digit

Fast Track *to*
UPGRADE
YOUR PC

Your PC Explained

Before You Upgrade

Basic Repairs

Character-sketching Your PC

Companions For Your PC

Networking And Communications

Upgrading The Operating System

Jasubhai
DIGITAL MEDIA

Fast Track
to
Upgrade
Your PC

By Team Digit

Credits

The People Behind This Book

EDITORIAL
Sachin Kalbag Editor
Aditya Kuber Coordinating Editor
Bhaskar Banik Writer
Ram Mohan Rao Copy Editor
Renuka Rane Copy Editor

DESIGN AND LAYOUT
Jayan K Narayanan Lead Designer
Harsho Mohan Chattoraj Illustrator
Vijay Padaya Layout Designer

June 2005
Free with Digit. Not to be sold separately. If you have paid
separately for this book, please e-mail the editor at
editor@thinkdigit.com along with details of location of
purchase, for appropriate action.

Upgrading Your PC

Remember the time when a 386 machine was considered more than enough for everybody, for everything—from games to programming? Remember the ads in newspapers with prices falling by the day? It was around that time that the hunger for increased processing power began, and it was around the same time that the upgrade races too gained momentum.

As time passed, and as people's needs increased—sometimes reasonably, sometimes driven by marketing and advertising—we saw more and more powerful home computers enter the market.

But it's not possible to buy a new computer every year and so we upgrade parts of our existing computer that we think are the most important like the memory and the hard drive.

Upgrading computers used to be the forte of the elite few called hardware engineers. But with increased availability of information and awareness, reduced complexities in installing devices, upgrading and maintaining a computer is now simpler.

First and foremost, you need to have the curiosity to peer inside the dusty tower you call your computer. Having some knowledge of computers is helpful, but curiosity is the driving force. One thing you need to understand is that upgrading a computer is not going to be a walk in the park, and there are pitfalls and stumbling blocks. However, it need not be a tedious job either, and you can also have fun fiddling with your machine.

This book covers several upgrading issues ranging from the operating system to the hardware. Sections such as 'Opening Pandora's Box', and 'Companions For Your PC' will help you understand the installation of devices while having fun wiring them up. We are also talking about modems and networks territory.

Troubleshooting software issues and finding help for these is also covered as is a special Q&A section, answering queries related to upgrading, is also a part of this book. We finish off with a thorough bibliography of essential books and resources that will satisfy your thirst to know more. While you may be tempted to skip certain sections of the book, BIOS settings and other such sections are important and we recommend you not to skip these. Let's upgrade!

Contents

Ten Fixes To Try

There are a few 'fixes' you must take care of before upgrading your PC. In the following few pages, you will find tips you can try before actually upgrading—to do a cheaper upgrade instead of going in for a more expensive one, for instance. If you feel you need a new power supply, try repairing the old one first. If you think you need more RAM, consider the idea that one of your RAM chips may be bad—and you can get this replaced from your dealer. And so on.

Here, then, are 10 possible money-saving tips.

1. Does your PC shut down by itself, sometimes at intervals of half a minute, and sometimes half an hour? Does it hang for no reason whatsoever? Did you run a virus scan, and nothing showed up?

    Instead of upgrading other components, think about the power supply. If it is not powerful enough, it could cause several other problems. So, get the power supply checked. In some cases, a capacitor or some other component may have blown, in which case you can get it repaired. Otherwise, too, you may consider buying a better, more powerful power supply.

2. Overheating is a frequent problem, which mostly occurs if you are using your PC during hot weather without any air conditioning. Your computer can run slow, and crash often. If this is the case, think whether your computer is indeed overheating. Do not rush to upgrade.

    Overheating can be fixed in many ways, some of which have been discussed in past *Digit* issues. The most common solution is to add an extra fan, while ensuring that there is sufficient space for ventilation inside the cabinet. Remove wire clutter. If need be, buy a larger cabinet.

3. Here is a tip that may not apply right now, but could affect a future upgrade: remember that hard disks are mechanical devices, and most often require an upgrade or repair when the mechanical system fails. Remember that the mechanical system can fail due to overheating.

   Do your hard disk a favour, and get a hard disk fan. This can be mounted either directly above the hard disk or right in front of it. If it is mounted above the hard disk, it will take up the space of one IDE drive, but it will be worth it.

   You can do another simple thing to increase the life of your hard disk: go to the power saver settings in Windows and set the hard disks to turn off after 3, 5, or 10 minutes of idling. This has the negative effect of your sometimes needing to wait a while for the hard disk to turn back on, but your disk will be happy you did it—it will not spin nearly as much.

4. Some people tend to rush in to upgrade if the Net runs slow. Don't do that! It could just be a modem problem. Take your modem to a technician and see if it can be repaired. There are several factors involved, including your phone line—ask your technician to do some troubleshooting. You might need to get a new modem, but that is better than going for a more expensive upgrade.

   Of course, you could do away with the modem altogether and go in for broadband. Some broadband services don't require a modem on your end at all—just a network card. Some require that you purchase an ADSL modem.

5. We've said it before, and we'll say it again: get RAM, get RAM, get RAM! If Windows runs slow, you may be tempted to think of a system upgrade. You might think your computer just isn't powerful enough to run Windows XP.

   In such cases, recall that Windows XP requires a lot of RAM to function properly. Buy more RAM. The more RAM you give XP, the happier it will be—to a point. In some cases, 512 MB will do just

fine, and upgrading to 1 GB won't help at all. In other cases, a 1 GB upgrade is called for. Tell your vendor about what programs you run, and about the configuration of the rest of your system, so he can determine how much RAM you need.

6. If you have an old computer and the display doesn't look too good, with colours showing up weird and such, don't rush to get your monitor changed!

It could be just a problem with the display card. Try it first—get a cheap, perhaps second-hand, PCI display card. This should cost hardly a couple of hundred rupees, so it's worth trying out even if it does turn out that you need a new monitor.

7. If you have desktop speakers with an old computer, and are wondering whether the sound can be improved—don't first think of getting a new speaker set. Changing the sound card might help, and you can keep your old desktop speakers.

Check if you have an ISA sound card. These are outdated. The good news is that PCI sound cards are very cheap, and also, you can get second-hand ones very easily. Doing this minor upgrade might have a big impact on the sound your get from your old speakers. Of course, we're not talking really great sound here— just decent, will-do sound.

8. If your computer seems too "weak" for Windows XP, then, RAM apart, you might feel you need a complete system overhaul. Don't do that—try a faster hard disk first. Hard disk speed affects the system speed tremendously.

This doesn't apply if you have a really old, Pentium 1 system—in this case, a faster hard disk won't help. You'll need to do a fuller upgrade.

9. Do a thorough virus scan.
You may not know it, but spyware and viruses may be slowing down your system. If necessary, get a professional virus scan

done. This is a really simple fix that you must try before going in for anything else, in the case of your computer seeming slow. There are plenty of stories of people who upgraded their processors only to find that their system was still slow—and the cause turned out to be viruses on the hard disk.

10. Constant reboots required? Don't upgrade your computer—just upgrade the OS.

You may be one of those who swear by Windows 98 and are unwilling to accept the fact that 98 is, simply speaking, ancient. Get out of that mindset—upgrade to Windows XP. XP is a stable, in fact wonderfully stable, operating system. You could find that the number of times you need to reboot will drop by 90 per cent when you get XP! But you also need to keep in mind that upgrading to XP could mean that you'll need more RAM. But it will be worth it.

Ten Tools You Will Need

Here are 10 tools you need to keep handy when you're going to do an upgrade job on your computer.

1. A complete screwdriver set with a tester
This is, of course, the most essential thing of all. Remember that trying to use a single screwdriver in a one-size-fits-all style may seem to work for many screws, but you'll be wearing down the screw heads—and this is entirely avoidable by getting a complete set.

2. A multimeter
This can help check for grounding problems, checking whether the power supply is working fine, finding out which IDE power supply cables aren't working, and so on.

3. Pliers, tweezers, wire cutters, and other such tools
These are available at any hardware store, and are the same as those required for any other kind of mechanical work. Tweezers, for example, are a great help when screws fall into the computer case and you want to get them back out.

4. A set of screws
This is essential. You may get screws supplied with your motherboard if you're doing a motherboard upgrade and so on, but unless you're doing a major upgrade like this, you'll need to purchase a set of screws at your local hardware store. Get as many sizes and shapes as you can.

5. A hard disk mounting rack
This is useful if you have only a 5.25-inch bay left and you need to put in a regular 3.5-inch drive.

6. IDE cables
These are available at any computer store. You may want long ones or short ones, depending on how you've placed your drives and the placement of the connectors on your motherboard. In

general, keep the connectors as short as possible without having to twist them too much.

7. Cloth, tissue etc
If this will be the first time you're opening up the box, you'll need to do a lot of cleaning. Keep cloth and tissue handy to clean up the case, especially contact points.

8. A vacuum cleaner
No, not a 400 W home vac—just one of those small ones you get for laptop keyboards. This is useful to clean up places that are hard to reach with cloth and tissue.

9. An IC inserter and extractor
These will be needed if you're going to work on the CPU or do any kind of advanced tinkering with the motherboard. These should be available in some computer stores.

10. Finally, an adjustable wrench
This will come in handy for tough screws and nuts.

The Ten Commandments Of Upgrading

1. DON'T upgrade unnecessary stuff. Upgrade only what you really need. When going in for an upgrade, there is always the temptation factor involved—"if I'm going to upgrade this, how about getting a new hard disk as well? That will make my computer spanking new..." Avoid the temptation.

2. DO look at market price forecasts. You'll often see that something is expected to come down, in terms of price, within a few months. Wait. You can save a lot of money this way. Looking to buy a DVD-Writer? Check the current price, and also check how and whether prices will dip in, say, three months from now.

3. DO remember what kind of software you'll be running while doing the hardware upgrade. Will the RAM be sufficient? Will the processor be fast enough? It may seem as though we're contradicting what we said above, about avoiding the temptation to upgrade more than necessary. But what we're saying here is, don't follow the herd when you're on the upgrade path. Look at your requirements from the software point of view as well. If everyone is upgrading to SATA hard drives, for example, don't do it unless you really need one. On the other hand, if you do a lot of processor-intensive work, go for a really fast processor.

4. DO remember your hardware limitations while doing a software upgrade. This is a complementary to what we said earlier. If you're thinking of upgrading to XP and you don't have enough RAM—and can't afford it right now—don't do the upgrade. If you're upgrading to Photoshop CS, check the processor and RAM requirements before you do.

5. DO remember cooling requirements and power supply requirements when upgrading. These are things you may not have factored in. If you're upgrading to a much faster processor, for example, your current cabinet and cooling system may have to be overhauled as well.

6. DON'T rack hard drives on top of each other, cramp up the space with wires, etc. Buy a bigger cabinet if need be.

7. DON'T do a mismatched upgrade—for example, too much RAM for a relatively slow processor, etc. You'll need some research to come up with a balanced system configuration.

8. DO keep ergonomics in mind when upgrading keyboards, mice and any other input devices. This is very important. It also depends on how often you use your computer. And it also depends on what kind of chair and table or desk you'll be using. If need be, simulate your seating arrangement when you're purchasing, say, a new keyboard, to see if you're comfortable. Also, consider something like the Natural Keyboard from Microsoft.

9. DON'T rush in for something that strikes your fancy. For example, Zip drives in their heyday were attractive, but they soon fizzled out because CD-Writers were just round the corner. Those who didn't consider all their options were left with poky 100 MB drives, while those who did were up-to-date—with 650 MB media drives. This is a lesson from the past well worth remembering.

10. DO balance your budget. Do you need more RAM, or a larger monitor? Do you need a larger hard disk, or a better cabinet and power supply? It may seem odd to compare such diverse components, but unless money is no concern, you'll need to look hard and see what exactly you want to upgrade, and what you can do within your budget.

Building Blocks
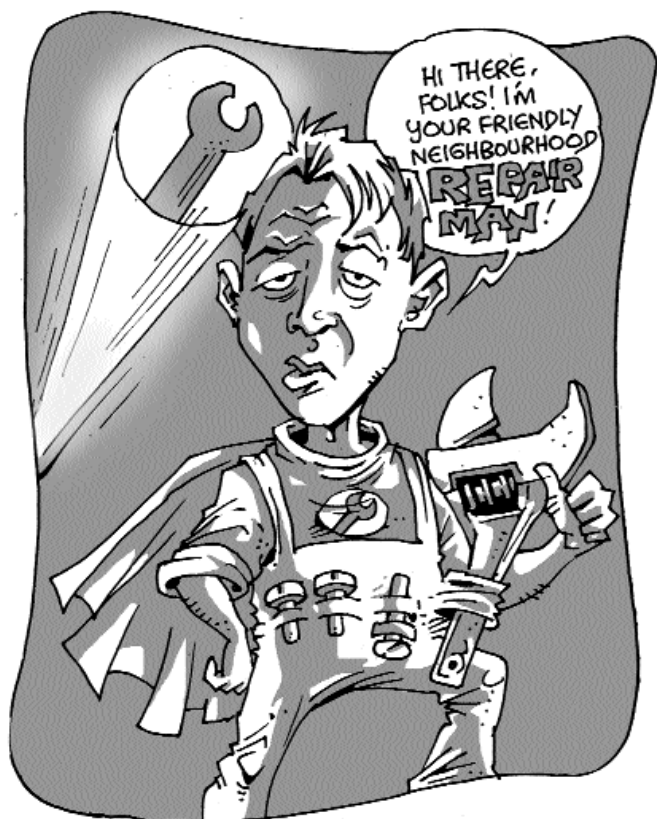
First off, you need to get your basics right. Opening a computer case for the first time is not a joke—changing or just touching something could prove to be the root cause of the untimely demise of your computer. The basics need to be in your head at all times so you avoid the pitfalls inherent when upgrading your computer. Let's get on with it, then!

1.1 Ground Zero
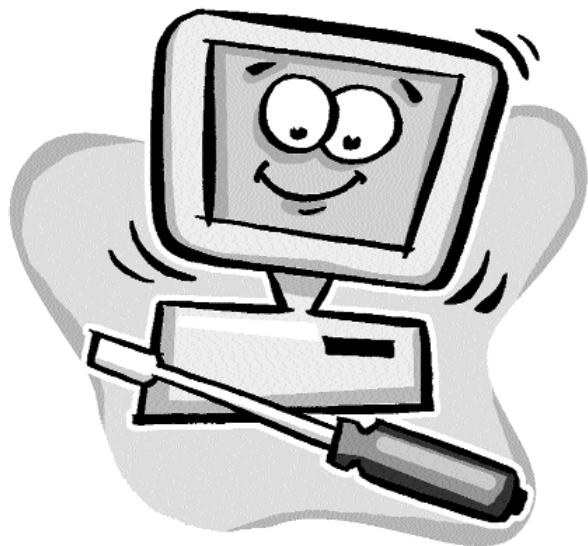
The essential equipment you need includes a complete set of screwdrivers, or one of those neat multi-headed screwdrivers with replaceable heads; an anti-static wrist strap; small needle-nose pliers (forceps from a dissection box can also be used here); and a small piece of thin but hard wire. The Philips-head (or the star-shaped) screwdriver will be the most-used one on any given day when you open a cabinet and install any device. The pictures on these pages should give you a better idea of what is needed.

The human body emits minute electrical charges under certain circumstances. This is what we call static
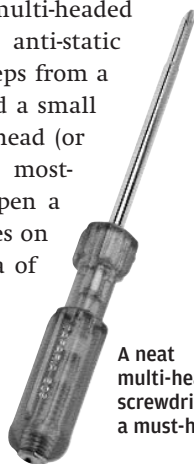
A neat multi-headed screwdriver is a must-have

electricity, or just static. All components inside a computer conduct electricity. So even if these devices are not inside the computer, they are packed in an anti-static bag to protect it from stray currents of electricity, of which our bodies too, are sources. These components are extremely sensitive to static electricity, also known as electrostatic discharge (ESD). ESD can damage a device the first time you touch it if proper precautions are not taken. So, even before you have used that spanking new video card, thanks to static, you could have already destroyed it.

To prevent this, the simplest (and least expensive) way is to ground or earth yourself before you touch anything inside the computer. You can do this by touching a metal object (such as the sides of the computer tower or a metal rod) for some time. Only then, should you start taking apart your computer. Or, you can wear an anti-static strap at all times when working with the computer to make sure you don't damage anything. This method is the more recommended one. You can purchase an anti-static wrist strap from any computer hardware store.

Now that you have the necessary tools at hand, find a place to disassemble the computer. Ideally, the place you would want to operate on your computer should be illuminated well and static-free. That means, no working on carpeted floors. Choose a stable

Wear an anti-static wrist strap before you start taking apart your computer
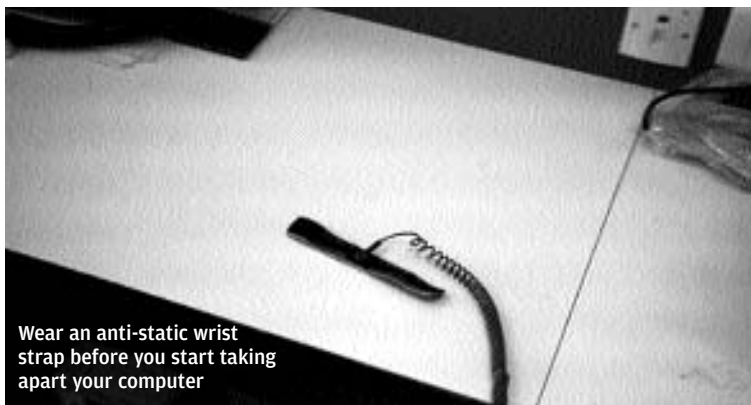
and sturdy surface to set the computer on. The place should have enough room to accommodate all components that will be needed. Also, ensure the location is near a grounded outlet, so you can test your computer if needed during and after component installation.

If this is the first time you're going to fiddle with the innards of your computer and if all your previous upgrades having been done by your hardware engineer, get a blank sheet of paper. Now, get to the back of the computer and check everything out. At first sight, everything may look alien to you, but what you need to do is draw a rough sketch of the back of the computer and then trace the wires or cables to the various devices they are connected to. This will help when reassembling the machine. In older computers, colour coding is absent, and this will help even more.

Manuals play a crucial role. If your computer is old, you may have lost the manuals. It would be a good idea, though, to locate whatever you can, and keep it handy.

Before you touch the insides, make sure that all cables including the network, phone and power cables have been detached, and that the computer is free from anything attached to it—including the speakers, keyboard, mouse, and any USB devices.

You may want to think about stuff outside the box that needs upgrading—keyboards, printers and such. Here's a brief digression on these before we get to opening up the box.

1.2 Keyboards And Mice

Keyboards and mice are the most-used input devices and the least-upgraded ones. The main reason people don't upgrade these is belief in the 'if it ain't broke, don't fix it' principle. However, if you use your computer for the most part of the day (or night!), you need to think about your fingers and wrists. Carpal Tunnel Syndrome, or CTS as it is commonly known, is a physical issue that occurs with many computer users. One of the most common reasons that it begins is because of repetitive bending of the wrist. Poor ergonomics and irregular posture are other reasons.

At a time when computers cost a bomb, no one paid attention to what kind of keyboard came with them—users went along with whatever was available. And so, if you are still using an old 101-key keyboard, it's time you upgraded to a newer one. Keyboards available today are more ergonomic, provide extensive ease of use, and the best part is, they come cheap.

You can start from a basic multimedia keyboard from Acer or Samsung with multimedia keys and buttons. The buttons on the keyboard act as shortcuts for opening some the most-used applications in Windows such as the Media Player, Internet Explorer, and others. If price is no concern, you can choose a spill-proof RF wireless keyboard with which you can have long, strain-free gaming sessions. Some models from Microsoft retail at around Rs 4,900, and offer a host of features such as optical fingerprint recognition and more.

Keyboards are available from various companies including no-name local brands that are here today, gone tomorrow. We suggest you upgrade to a keyboard from a well-known brand, even if there is some difference in the price. For our views on various keyboards, refer to the handy *Digit* PDF section on our DVD, or check out our buying guide in the December 2004 issue. A few keyboards are shown here as well.

Some keyboards and mice
come bundled together

It's the same with mice as well. There are a lot of things that point towards an upgrade. For instance, if you are using a ball mouse, we recommend you move to an optical mouse. Why? Because they are cheaper, and in the long run, more comfortable than a ball mouse—and also do not require cleaning like ball mice do. No more erratic cursors running amok on your screen!

Newer optical mice from, for example, Logitech, are based on laser technology. An example is the Logitech MX1000, which retails for around Rs 5,000. This offers more precision than regular optical mice, and is targeted more towards users who are into gaming or drawing. However, for upgrading from an older mouse, you need to keep the following in mind: older mice connected to the serial port; newer mice connect either to the PS2 or the USB port. (We will talk about the various ports on the back of your computer in a little while.)

Mice, like keyboards, come in wired and wireless flavours. Wireless is in the form of Infrared (IR) or radio frequency (RF)

A cordless mouse and its receiver

types. IR devices, though common some time ago, have been considerably overshadowed by RF ones. RF offers more freedom in terms of distance and positioning when compared to IR devices. This is because IR works on the line-of-sight principle, which makes it necessary for the device to be located near the IR receiver for transmitting data. With RF, this scenario changes, and you can move around freely within a specified distance—and the mouse and keyboard will still work. The downside to this, like always, is the price.

If you would like to upgrade both—your keyboard and mouse—you can look for a package. Companies like Microsoft and Logitech have special keyboard-and-mouse bundles that provide greater value for money.

We also need to talk a little about gamepads and joysticks meant specifically for games. While gamepads are multi-purpose

More modern high-end normal and gaming mice

and can be used for racing simulators, flight simulators, First Person Shooters etc joysticks are meant specifically for flight simulators. You could configure one for other games, but if you really want to experience a flight simulator to the max, a joystick is a must.

A new-generation gamepad

While older joysticks and gamepads are still good enough for the games available today, features such as force-feedback may not be available on older joysticks. Force-feedback is a technology that emulates in-game environmental conditions to make you feel you are actually in the game. For instance, if you hit the gravel driving a car in a racing sim, the gamepad can actually shudder in your hand to give you the experience of driving a car over gravel. Newer gamepads also feature PlayStation-type dual control sticks on the pad (as shown in the image below). This comes in very handy when playing racing and flight simulators and also action games.

A high-end joystick

Again, you have the option of choosing between wired and wireless versions. Buying a wireless gamepad or joystick makes more sense since if you are engrossed playing a game, you may become reality-impaired—tugging on your wired joystick or gamepad may or may not help you

A high-end LCD monitor

attain your objective, but it will definitely help you damage your gaming device! There is a choice of brands, and you should research in the local computer market before picking one. Again, settling for known brands will serve you well in the long run.

1.3 Monitors

CRT or LCD? You decide...

Monitors remain the most-neglected device when it comes to upgrading. With prices taking a downturn, upgrading to a bigger monitor is not a bad idea at all. Newer monitors are more environment-friendly and generate less radiation. Moreover, you can turn in your old monitor and get a new one with a bit of reduction in price (as in a buy-back scheme).

A 17-inch monitor is the minimum you should opt for in CRTs, and a 15-inch in LCDs. However, there are pros and cons you have to understand when you're choosing a monitor. CRTs are excellent if you are an avid gamer or movie buff. The clarity and quality offered by a CRT in movies can't be compared to that on an LCD. But LCDs offer you space-saving designs and low power consumption, as well as a decent gaming and movie experience. Regular office work can be handled competently by either.

Where CRTs lose out is on their size: the bigger you choose, the greater the space it consumes on your desktop. LCDs, on the other

CRT monitors offer
good clarity

hand, take up more or less the same amount of space even if they are bigger in size.

Also, upgrading your monitor depends on your budget. If you can afford a 19-inch monitor, go for it: you wouldn't have to think about upgrading your monitor again for a few years. 15-inch LCDs from brands such as Acer, Digi-view and CMV cost approximately Rs 10,000, while 17-inch LCDs start from Rs 15,000, and can go up to Rs 30,000. In CRTs, 19-inch monitors start at Rs 14,000, with flat 19-inchers costing around Rs 18,000. (Check the May 2005 issue of *Digit* for more on LCD monitors.)

CRT monitors are available from well-known; however, LCDs are also available from no-name brands, and you have to watch out for these. In case of LCD monitors, check for 'dead pixels' (they don't light-up on the monitor) on the screen due to manufacturing defects. CRTs, thankfully, are free of such defects.

There's a myriad of options in brands to choose from. Aperture-grille CRT monitors offer excellent clarity, and if you can afford one, go for it. One reason you would want to opt for an aperture-grille monitor is that they are very flat. This offers extreme clarity. For more information, you can refer to the *Digit* CRT comparison in the March 2004 issue.

1.4 Printers

Inkjet printers are
ideal for home use

Printers were once considered luxury devices when buying a
computer. Printers bundled with computers were usually inkjet or
dot-matrix printers.

Today, though, printers are much more efficient and serve a
variety of purposes. However, that doesn't mean you go flat out
and sell your old printer. Make a sensible upgrade. If your needs
are satisfied by your current printer, make do with it.

How do you know it's time to upgrade your printer? When you can visually compare older printouts with newer ones and see that they are not of the same quality, colour- or clarity-wise, it may be time to upgrade. Also, if the printer has undergone repairs and pops up a problem every now and then, think of upgrading.

It also depends on how and what for you use your printer. If you only occasionally use a printer for printing résumés or recipes off the Internet, you can certainly make do without an upgrade. Inkjet printers definitely score over dot-matrix ones if you are using it in a home. Text quality, for one, is much better, and you can also use an inkjet printer for other purposes such as printing on T-shirts (more on T-shirt printing in the April 2003 issue of *Digit*) and making CD labels, which are simply not possible on a dot matrix printer. On the other hand, a dot-matrix printer is the device of choice if you have a departmental store or a similar business where volume printing is the norm.

If you would also like to do a bit of scanning (digitising your old photographs, for instance), you could consider an entry-level Multi-Function Device (MFD). It can scan, print and copy. Not only does this save money in terms of the purchase cost, the

Laser printers are used where high volume of printing is needed

maintenance and running costs of such a device are pretty low, too. The quality though, in general, may not be as good as it would be in the case of a dedicated printer or scanner, but it will still be good enough for home use.

You can also opt for an entry-level monochrome laser printer, which will provide faster printing as compared to inkjet printers. Laser printers will be particularly useful for engineering students and those who are doing management studies, since they usually have a lot of project work and case studies. Laser printers come in extremely handy when doing project work since you can get professional-looking print-outs at half the cost of getting it done from a shop—and fast.
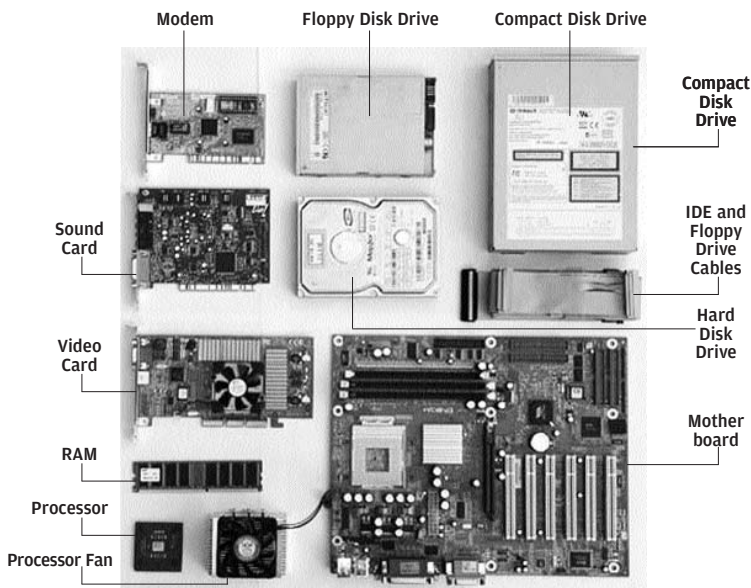

MFDs are often a good choice for homes

Character-sketching Your PC
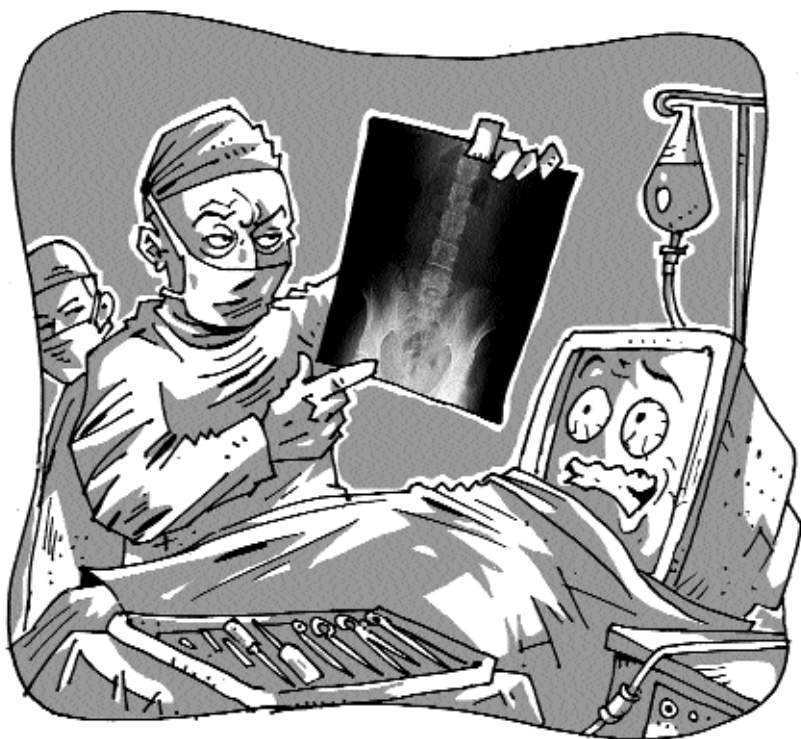
In the previous chapter, we have seen the possible upgrades that can be done without opening up the box. Now, lets look at the inside of the PC, where everything—from the RAM to the LAN card to the power supply—can be upgraded.

