Dynamic Disks

Most people, most of the time, use hard drives just the way you've probably always used them. You've got a hunk of hardware called a drive, either inside or outside your computer, that holds all your files and programs.

Some advanced people learn to *partition* those drives—to chop them up so that they appear as more than one icon on the screen.

Even then, the power-geek intelligentsia would still call those *basic disks.* They work the way most people have always used them. A file can exist only on one partition, and only on one disk.

A few people, however—usually highly trained professionals who do this kind of thing all day long in corporations—can embrace an even higher level of disk complexity: *dynamic disks*.

Those terms—basic and dynamic—refer only to the way the physical disk is formatted; it's not like you shop for a different kind of drives. But in a big company or some hobbyist's basement, converting basic disks into dynamic ones lets you pull off all kinds of cool new stunts.

Most of them require having *more than one* physical drive attached to your machine. Windows will mentally think of them, though, as one big disk; you'll see it show up with only one drive letter.

The dynamic-disk tricks harness the convenience of the two or more disks in various clever ways. For example, once you've converted a couple of basic disks into dynamic disks, you can turn them into any of these special things:

- **Simple volume.** Just like a regular old partition on a basic disk.

- **Mirrored volume.** Your second drive is always a perfect duplicate of the first. If anything goes wrong with one, you've still got the other as a backup. Great for safety; no speed benefit.

- **Striped volume.** A speed trick (known by the geeks as RAID 0), which makes it especially popular for use with video. Every time you save a file, it's spread in pieces across multiple drives simultaneously. Since you've got two (or more) drive heads operating at the same time, saving and opening files is much faster than if you had only one. (A drive head is like the needle of a record player.) It's like sending three messengers to deliver 30 packages instead of one.

  The downside: If one of the disks goes bad, they *all* go bad.

- **Spanned volume.** You've got several drives, but Windows thinks of them as one single disk—this time, for the purposes of expanding capacity. Each physical drive is an overflow area for the previous one. As each drive fills up, your computer automatically starts using the next one to hold more files. Unlike the striped scheme, this time, the physical disks don't have to be the same size. And if one drive dies, you lose the files on it—but the files on the remaining physical drives are usually OK.

- **RAID 5.** To set this up, you need at least three physical drives. This system combines the speed of striped volumes with the backup safety of mirrored ones. If one of the drives goes bad, you're on good shape: the other two drives can reconstruct whatever files were lost.

Note: Unfortunately, you can't extend your startup drive (the C: drive that contains your Windows 10 installation).

What About Extending Basic Disks?

Windows allows you to extend (and shrink) basic disks as well as dynamic disks. Previously, you'd have to buy a program like Paragon Partition Manager to perform this kind of operation.

But why would you want to resize your basic disk? In most cases, your basic disk already takes up the entire physical disk drive. However, many computer manufacturers devote several gigabytes of precious disk space to storing *restore images* so you can quickly and easily restore your computer to its factory-fresh state (minus the new-computer smell).

You may not need these restore images. Maybe your PC manufacturer provided a utility program that can generate

a set of installation discs, or will sell you a set for a small fee. The point is, though, that if you're sure you'll never need the volume that contains your restore images, you may be able to delete it and extend your C: drive into the space you freed up.

To delete a partition, right-click it in the Disk Management window; from the shortcut menu, choose Delete Volume (this is a good time to pause and think about how fresh your backups are). Once you've done that, you can right-click your C: drive and select Extend Volume.

You can just as easily *shrink* your C: drive, perhaps to make room for dual-booting another operating system like Linux.

How Dynamic Disks Work

When you (or your PC maker) first installed Windows, it configured each drive as a basic disk—a disk with its own drive letter. The good news is that you can convert a basic disk into a dynamic disk without losing any data on the drive.

The bad news is that you can't change a dynamic disk *back* to a basic disk unless you erase all the data stored there (or buy a third-party utility program).

Nor is that the only limitation. Before you proceed with converting basic disks to dynamic disks, assume a reclining position and read the following fine print:

- Dynamic disks generally don't work on removable disks, like disks connected by USB or FireWire. If your disks fall into any of these categories, Windows won't let you convert them to dynamic disks. And, of course, since you need at least two drives (not *including* your startup drive), dynamic disks generally don't work on laptops or tablets. This is a desktop PC thing.

