Disk partitioning

Disk partitioning is the creation of divisions of a hard disk. Raising overall computer performance because smaller filesystems are more efficient. For instance, large hard drives with only one NTFS filesystem typically have a very large Master File Table (MFT) and it generally takes more time to read this MFT than the smaller MFTs of smaller partitions.

A PC hard disk can contain either as many as **four** primary partitions, or 1-3 primaries and a single extended partition. Each of these partitions are described by a 16-byte entry in the **Partition Table** which is located in the Master Boot Record.

The "type" of a partition is identified by a 1-byte code found in its partition table entry. Some of these codes (such as 0x05 and 0x0F) may be used to indicate the presence of an extended partition, but most are used by operating systems that examine partition tables to decide if a partition contains a file system they can *mount/access* for reading or writing data.

Once a specific partition's *type* has been identified, additional information about its purpose and probable contents may be found. For example, some *type codes* are used to *hide* a partition's contents from various operating systems. However, if an OS or some partitioning tool has been programmed to also examine the boot sectors of any partition, then its file system may no longer remain hidden. (Note: There are no *officially assigned* partition types; thus, more than one kind of file system may *lay claim* to the same code value.)

Partition types

A *primary partition* contains one file system. In MS-DOS and earlier versions of Microsoft Windows systems, the first partition (C:) must be a "primary partition". Other operating systems may not share this limitation; however, this can depend on other factors, such as a PC's BIOS.

The "partition type" code for a primary or *logical* partition can either correspond to a file system contained within (e.g. 0x07 means either an NTFS or an OS/2 HPFS file system) or indicate the partition has a special use (e.g. code 0xBC may mean an Acronis Secure Zone and code 0x82 usually indicates a Linux *swap* partition).

The FAT16 and FAT32 file systems have made use of quite a number of partition type codes over time due to the limits of various DOS and Windows OS versions. Though a Linux operating system may recognize a number of different file systems (ext2, ext3, reiserfs, etc.), they have all consistently used the same partition type code: 0x83 (Linux native).
Extended

An *extended partition* is secondary to the primary partition(s). A hard disk may contain only one extended partition; which can then be sub-divided into *logical drives*, each of which is (under DOS and Windows) assigned additional drive letters: C:, D: and E: (in that order).

Partitioning schemes

With Microsoft Windows, the standard partitioning scheme is to create a single active primary partition, the C: drive, where the operating system, user data, applications, and page file all reside. Windows Vista includes an inbuilt 'Disk Management' program which allows for the creation, deletion and movement of partitions.

Unix-based and Unix-like operating systems such as Linux and Mac OS X, the creation of separate partitions for /boot, /home, /tmp, /usr, /var, /opt, swap and all remaining files under the "/" (root directory) is possible. Sun operating systems call their partitions slices. Judicous use of partitioning can increase performance and reliaiblity while sacrificing space management.

Logical Volume Management, often used in servers, increases flexibility by allowing data in volumes to expand into separate physical disks (which can be added when needed); another option is to resize existing partitions when necessary. Typical desktop systems are often comprised of a single "/" (root directory) containing the entire filesystem plus a much smaller swap partition. By default, Mac OS X systems use a single "/" (root directory) containing the entire filesystem (including the swap file) as a point of simplicity (but other setup options do exist).

Partition recovery

When a partition is deleted, in general, only its partition table entry is removed from a table; and although the data is no longer accessible, it still remains on the disk until being overwritten. Specialized recovery utilitieslocate *lost* file systems and recreate a partition table which includes entries for these recovered file systems.

Some disk utilities may also overwrite a number of beginning sectors of a partition they delete. Windows Disk Management (Windows 2000/XP, etc.) is used to delete a partition, it will overwrite the first sector (relative sector 0) of the partition before removing it. It may be possible to restore a FAT32 or NTFS partition if a backup boot sector is available.