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Control Imperative

The Internet is out of control, with dangerous people spreading dangerous lies. But our Department of Information Technology can fix all that. Internet censorship has finally arrived at our doorstep.

The Internet is a collection, in David Weinberger's words, of "small pieces loosely joined". Closing access to a small section of the Internet is like grasping a fistful of water—the only way to do it is to build an information dam. China seems to be doing it well, maybe our ministries could take a few pointers from the dragon next door.

In an attempt to block one message board hosted on the Yahoo! Groups service, all Indians have been denied Web access to the entire service. Our ISPs are not equipped to block one section of a site, so in order to comply with the government directive they went the extra distance and blocked the entire site. Ironically, Yahoo! India mirrors the Groups service, so we still have access on another URL. If you had set the group to e-mail messages to you, you would get those too. And this does not count the free services that would let you bypass this simple-minded, clumsy attempt at censorship. Of course, this action has been a wonderful concentrator of world attention, and this obscure group with 3 messages a month and less than 30 subscribers is now on the Internet map for millions.

There certainly are problems associated with Internet anarchy. Unsavoury, unwanted messages from around the world already clog every e-mail box, and once we begin to turn to the convenience of an online economy, we too will be afflicted with the troubles that afflict our Western brethren. Scams and identity theft are inevitable and we certainly need the policing, but is isolationism the solution?

The Internet only reflects what we see in the real world—calls for revolution included. Underlying this attempt at silencing dissent is the implicit assumption that we need to be 'protected' from misinformation. Hopefully, this fiasco will drive home the point that misinformation can only be fought with the truth, not blinkers.

sumod_hajela@jasubhai.com

Sumod Hajela
Assistant Editor

"Scams and identity theft are inevitable and we certainly need the policing...."

index ■ magazine

◀◀ 32 Buying high-end devices entails a lot of burdensome hassles.

▲ 56 Graphics cards that project viewing dimensions of another world!

▲ 42 Multi-function devices—perfoming all the different tasks together!

Reviewed this month

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Mindware\Software\Dev Tools

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Mindware\Software\Internet

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Mindware\Software\Multimedia

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Mindware\Software\System

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PLAYWARE\ARENA

If it's gaming that matters to you, then this is section that you should start off with.

Within Arena, look at the Games section for all the latest and hottest demos. This month we feature *Great Escape*, the well-designed and engaging game based on an Oscar nominated movie. The other big game— *XIII* is based on the Unreal engine, and showcases excellent graphics. This month, we also have *Abashera*, an interesting 3D puzzle game. For all our arcade fans, we have the *Hoyle Games*

Demo, which is a collection of some quality games.

MUST TRY SOFTWARE

Great Escape

This game is based on the 1963 Oscar nominated film starring Steve McQueen and revolves around actual events during World War II. Event locations

include castles, hospitals, POW camps, chase on a moving train and more. Race to freedom as you commandeer jeeps, APCs, trucks and motorcycles in high-speed chases against the armoured might of the German army.
Size: 240 MB   *Type: Trial*
Playware\Arena\Games

Yahoo! SiteBuilder

Yahoo! SiteBuilder is a great way to quickly and easily make great-looking Web sites, using the variety of flexible templates provided. You

need a Yahoo! Web Hosting Starter, Standard, or Professional account. It also supports features such as exact positioning, drag-and-drop editing, layering, gridline support and FTP upload.
Size: 15.4 MB   *Type: Free*
Mindware\Software\Dev Tools

Adobe Acrobat Reader 6.0 Full

Adobe Reader lets you view, and print PDF files on all major computer platforms, and also lets you fill in and submit PDF forms online. An expanded version of Acrobat
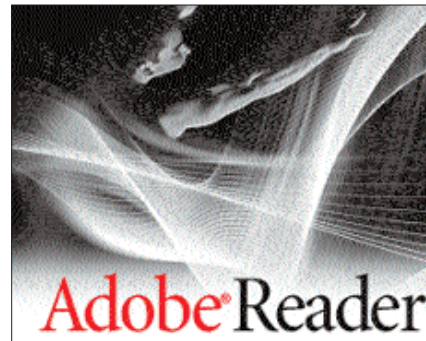
Reader for Windows—it offers additional functionality, including support for the visually impaired, and the ability to search a collection of Adobe PDF files.
Size: 15.4MB   *Type: Free*
Mindware\Software\Essentials

index ■ colophon

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WEB SPECIAL

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DIGIT   OCTOBER 2003

snapshot

The world-wide market for **anti-virus** software should reach **$4.4** billion in **2007**, up from **$2.2** billion in **2002**

Source: IDC

Pricey penguin

Research firm Gartner, has concluded that migrating to Linux makes business sense, only in very few situations. Whilst Linux costs next to nothing, the total cost of ownership is quite high. A move to Linux means that replacements will be required for all the desktop packages a person uses. Linux scores high marks in the server area, where typically servers run only one application. It can also be cost-effective on the desktop when used for simple tasks such as data entry. The findings also reveal that it is beneficial for companies currently running Windows 95 to migrate to Linux considering the high costs of maintaining the older OS- now that Microsoft has stopped supporting it.

ILLUSTRATOR: Farzana Cooper

Consumers want truth in advertising

A lawsuit has been filed against Apple, Dell, Gateway, HP, IBM, Sharp and Sony by a group of computer owners, saying that the advertisements overstate the capacity of their hard drives— for example, what is described as a 20 GB hard drive, actually has a capacity of 18.6 GB. This happens because computers follow the binary system, but to mention the capacity, manufacturers use decimal notation. The result is that if consumers buy a 150 GB hard drive, they actually get 140 GB.

The lawsuit asks the defendants to disclose their unfair marketing practices to the public, and distribute the profits made by this ill-practice.

The other confusion area is the speed of the Internet connections where 56 Kbps actually means 56 Kilo bits per second, whereas most people think it's 56 Kilo bytes per second.

Now, they can tap your calls

An Israeli scientist, Elad Barkan, and his team have found a flaw in the Global System for Mobile communications (GSM) code that allows you to break into mobile phone calls, and even take over the caller's identity.

According to Barkan, the GSM code gives high priority to call quality and noise interference correction after which it encrypts the call. This enabled the researchers to break into the call.

The GSM Association said that they knew about this vulnerability, and had even released a patch in July 2002 to fix the encryption algorithm. However, the researchers claimed they also managed to overcome the new encryption system that was put in place as a response to previous attacks.

Lindows settles Microsoft for you

Lindows has announced a new service that will help you get your share of the $1.1 billion Microsoft settlement for overcharging Windows users. The ruling applies to consumers who bought Microsoft software in California, between February 1995 and December 2001. Depending on the software they bought, they will receive vouchers. The catch here is that the vouchers can only be used to buy Lindows software. The Web site— www.MSfreePC.com—will handle the process of making legal claims, and will even give 10,000 plaintiffs free PCs. Consumers have till March 2004, and just need to fill out the forms available on the Web site. If they meet the criteria, they can get some software from Lindows.com, including a Windows version of StarOffice.

■ Ford moves its IT infrastructure for sales and human resources to Linux ■ BSNI, MTNL, VSNL, and Dishnet do not meet TRAI's quality norms

Your Internet, My Internet

Every day, people type in an incorrect Web address around 20 million times, and consequently stare at an unexpected Web site or an error message. This fact was turned into an advantage by Verisign, the company maintaining the database of most of the .net and .com addresses on the Internet. It launched its Site Finder service that is designed to redirect people making typos directly to a suggested Web site, which in turn, pays Verisign to do so.

Critics, including Yahoo!, AOL and MSN, are unhappy about loosing their prospective pay-per-click customers who use their respective search engines.

statattack

Customer's take on ISPs

User satisfaction

ISP Name	
Satyam/Sity	5.86%
DISHNET	10.51%
Others	20.23%
Mantra Online	28.94%
VSNL	34.06%
MTNL	42.68%
BSNL / DOL	50.19%

■ Unsatisfied Customers

Are users able to get connected within 4 attempts?

ISP Name	
DISHNET	0.694%
Satyam / Sity	3.52%
Mantra Online	10.52%
VSNL	14.68%
BSNL / DOL	21.25%
MTNL	24.19%
Others	36.07%

■ User needing >4 attempts

Number of users sharing an ISP account
(compiled with inputs from the top 5 ISPs)

5 User 4.24
4 User 4.85
3 User 10.23
2 User 28.41
1 User 52.27

Source: The Telecom Regulatory Authority of India (TRAI) Survey Report on Customer's Perception Regarding Quality Of Service of Internet Services. Access the complete report at **www.trai.gov.in**

INFOGRAPHICS: Sachin Dalvi

Microsoft's opening up

Microsoft has submitted the video compression code of Windows Media Player 9 (WMP9) to the Society of Motion Picture Television Engineers. Having launched WMP9 a year ago with great fanfare, it finds itself competing against the MPEG-2 compression stan-

Windows Media 9 Series

dard that the cable, satellite and video-editing fraternities have adopted with open arms. Rivals such as RealNetworks have stolen a march on Microsoft by sharing source code with the developer community, hence ensuring a steady support in terms of applications for more sophisticated cellular phones.

Super fast coax cable

Teleste and Essent Kabelcom, two European companies are working on a fast IP-based data access technology called Ethernet to the Home (ETTH), which offers speeds of up to 10 Mbps for residential customers, and upto 50 Mbps to business customers. Since it uses co-axial cables, no upgrade of infrastructure is required. Secondly, subscribers don't need additional equipment since it is based on Ethernet. The first trial is scheduled to take place in Netherlands.

The present alternatives to this technology are DSL and Cable Internet, but their maximum speed is just 8 Mbps. Another option is VDSL (Very High Data Digital Subscriber Line)—a variation of DSL—that offers a speed of 56 Kbps, but is valid for a limited distance. ETTH doesn't have this limitation, as it uses network amplifiers.

redalert

Old Bugs Revisited

The worm called Swen-A (aka Gibe-F), appears as a Windows security update. It exploits the vulnerability of Outlook and Outlook Express to execute automatically when the message is previewed. The worm pops up a message posing as an update from Microsoft, asking whether you would like to install the security update, but effects the system regardless of your choice. It attempts to kill anti-virus programs and RegEdit. Visit *http://securityresponse.symantec.com/avcenter/venc/data/w32.swen.a@mm.html* for further details.

BAT.Deav.Worm

BAT.Deav.Worm is a worm that propagates through File sharing networks such as KaZaA and iMesh. When the worm is executed, it deletes files with .exe, .dll, .dat and .ini extensions. It then copies itself into your file-sharing software's shared folders under various file names for propagation. Later, it deletes all files with the extensions .doc or .zip, from your C: drive and proceeds to shut down Windows. Visit *http://securityresponse.symantec.com/avcenter/venc/data/bat.deav.worm.html* for a removal tool.

Beatle bites the Apple thrice

The Beatles record label company—Apple Corps Ltd—has sued Apple Computer Inc for the third time over , promoting music using the name 'Apple'.

Apple Corps sued Apple Computer the first time in 1990, over the misuse of their name and the logo to promote digital music software. Apple Computer paid US $26.4 million, and signed an agreement to not offer music products. The second time, the lawsuit was regarding Mac's ability to manage music content through the attached speakers, which was a supposed violation of the agreement between them.

This time, the Beatles claim that the launching of the iTunes service was a breach of agreement. Apple Computer has also been advertising the new iPod as being from Apple-Music. The iTunes Music Store has been exceptionally successful in selling music online. Apple Computer has sold more than 10 million songs through it, at 99 cents each.

snapshot

The number of active Web sites running on **Windows Server 2003** has grown to about **185,000**-an increase of **109** per cent since **July 2003**

Source: Netcraft

ATi zooms past nVidia

According to recent test results by Valve Software, the developers of *Half Life 2*, the ATI Radeon 9800 Pro was found to be about twice as fast as the nVidia GeForceFX 5900 Ultra in the high-end section. In the price to performance category, the Radeon 9600 Pro was about three times faster.

In February 2003, when FutureMark conducted tests using its 3DMark03, the GeForce Ti 4600 scored less than the 2000 mark, while the Radeon 9700 Pro breached

Courtesy:ExtremeTech.com
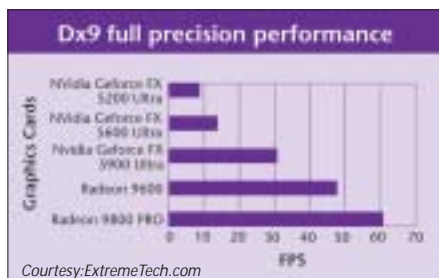
the 4500 mark. This caused nVidia to initiate a public relations campaign aimed at undermining 3DMark03's credibility as a benchmark.

Now, rumours are rife that *Half-Life 2* will be offered as part of the ATi card-software discounted deal at the game's launch.

Good morning, Bucharest

Rising costs and cultural affinity may make Eastern Europe in general, and Romania in particular, very attractive for outsourcing operations.

Being geographically, and hence culturally closer to western Europe, French, German, British and Dutch com-

panies are now setting up their operations there. Others are moving further east to Romania, where human resources are available at even lower costs. Though India is perceived as getting increasingly expensive, it may be a long while before eastern Europe is threatens India's position.

Sharp 3D Notebooks

Sharp is to launch a notebook at the end of October 2003 that is capable of displaying 3D images. Priced at around US $3,000 (Rs 1,50,000), the 2.8 GHz, Pentium 4-based, Mebius PC-RD3D comes with a 15-inch display, and has an nVidia GeForce4 Go 440 graphics controller. A parallax barrier between two LCD panels generates a slightly different image for each eye, which the brain merges into a single 3D image. No special glasses are needed to view these images.

The 3D and 2D mode can be interchanged, thus allowing it to act as a normal 2D monitor as well.

Sharp will be shipping the basic 3D content creation and viewer tools with the notebook, and is expecting software developers to come up with plug-ins for their applications and games to support it. Currently, Dynamic Digital Depth Inc, is providing 3D content to Sharp. Sharp has also taken the lead in establishing a 3D consortium, which now has 142 members.

heroes

Anti-virus software
Norton AntiVirus has sold more than 120,000 units, making it the top business software in terms of sales. Sophos had a good year as well, with profits going up by 24 per cent to £12.1m. Though this does mean a good time for the developers, it is only due to increasing threat of worms such as W32.Blaster.

DirectX 9
Microsoft hails *Half-Life 2* as the new benchmark for DirectX 9-based games. *Half-Life 2* is being developed by Valve Software, and is being made ground up by their in-house game engine, Source. The game is touted to deliver a new dimension in game graphics.

zeroes

Microsoft
After pushing the release date back twice, Microsoft declined to give out the shipping date of Longhorn, the company's most significant upgrade to Windows. Unfortunately, PCI-X—the replacement for the aging PCI standard—will be ready next year, and will have no software support unless Microsoft builds something into Windows XP.

ISO
The Geneva-based International Standards Organisation (ISO) has proposed a royalty fee on the ISO standards, which implies that all the companies selling an ISO-compliant product will have to pay a fee. Organisations such as the World Wide Web Consortium (W3C) and Unicode are opposing this proposal.

■ RIAA sues iMesh—one of the oldest P2P file-swapping services ■ Intel launches the XScale mobile device processors and the 855GME chipset

Linux boxed out of Xbox

Microsoft is updating the Xbox to fix a bug that allows Linux to be installed on it.

Xbox only runs software approved by Microsoft, which usually involves promising to pay taxes for each game sold. There is no version of Linux that is approved by Microsoft for use on the Xbox. However, you can overcome this by put-

ting a specially crafted file such as a saved Mech Assault game on the memory stick. The file in reality was some Linux code.

The controversy surrounds the fact that the Xbox Live Service updates the Xbox without asking for your consent. The legality of this is being questioned by experts and consumers.

Cell jam

Though using cell phone jammers—devices that produce waves to block cell phone signals—is illegal in the UK, Global Gadget sells five such devices through its Web site, *www.globalgadgetuk.com*. One of them resembles a mobile phone and has a blocking range of 10 to 15 metres. The expensive ones can jam cell phones within a 50-metre range. Another set of devices can turn off only the camera feature of the phones.

Iceberg Systems, UK (*www.icebergsystems.co.uk*), is developing Safe Haven that combines hardware transmitters with a software loaded into a camera phone handset. The imaging systems of the phones nearby get turned off when the handset is taken into a room, or a building containing the Safe Haven hardware. Though the company is currently focusing on controlling the imaging side of the handset, the technology can be adapted to block loud ring tones, or text messaging in schools.

IEEE to secure existing operating systems

The Institute of Electrical and Electronics Engineers (IEEE), has decided to outline certain basic security requirements for general-purpose (GP), commercial, off-the-shelf (COTS) operating systems.

The proposed IEEE P2200, Base Operating System Security (BOSS), will provide security functions such as cross-platform security, identification, authentication access control and key cryptographic con-

cepts. This project will run under the guidance of the US National Institute of Standards and Technology (NIST), and will adhere to the International Organization for Standard's (ISO) Common Criteria framework. Apart from IEEE 2200, other related developments are the formation of Information Assurance Standards Committee, and standards such as the IEEE P1618 and IEEE P1619.

KaZaA enters P2P VoIP Telephony

KaZaA co-founders, Janus Friis and Niklas Zennstrom, have launched a P2P-based Voice over Internet Protocol (VoIP) telephony service called Skype (*www.skype.com*). They claim it to be the first Internet phone service to use peer-to-peer software. In an interview, Friis said that it took them 6 months to develop the software that has already scored 375,000 downloads. Free World Dialup (FWD), a

rival phone service, relies on lots of servers to maintain the calls. Thus, Friis believes that in the long run, FWD will not be able to provide top quality. The advantage that Skype has is that it connects even when the broadband users are behind NAT (Network Address Translation), which does not use VoIP based on SIP (Session Initiated Protocols). All that is needed is Skype software installed on both the computers.

■ IBM launches a pre-school learning program that looks at introducing technology at the pre-school level ■ Britain sets new anti-spam rules

Dangerous music downloads

The Recording Industry Association of America (RIAA), filed 261 copyright lawsuits across the country against Internet users, accused of illegally downloading and sharing songs. According to one estimate, 60 million Americans participate in file-sharing networks and half of them are teenagers. The RIAA stated that it has named the people who paid for the household Internet account as the defendants. It also clarified that it would not sue those who admitted to the deed, and promised to delete the songs off their PCs.

OWN ONE?

Tell us more, and WIN!

You can't steal my TV!

A new technology being developed at Britain's Centre for Networking Telecommunications Research will soon be available for household devices such as Televisions, DVD players, computers, etc., so as to enable them to inform police when they are stolen. These devices will be fitted with special microchips that will keep track of their location and normal proximity to each other, and will alert the police whenever there is a unexpected change.

Nigel Linge, professor at the Research Centre, said that they expect the pilot project to run within six months, using hybrid wireless and mobile phone technology, and would be accurate up to a metre. He also stated that work is on to install global position technology in cars for speed regulations.

Windows smartens Motorola

Microsoft is finally launching the Motorola MPX200 Smart Phone. Powered by Microsoft Windows Mobile, it can connect to computers and communicate with almost every MS application. The phone itself has pocket PC versions of MS Outlook, Windows Media Player, Internet Explorer and Microsoft Messenger. This is a 2.5G phone with two sleek screens—the resolution of the inner screen 176 x 220 pixels at 65,536 colours. It has an expandable memory card of up to 1 GB, and comes with a USB connector for data transfer and battery charging. It is expected to be available in October through Orange in Europe, and other distributors throughout Europe and Hong Kong. It will also be available in US through AT&T later this year.

quoteworthy

"We are in many ways humbled by the developments of the last few weeks"

Steve Ballmer, CEO of Microsoft, commenting on the recent rash of attacks exploiting vulnerabilities in the family of Windows. Microsoft now intends to make all the necessary improvements in its software to thwart viruses and other types of attacks.

"Silicon Valley will more closely resemble Detroit."

Larry Ellison, CEO of Oracle, commenting on how he believed IT is rapidly becoming a commodity and that eventually, the IT industry would consist of a few giants such as IBM, Sun Microsystems, Oracle, Microsoft, and a number of small specialised IT vendors.

"100W for a desktop is OK."

