الملزمة التاسعة

File Systems

File system consist of:

1. Files.
2. Directory structure, which organize all files in the system.

- ***File:*** A logical storage unit mapped by the O.S onto physical devices. It is a collection of related information recorded on nonvolatile secondary storage.

File Attributes

1. Name
2. Type
3. Location
4. Size
5. Protection: read only, executing, …
6. Time, date, and user identification.

- The information about all files is kept in the directory structure.

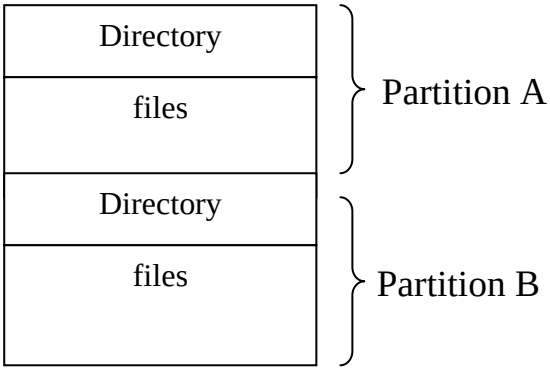
Access Methods

1. ***Sequential access:*** information in the file is processed in order, one record after the other. Ex: editors and compilers.
2. ***Direct access:*** reading or writing records rapidly in no particular order. Ex: data base.

Directory Structure

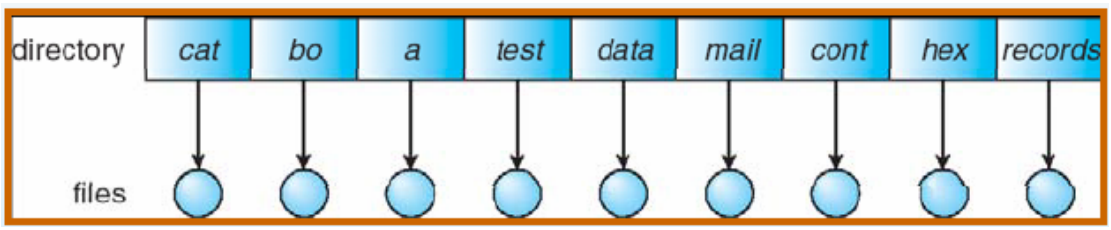
To manage all files in the system, we need to organize them. This organization is done in two parts:

1. ***Partitions:*** file system is broken into partitions, to provide several separate areas within one disk.
2. ***Directory:*** each partition contain information about files within it in directory, which records information such as name, location, size, and type for all files on that partition.



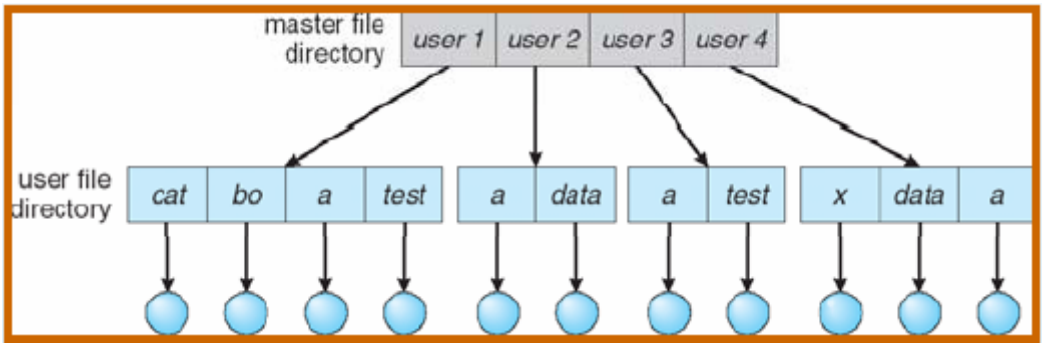
Directory Schemes

1. ***Single-level directory***
   - The simplest structure**.**
   - All files are contained in the same directory.
   - Disadvantage: confusion of file names of different users (***name –collision problem***).



