File system is nothing but a software

To understand the working of file system we need understanding of

* **Data structures** 
  + what type of DS are maintained on-disk?
  + more sophisticated file systems, like SGI’s XFS, use more complicated **tree-based** structures
* **Access methods**
  + How does it map the calls made by a process, such as open (), read (), write (), etc., onto its structures?
  + Which structures are read during the execution of a particular system call?
  + Which are written?
  + How efficiently are all these steps performed?

**OVERALL ORGANIZATION**

Text

Description automatically generated

* We divide disk into **blocks of 4KB size**
* Most of the space in file system should be **user data (56 blocks here)**
* Inodes contain the metadata about the region
* Inodes stores information about
  + Which data regions is the file contained?
  + Owner etc.,
* Inode table contains all inodes
* For 64 block disk, block size of 4KB, inodes of 256B, and allocating 5 blocks out of 64 blocks for inodes, we can have 80 inodes and this represents maximum number of files in this file system
* We also need to maintain, which Inode and data blocks are free, and we use **bit map** to signify free data and inode blocks
* The first block signifies **super block** which contains
  + how many inodes and data blocks are there
  + where inode table starts
  + Which file system it is
* When OS mounts a FS, it will read super block and initialize various params and attaches a volume so that whenever an access in that volume it will know how to handle it

**INODE**

* **Index node**
  + Name comes from the fact that earlier these nodes were in array and the array was **indexed** to access file
  + The inode number is used to index into an array of on-disk inodes to find the inode of that number.
  + Each Inode has i number which is the low-level name of the file
  + Given inode number, we need to calculate its exact address from inode table starting address
    - Inode table start address + (inode number \* size of inode)