Pat Gelsinger, Intel CTO, indicating that the Prescott, may dissipate more than 100 Watts of power. Now who's making bigger fans?

snapshot

Logitech has shipped **500 million** mice. These were sold with an estimated **55 per cent** of the **900 million** PCs **shipped** over the last **two** decades.

Source: The Associated Press

tomorrow'stechnology

Out of thin air…

One of the most promising new concepts presented at the SIGGRAPH 2003 Emerging Technologies show in San Diego, USA is the fog screen. The display works on two major components—a laminar (non-turbulent) airflow, and a thin sheet of a fog that is injected into the non-turbulent airflow. The fog is the actual viewing surface, and works by reflecting light projected onto the fog screen by a projector to the observers. As long as the airflow remains non-turbulent, the images reflected off the viewing surface remain crisp. The transparency of the screen can be controlled, and the images can be projected from either the front, or the rear. Its developers, the Academy of Finland, are convinced that it's feasible. They believe that the quality and size of the screen, among other parameters, will be dramatically enhanced over the next few weeks. Interestingly, the screen is dry, silent and non-breakable; and it can create virtual environments around audiences that are composed rapidly by a series of screens.

■ Trillian releases patches to be fully-functional with Yahoo!'s and MSN's messenger services ■ Seagate creates a 3.5-inch platter that stores 100 GB of data

Size matters

I bought a SP0802N Samsung 80 GB 7,200-rpm hard drive, but my PC—a Pentium 4, 1.7 GHZ, 256 MB RAM, 845G chipset motherboard—shows only 76348 MB. Please tell me how I can get the lost capacity of my hard disk back.

Amit Thakur
Via e-mail

ILLUSTRATOR: Mahesh Benkar

Dear Amit,
That difference is where all hard disk manufacturers have made some interesting changes to account for space. Hard disk sizes have so long been specified in Millions of Bytes (1,000 x 1,000) instead of Mega Bytes (1,024 x 1,024), that the computer actually uses it to show hard disk capacity. When disk sizes were measured in Mega Bytes, this difference was negligible, but stepping up to GigaBytes (1,024 x 1,024 x 1,024), multiplies the apparent discrepancy more than a thousand fold.

The 3 GB that you find missing, is mostly that, plus a little overhead in formatting. Some enterprising consumers in the US have recently filed a case against computer and hard disk manufacturers to stop this apparent mis-statement of capacity.

DVD disappointment

Dear Digit,
First of all, thank you for the 10 CD pack. WOW!!! It's really great. I hope you keep sending such goodies to your subscribers.

I don't have a DVD-ROM drive to use the DVD you provided with the August edition of Digit. I have heard that there is a software that will allow me to use the DVD on my CD-ROM drive, but I can't remember its name. Please help my friends and I, so we can use your DVD.

Jawidur Rahman
Via e-mail

Dear Jawaidur,
DVD technology is very different from CD, and uses much higher precision and data density. The DVD we provided carried 4 GB of data, but other DVDs can carry up to four times as much. Just as the CD was a huge leap over floppy disks, this is the next step up from CDs. Don't be deceived by the similarity—just as you can't expect to read a CD in a floppy drive, there is no way to make a CD drive read a DVD disc.

Digital dissected

Dearest Sumod,

I'm a photographer employed in a photo-lab, and use both digital and analog cameras. I have a point to make, with regards to your digital camera test (September 03).

With all due respect to Mr Sherwin Crasto, and all the charged grey-cells at Digit Test Centre, I do feel the comparison between all the appalling digital cameras could have been more structured (to do justice to their CCDs and their manufacturers). The tests should have been bracketed according to megapixel—for example, comparing 0 to 2 megapixel cameras, 2 to 3 megapixel cameras and 3 to 4 megapixel cameras in separate categories. This way, their performances within their given parameters would have been neither justifiable, nor questionable. Your format, which even photography magazines do not follow, will not help most photographers, professionals or amateurs.

I also suggest that you include a regular column with URLs of interesting Web sites, as this will save us the effort of searching and time.

M Narasimha Murthy
Via e-mail

Dear Narasimha,
Most of us have some idea of the amount of money we are prepared to spend for a product, whether a digital camera or a computer. We could just as easily have grouped the digital cameras by one primary feature, instead of by price. But then, what is the question that we answer by giving out an award? For example, we prefer to say "This camera is the best you can buy for under Rs 30,000", rather than saying, "This is the best 3 megapixel camera". Then there is the matter of the key feature being an ambiguous classifier. Sensor technologies vary considerably across manufacturers, and will continue to diverge for a while, as each company pursues its own research. This means that a 3 megapixel camera from Kodak may not be comparable to a 3 megapixel from Nikon.

You are right about the need for interesting sites, and we do carry them. For your clicking convenience, they are located on the Mindware CD, in the Bookmarks section. Do let us know if you would like us to recommend sites for a topic of your interest.

More Digital Cameras

Dear Editor,
I was always confused about picking the right digital camera, but thanks a ton for fixing my problem. Your 31 camera test was very informative, making the September 2003 edition of Digit a really precious one. Now all my confusions have vanished, and I am going to buy a new D-Cam this Diwali, based on your testing. Give yourselves a pat on the back.

Raman Garg
Via e-mail

digit READER POLLS

Your vote counts

Q. What is your primary means of Internet access?

Mobile Phone — 5.5%
Broadband — 22.4%
Dial-up — 72.1%

Respondence: 788
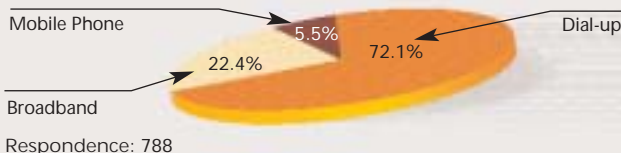
This month's question:
Question: How satisfied are you with the after-sales service and support you get for your PC and components? Participate in the first annual Digit Service and Reliability Survey to vote for or against your PC vendor. For details turn to Page No. 41

Log on to www.thinkdigit.com and vote

The truth about Reliance

Hi Niketu,
I read your article about the Reliance Internet connection. I must tell you that whenever I try to download, the connection gets disconnected. I believe it is because downloads absorb a lot of bandwidth, and this kind of a connection does not have a dedicated line. I tried to file a complaint with Reliance, but they too have no answer.

I have seen a lot of people give up their landline connections and opt for Reliance, as it provides good connectivity. I think it is important that they know all the facts before they make their decision.

Vijyant Jain
Via e-mail

Hi Digit,
When I read the last issue, I was excited to read 'Rely on the Net'. I found that you mentioned the connection speed as 'varies between 40 Kbps to 80 Kbps'. From my experience with Reliance, the connection speed is about 115 Kbps—even when my handset has only two bars of signal strength (out of a maximum of six bars).

Pankaj Katiyar
Via e-mail

Dear Vijyant and Pankaj,
As you can see, our experiences were different, both better and worse. There are many factors that affect bandwidth—from signal strength, to the basic infrastructure network in your area. While Vijyant has poor connectivity, Pankaj is bumping up against the limits of the serial cable on his PC. With services, quality is unpredictable, and only Reliance can tell you what quality of service they assure.

Linux Costs

Dear Sumod,
This is in reference to your reply to Vicky Jambhore, in the Readers Letters section. SuSE is a Linux distribution, but I still have to pay in order to use it—even as a home user. There is so much buzz about Linux being free. If I have to buy an OS, then why not Windows 98 for under $100 (Rs 4,600).

Microsoft offers Windows 95, NT, 98, 2000, XP, Server 2003, but on the other hand, Linux has SuSE, Redhat, Mandrake, Knoppix and host of other distributions—this is confusing. Linux distributors need to overcome this before challenging mighty Microsoft. How does Linux make money? Microsoft makes billions because it spends billions to make their operating systems.

Ashish Kumar Varun
Via e-mail

Dear Ashish,
It is true that most Linux vendors now charge for their distributions, but like you pointed out, they too need to make money. Unfamiliarity is a big problem with Linux, so there are many vendors that specialise in making 'Windows replacement' distributions. We have tested some of these in our August Linux special, and you may want to try some of them out yourself. Of course, they are not free.

The whole point of Linux is the freedom of choice, and thus each vendor is free to add to and modify Linux as they choose. You can choose which one you would like to try. There still many free options, just not the big 'branded' ones. In the meanwhile, it is perfectly safe to install and try Red Hat 9 from our DVD, as long as you follow the guidelines carefully; and you have it for free!

Ado about Editorial

Mr Hajela seems to be utterly disappointed with Microsoft, and has found a vent for his malice—the editorial. Just because you distributed a Linux DVD, Mr Hajela criticises, degrades and molests Microsoft, forgetting the umpteen Windows-based utilities and product distributions supplied with all your other issues.

He continues his cacophony saying that people don't update Windows because of lack of trust!! Do people trust Symantec, Message Labs and Trend Micro more? The only thing I every ticked on a pop-up security box was 'Always trust content from Microsoft'.

Microsoft is like a religion for us, kindly don't molest it. If there superior products, state the facts and let people decide. If one can't respect the company that has played such a key role in the development and evolution of the Software industry, at least don't abuse it.

Rajat Garg
Via e-mail

Dear Rajat,
May all deserving companies get such loyalty, but when was the last time your anti-virus update needed an update to fix what it had updated? Microsoft security patches sometimes need additional patches to undo the damage. Look at the patch history for both Internet Explorer and Windows XP. System administrators are wary of any new patch, and we have talked to users who are reluctant to use Windows Update for fear of letting Microsoft 'scan' their computers. All facts.

We use Windows and Windows-based applications all over our offices, but that does not mean that they are flawless. With applied technology, it is a good idea to put religion aside and focus on practical benefits.

Goof Ups

■ The Liteon 52X/32X/5X costs Rs 2,750, and not Rs 2,995.
■ The Samsung Digimax 201 has been referred to as the Digimax 210 in some places.
■ The HP Inkjet printer costs Rs 2,999, and not Rs 550.
■ On the cover, Internet has been misspelt as Intenet.

Notice any goof-ups?
Write to goof@jasubhai.com

Security Symantecs

Norman Kohlberger is the Senior Regional Products Manager of Symantec's Consumer Products Division for the Asia Pacific region. He was in Mumbai to launch Symantec's Norton 2004 product range. Digit caught up with him, and spoke to him about security from the end-user's perspective

Digit (D): Here in India, how different is the market from the rest of the world?

Norman Kohlberger (NK): It's a lot different, and yet has a lot of similarities, depending on how you look at it. If you look at Internet connectivity, India is very similar to Australia. Australia has roughly 3 per cent of its population on broadband, and the rest on dial-up. But, Australia has three main telecom companies versus India, which has lots of regional TelCos. But the threats here, with the Internet experience, are no different from anywhere else. I'd probably say that in some instances, it's somewhat higher.

D: Would it be correct to say that the threat visibility has gone up in the past month, as compared to the statistics over the past six months? Is that a matter of concern?

NK: Yes, we are concerned. We have seen more activity—in a certain sense. The method of distribution of the malicious code that was sent out, exploited a vulnerability in Windows. Earlier, when you sent a virus it was attached to e-mail. Not everyone had e-mail, or not everyone was downloading files, but now everyone's got Windows, and is connected to the Internet.

It's also a change in the mentality. Earlier it was the corporations that were targeted, but with Blaster and SoBig, they have targeted individuals. When a corporation gets hurt, most people go "Ok, yes, we understand that's not very good." But they get angry when it happens to them personally at home. It leaves a bitter taste in the mouth, and it's changing the way people are looking at their Internet experience.

D: But this is not the first time a virus is exploiting a vulnerability in Windows…

NK: True, but not as many different variants in a short period of time, and that's what made the difference. Mobile connectivity has opened up a whole new threat, because now, you don't have to be plugged into a wire. There is a whole new entry point which we are looking at, and trying to produce solutions for. And not just for corporations. In the US and on a global basis, about 86 per cent of people are storing sensitive information on their PCs… addresses, credit card numbers, phone numbers, birth dates, etc.

D: Do you believe that the problem lies with the OS, or are people just getting smarter and launching more sophisticated attacks?

NK: I think they are getting smarter. As more and more people get on the Internet, your user base becomes bigger. They start younger and younger, and the Internet has been around for 10 to 15 years; more and more people understand how to manipulate it, and I think

" Once is too often "

that's what is happening. It's just the base that's getting broader, and it's a competitive world.

D: What sort of a threat do you see for the wireless platform?

NK: Right now, we are positioned where the PC was 10 years ago. The market penetration of PDAs is right now, I believe, 22 million worldwide. It seems to be exploding faster than the PC penetration rate and by the year 2006, there will be approximately 90 million devices out there. So as soon as you get that many devices out there, then they become vulnerable.

D: Is there going to be a NAV2008 for microwave ovens?

NK: Well, we might get down to that point…

D: …Something like "Help, my toaster's burnt my toast!"?

NK: [Laughs] …possible…it would be a sad world if everyone's toast got burnt, and if they didn't have an anti-virus program!

D: Symantec has, in the past, spoken of how over 70 per cent of children receive inappropriate e-mail. How does Symantec intend to deal with it?

NK: Spam is not just a nuisance, but a threat. It is a resource threat, it eats up bandwidth, eats into server space. Right now 37 per cent of all e-mail world-wide is spam. By the end of 2003, Gartener predicts that 50 per cent will be spam. If you were to send some of the stuff you see in spam by post, you would be in jail! It's criminal, because from the littlest kid to the world's biggest government, everyone is getting the same thing.

We have had a filtering capability in the Internet Security suite since last year, and have now brought out a product to deal specifically with spam.

D: What's going to be Symantec's biggest threat tomorrow?

NK: I think the future is going to be about increased wireless connectivity, open operating systems in such devices that can, and will, get customised. That's where we see threats rising. The next big one within the coming two years will be PDAs, and then after that it's going to be phones.

D: So increased wireless connectivity and wireless devices will be the next wild frontier?

NK: Yes, that's correct. As more and more people purchase such products and use them, there's going to be faster connectivity and the threat increases. ◘

Sensing the world

In the near future, intelligent little sensors are all set to network themselves into a useful web around you

They could be as big as pocket radios, or as small as household dust—tomorrow's biggest pervasive networks are going to comprise tiny sensors, sampling everything on Earth and beyond. The idea is simple, yet startlingly effective—flood the world with a vast number of intelligent network sensors and use them to observe, study and analyse everything around them. That's what the incubators of tomorrow's technology, such as National Aeronautics & Space Administration (NASA), the Palo Alto Research Centre (PARC) and several universities have been working on—wireless sensor networks.

Sensors are all over our world—right from tiny ones that monitor your oven, to those that monitor a car's internal mechanisms. Sensors are also wired into smoke and fire detectors that cover industrial buildings and households. They have a simple job—to sense changes in physical conditions and act on pre-programmed instructions, or relay back information to a central authority. Thus, their behaviour is very predictable.

Going web-ing

That's where things are changing. At NASA's Jet Propulsion Labs (JPL) (*http://sensor-webs.jpl.nasa.gov/*), located within the California Institute of Technology, a team of dedicated scientists headed by Kevin A. Delin, is working towards teaming up simple sensors into a gigantic web of sorts. They have christened it the Sensor Webs project, and are looking at the emergence of intelligent, networked sensors, and focusing on acquiring and interpreting physical information over a large spatial area.

The Sensor Webs project is working with fixed, as well as mobile sensor platforms, which are made up of tiny multiple sensors that apart from sensing changes in the environment, can also communicate with each other. However, instead of using few expensive sensors that read and transmit high-resolution physical data such as readings taken over a wide area, the project looks at multiple, low-cost sensors working together with more sensors sampling, analysing and sharing local physical information. Thus, they form a wireless web of sensors that read, share and analyse external conditions, and go even further by reacting and adapting to the environment.

Each of the sensors has a processor, memory, radio transmission capabilities, a battery cell, as well as a solar cell—all of which sits within a plastic body. Each pod holds several such small sensors that first sample the physical characteristics they were designed for, share this information with neighbouring pods, and analyse and alter their behaviour accordingly. The information that is read and processed, hops all along the pod and other pods, till a common point is found from where the data can be shared with a central computing environment, called the base station. Redundancy is built into the web; if one sensor happens to go down, the neighbouring sensors realise this, and adjust their sampling rates in order to make up for the loss. In effect, the sensors are smart enough to understand the information, and then uplink that processed knowledge to the computers and teams monitoring them.

Now all this information has to be easily accessible to the team handling and

IMAGING: Parag Joshi

evaluating this data, irrespective of its location. Hence, JPL has designed these networks such that the data can be streamed on a real-time basis over the Internet, and be accessible from a browser. The sensor pods are built to withstand adverse elements such as rain, temperature fluctuations, etc. JPL is looking at building the sensors using standard off-the-shelf technologies and products such as transmission and sensing equipment. So it's not going to be all that expensive to get the Sensor Web up.

Web in action

Apart from the relatively low costs, what is also very promising is the fact that the webs are up and running at several places, with some success. JPL's teams have got working Sensor Webs in place at the Huntington Gardens, California since the year 2000. Called Sensor Web 3.1, this version shows improvements in the general system design over its predecessors. JPL has designed the v3.1 pods to be relatively more impervious to the vagaries of nature and the environment in which they have been deployed, as well as making them consume less power.

The Huntington Gardens deployment covers a large area, a substantial portion of which is a public place. The pods sample and graph real-time light levels, air temperature and humidity readings. Each pod is mounted very close to the ground, and can be additionally configured to take on readings of soil temperature and soil moisture. The system also allows for monitoring of the sensor pods themselves, and researchers can run check battery status, for example, on a real-time basis. The JPL team is using the garnered

data to understand ecological balances in the area. You can dig into the Huntington project details at *http://sensorwebs.jpl.nasa.gov/resources/huntington_sw31. shtml.*

Sensor Webs have also been deployed at NASA's Kennedy Space Centre, Florida, located right in the midst of a large wild life refuge. Aimed at monitoring the ecology of the area, the sensor pods are mounted in the lagoons located around the shuttle launch pads. All the pods conform to the strict Federal Communications Commission (FCC) rules for radio spectrum usage, and do not interfere with the communications channels used for the space program.

It's also being designed to be deployed in very hostile territory, such as the planet Mars. To test the network over similar conditions, the JPL team set up a Sensor Web in Antarctica. With 14 self-contained battery-powered pods equipped with solar panels, temperature and humidity sensors, and onboard radio communication gear, the team aimed to observe geo-physical phenomena unique to the area. Communication between the sensors was facilitated with two dedicated communication relay pods, and one mother pod that connected to a laptop, which was used to continuously download data from the Sensor Web. The study proved the Sensor Web to be a robust platform for monitoring the physical environment, even in the frozen wastes of Antarctica.

Dust that thinks

At PARC, California, Dr. Feng Zhao and teams of scientists are working on several projects that are loosely described as Sensornets, or getting sensors to communicate and form ad-hoc networks of their own to exchange and process information. Research is now focusing on getting tiny cheap sensors—complete with battery power, networking controls and an onboard processing chip—that read, analyse and share information and yet, are so small that they could be mistaken for ordinary terrestrial dust. The applications are immense—right from animal conservation programs, to military applications,

Sensor Web pods, monitoring the environmental conditions near the Space Shuttle at the Kennedy Space Center, Florida, have been rigorously tested to ensure that they confirm to all FCC regulations regarding electromagnetic interference (Sensor Webs Project, JPL, NASA)

there exists tremendous opportunity to exploit networks of information gatherers...and PARC's teams are expecting this within the next 10-odd years.

Not very different in terms of appreciable size, is Smart Dust. Researchers at the University of California's Berkeley campus are working on creating a millimetre-scale platform for a massively distributed sensor network. It will probably turn out to look like a grain of sand—maybe smaller—but Smart Dust is going to come well-wired for computing. Complete with sensors, not-insignificant computational ability and bi-directional wireless communications, this will be cheap to produce and should address a wide range of applications.

Both the PARC and Berkeley's dust motes are going to have to live with very, very small volumes. Power supplies are going to be a crunch; even with solar panels, the idea is to squeeze work out of every joule of energy. Indeed, as in the case of the Berkeley mote, at any given point of time, there will just be a clock and a few assorted timers working. All actions are initiated by a time delay, or by the motes' own initiative. Researchers are, for example, looking at the mote being smart enough to contact the base station, in case something interesting, such as a relayed report or a sensor reading, turns up.

