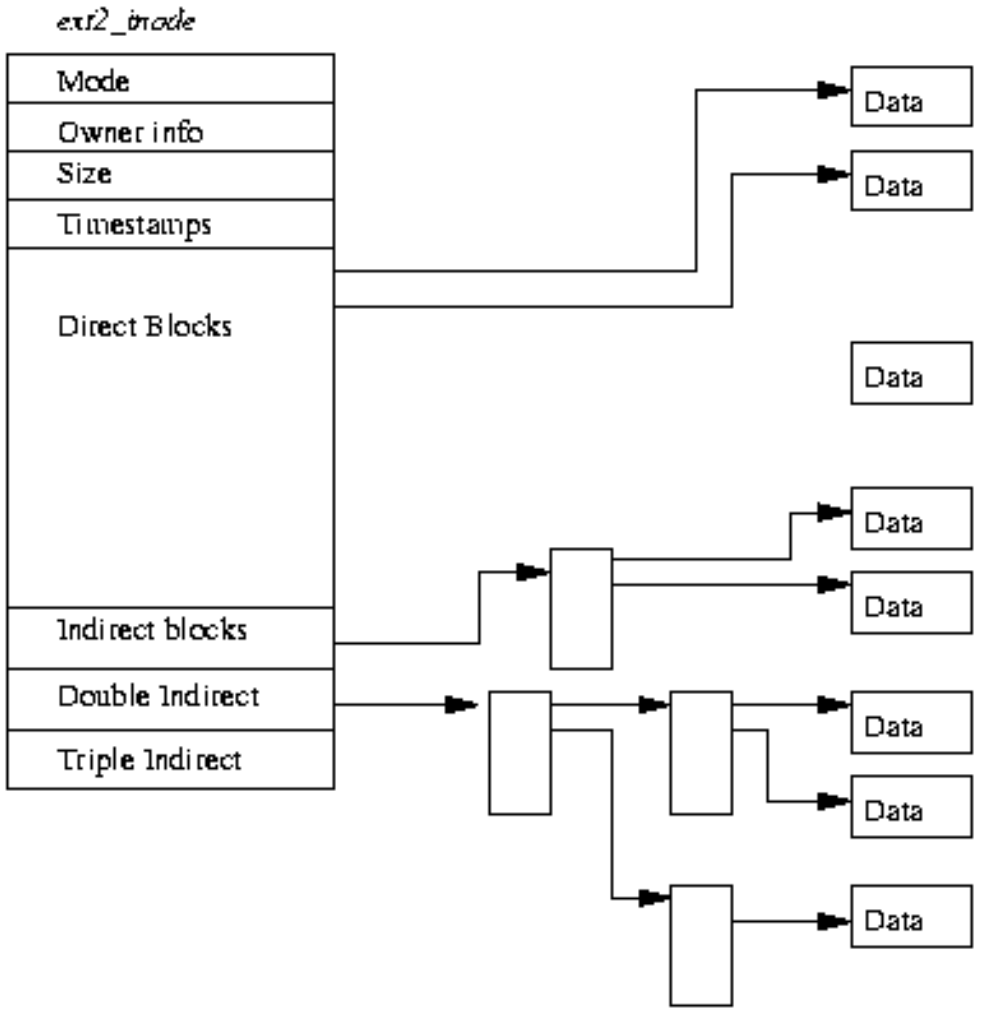
The inode table consists of a series of consecutive blocks, each of which contains a predefined number of inodes.

The inode table contains everything the operating system needs to know about a file, including the type of file, permissions, owner, and, most important, where its data blocks are located on disk.






inode 2
Root
INODE
block[0]
2 .
2 ..
17 picture.jpg
13 home
14 test.txt
inode 13
home
INODE
block[0]
13 .
2 ..
31 ealtieri
32 nhowe
33 spiderman
34 tomcruise
35 superman
inode 31
ealtieri
INODE
block[0]
31 .
13 ..
50 homework1
51 homework2
52 test1.doc
53 hello.txt
hello.txt
belongs to inode 53



Mode : What does this inode describe and the permissions that users have to it

Owner : The user and group identifiers of the owners of this file or directory.

Size :

Timestamps : The time that the inode was created and the last time that it was modified

Blocks : The actual data blocks of the file

You can see system information with : `sudo tune2fs -l /dev/sda1`

- Use Tab for autocompletion

- *CTRL* + *L* to clean the terminal

- Switch back to the previous working directory : *cd -*

- Alias could be use to simplify some commands : *alias cdh='cd $HOME'*

- To stop a command (in an infinite loop for instance), you can do *CTRL* + *c*

- To know where is a command or an application : *whereis <command>*

You can continue the labs!