2.1 What's inside?

Modem   Floppy Disk Drive   Compact Disk Drive

Compact Disk Drive

Sound Card

IDE and Floppy Drive Cables

Video Card

Hard Disk Drive

RAM

Mother board

Processor

Processor Fan

The main components of your computer at a glance

The Computer Case

Computer cases (or cabinets) come in various shapes and sizes, and are differentiated into two broad categories depending on what power supply they have: ATX or AT. They are further divided into sub-types such as tower cases, mini-tower cases, or desktop cases. The latter are very good in terms of space saving, and mostly belong to the ATX power supply category.

Cases with the AT type of power supply resembled the mini-tower ATX cases of now, and had much lesser room. Also, about five to six years ago, AT power supplies were more prevalent in home computers than ATX power supplies, because the cost of the latter was considerably higher. Besides, if you opted for one, you
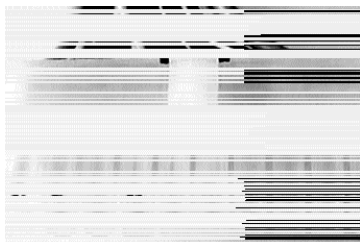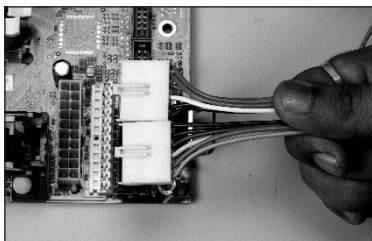
ATX Motherboard Power Connector
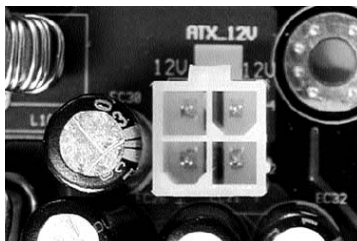
ATX 12V Motherboard Power Connector

also needed to get a motherboard that specifically used that kind of power supply. These motherboards cost significantly more.

AT Motherboard Power Connector

The images on this page should reduce the confusion about what type of power supply you have. The differentiating factor is the type of power connectors that connect to the motherboard from the power supply.

Look at the images, and then look inside your case. It should then be clear what type of case you have. For either type, you will need to remove four to six screws on the back of the case. In most AT cases, the metal plates covering the tower will come off completely once the screws are removed and the sleeve is slid on the outside.

For ATX cases, it is a bit different: the sleeve on each side has to be removed individually after the screws are removed from the back of the case.

Desktop cases are a different species: they can have both ATX and AT power supplies, and you cannot just look at a desktop case and say what kind of power supply it has. You can only do that after you have opened the case. Another thing is opening a
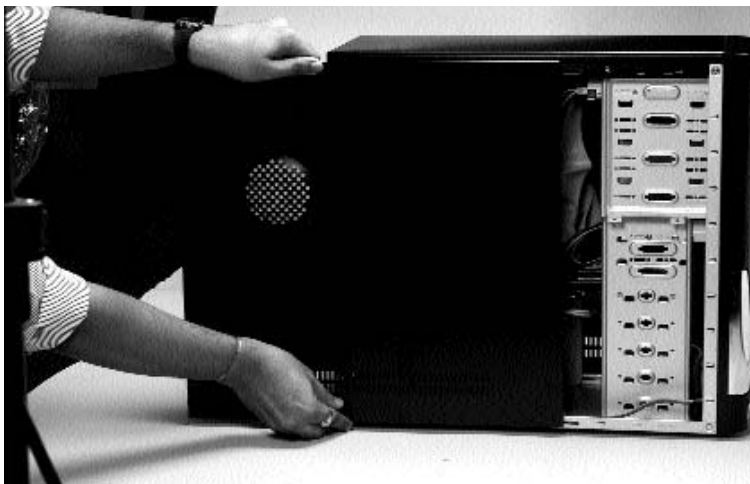
Slide the metal sleeve outwards in an ATX Case

desktop case: with some cases, you need not remove any screws—just press two buttons on either side of the case, and either slide the metal cover or pull it upwards. In some cases, you will have to remove screws on the back of the case while in others, you have to do both. As a precaution, check for screws at the back of the case.

Again, before you dismantle the case, make sure that you have disconnected all power cords and other component cables and isolated the case in a well-illuminated, static-free workplace.

Upgrading The CPU

Once you open the tower case and start peering, you may be scared by the collected dust and cobwebs—if this is the first time anyone has opened it in several years—and also by the devices inside. But fear not: you have this book for reference!

First off, clean the inside of the cabinet with a piece of cloth and a small blower or fan. Clean it to the point that you can look clearly inside the case. There will be lots of stuff inside the computer that you may or may not have seen before. However, let's assume that you haven't, and move to upgrading the CPU.

You'll see a lot of cables running all over the place, stuck on one end to various devices, with the other ends attached to a common board. This is the biggest circuit board inside the case, and is called the motherboard. It has various types of slots on it, and also houses the CPU and the RAM modules. We'll get to these a little later; the part we are concerned about right now is the CPU.

A CPU upgrade is generally necessary when you try installing applications and games and they don't work properly—or give too many errors, or crash frequently. This is due to insufficient processing power.

Before you start tugging at the heat-sink of the CPU, let's go through a small checklist that will prevent you from damaging the CPU. First of all, make sure you have enough room to work with the CPU without any obstructions, most notably the power supply and the add-on cards on the motherboard. If anything is causing an obstruction, remove it gently. If the RAM modules are coming in the way, remove them by pushing the little levers on both sides of the slot. This will make the RAM module pop up. Before you remove the module, note the manner in which it was inserted, so you can put it back in the right way. (You shouldn't try and push it in the wrong way; there's only one direction in which it will fit.)

Removing the power supply is pretty easy—all you have to do is disconnect all power cables connected to all devices inside the cabinet, including the motherboard, and then remove the screws on the back of the tower that go into the power supply. Then gently slide the power supply out of the cabinet.

For add-on cards such as an internal modem or a video card that may be obstructing your view of the CPU, remove the screw on the back panel that attaches it to the tower, and then remove it gently by pulling it out of the slot. In case of video cards that are plugged into an AGP slot, check for a small lever that acts as a lock before trying to remove the card. Once you have taken all these

precautions and removed all obstructions, we can move on to removing and upgrading the CPU.

There are various forms of CPUs available, but upgrading only the CPU is an option available to users who have the current generation of CPUs, such as an Intel Pentium IV or an AMD Athlon or Duron. This is because only current-generation CPUs are available from dealers and retailers.

Another factor is the warranty on the processor. Older Pentium II and Pentium III processors are already out of warranty, so there will be no such processors available in the market in the first place for you to go and upgrade. In such cases, you will have to go in for a complete makeover, which will result in an almost new machine. Thinking of upgrading, you will fall in one of two categories, the first being a Pentium I, II or III or an equivalent AMD or Cyrix processor category. The second category would be a Pentium IV or an equivalent AMD processor category.

If you belong to the first category, upgrading the CPU will generally involve purchasing a second-hand, out-of-warranty CPU, and selling your old CPU for a not-so-good price. If you fall in the second category, you can get a spanking new processor with a warranty, and also a good resale value on your old processor.

In the first category, you will come across three different physical slot types. The first is Socket 7, applicable to Intel Pentium and AMD; then Slot 1, again applicable for three types of processors—Pentium II, Pentium III, and Celeron; and Slot A for the AMD Athlon Thunderbird series. There was a socket called Socket 370, created specifically for the Flip Chip Pin Grid Array (FCPGA) type of Pentium III and Celeron processors.

None of the processors mentioned above are available from retail stores and the only option you have is to either go for a new motherboard, processor and RAM, or settle for a second-hand deal, which is unviable because some time, you will have to upgrade.

In the second category, there are, again, two types of sockets: Socket 478 for Intel, and Socket A for the newer AMD Athlon and Duron range of processors. Newer Pentium IV processors for the PCI-Express chipset use the LGA 775 socket, while AMD 64 chips use either Socket 754 or 939.

The above information is necessary since you need to understand what you're upgrading your CPU to, and how to do it. Whenever you hear sockets mentioned, the term refers to the white socket, usually square, on the top of the motherboard: this is what the processor goes into.

When we talk about a 'Slot' type of processor, it refers to a dark brown slot on the motherboard that is completely isolated from all the PCI and AGP slots. The processor is rectangular and mounts vertically like an add-on card into the slot. The images below will help you understand what we're talking about.

Now that we have seen what processors go into what kind of slot type, let's try removing and installing some into their respective slots. While we do this, it is important to understand that while the Slot type of processors do not need to have their heat-sinks and cooling fans removed to remove the processor, Socket-type processors do: the processor is secured completely in the socket while the heat sink is mounted on top of the processor, and the cooling fan is mounted on the top of the heat sink.

The heat-sink and cooling fan mechanism is secured by a latch on the top of the motherboard. The processor can be removed by pulling gently on the plastic or metal lever on the side of the socket. Once this lever reaches up, gently pull out the processor.

A completely installed slot processor
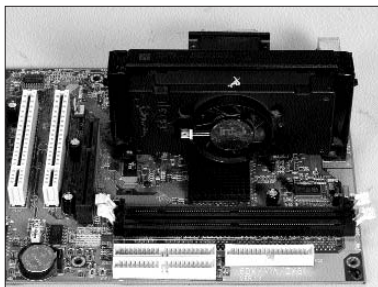
Slot-type processors are secured by locks on the side that run along the breadth of the processor. It is necessary to remove this lock first and then pull out the processor from the slot.
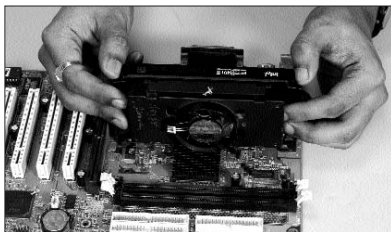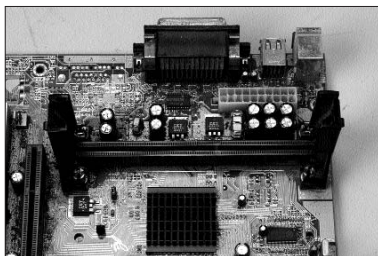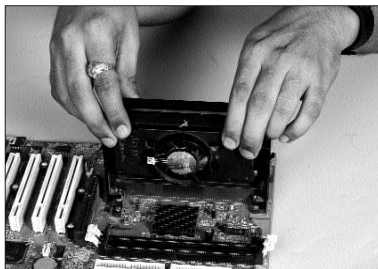

Removing a slot processor

For processor upgrades, we will only dwell upon processors belonging to the Pentium II and above category. A system with a processor below this can be put to other uses: they can be used as dedicated Linux boxes, for Internet surfing, and for playing old DOS and Windows games. Upgrading these is not a good idea.

For Pentium II and Pentium III Slot processors, you can remove them from their slots as described above. Here's a list of steps for installing the processor:

1. Make sure the immediate periphery of the processor slot is empty. If there are capacitors lining the slot, make sure you don't apply force on them when installing the processor.

An empty PII/PIII processor slot

2. Align the processor with the notch on the slot. Insert the processor slowly at both ends and then gently push it downwards. The processor will automatically slide in, and the locks on either side will click into position.

3. Once installed, connect

Inserting a slot processor

the fan power connector to the pin that has 'PWR_FAN' (this is the case across nearly all motherboards) imprinted near it. The exact placement of the word varies with different motherboards.

Before you upgrade the CPU, make sure you check the maximum processor speeds that the motherboard supports. Older motherboards that supported Pentium II 200 and 233 MHz processors were unable to support later versions of P2 processors. So you'll need to refer to the manual. Some motherboards had jumper settings on the motherboards with a table explaining the combinations for different speeds imprinted on the motherboard.

If you are missing the manual for your motherboard, you can do a search on the Internet with your motherboard model number as the keyword, and look for the manual. Else you can contact your hardware dealer.

With the Slot type of processors taken care of, let's move on to the Socket type of processors. There is some difference in the installation.

Socket type
processor PIV
3.06 GHz
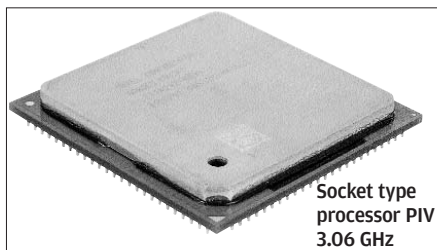
1. Remove the heat-sink by unclipping the locks on both sides of the processor. The images below show how to do this for both the Intel and AMD processors.

2. Once this is done, keep the heat-sink aside and look for the lever on the side of the processor socket. Gently pull it upwards.

3. Now take the new processor out of its box, apply some thermal paste on the top, and then place it in the socket. When placing the processor in the socket, note that the processor only fits in

one manner. The processor has
a small arrow pointing
outwards, which is the way it
has to be placed in the socket—
the socket has a small blank
space where the part of the
processor with the arrow mark
should be placed. Once you
have put in the processor in
the socket, it should fit snugly.
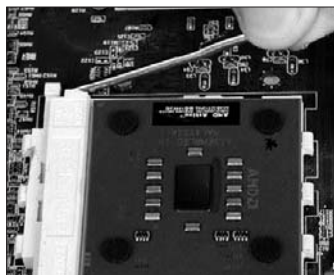
Finishing a socket type processor
installation

Check the corners of the processor to see if you can feel if any part
of the processor to be not on the same level as the rest of it. If there
is, take out the processor and re-insert it properly. When the processor
is properly inserted, you should be able to touch the surface and see
that it is level on all sides. Now lower the lever until you feel or hear
a click that indicates that the processor is locked in place.

4. Now, take the heat-sink/cooling fan combo that came with the
   new processor and place it gently over the processor. Attach the
   clips to the socket base on the motherboard.

Apply Thermal paste on the heat sink and the processor
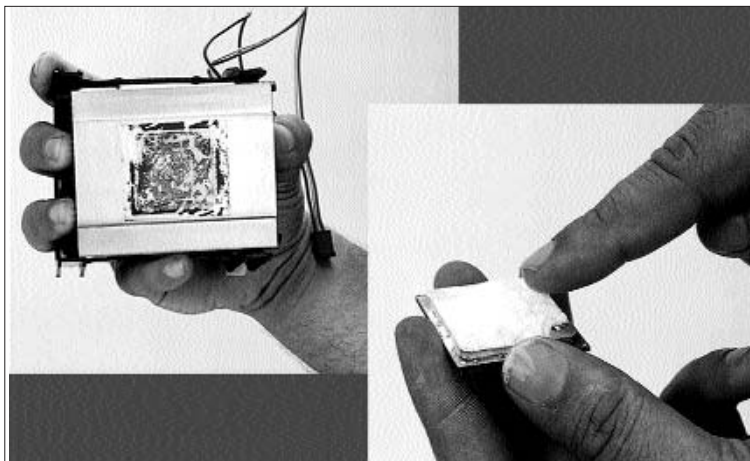
Install the processor in the socket

Connect the cooling fan connector to the proper labelled connec-tor on the motherboard and then install whatever additional components are to be installed (this is explained in further chapters), and boot the computer. Check for the display. If the display comes on fine, you can give yourself a pat on the back. If it does not, you will need to repeat the process and re-install the CPU.

Finally lock the cooling fan in place
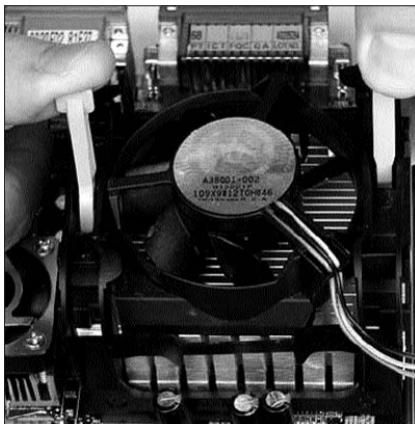
### Installing A CPU On An Intel 915/925 Chipset Motherboard

The upgradation steps mentioned above are for older-generation or current-generation CPUs. With the new PCI-Express architecture, this is going to change. If you are upgrading to PCIe, 'upgrading' is a misnomer, since it will be a platform change.

In such a case, if you are upgrading to an AMD CPU (say to an AMD 64 FX53), the steps mentioned above will be applicable. However, if you are upgrading to a platform based on the Intel 915/925 based board and CPU, follow the instructions below to install the CPU on that kind of board.

The slot on the board is different and so is the CPU that you are about to install. Before installing, let's take a good look at the socket and the processor.

1. Take the processor and apply some thermal paste on top of it. Place it in the socket so that the notch on either side of the processor coincides with the small jaws on either side on the socket, and fits snugly. Then, lower the metallic retention mechanism on the top of the processor. Lower the pin and tuck

Install the processor in the open socket
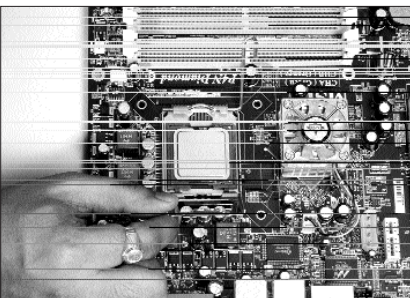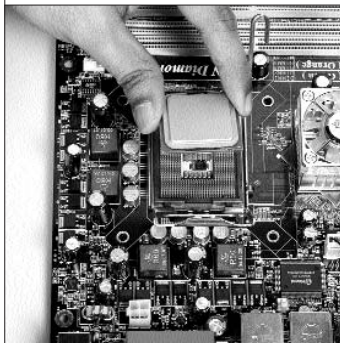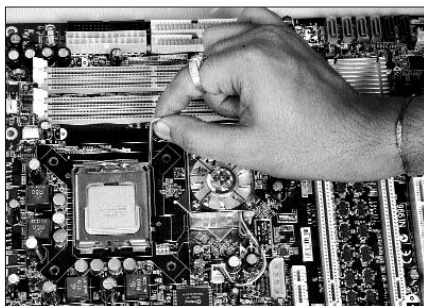
Pull the retention mechanism on top of the processor

in the side where it is to be held.

2. Keep the cooling fan on top of the CPU and gently press it down so that the screw on the top of the fan goes down the hole on the periphery of the CPU

Finally lower the lever to lock processor in place

socket on the motherboard. This completes the installation of the CPU on the motherboard.

2.2 Flashing Your Motherboard's BIOS
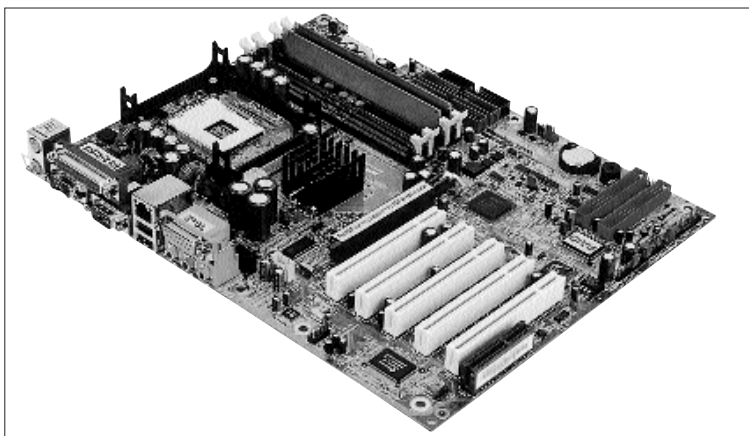
Flashing the BIOS is generally not recommended unless absolutely necessary, since if done wrongly, you can destroy the motherboard, and the damage cannot be reversed. If you are in the warranty period, you can send it for repair, but if you are not, you can blame nothing or no-one other than yourself.

So why is a BIOS flash required in the first place? Similar to Windows updates and patches, motherboard manufacturers provide you with performance tweaks, fixes and patches that enhance the features and performance of the motherboard, and also take corrective action against any bugs that may be present in the motherboard firmware. However, the process of upgrading or flashing the BIOS is not that simple. It will require some time.

Of late, motherboard manufacturers have realised this, and have come up with much more user-friendly solutions. We will look into the different ways you can go about upgrading your BIOS.

First, we discuss the regular way of flashing the BIOS: the floppy disk method. For this we need to complete some preliminary steps, listed below.

1. Make a DOS bootable disk and boot to DOS using this disk. This disk can either be a floppy disk or a bootable CD-ROM. Generally, a Windows 98 or Windows ME bootable floppy disk is preferred, since making a bootable CD-ROM takes much longer. To make a bootable floppy in Windows 98 or Windows ME, go to Start > Settings > Control Panel > Add/Remove Programs. In the Window that opens, click on the 'Startup Disk' tab. Then insert a blank formatted floppy disk in the floppy drive and click on the 'Create Disk' button.

2. To create a boot disk in Windows XP, insert a formatted floppy disk in the floppy drive. Next, open Windows Explorer (Start > All Programs > Accessories). Right click your floppy drive and click 'Format'. From the dialog box that appears, click 'Create an MS-DOS startup disk'. Windows will place the necessary files on the floppy disk that are required to boot the computer.

3. If you don't have access to Windows 98 or ME systems, you can go to www.bootdisk.com/bootdisk.htm and download the 'Windows 98 SE OEM' file. Once you have this file, double-click it and enter a blank formatted disk in your floppy drive, and the contents of the downloaded file will be extracted to the disk.

4. Next, download the BIOS update file for the motherboard. This is a hit-and-miss step for older motherboards, since you may or may not find the BIOS for your motherboard. Also, it is highly recommended that you download BIOS updates from the motherboard manufacturer's Web site, as you can be sure of what you are downloading. Downloading from third-party Web sites is not recommended.

5. Generally, the motherboard has information on it about the manufacturer and the model. But you will need to spend time on the Internet to locate the correct BIOS for your motherboard. Pay notice to the hardware revision of the motherboard, since some manufacturers such as Asus have different BIOS updates for different hardware revisions for the same motherboard.

6. The BIOS update is available in the form of a WinZip or WinRAR archive, and contains two files that are essential to the flashing of the BIOS. These are the data file and a DOS executable file that writes the BIOS information onto the BIOS chip. The filenames will be different depending on the motherboard manufacturer. Sometimes you will only see one file, which is the data file. In that case, you will need to check the support section of the motherboard manufacturer's Web site and locate the BIOS flashing tool, which will vary depending on the BIOS manufacturer. Examples are 'flash879', 'awdflash', and 'aflash'.

7. In addition to the two abovementioned files in the archive, you may also have a .bat file (a batch file) that makes the task easier for you, since all you need to do is double-click it, and the BIOS flashing process starts. There will be another file—a Readme.txt file—explaining the steps you will need to take to flash the BIOS. You may want to read that before you start flashing the BIOS.

Before starting on the flashing process, ensure that the boot order in the BIOS is set such that the computer boots from the floppy. Then follow these steps:

1. Start the computer and boot using the Windows 98 bootable floppy disk. You will reach the A: prompt.
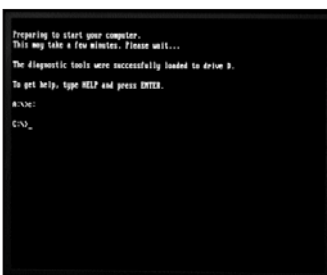

↑A **typical BIOS screen seen on pressing the Del key.**

↑ **Go to the Advanced BIOS features to access the boot sequence setting.**

2. Insert the floppy disk that contains the extracted BIOS files. If the BIOS update files contain a .bat file, then type the name of the .bat file at the command prompt and press [Enter], for

Set the boot order so that the computer boots from the floppy. Boot the computer using a Win98 boot disk, finally reaching the A: prompt.

example, A:/> xyz.bat [Enter] (In the above step, we have already saved the BIOS files on to the hard drive. This is an alternate method to flashing the BIOS using a floppy disk. You may also try this step if you want to.)

3. This should automatically start the BIOS flash process. You will be asked to provide the filename of the BIOS update file and once you do that, the process continues. If you are asked to make a backup of the existing BIOS, make the backup in a directory on the C: drive. At the end of the process, you will be provided with a result saying whether the BIOS update was successful or not. Finally, you will need to restart the computer.

4. If the BIOS update files do not contain a .bat file, you will have to perform the steps manually: at the command prompt, type in the name of the .exe file, such as 'A:\ flash879.exe' or 'A:\ awdflash.exe'. Then press [Enter]. You will be then prompted for

the filename and location of the data file. Enter 'A:\ filename', and press [Enter] to start the process. If you are asked to save a backup of the existing BIOS, make the backup in a directory on the C: drive. Now press [Enter], or whatever key is mentioned to flash the BIOS. At the end of the process, you will be provided with a result message saying whether the BIOS update was successful or not, and to restart the computer.

File listing of the BIOS update directory

5. Before you restart the computer, remove the floppy disk from the drive. The newer BIOS version will be displayed at the bottom of the POST screen when the computer boots.

If you see a newer BIOS version, give yourself a pat on the back for having gotten a tricky job done!

For flashing the BIOS through proprietary motherboard BIOS software in Windows, there are some generic steps you need to follow. First, install the software that came with the motherboard. For instance, MSI motherboards have 'MSI Live BIOS', and Asus has 'Live Update', which basically mean the same thing. Software such as MSI Live BIOS is a part of a complete suite that includes live update for LAN and other system component drivers.

Once the software is installed, you will need to configure it for checking for updates on the motherboard manufacturer's Web site. The advantage with flashing the BIOS from Windows using the update software is that you don't have to depend on a floppy disk or worry about mistyping the filename. On the flip side though, you do need to have an Internet connection, and also pray that the power doesn't go off during the flashing process. Once
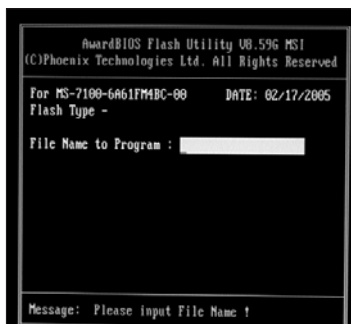
□ 1) First choose the BIOS filename. 2) Back up the current BIOS 3) Start the BIOS flashing procedure. 4)The BIOS is finally updated to the latest version.

the flashing process is completed, you will get a message to restart the computer. And that's about it; you've just upgraded your motherboard's BIOS. The screenshots below should make the whole process clear.

2.3 Motherboards

The motherboard is the base for all other components in the computer. Without the motherboard, the computer will be what it looks like from the outside: a tin box. It's the motherboard that accommodates all other devices like the sound card and LAN card, and it provides connectivity for external devices that are not accommodated on the motherboard physically, such as the hard drive or external USB drives, so that they can communicate with the processor. The motherboard is also a determinant in the performance factor of the computer.

There is a difference in the quality of the motherboards available in the market. For instance, you can opt for a cheap, on-board audio, video solution—or you can go for a high-priced, overclocker-friendly motherboard priced on the higher side. 'Good-quality' motherboards with an efficient architecture are more often higher in the performance ratings than regular motherboards. In fact, some motherboards are pushed in the market as high-performance. These motherboards are also priced higher than their 'regular' counterparts. Do a lot of research before making a decision.

When it comes to upgrading motherboards, look for a long-term investment. Processors, add-on cards and optical drives will come and go, but motherboards stay for years. So when you're upgrading your old motherboard, you may want to look at something that lasts you for at least four to five years.

When we are talking about motherboards, we can again refer to the same three categories that were discussed during the processor upgrade section. We will not be talking about the older motherboards that housed the Pentium I and equivalent AMD processors. Another point here is that currently, there are no motherboards available in the market that support Pentium II or III processors. Any upgrade would mean that you will have to move to a new motherboard supporting newer processors. Then again,

with the advent of PCI-Express, you could chuck all this out the window and go for a complete platform change a la 486DX4-to-Pentium II upgrades in the '90s.

The motherboards for both Pentium IV and AMD Athlon or Duron look alike with the exception of the processor socket types. They have the same PCI slots, USB ports, IDE/SATA connectors and regular ATX power connectors. Thus, illustrating an upgrade for a Pentium IV motherboard will give you a fair idea of how to go about installing an AMD motherboard. This process is, again, the same for PCI-Express motherboards for both processors, except for the processor installation process. This has been discussed earlier. We will therefore talk about upgrading from a Pentium II motherboard to a Pentium IV motherboard.

1. Check the computer case size. If you have an older AT case with an AT power supply, you will need to upgrade to a newer case with a newer PIV-compatible power supply (at least 350 to 400 W). PCI-Express motherboards come with a new type of ATX connector that requires a different type of ATX power supply that is exclusive to these motherboards. You will need to clearly and specifically mention the motherboard type to the hardware dealer to buy the right power supply.

2. Similar to the CPU upgrade process, open the case and clear all obstructions and dust. Then, unscrew and remove all cards installed on the motherboard. Remove all power cables and IDE connectors that are attached to the board. If the IDE drives and power supply are obstructing the removal of the motherboard from the case, carefully unscrew the screws attached on the sides and remove the IDE drives from the cabinet. As explained earlier, remove the power supply from the cabinet.

3. Now, take a look at the motherboard. You will see that there are screws attaching the motherboard to the cabinet. At some places, there may be plastic studs on which the motherboard may be mounted. Carefully remove the screws and then

unmount the motherboard from the screws. You need not necessarily remove the processor and the RAM module before doing this; however, it is recommended that you remove the RAM modules from their slots before proceeding to remove the motherboard. If you bought a new case and are installing a motherboard in it, the steps so far do not apply.