Yet another Sensor Web pod located at the Kennedy Space Center that shows no ill effects even after 5 months of coastal weathering (Sensor Webs Project, JPL, NASA)

Analog I/O, DSP, Control

Power Capacitor

Solar Cell

Thick-Film Battery

The Smart Dust project motes, being worked upon by the University of California, Berkeley, is going to be a self-contained, millimeter-scale sensing and communication platform for a massively distributed sensor network
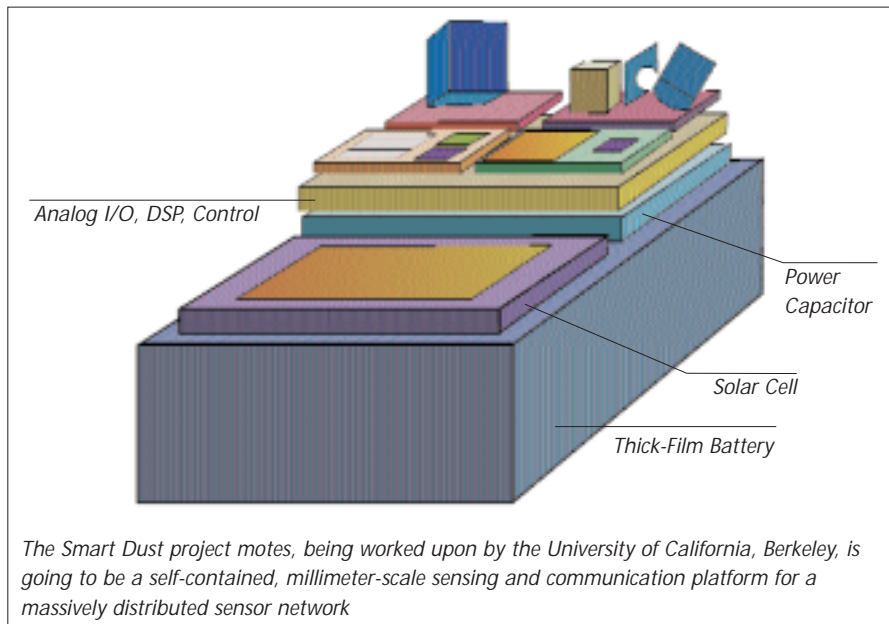
Sands of time

Of course, the challenges are still there—current technologies restrict the size of the sensors. It would take some time to create dependable sensors that resemble household dust. Since sensors on the wireless networks (nodes), will need to operate autonomously, they need to have dependable power supplies. The Sensor Webs project for instance, does not look at microscopic devices, yet the implementation at Huntington Gardens was done with solar panels, and each sensor also had a battery.

Another crucial problem is that of actual networking. The sensors currently deployed on the Sensor Webs project, communicate using a mesh-type network, where each sensor links up to other neighbouring sensors on the local net via radio-based connections. With careful network management features built in, the wireless network is maintained as nodes get added or come off the network. Since it makes sense for each sensor to tune in, and talk, as and when required, the network will be dynamic in nature. To keep the network up and going, each sensor is being made smart enough to notice if a neighbouring sensor is going down, in which case, all the sensors around adjust their sampling rates in order to make up for the loss, whilst informing central command about it.

The data routing protocols will be customised for select applications, and will depend on the type of the sensor network. The communication protocols are still not standardised; indeed, there are several factors to be considered for the right protocol, such as battery power consumption, the amount of traffic, efficiency of transmission, as well as the numbers of nodes on the network. Since this is going to be a dynamic and relatively autonomous network, the protocols being considered range from the generalised Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA) protocols, to the more exotic Ultra-Wideband (UWB), apart from the basic radio or cell-phone-style communications. Eventually though, each set of applications will use a dedicated protocol.

Information will be managed conveniently on a localised small-scale network. The Sensor Webs project, for instance, can have all the results sent over to a central server, from where, if needs be, each individual sensor can be monitored over the Internet. However, if the network comprises huge numbers of dust-sized sensors scattered just about all over the world, the sheer volume of information is going to be huge. Anticipating this, teams at PARC are working on a prototype search engine that will allow one to query this vast network. It could be the sensor world's Google, and be just as simple to operate. The query posed will be translated into a language that nodes can understand. Intelligent networks will then send back a reply based on the information just learnt. For example, you could query the Internet using this search feature, and find out if you have enough vegetables in your cold storage, or a soldier could query and find out if adequate ammunition is available in the local stockyard.

Dust at work

There's a large market of applications waiting for Smart Dust, and researchers are scrambling to tailor make solutions for it. Funded by DARPA, Smart Dust may be used as battlefield sensors in applications of military importance, as may the Collaborative Sensing project at PARC. In both cases, battlefield sensor style devices seem to be war's new toys.

Other possibilities include improved Human-Computing interfaces owing to tiny sensors mounted under your nails. Sensor-enabled interfaces for the disabled will give them a level of freedom in communications, and in personal interactions with other people.

Inventory control could be a case of a sensor-in-box talking to a sensor-in-shelf, thus enabling you to query and receive accurate inventory checklists instantly. The houses we live in could become intelligent, thanks to sensors that will monitor and accordingly adjust the temperatures inside the house to ensure the perfect day, weather, light…the possibilities are many.

Such sensors could monitor product quality and safety systems in factories, industrial areas and places containing hazardous materials. Sensors embedded in concrete, for example, could tell you when the structure has reached a fatal stress point. The University of California at Los Angeles (UCLA) now uses an intelligent sensor network to monitor seismic (earthquake-related) activity in the UCLA area. Built into buildings and programmed to detect structural damage, they could act as early warning devices. Also, plans are afoot to use it to scrutinise stockpiles and flow of weapons of mass destruction.

This is the beginning

Recent advances in micro-electronics, power supplies, wireless communication and other esoteric fields are working towards wiring up the world, and the possibilities of sensors ringing the world is a not-so-distant reality—from academia to industry, everybody is looking at this turning into a reality within the next decade. And ten years from now, cheap pervasive computing is just what we are going to get, from nano-scale sensor networks located right under our fingernails! ◨

SRINIVASAN RAMAKRISHNAN
srinivasan_ramakrishnan@thinkdigit.com

Sony Overhead Drop Down ▶▶ Display Screen
New luxuries on the move

Here's a 7-inch drop-down LCD for your car that can be connected to any portable DVD player. It has 16 x 9 widescreen aspect ratio TFT screen and a motorized fold-down panel. It also integrates an infra-red transmitter for headphones.

Let me
Entertain
you

Here's a look at a few products that take entertainment to the end of the earth, and cost about as much

◀◀ BeoLab 5 Speaker System
Unidentifiable flying speakers

These 2500 Watt speakers from Bang & Olufsen weigh 60 Kgs each, and use flying saucer-like radiators to disperse sound in a more natural fashion. A Digital Signal Processor (DSP) and a moving microphone sample the various self-emitted frequencies and re-adjust the output.

SONY DVD Player ▶▶ (400 disc-changer) - DVP-CX777ES2
Four centuries of music

Sony's DVP-CX777ES2 is a DVD player with Disc Explorer System that can store and organise up to 400 discs. The on-screen graphic interface lets you choose your music title, disc type or genre wise. The Jacket Picture function records disc jacket pictures that appear automatically when a disc is accessed.

Philips Streamium MC-i250
⏶ **Listen to the world**

The world's first wireless broadband Internet audio system connects to a wireless home network with integrated 802.11b WiFi it's capability. Once connected, it can play locally stored mp3 and mp3pro formats, and streaming audio from the Net. It supports both CD-R and CD-RW discs, and has a conventional FM/AM tuner.

⏷ **SONY Psyc DVD Player DVP-PQ1**
One-player band
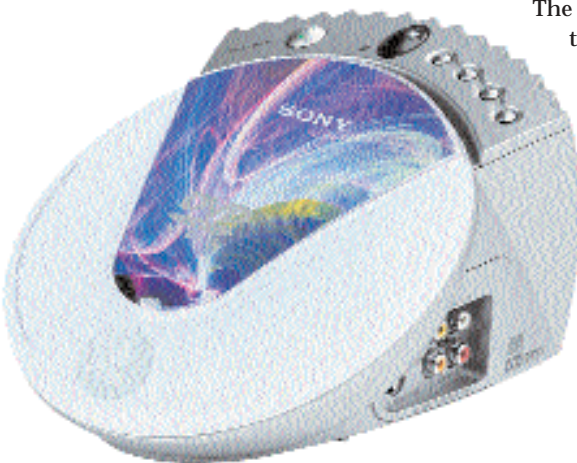
The Psyc is a DVD player that can also play audio CD, CD-R and CD-RW discs, not to mention MP3s. The Psyc weighs about 1 kg, and comes with colour panels with which you can change its look.

Panasonic PT-40LC12 LCD HDTV Multimedia Display ▶▶
All that you can see

This 40-inch HDTV accepts decoded 1080i, 720p, 480i and 480p digital television broadcasts. When connected to a PC, it can display true SVGA (800 x 600) resolution, as well as digitally expanded VGA (640 x 480) and compressed XGA (1024 X 768) data. It features two speakers with BBE high-definition sound.
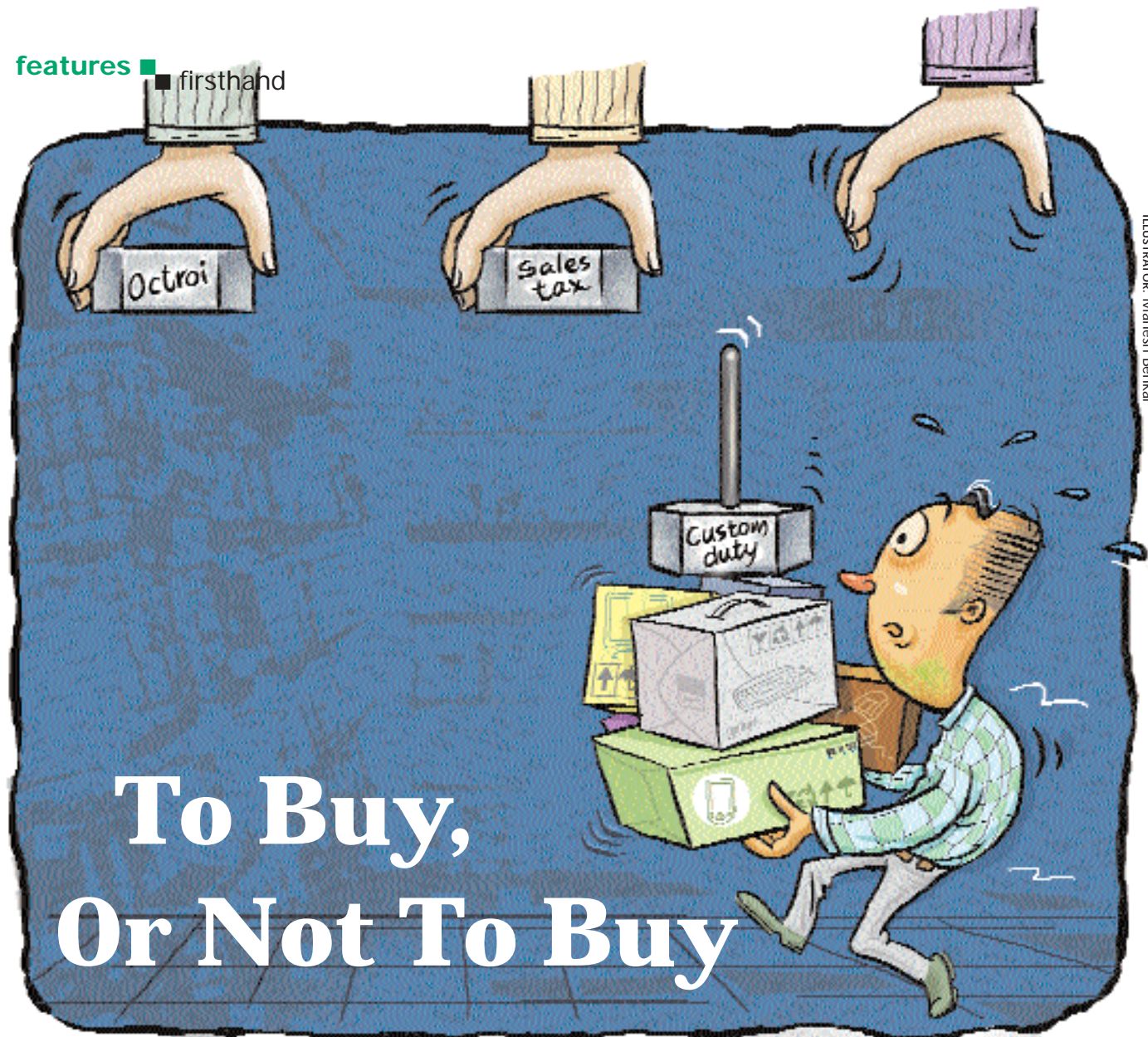
ILLUSTRATOR: Mahesh Benkar

To Buy,
Or Not To Buy

If only buying electronic toys was as easy as walking into a shop and choosing one. Even if they're available, the prices in India are liable to give you a cardiac infarct. Is there a way around this?

Do you feel the urge to splurge? Do you feel that you deserve a tech toy from our Droolmaal section? No matter what your budget, high-end products require serious thinking and some resources. A high-end PDA may cost you anything north of Rs 25,000. Before you run off to the bank for a 'I'm desperate, I need a Clié' loan application, take a look around, there may be a better alternative.

First things first—zero in to what you want to buy. Do online research for features and specifications, and narrow down your search to a few products; then talk to people who have bought what you want—for their experiences, and a reality check. This will tell you what's hot, what's not, and what's a definite no-no.

Just like your momma always said, "Money doesn't grow on trees!" Why buy

something for Rs 30,000, when you can get it for Rs 25,000? Of course, if the extra buys you warranty and service, it's worth it.

Now, you're at a crossroad—if you're lucky, the toy you want is available in India at a decent price, from an authorised showroom, with warranty and after-sales support. But then, in an ideal society, you'd be born with all the gadgets you'll ever need. So, the next option is the grey market, where the product range is good, the prices are lower, but god help you if your toy dies. So what's left? You can ask a friend or relative to buy it from abroad, and though you'll get it cheaper, you might miss out on warranty and support—unless the device comes with international warranty, and the manufacturer has a presence in India. Lastly, when all else fails, use your credit card to buy online and wait, with

nails chewed to the bone, for your next few bills—hoping and praying that the transaction was actually as secure as the Web site claimed, and that there were no hidden costs.

Wait! Before you break into you're sibling's piggy bank, empty out your pockets, look in the couch for loose change, scrimp and save, and take a few years advance on your allowance, understand the benefits and pitfalls of each of your options.

Going white
In the past few years, things have changed dramatically. Big brands such as Sony, Creative and IBM are going all out to grab your attention, and come up with huge stores that stock almost their entire product range. Rajshekhar Bhatt, the Sales and Marketing Manager of Creative Labs Asia

proudly says, "As of now we have a respectable market, which is not restricted to the metros." He also points out that that they have clients in locations as diverse as Mumbai and Kohima.

In an authorised retail store, you can walk right in and browse through their product range, tinker with the gadget you want, before you make your decision. Jyotin Shah of J.S. Equipments, who import and distribute high-end products for the laptop and portables market, says, "See, when you buy here, you have the advantage of being able to see the device in action, try it out, making sure that its reliable, and ensuring that that is what you need".

Big brands come with full-fledged service centres that can tackle any problems you face. While you are sitting within the warranty period, you are assured of servicing as well as repairs and replacements—at no cost. Dushyant Mehta, of Mediaman Infotech, importers and distributors of niche computer products, agrees with this saying, "Service is a major issue, and proximity means that you can get installation service and after-sales support very easily."

Buying from official authorised stores can give a wide range of transparent payment options. You can also take advantage of any existing schemes that may throw in a few freebies, as well as allow for flexible financing. And since you are buying from an accredited source, you can be assured about the quality and origin.

Typically though, all this comes at a price. With a duty structure imposed on the import of consumer electronics into India, the end-level retail prices may not be on par with what you would see abroad. As Rishi Kapoor of Solar Systems, dealers of such exotic Sony products as

Clié handhelds, and Vaio laptops, put it, "India has a complex duty structure, and naturally, this affects the prices"

The customs duty on imports of consumer electronics and computer hardware, has been dropping steadily, and currently, the customs duties work out to anywhere from nothing, to 25 per cent. In addition, come several other duties and taxes, importer, distributor and retailer margins, and the end result, as Jyotin Shah puts it, "is close to Rs 1,600 for a $10 value import". This may seem rather outrageous, but you are also buying after-sales service, and the peace of mind that only a valid warranty can offer. As Neil Rumao, a young technophile from Mumbai, who regularly

> **"** Generally, there is a thumb rule factor in the IT industry—a $10 item would have a final product MRP of Rs 1,600, after margins **"**
>
> Jyothin Shah
> Proprietor
> J.S. Equipments

buys high-end hardware and consumer electronics says, "When you can afford to pay Rs 25,000 for a product, paying Rs 30,000 to get an assurance of product quality, service and warranty, is not really an issue." However, though most big brands stock substantial portions of their product range, most of the latest high-end products take too long to reach the sub-continent.

Going grey

Until about 3 years ago, the grey market had the advantage of a vast product range, and not to mention, low prices. If you couldn't make it to the Middle East or Far East, this was the easiest place for you to

pick up esoteric hardware. Though, the entrance of big brands has rained on the grey parade. The price differences have reduced, and most resellers now offer you a choice of with warranty or without—obviously without warranty is a little cheaper. If you want the latest, and want it cheap, then this is the place for you. What's more, even if your toy isn't in stock, you can order it—without after-sales support and warranty, of course.

Prices in the unorganised market can be very competitive—several dealers confirmed that the 'landed cost' of a $10 (Rs 460) value import item would come to between Rs 800 and Rs 1,000, if import duties were evaded. One dealer (name withheld), spoke of a recent experience where he sourced a "$1,000 product, that came up to Rs 75,000," and added that "counting a 42 per cent duty structure and other costs, the legitimate, post-import cost would have amounted to nearly double the initial cost". Ouch! A complex duty structure could very well push you to buying from the street, instead of heading off for an authorised showroom.

In the grey market, it's almost a one-way street as far as warranty and after-sales support goes. Paperwork is minimal, and local warranties aren't available. If you're lucky, global warranties will work, but you might have to pay for the service anyway. If the device is esoteric, you could be out on a limb if the device malfunctions. However, realising this, dealers are now willing to offer you service deals that you can purchase along with the product. Chances are that these retailers will stock brand new hardware much faster than you would see on the shelves of an authorised dealer.

It's pretty obvious that the difference in pricing between the unorganised market and the authorized showroom, is because some of these goods may have entered the country without paying customs duties. Others are legitimately imported, but sold slightly lower than current domestic prices, because the local post-import dues, such as sales tax, were not paid.

Currently, this market has legitimate major importers now tying up with such dealers. One grey market dealer that we spoke to went so far to say, "The grey mar-

Service and Warranty

Warranty is the period of time that a company can guarantee a product to be free from stated defects. If defects do occur, the company will repair or replace the product, or its components, without additional charges. Service deals with the repair of products. Though warranties may not be provided for a product purchased off the grey market, or if purchased from abroad or online, you can still find service for it.

Though service without an existing

warranty is charged for, it can still result in savings. Even if your warranty is void or non-existent, you may still find a maintenance contract for your device.

In the grey market, importers and dealers will often give you a service deal for just a few thousand rupees more. Dealers have worked out insurance schemes with insurance companies, and will happily offer you a replacement if your notebook is faulty, since they are covered by insurance.

ket is gradually dying out, and turning legitimate", and points out that this is due to the reduction of import duty and the fact that service now matters as much as price for the Indian consumer. Rumao concurs, "I look at quality, service and warranty, and a small price differential doesn't really matter." The result is a light-grey market, where the products you want are available, at a cheaper price, and a slightly lower risk—as far as support is concerned.

Going international

One of the more popular methods of purchase is to ask a relative or friend who is travelling abroad, to buy a device for you. A little research may work wonders. Just as buying off-the-shelf in India, buying abroad assures you of quality. The range of products is bigger, and you get an international warranty for your device.

