Hard facts

When your old PC needs a Zimmer frame to cope with new software, it's time for action. Eleanor Turton-Hill helps you along the road to deciding what you should do and explains the issues involved in upgrading your hard disk.

Computer technology changes fast: every year, processor speeds increase and hard drive capacity grows. Before you know it, there's a new generation of feature-rich software waiting to cripple your poor, aged PC. Sooner or later, you'll have to face up to the fact that your machine is becoming outmoded and find some way of dealing with it.

Connecting a Caviar 2540 IDE hard disk

Dig your heels in

One approach is to ignore all new technological advances and carry on using the software you've got. This is not a completely silly idea. Most software "upgrades" do not transform your current application into a superior product – they just add lots of extra features which you don't necessarily need. Ultimately, this takes up lots of disk space and strangles your system. So if your software does everything you want it to, that's a good argument for leaving it alone.

The problem with the "dig your heels in" approach is that eventually your hardware and software become obsolete. There's no chance of making any kind of minor upgrade, let alone running the current generation of software or adding some whizzy new peripheral. One day, you'll pick up a computer magazine and realise that no-one knows of your PC anymore.

Most people, especially computer enthusiasts, can't bear to be this out of touch. But they can't necessarily afford to splash their money around on new hardware either; so what they do is push their current systems to the limit. In fact, this is the option which most people unwittingly take. Although you may benefit from some of the new features provided in the constant software upgrades, your system will soon let you know that it can't cope with the continual effort of churning data from memory to disk. The signs are often subtle: "Out of memory" messages start to flash up on the screen and your favourite applications inexplicably refuse to save any more files.

Upgrade or not?

This is a sad state to get into, but once you've arrived at this point, there are only certain options available

The first is to clean up your machine, and there are dozens of techniques for squeezing more life out of your system. The most effective, however, is to delete old files (that you no longer use) from your hard disk and compress any "archive" files which you seldom use but would like to keep. There are hardware and software utilities which will do this. The software variety is generally cheaper; the hardware type, generally faster.

Second on the list is to buy a new machine. Whether or not you decide to do this will depend on the state of your current machine. If your PC has become truly medieval, it's the only sensible solution. But before you do this you should consider the third option, which is to upgrade some of your machine's over-worked components.

Hard disk upgrade

Last month we looked at simple upgrades, like adding more memory and improving graphics cards. This month we'll look at

some of the issues involved in upgrading your hard disk.

Although the price of RAM has remained constant for about two years and is showing little sign of change, the price of hard disks has plummeted in the past six months. Giving your machine a boost, in the form of a new hard drive, is now an option well worth consideration.

The speed of your hard disk has a major impact on overall machine performance. Hard drives found in old (or really cheap) computers tend to be physically large, slow, power-hungry and of limited capacity. If your machine is *really* ancient, then a modern IDE hard disk would greatly improve its performance.

Before splashing your money around, there are a few basic things you need to know about your PC. First, take the lid off it (there's no way of doing this without a screwdriver) and take a look at the arrangement of the components. The first and most obvious thing to find out is whether you actually have room for another hard disk.

If there's no spare space, don't panic. You can still add hard disk space using a "hard card": literally a "plug-in" card with a hard disk and controller circuitry attached to it. Hard disks of all types come on hard cards, so if the whole idea of replacing your hard disk or adding one to your system brings you out in a rash, a hard card may be the ideal solution for you. You can use it as a replacement for a dead hard drive or as a second drive. People with slimline PCs which generally lack extra drive bays may have no alternative but to use a hard card. The drawback with hard cards is that they tend to have rather low capacity and poor performance, but they're just as reliable as conventional disks.