4. Now, get the new motherboard out of the anti-static bag, and try fitting it into the case. Check for the studs and screw bases on the motherboard and see if the motherboard fits properly on top of them, and that the screw-holes on the motherboard coincide with the screw base and studs. If some of them are not coinciding, mark that particular screw base or stud and remove it. If there is a new one required to be installed, install one from the packet of screws accompanying the motherboard. You will have also received a back panel case with the motherboard that fits on to the back of the tower case. This is shown in the image below. This back panel is important since it is made in such a
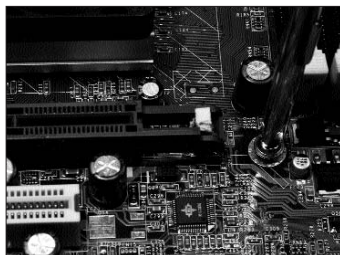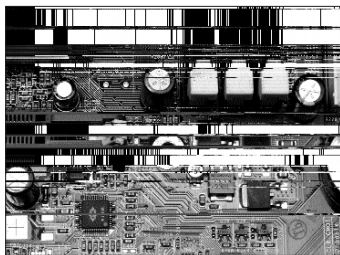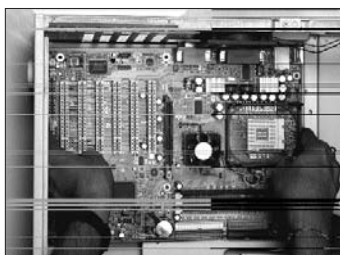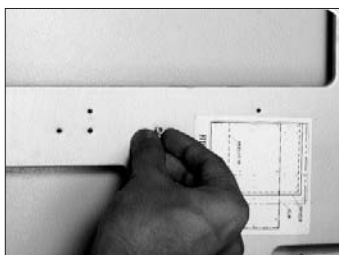
Install the screwholders to place the motherboard on. Place the motherboard on the installed screwholders and place the screws properly

manner that the ports such as USB, keyboard and mouse ports, and LAN ports are visible on the back of the computer tower.

5. Once you have installed the motherboard, put in the new processor (explained above) and the RAM modules. Then install the new power supply. Install the add-on cards and the IDE drives in their respective places. Now, connect the IDE cables to the back of the drives and check for the IDE connector on the motherboard to complete the connections.

Connect the IDE cable of your hard drive to the connector marked 'IDE 1' on the motherboard.

If you have more than one IDE cable that connects more than one IDE device to the motherboard, connect the other IDE cable to the connector marked 'IDE 2'. Now connect the front panel connectors to the front panel header on the motherboard. This information will be available in the motherboard manual.

If you have a motherboard that has onboard sound and video, you may have been provided with connectors for that. Refer to the manual for instructions for connecting these connectors.

Once all this is done, connect the motherboard power connector. Similarly, connect the power connectors for all other devices. Shut the case and connect the power cable to the mains, and turn on the power. Check for the display on the monitor, and listen for the POST beep, which indicates that everything is installed fine and running properly.

Check the hard drive and power LEDs on the front of the tower case. If they are lit and working properly—the HD LED blinking during read and write activity—you're done. If not, you will need to power down the machine and re-check the front panel connections.

Opening Pandora's Box...

We have already opened up the computer's tower case and looked at upgrading the motherboard and the CPU. We have briefly looked at the other components but not dealt with them at leisure. In this discussion we will look at whatever stays inside the case.

3.1 Power Potential

Power Supplies

A behind-the-scenes player. For us, pressing the power button to turn on the PC is a simple matter—we couldn't care less about what the power supply does in order to power the computer. But when you are upgrading your machine, you need to pay attention to these details.

The more components you put inside the computer, the more power it will require. If the power supply is not up to the task, it could get fried. Also, it could cause your computer to shut down unexpectedly and repeatedly. To avoid this, you need to calculate your power supply needs before you buy one. But before we get into that, let's look at the various types of power supplies available.

AT Power Supply

This type of power supply came with older machines such as Pentium and Pentium 3 machines, and was out of the scene with the exit of the Pentium 3 generation, making way for the newer and more powerful ATX type. AT power supplies were cheap, provided a decent amount of power, and withstood some amount of electrical problems such as brown-outs and over-voltage. But some people haven't been that lucky. It's advisable to opt for an ATX power supply when you are upgrading.

ATX Power Supply

These power supplies were available several years ago, but were not prevalent in older systems. Newer systems with Pentium 4 processors needed an ATX type of power supply as a requirement. Although more of a forced upgrade, it's better since when you ultimately migrate to PCIexpress, you'll need an ATX power supply.

The minimum that you should ideally have in your computer is around 350 W. With the addition of each new device there is an increase in the power consumption. Refer to the calculator table on the next page to get a better idea of what you need, keeping in mind that a 300 W power supply costs about Rs 750, and a 400 W costs about Rs 1,800.

A new variant of the ATX power supply, ATX version 2.01, has been launched in the market specifically for the newer PCI-Express motherboards. These boards have a different power connector with changes in the voltage requirements of the motherboard.

Another factor that makes this power supply a better option is the increased efficiency over previous versions of power supplies. PCI-Express motherboards can also work with older ATX power supplies, but it is recommended that if you are upgrading to a new platform, opt for a newer power supply.

The table below acts as a reference for various configurations when you are purchasing a power supply. We have used Intel processors in the configuration mentioned in the table, but these can be used for reference when purchasing a power supply for AMD systems as well.

	Low-End Configuration	Mid-Range Configuration	High-End Configuration
Processor	Intel Pentium 4, Prescott, S478, 533 MHz FSB, 2.4 GHz	Intel Pentium 4, Prescott, S478, 800 MHz FSB, 3.0 GHz	Intel Pentium 4, Prescott, S478, Extreme Edition, 3.4 GHz
Video Card	nVidia GeForce FX 5200	ATi Radeon 9800 series	nVidia GeForce FX 6800 Ultra
AmountOf Memory	Two sticks of DDR memory (256 MB each)	Two sticks of DDR memory (512 MB each)	Two sticks of DDR memory (1 GB Each)
Number Of Hard Drives	One, 7200 rpm	One, 7200 rpm	Two, 7200 rpm
Number Of Optical drives	CD-RW Drive	DVD/CDRW combo Drive	DVDfflR/RW drive
PCI Cards	—	Sound Blaster Live	Sound Blaster Audigy
External Devices	1 USB memory stick	1 USB memory stick	1 USB external drive/1 FireWire device
Accessories	One 60/80/120mm system fan	Two 60/80/120mm system fans	Two 60/80/120mm system fans
Total Power Required	253 Watts	279 Watts	349 Watts

Other hardware taken into all equations (36 Watts):

Motherboard (25 watts) Floppy drive (5 watts)
Keyboard and mouse (3 watts) CPU fan (3 watts)

We recommend that you buy a power supply that is rated more than what you require, so you will be safe when the power fluctuates. So if the wattage you need is 349 watts, go for at least a 400 W power supply.

Installing A Power Supply

Most tower cases come with a pre-installed power supply. However, if you want to install a different one from the one that comes along, here's what you need to do.

1. Remove the older power supply by unscrewing the screws on the back of the computer case. Before you do this, disconnect all power cables attached to the motherboard and all devices inside the case.

2. Gently remove the power supply from its enclosure and keep it away. If you are removing the power supply from a machine that already has the motherboard and all the other components installed, then take care that the power supply does not hit the components.

3. Put the new power supply back in the enclosure of the cabinet and screw it in from the back of the case. Now, attach the power cables to the motherboard and all the other devices, and you are done.
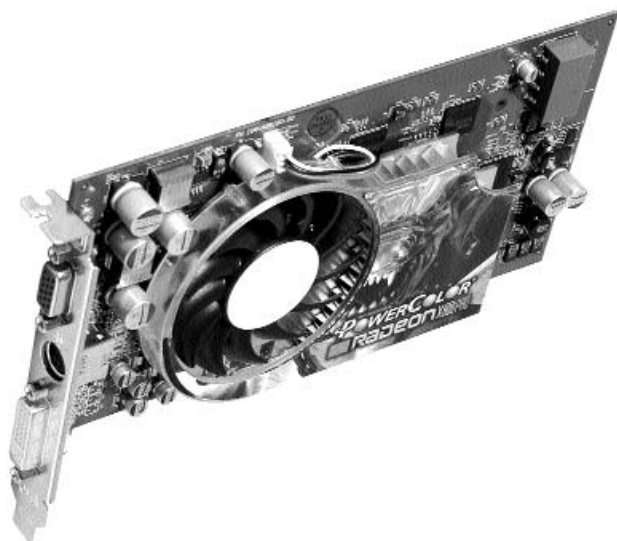
3.2 Playing With Cards

A computer is made up of various components that contribute in one way or the other to its usability, and matter in the final experience of the user. For instance, if you try watching a DVD movie on an old video card such as the Cirrus Logic or SiS 6215 with a maximum of 2 MB of video memory, you'll end up watching a slideshow rather than a movie. In some cases, the player will crash with an error message saying there isn't enough video memory. The point is that there is always a need to upgrade not only the CPU and the motherboard, but also the other installed components as and when needed, since each of these is designed specifically to cater to some segment of your computer usage.

Let's look at the various types of cards that are installed on a computer's motherboard.

Before we take a look at the cards themselves, we will need to understand a bit about the slots that they fit into.

ISA Slot

These are the older types of slots, identifiable by their length and black colour. These were 16-bit slots and were

An ISA slot and card

seen in older motherboards, but were available on some motherboards as late as the Pentium 3. In fact, there are some manufacturers who still manufacture motherboards with the latest chipsets and also provide ISA slots on it for users who still have to work with legacy ISA cards. ISA cards are not available in the market any more, and you'll have to really look hard to get hold of a second-hand one.
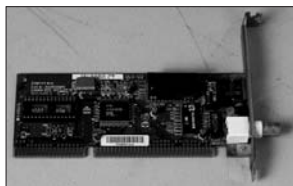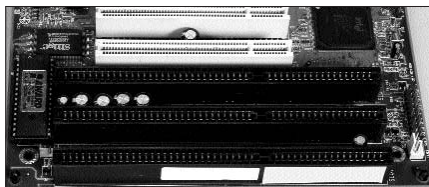
ISA cards were available for various types of uses such as video,

Installing an ISA card in an ISA slot
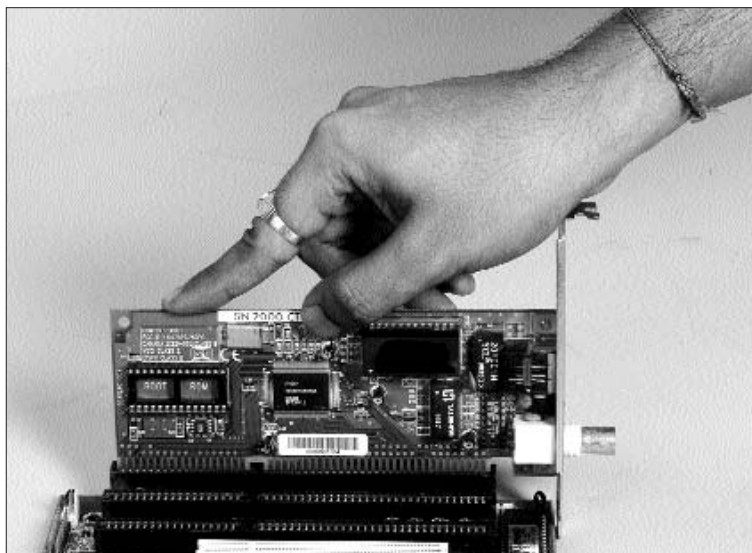
audio and network and
modem cards.

PCI Slot

These slots succeeded the ISA
slots and are shorter and
white. Similar to the ISA slots,
a variety of cards come in the
PCI version, with some
them completely
redesigned for the PCI
slot to take advantage
of the increased data
transfer bandwidth
that the slot offered.

The PCI form factor
is still prevalent today
and will remain so for

PCI card and Slot

some time to come, until PCI-Express finally edges it out.
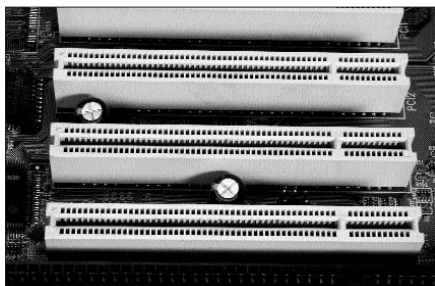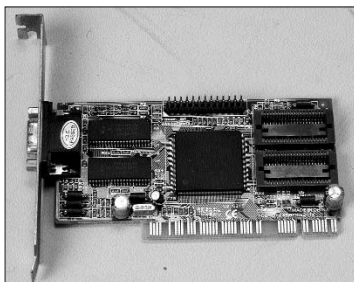
AGP Slot

The bandwidth offered by a PCI slot is enough for regular 2D work such as office applications, and also for 2D gaming. But once gaming moved on from the realm of 2D to 3D, it was it was realised

that the PCI slot was insufficient for playing video games. Chipset manufacturers soon came out with a completely new type of slot called the AGP (Accelerated Graphics Port) slot. This slot was dedicatedly meant for the video card, and today, we have video cards which, when combined with the proper slot, give a bandwidth of around 2.1 GBps, which is more than enough for playing any current game and running any video application.
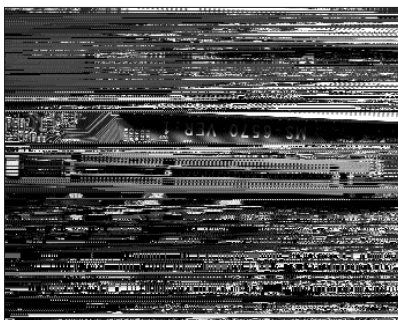
AGP slot

These slots are almost always placed above the PCI slots, and near the centre of the motherboard. Different motherboard manufacturers use different colours for this type of slot, and also provide it with a locking mechanism for locking the card in place.

PCI-Express slots

PCI-Express slots are the newest avatar of PCI slots. These are available on the newest motherboard chipsets for processors made by Intel and AMD. Similar to the AGP slot on the previous motherboards, there is a dedicated slot meant for video cards on PCI-Express motherboards. These are the PCIe x16 slots, and offer a much greater bandwidth—around four times greater than present AGP slots—for games of the future to run lag-free.

A PCI Express X-16 slot

Another version of the PCIe slot is the PCIe x1. These slots will be used for all cards other than video accelerators.
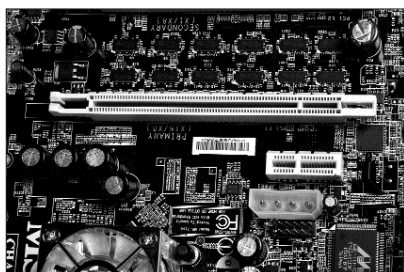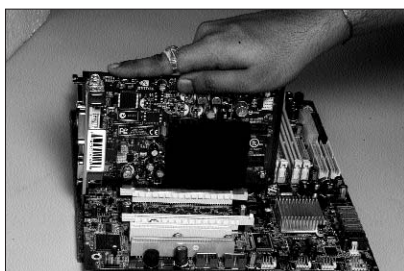
Installing a PCI express video card

Sound Cards
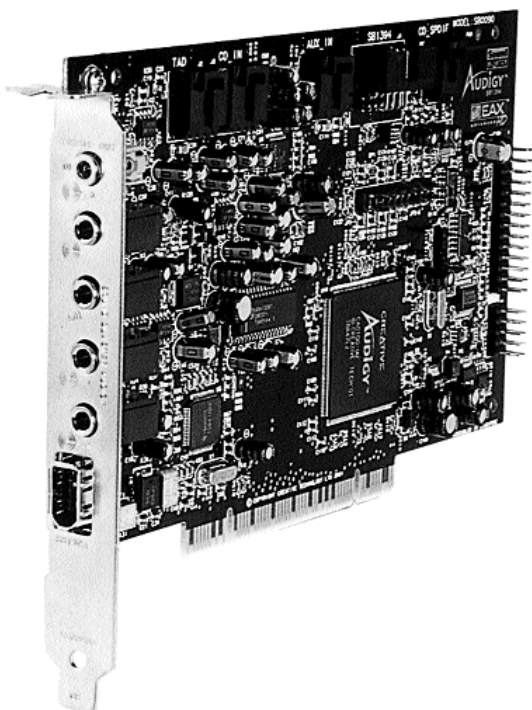
This card is present in almost all computers. Sound cards are available for PCI slots, and are yet to be available for the PCIe format. ISA sound cards have long become obsolete, and if you have one, you should upgrade because they are more resource-hungry, and are limited to a sampling rate of 16 bits at 44,100 Hz. Newer PCI sound cards such as the Audigy2 can sample at 24 bits at 96 KHz, which is the specification for DVD quality audio disks. Most new motherboards have an on-board sound card which gives you a free PCI slot for further expansion options, and which also provides decent performance in the sound department. Of course, there are PCI sound cards available, such as the Creative Audigy 2, which is one of the best sound cards available for the home user segment.

A PCI sound card starts at Rs 600 for a 2-channel sound card, and can go up to Rs 18,000: these have top-of-the-line features normally found on high-end home theatre systems.

LAN Cards

Newer motherboards come with on-board LAN; however, those that don't need to have a LAN card installed on the motherboard to be able to connect to a network. LAN cards are available in the PCI version, apart from other formats, and when upgrading, you may need to purchase one. With the advent of Internet via cable, LAN cards have now become a part of a standard home computer. Common LAN cards such as 10/100 LAN cards from D-Link are available for around Rs 450.

TV Tuner Cards

TV tuner cards are not so common, however, with falling prices, most users can afford one. They offer the advantage of being able to watch TV on your computer, and you can also capture content you would like to watch later. Moreover, you don't need to fight for the TV remote any more—you can use the PVR (Personal Video
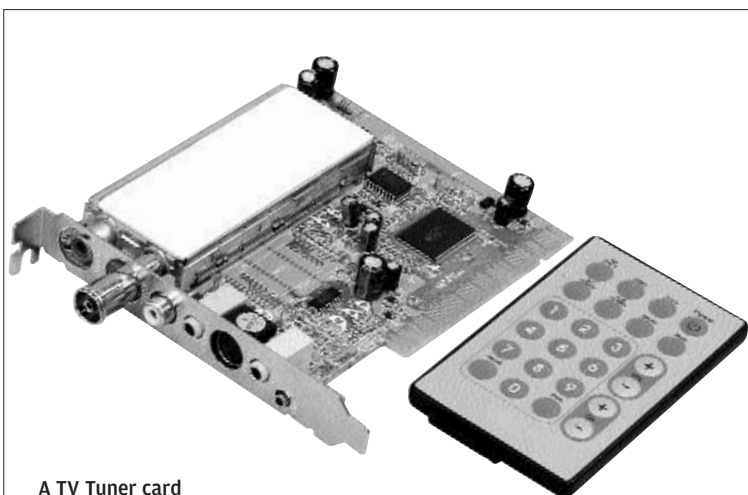
A TV Tuner card

Recording) functionality and record programs as scheduled, and watch them later at your leisure. TV tuner cards are available for as little as Rs 1,200, and depending on the brand and quality, can go as high as Rs 9,500 to Rs 11,000.

Video Capture Cards

Video capture cards are not necessary for the typical home user. They are meant for enthusiasts who would like to do more with what they have recorded. Video capture cards come in very handy in situations such as when you have a home-recorded video on a handycam and want to transfer it to a DVD, VCD, or any other portable media. These cards can also be used to convert old VHS tapes to DVD or VCD with a bit of video tweaking and cleaning. You could opt for such a solution in your PC, but remember that good video capture and editing is extremely taxing on system resources. You would probably want to check the capture card system requirements before buying one. Video capture cards will set you back by around Rs 5,000 for a decent-quality card.

PCI Converter Cards

If you have a motherboard that does not have either a FireWire or a USB port, and you need the functionality but are not in a position to upgrade soon, there is the option to install a PCI card that has USB or FireWire ports. PCI converter cards are generally priced around Rs 500 and higher. Brand names are not common in this category, and you may have to settle for a no-name brand.

Installing A PCI Card

A PCI card is simple to install:

1. Locate a free PCI slot on the motherboard. Remove the metal back-panel cover (if present).

2. Take the PCI card that you want to install out of its anti-static bag, and gently but firmly push it into the free PCI slot. Take care and check that the back panel of the card is not forced hard
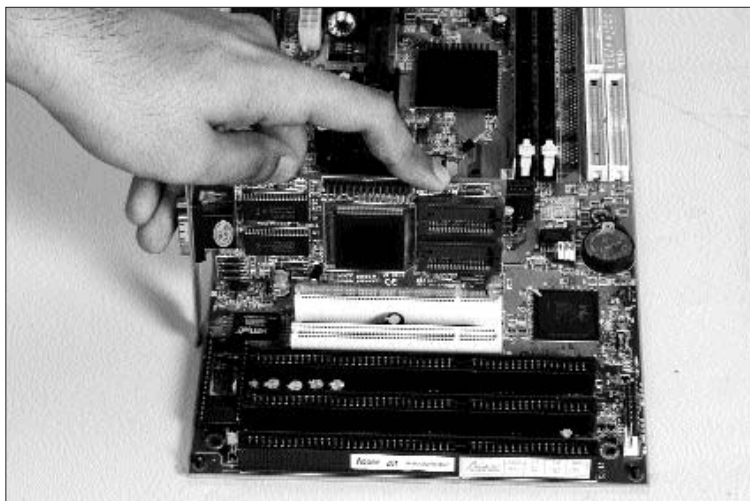
onto the motherboard, and that the edge of the motherboard is not damaged in any manner.

3. Insert a screw on the top of the back panel of the card and tighten it. That's it—you're done!

Video Cards

Video cards are available in the PCI, AGP and PCIe x16 forms. Older PCI video cards are still available for users who

1. Cannot afford to go for an AGP/PCI-Express video card upgrade;

2. Don't have on-board video or an AGP slot and

3. Have blown their present PCI video card.

AGP cards rule. They are here to stay at least for a couple or more years from now.

PCI-Express video cards have already entered the market and low end cards are abundant in the market, and retail for about Rs 5,000 to Rs 6,000. Higher end PCIe cards are available, but for exorbitant prices.

Installing a video card is similar to installing a PCI card; however, you need to remember some points.

1. If you have an older AGP card such as the SiS 6326 or an nVidia Riva TNT/TNT2, or a Savage Voodoo, these cards may not install on newer motherboards with AGP slots, as the voltage requirements of the older cards is higher than those available now. So your old video card will be better off in your old machine. Get a new card for your new machine.

2. Follow the instructions as for installing a PCI card for installing the AGP card, except that you will need to check if the lock of the video card has clicked into place.

Locate the AGP slot as shown
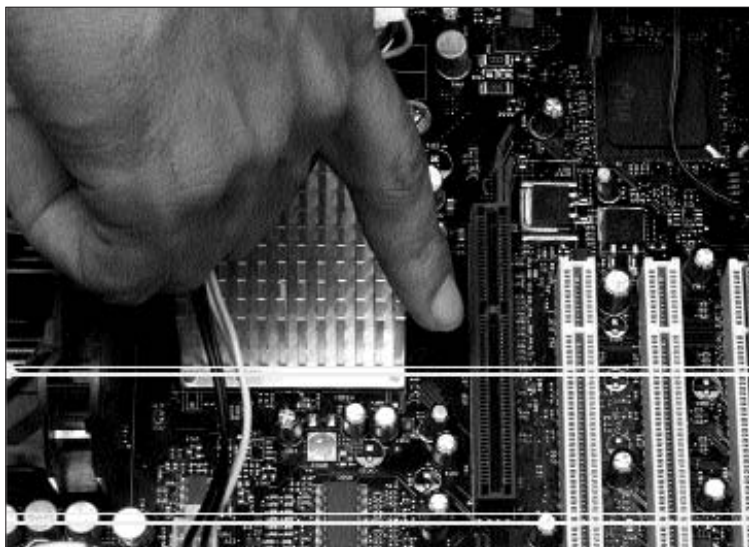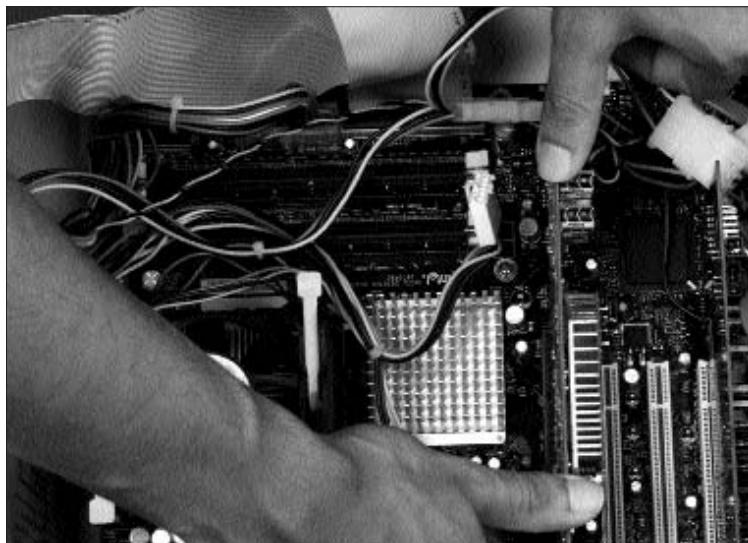
Insert the AGP card in the slot

3. After the installation is done, turn on the computer and check for the display. The computer should give a beep indicating that POST is complete, and the display should come on.

4. If, on starting the computer, you hear long beeps at regular intervals, the video card has not been installed properly. You will need to re-install it.

3.3 Mastering Memory

Have you ever felt your computer whine and groan when starting up the latest game or application? Did you notice that the program took too long to install? Did you read the system requirements when you installed the program?

After the processor, the component that plays the most crucial role in system performance is the RAM (Random Access Memory). The more you give it, the better your system runs. There is a ceiling to how much RAM you can install to actually improve system performance, but there usually is a definite improvement depending on how much you increase the RAM.

Older RAM sticks were available in the form of EDO RAM SIMMs (Pentium 1) and then transformed into a new format called SDRAM (Pentium 2 and above). Most users today have SDRAM installed in their systems, which operates at speeds of up to 133 MHz.

Previously there was just SDRAM, up to speeds of 133 MHz, which was available for computers running Pentium 3 processors. With the introduction of the Pentium 4, a new type of RAM called Double Data Rate (DDR) SDRAM came up. These RAM modules operate at a minimum of 266 MHz, which is twice the rate of the previous generation. Later, the speeds increased to 400 MHz.

If you upgrade to a non-PCIe platform, DDR 400 RAM modules are recommended. With motherboards taking advantage of dual-channel RAM, the overall system performance gets a marked boost. DDR400 256 MB RAM modules will cost you around Rs 1,700, while a DDR400 512 MB RAM stick will cost around Rs 3,300.

SDRAM for older systems are still available, but surprisingly, they cost more than DDR RAM!

PCI-Express chipsets cost more, and they use RAM of a format called DDR2, which run at a minimum of 533 MHz. These RAM

modules are expensive at this time, but with increase in sales, the cost is expected to come down.

When upgrading, if you are moving to a PCI-Express platform, make sure that you opt for a motherboard that has only dedicated DDR2 slots: there are motherboards that have both DDR and DDR2 slots. This is so that, in the long run, you will be able to use all the available RAM slots. The initial cost will be high; however, in the long run, opting for a DDR2-type motherboard will prove more cost effective.

Installing Memory

We will only talk about installing memory that is prevalent now - DDR SDRAM.

1. A single module of DDR SDRAM has 168 pins and a notch at the bottom, almost at the middle, between the connectors. This corresponds to a bump in the slot. As a result, you can't install the

Install the memory module in the DIMM slot
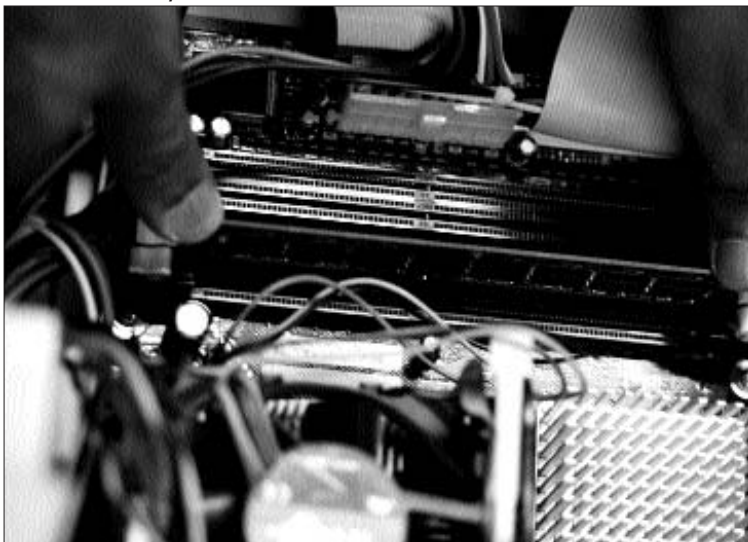
memory in the reverse manner - it can only go into the slot in one way.

2. There are two notches on either side of the RAM module. The locks on either side of the RAM slots on the motherboard fit into these notches, securing the module in place.

3. When inserting the module in the RAM slot, check for the notch on the bottom and install the RAM module accordingly.

4. Once you have inserted the RAM modules properly, the locks on the motherboard automatically click into place.

5. Start the computer and check for the display. Once the display comes on, you will see a RAM count indicating the amount of memory installed on the computer.

6. If you haven't installed the RAM properly, you will hear constant beeps when you start the computer. Shut down the computer and re-seat the RAM properly in its slots, and restart the computer.

Hard Drives And Floppy Drives

RAM is also called 'dynamic memory'. This is because once you power off the computer, the stored data vanishes. For storing the data therein without losing it forever, you use a 'secondary storage' option—the hard drive. The hard drive has come a long way from providing a tiny 240 MB of storage to a mammoth 1,000 GB.