Price is a definite advantage here, provided you can get past customs. Even if you are carrying your gadget in personal baggage, import and associated duties, need to be paid. The duty structure in India can be rather complex to understand; the total duties applicable are a basic import duty that varies between 0 to 25 per cent (storage devices, for example, have 0 per cent basic customs duty), to which a further duty (a central excise duty) of 16 per cent is added. Beyond this, an additional duty of 4 per cent is levied. Now, all of these are cumulative, and can add up to a tidy sum. We did the math and learnt that at the highest level of basic customs duty, you end up paying a little over 150 per cent of the international price.

Currently, you are allowed to bring in Rs 12,000 worth of dutiable items in personal baggage. Above this amount, you are charged duty on the excess. Thus if you bring in Rs 15,000 worth of dutiable items in your personal baggage, you will be charged duty on Rs 3,000. If you are importing the goods through unaccompanied luggage, or via courier, the duties levied change. Keep in mind that rules change frequently, and you should keep checking with authorities and customs agents to find out the latest rates. The Central Board of Excise and Customs maintains an exhaustive Web site with relevant information at *http://www.cbec.gov.in*; the Indian Customs homepage is located at *http://www.cbec.gov.in/cae/customs/csmainpg.htm.*

Post-sales service can prove to be a mixed experience. As Kapoor puts it, "In case of breakdowns of really niche products brought abroad, spares may not be readily available," Shah too recounts an interesting incident about this, "We had tied up with a German company, and a customer had a problem with some component he bought from Dubai. We brought it here, and corresponded with the parent company. Unfortunately, it could not be serviced, and the component had to be sent abroad at the customer's cost. The cost of sending it and getting it back was so high that it made sense to buy a new piece." But still others point out that with big brands setting-up full-fledged service centres in India, after-sales service isn't really a problem. *(See box, 'Service and warranties')*

Retail prices in the Middle East and

> **Looking at all the avenues available, buying online doesn't make sense**

Neil Rumao
Technophile from Mumbai

Far East do not vary much; Dubai and Singapore are clearly the favourites. A few years ago, it made sense to buy tech toys in South-East Asia—even considering the product cost, air tickets and travel expenses, it worked out cheaper. A laptop available there for Rs 1,00,000, is available in India for Rs 1,40,000. So even though the trip will cost you Rs 30,000, you are safe behind India specific warranty and service. Only if the trip is incedental, does buying abroad make sense.

Most often, goods are not declared and sneaked in without paying duty. Although the saving in duties may be immense, it is not worth the risk—as getting caught may result in hefty penalties and even the confiscation of your dream device.

Going buying.com

At first glance, buying online looks like the ultimate deal—search for a Web site that will fetch you the cheapest price for your dream gadget, and drop it into your shopping basket. However, buying off the Net is not yet hassle free. Though most people worry about security, the truth is your credit card information is not secure—the transaction can be hacked by the store clerk you give your card to, or even by a 16-year old hacker. The bigger problem at hand is the lack of a centralised source. The *www.amazon.com* of books does not exist for other products. Fortunately, such Web sites as *www.mySimon.com* provide a price and and source comparison, to make your job easier.

We went Net-shopping to locate the best deals, and found out that an ATI Radeon 9800 Pro, with 128 MB DDR RAM costs anywhere between $359 (about Rs 17,000) and $458 (about Rs 21,750). This difference is huge; in fact, this is where the fine print comes in. Each Web site has different charges for shipping, handling, insurance and so on. And when you consider shipping this back home to India, you still have to pay for customs and associated duties. After locating e-retailers who will ship to India, and who have a sound history of delivering the goods, you will be informed by the courier agent about the requisite duties. Since most sites take credit card payments, you have already been billed for the article and delivery. You will need to clear these customs dues, failing which, delivery will not be acted on. This makes buying online a lengthy affair.

Still, this is the easiest way to get through to the actual purchase—everything here is a click away, and you do have access to a very large range, not to mention the research and comparisons possible about almost any product. Of course, getting a feel of the article is not really possible, and quality, while not necessarily suspect, can be questionable at times. When buying off third-party sites, some background research into their track record and fine print is highly recommended.

If you are looking for a generic, one-size-fits-all, great deal, best route… Sorry! there is no clear answer yet. Ultimately it boils down to your needs, and what is most important to you. To get the best deal on that killer product, all you need to do is apply common sense and make a decision after weighing all the factors that we have discussed. Finally, remember, the ancient Latin phrase, *Caveat Emptor* (let all buyers beware) always holds true. If all goes well, you will soon be strutting around with the envy of your neighbours…

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The
Pent-athlon

We give the Athlon 64 FX a run for its hype

Processors built on the 64-bit architecture are slowly, but surely sneaking into the desktop environment. SUN Microsystems, IBM, Digital and HP have been using the architecture for many years, but all of these were tied down to server-class operating systems that were specifically written to make use of their special instruction sets. Moreover, all these were pure 64-bit architectures that were incapable of running existing 32-bit applications. The AMD Athlon 64 FX makes all this history. This AMD processor is a desktop version from the Opteron family. We pitched it against the tried and trusted Pentium 4 3.2 GHz that is currently ruling the high-end desktop market.

This Athlon differs from its predecessor, the Barton core Athlon XP 3200+. Apart from two additional integer pipelines, it has an on-chip memory controller and HyperTransport controller making the I/O system faster. It operates in three modes:

Long mode: In this mode, the operating system performs in pure 64-bit mode, and supports only 64-bit applications.

Compatiblity mode: Here, it supports both 32 and 64-bit applications under a 64-bit operating system.

Legacy mode: The legacy mode can only run current 32-bit operating systems; 64-bit applications cannot be used.

We tested the Athlon 64 in Legacy mode, running a 32-bit version of Windows XP as it will have to compete with a 32-bit Intel family, for at least the next year. The results were compared with those given by a Pentium 4 3.2 GHz on a Canterwood (Intel 875 PBZ) motherboard. Both the computers were configured with 512 MB RAM and used the Gainward GeForce FX 5900 Ultra graphics card. The overall analysis was a combination of real-world and synthetic scores.

The the real world test, application benchmarks included Photoshop tests, audio and video encoding and games that involved intense calculations such as calculating the value of pi to varying degrees of precision, ranging from 16K to 32 million decimal places. In the synthetic benchmarks, we used Sisoft Sandra 2003 Pro, Winstone Content Creation 2003 and PCMark 2002 Pro.

Pure performance

While the time difference between the pi calculations was small at 1 million decimal places (6 secs), it increased drastically as the decimal places went up to 32 million (409 secs).

In SiSoft, the Dhrystone and Whetstone scores were much lower than those of the Athlon XP 3200+. This seemed very unlikely, so we disregarded them. We installed Red Hat 9 on both the computers, and configured them in exactly the same way—including switching off GUI and networking—and stopped all services that were not needed. We then compiled the unixbench v 4.1 benchmark to generate code that works well with their respective architectures. The results clearly showed that the Athlon FX has an upper hand in both, integer and floating point operations, but it also highlighted an impor-

tant problem. Many applications may have to be specifically recompiled for the Athlon, since they may not be optimised for its specific enhancements.

Gaming scenes

In the gaming tests, the Athlon FX gave quite disappointing results. In *Quake III*, it scored better than the Athlon XP 3200+, but when compared with the P4, it lagged behind by almost 100 fps. In *Gunmetal,* the P4 scored better at all resolutions with low-quality settings. However, when the settings were turned to high, the Athlon zoomed ahead.
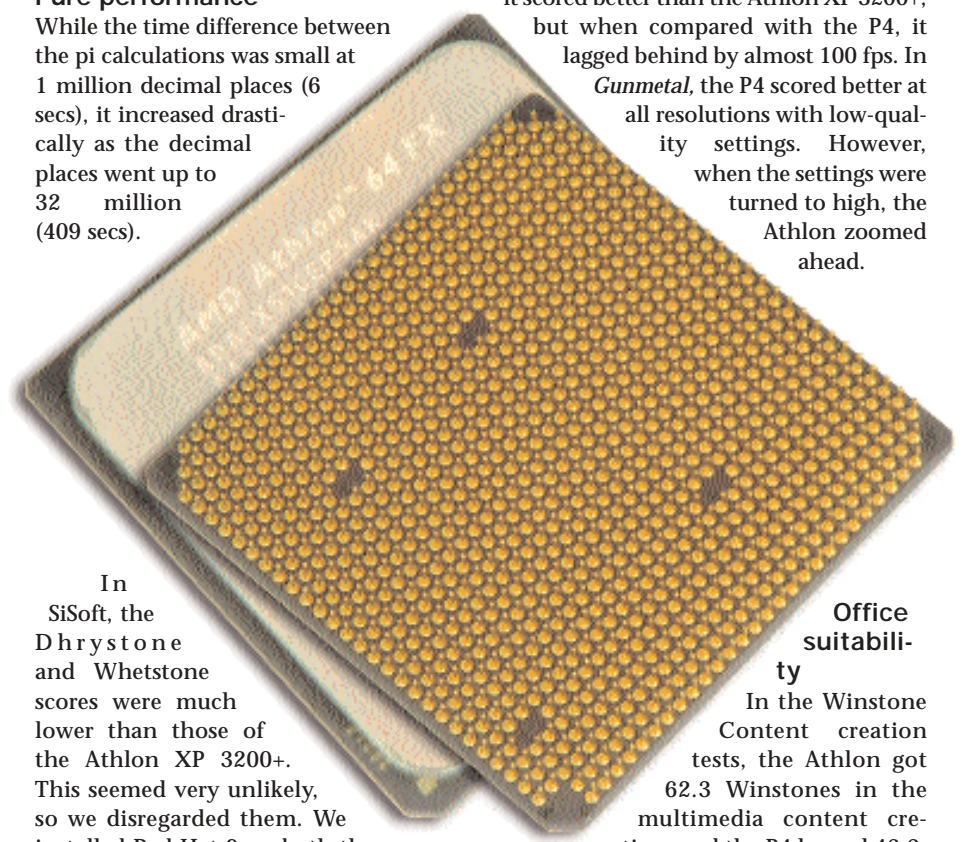
Office suitability

In the Winstone Content creation tests, the Athlon got 62.3 Winstones in the multimedia content creation, and the P4 logged 43.3. In the business content creation, it logged 41.9, while P4 scored 35.3. The WinRAR compression, the Athlon is almost twice as fast as the P4, but do you really need a 64-bit computer to run office applications? In the PCMark 2002 CPU tests, the scores again plummeted, with the P4 scoring 7939 points to the Athlon's 7100. This again may be because of the lack of optimisation, but it also emphasises that finding applica-

Chatting in 64-bit

We got Randy Allen, Vice President of Design Engineering, Computation Products Group at AMD, to answer a few questions.

Digit (D): Which applications will benefit from the AMD64, and when?

Randy Allen (RA): Databases, etc., require 64-bit addressing, but high-end gaming and the 'cinematic experience', are also significant beneficiaries. Time-frames are something we have to work out, but it should be in 2004.

D: What have you done to make it perform so high at such low clock speeds? Are there any specific technologies to allow it to compete with Intel's Hypethreading?

RA: Naturally, when you look at clock speed, we have a frequency deficit against some of our competitors. So people ask, "How do you do it?" With the Athlon 64, we have made numerous improvements, though the two most significant are the integrated memory controller that reduces latency and the Hyper Transport bus. The Athlon 64 offers outstanding 32-bit performance, so it is better purely as a 32-bit processor anyway. But it's not simply a 32-bit processor—it allows you to move to 64-bit whenever you want. So I would turn that question around and ask why would anyone want to be limited to a 32 bit only system.

D: Will the benefits justify porting existing 32-bit applications to 64-bit today? And how will you ensure 64-bit driver support since 32-bit drivers won't work in 64-bit Windows?

RA: To give you an example, at the Opteron launch, IBM said that they ported each of their applications in a week—they were astonished at the simplicity. When we launch, we will have a host of chipsets, motherboards and systems from several vendors. And by the time 64-bit Windows comes around, we will be bringing hardware into our validation lab.

D: Will there be a Athlon 64 to FX upgrade path? (Note: The Athlon64 FX has a better integrated memory controller, and has a different socket configuration from the Athlon64.)

RA: Certainly in the future we would like to move to a common socket, but I wouldn't go as far as to say that there will be an upgrade path.

D: If Intel would like to use AMD64 architecture, would it be made available to them?

RA: Certainly! As a company, we are very active in licensing our technologies. Hyper Transport is a good example of a technology we have licensed. I think it will be very interesting to see Intel acknowledge that AMD64 is the standard.

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tions for the Athlon 64 FX may be a problem.

In the real world video encoding tests that compare the system's ability to encode an MPEG-2 file to DivX, the Athlon outperformed the P4 by nearly 13 minutes. In the audio encoding tests, the Athlon lost out by 3 minutes. However, this small setback in the audio scores will not be a concern when working with multimedia applications. The POVRay scores rated the Athlon 64 FX lower than the AMD Athlon XP 3200+.

At the end of the day, the Athlon does give better performance on certain fronts—a conclusive verdict can only be passed after the benchmarking is a little more consolidated, and 64-bit OS' enter the scene.

The Athlon 64 FX is priced at $733, while the Pentium 4 3.2 GHz is available in the range of $600 to $700. To get maximum return over this investment, the Athlon 64 should excel in 32-bit mode since 64-bit applications will not be available for at least the next 18 months. Even when these applications are ported to 64-bit, the first ones will be professional applications like audio and video-editing tools. Intel is also releasing its P4 HT Extreme Edition that could give some stiff competition to the Athlon FX. AMD is also releasing a scaled-down version of the AMD Athlon 64 without the FX tag that is aimed at bringing affordable 64-bit computing to desktops. But until that happens, it makes sense to stick around with your old PC.

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Performance Charts
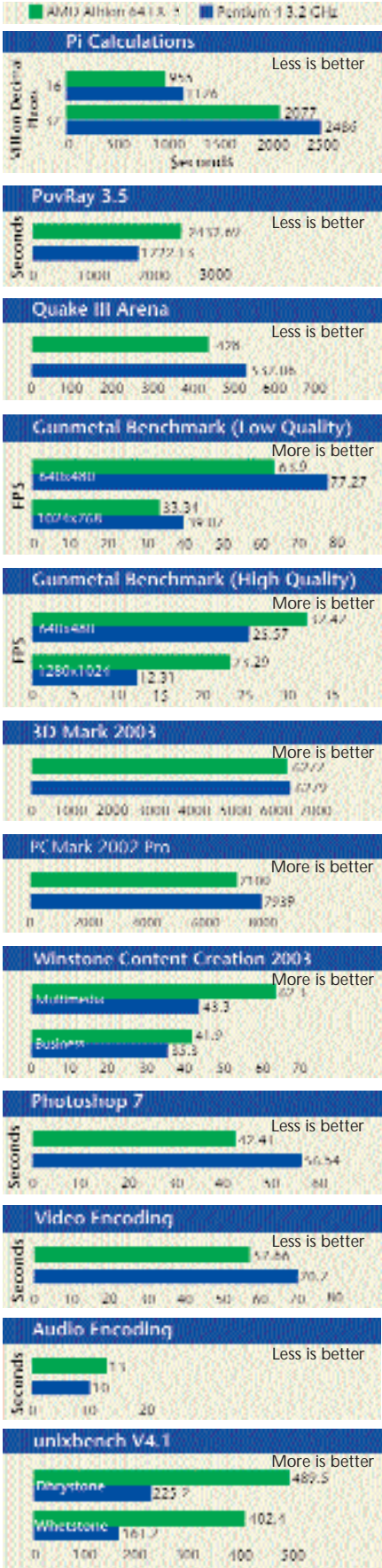
How we Test

It looks good and the technology is glitzy, but does it do the job?

To ensure that our readers have all the information they need to make an informed buying decision, reviewers at the Digit Test Centre conduct comprehensive tests to evaluate the latest hardware, software and technology services in accordance with international standard evaluation processes and methodologies.

Our test results may be presented either as Comparison Tests, or as individual reviews in the Bazaar section. The representation of the results is different for each in the interests of clarity, but the test process for both is identical in all respects.

Of all the products we test, only the best make it to the A-List.

Comparison Tests

In the comparison tests, we compare the performance of products within a particular category. Each product is evaluated under different parameters such as performance, value for money, features, ergonomics, etc.

Weightages are then applied to the various test parameters according to their importance for that particular category of products. These weightages are then used to arrive at scores for features, ergonomics and performance for each individual product. A detailed test process is included with each comparison test, and explains the parameters that were taken into consideration, along with weightage allocation and reasons for the same.

In Bazaar

The evaluation of products in Bazaar also covers the same parameters such as performance, ease of use, value for money, build quality and features of the product.

Here, each of these parameters is rated on a scale of 5, which is represented by arrows (->).

The greater the number of arrows, the better the product. This simple five-point rating system is designed to give you an easy-to-interpret assessment of a product. For example, a product that receives a value for money score of five arrows signifies an outstanding buy.

The Awards

Digit awards outstanding products by selecting a Best Performance and Best Value winner in each comparison test. The winner of the Best Performance Award will be the product that scored the highest in the performance segment combined with rest of the package including features, ergonomics, bundled accessories etc. This award represents the best performing product in our tests in terms of the complete package that is offered to a customer. The winner of the Best Value Award will be the product that scores the highest in our value for money parameter which is derived taking into account the ratio of a product's ergonomics, performance and features to its price. The product winning this award offers a good combination of performance and features at a great price. Since value for money takes into account all scores for all parameters including the price, this score will be used to arrive at a grade (e.g. A+) for each product.

The 5-point Rating System used in Bazaar	
► ► ► ► ►	**Excellent:** A brilliant combination of price, performance and features—far beyond expectations
► ► ► ► ►	**Good:** A good buy, better than most products in its category
► ► ► ► ►	**Average:** Reasonably competent but nothing spectacular about the product
► ► ► ► ►	**Mediocre:** Does not live up to expectations, needs improvement in many areas
► ► ► ► ►	**Poor:** has serious drawbacks and needs improvement before it can be used for its target application

Dear Readers,

Buy a product, and the manufacturer is automatically bound to a simple contract with you. You pay for the product, and they promise to keep you satisfied for the duration of the warranty.
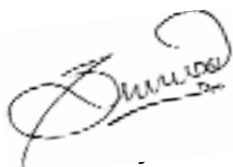
Too often, that promise is broken. What can you do when things go wrong?

The Digit Test Centre gives you authoritative technical reasons why you should, or shouldn't buy a particular make of hardware. It's your authoritative experience that describes how well the company honours its obligations once you put the money down.

Here is your chance to say your piece on IT products that you own, in our first service and reliability survey. Did you get outstanding after-sales service? Are you so happy with your purchase that you must share the good news? Do you get the run-around from your dealer? Are you stuck with a dodo of a device, with no recourse in sight?

The first Digit Service and Reliability Survey commences today.

We invite you to speak up, and be heard.

Assistant Editor

Service & Reliability
Survey 2003

Your experience will form a part of the survey to accompany the **Zero One Awards** in the December 2003 issue. Be a part of a larger voice, demand better service standards and get the reliable products that you deserve. Logon to **www.thinkdigit.com/survey** and use this unique access code to record your vote.

digit
>> Your Technology Navigator

The Jack of ALL

Multi-Function Devices are the latest in space saving techniques, both for home as well as office users. We pit 13 of them against each other to see which one best suits your needs

One peripheral commodity that is rapidly gaining popularity, amongst manufacturers and target audience alike, is the multi-function device (MFD). When introduced in the market a few years ago, they failed to entice users, given their mediocre performance and unjustifiable price. But that was long ago. The new crop of MFD is on par, if not better, than their stand-alone counterparts. This acceleration in acceptance is a result of something as elementary as lack of space. As the metropolitan cities spill out in every direction, offices are trying to squeeze in as much productivity per square inch as technologically possible—and MFDs promise just that.

But therein lies the paradox, though MFDs seem ideal for workspaces, manufacturers think otherwise. Most have introduced MFDs for SoHo, with the price being more an area for concern, than performance. The low-end band plays to the home-user's tune-all basic functions of printing, copying and scanning are seen to, and in some cases, even faxing. This Consumer category is the site for some aggressive pricing, with the lowest MFD costing just around Rs 5,000.