- A dynamic disk can contain only one operating system. You can't *dual boot from another partition on a dynamic disk,* as you can with basic disks. (Dual booting means choosing which of two operating systems to use each time you turn on the PC.) Since you can't extend your boot drive, it's unlikely that you'd want to turn it into a dynamic disk, but you should keep this limitation in mind if you decide to install another operating system, such as Linux, onto the disks you want to convert to dynamic disks.

Note: You might have a dual-boot system and not even know it. Many manufacturers hide a bootable operating system on the hard drive whose sole purpose is to restore your computer to its original configuration when things go wrong.

For example, some manufacturers put a copy of DOS on a small partition. If you hold down F11 as the computer is starting up, it launches into DOS, loads disk-imaging software, and uses it to restore your hard drive using files from yet another partition—this time, a hidden *3.5 GB* partition.

If you convert your drive to a dynamic disk, you will lose the ability to invoke this rescue mode.

Extending a Volume

One big advantage of dynamic disks is that you can extend an existing volume whenever you feel like it, just by allocating additional disk space to it. If, for example, you run out of space on a volume you've named Data, and you still have some unallocated space on some other disk, you can simply add it to the Data volume to make it bigger. The unallocated space you specify becomes a permanent part of the Data volume. (Note that this is a one-way trip. Once

you've added free space to a dynamic volume, it becomes part of that volume permanently, or at least until you delete the volume—and its data—and recreate it.)

The disk space you use to extend the volume can come from either the same disk or another dynamic disk (in which case you create a *spanned* volume). Note, though, that you can't extend the *system* volume, nor any volume that was originally a partition created by another operating system.

- To convert a hard drive to a dynamic disk, it must set aside an invisible storage area to hold a *dynamic disk database.* If you partitioned the drive using Windows, then it already reserved enough space for this purpose. But if the drive was partitioned with another operating system, you may have to erase it before converting it to a dynamic disk.

How to Create a Dynamic Disk

If you haven't yet been scared off by the cautions in the previous section and are ready to convert a couple of your existing disks into dynamic ones, the procedure is simple. First, back up your computer. Tragedy isn't likely to befall you, but it's a good idea to back up before performing any kind of traumatic surgery to the disks in your computer.

Next, log onto the computer as a user with administrative privileges, and exit any programs that might be running on the disk you plan to convert.

You convert disks and manage the dynamic volumes on them using a special window called the Disk Management console. To open it, type *diskmgmt* into the Search box, and then choose "Create and format disk partitions" in the results.

Once this window is before you, you see a display of your drives and the partitions on them, as shown in Figure 1.

Figure 1:
The Disk Management console is the central toolbox for all your disk-related tasks. This is where you create the dynamic volumes on your disks.
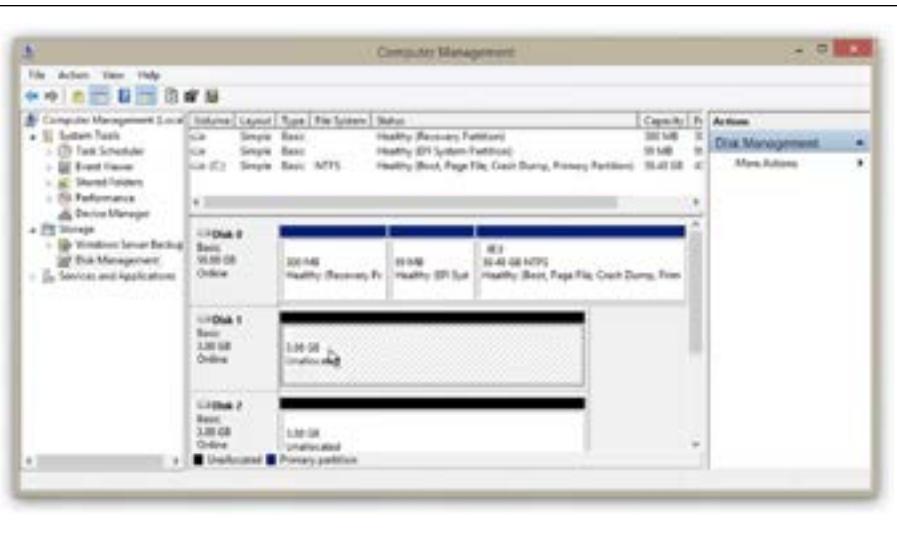
The top part of the window lists the partitions on your computer. The bottom part contains a horizontal box representing each drive on your computer, with smaller boxes inside indicating the partitions on each drive. Notice that the header box for each drive indicates the number of the drive in your system, its capacity, whether or not it's online, and the word "Basic" (indicating that it's currently a basic disk).