A standard hard disk drive

Upgrading hard drives used to involve a lot of thought: hard drives used to be either SCSI or IDE. IDE drives used to vary in their rpm (rotation speed, in rotations per minute) values, apart from capacity. Lower 5400 rpm drives used to cost less, while the 7200 rpm drives used to be priced higher. SCSI drives were not considered for home users, given their prohibitive costs and the high amount of heat generated.

Today, however, this has changed, and most brands available
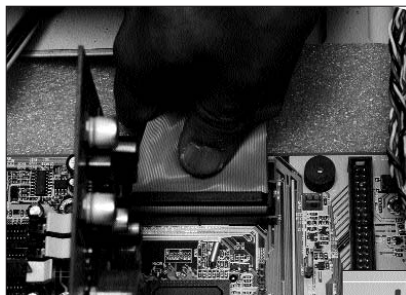
Connect the IDE cable to the motherboard
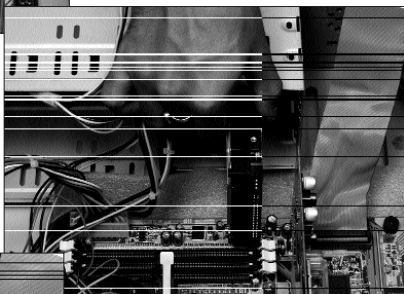
Insert the hard drive in an empty bay
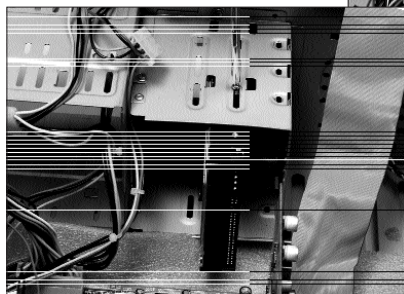
Screw the hard drive to the bay

Connect the other end of the cable to the hard drive

Finally connect the power cable to the hard drive

are only of the 7200 rpm type. The major advantage with these hard drives is that their data transfer throughput is higher when compared to older 5400 rpm drives, and that helps when you are playing games or watching movies or doing video capturing and editing. 7200 rpm hard drives, in general, are good for all kinds of work.

There is a new type of hard drive that has recently become available: the SATA drive. Again, these drives offer better throughput and also make for less of a cable mess. However, unlike with the IDE cables that most users have, only one drive can be attached to a SATA cable at one time. So you don't have the concept of a master and a slave in machines that have SATA drives.

IDE drives come in ATA 100 and ATA 133 flavours, and ATA 133 drives offer more data transfer bandwidth. But this also depends on the motherboard: if your motherboard only supports ATA 100, the drive will operate at ATA 100. So when upgrading your motherboard, look for a motherboard that supports ATA 133. IDE cables also play an important part, and it is better to chuck the older IDE cables that you may have and use the newer IDE cables bundled with your motherboard. Some IDE cables also have 'ATA 133' printed on them, indicating compatibility with UATA (Ultra ATA) 133 hard drives.

Most new motherboards come with both type of connectors so it depends on you to opt for which type of drive you want to install.

Installing An IDE Hard Drive Is Simple Enough

1. Locate an empty IDE bay in the computer case. Generally, the hard drives go below the floppy drive, and is hidden from view from outside the computer. The only sign that they're inside is the little red LED which indicates the hard drive is working.

2. Take the hard drive out of its case. Check the jumper settings on the back of the drive. If you are installing only a single IDE hard drive, or a SATA hard drive, you don't need to check the jumper settings. However, if you are installing two IDE hard drives, you will have to check for the jumper settings on the back of the drive.

3. Do not fiddle with the jumpers of the drive that you decide to make the master. Change the jumper settings of the drive that you decide to make the slave, according to the instructions on the back of the drive.

4. Insert the drive in the empty bay in the computer case. Make sure that you can see the screw holes on the sides of the hard drive on either side of the cabinet. Fit the screws that came with the hard drive into these holes and secure the drive.

5. Connect the IDE or SATA cable on the back of the drive and then attach the power cable. The IDE or SATA cable will only fit in one way, so you cannot damage the hard drive; however, take care that the connector pins on the back of the drive don't bend when you're plugging in the IDE cable.

Floppy Drives

The floppy drive is the only device that hasn't undergone any change from the time of the Pentium 1, and is probably the only thing you can cannibalise from your older system when you are upgrading to a new one. External storage options such as CD-ROM and DVD may have put the floppy drive in the back seat, but if you have a bad BIOS flash and want to revive your computer, or if you want to install Windows XP on a RAID-enabled motherboard, you will have to rely on that old, dusty floppy drive.

Upgrading the floppy drive doesn't make sense unless it is broken or if you are selling your older computer. A new floppy drive
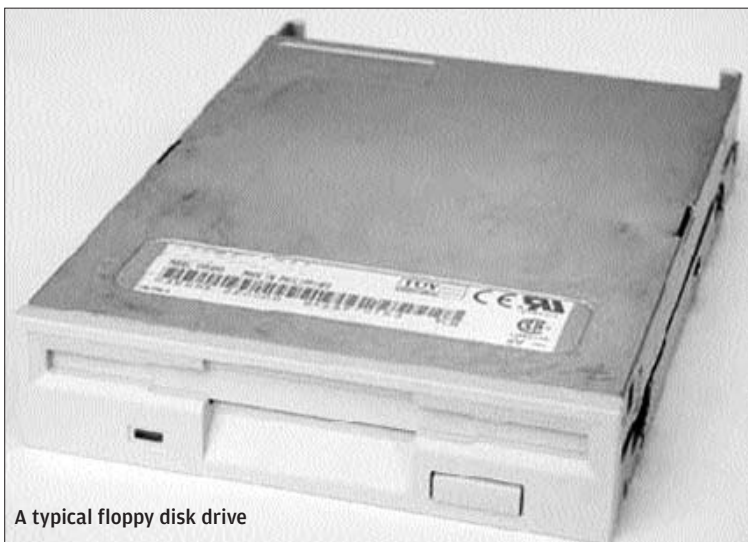
A typical floppy disk drive

will set you back by about Rs 550, but could save your life—until Microsoft decides to let it rest in peace.

Installing the floppy drive is similar to installing the hard drive. The only difference is the cable that plugs into it. You have to make sure that the end of the cable that has the 'cut' or 'cross-connect' end plugs into the drive. Make sure that you check for the Pin 1 on the back of the drive and accordingly insert the cable. Pin 1 is indicated by a little arrow etched onto the drive. The side of the cable that has a blue or red strip running the length of the cable plugs into the floppy drive Pin1.

Another factor you have to take care of when installing the floppy drive is its visibility on the front of the case. Make sure the floppy drive door is completely visible, and insert and eject a floppy disk in the drive to make sure that there are no obstructions in the movement of the disk due to the computer case.
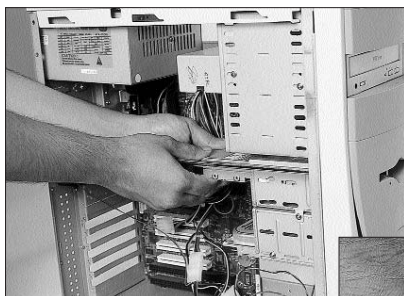
Insert the floppy drive in an
empty bay
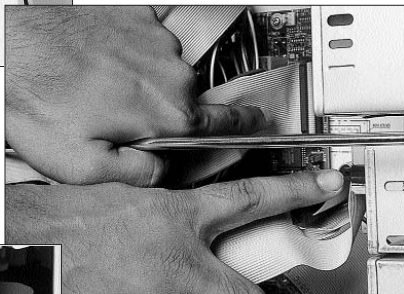
Connect the floppy cable to the
floppy drive

Connect the power cable to the
floppy drive

Upgrading The Operating System

After installing the hardware, installation of software is next. Almost all users have some software or the other on their computers. There are many users who may not have installed an operating system all by themselves. In this chapter, your will learn to install an OS on your own, and also troubleshoot common issues that may arise during installation.

4.1 Upgrading From Windows 98

We shall only discuss installing Windows XP, it being the OS of choice for users worldwide, and one of the best releases of Windows since its inception. Some may differ on this, and would want to install Windows 2000 or Windows 2003; however, we are only covering the OS which the majority of users would install on their machine.

First of all, let's see how to upgrade an already installed version of Windows (Windows 98 or Windows ME) to Windows XP. Follow the steps below.

1. Boot the computer into Windows, and quit all programs running in the background, including AntiVirus and pop-up

The Windows XP Autorun screen.

blockers. Insert the Windows XP CD in the CD/DVD drive, and let it Autorun.

2. Once the Autorun starts, the screen will appear as shown above.

3. Choose the final option—'Check system compatibility'. On the next screen, choose the option 'Check my system automatically'. If you get a box asking you to connect to the Internet, skip it if you don't have an Internet connection, or else connect to the Internet. This is the conclusive test for you to know if your computer can be upgraded to Windows XP or not. As a rule of thumb, if your PC is older than a year or two, you won't have any problems upgrading to Windows XP. However, if your PC dates back to pre-Y2K, then you will have problems installing Windows XP.

4. Once the system check is complete, you will get a report informing you about the components that need a new driver, a BIOS update (maybe), and any software installed in the computer that

Windows XP System Compatibility Report screen

is incompatible with Windows XP.

5. Depending on what information you received after running the system compatibility check, you may need to download drivers and other related software. If you have to upgrade the BIOS, then you will need to download and flash your motherboard BIOS before you begin to install Windows XP.

6. Once this is done, defragment and run Scandisk on WindowsXP installation options the hard drive and start the installation of Windows XP.

7. If you have any back-ground applications running, you will get an error message ask-ing you to stop the application. Quit all programs running in the background and proceed with installation.
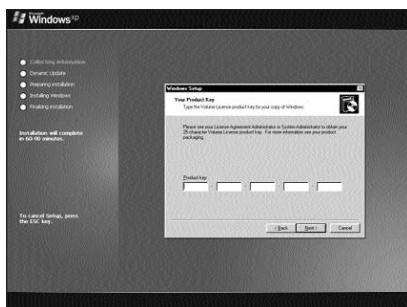
Insert the product key for installing Windows XP

8. Once you get to the Setup Wizard screen, you will have to choose an installation option from the drop-down menu beside 'Installation Type'. Choose 'Upgrade'. This will upgrade Windows 98/ME to Windows XP.

9. On the next screen, you will see the License Agreement as above, which you need to accept if you want to install Windows XP. Then on the next screen, you will need to enter the Windows XP CD Key. This key is located on the Windows XP CD Case on an orange-coloured sticker.

Download the updated setup files for Windows XP
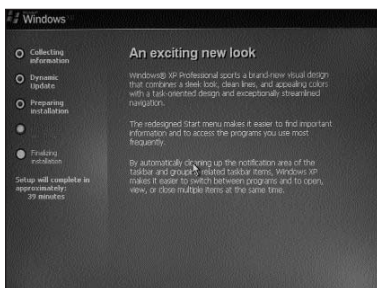
10. Click 'Next', and the Upgrade Advisor runs again, giving you data regarding any issues with your PC that may still need to be ironed out.

The Windows XP installation screen

11. The next screen will ask a question—whether you want to download and install updated setup files from the Microsoft Web site—recommended only if you have a fast Internet connection. If not, skip it for now.

12. In the next step, Windows setup starts and files are copied to your computer, and after a while the computer reboots. When the computer reboots, do not hit any keys when you reach the screen where it prompts you to do so to boot off the CD-ROM.
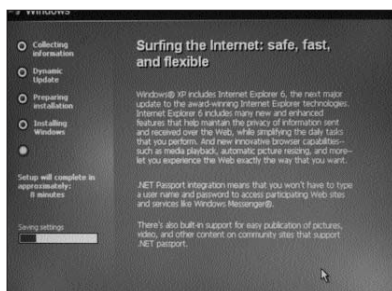
Further Windows XP installation screens

13. Next, you will see Windows XP installing more files, devices and configuring the rest of the installation, and also registering all the components.
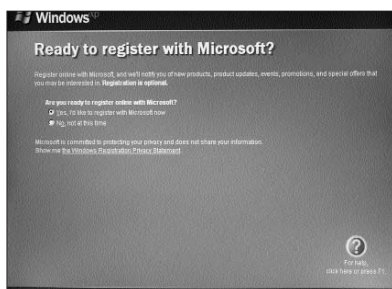
14. In the final step, all program and device settings are configured,

Registering Windows XP

and all the settings are saved. Then, the temporary files are removed, and the system reboots.

15. After the system reboots, you are presented with the now famous blue screen (no, not the fatal error one); this is the OOBE or Out-Of-The-Box Experience screen of Windows XP, where you can specify other users, and provide them rights to use the computer as well as activate Windows (extremely important), and also register your copy of the OS with Microsoft. For registering your OS, you need to be online.

After Installation

After the installation of Windows XP is done, there are some steps you need to perform before you start using the OS.

1. Since you have upgraded your OS from Windows 98 to Windows XP, check if all the pre-installed applications are working fine. Some applications may not work, and you will need to re-install those. More details in the troubleshooting section of this chapter.

2. Similar to checking your software, check if the installed hardware is working fine. Older chipset drivers are detected automatically by Windows XP, and should not trouble you much. Check the device manager and see if you can find any hardware which shows problems (indicated by an exclamation mark in a yellow box).

3. If you can connect to the Internet, check for the most critical updates for Windows XP. These updates are mostly small in size, and should not take much time to download, even over a dial-up connection.

4. Customise your system to your heart's content. Windows XP is similar to previous versions of Windows in almost all aspects. It's just a matter of time before you start feeling that you've been using Windows XP all your life!

Clean-Install Windows XP

We have looked at installing or upgrading Windows XP over a previously installed OS, say, Windows 98 or Windows ME. Now, let's look at installing Windows XP on a computer that has no previous OS installed. This is also called a clean installation of Windows XP.

Since we are installing Windows XP from scratch, you need to check the system requirements before you start installing Windows XP. If you have an older system and are installing Windows XP after wiping your hard drive clean, then download the Windows XP Upgrade Advisor first, and run it on your system before you format the drive. It will inform you which hardware and software is incompatible with Windows XP, and if the system is tough enough to install Windows XP. In fact, even before you go out and spend Rs 7,000 for a copy of Windows XP Professional we suggest you run the Upgrade Advisor on your computer.

For users with a brand new computer, compatibility with hardware is not an issue since all new hardware ships with XP-specific drivers. Once you have performed these preliminary checks and are satisfied, then move on to formatting and installing Windows XP on the hard drive. We have listed the steps you need to perform to clean install Windows XP.

1. Insert the Windows XP CD-ROM in the CD/DVD drive and restart the computer. Access the BIOS by pressing the [Del] key, go to the Advanced Settings in the BIOS, and change the Boot Sequence. The boot sequence should start with CD-ROM, then hard drive, and finally include the floppy drive. Then save the settings, and restart the computer when you are prompted.

2. When the computer reboots, you will see a screen asking you to press any key to boot from the CD. Go ahead.

3. The next screen is that of Windows XP loading files onto the hard drive. These are all blue and black MS-DOS screens, and

Change the boot sequence in the BIOS such that the computer boots off the CD/DVD drive. (Sequence of screens above is 1, 2, 3 and 4.)

remind you of the old Windows NT installation. If you have a SATA hard drive, you may need to install the RAID drivers for the chipset before you can go on to installing Windows XP. For this, press [F6] when you are prompted to do so, put in the flop-

Initial Windows XP install screens
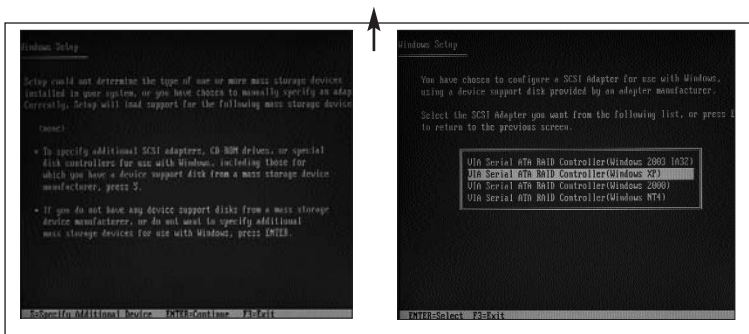
SATA Raid drivers installation screens

py that contains the RAID driver, and the drivers will be auto-
matically installed.

4. After this you will get a blue screen providing you with
options to a) install Windows XP, b) go to the Recovery
Console, or c) quit the installation. Press Enter to continue
with Windows XP setup.

Windows XP setup options screen
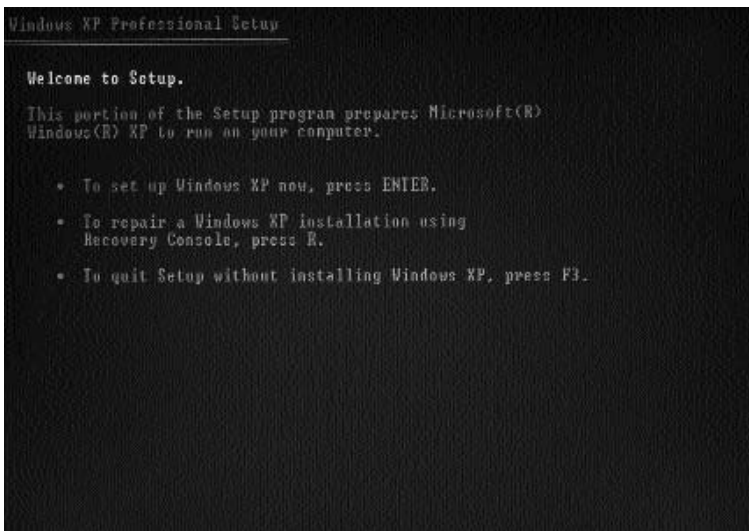
5. You will get the License Agreement on the next screen. Press [F8] to accept it and continue.

Windows XP EULA

6. Next, you will be asked to specify the partition on which you want to install Windows XP. If you haven't yet partitioned your hard drive, then you will be asked to do so. You can create any number of partitions that you want.

7. After you have created the partition, you will need to format it, and you can choose between NTFS and FAT32 filesystems with both quick, full format, and options. If you want to install the OS real quick, just

Choose the partition to format

format, and options. If you want to install the OS real quick, just choose quick format, and go on with the installation of Windows XP. NTFS is preferred over FAT32 as the file system, as it offers more security features such as file encryption.

The confirmation screen for formatting the partition ⌊

⌐ **Choose the filesystem to format the partition**
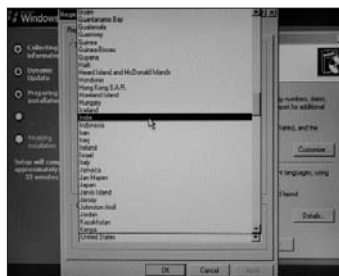
Personalize Windows XP

10. Then you can specify the computer name, and your organisation in the next screen. Press 'Next'.

11. In the screen that appears, put in the product key which you can look up on the yellow sticker on the jewel case of the Windows XP CD.

12. In the next screen, you will need to specify the computer name, the Administrator name and password. It is a good idea to specify an alphanumeric and well thought-out password, which you don't forget easily and is hard to crack.

Provide the Windows XP CD Key

13. In the next screen, you get to fill in the date and time settings. If your BIOS is keeping the right time, Windows XP will automatically take up the system time.

Provide a computer name and password

14. Next you will reach the network settings setup. Click the 'Next' button for now, and make the network changes later.

15. After this, the setup continues and further installation of Windows is carried on. In this installation, Setup copies files, start menu items, registers system components, and finally removes temporary files that were used during the installation. Finally the system reboots.

16. When the system reboots, ignore the message where it prompts you to press a key to boot from the CD. The system then moves on to the first boot screen

and you will get a dialog box asking you if Windows XP should automatically adjust the Windows resolution. Choose 'Yes' and continue to the Windows XP start-up screen.

17. The next screen will provide you with Windows XP OOBE screen, and a Wizard for the final steps in configuring your installation of Windows XP.

18. The Wizard will ask you if you are connected to the Internet directly or through a network. If

The Windows XP OOBE screen

you have a cable Internet connection, and if you know the settings then select 'Yes' or else skip the configuration.

19. If you are connected to the Internet, then you can go ahead, and activate your copy of Windows else you can skip the step for now, and activate Windows after you have made the modem and Internet connection settings.

20. The next screen indicates you have to create users. Windows XP, by default, creates all users as equivalent to Administrators with all rights and privi-

Create users in Windows XP

leges, and no passwords. However, you can limit the access of users to your PC, and provide each account with passwords. But this can only be done later by accessing the 'User Accounts' option in the Control Panel.

21. After you do this, you will get the Windows logon screen where you will see each user account logon with a picture on it. If you specified your name as the Administrator and entered a password during the installation of Windows XP, then you can click your user logon picture and type the password to logon to Windows.

22. Follow the instructions provided in the section 'After Installation' above, and check if all the software and hardware are working properly. Instructions 1 and 2 are for users who are clean installing Windows XP on older hardware, and will be using older software. If you have a new computer, then you can skip instructions 1 and 2.

23. After clean-installing Windows XP, we suggest you install applications you think are important, and then see if they run fine. Older applications may cause some problems, in which case you can refer to the troubleshooting instructions under the 'Handling Windows XP Incompatibilities' section below.

Whew! Now you sure must be adept at Windows XP installation. In the next part, we will check some common errors and troubleshoot these for Windows XP, and also move your luggage from your old PC to the new one. Let's have a hot mocha before we start doing that!

Ring Out The Old, Ring In The New

Moving stuff from your old PC to the new one can be exasperating. One way of doing it is to connect your older computer's hard drive as the slave in the new machine, and transfer all your important data to the master hard drive. Then format the older hard drive.

Although it's the easiest way, you won't be able to transfer all the settings and changes you have made to your favourite programs, and so you will have to install and customise each program as it was on the old computer.

An alternative way is to use the Windows XP Files and Settings Transfer Wizard. A detailed list of instructions is given below for you to complete this task smoothly.

4.2 Using Windows XP Files And Settings Transfer Wizard On The New PC

Choose the third option on the Windows XP Autorun screen
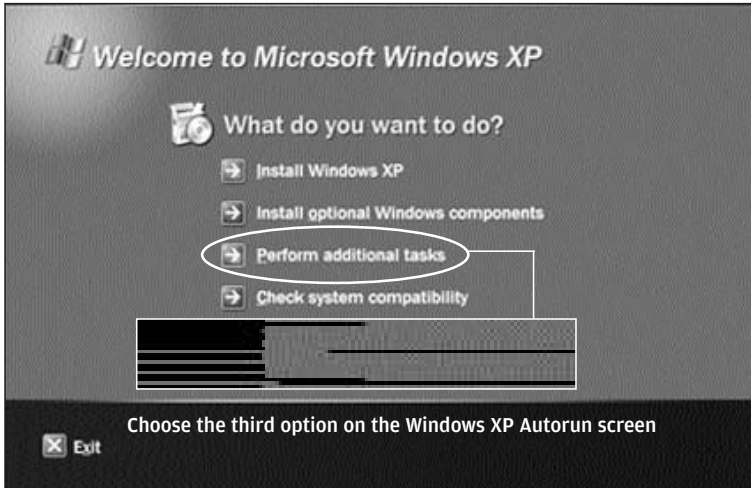
Your old computer needs to be up and running in order to perform this procedure. Once you start the old computer and boot into Windows, you will need to execute the following steps-

1. First, insert the Windows XP CD-ROM in CD/DVD drive of your older computer. It will auto run, and a menu will appear—click 'Perform Additional Tasks'.
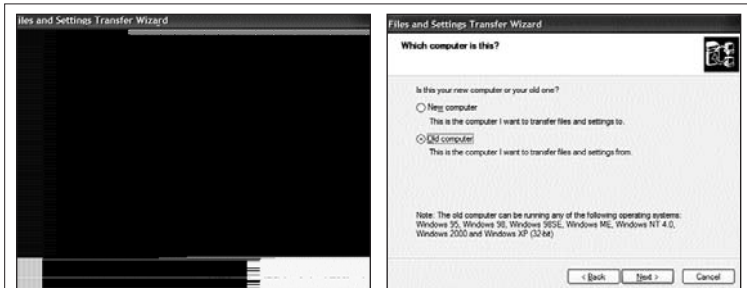
Run the Files and Settings Transfer Wizard on your old computer to import your Files and Settings to the new computer.

2. On the next screen, choose 'Transfer files and settings'. Once you click this, the File and Settings Transfer Wizard starts, as shown on the previous page. Click the 'Next' button on this screen.

3. Your computer will be scanned for god-knows-what, but it will take some time before you get to the next screen. In this screen, you will be given the option of choosing the method of transferring the files and settings that you want, from your old PC to the new one.

Selecting a transfer method

4. The options you will see are Direct Cable Connection, Floppy drive or other removable media, and others including external USB drive, network drive and so on.

5. For Direct Cable connection, you need to connect the two computers together using a serial cable. This is the most useful method as you can transfer massive amounts of data without a hitch. However, you need to have both computers up and running at the same time and connected to each other. Also, you require a serial cable to perform this task.

6. Floppy disks are not advisable for transferring files and settings from one computer to another; if you have a ZIP drive, you can use it.

7. The last option is 'Other', which most users will choose. This option saves all the files and settings that you want to transfer to the new computer, on the old computer itself.

8. Click the radio button beside 'Other'. You will have to choose a location to store your backup by clicking 'Browse' and selecting a folder.

Backup your file and settings to a folder on your hard drive. Make sure you enough space before you do so.

9. The next screen will present you with a list of programs that you would like to back up. This includes all the programs, and you can back up either the files or settings or both. There is also an option to create a custom list of programs if you want. You can also choose specific folders that you may want to back up.

Choose 'Both files and setting'

10. You will then be presented with a list of programs from which you can choose what programs to back up. You can add the folder, settings, file and file type. If you find it too cumbersome, just use the Wizard.

Programs to be installed in the new computer

11. Now you will be presented with a list of programs you will need to install on your new computer.

12. Next, the Wizard will collect the files into the folder specified by you earlier. All the data that is being collected is compressed to save space. In the next step, the collection phase completes. You may want to check the size of the backup you have made.

Using Windows XP Files And Settings Transfer Wizard On The New PC

Perform the following steps on the new computer to restore the backup from the old computer using the 'File and Settings Transfer Wizard'. But first, connect the hard drive as the slave in the new system.

1. Insert the Windows XP CD-ROM in the CD/DVD drive, and let it Autorun. In the menu that appears, click 'Perform Additional Tasks' and then click 'File and Settings Transfer Wizard'.

2. In the next screen, choose the option 'New' computer when you are asked which computer you are using.

3. In this screen choose the option 'I will use this wizard from the Windows XP CD', and click 'Next'.

4. Since you have already completed the process of making a File and Settings backup on your old computer, just click 'Next'.

Run the files and Settings Transfer Wizard on the new PC

5. Now, you will have to provide the path of the folder where the backup is stored. In this case, we are providing the path of the folder in the slave

hard drive. However, if you are
using any other option such as a
CD or Direct Cable Connection
(DCC), you will need to provide
that particular path.

6. After doing do, the wizard starts
applying these settings, and
transfers the files to your com-
puter. It may take some time.

7. Once that is done, you will be
prompted to log off. You can
either do that or restart the com-
puter. This will let you apply the
settings that you just transferred.

Locate the backup folder on the
older hard drive

4.3 Finding The Right Drivers For Windows

Windows XP can be inexplicably fickle about installing hardware. While older hardware is usually detected without any issues, hardware such as capture cards and external devices can be difficult to install. If you face such similar issues, then do the following.

1. Remove or re-seat the device or card from the computer. Do this after you have shut down the computer. Restart the computer and then see if the OS detects the device. If it does, go ahead and install the driver for the device. If not, then we will have to try some other tactics.
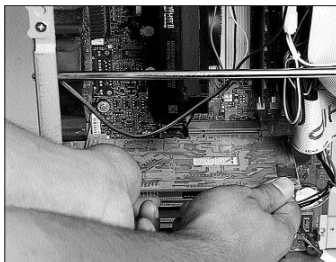
2. If your device is still not detected, go to **Start > Control Panel** and click 'Add Hardware'. Once you get there, click 'Next' and in the screen that appears choose the option 'I have already connected the hardware'.

3. Then Windows XP will search for the hardware. If it finds the hardware, you will be prompted for the drivers. If not, then you will be provided with a list of hardware from which you will have to choose.

Install the hardware and start the Add hardware Wizard in Windows XP

4. Next, you will be asked to install drivers for the software.

This should resolve your issue. If not, you can contact the hardware manufacturer or vendor for further support. In case of old hardware, check the hardware manufacturers' Website for further information.

Specify if you have already connected the hardware

Driver Signing

A new feature in Windows XP, 'driver signing', is always switched on in a default installation of Windows XP, and is one of the major causes of hardware on the system not being installed properly.

Basically, driver signing means that Windows XP will only install those drivers that are certified by Microsoft commonly called as WHQL certified drivers. If a driver is unsigned, you get a warning box indicating the driver is unsigned and stating the related risks in installing the driver. If you still proceed with installing the driver, Windows XP may (sometimes) not install the driver leading to a malfunctioning in the hardware.

However, driver signing can be turned off, and more often than not, this actually helps in installing older drivers.

To turn off the driver signing feature in Windows XP, perform the following instructions—

1. Go to **Start** > **Settings** > **Control Panel** and click the 'System' icon.

2. On the 'System Properties' dialog box click the 'Hardware' tab and click 'Driver Signing'.

Click on the Driver Signing button in the hardware tab

3. Then check the option 'Ignore—install the software anyway and don't ask for my approval'.

4. Click 'OK', and click 'OK' once more on returning to 'System Properties'. Then try installing the hardware.

This in most cases resolves hardware installation issues. If there are other issues that are affecting your Windows XP instal-

Choose the Ignore option in the Driver Signing dialog page

lation, you need to contact your hardware manufacturer, and in some cases, even Microsoft.