Not that the commercial segment is completely ignored. High-end MFDs are feature-rich, offer better performance and also come with frills such direct printing from flash cards, full-fledged faxing and extra paper handling capacity. This 'Prosumer' category is all about performance and lacing. The price range for a prosumer MFD starts around Rs 10,000, and can go up to Rs 35,000. The highest level of MFDs is the Enterprise level devices which cost in excess of Rs 1,00,000.

The Consumer and Prosumer categories use the thermal or piezoelectric inkjet technology to offer colour printouts. However, in an office environment, the bulk printing is always in black text, making the inkjet a technology too expensive to waste. To counter this, a new breed of MFDs based on Laser technology has also been introduced, and is priced above Rs 40,000. We got just three such MFDs, but since they were placed in different price bracket, we decided against a direct comparison between them.

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Epson Stylus CX3100

Average performer

The Epson Stylus CX3100 is targeted at the SoHo user. It includes a printer and a flatbed scanner which doubles up as the copier, but the fax has been done away with. The interface is USB, so data transfer rate is not an issue.

The CX3100 is bulky and looks clumsy, but a potential buyer would be looking at cost, not looks. It features 48-bit colour depth scanning with an optical resolution of up to 9600 dpi. There's an LCD display and nine self-explanatory function buttons.

The CX3100 was an average performer, with average text printout time. The photo printout took long—399 seconds—the second slowest in this category. The text print quality wasn't too good in general, but it was better than the others in terms of minimum readable text size. The photo quality printing test gave a mixed bag of results: the CX3100 came in last in terms of time for high-resolution scanning; and though it was good in the tonal deviation test, it was mediocre in the colour uniformity and colour deviation tests. This MFD was the fastest in the entire category when it came to copying. The price-per-page for B&W pages works out to Rs 3.87, and to Rs. 4.43 for colour—more or less the same as the others.

The CX3100 is priced at Rs 8, 395. Although it is not a top-notch performer, it definitely is above average in this category. If you're looking for a decent, economical MFD, the CX-3100 is a

Price: Rs 8,395
Pros: Fast copy speed
Cons: Expensive

Epson Stylus CX3100				B-
Performance				
Features				
Ease of use				
Value for money				

HP PSC 2110 all-in-one

Pocket-rocket scanner

The PSC 2110 all-in-one is intended to replace the ageing PSC 750. The design is more or less similar to that of its higher-end sibling, the HP 2210. There's no fax capabilities or memory card reader. The dimensions of the HP PSC 2110 are compact—it features a little one-line, barely-readable LCD display, and ten function buttons. There's also a nifty feature that lets you scan directly to your e-mail client.

The ink cartridges and the power and USB cables come bundled. This MFD can also work with PhotoRet IV technology, but you'll need to order a separate photo cartridge. The 2110 is an attractive option for users who need to take photo-quality printouts.

It took the longest of all for printing a text document. Photo printout time was average. On the quality front though, the 2110 gave crisp, high-quality printouts. It also scores in the scanning department—it was the fastest scanner of all, including the other HP devices we tested. It came in second in the document copying tests.

This product is another viable option for SoHo users, because it provides good printouts and quality scans. With solid performance across all categories, the HP 2110 provides value for money as well as a good price-to-performance ratio. The cost-per-page, for both B&W and colour, is slightly high, but not high enough to put off users willing to spend a little extra for quality.

Price: Rs 9,999
Pros: Good print quality
Cons: Mediocre scanning performance

HP PSC 2110 all-in-one				C
Performance				
Features				
Ease of use				
Value for money				

HP PSC 1210 all-in-one

A cheap solution

Don't be fooled by the appearance of the 1210—this all-in-one performs reasonably well. Its footprint is among the smallest of those of the devices we tested. The 1210 is aimed squarely at home users who are looking for more than just a printer.

The device can print, scan and copy A4-size documents. A press of a button beside an LED counter orders one to nine copies of a document, but you'll need to use the software control panel if you want 10 or more.

The device comes with print cartridges, and power and USB cables. It's a light-duty machine, with its duty cycle a very modest 1000 pages per month. Printing resolution is the lowest amongst all the MFDs we tested—just 2400 dpi. Connectivity also takes a hit, with only USB 1.1. There's no LCD display—you have a stick-on label identifying the eight buttons on the top left edge, for black or colour copy, scan, number of copies and so on.

Text print time was in line with that of the other printers. Photo print quality was no great shakes, but it was what one can expect of a low-end stand-alone printer—in fact, better. Scanning speed was good, while copying was slow. Scan quality was average overall, but bad in the dark region of the spectrum. Sensitivity to light shades was good.

The 1210 is the second-lowest priced device in this category, at Rs 5, 999, it costs almost the same as a regular printer. If you want a really cheap printer-scanner combination, this is

Price: Rs 5,999
Pros: Simple to use
Cons: USB 1.1

HP PSC 1210 all-in-one				A
Performance				
Features				
Ease of use				
Value for money				

How We Tested

The entire test was divided into two procedures—one for testing printing capabilities and the other for the scanning capabilities of the MFD. The copier function was judged on two parameters—speed and quality. Faxing was considered a feature and not a performance criterion.

Our test bed comprised a Pentium 4 processor at 3.06 GHz, plugged on to an Abit 845GE board with 256 MB of Kingston 333 MHz DDR RAM, an MSI Ti4800 display card and a 40 GB 7200 rpm ATA IV Seagate Barracuda hard drive. We used Windows XP with SP1 as the operating system. The system was brought up-to-date, by loading all the latest chipset and graphics drivers. The USB patch for Windows XP was also installed, and the devices were connected on the USB 2.0 port for optimum performance.

Features: The main reason one would want to purchase an MFD is the numerous features it offers. So features formed the basis of our tests, and were awarded 15 per cent weightage. The various features that we logged for the printer aspect were the maximum printing resolution, paper capacity and type of interface offered. For the scanning aspect, features such as the maximum optical resolution supported, bit depth, scanner type and the sensor employed were noted. The MFD should work like a copier without a PC, so features such as one-touch copying, buttons for a colour or black and white copy, an option for multiple copies, and reduce and enlarge features were given prime consideration. After logging all of the above, weightages were allocated according to the importance of each particular feature.

The Test page for Cost per page analysis, helped us make a buying desicion

Performance: Each of the two major test procedures—the printer and the scanner tests—reflected two prime parameters, speed and quality. For the printing speed test, we logged the time required for printing our standard black and white text document at normal settings, and for printing our test image file on photo paper, where the MFD was set to its best printing mode.

For determining the quality of the output text, we printed a document with varying point size text and looked for jarred edges and smudging. For evaluating image quality, we took the same printed photograph and looked at the parameters we decided upon as quality criteria. We used a standard combination document to judge the MFD's performance at printing documents containing both images and text.

This time around, we also included a cost-per-page test. For this, we prepared a test document with four paragraphs with the same content, but in four different colours—cyan, magenta, yellow and black. This ensured that each colour was used in the same proportion when the test page was printed. Before the test, we noted the ink level, and then printed out as many copies as could get printed before the ink level dropped to 20 per cent of the original.

For the scanning speed test, we logged the time taken for scanning a standard text document at a resolution of 200 dpi. The same test was repeated for a test photograph at resolutions of 150 dpi and 600 dpi. The time taken was noted.

To determine the scan quality, an assortment of tests were run on the MFDs. These included:

The image quality test using the IT8 card: An IT8 card is used by professionals all over the world to gauge the colour purity of a scanned image. This card was scanned at 300 dpi to check colour reproduction in the light and dark spectra. This test is of prime importance, since it reflects the scanner's accuracy in colour reproduction.

The image quality test using a resolution chart: In this test, a resolution chart consisting of several lines was scanned at 300 dpi; then, using the Magic Wand feature of Adobe Photoshop, all the scanned blocks were analysed. The more lines the MFD differentiated, in each of the five blocks, the more points it scored. This test essentially determined the MFD's ability to pick up fine details.

When not to buy an MFD

While MFDs are generally suitable for areas that lack in space, one might sometimes find MFDs lacking in performance. Here are some instances where buying individual peripherals would be a better option.

The Printer Unit: The quality of the printing units incorporated into MFDs have improved a lot over time, and today they give performance comparable to some of the best in the consumer to prosumer printers. But for business users and professionals in specific fields such as Web designing and publishing, printer units built in prosumer MFDs do not deliver the quality of a desktop printer. This segment requires photo-printer performance. Also, most MFDs come with support for A4 sizes—so for A3 size printing, you can't bank on a MFD.

The Scanner Unit: The scan quality offered by most MFDs is comparable to that of a standalone entry-level scanner. Most consumer MFDs offer quality not at par with that of entry-level scanners. Users who need the quality of a prosumer scanner may get a raw deal, since the cheapest MFD today costs about the same as a mid-range scanner, and one cannot, therefore, expect similar scan quality. Professional graphics designers, Web designers who require precise colour reproduction, and the like, just won't be satisfied with the results of a typical MFD's scanner. Such users would do well to avoid an MFD.

The Copier Unit: The cost for a copy taken on an inkjet MFD is higher than that of one taken on a regular copier. Also, an MFD takes longer for a copy. If your work demands include a large number of copies, it's wise to invest in a regular copier.

HP OfficeJet 4110 All-in-One

Compact and fast, but falls short

If you take a sudden look at the 4110, it may pass off for a regular office fax machine. It's much smaller than the PSC 1210, and has some extremely nifty features. This baby weighs the least amongst all the contenders.

The power and USB cables, and the driver CDs, come packaged. So do the print cartridges. There's an LCD display and nine control buttons. With the USB 2.0 feature, data transfer is fast.

The 4110 has the scan-to-mail client feature, and the Auto Document Feeder feature allows for faster copying of multiple sheets. But because of the sheet-feeder approach, one cannot scan a magazine without tearing out the page. Printouts fall over the input tray, so it's difficult to refill paper during printing.

The printing tests gave us a surprise—the OfficeJet 4110 turned out to be the fastest in both tests. The image quality tests were pretty okay, but not exactly up to the mark. It comfortably scanned our test document at 600 dpi in 112 seconds, making it the second fastest in this category. The copying tests were a different story altogether—the 4110 took way too long (38 seconds).

The HP OfficeJet 4110 All-in-one comes for Rs 8,999, which, going by the test results, is steep; the price-per-page for black and white pages comes to Rs 3.03, and Rs 5.17 for colour. Overall it loses out on all the tests, and is a bad choice.

Price: Rs 8,999
Pros: Very fast printing speed
Cons: Lacks a flatbed scanner

HP OfficeJet 4110 All-in-One	C
Performance	▶ ▶ ▶ ▶ ▶
Features	▶ ▶ ▶ ▶ ▶
Ease of use	▶ ▶ ▶ ▶ ▶
Value for money	▶ ▶ ▶ ▶ ▶

Lexmark X1150

The cheapest alternative to your printer

The design of the X1150 is both sleek and intuitive. The device is large, however, and very tightly packed—the headroom between the scanner bed and the printer interior is small, making it cumbersome to replace cartridges. Also, the X1150 does not have an LCD panel, or standalone copying functions—it requires a PC to do so, which is quite annoying.

Like the others, the packaging includes power and USB cables, and ink cartridges.

The X1150 gave mixed results in our tests. While the text printout took a regular 18 seconds, the photo printout shocked us with a whopping 1521 seconds, or 25 minutes—which which clearly shows that it is not meant to be a photo printer. Image quality was average—some of the colours seemed a little washed out, but contrast highlighting was good. However, the dithering was clearly visible. The scanning and copying speed tests were the saving grace for the X1150. It took 15 seconds to scan the the document—the second best time we logged. Copying speeds were acceptable, but the quality was affected by the lack lustre printer unit.

The cost-per-page is Rs 5.33 for black and white prints, and a surprisingly low Rs 4.13 for colour. The X1150 is priced at Rs 5,199, competing directly with the HP PSC 1210. The X1150 would make a good buy, if you want a MFD that can print text fast and scan things quickly at a decent quality. If you want it primarily for photo print lookout for something else.

Price: Rs 5,199
Pros: Cheap
Cons: Extremely slow photo printing

Lexmark X1150	A
Performance	▶ ▶ ▶ ▶ ▶
Features	▶ ▶ ▶ ▶ ▶
Ease of use	▶ ▶ ▶ ▶ ▶
Value for money	▶ ▶ ▶ ▶ ▶

Advantages and disadvantages of Multi-function Devices

Here are some of the advantages and disadvantages of a Multi-function Device:

Advantages

✔ Since an MFD integrates multiple functionality into one device, you can scan, print, and copy on the same device, and if it supports faxing, you can fax as well.
✔ These devices usually have hotkeys and specially developed software, which makes them user-friendly—a novice can operate one without much trouble.
✔ Since all the functional units are combined into a single machine, you require only one USB port on your PC to connect to all devices, freeing up other ports and reducing wire clutter.
✔ In terms of consumables, all that is required are ink cartridges for printing, faxing and so on—this means lower running cost compared to individual peripherals, where one has to buy consumables for each machine.
✔ Many high-end MFDs allow you to place the device on the network without the need for attaching a PC. Users can print documents from their PC to the device.

Disadvantages

✘ All the components on an MFD cannot be used simultaneously, so if two people need to use two different functions, they'll have to go about it taking turns.
✘ If the printer or the scanner unit malfunctions, you won't be able to use the copier and the fax functions.
✘ Professionals may well turn a blind eye to these devices as they don't supply the kind of print and scan quality they need.
✘ These devices are generally fragile, and proper handling becomes an issue.

Canon MP-730

Featured to the boot

The MP-730 from Canon is bulky, but its proportions are concealed by clever design—rounded corners and detachable paper trays. The device we reviewed had a twin-tone grey finish. Ergonomically, the MP-730 has the best interface among the MFDs we tested. The exception is the memory card reader, which, we feel, is positioned awkwardly, just beneath the operating panel.

The fax unit, still lacks certain features provided by stand-alone fax machines such as synchronising fax numbers. The unit can connect to a PC via the provided USB 2.0 compliant USB port, but does not include a USB cable.

In the speed test it was able to print our test text document in 19 seconds—pretty good for an MFD. The printer unit is also decent—it prints both text and images fast. On the scanning front, the MP-730 is quite fast on lower resolutions, but as you go higher on resolution, the time increases considerably. The scan quality is average, with good details and colour reproduction—but the image is overly bright. Copying quality is excellent, though it takes a little long.

Coming to cost per page, the MP-730 comes out tops, with B&W pages working out to a little under Rs 2.50, and colour pages to Rs 2.25. Overall, this is a good product with features, functionality and performance blended into a single appealing package that is hard to resist.

Price: Rs 35,000
Pros: Lot of features; easy to use; low running cost
Cons: Bulky design

Canon MP-730		C-
Performance		
Features		
Ease of use		
Value for money		

Epson CX5100

The shotgun device

The CX-5100 is one of the two MFDs that Epson has selected from its kitty for the Indian market. Though the CX-5100 is termed a MFD, one needs to note that it does not integrate stand-alone fax functionality. It comes with the printer, scanner and copier units in a single package, with software-driven faxing capability. Another sorely-missed feature is the absence of a memory card reader with which you print photographs directly from the card reader, without the need for a PC. One good feature, is the four separate colour cartridges—you save money because you can just buy the one cartridge that gets over, say the red one.

The CX-5100 makes up some lost ground by logging some of the best scores in the speed-printing department. In the image speed test, the CX-5100 took just 141 seconds to print our photograph, and that means it completes the job 20 seconds faster than any standalone printer we've tested so far.

It seems Epson has tweaked the paper pickup mechanism quite a bit, as is evident from the amount of noise it makes when loading the paper—this earned it the nickname 'shotgun'. On the quality front, the CX-5100 performs decently in the image test and brilliantly in the text quality test. In the scanning department, though, the Shotgun lost out completely, and came in last in the speed tests—but logged decent quality. In the cost per page analysis, it stood second.

Overall, this is a good product that's largely let down by the absence of integrated fax capability— and an unrealistic price of Rs. 22,500. We think Epson needs to work on its pricing policy.

Price: Rs 22,500
Pros: Very fast printing
Cons: Low on features; expensive

Epson CX5100		C+
Performance		
Features		
Ease of use		
Value for money		

HP PSC 2210 All-in-one

HP's trump card, the all rounder

The HP 2210 looks like a scanner placed on top of their DJ-5550 DeskJet printer—very uninspired. The wedge-shaped scanner bed does not feature a transportation lock, so careful handling is required.

The HP 2210 packs in all the features you can expect of an MFD. The PSC 2210 is USB 2.0 compliant, and therefore can be connected to a full-speed USB port on your PC. A one-touch scan-to-mail button further simplifies your life.

It took a long time to print out our text document, and clocked 30 seconds. It took nearly 5 minutes in the image-printing speed test—but output superb print quality.

When an image was scanned at 600 dpi, the 2210 clocked the fastest time (93 seconds). In the scan quality test the 2210 again showed its mettle with good contrast and colour accuracy; and in the colour deviation and uniformity test, no other MFD comes quite close to the 2210's performance.

Overall, this is again a great product—another all-rounder. Whether it's printing, scanning, copying or faxing, you can expect a good performance. The only area where the 2210 loses out ot the MP-730, is the sheer features that the latter offers. But the price difference between these is staggering too—the MP-730 costs over Rs 30,000, whereas the 2210 costs just Rs. 13,999. Comparing them would be an injustice to both. All kudos to HP for packing this little beauty with enough punch to be a beast.

Price: Rs 13,999
Pros: Great print and scan quality
Cons: Lacks in the faxing department

HP PSC 2210 All-in-One		B+
Performance		
Features		
Value for money		
Ease of use		

CATEGORY — PROSUMER MULTI-FUNCTION DEVICES

	Canon	HP	Epson	HP	Lexmark	Epson
Brand	Canon	HP	Epson	HP	Lexmark	Epson
Model	MP 730	Officejet 6110 all-in-one	CX 5100	PSC 2210	X 5150	CX 3100

FEATURES (10%)

Printing technology	Bubble Jet	Thermal Jet	Piezoelectric	Thermal Inkjet	Thermal Inkjet	Piezoelectric
Resolution (dpi x dpi)	600 x 600	1200 x 1200	5760 x 1440	1200 x 1200	2400 x 1200	5760 x 720
Paper capacity	150	100	150	100	100	100
Type of cartridge (black and colour or CMYK)	CMYK	Black and Colour	CMYK	Black and Colour	Black and Colour	Black and Colour
Max Scan optical resolution	1200 x 2400	1200 x 2400	1200 x 2400	1200 x 2400	600 x 2400	600 x 1200
Scanning Bit Depth	48	48	48	48	48	48
Document Feeder included (Y/N)	✔	✔	✘	✘	✘	✘
Scan Image directly to mail client (Y/N)	✘	✔	✘	✔	✔	✘
Stand alone copying- Enlarge/reduce - Multiple copies in stand alone mode	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔
Standalone Faxing (no need for fax modem) (Y/N)	✔	✔	✘	✔	✘	✘
Weight (Kgs)	12	10	9	8.5	6.57	7.5
Dimensions (H x W x D) cms	43.9 x 57.8 x 34.0	49.6 x 39.4 x 30	25.4 x 45.3 x 43.4	45.2 x 35.8 x 27.2	24 x 46.9 x 36.5	23.5 x 47.5 x 42.3
Interface	USB 2.0	USB 2.0	USB 1.0	USB 2.0	USB 2.0	USB 1.0
Memory Card Reader Capability (Y/N)	✔	✘	✘	✔	✘	✘
Transport locks (Y/N)	✘	✘	✔	✘	✔	✔
Breakable flaps/moveable parts (scale of 5)	4	3	4	4	2	4
Ease of use (scale of 5)	4	4	3	4	4	3
Overall Features (Out of 100)	85.29	74.21	75.30	75.03	63.43	71.55

PERFORMANCE (90%)

Printing : Speed test

Text print (Black and White mode) at Normal setting (secs)	19.6	22	16.32	30.42	18.01	18.01
Photo Printout (Full color supported) (secs)	169	293	413	295	540	399

Image quality - Combi document - Normal mode (Scale of 5)

Text print (black and white mode)	3	3.5	3.5	4	3	2.5
Resolution of circles on concentric pattern	3	3.5	3	3	2	4
Number of colour bars differentiated (out of 7)	7	7	7	6	7	7
Yellow text on black background	3	4	3	2.5	1	3
Details on fruit	2.5	3.5	3	3	3	2.5
Blue shading on the wall	3	4	3	3	2.5	2.5
Grille on the wooden plate	3	2.5	3.5	4	3	4