To convert a basic disk into a dynamic one, right-click the disk's name panel at the left side. From the shortcut menu, choose Convert to Dynamic Disk. Click OK, then Convert, then Yes in the following boxes.

And that is all: You've just converted your first drive into a dynamic superdrive!

Choose a Dynamic Volume Type

Next, you need to decide how you want to expand the disk: Simple, Mirrored, Striped, Spanned, or (if you have at least three drives) Raid 5.

To do that, right-click the disk's name panel at the left side (Figure 2). From the shortcut menu, choose the dynamic disk type you want to create.

Figure 2:
In this example, you're going to convert your new dynamic disk into a spanned volume, so you'll never be frustrated when your main disk runs out of storage space.
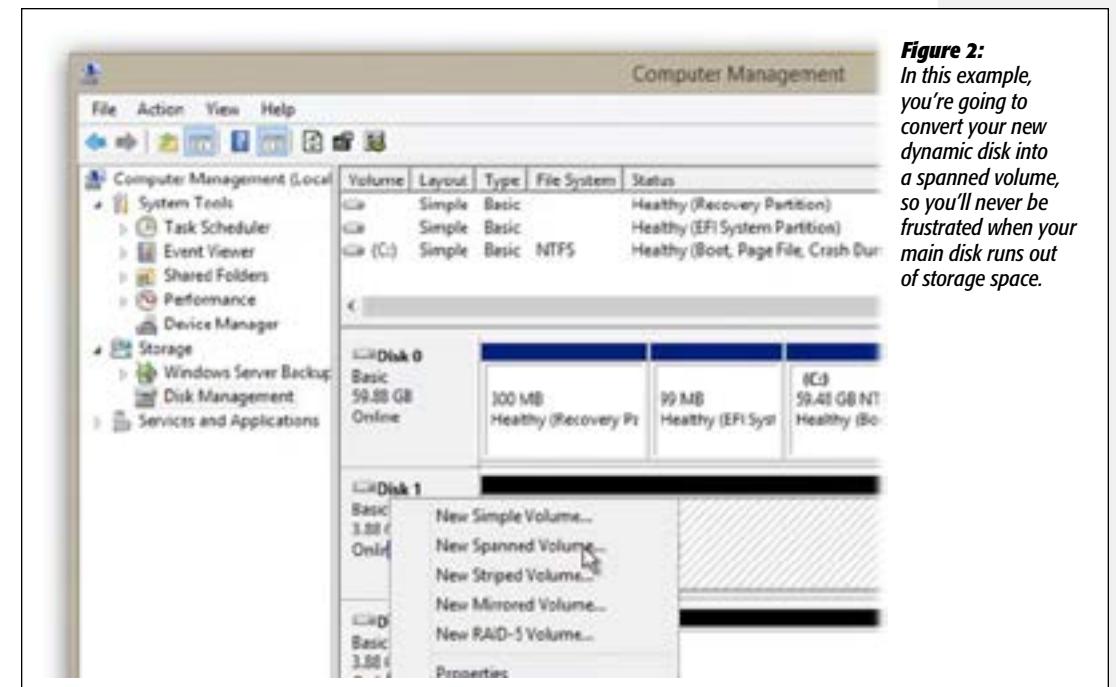
What happens next depends on which kind of dynamic disk you've selected.

If you want a Spanned Volume, for example, select the dynamic disks in the Available column and click Add to add them to the Selected column (Figure 3). Specify how much of the new drive you want to add to the volume (or, to add *all* of it to your original drive, do nothing). Finally, click Next and then Finish.

Figure 3:
When extending a volume to another disk, click its name in the Available column before adding it to the Selected column.

Notice now that your original volume and your new drive both have a purple header bar and use the same drive letter. You now have a spanned volume using space on both of your hard drives. Your hard drive is now effectively bigger, and you can continue to amass new files at your accustomed rate.

Clearly, messing around with dynamic disks requires an unusually well-equipped PC and an unusually experienced person operating it. But if you have enough smarts and enough drives, you can create unusually high speed, data safety, or both.