



Mawlana Bhashani Science and Technology University

Lab-Report

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Lab-Report Name : File operation and permission.

Theory

What is File Operation and File Permission in Linux Operating System?

File Operations

The operating system can provide system calls to create, write, read, reposition, delete, and truncate files. There are six basic file operations within an Operating system. These are: ... Relocating within a file need not require any actual I/O. This file operation is also termed as 'file seek.

Permissions

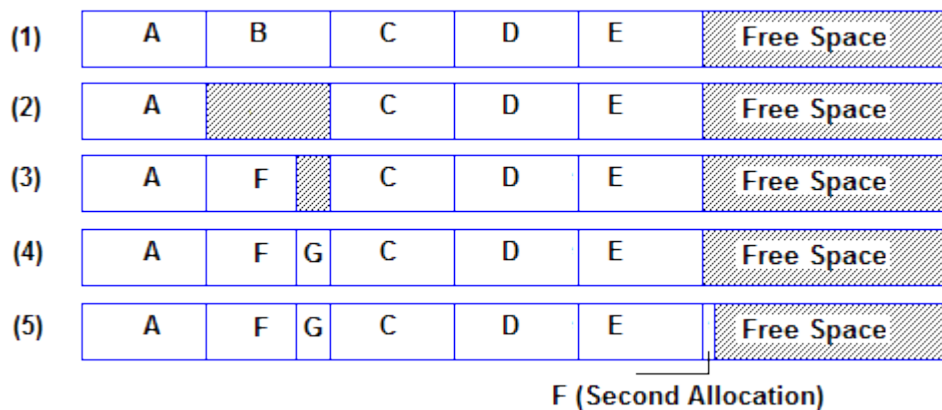
Every file and directory in your UNIX/Linux system has following 3 permissions defined for all the 3 owners discussed above.

- Read: This permission give you the authority to open and read a file. Read permission on a directory gives you the ability to lists its content.
- Write: The write permission gives you the authority to modify the contents of a file. The write permission on a directory gives you the authority to add, remove and rename files stored in the directory. Consider a scenario where you have to write permission on file but do not have write permission on the directory where the file is stored. You will be able to modify the file contents. But you will not be able to rename, move or remove the file from the directory.
- Execute: In Windows, an executable program usually has an extension ".exe" and which you can easily run. In Unix/Linux, you cannot run a program unless the execute permission is set. If the execute permission

is not set, you might still be able to see/modify the program code(provided read & write permissions are set), but not run it.

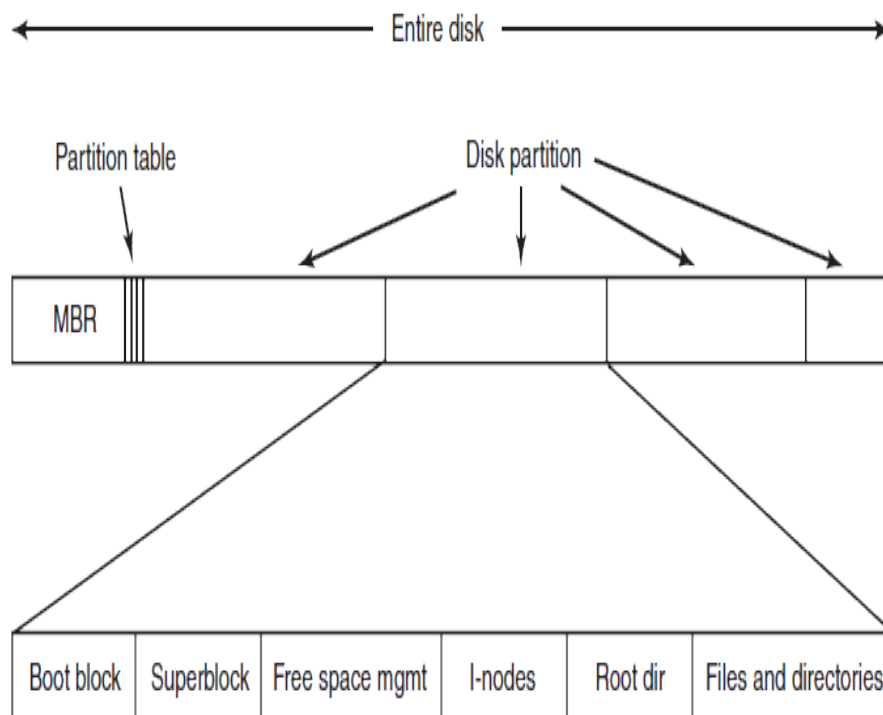
Implementation of File Operation and File Permission.

File System Implementation



File system implementation defines how files and directories are stored, how disk space is managed, and how to make everything work efficiently and reliably.

File-System Layout



File Systems are stored on disks. The above figure depicts a possible File-System Layout.

- **MBR:** Master Boot Record is used to boot the computer
- **Partition Table:** Partition table is present at the end of MBR. This table gives the starting and ending addresses of each partition.
- **Boot Block:** When the computer is booted, the BIOS reads in and executes the MBR. The first thing the MBR program does is locate the active partition, read in its first block, which is called the boot block, and execute it. The program in the boot block loads the operating system contained in that partition. Every partition contains a boot block at the beginning though it does not contain a bootable operating system.
- **Super Block:** It contains all the key parameters about the file system and is read into memory when the computer is booted or the file system is first touched.