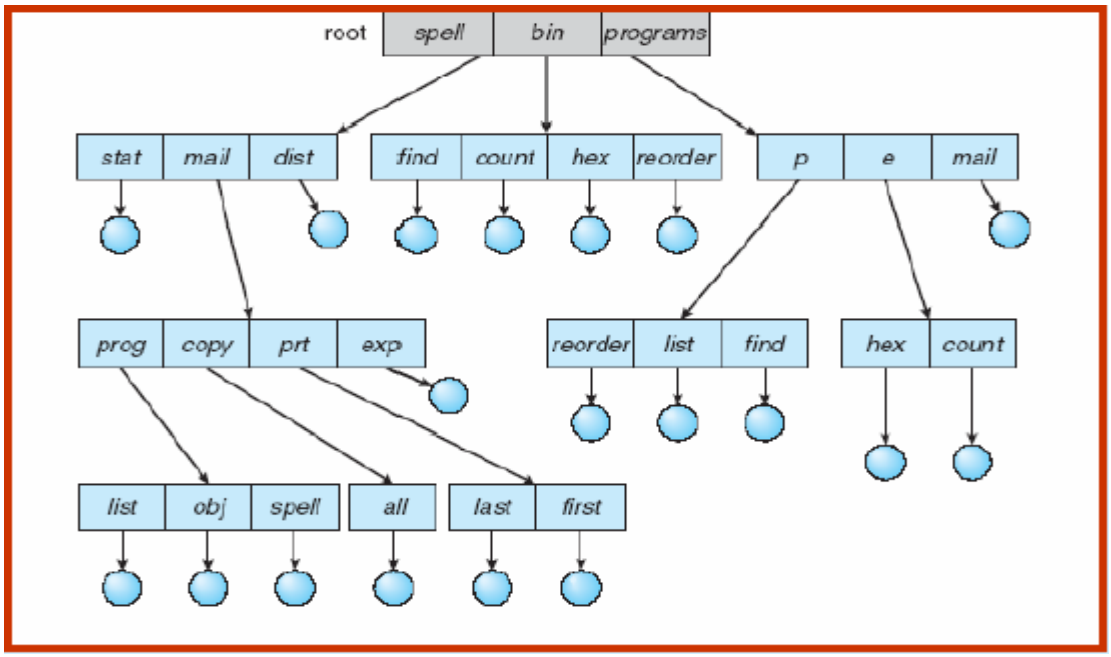
2. Two-level Directory

- Create a separate directory for each user.
- When a user job starts a user logs in the System's Master File directory (**MFD**) is searched by the user name for User File Directory (**UFD**).
- This scheme solve the name-collision problem.
- Its disadvantage when users want to cooperate on same task and to access one another's files.



3.Tree-Structure Directories

- This scheme allows user to create subdirectories and files.
- Subdirectory contains a set of files or subdirectories.
- Every file has a unique path name.

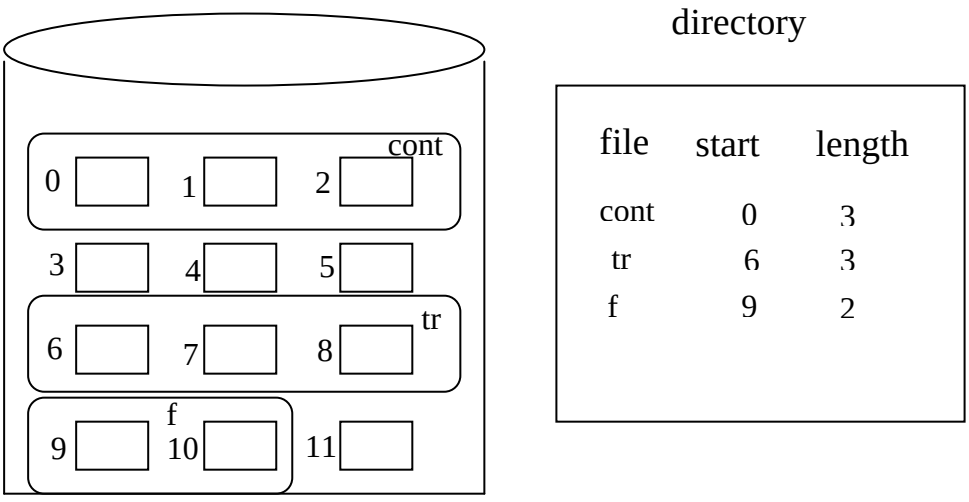


Allocation Methods

How to allocate space to files? so that disk space is utilized effectively and files accessed quickly.

