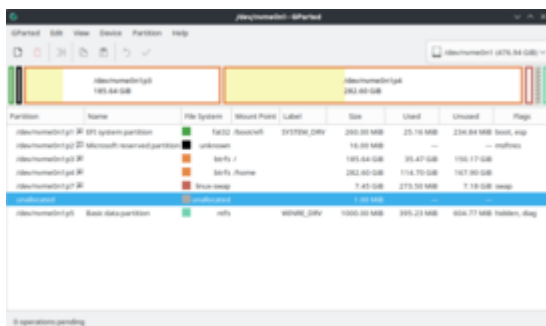


Disk partitioning

Disk partitioning or **disk slicing**^[1] is the creation of one or more regions on [secondary storage](#), so that each region can be managed separately.^[2] These regions are called partitions. It is typically the first step of preparing a newly installed disk, before any [file system](#) is created. The disk stores the information about the partitions' locations and sizes in an area known as the partition table that the operating system reads before any other part of the disk. Each partition then appears to the operating system as a distinct "logical" disk that uses part of the actual disk. [System administrators](#) use a program called a [partition editor](#) to create, resize, delete, and manipulate the partitions.^[3] Partitioning allows the use of different filesystems to be installed for different kinds of files. Separating user data from system data can prevent the system partition from becoming full and rendering the system unusable. Partitioning can also make backing up easier. A disadvantage is that it can be difficult to properly size partitions, resulting in having one partition with too much free space and another nearly totally allocated.



GParted is a popular utility used for disk partitioning

History

IBM in its 1983 release of [PC DOS version 2.0](#) was an early if not first use of the term *partition* to describe dividing a block storage device such as an HDD into physical segments. The term's usage is now ubiquitous. Other terms used in the art have included *logical disk*,^[4] *minidisk*,^[5] *portions*^[6], *pseudo-disk*^[6], *section*^[6], *slice*^[7] and *virtual drive*^[8].

One of the earliest such segmentation of a disk drive was IBM's 1966^[9] usage in its [CP-67](#) operating system of *minidisk* as a separate segment of a hard disk drive.^[5]

Partitioning schemes

DOS, Windows, and OS/2

With [DOS](#), Microsoft Windows, and [OS/2](#), a common practice is to use one primary partition for the active [file system](#) that will contain the operating system, the page/swap file, all utilities, applications, and user data. On most Windows consumer computers, the [drive letter](#) C: is routinely assigned to this primary partition. Other partitions may exist on the [HDD](#) that may or may not be visible as drives, such as recovery partitions or partitions with diagnostic tools or data. (Windows drive letters do not correspond to partitions in a one-to-one fashion, so there may be more or fewer drive letters than partitions.)

Microsoft [Windows 2000](#), [XP](#), [Vista](#), and [Windows 7](#) include a '[Disk Management](#)' program which allows for the creation, deletion and resizing of FAT and NTFS partitions. The Windows Disk Manager in Windows Vista and Windows 7 utilizes a [1 MB partition alignment](#) scheme which is fundamentally [incompatible](#) with Windows 2000, XP, OS/2, DOS as well as many other operating systems.

Unix-like systems

On [Unix](#)-based and [Unix-like](#) operating systems such as [Linux](#), [macOS](#), [BSD](#), and [Solaris](#), it is possible to use multiple partitions on a disk device. Each partition can be formatted with a [file system](#) or as a [swap partition](#).

Multiple partitions allow directories such as [/boot](#), [/tmp](#), [/usr](#), [/var](#), or [/home](#) to be allocated their own filesystems. Such a scheme has a number of advantages:

- If one file system gets corrupted, the data outside that filesystem/partition may stay intact, minimizing data loss.
- Specific [file systems](#) can be mounted with different parameters, e.g., [read-only](#), or with the execution of [setuid](#) files disabled.

- A runaway program that uses up all available space on a non-system filesystem does not fill up critical filesystems.
- Keeping user data such as documents separate from system files allows the system to be updated with lessened risk of disturbing the data.

A common minimal configuration for Linux systems is to use three partitions: one holding the system files mounted on "/" (the [root directory](#)), one holding user configuration files and data mounted on /home ([home directory](#)), and a swap partition.

By default, macOS systems also use a single partition for the entire filesystem and use a [swap file](#) inside the file system (like Windows) rather than a swap partition.

In Solaris, partitions are sometimes known as **slices**. This is a conceptual reference to the slicing of a cake into several pieces.

The term "slice" is used in the [FreeBSD](#) operating system to refer to [Master Boot Record](#) partitions, to avoid confusion with FreeBSD's own [disklabel](#)-based partitioning scheme. However, [GUID Partition Table](#) partitions are referred to as "partition" worldwide.

Multi-boot systems

A [GRUB](#) startup menu showing [Ubuntu](#) Linux (with three different boot modes) and [Windows Vista](#) options

Multi-boot systems are computers where the user can boot into more than one distinct operating system (OS) stored in separate storage devices or in separate partitions of the same storage device. In such systems a menu at [startup](#) gives a choice of which OS to boot/start (and only one OS at a time is loaded).