Implementing Files

- Contiguous Allocation:

Each file is stored as a contiguous run of disk blocks.

Example: On a disk with 1KB blocks, a 50KB file would be allocated 50 consecutive blocks. With 2KB blocks it would be 25 consecutive blocks.

Each file begins at the start of a new block, so that if file A is occupying $3\frac{1}{2}$ blocks, some space is wasted at the end of the last block.

Advantages:

Simple to implement.

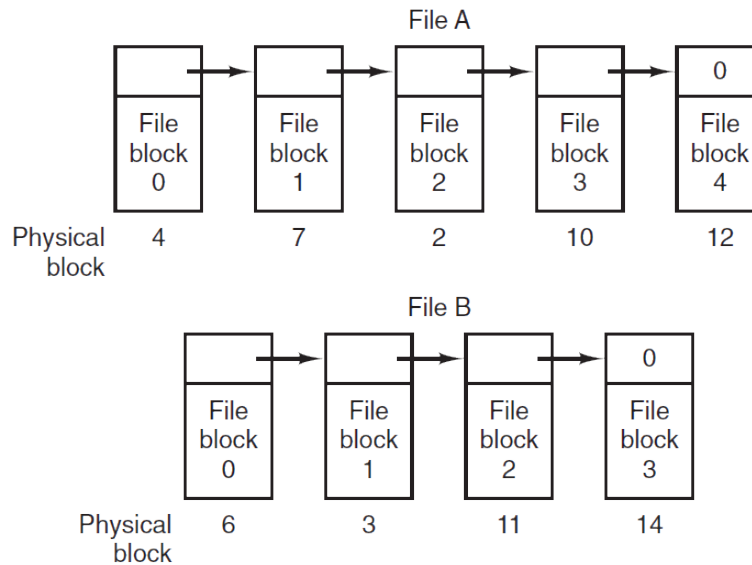
The read performance is excellent because the entire file can be read from the disk in a single operation.

Drawbacks:

Over the course of time the disk becomes fragmented.

- Linked List Allocation:

The second method for storing files is to keep each one as a linked list of disk blocks. The first word of each block is used as a pointer to the next one. The rest of the block is for data. Unlike Contiguous allocation no space is lost in disk fragmentation.



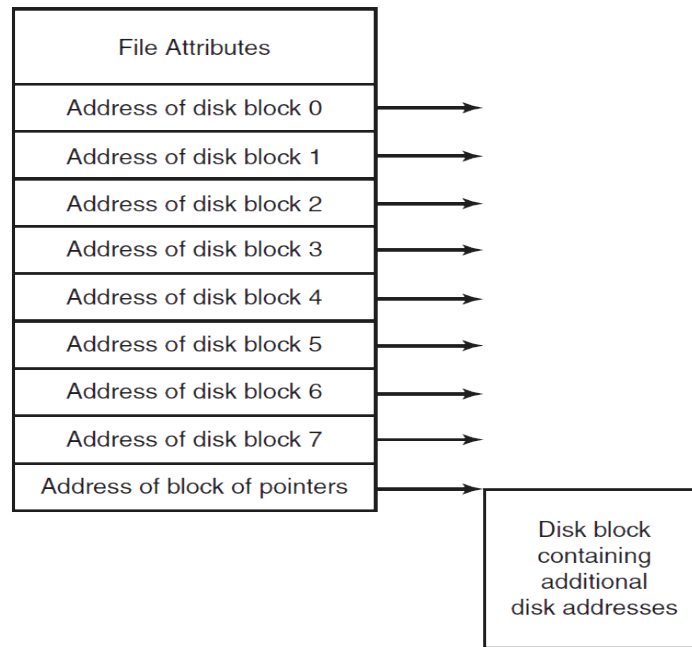
Random access of a file is very slow.

- Linked-List Allocation Using a Table in Memory:

The disadvantage of linked list can be overcome by taking the pointer word from each disk block and putting it in a table in memory. Such a table in main memory is called a FAT (File Allocation Table). Using FAT random access can be made much easier.

The primary disadvantage of this method is that the entire table must be in memory all the time to make it work.

- I-nodes: I-node is a data structure which is used to identify which block belongs to which file. It contains the attributes and disk addresses of the file's blocks. Unlike the in-memory table the i-node need to be in memory only when the corresponding file is open.



Operations on the File

There are various operations which can be implemented on a file. We will see all of them in detail.

1.Create

Creation of the file is the most important operation on the file. Different types of files are created by different methods for example text editors are used to create a text file, word processors are used to create a word file and Image editors are used to create the image files.

2.Write

Writing the file is different from creating the file. The OS maintains a write pointer for every file which points to the position in the file from which, the data needs to be written.

3.Read

Every file is opened in three different modes : Read, Write and append. A Read pointer is maintained by the OS, pointing to the position up to which, the data has been read.

4.Re-position

Re-positioning is simply moving the file pointers forward or backward depending upon the user's requirement. It is also called as seeking.

5.Delete

Deleting the file will not only delete all the data stored inside the file, It also deletes all the attributes of the file. The space which is allocated to the file will now become available and can be allocated to the other files.

6.Truncate

Truncating is simply deleting the file except deleting attributes. The file is not completely deleted although the information stored inside the file get replaced.

Discussion :

The most common permissions are read, write, delete, and execute. Read allows a user to open and read a file or directory. Write allows a user to open the file or directory, make changes, and save those changes. Delete allows a user to delete the file or directory