If you find that you do have a spare drive bay, the next thing to check is the interface standard used by your machine. If your hard disk is of the MFR (Modified Frequency Regulation), RLL (Run-Length Limited) or ESDI (Enhanced Small Device Interface) type, then you have several upgrade options. With a bit of phoning around you can still get hold of RLL and MFM drives. The major problem with them is they tend to be painfully slow (compared with modern IDE drives) and of low capacity. The more sensible choice is to replace your old drive with an IDE hard disk, but make sure you get a matching controller with it. This goes for any type of hard drive. You cannot plug an MFM drive into an RLL controller and expect anything other than smoke.

Check up on the manufacturer of your hard drive, and the drive's type (if you've lost your manual look in the machine's setup screen) before you go shopping for a new hard disk because the BIOS (basic input/output system) in some older machines do not officially support IDE (integrated drive electronics). Ask the dealer if the new drive will work in a "master/slave" configuration with the old one. And finally, cover yourself by checking that the drive you buy has a "no questions asked" return policy.

Which drive interface?

There are basically two types of modern drive interface: SCSI and IDE (see the panel, below left). Here we'll concentrate on the more common IDE variety. Unfortunately, adding a second IDE drive is not always a simple procedure because they don't all work to the same standard. If both your drives adhere to the ANSI standard (ATA) they should happily co-exist. But if they are incompatible, you could well end up throwing your old one away.

IDE drives can control two hard disks on the same cable, and in order to make them work together one must be set up as a "slave" and the other as a "master". This is done fairly simply by moving a jumper at the back of the drive from one position to another. When you plug in the drive, make sure that the cable is plugged in the right way round, otherwise your machine will appear dead when you turn it on. Pin 1 is usually marked so that you can align the cable correctly.

The hard disk you buy will generally be faster than your current one, so set up the new one as the master and the existing one as the slave. They'll work more efficiently together if you store your applications on the faster disk and data on the slow one.

Once you've physically connected your new hard drive to the machine, you will have to configure the PC's BIOS. The BIOS contains a series of entries such as number of heads, cylinders and sectors per track which define the type of hard drive in the machine. Generally, you can get into the BIOS setup utility by pressing a key combination when you boot up. Here you'll need to configure the hard drive type number as well as other system configuration details. Make sure you have all the information you need before you go anywhere near your BIOS, or you could spend many frustrating hours (even days) trying to put it right.

IDE and SCSI: the next generation

If you've leafed through a *PCW* computer group test, you couldn't have failed to notice lots of incomprehensible acronyms like those above. These acronyms refer to interface standards which define the way in which the hard drive connects to your PC.

The first generation of computers stored the electronics to manage the hard disk, on a separate controller card. But technology has moved on since then and the same advances in microchips which have led to faster processors and cheaper memory, now enable the controller function to be placed on the disk itself. Integrated Drive Electronics (IDE) is currently the most common hard drive interface. It's also the least expensive.

IDE disks are connected to an interface card by a cable which extends the signals from the bus inside the PC. The cable does not plug directly into the ISA bus (industry standard architecture), so it either goes into an interface port on the main board or into an interface card. The IDE standard supports two connected disks, the first acting as controller, the second as a slave, with both disks sharing a single I/O address and interrupt.

Enhanced IDE (EIDE) is a much upgraded version of IDE. All computers built since 1994 should have an EIDE hard disk controller, and this provides many advantages over IDE. Firstly, EIDE can support four devices (instead of two) and they don't necessarily have to be hard disks — they can be CD-ROMs or tape drives that are compatible with the EIDE standard. Secondly, IDE was always restricted in that it would not support hard disks larger than 528Mb. The third improvement was in the massive increase in data throughput compared with standard IDE. This massive speed enhancement puts EIDE on an equal level with SCSI (pronounced "scuzzy") as a high-end drive interface.

SCSI stands for Small Computer Systems Interface — it is another standard for connecting hard drives and peripherals to your PC. SCSI hard drives are very fast and very expensive. They act as good interfaces for high-capacity hard drives used as network file servers and for very high-powered scientific and engineering applications. For the average user, it's not really worth spending lots of extra money on a SCSI, especially as EIDE now provides similar performance results.

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