Image quality - Photo document - Best mode (Scale of 5)

Clean white teeth - no dithering	4	4	4	4	3	4
Natural color of skin	3	3.5	4	4	3	3
Good contrast in dark areas of plant	3	4	4	4	2.5	4
Clear specular effect on bracelet	4	3	3	4	3	3.5
Wrinkles between the eyes on forehead	3	3.5	3	3	3	3
Overall image	3	3.5	2.5	4	2.5	2.5

Scanning: Speed Test

Text scan (black and white mode) seconds	13.02	19	22.73	19	18.38	24.46
Photo scan (On 150 dpi / 600 dpi) seconds	17.98 / 347	19 / 100	38.52 / 177	19 / 92	13.54 / 114	12.73 / 173

Image Quality Evaluation using IT8 card

Tonal deviation (No. of boxes visible out of 22)	22	22	22	21	22	22
Colour Uniformity Test-300 Dpi	1.32	1.67	1.24	1.16	1.69	1.26
Color deviation test 300Dpi Dark Area	1.18	2.25	1.08	1.79	1.15	1.16
Color deviation test 300Dpi Light Area	0.00	0.78	0.00	0.85	1.00	0.00

Resolution test (Lines Pair Per Inch test) 300 Dpi

Gray scale mode (out of 5 boxes)	2	3	2	1	2	2
Black and white mode (out of 5 boxes)	1	2	0	0	1	0
Threshold limit (out of 5 boxes)	3	3	2	2	2	2

Copying

Quality (scale of 5)	4	3	2.5	3	2.5	3
Speed at normal mode (secs)	26.79	28	23.63	24.58	30.73	18.64
Overall Performance (Out of 100)	61.11	54.71	50.76	51.45	47.33	51.87

Cost per Page

Total Black printouts for 100% ink usage	220	215	380	255	235	355
Total colour Prinouts for 100% ink usage	660	281.25	776.25	393.75	187.5	322.5
Cost of Black / Colour cartridge (Rs)	545 / 1485	1050 / 1650	1430 / 1905	1050 / 1650	1425 / 1705	1375 / 1430
Cost per Black / Colour page (Rs)	2.48 / 2.25	4.91 / 5.86	3.76 / 2.5	4.11 / 4.19	6.06 / 9.09	3.87 / 4.43

OVERALL SCORE

Performance (85%)	51.94	46.51	43.15	43.73	40.23	44.09
Features (15%)	12.79	11.13	11.29	11.25	9.51	10.73
VFM	1.85	3.03	2.42	3.93	4.52	6.53
Grade	C	B	C+	B+	A	B
Warranty (Number of years)	1	1	1	1	1	1

CONTACT

Vendor name	Canon India Pvt ltd	Hewlett Packard India Ltd	Epson India ltd	Hewlett Packard India Ltd	Lexmark International (India) Pvt Ltd	Epson India ltd
Phone	011-2680 6572/2680 7317	011-2682 6000	080 5321266-70	011-2682 6000	022-26057755	080 5321266-70
Fax	011-2680 7180	011-2682 6052	080 5581799	011-2682 6052	022-26054678	080 5581799
E-mail	rajeev.singh@canon.co.in	seema.dawar@hp.com	sales@eid.epson.co.in	seema.dawar@hp.com	sandeepk@lexmark.com	sales@eid.epson.co.in
Web site	www.canon.co.in	www.hp.com	www.epson.com	www.hp.com	www.lexmark.com	www.epson.com
Price (Rs)	34,995	18,999	22,500	13,999	10,999	8,395

HP	HP	HP	Lexmark
PSC 2110 all-in-one	PSC 1210 all-in-one	Officejet 4110 all-in-one	X 1150
Thermal Inkjet	Thermal Inkjet	Thermal Inkjet	Thermal Jet
1200 x 1200	600 x 600	600 x 600	2400 X 1200
100	100	100	100
Black and Colour	Black and Colour	Black and Colour	Black and Colour
600 x 1200	600 x 2400	600 x 1200	600 X 1200
36	36	36	NA
✔	✘	✔	✘
✔	✘	✔	✘
✔ / ✔ / ✔	✔ / ✘ / ✔	✔ / ✔ / ✔	✘ / ✘ / ✘
✘	✘	✔	✘
8.1	4.31	3.5	4.9
22 x 46.28 x 37	16.97 x 42.57 x 25.91	42.5 x 20.9 x 18.2	16.3 x 44.5 x 30.8
USB 2.0	USB 1.1	USB 2.0	USB 2.0
✔	✘	✘	✘
✘	✘	✘	✘
4	4	3	3
3.5	4	3	2.5
64.58	57.08	66.87	34.53
21.87	18.2	18	18.35
290	288	168	1521
4	4	4	4
3	3.5	3.5	2.5
6	7	6	7
2.5	3	3.5	1
3	4	3	2.5
3	3	3	3
4	4	3.5	3
4	3	3	2.5
4	2.5	2	3
4	4	4	4
4	3	4	2.5
3	3	3	3
4	2.5	3	3
16.1	13.95	18.36	15.22
12.91 / 76	21.5 / 157	26 / 112	22.89 / 163
20	20	21	20
1.28	0.00	0.00	0.64
1.78	0.00	0.00	1.06
0.00	1.04	0.00	0.00
2	2	2	2
1	0	0	1
2	2	2	3
3	3	3	2.5
19.67	29.22	38	26.45
53.84	50.21	51.03	46.47
230	285	346	150
318.75	356	425	217.5
1050 / 1650	1050 / 1650	1050 / 1650	799 / 899
4.56 / 5.17	3.68 / 4.63	3.03 / 5.17	5.32 / 4.13
45.76	42.68	43.37	39.50
9.69	8.56	10.03	5.18
5.55	8.54	5.93	8.59
🄲	🄰	🄲	🄰
1	1	1	1
Hewlett Packard	Hewlett Packard	Hewlett Packard	Lexmark International
India Ltd	India Ltd	India Ltd	(India) Pvt Ltd
011-2682 6000	011-2682 6000	011-2682 6000	022-26057755
011-2682 6052	011-2682 6052	011-2682 6052	022-26054678
seema.dawar@hp.com	seema.dawar@hp.com	seema.dawar@hp.com	sandeepk@lexmark.com
www.hp.com	www.hp.com	www.hp.com	www.lexmark.com
9,999	5,999	8,999	5,199

Lexmark X5150

The ink guzzler

The X5150 is Lexmark's mid-level MFD, and like the Epson CX-5100, does not have stand-alone faxing capability. It is simple, yet beautiful. With silver-coloured panels over the contrasting jet black body, the X5150 should look great on any desk.

Except for the absence of full-fledged faxing capability, every other aspect here is up to the mark. The X5150 can be connected to a PC using the provided USB 2.0 interface, and the power and the USB cables come bundled, along with the driver CDs and the software faxing and scanning software.

On the performance aspect: the X5150 was second in the speed test, printing out a text document in just 18 seconds—but it stood last in the image speed test. The quality of printing was average.

It surprised everybody, when it quickly scanned the test image to place second. Overall, the scanner unit integrated into the X5150 makes up for the average performance in the printing department. Because of the mediocre printing unit, the copies from the X5150 do not quite come out great. Copying a document take a long time too.

In the cost-per-page analysis, the X5150 slipped in the rankings, with its tendency to guzzle ink. A colour page costs as high as Rs 9, and a black and white page will cost you Rs 6.

Priced at Rs 10,999, the X5150 seems great when considered in its category. However, there are better options available that one should consider before opting for the X5150.

Lexmark X5150 Ⓐ

Performance	▮▮▮▮▮
Features	▮▮▮▮▮
Ease of use	▮▮▮▮▮
Value for money	▮▮▮▮▮

Price: Rs 10,999
Pros: Good scanning capabilities
Cons: Extremely bad printing quality

HP OfficeJet 6110

True OfficeJet

The HP 6110 is the next step in the evolution of the HP 2210. The 6110 is fit for a typical small office, where one expects features such as good faxing capabilities, one touch dialling buttons and so on.

The OfficeJet 6110 sports an elongated design—it seems bulky compared to the others. The base is wide, and takes up a lot of desktop real estate. One particular flaw that has been carried over from the HP 2210, is the design of the paper trays—the output paper tray still sits on top of the input tray, and so, when you add paper, you need you remove the out-tray.

The feature list on the 6110 has gotten a trim, and does not include a memory card reader. But because it is targeted at office environments, it integrates an automatic document feeder. The 6110 also comes with USB 2.0 and so allows a full-speed USB connection for faster printing.

The HP 6110 took around 22 seconds to print our test page, and took 293 seconds in the image printing speed test. But the points it loses for time, it makes up in quality—the print-outs were fantastic, with minimal colour deviation and true-to-original details.

The Officejet 6110 was decent when it came to scanning speed, taking 19 seconds. The 6110 was the only MFD that could distinguish between the finer lines, in the resolution test. However, it took 28 seconds for a copy, which was the slowest.

Priced at Rs. 18,999, the Officejet 6110 is suitable for a small office environment. The sore point was the paper handling capacity and the slow printing and copying—parameters of utmost importance in a typical office.

Price: Rs 18,999
Pros: Good quality printouts
Cons: Slow in operation

HP OfficeJet 6110 (B)

Performance	
Features	
Value for money	
Ease of use	

And the winner is...

The Canon MP-730 was a clear winner in the Prosumer category, thanks to its great performance, friendly interface, coupled with features such as memory card reader, USB 2.0 support and plausible button layout. Though it's slightly expensive, it had the lowest cost per page, solid performance and good after-sales support across the country—this won it the title.

The X5150 from Lexmark won the value award with its decent performance and sparse features that come at a great price. Unfortunately, if you are looking for a printer for bulk usage, the

Decision Maker

	MFD for your Home	MFD for your Office A MFD that can print	MFD for professionals
You Need	A decent performing MFD with features that can replace your exsisting printer, scanner and does not cost a bomb	and scan fast with decent quality and with low Cost per page.	A MFD with all best features packed into a single package, to deliver on all grounds and also have some extra frills
Look For	features such as, atleast 600x600 dpi printer and 600x1200 dpi scanner,stand-alone copying feature and low cost per page.	Features like Automatic document feeder, Dialpad for faxing, USB 2.0 and having smaller dimensions	Memory card reader, USB 2.0, Direct printing from flash cards and supports the highest possible resolutions
Our Pick	HP 1210, Lexmark X1150 and HP 2110	Canon MP-730, HP 6110, Epson CX-5100	Canon MP-730 and HP 2210
Price	Rs 5000 to Rs 10,000	Rs 15,000 and above	Rs 20,000 and above

X5150 might not fit the bill, given its high cost per page.

In the Consumer category, the HP PSC 2110 managed to take the top spot with a good overall performance and a decent feature set. It fared better than the rest of the crowd on all counts. Though the Epson Cx-3100 had more features than the PSC 2110, it failed to catch up with it and hence, lost by a fairly small margin.

There was cutthroat competition for the value award, with the Lexmark X1150 and the HP 1210 battling it out for the coveted place. However, the Lexmark X1150 beat the HP 1210 by a small margin of just 0.05 points, but unlike the HP 1210, the X1150 does not have a stand-alone-copying feature, and it has a higher cost per page than the HP 1210. On the price front though, the X1150 is cheaper than the HP 1210 by Rs 800. Yet, if price is the last thing on your mind, we recommend that you purchase the HP1210.

VISUAL EVIDENCE

Canon MP730

Epson CX-3100

Epson CX-5100

HP 1210

HP 2110

HP 2210

HP 4110

HP 6110

Lexmark X1150

Lexmark X5150

We tested the scanner units, using this image document. It is quite clear from the results that the HP 6110 gave the best overall results, with good tonal balance. The HP 2210 and Canon MP730 placed second and third, respectively. The HP 2210 was less sensitive in the darker regions of the image. Similarly, the Canon lost out on picking up lighter areas. The Lexmark X5150 also scanned th image well, but could not match the others in printing quality.

Inkjet printers are not a viable option for a work place since most office documents printed are full of text with a few odd colour prints. In such cases, Laser-based MFDs that generate a large number of printouts at a low running cost, come in handy. We tested three Laser MFDs from different price brackets, aimed at three different types of audiences. Read on to find out more about the Laser trio.

Samsung SCX 4016

Fast to print, but slow to scan

The 4016 offers laser printing, digital copying and colour scanning, but doesn't integrate faxing. The operation console is intuitive, with button functions clearly marked. The little LCD panel displays sufficient information, but it could have been a little larger. It is built for economy with such features as Toner Save. Paper handling is via a 250-sheet capacity paper cassette. There's also a single-sheet feeding mechanism on the front side.

The printer unit is the ML-1710, which is the fastest laser printer that we've tested so far. The scanner unit performed rather badly—its IT8 cards tonal deviation test was the worst of any in this entire comparison. Results were similarly poor in the dark region of the IT8 card—but with acceptable resolution. Copies on the 4016 were crisp and clear, and the time it took for a copy was average (10 seconds).

At Rs 36,000, the SCX 4016 is a good deal if you want a laser MFD with fast printing and decent printouts. The unit as a whole should be up to the task in a typical office.

Samsung SCX 4016	B+
Performance	
Features	
Ease of use	
Value for money	

Price: Rs 36,000
Pros: Fast print speed
Cons: No faxing capability

Samsung SCX 4216F

Print 'em cheap

The 4216F has good fax features such as support for resolutions up to 300 x 300, 4 MB of memory—enough for storing 320 pages, fax forwarding, and more.

The 4216F comes with a hefty 8 MB of buffer memory that gives it the extra edge while bulk printing. It connects to a PC via both, the USB and parallel interface. The scanner unit supports a native optical resolution of 600 x 600 and an enhanced resolution of 4800 x 4800 dpi.

The printer unit is the fastest we've encountered, and the prints are crisp and crystal clear. At scanning, the SCX 4216F is slower than the 4016. In the IT8 card tonal deviation test, the scanner unit on the 4216F performed no better than did that on the 4016. And in the resolution test, the unit was just mediocre, not detecting the finer lines. Copying quality was excellent, and copying speed was typical.

The cartridge for the 4216F is priced at Rs 3,300, and this means lower cost-per-page as compared to any Inkjet MFD.

Priced at Rs 45,000, the SCX 4216F offers good features at a competitive price and should be considered if you want to replace all your ageing peripherals with a single cost-effective solution.

Samsung SCX 4216F	B+
Performance	
Features	
Ease of use	
Value for money	

Price: Rs 45,000
Pros: Feature-rich
Cons: Scanner unit not up to the mark

Xerox WorkCentre Pro 412

The daddy of MFDs

The Xerox WorkCentre Pro 412 is a top-of-the-range MFD solution for corporate users, and dwarfs all the others, in features and performance alike.

The 412 looks like a full fledged copier—It's huge, and weighs 22 kg.

The feature list on the 412 is long and extensive—the paper loading cassette has a capacity of 650 pages. The printer unit supports a true resolution of 600 x 600. The scanner unit employs a CCD sensor, and supports a true resolution of 600 x 600. The 35-pages Automatic Document Feeder simplifies scanning. The fax features 4 MB of memory that can store 400 pages of faxes, and can acquire a maximum modem speed of 33.6 kbps. The 412 supports multiple copies of a single document, from 1 to 999.

Printing was fast, and the quality was excellent. Both text and image scanning were fast. In the IT8 card tonal deviation test, the 412 demonstrated excellent colour reproducing capability. But in the colour deviation test for the lighter regions of the spectrum, the 412 performed badly. Resolution was average.

The 412 showed its true mettle in the copying test: where all the other MFDs take a minimum of 20 seconds, the 412 completed the same job in just 12 seconds, and that, without any loss of quality.

The Xerox WorkCentre Pro 412 is priced at Rs 73,500 plus taxes. Although it's expensive, it makes up for it with features that'll meet the demands of most offices.

Xerox WorkCentre Pro	B+
Performance	
Features	
Ease of use	
Value for money	

Price: Rs 73,500
Pros: Excellent performance and great features
Cons: Expensive

How We Tested

The entire test was divided into two procedures—one for testing printing capabilities and the other for the scanning capabilities of the MFD. The copier function was judged on two parameters—speed and quality. Faxing was considered a feature and not a performance criterion.

Our test bed comprised a Pentium 4 processor at 3.06 GHz, plugged on to an Abit 845GE board with 256 MB of Kingston 333 MHz DDR RAM, an MSI Ti4800 display card and a 40 GB 7200 rpm ATA IV Seagate Barracuda hard drive. We used Windows XP with SP1 as the operating system. The system was brought up-to-date, by loading all the latest chipset and graphics drivers. The USB patch for Windows XP was also installed, and the devices were connected on the USB 2.0 port for optimum performance.

Features: The main reason one would want to purchase an MFD is the numerous features it offers. So features formed the basis of our tests, and were awarded 15 per cent weightage. The various features that we logged for the printer aspect were the maximum printing resolution, paper capacity and type of interface offered. For the scanning aspect, features such as the maximum optical resolution supported, bit depth, scanner type and the sensor employed were noted. The MFD should work like a copier without a PC, so features such as one-touch copying, buttons for a colour or black and white copy, an option for multiple copies, and reduce and enlarge features were given prime consideration. After logging all of the above, weightages were allocated according to the importance of each particular feature.

The Test page for Cost per page analysis, helped us make a buying desicion

Performance: Each of the two major test procedures—the printer and the scanner tests—reflected two prime parameters, speed and quality. For the printing speed test, we logged the time required for printing our standard black and white text document at normal settings, and for printing our test image file on photo paper, where the MFD was set to its best printing mode.

For determining the quality of the output text, we printed a document with varying point size text and looked for jarred edges and smudging. For evaluating image quality, we took the same printed photograph and looked at the parameters we decided upon as quality criteria. We used a standard combination document to judge the MFD's performance at printing documents containing both images and text.

This time around, we also included a cost-per-page test. For this, we prepared a test document with four paragraphs with the same content, but in four different colours—cyan, magenta, yellow and black. This ensured that each colour was used in the same proportion when the test page was printed. Before the test, we noted the ink level, and then printed out as many copies as could get printed before the ink level dropped to 20 per cent of the original.

For the scanning speed test, we logged the time taken for scanning a standard text document at a resolution of 200 dpi. The same test was repeated for a test photograph at resolutions of 150 dpi and 600 dpi. The time taken was noted.

To determine the scan quality, an assortment of tests were run on the MFDs. These included:

The image quality test using the IT8 card: An IT8 card is used by professionals all over the world to gauge the colour purity of a scanned image. This card was scanned at 300 dpi to check colour reproduction in the light and dark spectra. This test is of prime importance, since it reflects the scanner's accuracy in colour reproduction.

The image quality test using a resolution chart: In this test, a resolution chart consisting of several lines was scanned at 300 dpi; then, using the Magic Wand feature of Adobe Photoshop, all the scanned blocks were analysed. The more lines the MFD differentiated, in each of the five blocks, the more points it scored. This test essentially determined the MFD's ability to pick up fine details.

PROSUMER MFDs

Canon MP-730
Featured to the boot

The MP-730 from Canon is bulky, but its proportions are concealed by clever design—rounded corners and detachable paper trays. The device we reviewed had a twin-tone grey finish. Ergonomically, the MP-730 has the best interface among the MFDs we tested. The exception is the memory card reader, which, we feel, is positioned awkwardly, just beneath the operating panel.

The fax unit, still lacks certain features provided by stand-alone fax machines such as synchronising fax numbers. The unit can connect to a PC via the provided USB 2.0 compliant USB port, but does not include a USB cable.

In the speed test it was able to print our test text document in 19 seconds—pretty good for an MFD. The printer unit is also decent—it prints both text and images fast. On the scanning front, the MP-730 is quite fast on lower resolutions, but as you go higher on resolution, the time increases considerably. The scan quality is average, with good details and colour reproduction—but the image is overly bright. Copying quality is excellent, though it takes a little long.

Coming to cost per page, the MP-730 comes out tops, with B&W pages working out to a little under Rs 2.50, and colour pages to Rs 2.25. Overall, this is a good product with features, functionality and performance blended into a single appealing package that is hard to resist.

In Graphic

IMAGING: Solomon Lewis, PHOTOGRAPHER: Mexy Xavier

...presenting 29 3D Graphics cards that enhance the dimensions of your viewing pleasure!