4.4 Handling Windows XP's Incompatibilities

As is observed in hardware, there are also software incompatibilities in Windows XP. Unlike old hardware, old software has problems when running on Windows XP. One major reason being that old software such as applications and games are DOS-based and

Choose WIndows 95 for best compatibility with older applications

Windows does not support real-mode DOS. This causes conflicts, and the software either fails to install or if it does install it does not run.

For software that installs and does not run, right-click the shortcut of the installed application and click 'Properties'. In the next screen, you will see a tab called 'Compatibility', which was especially incorporated in Windows XP to make it compatible with older software. Here you will find a host of options-making the software run in an environment that emulates as if the OS is Windows 95/98/ME, and you will need to check if the software runs fine. If it does, your job is done. If not, try checking the boxes under the Display settings and Input settings options, and see if the software runs fine.

Microsoft has released Service Packs for Windows XP, which not only offer updates, patches and other OS enhancements in one big pack but also take care of compatibility issues of hardware and software. Some software depend on other Microsoft products such as the .Net Framework, to install and function properly in Windows XP. For instance, the latest ATi drivers need .Net to be installed first before you install the drivers in the system. As a rule of thumb, it's better to check the software requirements before installation. Older software may or may not install, but if you are using really archaic software, you would be better off without it.

Troubleshooting And Fixing Windows XP

Finally, it's time for troubleshooting Windows XP. There can be a million different issues in different computers mostly caused by the installed software and hardware.

We cannot and for that matter not even Microsoft can list all the software and hardware issues that may occur after installing the OS. Below, we have tackled FAQs that users across the world face regularly.

1. **How can I increase performance with Windows XP?**
Solution: It's true that Windows XP does take up a lot of resources. Try the following steps.

On booting the computer, click **Start > Run** and type 'msconfig' without the quotes and press 'Enter'. In the screen that appears, click the 'Startup' tab. Here, except for 'SystemTray', uncheck the boxes beside all applications.

Another method is to go back to the old Windows 98 look and feel. Go to **Start > Control Panel > System**, and in the 'System Properties' dialog box, click the 'Performance Options' tab. Check the box beside 'Adjust for best performance'. Then click 'OK'. This will make the computer use fewer resources.

Here's one more way of doing it—disable the Kernel paging using the following Regedit command: (For using Regedit, go to **Start > Run**, and type 'Regedit'. This will open the Registry Editor).Once you have the registry editor window open, navigate to the following key—

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\SessionManager\Memory Management

Click the Memory Management folder and right-click the 'LargeSystemCache' entry. Select Modify, and type '1' in the Value Data field. If you have 512MB or more of RAM, you should locate the 'DisablePagingExecutive' entry, and ensure it is set to '1' as well (this setting keeps as much information as possible loaded into RAM rather than in the swap file).

2. **Where is Scandisk in Windows XP?**

Solution: There is no Scandisk in windows XP. Instead, that func tion has been replaced by CheckDisk. Go to Start > Run, and enter CHKDSK instead, or just right-click the drive you want to check, choose 'Properties', click the 'Tools' tab, and click 'Check Now'.

3. **There is a program that is already removed from the computer, but I can still see it on the Add/Remove Programs list. How do I remove it?**

Solution: For this you again need to access the Windows registry (as explained above) and locate the key—

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall

and locate the name of the application you see in the Control Panel although it has already been uninstalled. Delete this folder.

4. How can I play old DOS games in Windows XP?

Solution: This is common among users who have played old DOS games such as Crusader and Leisure Suit Larry which don't play on Windows XP. You can use freely available software such as ScummVM or DOSBoxe, which emulate the DOS environment in Windows XP and run the game.

5. I cannot see the CD/DVD-ROM in my computer after installing Windows XP. What happened?

Solution: If you cannot access CDROM, DVD, CDR or CDRW drives or get a Code 31 or 39 error in Device Manager then the solution is to run 'Regedit' and delete 'Upperfilters and LowerFilters' at:

HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\Class\{4D36E965-E325-11CE-BFC1-08002BE10318}

After you perform these steps restart the PC. Your problem will be resolved.

6. Windows XP does not let me delete a file, and I get an error message such as 'Access Denied' or 'File In Use'. What should I do?

Solution: First of all, make sure you are not deleting a system file. Then perform these steps—

a. Check if the file is in use. It's quite possible that you actually have the file open and are trying to delete it. If it is a media file, close the media player application.

b. If the file is an AVI file especially encoded using DivX or Xvid, then at times Windows XP does not delete it. In such cases, go to the command prompt, **Start > Run**, and type 'cmd'. Then go to the location of the file, and use the old 'del' command to delete the file.

7. Windows XP hangs at the shutdown screen when I try to shutdown the computer.

Solution: This is a regular occurrence that users have faced ever since they encountered Windows XP. Generally caused by hardware or software installed recently, this can be resolved by using the 'System Restore' feature, which is always turned 'on' by default in Windows XP. This feature lets you restore your computer back to the time when it was working fine. For using this feature, perform these instructions.

a. Go to **Start > Programs > Accessories > System Tools** and there click 'System Restore'. A dialog box appears that gives you two options-the first one is to restore the computer back to an earlier date, and the second is to create a restore point.

b. Choose the first option and click 'Next'. You will see a calendar in which some of the dates are highlighted-these are the dates to which you can restore. Click any of the highlighted dates during which you know the computer was working fine. Select that date, and click 'Next'. Now, you will get another screen asking you to close all programs and follow other instructions. Do that and click 'Next'. The process starts, and after it is over, the computer reboots.

c. After rebooting, check if the computer shuts down properly. If not, then install the latest service pack and check again. If your issue still remains unsolved, contact Microsoft.

Accessorise Your PC

We have seen the installation of both essential hardware and software that makes the computer what it is. But without other add-ons that will provide you with a real taste of what can be done with a computer, the computer will be nothing but another device that you just use for all work and no fun. And a computer need not only be your workstation, but it can also be your family's entertainment centre. In this part of the book, we will talk about gadgets that you can use with your computer and make it a more fun and enriching experience for you and your family.

5.1 Adding The Fun Accessories

A high-end digital camera

Playing With Video

If you still have some age-old musty VHS tapes, wouldn't you like to convert them into brand new DVDs? Now, you can do the same from the comfort of your home-all within a matter of hours. While the computer does the processing, you may brew some caffeine or even get some shut-eye!

Most users like to amuse themselves with video—whether it's a music video downloaded from the Internet, a movie file or an interview clipping. The main obstacle one would face when using video is a slow machine. Playing with video requires the PC to have ample resources, so low-end computers are a definite no-no. However, once you upgrade the computer, this shouldn't be an issue, since the processor would be a minimum of 1.8 GHz, and RAM a minimum of 256 MB. This will suffice to run programs that edit and process video.

Before you actually reach the video editing part, you need to source the video first. For this, you can use a variety of devices, the primary one being a video capture card. A video capture card is installed in the PCI slot of the computer, if it is internal and it is connected to the computer using a USB2.0 or Firewire port, if it is external. You connect the other device—a VHS player or a camcorder to the video capture card. Once you do that, you can transfer your video from the camcorder or VHS player to the

A Web cam

computer. Newer digital camcorders come installed with Firewire or USB connectivity, which makes the capture card redundant. It's definitely a plus if you have a digital camcorder or camera.

Other devices that are used for video are Web cams, TV tuners and digital cameras. Whatever the video source, your main aim is to plug-in the device to the computer, and make sure it works fine. Once that's done, you can rest easy.

Installing the devices is an easy task in Windows XP—all you need to do is connect the Web cam or TV tuner or digital camera to the FireWire or USB port, whichever the device supports. If the device provides connectivity for both FireWire (aka IEEE 1394) and USB 2.0, and your computer has a FireWire port, then we suggest that you use the FireWire port for connectivity. While a USB 2.0 port theoretically supports a 12 Mbps data transfer rate, FireWire, theoretically specified at 1600 Mbps, is more than adequate for all your video editing requirements.

Users receive individual manuals and drivers on purchasing the aforementioned devices. While connecting the devices to the computer is rather easy, installing the drivers can get tricky.

A Digital Video Camera

However, with the Windows XP automatic device detection feature, installing drivers should not be an issue at all.

Video capture cards retail at a minimum of Rs 4,000 for a decent quality card. If you are a video enthusiast, you may want to look for something better. Digital camcorders start at Rs 18,000; take your pick—it all depends on your pocket. Even the least expensive ones provide Firewire and USB connectivity, both being fine connectivity options.

As the name suggests, a TV Tuner lets you capture content from cable TV, and is the most common device used for video capture. These cards start at Rs 1,500 and can cost as much as Rs 1 lakh! TV Tuners are available in external and internal forms. In the internal form, you can install it as you would install a PCI card as mentioned in chapter 3.

In case of an external TV Tuner, you can connect it to the USB2.0 port of the computer. Once Windows XP detects the tuner,

you will be prompted for the drivers, and you just need to install them.

TV Tuners have their own recording software. In case you are not satisfied with the software, you can try Cyberlink PowerVCR2 or Intervideo WinDVR.

By far, Web cams are the easiest devices to use for video capture although the video capture quality can be low vis-à-vis other video sources. Web cams retail at a minimum price of Rs 1,200, and can go up to Rs 5,000. Connectivity is again provided in the form of USB2.0, suitable for the kind of resolution captured by a Web cam.

Scanning For Work And More!

Although scanners have been around for long, they were not commonplace in most homes, and only certain users who needed scanners, say for revenue generation, purchased them. Older scanners that were available a few years ago were quite costly and also lacked the features that the present day scanners can boast of, such as high scanning resolutions.

Home users generally find a scanner less appealing in usability as opposed to the printer. Since the latter is used more often than the former, which is left to gather dust. Scanners need extra care, and without proper maintenance they get easily damaged.

While it's true that scanners are primarily used to scan documents and images, you can also use them to scan objects. Also, you have the advantage of digitally storing important documents and images, which can be easily retrieved as and when needed. For instance, you can scan all your childhood photographs, and save it on to a CD or DVD, and not worry any longer about the pictures getting damaged, as you can get a print anytime.

Branded scanners such as Acer and HP are available for a street price starting from Rs 3,000. You can probably get a bargain if you

shop around, and if you are lucky, even some freebies with the purchase. For connectivity, you get USB2.0, and in some high-end models you may be given the Firewire.

Let's Hear It For MFDs

At the same time, some users may not want to invest in a scanner alone. For such users, a more viable option would be a Multi-Functional Device. MFDs seem to have caught everyone's fancy of late. An MFD is a device that incorporates the functionality of a printer, copier, scanner and fax-all in one machine. The most basic ones start at Rs 5K, which is just Rs 2K more than a scanner.

Essentially, for less than the price of a standalone printer and a single scanner you get a device that does all that and more! However, the drawback of MFDs is maintenance, since if they conk off, you can't perform any of the individual functions till the entire MFD is repaired. On the other hand, if you had single-use devices, even if your printer failed, your work would not come to

A high-end scanner

A multi function device

a standstill as you could use the still functioning fax machine or the copier.

Generally, an MFD would be more suitable for a SoHo environment rather than a home, however with falling prices and increasing affordability, MFDs may be the perfect solution for home users.

5.2 Will It Be The CD Or The DVD?

Every computer, old or new, is equipped with an optical drive. While CD-ROM drives were the norm on older computers, newer ones are provided with CD-RW or CD-RW/DVD combo drives. The arrival of the CD was a turning point in the history of computing, as one could now store 500 times more data on a CD than on a floppy disk, thus saving cost—coupled with the added benefit of portability.

CDs could be relied on for data integrity (being a write-once medium), and you could be positive that the data present on the disc would not be damaged unless you wanted it to be.

With falling prices, CD-RW drives have now become common. In fact, a CD-RW drive costs as much as a CD-ROM drive did about two years ago. With a CD-RW drive, home users have found a new way to store data and free their hard drive from files that need not be perpetually available on the computer but may be needed in the future.

A single format DVD Writer

CD-RW drives are available for as low as Rs 1.5K, and offer an extremely cheap storage option, which is unrivalled by any other device till date. CD-RW drives are available in internal and external forms, with internal CD burners being cheaper. An external CD-RW offer portability-as you can carry it around rather than having it fixed in a machine. However, the cost difference is a deterrent, and users would prefer the internal version.

While users today prefer the CD-RW as a storage option, another medium is fast catching up, which has already made an appearance on user desktops. Yes, we mean the DVD. Standalone DVD players made their appearance a long time back, but they were and still are restricted to playing movie DVDs. However, on a computer it attains a different status. You can still play movies on a DVD drive in the computer, but that is not the primary use of the drive. A normal DVD±R/RW can store up to 4.3GB of data, which is almost equal to the amount of hard drive space available on some single hard drives.

An external dual format DVD writer

DVDs make for a viable storage option and reduce clutter as you can store a large amount of data on a single DVD as opposed to storing the same on a number of CDs. This will also prevent you from running from pillar to post when you try to locate your unmarked CDs.

As of now, DVD writers are costlier than CD-RW drives. However, prices are slowly falling, and will probably be in the range of the CD-RW drives available today as soon as HD-DVD and BluRay hit the market.

Another development in DVD technology is the availability of dual-layer media, which can store twice the amount of data on a single side of a single disk (approximately 8.5GB). With the advent

of HD-DVD and BluRay, the data storage capacity on DVD discs is only going to increase. To be able to use the HD-DVD and BluRay, you will need a new drive. Moreover, it will take time for these discs to be part of the mainstream market.

DVD writers are available for Rs 4,500 for dual format while dual layer writers are available for around Rs 1,000 more, not a big difference if you want better value for money in the long run.

If you are upgrading from your older CD-ROM drive to another optical drive, our first recommendation would be to go for a DVD±R/RW drive, if you can afford it. Otherwise a CD-RW/DVD combo drive would be the way to go since you can have the best of both worlds with this drive. Obviously, you can also watch movies on the DVD drive on a PC. However, for an enhanced experience you need to pump in extra amount of money in your computer. And this is precisely what we are going to talk about next!

5.3 Selecting Sound Cards
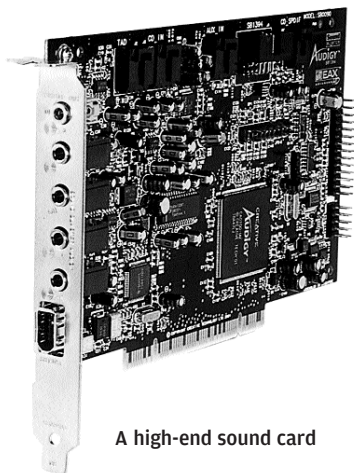
A high-end sound card

The best part about a computer is that you can convert it into an entertainment centre. You can not only watch movies but also play games and listen to music. Although this requires a lot of system resources, if your computer has what it takes then it can be done.

Largely, users are satisfied with the standard speakers that come with the PC, however for an enthralling experience you will need more than the two forlorn stubs sitting on your desk. Listening to music doesn't demand much out of a computer, and the most widely used audio source is the stereo. If you listen to music alone, you can still make do with a standard set of speakers. But if you love to watch movies on your PC, a 5.1 setup would do you a lot of good.

Newer computers almost always have a 5.1 sound card chip onboard that does a pretty good job of providing sound but also hogs system resources. Another drawback to such solutions is that

A 5.1 set of speakers

when you use the 5.1 mode, you have to sacrifice the Line In and the Microphone jacks for connecting the rear and the subwoofer connections. If you want to avoid sacrificing any of these connections then opt for a 5.1 PCI sound card.

The Creative Live 5.1 Value is available for Rs 3,000 or thereabouts, which is a very good buy. Higher end 7.1 sound cards cost a bomb while some motherboards such as the Intel 915G have onboard 7.1 integrated sound chips. Having a good sound card is important as it enhances the overall experience of watching a DVD on the PC.

On that account, to have a good movie experience you will also need good quality speakers. For watching a DVD, a 5.1 setup is a must since DVDs are encoded with 5.1 discrete channels of sound each emanating from a specified speaker according to the audio track. Newer movie titles come with 6.1 and 7.1 channels of audio, which can sometimes be overkill. A 5.1 setup is good enough for most movies; another use for the 5.1 speakers would be to playback DVD audio discs that offer more clarity and quality than regular audio CDs. However, for playing DVD audio discs you will need a 24-bit/96KHz sound card.

A 4.1 set of speakers

Hardcore gaming is limited to some users but almost everyone likes to play games on the computer at some point of time. Gaming today is a serious business, and almost all games have 5.1 surround sound. If you are a game freak, you absolutely need to experience the sound when it comes to games. Play *Half-life 2* or *Doom 3* and you'll know what we mean.

When purchasing speakers make sure that you check the RMS (Root Mean Square) rating of the speakers and the combined power rating is either equal to or greater than 47 to 50 watts RMS. The higher the RMS rating the better; do not pay attention to the PMPO (Peak Music Power Output) level, as the RMS rating can be pretty low compared to the PMPO rating.

Slightly above average speakers such as the Creative Inspire 5.1 5200 cost Rs 5,000, which do not burn a hole in your pocket, and also provide good music and movie experience. Of course, there are bigger and better things available in the market, but the moolah you can spend on jazzing up your home computer for entertainment finally depends on your pocket.

Communications And Networking
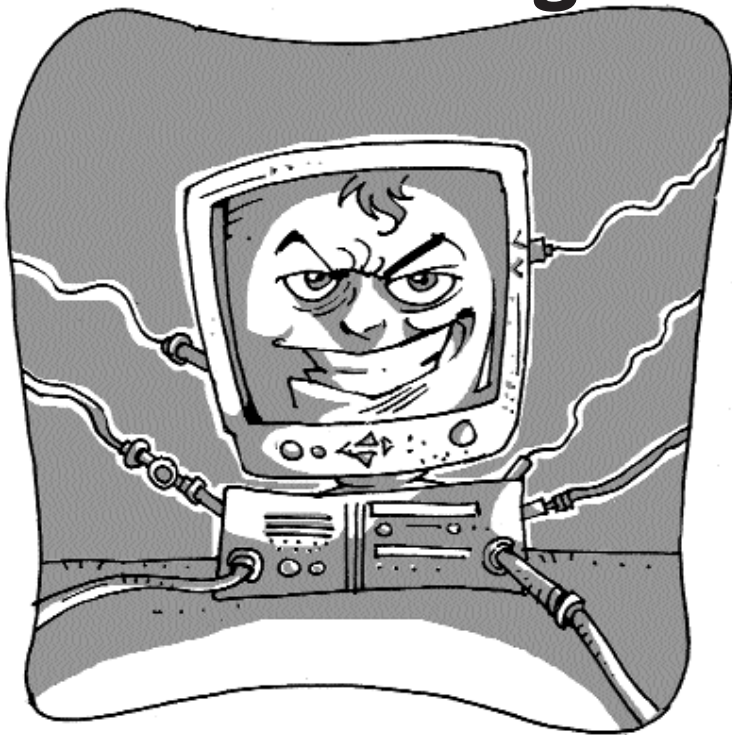
The massive penetration of the Internet into the common man's life could not have taken place without the fall in computer prices and Internet connections. Today, broadband connections are available in most urban areas. In the midst of wired connectivity, you also get wireless solutions. This has begun to pose new questions for the common user—for example, how do you connect two PCs wirelessly? This chapter explains wired and wireless connectivity, and more. Welcome to the world of communications and networking!

6.1 Minding Your Modem
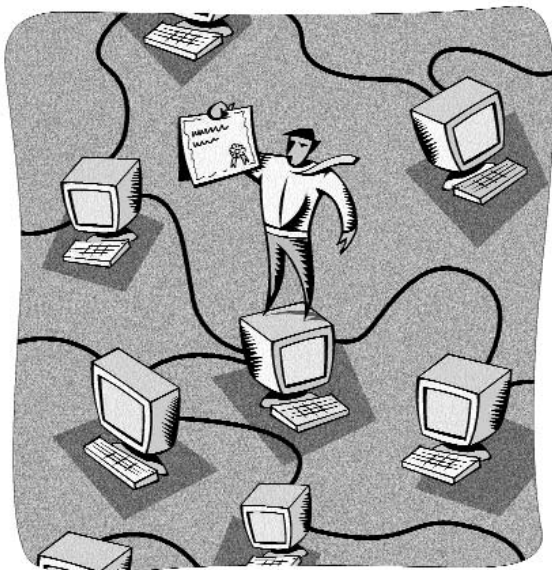
Modems were an add-on that only some users had. But today, they are included by default in any PC configuration. With Windows XP, using modems and getting connected to the Internet has become as easy as 1-2-3. Another factor helping this growth is the low cost of modems, which have made them more affordable for everyone.

If you don't have a modem but are planning to get one, we suggest that you get a 56.6K modem which should cost around Rs 2,000 for an external model and Rs 700 for an internal one.

Connecting a modem is easy. External modems connect to the serial port of your computer while internal modems install in a PCI slot.

Once you have installed the modem properly and then turned on the computer, Windows XP will automatically detect the new hardware and ask you for its drivers. Insert the driver CD into the CD/DVD-ROM drive and Windows XP will automatically look for the drivers. If you have changed the driver installation settings according to the instructions mentioned earlier, the drivers should install without any issues.

Once installed, you may need to restart the computer for the changes to take place. After restarting, you will need to make a dial-up connection for connecting to the Internet. For this, you will first have to purchase an Internet pack from any ISP such as VSNL or BSNL, for example.

Once you have the pack, you will need to install the software and then you can connect to the Internet using a telephone line. Some software automatically creates the dial-up connection, which lets you connect to the Internet by typing your username and password. For users in Delhi and Mumbai, MTNL has a number which can be used for connecting to the Internet and the charges are levied in the monthly telephone bill. For such users, you will manually need to create a dial-up connection. Read on to find out how to do this.

Creating A Dial-up Connector

1. Click on 'Start' and then on 'All Programs'. Scroll up to 'Accessories' and over to 'Communications', and click 'New Connection Wizard'.

2. A new window called 'Location Information' will open, which will ask you for various information. The first

is the 'Country/Region' ('United States' is chosen by default), area code and a number to access the outside line (if applicable). Then specify 'Tone dialing'. For the 'Country/Region', choose 'India'. Leave the 'specify carrier code' and 'dial number to access an outside line' fields blank. For area code, you may want to enter an area code which you may need to use before dialing a number. For example, people living in areas like Kalyan or Dombivli in Thane (on the outskirts of Mumbai), need to dial 9522 before dialing a Mumbai number. The '9522', in this case, goes in the area code box. Finally, click on 'OK'.

3. Next, a 'Phone and Modem' options window appears. This window will show you the options you have chosen in the previous window. Click 'OK'.

4. At this point, the 'New Connection Wizard' window opens, which will help you to create a new dial-up connection. Click 'Next' to continue with the Wizard.

5. In the next window, you will be asked to choose the connection type. By default, the option 'Connect to the Internet' will be chosen for you. Click 'Next' to continue.

6. In the next window, you will be asked to choose the manner in which you would like to connect to the Internet. Choose the second option, which is 'Set up my connection manual-ly'. Click 'Next' to continue.

7. In the next window, Windows XP will ask for information regarding how you would be physically connecting to the Internet, such as using a Dial-up modem or a broad-band connection. By default, the option 'Connect using a

dial-up modem' is chosen. Simply click 'Next'.

8. This window lets you specify your ISP's name. If your ISP is BSNL, enter that name in the box and click 'Next'. If you are using multiple ISP's for your Internet access, you will need to specify different names for each one.

9. In this screen, you will have to specify the phone number that you will dial to connect to the Internet. This is the number your ISP provided. Click 'Next' to continue.

10. This next screen is very important. You will be asked to provide your username and password. There are also other options on this screen. Of these, turning on the Internet firewall is an option that should be checked, which will save you a lot of heartache later. What a firewall is has been explained later on in this chapter. You can also choose this connection to be the default connection for your computer. If you want anybody to connect to the Internet from the computer using the same username and password, you can also check a box that asks you about this. However, if you want to restrict access, uncheck this box.

11. This is the last screen of the 'New Connection' configuration wizard. You can check the box which adds a shortcut to the desktop for easier access.

12. Once done, go to **Start > All Programs**. Click on 'Accessories', find 'Communications', and click on 'Network Connections'.

13. The 'Network Connections' window will open and you will see the newly created dial-up connection there.

14. Now, right-click this icon and select 'Properties'. A new dialog box opens.

15. The first tab is 'General'. Check this if your modem is displayed in the 'Connect using...' box. Locate the phone number and see if it is the same number you specified when you configured the connection using the 'New Connection Wizard'.

16. Now, click on the 'Networking' tab. See if the 'Type of dial-up server' is set to 'PPP: Windows 95/98/NT4 /2000, Internet'. Next, click and highlight Internet Protocol (TCP/IP), and click the 'Properties' button.
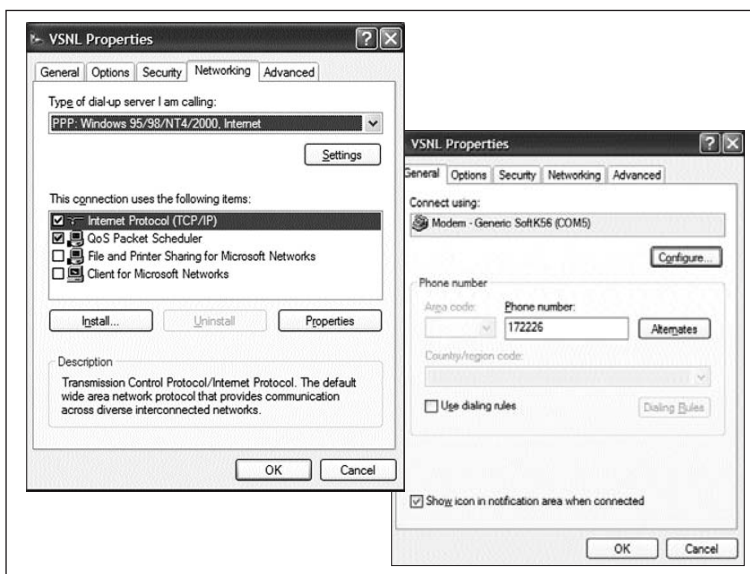
17. In the window that opens, check the settings. They should be 'Obtain an IP address automatically' and 'obtain a DNS server automatically'. These settings should be chosen by default.

18. Now locate the dial-up connection icon on your desktop and double-click it. A dialog box asking for your username and password will pop-up. Fill in the username and password and click on 'Connect'. You will hear a lot of whistling and dialling and

finally, two little computers will appear in your system tray (bottom right of the screen), connected to each other. This indicates that you are connected to the Internet. Now launch your Web browser—such as Internet Explorer or Mozilla Firefox—and start browsing the Web!

6.2 Networks

Broadband Internet has suddenly become the rage in urban India. ISPs and local operators have started providing broadband connections and suddenly, most computers have miraculously grown a LAN card!

LAN cards are available for as low as Rs 650 and you can get one from the local hardware shop and install it. This is in a way good as most ISPs bundle in a LAN card at an extra charge, which could be more than the market price of just the card. Also, the brand of LAN card may not be to your liking. Thus, shopping for your own LAN card gives you the freedom to choose, what you think is right for you. Most new motherboards come with on-board LAN cards, which can be utilised right away. In fact, some boards bundle a normal LAN card chip plus a gigabit LAN card chip. Gigabit LAN is a new technology that allows for data transfer rates of about 1000 Mbps compared to the present LAN which allows only upto 100 Mbps. This makes such boards future-ready.

Having a LAN card not only helps you connect to the Internet, but also share information and data from one PC to another that, in other conditions, would be not feasible. For example, transferring around 20 GB of data from one computer to another will definitely involve the use of external storage or at least the removal of a hard drive from one of the computers. However, if both computers are connected over the network, sharing of data can be done easily although it will take some time to transfer the data. But the moot point is that the data can be transferred without hassles, which would not have been possible in the absence of a network.

So far, we have seen how to connect to the Internet using a modem. In this part, we will see how to network computers briefly and how to connect to the Internet using a LAN card. For connecting to the Internet using a broadband connection, you will have to contact any ISP such as BSNL, Sify, Iqara or any of the other ISPs and they will give you the necessary instructions to set up the Internet protocol or IP address. How to do that is explained below.

The procedure to install a LAN card is similar to that of installing a PCI card. Install the card in any free slot and after you have checked that the card fits snugly into the slot, attach a screw on the top of the card. Then start up the computer and Windows XP will automatically detect the new hardware and ask you for the drivers. The rest of the steps to be performed are as follows:

1. Click on 'Start' and highlight 'All Programs'. Go up to 'Accessories' and scroll over to 'Communications' and click on the 'New Connection Wizard'.

2. The next window is the 'New Connection Wizard', similar to what we have seen earlier during the configuration of the modem. Click 'Next' to continue.

3. This window similar to the one explained in the modem configuration window that lets you specify the network connection type. By default, the option 'Connect to the Internet' is chosen. Click 'Next' and continue.

4. In the next window, you are asked to select how you would like to connect to the Internet. Choose the second option by clicking in the radio button next to 'Set up my connection manually' and click 'Next'.

5. In the ensuing window, choose the last option which is 'Connect using a broadband connection' that is 'always on'. Unlike a dial-up connection, a LAN or broadband connection will always remain on, hence this option.
Once again, click 'Next'.

6. On the next window, click on the 'Finish' button and the connection is created.

7. Once you have created the new network connection, you will have to check that the configuration of the connection is proper. For this, go to the **Start > All Programs**. Click on 'Accessories' and scroll to 'Communications' and then click on 'Network Connections'.

8. In the 'Network Connections' window, you will see the connection we have created under the LAN or high-speed Internet category. In this category, right-click on the connection and click on 'Properties'.

9. The 'Local Area Connection properties' window opens and the 'General' tab is visible by default. You will see the name of your network card in the first box and below, in another box, you will see a list of protocols. At the bottom of the screen, check the box that says 'Show icon in the notification area when connected'. In the second box, click on the 'Internet Protocol' (TCP/IP) and then click on 'Properties'.