1. **Contiguous Allocation:**

- Each file should occupy a set of contiguous blocks on the disk.
- A directory entry for each file indicates address of a starting block and length of area of this file.

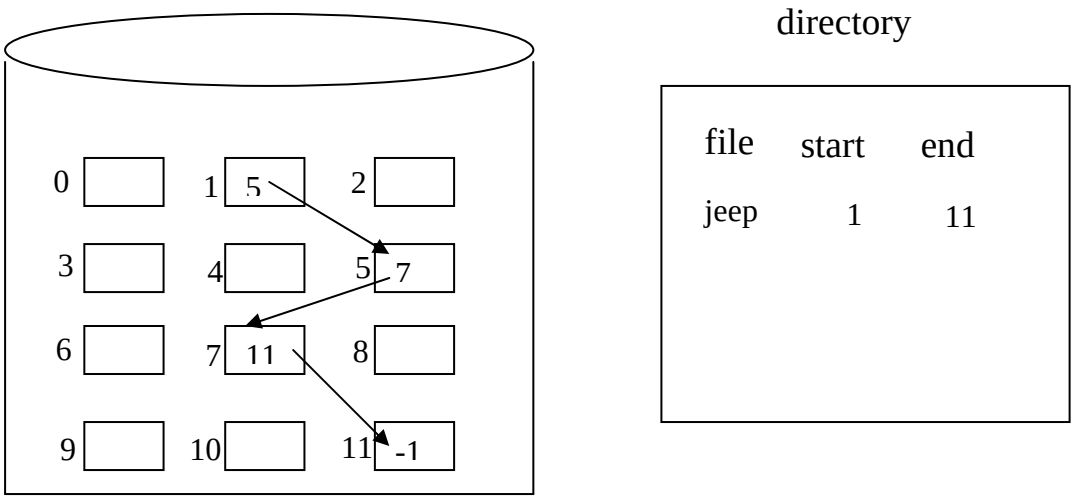


- Suffer from external and internal fragmentation.
- Difficult to find space for a new file and extend the file.

2. ***Linked Allocation:***

Each file is a linked list of disk blocks. These blocks may be scattered anywhere on the disk.

- The directory have a pointer to the first and last blocks of the file.



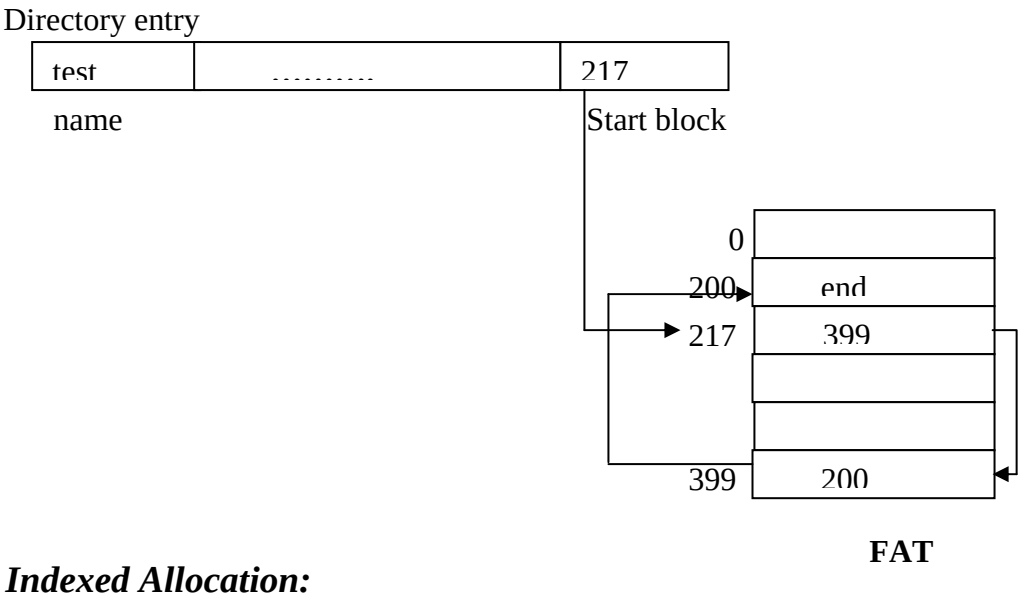
Advantages:

a. no external fragmentation.
b. No need to declare the file size.
c. No necessary for compaction.

Disadvantages:

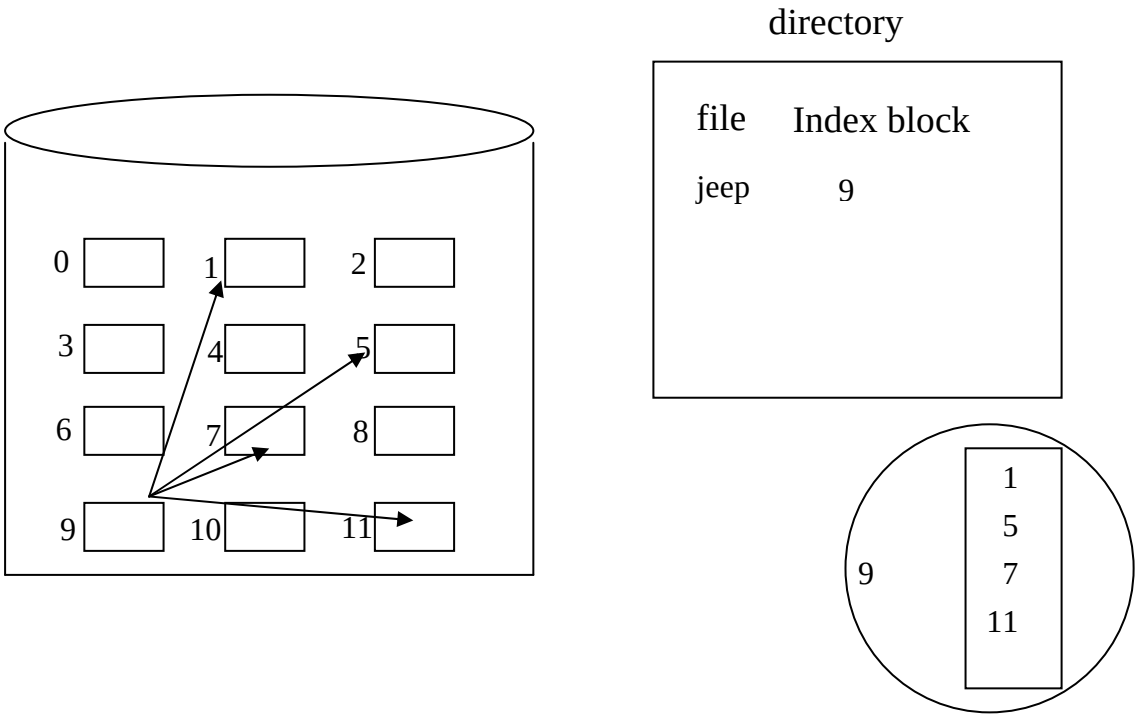
a. used for only sequential accessed files.
b. Space required for pointers.

- Solution for pointer space problem is to collect blocks into (**clusters**) and allocate the cluster rather than blocks.
- An important variation on the linked allocation method is the use of **FAT** (**F**ile **A**llocation **T**able). Which is simple and efficient method of disk-space allocation.
  - it found in the beginning of each partition.
  - FAT is used as a linked list.
  - Directory entry contains the first block no.



3. ***Indexed Allocation:***

- Bring all the pointers together into one location : **index block.**
- The directory contains the address of the index block.



- This organization support direct access without suffering from external fragmentation.