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Disk Formatting

I volunteer at the electrical testing benches in a Thrift Shop about three times larger than the large Packwood Presbyterian Thrift Shop. For testing various devices, I needed a simple & quick source for video and sound so I set up one of the many devices we would normally discard, a 9-yr-old wifi router. Most modern routers can have a storage hard drive, SSB drive or flashdrive connected to its USB connector. The storage disk is then available to every device, phone or computer logged into the router.

Routers can be very particular about the USB storage disk connected and its format. On my 8-year-old Netgear Router, after trying unsuccessfully three other drives, a 64GB SanDisk Cruzer flashdrive using USB 2.0 finally worked. On newer routers, finding a usable drive would be much easier; check your drive's manufacturer's help sources.

Though I knew some basics about formatting from experience through the years, here is what I now know about drive or disk formats.

Many of us rarely need to format a storage disk such as our hard drive, SSD drive or flashdrive, but we sometimes might need to do so.

Disk formatting is a process to configure the data-storage device such as a hard-drive, floppy disk or flash drive before we can use it, most commonly used when we've bought a new disk or drive. Usually, the disk manufacturer or the computer or other device we're using will want to set the format it prefers but often we need to set a different format, so we need to know which format to use.

We can perform disk formatting on both magnetic platter spinning hard-drives, solid-state drives or flash drives. Formatting is done in Windows machines by the Disk Manager or DiskPart applications that are part of every Windows machine. In Macs, formatting is done by the Disk Utility application that is part of the Mac Operating System. Phones have similar formatting applications within their operating systems.

Formatting can scan for virus and "lock out" any bad sectors within the drive. All disks have unavoidable bad sectors from manufacturing processes; these sectors are normally permanently locked out by the manufacturer. In our formatting, more bad sectors may be found and locked out.

Disk formatting deletes all data and all programs installed on the drive, so it must be done with caution. If the disk has data and applications we will need later, we must back them up to another disk, then copy them back to the new disk after it is formatted. Disk formatting takes our time and decreases the life of the disk, so we do it only when necessary.

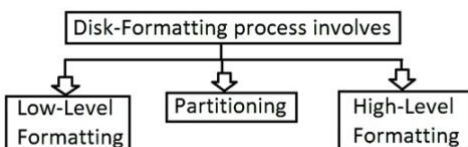


Figure – Formatting process of a disk

1. Low-level Formatting :

Low level formatting is the first formatting done on new disks. It is the process of marking of

cylinders and tracks of the blank disk. After this there is the division of tracks into sectors with the sector markers. All low-level formatting is normally done now by the hard-disk manufactures.

If we perform low-level formatting in the presence of data in the disk, all the data is erased and cannot be recovered. Low-level formatting also shortens the disk's life.

We users almost never do low-level formatting any more even though every phone, tablet and computer is capable of it.

2. Partitioning:

As suggested from the name, partitioning means divisions. Many disks are left as one partition, but others are partitioned into one or more partitions. Partitions have different names and can have different formats. Partitions look and perform like separate disks.

3. High-level Formatting:

High-level formatting is preparing the partition for the way we will write and read from it.

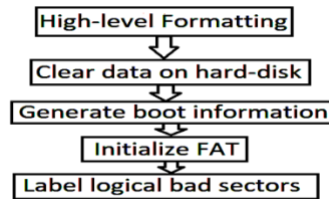


Figure – Steps of High-level Formatting

First, high-level formatting clears the data on the partition. For startup disks, it will generate startup information. Then our formatting must choose and set the disk's **Format** (FAT in the diagram above).

4. The Different Formats

Disk formats are the way files are written to and read from the disk. A dozen disk formats exist.

Various computer or phone Operating Systems such as Windows, Mac OS, Android, iPhone iOS or Linux read various Disk Formats.

Some most-used Formats:

- **NTFS:** The NT File System (NTFS) is the file system that modern Windows versions use by default. Macs & iPhones cannot write to NTFS.

- **HFS+:** The Hierarchical File System (HFS+) is the file system modern macOS & iOS versions use by default. Windows will not even recognize disks formatted with APFS or HFS+.

- **APFS:** The proprietary Apple file system developed as a replacement for HFS+, with a focus on flash drives, SSDs, and encryption. APFS was released with iOS 10.3 and macOS 10.13 and will become the mandatory (?) file system for those operating systems. Windows does not support APFS without third-party drivers.

- **FAT32:** The File Allocation Table 32 (FAT32) was the standard Windows file system before NTFS. FAT32 is usable by both Windows and Macs- a choice for files to be used by both Windows, Android phones, Macs & iPhones, but **limited to files less than 4GB.**

- **exFAT:** The extended File Allocation Table (exFAT) builds on FAT32, but with unlimited file size and is a modern, cleaner, faster format than NTFS. **exFAT is the best choice for disks that must be used by both Windows, Android phones, Macs & iPhones.** However, exFAT is NOT USABLE on some accessory devices such as some routers- check your router or other device's manufacturer's Help files.

This article includes some excerpts from geeksforsgeeks.com dated 16 May, 2020.

Info: geeksforsgeeks.org/disk-formatting/

Check out this week's Bible Readings on page 6 which includes Peter being taught by God that salvation is for everyone, "As I looked at it closely I saw four-footed animals, beasts of prey, reptiles, and birds of the air (animals they were forbidden to eat). I also heard a voice saying to me, 'Get up, Peter; kill and eat.' But I replied, 'By no means, Lord; for nothing profane or unclean has ever entered my mouth.' But a second time the voice answered from heaven, 'What God has made clean, you must not call profane.'" Acts 11: 6- 9 NIV

Dave Bunting, May 9, 2022

Credits in links below items.

See these columns on my blog

daverant.com