10. In the 'Internet Protocol (TCP/IP) Properties' window that opens, you can specify the network-specific set-

tings. The default settings are 'Obtain an IP address automatically' and 'Obtain DNS server address automatically'. These settings are perfect for a dial-up connection, since you are automatically assigned an IP address by the ISP. In case of a network/broadband connection, you will need to specify both the settings according to the information provided to you by the ISP/Network administrator.
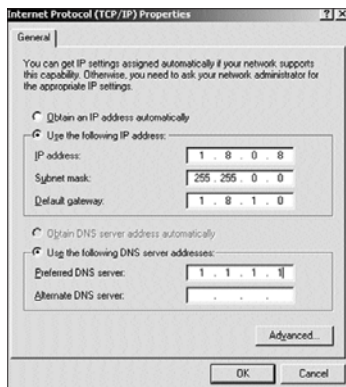
11. Once the above mentioned settings are done, click 'OK' and come back to the previous window. In the 'Internet Protocol (TCP/IP) Properties' window, click on the 'Advanced' tab and check the box next to 'Turning on the Internet firewall' option.

The above settings are perfect for most network connections. If any extra settings are provided by the ISP/Network administrator, you will have to make the subsequent changes according to the provided instructions.
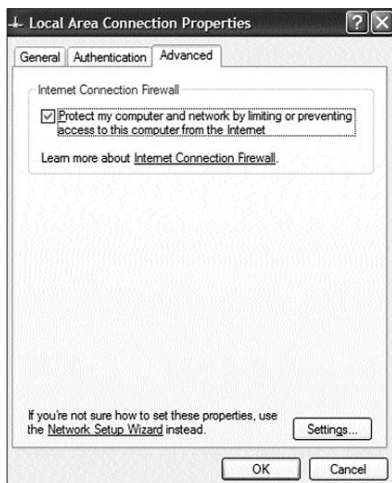
6.3 The Wireless Home

We are currently at a point where most new technologies get adapted into our lifestyle without too much fuss. Wireless is fast becoming one such technology. Many of us own more than one computer or communication device such as a laptop, PDA or the cell phone. Our personal and professional data is often scattered between these devices, and obviously, we need to have all our data available to us all the time. The solution to this issue is undoubtedly wireless networking.

Our previous *Fast Track* (May 2005) book exclusively dealt on everything Wi-Fi. In this chapter, we will only discuss connecting a PC and a Wi-Fi-enabled laptop in a home networking scenario.

Setting Up Ad-Hoc Mode

Adhoc-Mod or Peer-to-Peer mode as it is commonly known, is easy to set up and comes with multiple advantages such as creating a network between two or more notebooks that are Wi-Fi-enabled and share small files during meetings. It doesn't need an access point as one of the notebooks can be turned into a soft access point (AP) and the rest can connect to each other through it. The following is a stepwise explanation of how to turn a Wi-Fi-enabled laptop into a soft AP and configuring the rest to connect to it. We will use Windows to get the Wi-Fi up and running.

1. To set up a soft AP, click **Start > Connect To > Wireless Network Connection**. This will open up the 'Wireless Network Connection' dialog box. Here, click 'Properties' and a new dialog box will open from where we need to assign various settings.

2. In this dialog box, under the 'General' tab, scroll to Internet Protocol (TCP/IP) and select it. Now click 'Properties', which will take you to the next dialog box where we need to assign the IP. Just assign the IP and click on the subnet mask once and it will appear automatically.

3. The next step will be to close this dialog box and then click the second tab, which is 'Wireless Network'. Here, at the bottom, click 'Add', which will launch another dialog box where we need to assign a name for the 'Network Name' (SSID) and right-click WEP and 'Key provided automatically' for rest to seamlessly connect to this AP. Press 'OK' once with this settings. Now click 'Refresh' in the 'Wireless Network' dialog box and the network name will appear in the available network area.

4. Now it's time to configure client systems that will connect to this AP and eventually, to other client systems through it. For this, go to the 'Network Properties' dialog box and assign an IP in the same range, e.g., if you have assigned 192.168.1.1, assign 192.168.1.2 and so on to other client systems. Now, click on 'Subnet mask' and it appears automatically.

5. Next, right-click on the network icon in the system tray, it will launch a dialog box which will display the name of a soft AP. Right check 'Allow me to connect to the selected network'. This will highlight the 'Connect' button at the bottom. Just click on it and you will be able to connect to other machines.

Do the same on other client laptops and you will be able to connect to each other without an Access Point.

6.4 Firewalling The Demons

We have seen how easy it is to connect to the Internet using a modem or a network card. However, life is not all rosy, and your Internet experience can turn sour if you do not take the proper precautions. One of the most important tools in safeguarding your computer on the Internet is a firewall. Over the next few pages, we will understand software firewalls in brief and also learn how to configure and use them to our advantage.

We will only talk about free firewalls for home users. This is because paid firewalls may not find many takers in the home-user segment, since free software such as ZoneAlarm Pro can do the same job. Windows XP SP2, in fact, comes with its own, built-in firewall. The configuration of the firewalls does take some time but once complete, your PC stands protected and safe from attacks over the Internet.

First let's talk about one of the best free (for home use) firewall around. We're talking about ZoneAlarm. The basic version of ZoneAlarm is free, but if you want to upgrade, you will have to pay for it.

Installation

For installing ZoneAlarm, you can download it off the Internet or you install it from the *Digit* May 2005 DVD. For installation, double click on the setup.exe file and the installation starts automatically. (The file will be called something like zlsSetup_55_094_000.exe)

1. The first screen will ask you if you want to install the free version of ZoneAlarm or if you want to install a free 15-day trial of ZoneAlarm Pro. You can choose to install ZoneAlarm PRO for 15 days and at the end of the trial, pay for upgrading to the full version or go back to using the free version of ZoneAlarm.
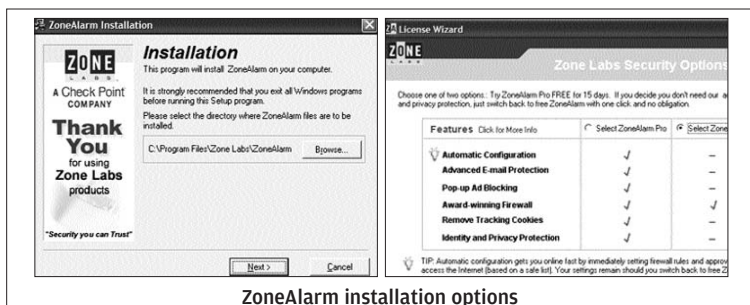
ZoneAlarm installation options

2. Let's choose to install ZoneAlarm. After you click 'Next', ZoneAlarm installs on your computer and once installation is complete, you will be presented with the configuration wizard.

This will help you to configure the firewall.

Configuration

1. The first screen will ask you if you want to go through a tutorial for using ZoneAlarm. This is helpful and will help you in getting an insight into the software that you are going to use. You can always refer to this tutorial by accessing the Help menu of the software or after restarting the computer for the first once you have installed ZoneAlarm. Click 'Next' after you are done using the tutorial.
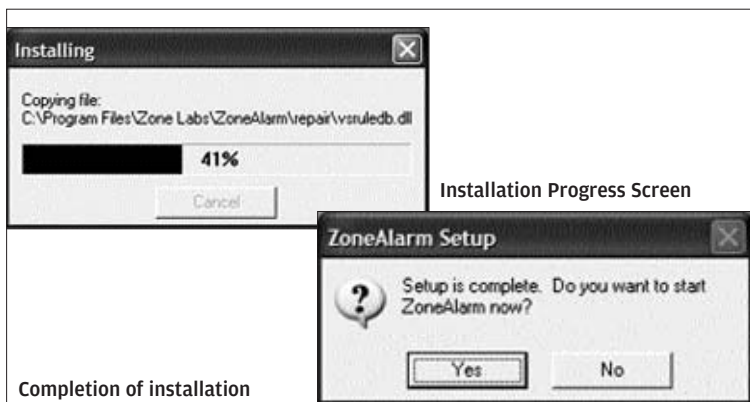
Installation Progress Screen

Completion of installation

2. On the next screen, you will be asked to configure ZoneAlarm for surfing the Internet. Click 'Yes' and then 'Next' to finish the installation and configuration of the software. You are now
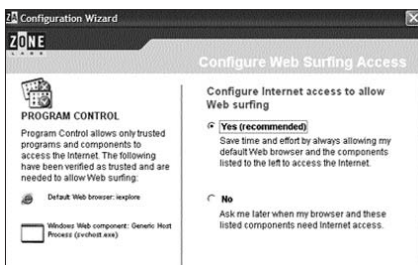
ZoneAlarm configuration screen

ready to surf the Internet under the watchful eyes of a firewall.

ZoneAlarm tutorial screen

Windows XP Service Pack 2 (or SP2 as it is commonly known) is a complete pack of updates, patches and essential bug fixes for Windows' XP operating system. SP2 also includes a firewall. For us, this is a bonus since you get the Service Pack for free and a firewall with it! Here's how you can make the most of this.

Installation

Installing the firewall is not a major concern as it installs along with the default installation of the Service Pack. Also, after installation, the firewall is always turned On by default. It is the configuration of the firewall that we are interested in. Let's take a look at this.

Windows XP SP2 firewall options

Configuration

To configure the settings of the firewall, we will need to go to the 'Network Connections' in

the 'Control Panel'. Here, we will see the Local Area Connection we had created. Right-click on this and click on 'Properties'. Then, click on the 'Advanced' tab and you will get to the firewall interface. You will see that it has changed since the last time. The reason for this is that you enabled the firewall when configuring the LAN connection.

In the next window, click 'Settings', and you will get to a new window where you will be able to configure the firewall. You will see that, by default, the firewall is On.

When you click on the 'Exceptions' tab, you will be taken to a window that has some programs listed alphabetically. These are the programs that are being allowed to send and receive data on the Internet. You can customise this list and add any other programs you want by clicking on the 'Add Program' button. For instance, if you play online games, you will want to add the path of the game executable in this list lest the firewall block the game from accessing the Internet. You can also add specific ports and edit a program already added. If you want to remove a program from the list, you can click on the 'Delete' button.

You need not use the 'Advanced' window as you will need to know the nuances of the firewall and also have a bit of networking knowledge to be able to safely play around. Without proper precautions and with improper settings, you will not be able to connect to the Internet.

Windows XP SP2 Security Center resources screen

Click 'OK' to exit this window and restart the computer if needed. You are done configuring the firewall.

There is other free firewall software also available on the Internet such as BlackIce, Kerio Personal firewall, Kaspersky, F-Secure and many more. You could use any of these if you wish. We chose ZoneAlarm since it is the most-used free firewall software across the world.

There are other also other paid software such as Norton and McAfee who have firewall software. These are more customisable and you also get professional technical support, which may be absent in case of the free software. But whatever the software, remember that to browse the Internet safely, a good firewall is, these days, a must!

Q&A
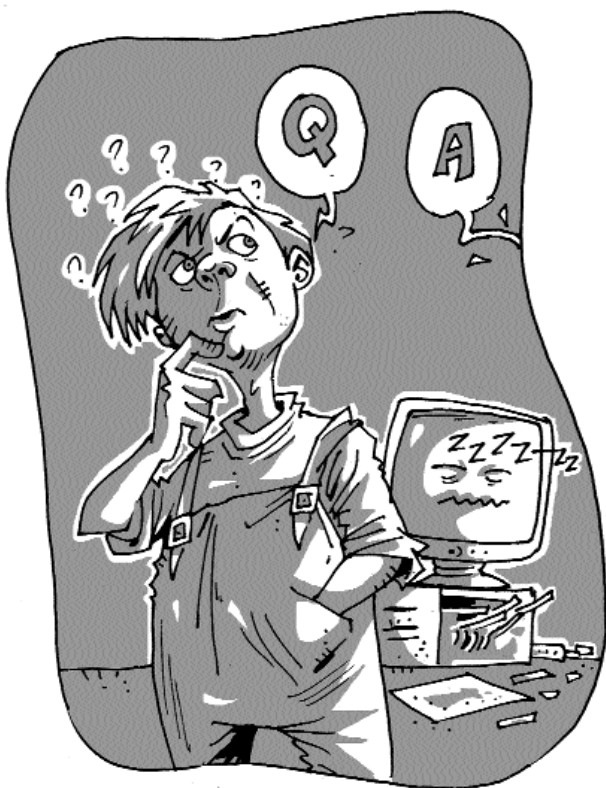
Upgrading your computer should be a cake-walk now that you know how it's done. But what about getting the right components for your PC, and which brand will you buy? We have compiled a comprehensive list of Q&A for you, which will help you learn from other users' experiences. The questions will address almost all the components that go into building your PC.

$\boxed{\text{Q}}$ I have a Pentium 4 1.8 GHz, a 40 GB hard disk, 128 MB DDRAM and an nVidia graphics card running Windows 98 and Windows 2000 Server. I have VB.Net installed in Windows 2000. I get a message that reads, "Your Computer Virtual Memory is too low" when trying to load VB.Net applications. The partitions on my disk are as follows—

C: has 10 GB, D: has 20 GB, on which I installed VB.Net, E: has 5 GB and F: has 5 GB. The minimum paging file size is shown as 192 MB, and maximum is shown as 384 MB under D:. The other fields are kept vacant.

Can I use this option to increase the virtual memory setting? What is the maximum level that I can set it to? Will it affect the normal working of the system? Will it load the VB.Net project files without any problem? Currently, the system slows down when I do so. Another problem is the execution of the project file in VB.Net. I created a shortcut for the .exe file on the desktop, and executed the same without any problem in Windows 2000. However, when I copy it to Windows 98 and try executing it, I get a message saying that mscoree.dll is not found. Where can I get this file and where should I copy it? The .Net project uses an MS Access database that is available under both OSes.

Venu Gopal S

$\boxed{\text{A}}$ You can increase the size of virtual memory page file manually. The maximum value that it can be set to is the amount of free space on the drive. You can even allot space on more than one drive for the page file. However, before you look at increasing the size of the page file, try to reduce the number of running applications, and stop all unnecessary services, including IIS. Virtual memory page files are very slow to access. Ideally, you need to have at least 256 MB of RAM to use VB.Net. Programs written in VB 5.0 or VB 6.0 need the VB Runtime files to be present on the computer on which they are running. Similarly, applications written in any .Net language require the .Net Runtime to be installed. The Runtime files are about 20 MB, and are present on the VB.Net installer CDs.

Q I have a Pentium 4 1.8 GHz Processor and an 845 GLVA Intel original motherboard, which has inbuilt audio and video. I want to know if I can install external audio or video cards on this motherboard, and whether I need to change any BIOS settings. Is there any way of knowing the speed of the DDR-RAM of my system?

Tathagata Ray

A Sorry, your motherboard does not have an AGP slot, so you're stuck with the integrated graphics chipset. You can install a PCI video card such as a TV-tuner card for better graphics. For an enhanced sound solution, use an add-on PCI sound card. All you need to do is disable the onboard sound card from the BIOS. Windows does not provide a reliable utility to check the RAM clock speed, but you can see it when you start your system. At the first screen, where you see the RAM count taking place, you can also see the RAM clock speed. Another option is to use a freeware utility called WCPUID (www.hoda.com), to see the RAM clock speed.

Q I recently upgraded my home PC, following your advice for the latest motherboard, processor and graphics. My configuration is: an MSI KT4 Ultra SR, 333 FSB motherboard with VIA Technologies Inc VT8377 chipset, Apollo KT400 CPU to PCI Bridge, A6590VMS V1.1 091102 AMIBIOS Version 3.31a, an AMD Athlon XP 2600+, 2.083 GHz, 333 MHz FSB processor, Kingston DDR 512 MB, 333 MHz RAM, Seagate Barracuda ST380011A, 80 GB, 7,200-rpm hard drive, SMEDIA nVIDIA GeForce MX 440 SE, 64 MB DDR w/TV, AGP 4X graphics card-all running Windows 98 (C Drive) and Windows XP (D Drive). I also have an ibox cabinet, a 300 W power supply and an APC Back-UPS UPS.

The problem is that my AMD Athlon XP 2600+ runs only at 1.90 GHz, when it should run at 2.083 GHz. The CPU performance is also at par with an Athlon XP processor running at 1.90 GHz, which I tested with the SiSoft Sandra 2003 Standard software I got from the Digit June 2003 CD. In the BIOS setup (AMIBIOS New

Setup Utility 3.31a), the current values set under the 'Frequency / Voltage Control' submenu are as follows:

Spread Spectrum: Disabled (other available options: ±0.25, ±0.5, ±0.75), CPU FSB

Clock: 280 MHz (100 to 280 - in steps of 1)

CPU Ratio: Auto (x6.0 to 12.0 - in steps of 0.5, 14.0, 15.0, 12.5x13.0)

CPU Vcore (V): Auto (1.625, 1.650, 1.675, 1.700, 1.725, 1.750)

DDR Voltage (V): Auto (2.6, 2.7, 2.8)

Termination Voltage (V): Auto (1.27, 1.29)

AGP Voltage (V): Auto (1.6, 1.7, 1.8)

I have also observed that when the CPU FSB Clock speed was set at the default value of 100 MHz, the processor was being recognised as an Athlon 1.25 GHz; and when the speed was set at 266, the processor was detected to be an Athlon 2000+, 1.67 GHz. Now the CPU FSB Clock speed is set at the maximum available option of 280, and the processor is recognised as a 2600+, running at 1.90 GHz. How do I get my processor to work at its designated speed of 2.083 GHz?

S. Sinha

A Wow! That's a complete list of specifications if we ever saw one. You certainly did your homework, and all the troubleshooting possible. Here's the dampner-there's nothing wrong with your processor. It's running at the correct speed. There are two versions of the AMD Athlon 2600+ available in the market. You have the latest version with 333 MHz FSB and 512 KB L2 cache; this runs at a clock speed of 1917 MHz or 1.9 GHz.

The older models clocked 2.13 GHz, but ran at 266 FSB with 256 KB of L2 cache. Check the AMD processor box, and you will see the clock speeds in the fine print near the bar-code. The Athlon XP 2800+ runs at 2.083 GHz.

Q I have an Intel 815 EGEW board, an 800 MHz Pentium III processor, 128 MB of RAM, and onboard Intel integrated graphics. I can't play games such as Quake III Arena and UT 2003;

games such as FIFA 2003 and Need For Speed HP2 are rather sluggish. I don't have an AGP slot, so I can't install an AGP graphics card. Can I add a PCI graphics card to play these games? If so, please give me a list of the best cards available.

Ravi

A Unfortunately, PCI 3D accelerators have been dead for some time now. Hardly anybody buys them, as AGP has completely overtaken the graphics card market. You'll really have to search hard to find a suitable card. Some time ago, Visiontek offered a PCI card based on the GeForce2 GTS chipset. This would do nicely for the games you wish to play. Another PCI card worth looking for is the PowerVR Kyro. Happy hunting and best of luck!

Q I stay in Mumbai. Could you please recommend a good service centre or technician who won't insist on me signing a yearly contract to make home visits? My system is three years old, and it's been showing the wrong time since the last two months. I believe this problem can be solved by replacing the CMOS battery. But according to my vendor-my system is assembled-this is a crystal oscillator problem. Is that true? Can a motherboard fault cause the wrong time to show up in the system tray? Since I haven't signed a yearly contract with my vendor, he will not be sending a technician for inspection of the fault.

Ashar Bhavesh

A Firstly, sorry—we can't recommend any company or individuals to you. But regarding the CMOS battery, you can boot your machine without the CMOS battery. The only difference would be that the machine will generate a CMOS checksum error, and you would have to press [F1] each time you restart. Also, if the CMOS battery is at fault, it will not be able retain the changes made to the time. Replacing the battery is not difficult. Open the cabinet, locate the old battery, remove it, and insert the new one. A CMOS battery costs around Rs 20. If the problem is not rectified after replacing the battery, then it might be due to the oscillator, in which case you'll have to take the motherboard to a service centre.

Q I have a 1.5 GHz CPU with an Intel 845GBV motherboard, a 40 GB hard disk, an nVidia GeForce4 MX 440 graphics card and a Creative Sound Blaster Live DE 5.1 sound card. Can I use another fan for the graphics card instead of its own fan? If so, what kind of fan should I use? Will it enhance my card's performance?
Udayan

A The fan that comes with the card is more than enough! You need not change or add any more fans to it. However, you can increase the number of fans in the cabinet, as it might improve the cooling system, and thereby increase the lifespan of the component. However, make sure you have a better fan to keep things cool in case you wish to over clock your graphics card for better performance.

Q I have three questions—what is a firmware update, and what does it do? Which of the following needs regular driver and firmware updates for optimal functionality: motherboard, chipset, graphics card, sound card, hard disk, processor, modem, monitor, or the TV tuner card? Lastly, I intend buying a PC, primarily to play games. Which OS should I opt for—Windows XP Professional or Windows XP Home Edition?
Akhil Bahri

A Firmware is software that's embedded in the hardware. It's accessible through specially written applications that can write or read from the ROM chip, where the firmware resides. For instance, the BIOS on the motherboard is the firmware. As and when manufacturers discover bugs in the hardware, they put up specific updates to overcome them. Firmware updates can also help overcoming hardware limitations.

Assume that your current AMD board supports a 166 FSB processor. Later, if AMD releases a 200 FSB CPU, then the motherboard manufacturer may release a firmware update so that your board also supports it. In the case of such cards as TV-tuners, the manufacturer may release an update to support a new mother-

board. Motherboards often require firmware updates to support newer features and hardware. Finally, load Windows XP Home on your PC if gaming is your main need. It shores up to the needs of most games and is easy on the pocket too.

Q I would like to know more about HyperThreading. I have heard a lot about this new product from Intel. I have an assembled PC that comprises an Intel D845GEBV2 motherboard (which has an external AGP slot and Extreme Graphics onboard as well), an Intel 1.7 GHz, 512 MB RAM and a 80 GB Seagate Barracuda hard disk. I would like to exchange my current motherboard for Intel's new HyperThreaded one. Do you recommend the exchange, or should I make do with my present configuration? I intend switching to a HyperThreaded motherboard since it's relatively faster, and supports multitasking. Can you recommend motherboards that are better than the one I have in mind? If so, please suggest some that have an external AGP slot, as I have a graphics card. Also, please let me know the cost involved.

Siddharth

A Intel's HyperThreading technology pertains to processors and not to motherboards. Intel's latest CPUs have this feature, and nearly all new motherboards for the Pentium 4 platform support it. For performance, there will be a marginal gain, and that, only with applications optimised for HyperThreading.

Unfortunately, as of today, there are few such applications. Nevertheless, some applications actually see a performance drop when used with HyperThreaded processors. However, you have a pretty decent machine and there is absolutely no reason to shift to a newer configuration as of now.

Q I have a Pentium 4 1.4 GHz machine, running both Windows 98 and Windows XP Professional. The display card is SiS630 on a Vintron motherboard. When I play *Back Alley Brawl*, I get an error that says I don't have the latest version of OpenGL. Where shall I get this?

Jayharsh Krishnakumar

A | SiS630 is a PCI-based display card, which lacks hardware support for OpenGL. The minimum requirements are an AGP card for the game to run in OpenGL. One of the cheapest solutions is the GeForce MX 440, which costs about Rs 1,700.

Q | I am in the process of finalising the configuration of my new PC, and want to know whether 512 MB of RAM is sufficient to run Maya, or should I opt for 1 GB of RAM?

Kumaresh

A | Minimum memory requirements depend on the applications you use. For office applications 256 MB is enough; for 2D image editing tools, 512 MB should be sufficient, while for AV and 3D, a minimum of 1 GB is necessary. Basically, as much RAM as you can afford and cram into your system is recommended. Maya will definitely run with 512 MB of RAM, but will be sluggish.

Q | One of our clients wants to purchase an AMD Athlon 64-based system. He is a graphic designer, and uses Photoshop most often, working with files of sizes in excess of 500 MB. What system would be ideal here? I downloaded Microsoft XP, the 64-bit edition. Does it give good performance with the Athlon 64? Also, how should I configure the system for best performance?

Krishna Prasad

A | You should opt for an Athlon 64. It gives better performance than the Intel Prescott. Also, in memory-intensive applications like Photoshop, an Athlon 64 will give much better performance, as the memory controller is within the CPU, as against the Prescott, where the memory controller resides on the Northbridge. The second factor is memory. The RAM needs to be high enough, say 768 (512 + 256) MB.

Q | I have a five-PC network on a CAT 5 cable and a hub. What do I need to set up a fibre optic cable network? What's needed to set up a WiFi network? Also, please let me know the approximate costs involved?

Anil Gupta

A Setting up a fibre-optic LAN would be a very costly affair, and also a tedious and complicated process. You'll need a LAN card with optical fibre cable connectors, an optical fibre switch, an optical fibre patch cable and connectors. You will also need equipment to connect the cables to the connector etc, basically, lots of costly equipment. Fibre-optic connectivity is used to set up a high-speed backbone, while WiFi is used for connecting people on the fly.

WiFi is simpler and also comparatively less expensive, but definitely more expensive then a wired LAN. You will need a WiFi access point, which would cost around Rs 10,000, and five WiFi cards costing around Rs 3,000 each. The software needed to set up the access point comes bundled with the hardware.

Q I have a Pentium 4 600 MHz, 128 MB RAM and an Intel 82815 graphics controller, running Windows 98SE. I wanted to play *Halo*, but the game gave me an error that says, "Hardware acceleration may be disabled, run dxdiag." Also, when I try to run *Need for Speed: Underground*, I get an error that says, "This program has caused an illegal operation and will be shut down." What do I do?
Arshad

A You will face such problems when you try to run new games. This is because your onboard graphics controller cannot support the game that you intend playing. The minimum system requirements for Halo are at least a Pentium III 733 MHz processor, 128 MB RAM and a 32 MB video card that supports Hardware Transformation and Lighting. So you need at least an nVidia GeForce2 or an ATi Radeon 9200SE. You will need to upgrade to be able to play most new generation games.

Q Our educational institution wants to use 29-inch TVs as an output device instead of monitors. What computer configuration do we need for that purpose? We use a Pentium 4 2.4 GHz , an Intel GVSR original motherboard, 128 MB DDR RAM with a 40 GB hard disk, and need output to both TV and monitor.
AGS

A The hardware configuration that your institution currently uses is just perfect. However, you will need to install a display card with TV-out capability. Doing so will help you connect the computer to the TV. Since your motherboard does not have an AGP slot, you need to find a PCI display card with a TV-out connector. You can either use an S-Video cable, or a composite cable (if the video card supports it) to connect the TV.

Q I have a Pentium III 733 MHz, a 20 GB hard drive and 128 MB of RAM. For the past one year, my motherboard's battery has been draining swiftly. I have to correct the system clock every time I reboot. A couple of months back, the computer refused to boot as well. If I change the battery, everything starts working normally again, including the clock. Does a computer refuse to boot if the battery is completely dead? If yes, why does this happen, and is there something wrong with my motherboard?

Tejendra Pathare

A It's unusual for a battery to drain so quickly. Your PC should boot, whether the battery is dead or not. Your motherboard seems to have a problem, contact your hardware vendor.

Q I am an IIT Mumbai student. We access the Internet via a LAN from our rooms. The problem is, my room has only one LAN socket, but we have two computers in the same room, and want to connect both. How can we allow both to connect to the network using the single LAN socket? What hardware and software do we need? Also, we may use Linux and/or Windows.

Vamsi Krishna

A The simplest solution is to buy a four-port hub, and connect that to your LAN socket. You can then connect up to four computers to that one LAN socket. A four-port hub costs around Rs 800.

Q One of my clients has a VIA chipset HIS Motherboard. The model is Pentium 4 2.66 GHz. The problem is that he wants

to add an additional 512 MB of DDR RAM. Will it be OK for me to add an additional 512 MB of 266 MHz DDR RAM, parallel to the existing 256 MB?

Juzar

A You will definitely be able to install an additional 512 MB DDR memory module. Keep in mind, though, that the motherboard supports up to 2 GB of 200 MHz or 266 MHz DDR RAM only. We would like to advise that you install a RAM stick of the same speed as the one already in place, in order to avoid any further problems.

Q I want to buy a DVD/Combo writer for backing up my data. Can you suggest a good one? I need a drive with 52X writing speed and 16X DVD writing speed.

Dr V K Saxena

A Typically, a combo drive costs between Rs 2,500 and Rs 2,950 depending on the brand. Consider Lite-On, Sony, Asus or BenQ. Buy DVD-writers if your data set is going to be larger, above 1 GB. Or buy a 16X DVD-Writer too, but right now, DVD media availability is an issue. DVD-writers will cost upwards of Rs 4,500.

Q I have a Pentium 4 2.26 GHz and a Mercury motherboard with two memory slots. Each slot can hold a 1 GB RAM stick. There's 128 MB DDR RAM installed in one slot. I would like to install a 256 MB stick in the vacant slot. I want to know whether there would be a problem if I have two memory slots with memory modules of different capacities?

Goutam Ghosh

A There should be no problem with putting in RAM modules of different capacities. However, you might encounter problems if the RAM frequencies are different. If you would like to check your RAM frequencies, download a software called Everest from www.lavalys.com. Insert one module at a time and check for

the core frequencies. If they match, you will most probably not face a problem. However, it is not a sure-shot testing method, as different CAS (Column Access Strobe) latency timings might conflict. If the core frequencies match, you can put in the chips and test your system for stability. If the system is stable, keep them inserted, else discard the 128 MB module.

Q I recently downloaded a BIOS update from Intel's Web site. But now, I would like to roll it back. I want to know if there is a way to uninstall or remove the update. I have a Pentium 4 1.7 GHz computer, and the board is an Intel D845GLLY.