This is distinct from [virtual operating systems](#), in which one operating system is run as a self-contained virtual "program" within another already-running operating system. (An example is a Windows OS "virtual machine" running from within a Linux OS.)

GUID Partition Table

The **GUID Partition Table** ([Globally Unique Identifier](#)) is a part of the [Unified Extensible Firmware Interface](#) (UEFI) standard for the layout of the [partition table](#) on a physical [hard disk](#). Many operating systems now support this standard. However, Windows doesn't support this on BIOS based computers.^[10]

Partition recovery

When a partition is deleted, its entry is removed from a table and the data is no longer accessible. The data remains on the disk until being overwritten. [Specialized recovery utilities](#) may be able to locate *lost* file systems and recreate a partition table which includes entries for these recovered file systems. Some disk utilities may overwrite a number of beginning sectors of a partition they delete. For example, if 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 still may be possible to restore a [FAT](#) or [NTFS](#) partition if a backup boot sector is available.

Compressed disks

HDDs can be compressed to create additional space. In DOS and early Microsoft Windows, programs such as [Stacker](#) (DR-DOS except 6.0), [SuperStor](#) (DR DOS 6.0), [DoubleSpace](#) (MS-DOS 6.0–6.2), or [DriveSpace](#) (MS-DOS 6.22, Windows 9x) were used. This compression was done by creating a very large file on the partition, then storing the disk's data in this file. At startup, device drivers opened this file and assigned it a separate letter. Frequently, to avoid confusion, the original partition and the compressed drive had their letters swapped, so that the compressed disk is C:, and the uncompressed area (often containing system files) is given a higher name.

Versions of [Windows](#) using the NT kernel, including the most recent version, [Windows 10](#), contain intrinsic disk compression capability. The use of separate disk compression utilities has declined sharply.

Partition table

A **partition table** is a table maintained on a disk by the operating system that outlines and describes the partitions on that disk.^[11] The terms *partition table* and *partition map* are similar terms and can be used interchangeably. The term is most commonly associated with the **MBR partition table** of a **Master Boot Record** (MBR) in **PCs**, but it may be used generically to refer to other formats that divide a disk drive into partitions, such as: **GUID Partition Table** (GPT), **Apple partition map** (APM),^[12] or **BSD disklabel**.^[13]

PC partition types

MBR

This section describes the **master boot record** (MBR) partitioning scheme, as used historically in **DOS**, Microsoft Windows and **Linux** (among others) on **PC-compatible** computer systems. As of the mid-2010s, most new computers use the **GUID Partition Table** (GPT) partitioning scheme instead. For examples of other partitioning schemes, see the general article on **partition tables**.

The total data storage space of a PC HDD on which MBR partitioning is implemented can contain at most four *primary partitions*, or alternatively three primary partitions and an *extended partition*. The *Partition Table*, located in the master boot record, contains 16-byte entries, each of which describes a partition.

The *partition type* 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*. Most are used by an operating system's bootloader (that examines partition tables) to decide if a partition contains a file system that can be *mounted* / *accessed* for reading or writing data.

Primary partition

A primary partition contains one file system. In **DOS** and all early versions of Microsoft Windows systems, **Microsoft** required what it called the **system partition** to be the first partition. All Windows operating systems from Windows 95 onwards can be located on (almost) any partition, but the boot files (`io.sys`, `bootmgr`, `ntldr`, etc.) must reside on a primary partition. However, other factors, such as a PC's **BIOS** (see **Boot sequence on standard PC**) may also impose specific requirements as to which partition must contain the primary OS.

The partition type *code* for a primary 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 that the partition has a special use (e.g., code [0x82](#) usually indicates a Linux *swap* partition). The [FAT16](#) and [FAT32](#) file systems have made use of a number of partition type codes due to the limits of various DOS and Windows OS versions. Though a Linux operating system may recognize a number of different file systems ([ext4](#), [ext3](#), [ext2](#), [ReiserFS](#), etc.), they have all consistently used the same partition type code: [0x83](#) ([Linux native file system](#)).

Extended partition

An HDD may contain only one extended partition, but that extended partition can be subdivided into multiple logical partitions. DOS/Windows systems may then [assign a unique drive letter](#) to each logical partition. [GUID partition table](#) (GPT) only has the primary partition, doesn't have the extended partition and the logical partition.

Boot partitions

BIOS boot partition

BIOS boot partition (BIOS BP) is a share of the storage device used to keep software that boots the operating system, a [bootloader](#). It may be an operating system kernel image or bootloader or a completely separate piece of software.^{[14][15]:136}

EFI system partition

[EFI system partition](#) is the same as BIOS BP, but is loaded by EFI firmware instead of BIOS.^{[14][15]:136}

See also

The Wikibook [Guide to Unix](#) has a page on the topic of: [Partitioning Disks](#)

- [Amiga rigid disk block](#)
- [Disk formatting](#)
- [Filesystem Hierarchy Standard](#)
- [List of disk partitioning software](#)
- [LVM](#)

- [Master boot record](#) covers the partition table layout
- [Partition alignment](#)
- [RAID](#)
- [JBOD](#)

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