

## The Basics of a Hard Drive

When computers first came into use, computer data was stored on tape. You can see this in old movies, where walls of tape machines with huge reels spin incessantly. This kind of storage has been mostly replaced by a smaller device – the hard drive.

A hard drive operates like a turntable: a spinning platter. But a hard drive usually has several platters layered, like a stack of pancakes, to allow for more data storage. In order to read the data at a reasonable rate (especially for media playback, like music or movies), the hard drive has to spin very quickly. These days, a typical spin rate is 7200rpm. That's 120 spins per second! A hard drive slower than 7200rpm is not recommended for multitrack audio.

Hard drive capacity these days (2010) is typically measured in gigabytes (GB, billions of bytes) but it's growing. Now there are terabyte drives (TB, trillions of bytes).

### **Directories**

Most of the hard drive is dedicated to storing the data.. But there has to be a directory so that the hard drive can keep track of the location of the data on the hard drive. The directory is like a phone book, storing names and addresses of every file on the drive. When you open an MP3 by double clicking it, the computer checks the directory to find out where the file is, and sends the hard drive to retrieve it.

When you erase a file, by dragging it to the Recycle or Trash, you aren't actually erasing the data. Instead, you're only erasing the entry in the directory. It's like going into your personal phone book, and erasing someone's name and number because you've lost touch with them. It doesn't mean they disappear, it only means that you can no longer find them. In order to erase the data (to make the person disappear!), you have to erase the data itself. You can 'zero' the hard drive space that contains deleted files.

A hard drive crash can damage the directory. But only the address information is damaged; the files themselves are often untouched. So, a crashed hard drive can sometimes be restored or recovered, by using a special program to locate all the files on the drive that are still intact, and then rebuild a directory. If your hard drive crashes, don't be too quick to re-format or initialize it. Instead, look for some way to recover the data, especially if your drive is full of important files! There are programs that can do this for you, or you can hire a professional.

### **Fragmentation**

The hard drive has plenty of room for files and programs, but gradually it gets filled up. When you delete a file, you free up the space that it was using. Let's say you delete a 5MB MP3 file. There is now about 5MB of free space at that place on the drive. Now you want to write a 10MB MP3 to the drive instead. Depending on how full the drive is, your computer may split the file up, and put half of it (5MB) into the free space, and the other half somewhere else. This is called fragmenting the file.

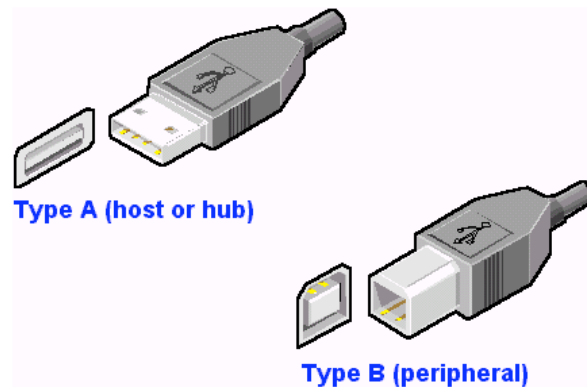
Hard drives are perfectly capable of handling these fragmented files, because they can jump around the spinning surface and gather all the fragments quickly and easily.

But, as the drive becomes more and more fragmented, you may notice problems when trying to playback multiple tracks of audio. Your music software might stop playing and warn you that there's a fragmentation problem. Or your computer will just seem to get sluggish. Eventually, the fragmentation may become a problem, and you may want to de-fragment the drive.

## Connectivity

When you use an external hard drive, you'll probably connect it by either USB (Universal Serial Buss) or Firewire.

USB comes in two flavors at the moment. USB 1, quite slow, good for mouse, keyboard, and other low intensity purposes. USB 2.0 is faster, good for hard drives, cameras, digital audio interfaces, and other medium intensity purposes.



Firewire also comes in two flavors at the moment. Firewire 400 is fast, and 'robust' – it's good for digital audio and video applications. Firewire 800 is even faster, and therefore even better than FW400 for high intensity purposes.