Bishesh Bhatta

A It is possible to roll back your BIOS by re-flashing it with an older version. If you have saved your previous BIOS, you can simply flash it from that particular file. If you didn't save your previous BIOS, you will need to download that version of the BIOS from the manufacturer's Web site. Please be very careful while flashing your BIOS as it can render your motherboard unusable if done incorrectly.

Q My system configuration is an Intel Pentium 4 2.4 GHz processor with HT technology, an Intel 865GBF original motherboard, and 256 MB of DDR 400 RAM. I want to upgrade my graphics card so I can play the latest games such as Half-life 2 and DOOM 3. The new series of cards from nVidia and ATi are expensive, so does it make sense to buy a MX-4000-based card for now and then later opt for the new cards when they get cheaper?

Ajit Das

A If you really want to play Half-Life 2, DOOM 3 and other games, then settling for an MX-4000-based card is not going to help you. In the next two years, graphics card manufacturers will move to the newer PCI-e interface, and it will become difficult to find a high-end AGP card.

Moreover, this will put you in a fix, and you will have no option but to upgrade your entire system, since your current mother-

board does not support PCI-e. I suggest you invest in a good AGP card now, so that your system will allow you to play most of the upcoming games. Remember, when it comes to IT, there's always something better looming on the horizon, and if you keep waiting, you are bound to end up spending a lot of money on components you don't really want.

Q I would like to purchase a TV-tuner card, primarily to record content from my VCR and TV programmes. I would like you to help me choose a good card with capturing capability. My budget is Rs 3,000.

G V V Rao

A For Rs 3,000, there are many good TV Tuner cards that you can buy. Look at Aver TV GO 007, Pinnacle PCTV Pro and Compro Videomate. Though these cards support video capture, the output isn't exactly of a professional quality, just in case you are thinking of using such cards to convert your VHS tapes to CD. The price for these cards will vary between Rs 2,250 and Rs 3,000.

Q I am currently in the process of building a workstation and need a full tower enclosure, but have been unsuccessful in locating a dealer. I would appreciate your help in locating a dealer, and please mention the brand, and the price of the cabinet.

Kanav

A You can opt for Antec tower cabinets-they have some good models meant for workstations. Their 'Performance' series has an array of cabinets to choose from, try the Performance Plus 660AMG. You should also check out the roomy P160, which Antec claims they have made from recycled fighter jets. Antec cabinets come with efficient and reliable power supplies and are hence more expensive than other products, so be prepared to spend a lot more. You can contact Cyber Space Abacus on 044-24917667, or visit their Web site www.theitdepot.com.

Q I have an Intel 2.4 GHz Pentium 4 CPU with 256 MB of RAM and a GeForce4 128 MB. While playing Splinter Cell: Pandora Tomorrow, my machine gives an error: "Inadequate pixel shader

support." Also, in 3D Mark Pro, it gives a Direct3D error with a 'pixel shader' problem. How can I play the game?

Avik

A Your graphics card does not support pixel shader-a graphics function that calculates effects on a per-pixel basis, giving ambience and a look of realism to the displayed image. You would need to upgrade it to at least a GeForce4 Ti card. If you are upgrading, go for a higher-end card, say the GeForce FX5950. If you are looking for a slightly cheaper card, try the GeForce FX 5200 or the FX 5700, or the 9600 Series from ATi.

Q I have a Compaq Presario 3600m machine with a Pentium 4, 1.5 GHz processor, 128 MB of SDRAM, and an nVidia Vanta graphics card with 16 MB of memory. My problem is, of late, no games seem to work on my PC.

The error messages mainly show that my hardware does not support my games. *Max Payne 2* was the last game that worked fine. After that, whether it is *NFS Underground, Doom* or *FIFA 2005*, it does not work. Will I have to buy a new computer, a new processor, or a new graphics card?

Anjan Jyoti Bora

A The problem lies mainly with your RAM and your graphics card. You have not mentioned which motherboard you are using, but we think it will not support DDR RAM. The best solution would be to go for a complete overhaul of your system, wherein you upgrade to a Pentium 4 2.4 or 2.8 with at least 256 MB of DDR 400 RAM, and a decent 64 MB graphics card, say a GeForce 5700 Ultra. That should let you play all the latest games at fairly decent settings. For a full comparison and specification, check out the graphics cards shootout in the January 2005 issue of Digit. If you do not want to go in for a complete overhaul, you could go in for a GeForce4 Ti card, which should let you play quite a few of these games at the minimum settings. Make sure to check what AGP slot your motherboard supports-8x or 4x. 8x is backward com-

patible with 4x, but there is no point in buying an 8x card if you cannot use it to its full potential.

Q The specs of my PC are as follows: Athlon XP 2400+, 256MB PC133 DDR RAM (Hynix) and a Krypton C18G-400 motherboard with onboard nVidia Geforce 4. Recently, my friend accidentally dropped my RAM module. But there were no cracks or scratches. From then on, while launching some applications or games, it shows an error—"(appname).exe has encountered an a problem and needs to close."

When I viewed the technical contents of this report, it displayed, "The following files will be included:
D:\DOCUME~1\SIVASU~1\LOCALS~1\Temp\WER6.tmp.dir00\gt a-vc.exe. mdmp.
D:\DOCUME~1\SIVASU~1\LOCALS~1\Temp\WER6.tmp.dir00\ap pcompat. txt"

For each application, only the number after "WER" and the application name itself changes. It happens mostly when launching GTA:Vice City, Colin McRae Rally 2, Adobe Live Motion and PDF-to-HTML converter. Is it due to my Hynix RAM? Do I need to get it replaced (it is within the warranty period)? Are there any tools to detect damaged RAM modules?

M Siva Subramanian

A To test whether your RAM is damaged, remove all RAM modules from their slots and insert only one of them into a slot. Now run any the following utility: http://www.memtest86 .com/ or get the Microsoft utility at: http://oca.microsoft .com/en/windiag.asp If you get an error, run the test again with your RAM chip in a different slot. If you do not get an error this time, then your RAM slot is not faulty. Repeat the test for all the RAM chips you have. It may turn out that both your RAM slots are faulty. To make sure that it is your RAM chip at fault, test it on another machine where the slots are working fine. If you do not get any memory errors, then your RAM chip is fine and you should try reinstalling your games and software and updating them with the latest patches.

Q I have a Pentium III 1.0 GHz, a Vesta 810e Intel chipset board with 256 MB of SDRAM and an 80 GB Seagate HDD running Win98 and WinXP as the OSes, a CD-ROM and an LG CD-RW. I also have a 40 GB Seagate HDD not connected to the system. The 40 GB HDD is divided into three partitions running Win98. The 80 GB HDD is divided into six partitions—four as FAT and two as NTFS. How do I connect my HDD to my system without opening the cabinet? Do I need any special drivers?

Ravi Shah

A It is possible to convert an internal HDD to an external HDD. You need to buy a case which retails for Rs 1,500-2,000. Just put your drive in the case and connect it to your PC with a USB cable. These cases do not support SATA drives—only regular IDE ATA disk drives.

Q I want to set up Wi-Fi at work with a single desktop and my Wi-Fi-enabled laptop. Can I use a wireless PCI card and communicate directly with my laptop with the RF waves from both terminals? Does technology support such configuration? Or is an AP a must? Can I use only an AP connected to the desktop that will communicate with the laptop? Which brand is preferred for the hardware (AP, wireless PCI card)?

Dedhia

A You do not need an access point to setup a wireless network between your laptop and your desktop. You need to set up an Ad Hoc access point. First, install the wireless card on your desktop. If you are using Windows XP, your card will be automatically detected and the drivers will install. If other networks are available, Windows will automatically open the window for wireless network connection. If not, click the 'Wireless Connections' icon to open the window.

If applicable, clear all connections in preferred access points to make sure that you connect only to your laptop. On the top right of your window, click the 'Advanced' tab and select 'Computer to Computer (Ad Hoc) networks only.' Un-click the 'Automatically

connect to non-preferred networks' box. Go back to the wireless networking tab under the preferred Networks window, click 'Add' and specify a name (SSID)—any name.

The connection type would already be specified as 'Ad Hoc'. Now you will see the name of your network in the preferred networks window marked with a red 'X', signifying that that computer is not within range. Since your laptop is Wi-Fi enabled, go to the wireless networks tab and you will see the name you gave in the above step in the "Available Networks" window. That's all you need to do to share data between the two.

Q I am learning Maya and plan to buy a new PC to pursue a career in designing. What processor should I settle for? Should it be a Pentium or an Athlon 64 FX? Also, please mention the appropriate motherboard, and the cost of the respective motherboard-processor combo.

Jeet

A Applications used for 3D modelling such as Maya require colossal amount of processing power and tons of memory. As of today, AMD's Athlon 64-bit processor is the numero uno and there should be no doubt about which processor to go for. The Athlon 64 family comprises the Athlon 64 and Athlon 64 FX processors, the latter being significantly costlier. In case money is not a problem, consider the FX series, the required RAM and motherboard, else you can settle for the Athlon 64 processor.

The Athlon 64 3200+ is ideally priced at Rs 12K, and should prove to be a great performer when coupled with the K8N Neo FSR motherboard from MSI. This motherboard is priced at Rs 7.5K, and a higher option, the fully loaded Platinum priced at Rs 9.5K, is also available. Keep in mind that for getting the maximum out of this PC, you need to equip it with at least 1 GB of DDR 400 MHz RAM from Transcend or Kingston.

Q I have a Pentium 4 2.66GHz, Gigabyte 8S650GXM mother-board, 256 MB Ram, 80 GB HDD, S3 Savage 2000 64 MB card. I would like to upgrade and have already bought an Asus Pentium 4C800 DLX motherboard, 1 GB DDR 400MHz RAM, and Antec PlusView 1000 AMG cabinet. Which is the best CPU, graphic card, hard drive and sound card? Money is not an issue for me.

Raj Anand

A The Asus Pentium 4C800-DLX supports socket 478 Pentium 4 Processors with 800 MHz FSB. For maximum perform-ance, you can opt for a P 4, 3.2 GHz processor with 1 MB cache. For the graphics, a GeForce 6800 GT card from Gainward is a good investment. Western digital drives also perform admirably; however, are harder to obtain and service might become an issue. You can safely bet on the Maxtor or Samsung SATA drives; they perform and help for them is not too far! As for the sound card, I recommend you try the on-board sound first. If you are not sat-isfied with the quality, then you could go in for any Creative Audigy card.

Q I want to buy a good 17" TFT monitor with fast response time (8-12 ms), analogue and digital inputs. My four-year-old CRT monitor has recently conked off, and I would like to know if this is the right time to upgrade to an LCD monitor considering the prices. Is a fall in prices expected any time soon?

M K Mech

A TFT LCD monitors are expensive and will set you back by at least 23K for a decent 17-inch model. LCD monitors with low response time of 8 to 12 ms are rare in India, and even if they are available, would be priced high. For the moment, it is not advis-able to go in for an LCD monitor given the fact that they are expensive for the marginal advantages they offer.

My reasoning is also based on experience... I play lot of games and have come to the conclusion that even the worst CRT is a bet-ter bet than a reasonable LCD since they let you play without dis-tortions. LCDs are also finicky about the resolution at which they

run. On the positive side, LCDs consume less power, but that should not be an issue since home computers hardly run long enough to show up in the electricity bill.

Q I am interested in buying 256 MB SD RAM-new or used. I have a Pentium III 64 MB SDRAM, 1 GHz processor. What is the market price for both options?

Dipen

A You should never compromise on a component like memory modules. Going in for used RAM has many pitfalls although the deal might look good. Used RAM does not carry warranty, and if you are going to buy used RAM, buy it from a trusted source only. The new 256 SD RAM would cost you somewhere around Rs 1,950. Before you buy, though, make sure you point out to the dealer that you are using a Pentium III and not a Pentium 4 processor.

Q I recently upgraded my PC to an AMD64, and my older power supply cannot cope with the processor's power demands. As a result, my system does not boot when I connect an additional hard drive or an optical drive. Can you suggest a power supply that offers decent performance at an affordable price?

Rohit Kumar

A Before buying a power supply, take note of the upgrade path you will follow. If you are a gamer, then at some point, you will invest in a high-end graphics card. Most next-generation graphics cards require external power, which is drawn from the system SMPS. Drives will also be a part of your future upgrade. It is advisable to make the power supply as robust as possible for your future demands.

For the AMD64 motherboard, you will require a 350W power supply at the least, but I suggest you invest in a 400W. You need to be careful, as the market offers a variety of 400W units, not all of which are truly rated at 400. The SL range from Antec is good value for money, and you can get a SL400 for Rs 2,450 with a three-year

warranty. The VIP 400W SMPS from Kunhar peripherals costs Rs 2k with a three-year warranty.

Q I have an AMD Athlon XP 1.7 GHz with a Gigabyte 7A2mmh motherboard, a 40 GB HDD, 256 MB of SDRAM and GeForce4 MX 440 graphics card. Is this sufficient for playing all PC games, or do I need to buy a better graphics card? And for a new card, will I need to change the motherboard?

Murtuza Madraswala

A The GeForce4 MX series card can run most games; in fact, *Doom 3* and *Half-Life 2* also run on these cards, but at extremely low settings and without any special effects. You don't need to upgrade your motherboard if you are settling for an AGP 8X card, since these are backward-compatible. If you are a gamer, I suggest you stall your graphic card purchase for the moment.

The reason is that all upcoming games will be more demanding in terms of CPU power and memory resources, and your processor can be a real bottleneck. Your current system will easily bog down with the demands of a high-end game, even with a new AGP card. Your only solution would then be to upgrade your entire rig. However, all new motherboards will soon start sporting PCI Express slots, making your brand-new AGP card obsolete! I'd suggest you change your entire rig when PCI Express enters the mainstream.

Q I am interested in recording some of my favourite TV programmes available via the TV cable connection at home.

V K Narayan

A Install a TV-tuner card in your PC, and it should help you record your favourite TV programmes without any fuss. TV-tuner cards from vendors such as Pinnacle and Compro are quite expensive, generally in the range of Rs 2,450 and Rs 3,925 each.

While the Pinnacle is just a TV-tuner card, Compro's Videomate TV gold is a graphic card cum TVtuner card. Pixelview

also has some good cards, which are reasonably priced at Rs 2,000. The bottom end of the TV-tuner card market is dominated by Mercury and Intex priced at Rs 1,350 and Rs 1,250 respectively. I recommend the Pinnacle PCTV solution for its good balance of features and performance.

Q I have a Pentium 4 3.2 GHz processor with 512 MB of DDR RAM and an 80 GB HDD. I have been using Windows 98, and now want to install windows XP Pro. I would also like to keep Windows 98. However, my hard disk is not partitioned, and I do not want to format it. Is there a way to partition a disk without formatting it? Or, can Windows XP and 98 SE be installed on the same partition?

Nitesh Kumar

A You can install Windows XP and 98 on the same partition by specifying different installation folders. This, however, can lead to various conflicts as the two OSes use entirely different drivers and system file versions. The best way to do it is to install the OSes on different partitions.

One of the best softwares that will let you accomplish this is Partition Magic 8.0. You can download it from http://snipurl. com/cbdk.

Note that you will need to purchase the software, as the demo version only shows you the partition creating process and will not actually create any partitions.

Glossary
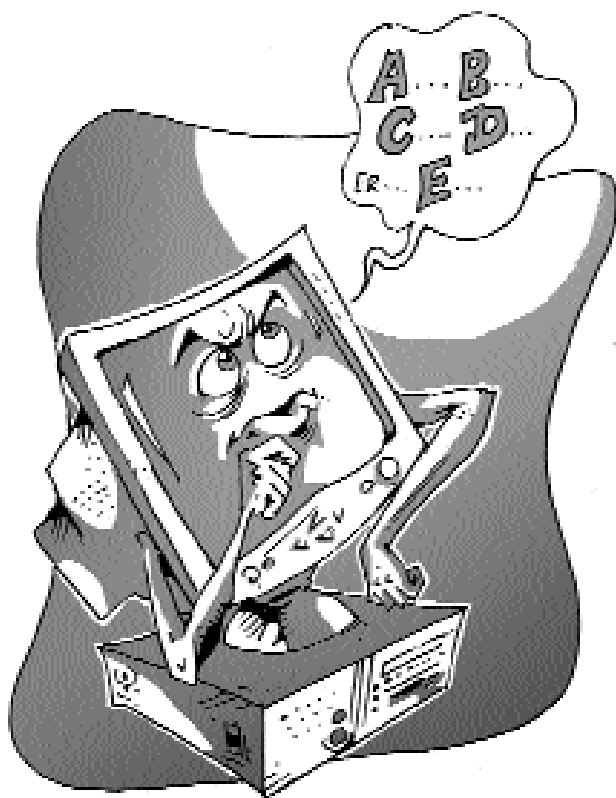
You may have come across terms and jargon when reading this book, which you may not understand. This glossary is intended to help you understand such terms and jargon. Acronyms abound in computer terminology, and hence we have provided detailed information about each term. The glossary is divided in sections for you to easily navigate to the section of your choice. We have tried to maximise the number of terms included in each section, so that they are relevant to the context of the matter in the book.

General

Actuator
The mechanism responsible for moving the read/write head in a hard drive.

Authentication
Refers to the set of processes by which a user's identity is verified on a network or standalone machine to ensure that the user is authorised to have access to the resources he or she requested.

Bandwidth
The data-carrying capacity of a network or bus. It is usually expressed in bits per second, bytes per second or cycles per second. In other words, the higher the bandwidth, the faster the data can be sent across the network or bus.

Cookie
A piece of information, usually a text file, sent by a Web server to user's computer in response to a request from a Web browser. The browser software saves the file, and sends it back to the server when required. For example, your username for a particular site may be stored as a cookie, so the next time you visit the same page, it automatically appears in the username field.

DHCP (Dynamic Host Configuration Protocol)
A protocol for automatic TCP/IP configuration which provides for static and dynamic allocation and management of addresses.

DNS (Domain Name System)
The system that allows you to find a particular computer on the Internet by name instead of by IP address. Host machines running DNS server software accept queries that contain the host name (such as thinkdigit.com) and return either the IP address of the desired host, or a pointer to another DNS server that might know about the host. The resolution of host names to IP addresses occurs transparently and almost instantaneously.

Domain Name
The unique name that identifies an Internet site, which other computers can look up.

ECC (Error Correction Code)
An algorithm used with special circuitry for testing the accuracy of data as it passes in and out of main memory or the cache.

E-Commerce
The conducting of business transactions through electronic transmissions between computers. The term is commonly used to mean doing business over the Internet.

Encryption
The scrambling of data in such a manner that only authorised users can descramble the encrypted data so as to get back the original information. This is a security measure.

Ethernet
A protocol for local area networks (LANs) that uses twisted-pair or coaxial cables and CSMA/CD (Carrier Sense Multiple Access with Collision Detection)—a method for sharing devices over a common medium. Ethernet runs at 10 Mbps; Fast Ethernet runs at 100 Mbps. Ethernet is the most common type of protocol used in LANs.

Firewall
Computer hardware and/or software that limits access to a computer over a network or from an outside source. Often used to prevent computer hackers from getting into a company's computer systems.

FTP (File Transfer Protocol)
A file-sharing protocol that allows users to transfer files to and from a PC, list directories on the foreign host, delete and rename files on the foreign host, and perform 'wildcard' transfers between hosts. It is designed to work with TCP/IP.

Full-Duplex

Refers to the use of simultaneous two-way communication between network cards, which effectively doubles the available bandwidth.

Gateway

A server that acts as an intermediary for some other server. Unlike a proxy, a gateway receives requests as if it were the origin server for the requested resource; the requesting client may not be aware that it is communicating with a gateway. Gateways are often used as server-side portals through network firewalls and as protocol translators for access to resources stored on non-HTTP systems.

Hop

The term used to describe the data link between two gateways or routers that a packet must traverse in order to reach its destination.

Host

The term used to describe any device attached to a network that provides an application-level service.

Hot-Swap

The ability to add or remove hardware to a computer without powering it off.

HTTP (Hypertext Transfer Protocol)

The protocol used for transfer of hypermedia documents. The protocol consists of resource requests from a Web browser to a Web server, and a response from the server that indicates whether the resource is available or not, and if it is, the transmission of the resource back to the browser.

HTML (Hypertext Markup Language)
A simple hypertext publishing language based on the ASCII standard. This document-encoding scheme is used for resources published on servers on the World Wide Web. An HTML document is a mixture of ASCII text and special reserved character sequences, called tags, which control formatting of the text.

Hub
A hardware device that serves as the junction where individual PCs and/or other network devices connect to each other. Hubs may be connected to increase the number of available ports.

Hyperlink
The 'clickable' spots in an HTML document. Hyperlinks can be clicked by the viewer to cause a jump to another document or resource on the same or another Web server. The hyperlink has two components: the text or graphic that is displayed by the Web browser, and the URL of the resource that will be available upon clicking it.

Internet
A conglomeration of networks that are connected together, forming a world-wide network. It uses the TCP/IP protocol as its backbone. The Internet today is mainly used for commercial, rather than military, purposes.

IP (Internet Protocol)
The TCP/IP protocol that defines the IP datagram. It is a low-level protocol that is responsible for routing packets of data across separate networks tied together by routers. It tracks the Internet addresses of nodes, routes outgoing messages, and recognises incoming messages.

IP Number
Each machine, or host, that participates in any Internet transaction, is identified by a unique 32-bit number called the IP number. The IP number is used as a return address or as a destination address in Internet transactions. IP numbers are commonly writ-

ten out as dotted octets with the decimal values of the four bytes separated by dots. An example is 128.128.4.129.

IPX (Internet Packet Exchange)
A Novell NetWare communications protocol used to route messages from one node to another. IPX is not able to always deliver a complete message, because an IPX packet can sometimes get lost when a network boundary is being crossed.

ISP (Internet Service Provider)
An institution that provides a user—a home user, for example—access to the Internet, usually for a fee.

LAN (Local Area Network)
A communications network that links PCs and other devices in a single office, across offices, in homes, or in a small campus. In client/server LANs, user PCs (the clients) access shared files and sometimes applications stores on a PC that acts as the server. In peer-to-peer networks, any connected PC can serve as a client or a server.

Parity
The data that is used to detect or correct single-bit failures. A parity bit, if used, comes attached with the data transmitted. Parity is normally associated with hard drives or system memory.

PPP (Point-to-Point Protocol)
A protocol that allows a user to connect to the internet using a standard telephone line and modem. PPP features error-detection and data protection unlike older systems such as SLIP.

RAID (Redundant Array of Independent Disks)
A group of two or more hard drives, which together provide increased performance with increased probabilities of error recovery and fault tolerance. Can be implemented in the operating system, by software with standard disk controllers, or designed in the disk controller itself.

Router
A computer or network device that transfers data packets from one network to another.

SCSI (Small Computer System Interface)
A standard connector and communications protocol used for connecting devices such as disk drives to computers.

Server
A computer that provides service for other computers connected to it via a network. The most common example is a file server that has a local disk and services requests from remote clients to read and write files on that disk using the Network File System (NFS) protocol or network operating system software.

SMTP (Simple Mail Transfer Protocol)
A protocol for sending e-mail messages between servers. Most e-mail systems that send mail over the Internet use SMTP to send messages from one server to another; the messages can then be retrieved with an e-mail client using either POP or IMAP.

Subnet Mask
The subnet mask is used to determine where the network number in an IP address ends and the node number in an IP address begins. A node is anything on a network that needs an IP address to communicate (a PC, server, router, etc). Also known as address mask.

Striping
The ability to use multiple drives simultaneously, using them as a single logical unit.

TCP (Transmission Control Protocol)
A connection-oriented protocol that transmits data in byte streams. Data is transmitted in packets called TCP segments, which contain TCP headers and data. TCP is a 'reliable protocol' because it uses checksums to verify data integrity, and hand-shaking to make sure that the transmitted data is received intact.

TCP/IP (Transmission Control Protocol/Internet Protocol)

Transmission Control Protocol/Internet Protocol is a transmission protocol that is extremely popular on the Internet. This is a standard for routing and data transfer around the world. The Internet Protocol is a connectionless protocol that provides packet routing. TCP is connection-oriented, and provides reliable communication and multiplexing.

UDP (User Datagram Protocol)

A TCP/IP connectionless-mode protocol that allows an application to send a message to one of several applications running on a remote or local machine. UDP is an 'unreliable protocol' because the sender receives no information indicating whether a datagram was received.

URL (Uniform Resource Locator)

A method for specifying the exact location of an Internet resource—typically a file—and the network protocol necessary to retrieve and interpret the resource. For example, http://www .thinkdigit. com points to the home page of *Digit* Magazine on the Web, and the 'http' indicates that the HTTP protocol is necessary. The file provided upon using this URL—that is, what you see when you make a request from your browser using this URL—is the front page of *Digit*'s Web site.

Web Browser

A program that retrieves HTML documents from Web servers and formats them for display. A browser can also interpret hyperlinks within an HTML document, and use them to navigate from one HTML document to another. Microsoft Internet Explorer and Netscape Navigator are examples of Web browsers.

Web Client

An Internet navigator. This is usually a PC or notebook with an Internet connection. A Web front end is a GUI-based, hypertext network browser that makes Internet navigation easy. It lets users jump with mouse clicks from one information source to

another anywhere in the world. Users can retrieve data, start applications on remote servers, and communicate in real time across the Internet.

Web Server

A computer that delivers or serves up Web pages. Every Web server has an IP address and possibly a domain name. For example, if you enter the URL http://www.thinkdigit.com/index.html in your browser, this sends a request to the server whose domain name is thinkdigit.com. The server then fetches the page named index.html and sends it to your browser. Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet.

Web Server Program

A program that understands HTTP and responds to resource requests from Web browsers using that protocol. A Web server program must run on a host that is addressable with an IP address, which is found using its corresponding DNS host name. The machine that runs the Web server program is often referred to informally as a Web server, although the machine may be running many other programs at the same time.

WWW

The World Wide Web, or simply the Web. The Web, which was invented by physicists at the European Community's particle physics research centre CERN, is more a conceptual construct than a physical entity. All the Web servers on the Internet, taken together, constitute the WWW, but there is no central administration.

Optical Drives

Authoring Software
Used for the creation of a database for a CD. Authoring usually results in a search-and-retrieval type of document, with the addition of a user interface. Authoring functions include tagging and indexing.

Buffer Underrun
An error where the data stream being fed from the CD's cache buffer falls behind the laser that is doing the writing.

CD
Compact Disc. A digital medium made of a polycarbonate substrate, a reflective metalised layer, and a protective lacquer coating. Recordable CDs also have an organic dye data layer between the substrate and the metal reflective layer.

CD-ROM
Compact Disc Read Only Memory. The compact disc format that is used to hold text, graphics and hi-fi stereo sound. The disk is almost the same as the music CD, but uses different tracks for data. The music CD player cannot play CD-ROMs, but most CD-ROM players are able to play CDs. A CD-ROM can hold 650 MB of data, which is equivalent to about 250,000 pages of text or 20,000 medium-resolution images.

CD-RW
Rewritable CDs; CDs that cam be written and erased many times, unlike CDR (CD read only) disks that can only be written on once.

Codec
Short for compressor/decompressor, a codec is any technology for compressing and decompressing data. Codecs can be implemented in software, hardware, or a combination of both. Some popular codecs for computer video include MPEG, Indeo and Cinepak.

Data Layer

In a CD-R, the organic dye sandwiched between the polycarbonate substrate and the metalised reflective layer of the media. CD-Recordable discs do not have any data on them until they are recorded. The recording laser selectively melts 'pits' into the dye layer: rather than burning holes in the dye, it melts it slightly, causing it to become non-translucent so the reading laser beam is refracted rather than reflected back to the reader's sensors. In pressed CDs, the data layer is part of the polycarbonate substrate, and is pressed into the top side of it by a stamper during the injection moulding process.

Data Transfer Rate

The speed with which data can be read from a CD ROM drive. 150 kilobytes per second, or 1x, was the original standard rate; 2x equals 300 kb/second; 4x means 600kb/s, and so on.

Digital Audio

Digital audio describes sound recording and reproduction systems that work by using a digital representation of the audio waveform. This usually requires at least 16 bits of linear coding to represent each digital sample.

DVD

A format jointly developed and agreed upon by Toshiba, Matsushita, Sony, Philips, Time Warner, Pioneer, JVC, Hitachi, and Mitsubishi Electronics, which is now the universal format for high-density compact disks. DVD is commonly taken to be an acronym for Digital Versatile Disk or Digital Video Disk. This format can hold much more information than a regular CD can, and has a higher data transfer rate.

Hard Drives

IDE Interface

Abbreviation of either Intelligent Drive Electronics or Integrated Drive Electronics. The IDE interface is an interface for mass-storage devices, in which the controller is integrated into the disk or CD-ROM drive. Although it really refers to a general technology, most people use the term to refer to the ATA specification which uses this technology.

EIDE

Short for Enhanced IDE, a newer version of the IDE device interface standard developed by Western Digital Corporation. Supports data rates of between 4 and 16.6 MBps, about three to four times faster than the older IDE standard. In addition, it can support mass-storage devices of up to 8.4 gigabytes, whereas the old standard was limited to 528 MB. EIDE is sometimes referred to as Fast ATA or Fast IDE, which is essentially the same standard, developed by Seagate. It is also sometimes called ATA-2.

There are four EIDE modes defined. The most common is Mode 4, which supports transfer rates of 16.6 MBps. There is also a mode called ATA-3 or Ultra ATA, that supports transfer rates of 33 MBps.

ATA

A drive implementation that integrates the controller on the drive itself. There are several versions of ATA, all developed by the Small Form Factor (SFF) Committee:

ATA: Known also as IDE, supports one or two hard drives, a 16-bit interface and PIO modes 0, 1 and 2.

