Input & Output 1: File systems

What are files?

A sequence of (usually) fixed sized blocks stored on a device.

A device is often refered to as a volume.

A large device might be split into several volumes, or partitions.

Or a volume might span more than one device.

Each volume, or partition is divided into numbered blocks.

Input & Output :

The O/S has to keep track of which blocks are used by which file.

A mapping between the file name, the volume, and the blocks in which it is kept.

A special file known as a directory holds these mappings

The simplest structure has a single volume and a single layer.

A table holds the mapping information.

Input & Output : Flat File Systems

Macintosh File System (MFS), A 400 kilobyte floppy disc based flat file system.

Each file contained two parts, known as forks :

Resource Fork :
contains metadata in the form of attribute/value pairs
- icon bitmaps
- program segments
- structured data

Data Fork :
contains the file data in common with other file systems

Introduced with the Macintosh 128k in January 1984

Input & Output : Hierarchical File systems

MS-DOS FAT(12/16/V) file system. Provided directories.

Data stored in 512 byte sectors, grouped into clusters of 4 to 64 sectors. Each cluster has an entry in the FAT to indicate how it is being used. Entry values include

marked as ’bad’

unused

used

next cluster number/end of chain number

Input & Output : Hierarchical File Systems 2

Each directory table has a 32 byte entry per file containing

- File name and extension
  - also used to indicate deletion
- File Attributes
  - Read-only
  - Hidden
  - System
  - Directory
- Change Date/time
- File Size
- Starting cluster number

Input & Output : Hierarchical File Systems 3

Disk Structure :

Volume Boot Sector, the first sector.

File Allocation Table, held in the next sectors

Two copies are kept

primary,

backup.

Root Directory Table, following the 2nd FAT

Fixed size, which limits number of entries.

1.44Mb floppy = 224 entries

Hard disk = 512 entries

Input & Output : Hierarchical File Systems 3

Each directory has 2 special entries

. and ..

shorthand for the current directory and the parent directory.

Files need not occupy adjacent clusters, leading to fragmented files.

Chaining clusters together to hold files is risky. The directory table only holds the first cluster number.

The FAT holds the chain information.