How FAT Works

Compiled by Tracy Baker
Graphics & Design by Bret Jurgens

FAT (file allocation table) is the method Windows 95/98/Me use to keep track of files stored on your hard drive. As you save files, FAT saves the data to clusters (groups of sectors on your hard drive, usually two to eight, treated as one entity by the operating system or a disk controller), and the size of the clusters varies depending on the size of your hard drive and whether you have FAT16 or FAT32. Here we show two hard drives: the one on the left is using FAT16, and the one on the right is using FAT32. Both are 10GB drives.

FAT16

The 10GB FAT16 drive has been divided into five 2GB chunks, called partitions, because its older technology can address a maximum of 2GB of files.

FAT32

FAT32 handles drives of up to 2TB (terabyte) in size, and it can store files in clusters as small as 4KB, vastly improving storage efficiency. With FAT32, you needn't partition the drive into 2GB chunks because FAT32 can manage the whole drive. That's not to say you can't or won't want to partition your drive, but unlike FAT16, you don't have to.
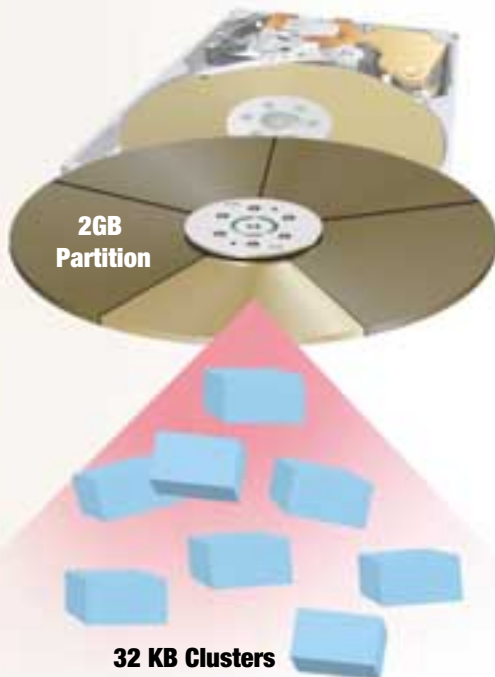
Looking closer at our two drives, we see how FATs store data in compartments called clusters. These clusters have a minimum size, which varies depending on the FAT technology and partition size. In this example, each cluster in the 2GB FAT16 partitions requires a minimum of 32KB of hard drive space. Each cluster in the entire 10GB FAT32 drive has a minimum size of only 8KB. If that drive was divided into two 5GB partitions, the FAT32 clusters would take only 4KB of space each.

2GB Partition

32 KB Clusters
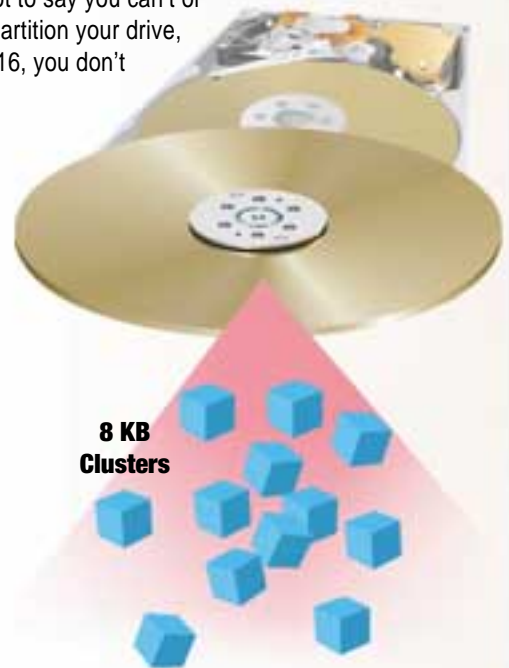
8 KB Clusters

FAT16 vs. FAT32 Clusters

16 KB unused space

FAT16 Cluster

Smaller clusters store files more efficiently than larger clusters. Consider a 16KB text file stored on the FAT16 drive. The file could be stored in one 32KB cluster, but there is 16KB worth of wasted space within that large cluster that other files can't use (Windows can't store two files in the same cluster, or it wouldn't be able to keep the files straight).

FAT32 Cluster

Look at that same file on the FAT32 drive. It spans two clusters, but fills them completely, leaving no wasted space. It's typical to have hundreds or even thousands of files that are smaller than 32KB on your PC. On two drives of the same size, the one with the smaller cluster size will have 10% to 25% more usable storage space.