Detail

Graphics cards have come a long way from the good old days when they just had to have a little processing power, and a few megabytes of RAM to augment the processing demanded of the CPU. The trend over the years has been to remove much of the load of graphics processing and rendering from the CPU to the GPU. So much so, that today's graphics cards are heavy-duty number crunchers that use much more advanced technology than other parts of the computer system. Today, you get graphics cards for almost every requirement, be it high-end or entry level, and at every level you have a mind boggling variety, as compared to the few that were available some time ago.

The 3D graphics card business is very competitive, and ATi has been a long-standing player. Previously, there wasn't too much competition because video games were generally 2D, and any run-of-the-mill card was sufficient to play your favourite game—recall *Prince Of Persia* and *DOOM*. The entire scenario changed when games started going the 3D way, and 3DFx was the first company to take advantage of this situation. They developed their 3D video cards and their proprietary Glide API. ATi was still concentrating on the 2D market, along with Matrox. Then nVidia changed overnight, and after some stiff competition, bought 3DFx lock, stock and barrel, and are currently the king of the hill.

No one could deny the lucrative draw of the 3D market. ATi realised this a little later, and followed suit. Their first offerings in the 3D video card market did not get a good response, first because of drivers problem, and second because of the poor positioning of their products. nVidia trounced the ATi cards like no one else. Even Matrox did better. But in late 2000, ATi struck back with its Radeon chip. The technology that went into making the

How We Tested

One of the most important factors that come into the picture, in a graphics card comparison, is the test environment. Even a slight variation in the configuration of the test machine is enough to ruin the results of the test. The test machine we used was an Intel Canterwood-based (D875 PBZ) computer, with a single Pentium 4 processor at 3.2 GHz and 512 MB DDR RAM (333 MHz), running Windows XP Professional. Before running all the tests, all the features of Windows XP that could potentially interfere with the normal operation of the tests, such as Windows Update, screen savers, power management, remote assistance, etc., were turned off. The operating system was re-installed after every test and brought to its initial state, so that it wouldn't cause any changes to the results. All the tests were run with V-sync and audio turned off, as V-sync synchronises the output of the graphics card with the refresh rate of the monitor, thereby giving frame rates that do not reflect the true capacity of the graphics card. All additional settings required for the tests were adjusted using the native drivers provided for the particular card being tested.

The tests for the graphic cards were extensive, and cover the entire range of features and specifications provided by the chipset. One very important thing to notice is that this test process has been revised for the DirectX 9 video cards, and the test process now includes two synthetic benchmarks, and one game for both the OpenGL and Direct 3D categories.

Features: Features of the card are assigned 10 per cent of the total score. All the bells and whistles such as TV-Out, S-Video, RCA, remote control and the software bundled with the video card are considered here.

Performance: The performance of the cards in the various tests made up for 90 per cent of the scores. We divided performance into three different categories—OpenGL, Direct3D and Image Quality settings.

OpenGL: In the OpenGL tests we used *Quake III* as the test game, as its game engine scales itself according to the provided resources.

It plays on both low-end, as well as high-end video cards, and so the scores logged show a marked difference in the fps. The synthetic OpenGL benchmark we used was VulpineGL that did a pretty good job at stressing the OpenGL subsystem of the graphics cards—the logged scores were almost one fourth of those given by the *Quake III* benchmark.

Direct3D: In the Direct3D tests, we used *Unreal Tournament 2003* as the game benchmark to test the card's performance when using DirectX 8.1. We used four of the standard benchmarks provided with *UT2003—BotMatch, Antalus and Flyby Antalus, BotMatch Asbestos and Flyby Asbestos.* The *GunMetal* benchmark is a pure DirectX 9 benchmark, which uses a real game engine to give the fps scores of the video card.

3D Mark 2003 was used as a synthetic benchmark to test the video cards, because it contains benchmarks to test the cards' Pixel and Vertex Shaders, and also subjects them to various other tests.

Image quality: We also tested the image quality of the screenshots taken during game play, since this gives an explicit idea of the quality of rendering supplied by the card. The image quality tests comprised of two in-game screenshots, taken while playing *UT 2003*, with all the eye-candy turned on. This helped to test the anti-aliasing and anisotropic filtering features of the video card.

The performance tests were given precedence over the features because better features obviously reflected better performance scores. Peripheral features such as Video-In, Video-Out were given additional points, thereby eliminating the tendency of certain vendors to obtain better scores by resorting to 'specmanship'—the art of bombarding a user with such impressive specifications, that he believes it's a better product.

All in all, these tests benchmark each and every aspect of the graphics cards, including the GPU and the memory bandwidth efficiency available to the graphics card.

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chip, and features such as anisotropic filtering and anti-aliasing were nice and solid. Suddenly nVidia had some serious competition from a player they had left to die. And as time went by, ATi just got bigger and better.

Chipsets in the pipeline

OpenGL has a rendering pipeline that directs different elements Both nVidia and ATi have announced their latest graphics cards—the nVidia NV40 and the ATi R420. The NV40 is rumoured to be manufactured by IBM as opposed to nVidia's long time fabrication partner Taiwan Semiconductor Manufacturing Corporation (TSMC). The NV40 has a 0.13 micron-based graphics core, just like the latest NV35 chipsets found on GFX 5900 graphics cards, but this is where the similarity ends. The NV40 is said to have almost twice the speed of NV35, and is based on a completely new architecture. We can only hope that this new technology does not turn into a huge embarrassment—as the NV30 (GFX 5800) did. ATi also claims that the R420 chipset-based graphic cards will be twice as fast as the Radeon 9800 Pro. The R420 will most probably be built on the 0.15 micron-based technology currently used for fabrication at TSMC.

The early Radeon cards such as the 7500 and its scaled down version, the 7500 LE, were targeted to match up with the GeForce3 and GeForce2 MX versions from nVidia. But they fell short because of poor drivers and some other major hitches. However, ATi did enjoy some success with this product line. Then it went back to the drawing board, and came out with the 8500 —which targeted the GeForce4—and its souped-up version, the Radeon 9000.

With the current crop of DirectX 9 cards, ATi has come out with the Radeon 9700, and its successor, the 9800. We dug deep to see what lies under the hood of these cards.

Analysis

There is no such thing as 'the best 3D accelerator card,' since every user has a different set of requirements and what is 'best' for one, might not even be close to the expectations of another. Realising this, we broke up the graphics card market into three segments—the low end, the mid-range and the high-end cards. The low-end segment is completely dominated by the nVidia-based cards, because ATi does not offer any cards in this category. The fight, therefore, was between individual graphics cards based on the same chipset, with the results being fairly interesting. However, in the other segments, the fight was much more interesting, since both vendors had offerings.

Low-end

This is the entry-level market where users are heavily price-conscious, and are happy with performance that's a little better than that of their old graphics card.

All the cards in this segment are based on the nVidia GeForce FX 5200 chipset that nVidia has specifically targeted at the budget-gamer segment. We received around nine cards, eight of these were plain vanilla 5200 cards, with the only variation being the video memory, which was either 64 MB or 128 MB on-board. The ninth was an nVidia 5200 Ultra based card from Gainward. We took out some time to understand what makes this card low-priced, what features it has and what it misses out on.

The card is based on the nVidia NV34 chipset. Compared to its richer cousins, this is the only card which still uses the 0.15 micron manufacturing process. The nVidia reference design features a heat sink, and most manufacturers are sticking to that. A few manufacturers have provided an active cooling system, but only on the 128 MB video cards.

Since this card is targeted at the budget-gamer, the package contents are minimal. Only the Gainward, S-Media, and PixelView video cards featured dual-monitor display support.

The ASUS V9520 Magic card was a very good performer, and with only 64 MB video RAM, its scores were really good. Compared with the Jetway and the PixelView 128 MB video cards, this card did really good. The ASUS V9520 128 MB card delivered lower performance than its 64 MB counterpart—this is similar to the behaviour we see in the XFX brand. The Gainward 5200 card gives some good scores, and ties with the S-Media card in terms of scores in the pure GeForce FX 5200 category. Both these cards are second only to the Ultra version of the 5200 chip. Comfortable gaming frame rates are provided for DX 8 games, as in *Unreal Tournament*. High resolution gaming is still a bit slow since the images start framing with all the frills turned on. Image quality is quite good—

The XFX GeForce FX 5200 is the the DirectX 9 graphics card for the budget-conscious buyer

this made the card earn a good score on that test.

The Jetway card is barely able to play the game at high resolutions with all the eye-candy turned on. This can be attributed to its bare minimum specifications; however, this does not bode well for this card. It seems that this card is just meant for those who want a GeForce FX label, without the real power that goes behind it. It did give comfortable frame rates at all resolutions in *Quake 3*, but was only able to run the *GunMetal* benchmark in playable frame-rates at a very low resolution, with all eye-candy, except for anti-aliasing turned off. This puts a serious question mark on whether the card is a viable solution for games coming out in the near future.

The S-Media card turned out to be a very good performer in the 5200 category giving better frame rates compared to its counterparts in all categories, and is second only to the Gainward GeForce 5200 Ultra. The Pine XFX 64MB FX 5200 is also an excellent performer. Considering that it only has 64 MB of DDR video, it gave performance equivalent to the Jetway 5200 128 MB. This shows that the quality of the components in this card is very good and the card is well worth the money. The XFX FX 5200 video card with 128 MB RAM performed worse than its 64 MB counterpart,

ATi vs nVidia on DirectX 9 Performance

Most of the tests that we ran, in this comparison, are DirectX 8 tests; and the nVidia cards beat ATi by a long shot in all of them. However, Valve Software has released benchmark figures for their first person shooter DirectX 9 game, *Half-Life 2*. These figures show ATi GPUs outperforming their nVidia counterparts by a significant margin.

A point to be noted here is that Valve has an OEM deal with ATi to provide their games with the latter's graphic card offerings. Valve, however, counters this by saying that they chose ATi as their GPUs are better than nVidia; as proved by the benchmarks. nVidia, on the other hand, claims that the Valve figures are invalid due to the fact that Valve used Release 45 drivers. They claim that the new detonator 50 drivers-currently in beta-will cover the performance gap, between nVidia and ATi, on *Half-Life 2* and other such shader-intensive games. The new drivers intelligently switch between DirectX 8 and DirectX 9, depending upon the instructions provided, without affecting image quality. To what extent this is true can only be determined after the drivers are released. Until then, what are the implications for prospective buyers? Well, nVidia cards are certainly better than ATi as far as the current crop of games go, but we recommend ATi to those who want to enjoy the games that will release in the near future.

The Gainward GeForce FX 5200 Ultra performed the best in the low-end category

leaving us wondering where the rest of the memory went. The most probable reason for this would be that both the 64 MB and the 128 MB versions have the same number of memory chips, thereby giving the 64 MB version much more parallel access than the 128 MB one. While this might make the 64 MB card look like a better option, this need not be the case—it can only be ascertained after more heavy duty games such as *DOOM 3*, which make use of massive texture mapping, are released. The 64 MB version will then have to kick in the AGP bus to move textures to the main RAM on the system, whereas the 128 MB one will have the advantage of processing them on the card itself.

In the 5200 Ultra category, we only had the Gainward 5200 Ultra video card which does what it is meant to do—provide a good performance-to-price ratio. It will play next generation games such as *Half-Life 2* and *Doom3*, albeit at a low resolution. The DX9 benchmark saw the normal 5200s lag behind, due to the stripped down clock and memory speeds which this card covers up. In fact, this card's performance was almost equal to that of a non-ultra GeForce FX 5600, which is very good, considering its price. All in all, this card should provide the value user a good gaming experience for some time to come.

Mid-range

This range consisted of the 5600 and the 9600 series graphics cards. This is a slightly more demanding market segment, which needs lots of performance at a decent price. Here price-to-performance is an important factor.

This is currently the most competitive market—both ATi and nVidia have excellent offerings in this range. The Radeon 9600 and its PRO version are the primary offerings from ATi. Both these give very good performance, but the pricing of the 9600 PRO is slightly higher than the 5600 series by nVidia.

The 9600 PRO is a scaled-down version of the 9800 PRO. It is currently aimed at replacing the 9700, and the 9500 series, which hasn't yet been released in India. The card's performance is lower than that of both the 9700 and the 9600 PRO. It is code-named

OpenGL Technology

OpenGL has a rendering pipeline that directs different elements of the scene via different processes, to the framebuffer. The OpenGL standard differentiates between two types of data—Geometric and Pixel. Geometric data resembles geometric shapes (vertices, line and polygons), whereas pixel data consists of pixels, bitmaps and images. Geometric data are passed through Evaluators, and various other pre-vertex operations, before they are rasterised. Meanwhile, the pixel data are passed through a separate branch of the pipeline that consists of various pixel operations. Finally, both the data are passed to the rasterising phase, at which point they are combined and converted into fragments. Just before rasterisation, various textures are applied to the pixel and geometric data to give them a realistic appearance. Finally, various per-fragment operations are carried out on the rasterised data, which are then stored in the framebuffer to be sent out to the display unit.
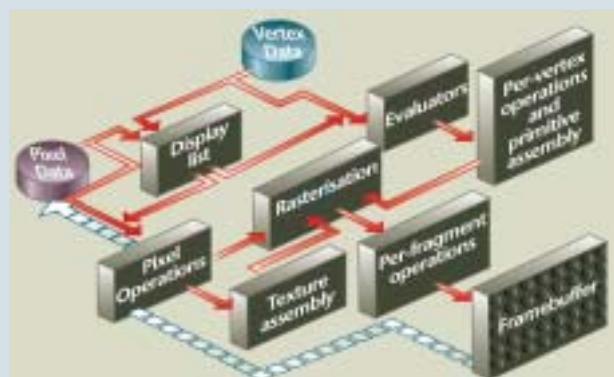
The OpenGL rendering pipeline divides raw data into pixel and vertex data, and then processes them seperately

Info TransGaming has come up with a Linux port of DirectX called WineX. Currently at version 3.1, it has support for DirectX 8. Some of the games they have ported using WineX are: *Diablo, Grand Theft Auto: Vice City, SimCity, Warcraft* and *The Sims*

the RV350. The Radeon 9800, 9200 and the 9600 were all announced at the same time by ATi; however, shipping was delayed, which caused some noise in the market. The 9600 is an important achievement for ATi, built as it is on the 0.13 micron fabrication process, which will decrease in the overall chip manufacturing cost.

Before we go into the tests and their results, a little background is necessary in order to understand the difference between the 9800 PRO and the 9600 PRO. The 9600 is the RV350 chipset based on the R350 chipset of the 9800 PRO. The RV350 features four full DX9 pixel pipelines and two vertex shaders. This is exactly the R350 halved. The two variants of the RV350 are the 9600 and the 9600 PRO running at 325/400 (200 MHz DDR) and 400/600 (300 MHz DDR) respectively. The overall effect of this is that ATi is expecting that the performance-to-price ratio of the

Low-End Cards Overall Performance

Graphics Cards	
Asus V9520 Magic (128 MB)	17.16
XFX GeForce FX 5200 (128 MB)	18.79
Asus V9520 Magic (64 MB)	19.58
PixelView GeForce FX 5200 (128 MB)	20.29
Jetway GeForce FX 5200 (128 MB)	21.23
XFX GeForce FX 5200 (64 MB)	21.38
S-Media GeForce FX 5200 (128 MB)	28.22
Gainward Pro/660 TV/DVI (128 MB)	28.26
Gainward Pro/760 (128 MB)	34.90

The Compro Poladyne 5600: A great combination of price and performance

The GigaByte Radeon 9600 PRO performed well in the mid-range segment

9600 will make it gain favour with consumers who want a good gaming experience at a lower price.

Of the nine graphics cards tested in this category, three were based on the ATi 9600 chipset. Hercules provided a 9600 PRO and a regular 9600 with 256 MB video RAM, while GigaByte sent a 9600 PRO card. 3DMark 2003 showed some marked differences in the scores amongst the cards. At lower resolutions in the game tests, all the cards all gave almost equivalent results. It was only on the higher resolutions that the differences showed. The two PRO cards from Hercules and GigaByte were tied neck to neck, but eventually the Gigabyte card won the race by a few points. Surprisingly, the Gigabyte 9600 PRO (128 MB) is priced lower than the Hercules 3D Prophet, even though the Hercules card afforded lower performance.

3D Graphics Card Demystified

While the basic components of a graphics card have remained more or less the same in the past few years, the complexity of each component has increased exponentially. A graphics card consists of the following components:

GPU: The heart and the brain of your video card, all in one place.

DVI or Analog Video Output: The final gorgeous display on your monitor, be it flat panel or CRT.

Graphic Card

Video RAM: This is where the textures are loaded. Faster the RAM, faster the processing.

Monitor
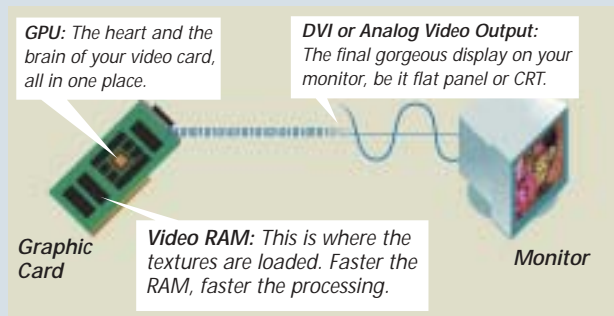
Graphics Processor (GPU): This is the processor on your graphics card that gives it all the number crunching abilities needed to render complex graphics at high speeds.

Video memory: Memory is another important component on today's graphics cards. Apart from storing commonly require fonts, icons, bitmap images, etc., in memory, the graphics cards also have to create and store all those frames before sending them to the screen.

RAMDAC (Random Access Memory Digital-to-Analog Converter): The RAMDAC is responsible for putting all the stuff in the video memory onto the monitor. It does this by converting each digital value stored in the memory to a corresponding analog signal. This can be understood by the monitor using a Digital-to-Analog (DAC) circuit. In fact, it has three separate DACs to convert each RGB component to the full spectrum of colours that the monitor supports. The speed of the RAMDAC is very crucial and has a huge impact on the ability of the graphics card to support different resolutions at different colour depths and refresh rates.

Mid-Range Cards Overall Performance

Graphics Cards	Score
Hercules 3D Prophet Radeon 9600 (256 MB)	37.02
Asus V9560TD (256 MB)	38.92
Gainward Ultra 780 XP (128 MB)	39.01
XFX GeForce FX 5600 (256 MB)	39.25
Asus V9560TD (128 MB)	40.54
Compro Paladyne FX 5600 (128 MB)	40.78
Hercules 3D Prophet Radeon 9600 PRO (128 MB)	45.54
Gigabyte Radeon 9600 PRO (128 MB)	46.02
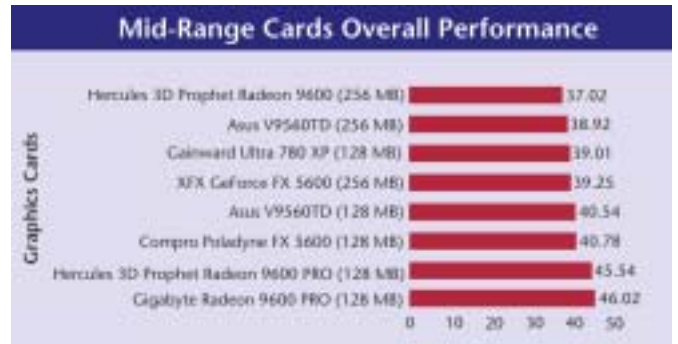
There was a huge performance difference between the 9600 and the 9600 PRO cards, and the price difference of just about Rs 1,000 to Rs 2,000 makes the 9600 a no-go.

The other four cards in this category were based on the nVidia 5600 chipset—the Compro Paladyne FX 5600 (128 MB), Pine XFX 5600, Asus V9560TD and the Asus V9560TD (256 MB). There was also a 5600 Ultra card, the Gainward Ultra 780 XP. The Gainward 5600 Ultra did not give better performance than the 5600 cards, but it has a lower price tag, which gave it the best value award in this category. The performance of all the four 5600 cards was lower than the two 9600 PRO cards, but what was really surprising was the pricing. The lowest performer in the 5600 cards, the Asus V9560TD (256 MB), costs Rs 2,750 more than the best-performing card in the entire category, the Gigabyte Radeon 9600 PRO.

