

Megabyte

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The **megabyte** is a multiple of the unit byte for digital information. Its recommended unit symbol is **MB**, but sometimes *MByte* is used. The unit prefix *mega* is a multiplier of 1 000 000 (10^6) in the International System of Units (SI).^[1] Therefore, one megabyte is one million bytes of information. This definition has been incorporated into the International System of Quantities.

However, in the computer and information technology fields, several other definitions are used that arose for historical reasons of convenience. A common usage has been to designate one megabyte as 1 048 576 bytes (2^{20} B), a measurement that conveniently expresses the binary multiples inherent in digital computer memory architectures. However, most standards bodies have deprecated this usage in favor of a set of binary prefixes,^[2] in which this measurement is designated by the unit mebibyte (MiB). Less common is a measurement that used the megabyte to mean 1000×1024 (1 024 000) bytes.^[2]

Contents

- 1 Definitions
- 2 Examples of use
- 3 See also
- 4 References
- 5 External links

Definitions

The megabyte is commonly used to measure either 1000^2 bytes or 1024^2 bytes. The interpretation of using base 1024 originated as a compromise technical jargon for the byte multiples that needed to be expressed by the powers of 2 but lacked a convenient name. As 1024 (2^{10}) approximates 1000 (10^3), roughly corresponding to the SI prefix kilo-, it was a convenient term to denote the binary multiple. In 1998 the International Electrotechnical Commission (IEC) proposed standards for binary prefixes requiring the use of megabyte to strictly denote 1000^2 bytes and mebibyte to denote 1024^2 bytes. By the end of 2009, the IEC Standard had been adopted by the IEEE, EU, ISO and NIST. Nevertheless, the term megabyte continues to be widely used with different meanings:

Base 10

1 MB = 1 000 000 bytes (= 1000^2 B = 10^6 B) is the definition recommended by the International System of Units (SI) and the International Electrotechnical Commission IEC.^[2] This definition is used in networking contexts and most storage media, particularly hard drives, flash-based storage,^[3] and DVDs, and is also consistent with the other uses of the SI prefix in computing, such as CPU clock speeds or measures of performance. The Mac OS X 10.6 file manager is a notable example of this usage in software. Since Snow Leopard, file sizes are reported in decimal units.^[4]

Base 2

1 MB = 1 048 576 bytes ($= 1024^2 \text{ B} = 2^{20} \text{ B}$) is the definition used by Microsoft Windows in reference to computer memory, such as RAM. This definition is synonymous with the unambiguous binary prefix mebibyte.

Mixed

1 MB = 1 024 000 bytes ($= 1000 \times 1024 \text{ B}$) is the definition used to describe the formatted capacity of the 1.44 MB 3.5 inch HD floppy disk, which actually has a capacity of 1 474 560 bytes.

Semiconductor memory doubles in size for each address lane added to an integrated circuit package, which favors counts that are powers of two. The capacity of a disk drive is the product of the sector size, number of sectors per track, number of tracks per side, and the number of disk platters in the drive. Changes in any of these factors would not usually double the size. Sector sizes were set as powers of two (most common 512 bytes or 4096 bytes) for convenience in processing. It was a natural extension to give the capacity of a disk drive in multiples of the sector size, giving a mix of decimal and binary multiples when expressing total disk capacity.

Examples of use

Depending on compression methods and file format, a megabyte of data can roughly be:

- a 1 megapixel bitmap image with 256 colors (8 bits/pixel color depth) stored without any compression.
- a 4 megapixel JPEG image with normal compression.
- about 1 minute of 128 kbit/s MP3 compressed music.
- 6 seconds of uncompressed CD audio.
- a typical English book volume in plain text format (500 pages \times 2000 characters per page).

The human genome consists of DNA representing 800 MB of data. The parts that differentiate one person from another can be compressed to 4 MB.^[5]



1.44 MB floppy disks can store 1,474,560 bytes of data. MB in this context means $1,000 \times 1,024$ bytes.

See also

- Timeline of binary prefixes
- Gigabyte § Consumer confusion

References

1. "Archived copy". Archived from the original on June 7, 2007. Retrieved June 1, 2007.
2. "Definitions of the SI units: The binary prefixes". National Institute of Standards and Technology.
3. SanDisk USB Flash Drive ([http://apac.sandisk.com/Products/Catalog\(1349\)-SanDisk_Extreme_Ducati_Edition_USB_Flash_Drive.aspx](http://apac.sandisk.com/Products/Catalog(1349)-SanDisk_Extreme_Ducati_Edition_USB_Flash_Drive.aspx)) "Note: 1 megabyte (MB) = 1 million bytes; 1 gigabyte (GB) = 1 billion bytes."
4. "How Mac OS X reports drive capacity". Apple Inc. 2009-08-27. Retrieved 2009-10-16.
5. Christley, S. .; Lu, Y. .; Li, C. .; Xie, X. . (2008). "Human genomes as email attachments". *Bioinformatics*. **25** (2): 274–275. doi:10.1093/bioinformatics/btn582. PMID 18996942.

External links

- Historical Notes About The Cost Of Hard Drive Storage Space (<https://web.archive.org/web/20140728221058/http://ns1758.ca/winch/winchest.html>)
- the megabyte (http://searchstorage.techtarget.com/sDefinition/0,,sid5_gci212542,00.html) (established definition in Networking and Storage industries; from [whatis.com](http://whatis.techtarget.com/definition/0,,sid9_gci551931,00.html) (http://whatis.techtarget.com/definition/0,,sid9_gci551931,00.html))
- International Electrotechnical Commission definitions (http://www.iec.ch/zone/si/si_bytes.htm)
- IEC prefixes and symbols for binary multiples (<http://members.optus.net/alexey/prefBin.xhtml>)

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