ATA-2: Supports faster PIO modes (3 and 4) and multiword DMA modes (1 and 2). Also supports logical block addressing (LBA) and block transfers. ATA-2 is marketed as Fast ATA and Enhanced IDE (EIDE). ATA-2 has an extension called ATAPI.

ATA-3: A minor revision to ATA-2.

Ultra-ATA: Also called Ultra-DMA, ATA-33, and DMA-33, supports multiword DMA mode 3 running at 33 MBps.

ATA/66: A new version of ATA proposed by Quantum Corp, and supported by Intel, that will double ATA's throughput to 66 MBps.

ATAPI
Short for AT Attachment Packet Interface, an extension to EIDE that enables support for CD-ROM players and tape drives.

Ultra DMA
A protocol developed by Quantum Corporation and Intel, which supports burst-mode data transfer rates of 33.3 MBps. This is twice as fast as the previous disk drive standard for PCs, and is necessary to take advantage of new, faster Ultra ATA disk drives.

The official name for the protocol is Ultra DMA/33. Also called UDMA, UDMA/33 and DMA mode 33.

SATA
A specification for consumer hard drive connections that boosts the data transfer rate up to 150MB/second. In addition, it changes IDE/ATA from a parallel interface requiring 40 separate wires to connect components to a serial interface requiring only 6 wires. 2x and 4x versions of Serial ATA double and quadruple the speed of Serial ATA.

Memory

System Memory

The system memory is the place where the computer holds current programs and data in use. The term 'memory' is ambiguous because it can refer to different parts of the PC: there are many different kinds of memory that a PC uses. When used by itself, 'memory' refers to the main system memory, which holds the instructions that the processor executes and the data that those instructions work with.

ROM

Read-Only Memory. One major type of memory used in PCs is called ROM. ROM is a type of memory that normally can only be read, as opposed to RAM, which can be both read and written. There are two main reasons that read-only memory is used for certain functions within the PC: permanence and security. Permanence means that the values stored in ROM are always there, whether the power is on or not. For this reason, it is called non-volatile storage. Security refers to the fact that ROM cannot easily be modified, and thus provides a measure of security against accidental (or malicious) changes to its contents.

The most common example of ROM is the system BIOS program. Having this in a permanent ROM means it is available when the power is turned on so that the PC can use it to boot up the system.

RAM

Random Access Memory. The kind of memory used for holding programs and data being executed is called random access memory. RAM differs from read-only memory (ROM) in that it can be both read and written. It is volatile storage because unlike with ROM, the contents of RAM are lost when the power is turned off. RAM is also sometimes called read-write memory or RWM. RAM is called "random access" because earlier read-write memories were sequential and did not allow random access.

The volatility of RAM means that you risk losing what you are working on unless you save it frequently. RAM is much faster than

ROM is, due to the nature of how it stores information. This is why RAM is often used to shadow the BIOS ROM to improve performance when executing BIOS code.

SRAM
Static RAM; a type of RAM that holds its data without external refresh, for as long as power is supplied to the circuit. This is contrasted to dynamic RAM (DRAM), which must be refreshed many times per second in order to hold its data contents. SRAMs are used for specific applications within the PC, where their strengths outweigh their weaknesses compared to DRAM. SRAMs don't require external refresh circuitry or other work in order for them to keep their data intact. And SRAM is faster than DRAM.

In contrast, SRAMs have the following weaknesses, compared to DRAMs: SRAM is several times more expensive than DRAM. And SRAMs take up much more space than DRAMs. 32 MB of SRAM would be prohibitively large and expensive, which is why DRAM is used for system memory. SRAMs are used for level 1 cache and level 2 cache memory, for which it is perfectly suited—cache memory needs to be very fast, and not very large.

DRAM
Dynamic RAM; a type of RAM that only holds its data if it is continuously accessed by special logic called a refresh circuit. This circuitry reads the contents of each memory cell several hundreds of times a second, whether or not the memory cell is being used at that time. Due to the way in which the cells are constructed, the reading action itself refreshes the contents of the memory. If this is not done regularly, the DRAM will lose its contents, even if it continues to have power supplied to it. This refreshing action is why the memory is called dynamic.

Asynchronous And Synchronous DRAM
Conventional DRAM is said to be asynchronous. This refers to the fact that the memory is not synchronised to the system clock. A memory access is begun, and a certain period of time later, the

memory value appears on the bus. The signals are not co-ordinated with the system clock at all.

Asynchronous memory works fine in lower-speed memory bus systems, but is not nearly as suitable for use in high-speed memory systems. A newer type of DRAM called 'synchronous DRAM', or SDRAM, is synchronised to the system clock. This type of memory is much faster than asynchronous DRAM. It is more suitable to the higher-speed memory systems of the newest PCs.

Double Data Rate SDRAM (DDR SDRAM)

A few years ago, 'regular' SDRAM was introduced as a proposed replacement for the older FPM and EDO asynchronous DRAM technologies. In the next couple of years, as system bus speeds increase further, double data rate RAM came up: it is a type of SDRAM in which data is sent on both the rising and falling edges of clock cycles in a data burst.

Single Inline Memory Modules (SIMMs)

The SIMM is the most common memory module format in use in the PC world, largely due to the enormous installed base of PCs that use them; in new PCs, DIMMs are now overtaking SIMMs in popularity. SIMMs are available in 30-pin and 72-pin flavours. 30-pin SIMMs are the older standard, and were popular on third and fourth generation motherboards. 72-pin SIMMs are used on fourth, fifth and sixth generation PCs.

SIMMs are placed into special sockets on the motherboard. The sockets are specifically designed to ensure that once inserted, the SIMM will be held in place tightly. SIMMs are secured into their sockets (in most cases) by inserting them at an angle (usually about 60 degrees from the motherboard) into the base of the socket and then tilting them upward until they are perpendicular to the motherboard. Special metal clips on either side of the socket snap in place when the SIMM is inserted correctly. The SIMM is also keyed with a notch on one side, to make sure it isn't put in backwards.

Dual Inline Memory Modules (DIMMs)

The DIMM is a newer memory module, intended for use in fifth- and sixth-generation computer systems. DIMMs are 168 pins in size, and provide memory 64 bits in width. They are a newer form factor and are becoming the de facto standard for new PCs. They are also not generally available in smaller sizes such as 1 MB or 4 MB.

Physically, DIMMs differ from SIMMs in an important way. SIMMs have contacts on either side of the circuit board but they are tied together. So a 30-pin SIMM has 30 contacts on each side of the circuit board, but each pair is connected. This gives some redundancy and allows for more forgiving connections since each pin has two pads.

This is also true of 72-pin SIMMs. DIMMs, however, have different connections on each side of the circuit board. So a 168-pin DIMM has 83 pads on each side and they are not redundant. This allows the packaging to be smaller, but makes DIMMs a bit more sensitive to correct insertion and good electrical contact.

DIMMs are inserted into special sockets on the motherboard, similar to those used for SIMMs. They are generally available in 8 MB, 16 MB, 32 MB and 64 MB sizes, with larger DIMMs also available. DIMMs are the memory format of choice for the newest memory technology, SDRAM.

DIMMs come in different flavours - 3.3 V and 5.0 V, and they come in either buffered or unbuffered versions. This yields a total of four different combinations. The standard today is the 3.3 volt unbuffered DIMM, and most machines use these.

Monitors

Aperture-grille Mask
With an aperture-grille mask, images are made up of vertical groupings of red, blue, and green phosphor stripes instead of dots. Aperture-grille monitors have two barely-visible wires going across the screen to help stabilise the image.

Aspect Ratio
The ratio of a monitor's height to its width. The typical aspect ratio for a monitor is 4 to 3, or 1.33. For example, 640/480 = 1.33.

Bandwidth
A qualitative term describing the video amplifier's potential performance. The higher the pixel rate (or format number), the higher the bandwidth required of the video amplifier.

Contrast
The ratio between the maximum and the minimum luminance values of the display.

Contrast Control
A manual control for a monitor that affects both luminance and contrast.

Colour Balance
The ability of the monitor to show and maintain the same colour when switching or varying the intensity of the screen.

Refresh Rate
The number of times per second that a device such as a CRT is re-energised. This is an ergonomic issue directly related to long term ease of use. A higher refresh rate translates into a more flicker-free display.

Resolution
The number of pixel or dots per frame (DPI).

VGA (Video Graphics Array)
The minimum standard for PC video display, which originated with IBM's PS/2 models in 1987.

XGA (Extended Graphics Array)
An IBM video display standard introduced in 1990 that extended VGA to 132-column text and interlaced 1024 x 768 x 256 resolution.

CPUs

Front Side Bus (FSB)
The primary bus interface that connects a microprocessor to other system devices via the Northbridge system chipset. Typically, it allows the processor to communicate with main memory (RAM), the system chipset, PCI devices, the AGP card, and other peripheral buses. It also connects to the Level 2 cache unless the processor has a backside bus.

L1 Cache
A small amount of SRAM memory integrated or packaged within the same module as the processor. It's clocked at the same speed of the processor. L1 cache is used to temporarily store instructions and data, making sure the processor has a steady supply of data to process while the memory catches up with the delivering of new data.

L2 Cache
Typically consists of SRAM chips near the processor, although the latest Athlon processors have on-chip L2 caches. This is cache used to temporarily store instructions and data to ensure the processor has a steady supply of data to process until main memory catches up. Also known as the secondary cache, this is the second-fastest memory available to a microprocessor, second only to the L1 cache.

Video And Graphics

3D Pipeline
The process of 3D graphics can be divided into three-stages: tessellation, geometry and rendering. In the tessellation stage, a described model of an object is created, and the object is converted to a set of polygons. The geometry stage includes transformation, lighting, and setup. The rendering stage, which is critical for 3D image quality, creates a two dimensional display from the polygons created in the geometry stage.

Alpha Buffer
An extra colour channel to hold transparency information. In a 32-bit frame buffer there are 24 bits of colour, 8 each for red, green, and blue, along with an 8-bit alpha channel.

Anti-aliasing
Anti-aliasing is sub-pixel interpolation—a technique that makes edges appear to have better resolution.

Atmospheric Effect
Effects, such as fog and depth cueing, which improve the rendering of real-world environments.

Bitmap
A pixel-by-pixel image.

Blending
The combining of two or more objects by adding them on a pixel-by-pixel basis.

Double Buffering
A method of using two buffers, one for display and the other for rendering. While one of the buffers is being displayed, the other buffer is operated on by a rendering engine. When the new frame is rendered, the two buffers are switched. The viewer sees a perfect image all the time.

Line Buffer

A memory buffer used to hold one line of video. If the horizontal resolution of the screen is 640 pixels, and the colour space is RGB, the line buffer would have to be 640 locations long by 3 bytes wide. This amounts to one location for each pixel and each colour plane. Line buffers are typically used in filtering algorithms.

MIP Mapping

'Multum in Parvum' means 'many in one'. A method of increasing the quality of a texture map by applying different-resolution texture maps for different objects in the same image, depending on their size and depth. If a texture-mapped polygon is smaller than the texture image itself, the texture map will be undersampled during rasterisation. As a result, the texture mapping will be noisy and 'sparkly'. MIP mapping removes this effect.

Rendering

The process of creating life-like images on a screen using mathematical models and formulas to add shading, colour and lamination to a 2D or 3D wireframe.

Rendering Engine

Generically applies to the part of the graphics engine that draws 3D primitives, usually triangles or other simple polygons. In most implementations, the rendering engine is responsible for interpolation of edges and 'filling in' the triangle.

Texture Filtering

Removing the undesirable distortion of a raster image, also called aliasing artefacts, such as sparkles and blockiness, through interpolation of stored texture images.

Texture Mapping

Texture mapping is based on a stored bitmap consisting of texture pixels, or texels. It consists of wrapping a texture image onto an object to create a realistic representation of the object in 3D space. The object is represented by a set of polygons, usually triangles.

The advantage is complexity reduction and rendering speed, because only one texel read is required for each pixel being written to the frame buffer. The disadvantage is the blocky image that results when the object moves.

Transformation
A change of coordinates; a series of mathematical operations that act on output primitives and geometric attributes to convert them from modelling coordinates to device coordinates.

Tri-linear MIP Mapping
A method of reducing aliasing artefacts within texture maps by applying a bilinear filter to four texels from the two nearest MIP maps and then interpolating between the two.

Z-buffer
A part of off-screen memory that holds the distance from the viewpoint for each pixel—the Z-value. When objects are rendered into a 2D frame buffer, the rendering engine must remove hidden surfaces.

Z-buffering
A process of removing hidden surfaces using the depth value stored in the Z-buffer. Before bringing in a new frame, the rendering engine clears the buffer, setting all Z-values to infinity. When rendering objects, the engine assigns a Z-value to each pixel: the closer the pixel to the viewer, the smaller the Z value. When a new pixel is rendered, its depth is compared with the stored depth in the Z-buffer. The new pixel is written into the frame buffer only if its depth value is less than the stored one.

Motherboards

Motherboard
The principal PCB assembly in a computer; includes the core logic (chipset), interface sockets and/or slots, and input/output (I/O) ports.

Printed Circuit Board (PCB)
A thin, laminated sheet composed of a series of epoxy resin and copper layers and etched electronic circuits (signal, ground and power).

Chipset (Core logic)
Two or more integrated circuits that control the interfaces between the system processor, RAM, I/O devices and adapter cards.

Processor Slot/socket
The slot or socket used to mount the system processor on the motherboard.

AGP (Accelerated Graphics Port)
A high-speed interface for video cards.

PCI (Peripheral Component Interconnect)
A high-speed interface for video cards, sound cards, network interface cards, and modems; runs at 33 MHz.

ISA (Industry Standard Architecture)
A relatively low-speed interface primarily used for sound cards and modems; runs at approximately 8 MHz.

Port
An interface connector for devices.

Serial Port
A low-speed interface typically used for mice and external modems.

Parallel Port
A low-speed interface typically used for printers.

PS/2
A low-speed interface used for mice and keyboards.

USB (Universal Serial Bus)
A medium-speed interface typically used for mice, keyboards, scanners, scanners, and some digital cameras.

VGA (Video Graphics Adapter)
The interface from the video card or integrated video connector to the display monitor.

SCSI (Small Computer System Interface)
The interface between a SCSI controller and an external or internal SCSI device.

Jumper
A small block, approximately .250" wide x .312" long x .125" thick, with two holes running lengthwise which are connected with a metal structure, or the functionally equivalent electronic interconnect; used to enable, disable, or select operating parameters on a motherboard or other PCB by either electrically connecting two pins on the PCB or separating them.

Connector header
A series of two or more metal pins on the motherboard or other PCB; used to attach a cable to indicator lights, switches, and/or other devices in the computer

BIOS
An acronym for basic input/output system. The BIOS is built-in software that determines what a computer can do without accessing programs from disk. On PCs, the BIOS contains all the code required to control the keyboard, display screen, disk drives, serial communications, and a number of miscellaneous functions.

The BIOS is typically placed in a ROM chip that comes with the computer. This ensures that the BIOS will always be available and will not be damaged by disk failures. It also makes it possible for a computer to boot itself. Many modern PCs have a Flash BIOS, which means that the BIOS has been recorded on a Flash memory chip, which can be updated if necessary.

Driver
Software that defines the characteristics of a device for use by another device or other software.

Socket 7
The form factor for fifth-generation CPU chips from AMD, Cyrix and Intel. All Pentium chips except Intel's Pentium Pro (Socket 8) and Pentium II (Slot 1) conform to Socket 7 specifications. Intel phased out Socket 7 and replaced it with Slot 1. But AMD and Cyrix are sticking with Socket 7, and are also developing an enhanced version.

Socket 8
The form factor for Intel's Pentium Pro processors. The Pentium Pro was the first microprocessor not to use Socket 7. Pentium II processors use the newer Slot 1 form factor.

Socket 8 is a 387-pin socket with connections for the CPU and one or two SRAM dies for the L2 cache.

Slot 1
The form factor for Intel's Pentium II processors. It replaces the Socket 7 and Socket 8 form factors used by previous Pentium processors. Slot 1 is a 242-contact slot that accepts a microprocessor packaged as a Single Edge Contact cartridge. A motherboard can have one or two Slot 1 slots.

Slot 2
A chip packaging design used in Intel's Pentium II chipsets, starting with the Xeon CPU. While the Slot 1 interface features a 242-

contact connector, Slot 2 uses a wider 330-contact connector. The biggest difference between Slot 1 and Slot 2 is that the Slot 2 design allows the CPU to communicate with the L2 cache at the CPU's full clock speed; in contrast, Slot 1 only supports this communication at half the CPU's clock speed.

ACPI (Advanced Configuration and Power Interface)
A power management specification developed by Intel, Microsoft, and Toshiba. ACPI enables the OS to control the amount of power given to each device. With ACPI, the operating system can turn off peripheral devices such as a CD-ROM players when they are not in use. ACPI also enables a computer to automatically power up as soon as you touch the keyboard, if it has been designed that way by the manufacturer.

APM (Advanced Power Management)
An API developed by Intel and Microsoft that allows developers to include power management in BIOSes. APM defines a layer between the hardware and the OS which effectively shields the programmer from hardware details. APM is expected to be gradually replaced by ACPI.

ECP (Extended Capabilities Port)
A parallel port standard for PCs that supports bi-directional communication between the PC and attached devices, such as a printer. ECP is about 10 times faster than the older Centronics standard. See also EPP.

EPP (Enhanced Parallel Port)
A parallel port standard for PCs that supports bi-directional communication between the PC and attached devices, such as a printer. EPP is about 10 times faster than the older Centronics standard. EPP can support several devices in a daisy chain formation. See also ECP.

Form Factor
The physical layout of a motherboard in regards to the relative

position of the adapter card expansion slots, the number of slots, the relative size of the motherboard, and the orientation of the board in the chassis.

Baby AT (BAT)

The oldest of the mainstream motherboard form factors. The distinguishing features are its orientation in the chassis - the long axis goes from the back to the front of the chassis; the type of keyboard connector—typically referred to as a 'large DIN' connector; the presence of AT or PS/2 power supply connectors—a series of 12 'blades' in one or two adjacent male connectors; and the implementation of the various I/O connectors—serial and parallel ports—via a bracket that goes into one of the adapter card slots at the rear of the chassis.

ATX

The most common of today's mainstream motherboard form factors. The distinguishing features are its orientation in the chassis— the long axis goes from side-to-side at the rear of the chassis; the use of 'integrated I/O connectors'—all the connectors are built into the motherboard and exit to the rear of the chassis through an 'I/O shield' where they are grouped together; and only an ATX power supply connector is provided.

MicroATX

A variation of the ATX form factor. It is much shorter in its long axis than ATX, and has fewer adapter card slots (three compared to ATX, which typically has seven).

Bibliography

This section is a compilation of some books and Web sites that we think will interest you in your pursuit of computer hardware and what you can do with your PC. This bibliography exclusively deals with the subject of PC upgrade and maintainence. The Web sites range from the utilitarian to the sophisticated. Whatever your need, we have tried to point you to a range of Web sites that will add to your knowledge about computers.

The Complete PC Upgrade And Maintenance Guide, 15th Edition

Author: Mark Minasi

Mark Minasi has been writing about PC upgrade and maintenance since the early 1990s. In this new edition of The Complete PC Upgrade and Maintenance Guide, Minasi covers new and emerging PC, and net-working technologies while staying true to his friendly style of writing and easy to understand language.

This bestselling book covers how to prevent hardware disasters, upgrade memory, replace power supplies, install EIDE and serial ATA hard drives, add SCSI ports, partition drives using NTFS and FAT32, protect your PC from viruses, worms, and spy ware, solve data backup challenges, add and repair DVDs and CD-ROMs, install and troubleshoot scanners, printers, com-munication devices, resolve mouse and keyboard problems, install video and sound cards, tackle networking issues, install a wireless network, troubleshoot Internet connectivity, solve laptop prob-lems and more.
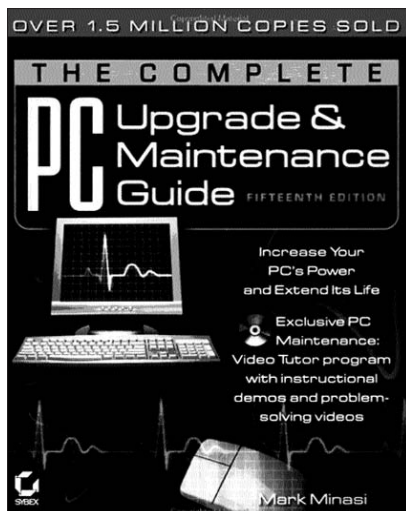
PC Upgrade & Repair Simplified, 2nd Edition

Author: Paul Whitehead

PC Upgrade & Repair Simplified is a 'novice-ready' book that delves into the crux of upgrading your computer without much ado. It is peppered with illustrations and diagrammes that help in readily assimilating information needed to start working on your PC. Ideal for beginners, the complex subject matter is concisely and comprehensively explained. Complicated solutions are strictly avoided with more space devoted to visual explanations. It features the latest technologies, upgrades and maintenance ranging from P III to newer computers, with more than 1,000 visuals and crisp captions.
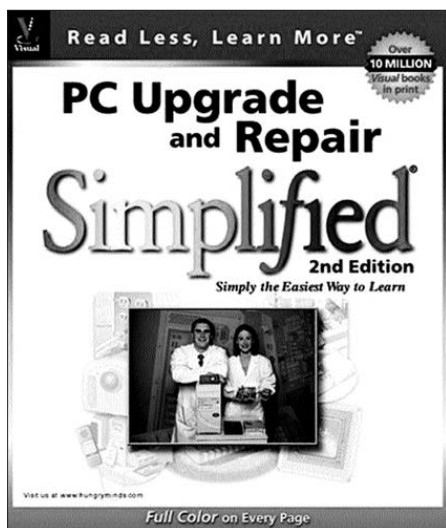
PC Upgrade and Repair Bible

Author: Marcia Press

The Bible series almost always resemble the Holy Bible in volume. This book is no different, with over 1,340 pages in 41 chapters, 200 pages of finely printed appendices and indices, more than 700 tables and illustrations, with CD-ROM, and a fabulous list of almost every vendor of every imaginable PC component.

It contains the A-Z of computer upgrading and repairing. It may seem daunting to the novice user as it contains a huge amount of text as opposed to the illustrations. The task of upgrading and maintaining a PC with detailed insights into printing, networking, modems, and other peripherals are provided. The book's tabular data is useful and, in many cases, the photographic evidence helps with the practical implementation of a particular upgrade.

Chapters are interlinked with each other, and the transition from one chapter to the other is smooth. Topics include 'cache' and 'buses' to building your own extreme machine. If you are serious about exploring your PC, this Bible will prove more than worthy of your desktop.
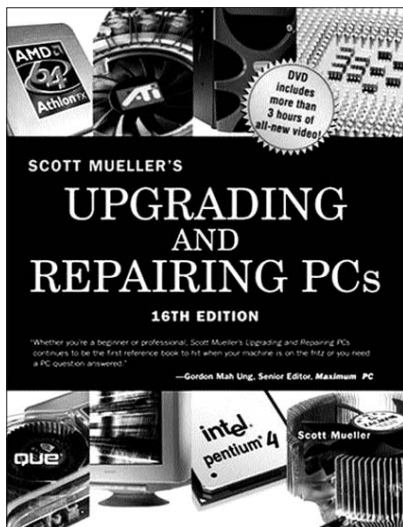
Upgrading and Repairing PCs, 16/e

Author: Scott Mueller

Scott Mueller is the president of the Mueller Technical Research Institute, and has produced the industry's most in-depth, accurate, and effective seminars, books, articles, videos and FAQs covering PC hardware and data recovery. Scott and MTRI maintain a list that includes Fortune 500 clientele, US and foreign governments. Scott has been writing for more than 20 years on this subject.
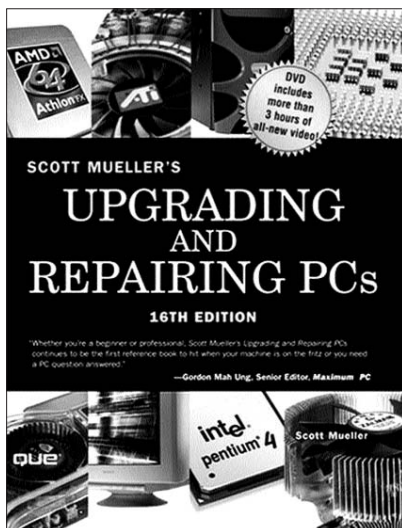
The latest edition includes hundreds of pages of new content, a completely new chapter on PC over clocking and hardware hacking. In this new chapter, Scott shows readers how to perform custom PC modifications, safely and within industry standard specifications, as well as how to pump up the PC performance.

The book comes with a DVD-ROM disc that can be played on standalone DVD players and contains more than three hours of video. The DVD contains searchable hard drive and vendor information, plus thousands of pages of earlier PC hardware coverage that can longer be included in the printed book. For those who have some idea about computer hardware, this book will serve as an encyclopaedia.

Absolute Beginner's Guide To PC Upgrades

Authors: T J Lee, Lee Hudspeth

Even if you've never opened the case on your PC, the Absolute Beginner's Guide to PC Upgrades will show you how you can add hardware components, upgrade peripherals, and be updated on the new version of your OS and applications. It tells you what you really need to know about trouble-free upgrading of computer hardware and software. The most essential upgrades are covered, such as improving your Internet connectivity, adding more memory, and storage, in an informative and at the same time entertaining manner. The authors show you how to get value-for-money from core upgrades that keep your computer from becoming obsolete.
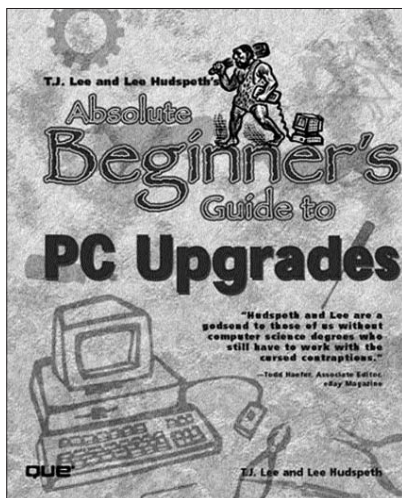
Top 10 Web Sites For Reference

1. http://www.tomshardware.com

One of the most visited Web sites worldwide, Tomshardware has a host of sections that will interest the novice and professional alike. A complete and resourceful Web site, it offers articles related to hardware and software upgrades, reviews, whitepapers, and buying guides.

2. http://www.extremetech.com

Extremetech has been a primary source of reviews and articles for millions of computers users worldwide, and is still going strong. Similar to tomshardware. com, it features articles and reviews for anything that is even remotely related to computers.

3. http://www.anandtech.com

Founded by Anand Lal Shimpi, Anandtech.com is now considered to be the Mecca of articles, reviews, and in-depth analysis of hardware. You will get to see some of the coolest computer hardware products ever.

4. http://www.hardocp.com

Apart from other regular reviews and articles, this Web site is more inclined towards the gaming population with majority of the content dedicated to gaming hardware and their performance. The forums on hardocp.com are excellent for novice and professionals alike.

5. http://www.techreport.com
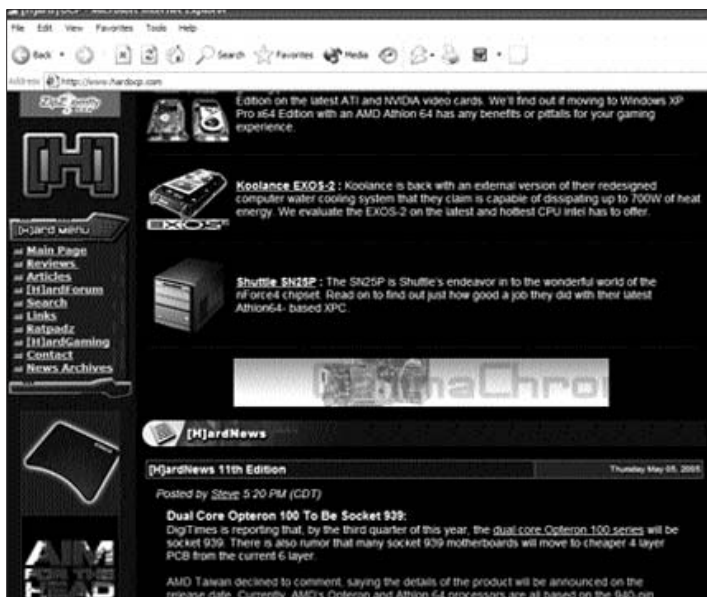
Techreport.com provides first-rate articles on all things comput-ing. Be it the cooling fans you buy for your CPU or the latest Windows XP 64-bit Professional Edition review, it's all there.

6. http://www.sharkyextreme.com

Similar to the aforementioned Web sites, sharkyextreme.com offers plenty of articles, reviews, news, buying guides, and all the regular stuff.

7. http://support.microsoft.com

You will probably wonder why we are mentioning this Web site. This is the support Web site for 90 percent of people using Microsoft Windows worldwide. Extensive help pages with an excellent search system dedicated to each version of Windows lets all

users navigate to their needed solution in no time. All you need to is enter the keywords of your error messages. Moreover, if you don't find the required solution, you can always send an e-mail to Microsoft regarding your problem.

8. http://www.cdrinfo.com

This Web site specialises in articles and research on optical drives. Full-length discussions on the nuances of CD/DVD hardware and software are available.

9. http://www.designtechnica.com

A lifestyle Web site, it leans towards the fun part of computers—laptops, PDAs, cell-phones, speakers, and hi-fi equipment.

10. http://www.gamespot.com

Who doesn't like to play games?
Gamespot.com has hundreds of reviews for all kinds of games irrespective of the platform they have been released on. You can download game videos and game demos plus exclusive video

reviews for selected games. Nothing beats this Web site for the latest and the greatest in the gaming world!