ATi's cards clearly had the upper hand in this category.

❓ Jargon Buster

AGP: Accelerated Graphics Port is a standard that defines the slot on which all the graphics cards are inserted on your motherboard. It allows the graphics cards to communicate with the other components in the computer such as memory, CPU; the data transfer rate on the AGP slot is higher than that of the PCI slot, thus enabling the graphic card to transfer massive textures faster to and from the main memory on the motherboard.

Blending: Reduction of two colour components to one component using interpolation

Alpha blending: Alpha is a fourth colour component (apart from RGB), that is used in 3D computer graphics to control the opacity of the rendered object. The transparent glass shown in this screenshot of *Quake III* is created using alpha blending.

Texels: A texel (Texture Element) is obtained by adding the texture data to the pixels.

Fill Rate: The fill rate is an indication of the amount of texels per second that a graphics card can transmit through its memory.

Texture mapping: A technique of mapping textures onto objects that are to be rendered on screen. Texture mapping is used to add realism to rendered scenes. For example in the screen shots along-

Screen 1

Screen 2

side, Screen 1 is a plain rendered image without any texture mapping, whereas Screen 2 has the texture of a building facade applied to the walls.

Jitter: A pseudo-random displacement (shaking), of the objects in a scene, used in conjunction with the accumulation buffer to achieve special effects. For example, when you bang a car into another car, the effect that is produced is done using jitter.

Aliasing: Assigning individual colours to each pixel, regardless of whether it has to cover the complete pixel or only part of it. This results in jagged edges.

Anti-aliasing: In anti-aliasing, pixel colours are assigned based on the fraction of the pixel area that needs to be coloured. These lead to better and smoother edges. Picture A is an aliased image while picture B is an anti-aliased one. Picture C and Picture D are blown-up images of Picture A and B that clearly show the jagged edges of the aliased image and the blurred edges of the anti-aliased image.
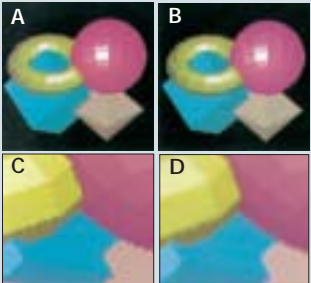
MIP mapping: This is a texturing technique that creates sceneries that contain polygons at acute angles, disappearing into the distance. MIP mapping reduces the jagged effect from textures by mixing high and low resolution versions of the same texture.

Clipping: Eliminating the portions of the various geometric shapes in a rendered scene that lie outside the current viewing area.

Z buffer: Z buffer is that portion of the video memory that is reserved for holding depth information. This was not present in earlier 2D cards since they did not use any depth information. It is now a de facto standard in 3D cards.

Tesselation: Reducing a large surface into a mesh of small polygons.

Frame Buffer: The Frame Buffer is the portion of the video memory that stores all the display information before sending it to the screen.

Double buffering: New cards divide their frame buffer into two parts-a display buffer that stores the current frames display information, and a draw buffer that can be simultaneously used to draw the next frame.

High-end

This segment comprised the cream of the crop—the 5900 and the 9800 series graphics cards. It is for those who demand the very best in graphics cards, and do not shy away from dishing out a few bucks for a few FPS more. Here, money is not the priority, performance is. All the cards in this category are based on the ATI Radeon 9800 and nVidia 5900 chipsets. The ATI Radeon 9800 and its PRO versions yielded decent performances, but were way behind what the nVidia 5900 had to offer. The Gigabyte 9800 PRO (256 MB) logged the best scores amongst the 9800 series. The Hercules 3D Prophet 9800 PRO also performed well, but was overshadowed by the Club 3D ATi 9800 PRO, which performed

The Gainward GeForce FX 5900 Ultra is the best that your money can buy

High-End Cards Overall Performance

Graphics Cards	Score
Club 3D Radeon 9700 PRO (128 MB)	60.34
Hercules 3D Prophet Radeon 9800 (128 MB)	62.51
Asus V9900TD (128 MB)	64.21
Pixelview GeForce FX 5800 (128 MB)	65.88
Gainward GeForce FX 5900 (128 MB)	68.68
Hercules 3D Prophet Radeon 9800 PRO (128 MB)	69.22
Club 3D Club 3D 9800 PRO (128 MB)	69.53
Pixelview GeForce FX 5900 (128 MB)	70.06
Gigabyte Radeon 9800 PRO (256 MB)	70.07
MSI FX 5900 (128 MB)	71.15
Gainward Ultra/1000 Plus (128 MB)	74.86
Gainward GeForce FX 5900 Ultra (256 MB)	76.49

better, and costs much less (Rs 28,000). The best performer in the ATI 9800 series comes with an unrealistic price tag, of Rs 44,000!

The Gainward GeForce FX 5900 is the budget gamer's delight

In the nVidia 5900 series we tested three brands, Gainward, Pixelview and MSI—all three performed superlatively. Though there wasn't much variation in the other benchmarks, the Gainward card lost out slightly on the *UT2003* test. The competition was neck-and-neck between Pixelview and MSI cards, with both scoring similarly, but the former lost out due to a few missing features and lower performance score in *Quake III*—thus the MSI took the spoils in the 5900 group.

Of the three 5800 series cards we got,—the Asus V9900/TD, the Gainward Ultra/1000 Plus and the PixelView GeForceFX 5800—the Gainward Ultra/1000 Plus outperformed both the 5900 series, as well as the 9800 series of cards—getting higher scores in both performance, as well as value for money. Unfortunately, it heats up a lot and makes too much noise, which is why nVidia decided to discontinue it in the first place.

The ATi 9700 PRO chipset was the first card to support DirectX 9. ATi beat nVidia at its own game, and launched this, much to the surprise of the whole industry, in mid 2002. For a card that old, it packs a punch with an impressive score of 3857 marks in 3DMark 2003 at a resolution of 1024 x 768. It also scored a comfortable 28.4 fps in the GunMetal Benchmark—one of the most rigorous benchmarks we used. Unfortunately, the fact that ATi is phasing out the 9700 Pro chipset and replacing it with the 9800 series leaves this card out in the cold.

The real performer in this category was the Gainward GeForce FX 5900 Ultra (256 MB), it was the only card to cross the 130 fps mark in the SeriousSam benchmark in high-quality

64-bit Gaming

The most obviously noticeable aspect in today's high-end gaming world, is the complete disparity between the graphics subsystem and the general PC architecture. While the GPU runs at close to 128-bit architectures, the CPU and its supporting system has a 32-bit architecture. Thus there is always a bottleneck, no matter how fast your GPU is. All this seems to be on the verge of changing, with AMD launching its 64-bit desktop processor the Athlon 64 FX51 which promises to change the face of personal computing. Moreover, Apple has also launched its PowerMac G5 that is based on 64-bit computing. What does all this mean to the gaming world? These 64-bit architectures have many more registers on the CPU that make it possible to manipulate more data simultaneously. Each piece of data is double in size, at 64-bits instead of 32-bits, so this too provides boost. This drastically improves the performance of the CPU, thereby leaving the GPU to render much more heavy duty stuff. Moreover, the size of the bus on the motherboard is double that on the current 32-bit versions and thus, more bytes of data can be transported across various parts of the computer in the same clock cycle.

Epic Games has announced that they will be coming up with a 64-bit version of *Unreal Tournament 2003* sometime next year, which will be an interesting test of the actual perfromance boost.

Decision Maker

Consider a low-end video card such as the Gainward GeForce FX 5200 Ultra for a PC running a PIII 800 MHz or a P4 1.3 GHz. Priced at around Rs 11,000; it pitched in a performance of 17.77 per cent on the PIII 800 MHz system.

Considering that the Gigabyte Radeon 9600 PRO scores 37 per cent and the Gainward GeForce FX 5900 Ultra pitches in 60 per cent on the P4 2.2 GHz and 69 per cent on the P4 3.2 GHz, opt for the latter in case price is not an issue. In the 1.4 to the 2.2 GHz range, we recommend the Gigabyte Radeon 9600 PRO since it gives a better price-to-performance ratio.
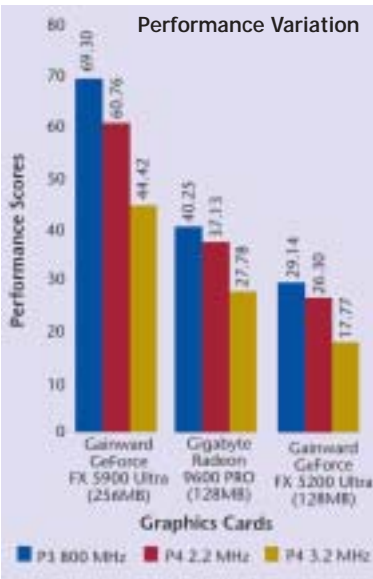
mode. It scored slightly higher than the MSI 5900 card thereby capturing the best performer award.

And the winner is...

Overall, the nVidia 5900-based cards and ATI 9800-based cards fought a valiant fight, but in the end the 5900 cards won. The Gainward GeForce FX 5900 Ultra took the best performance award and the Gainward 5900 took the best value award.

ATI has been trying to make a comeback in the graphics cards market. They have some excellent offerings in the midrange market, but when it comes to the hardcore gamer who needs the best of graphics cards, ATI clearly loses out to nVidia. This is quite evident from the massive score difference between the 5900 and the 9800 PRO. However there is a caveat. The first real DirectX 9 game shows a possibly different picture.

A huge disappointment was the average performance by the ASUS cards. At one time, ASUS was one of the most reputed manufacturer of high-end graphics cards, but this doesn't hold true anymore. Overall, the graphics card scene looks very good with more vendors coming up with better products.🔴

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Answers to quiz from page no. 132:

Crossword:

Across:
1. BernersLee,
4. Bhatia, 7.Gates
8. Allen, 9. Mitnick
10.Capek
11.Finland

Down:
1. Bhatkar
2. Ethernet
3. Bezos
5. Analytical
6. Palmisano

Answer:
1. c, 2.b, 3.a,
4.c, 5.a, 6.a,
7.a, 8.b, 9.a,
10.a, 11.b, 12.a,
13.b, 14.a, 15.b

SCORE BOARD

CATEGORY		ENTRY-LEVEL				
Brand	Gainward	PixelView	XFX	XFX	Asus	Asus
Model	Pro/660 TV/DVI (128 MB)	GeForce FX 5200 (128 MB)	GeForce FX 5200 (128 MB)	GeForce FX 5200 (64 MB)	V9520 Magic (128 MB)	V9520 Magic (64 MB)
Chipset	GeForceFX 5200	GeForce FX 5200	GeForce FX 5200	GeForce FX 5200	GeForce FX 5200	GeForce FX 5200

FEATURES (10%)

Dual Monitor Support	✔	✔	✘	✘	✘	✘
Video-Out	✔	✔	✔	✔	✔	✔
Video-In	✘	✘	✘	✘	✘	✘
S-Video/RCA	✔	✔	✔	✔	✔	✔
TV Tuner Chip	✘	✘	✘	✘	✘	✘
Remote Control	✘	✘	✘	✘	✘	✘
Software Bundle	✔	✔	✔	✔	✘	✘
Overall Features (Out of 100)	57	57	43	43	29	29

PERFORMANCE (90%)

Speed: 3D - OpenGL (SeriousSam SE)

Normal (640x480x16) (Frames Per Second)	144	130	130.3	136.1	130.2	137.3
Normal (640x480x16) (Frames Per Second)	118	70	70.5	83.4	70.1	83.3
Max (1024x768x32) (Frames Per Second)	84.7	44	44.5	53.4	44.1	53.4
Highest Quality(1280X1024X32) (Frames Per Second)	53.7	26	26.3	32.3	26.2	32.3

Quake III Arena

Normal (640x480x16) (Frames Per Second)	498.1	355.8	358.4	413.3	355.2	412.9
High (800x600x32) (Frames Per Second)	349	174	176	214	174	214
Max (1024x768x32) (Frames Per Second)	216.0	105.5	105.9	175.5	105.3	129.7
Highest Quality(1280X1024X32) (Frames Per Second)	133.5	62.3	62.8	109.1	62.2	78.1

VulpineGL mark (Synthetic Benchmark)

Normal (640x480x16) (Frames Per Second)	110.3	83.2	83.9	93.1	79.7	87
High (800x600x32) (Frames Per Second)	79.1	51.3	51.6	59.9	51.9	59.3
Max (1024x768x32) (Frames Per Second)	55.9	33.9	34.1	40.4	34.4	40.7
Highest Quality(1280X1024X32) (Frames Per Second)	38.1	22.2	22.4	26.8	22.7	27.3

3D - Direct3D: 3DMark2003 (Synthetic Benchmark)

Low End (800x600x32)	1775	1226	1220	1382	1223	1383
High End (1024x768x32)	1341	860	848	982	817	983

GunMetal Benchmark (Pure DirectX 9 Benchmark)

Normal (640x480x16) (Frames Per Second)	47	43.56	43.37	45.26	43.53	45.26
High (800x600x32) (Frames Per Second)	11	9.84	9.77	10.18	9.84	10.18
Max (1024x768x32) (Frames Per Second)	10	8.84	8.25	9.15	8.81	9.15
Highest Quality(1280X1024X32) (Frames Per Second)	9	7.3	7.29	7.86	7.31	7.86

UT2003: Normal (640x480x16) (Frames Per Second)

Flyby	179	131.75	132.35	148.33	131.47	148.45
Botmatch	78	70	70	73	70	74

High (800x600x32) (Frames Per Second)

Flyby	135	92.04	92.52	105.39	91.86	105.41
Botmatch	73	57	57	64	57	64

Max (1024x768x32) (Frames Per Second)

Flyby	90	59.45	59.79	68.86	59.34	68.87
Botmatch	59	40	40	46	40	46

Highest Quality(1280X960X32) (Frames Per Second)

Flyby	61	38.67	38.91	45.43	38.59	45.43
Botmatch	43	27	28	32	27	32

Image QualityTests: 3D Image Quality (Scale of 5)

UT2003 CTF	4.5	4	4.5	4	4.5	4.5
Overall Performance (Out of 100)	25.05	16.19	16.11	18.99	15.90	18.58

OVERALL SCORE

Features (10%)	5.71	5.71	4.29	4.29	2.86	2.86
Performance Total (90%)	23	15	15	17	14	17
Features+Performance	28.26	20.29	18.79	21.38	17.16	19.58
Value For Money (VFM)	3.98	3.17	3.48	4.45	2.29	2.80
Grade	B+	B+	B+	A	B	B

CONTACT

Vendor name	Mediatech India	Rashi Peripherals	Prime ABGB Pvt Ltd	Prime ABGB Pvt Ltd	Asus -India	Asus - India
Phone	022-56396696	022-28260258	022-23896600	022-23896600	022-56926013	022-56926013
E-mail	sales@ mediatechindia.com	ho@rptechindia.com	primeservices@vsnl.com	primeservices@ vsnl.com	info_india@ asus.com.tw	info_india@ asus.com.tw
Price (Rs)	7,095	6,400	5,400	4,800	7,500	7,000

	S-Media	Jetway	Gainward	Gainward	Compro Poladyne	XFX	Asus	Asus	Hercules
	GeForce FX 5200 (128 MB)	GeForce FX 5200 (128 MB)	PRO 760 (128 MB)	Ultra 780 XP (128 MB)	FX 5600 (128 MB)	GeForce FX 5600 (256 MB)	V9560TD (128 MB)	V9560TD (256 MB)	3D Prophet Radeon 9600 (256 MB)
	GeForce FX 5200	GeForce FX 5200	GeForce FX 5200	GeForce FX 5600 Ultra	Geforce FX 5600	GeForce FX 5600	GeForce FX 5600	GeForce FX 5600	Radeon 9600
	✔	✘	✔	✔	✔	✔	✔	✔	✔
	✔	✔	✔	✔	✔	✔	✔	✔	✔
	✘	✘	✘	✘	✔	✘	✘	✘	✘
	✔	✔	✔	✔	✔	✔	✔	✔	✔
	✘	✘	✘	✘	✘	✘	✘	✘	✘
	✘	✘	✘	✘	✘	✘	✘	✘	✔
	✔	✔	✔	✔	✔	✔	✔	✔	✔
	57	43	57	57	71	57	57	57	71
	142.3	137.5	139.7	144	142	143.4	143.4	144.6	126.9
	116.3	83.5	133.3	136	141.3	137.6	137.7	135.8	113
	84.4	53.4	111.7	111	118.7	111.9	116.8	111.3	96.1
	53.4	32.3	76.7	76	81.2	76	80.8	76	59.9
	498.2	412.7	526.8	543.2	302.8	547.5	548.7	547.3	383.5
	347	214	451	445	300	445	470	445	262
	214.9	129.5	300.0	281.46	270.4	283	308	283	159.06
	133.4	78.1	193.4	173.73	191.3	206	191	174	102
	110.2	93.1	134.7	140	119	140	119.3	117.5	106.3
	79	59.9	101.1	107	100	108	100.4	97.7	86.5
	55.5	40.4	74.3	79	78	79	78.5	75.3	65.4
	37.9	26.8	51.6	55	57	55	57.1	54.5	45.6
	1772	1374	2295	2776	2891	2776	2888	2763	2715
	1342	978	1768	2136	2247	2144	2248	2137	2034
	47.27	45.26	60	64	64	63	63.93	63.47	66.37
	10.61	10.18	14	15	15	15	15.25	15.13	23.05
	9.76	9.15	13	14	14	14	13.84	13.69	19.05
	8.75	7.86	11	12	12	12	11.99	11.78	14.67
	179.52	148.42	214	221	223	222	223.01	219.33	201.69
	78	74	79	78	78	79	79	78	79
	134.17	105.4	174	187	193	187	193.59	186.69	146.16
	73	64	78	78	78	78	78	78	76
	89.85	68.87	121	131	138	131	138.28	131.1	96.69
	59	46	73	72	73	72	74	72	59
	60.6	45.43	82	88	93	88	93.6	88.12	65.79
	43	32	57	57	59	57	60	57	41
	4.5	3.5	4.5	4.5	4	4	4.5	4.5	4.5
	25.01	18.50	32.43	37.00	37.38	37.26	38.70	36.90	33.20
	5.71	4.29	5.71	5.71	7.14	5.71	5.71	5.71	7.14
	23	17	29	33	34	34	35	33	30
	28.22	20.93	34.90	39.01	40.78	39.25	40.54	38.92	37.02
	4.03	3.81	2.60	3.34	3.62	2.85	2.72	2.19	2.743
	Ⓐ	Ⓐ	Ⓑ	Ⓑ+	Ⓐ	Ⓑ	Ⓑ	Ⓑ+	Ⓑ
	Xserve India Pvt Ltd	Anirox Technolgies Ltd	Mediatech India	Mediatech India	Mediatech India	Prime ABGB Pvt Ltd	Asus - India	Asus - India	Mediatech India
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	7,000	5,500	13,425	11,695	11,275	13,750	14,900	17,750	13,495

CATEGORY	MID-RANGE		HIGH-END			
Brand	Hercules	Gigabyte	Asus	Gainward	PixelView	Gainward
Model	3D Prophet Radeon 9600 PRO (128 MB)	Radeon 9600 PRO (128 MB)	V9900/TD (128 MB)	Ultra/1000 Plus (128 MB)	GeForceFX 5800 (128 MB)	GeForce FX 5900 (128 MB)
Chipset	Radeon 9600 PRO	Radeon 9600 PRO	GeForce FX 5800	GeForceFX 5800 Ultra	GeForceFX 5800	GeForce FX 5900

FEATURES (10%)

Dual Monitor Support	✔	✔	✔	✔	✔	✔
Video-OUT	✔	✔	✔	✔	✔	✔
Video-IN	✘	✘	✘	✘	✔	✘
S-Video/RCA	✔	✔	✔	✔	✔	✔
TV tunerChip	✘	✘	✘	✘	✘	✘
Remote Control	✘	✘	✘	✘	✘	✘
Software Bundle	✔	✔	✔	✔	✔	✔
Overall Features (Out of 100)	57	57	57	57	71	57

PERFORMANCE (90%)

Speed: 3D - OpenGL (SeriousSam SE)						
Normal (640x480x16) (Frames Per Second)	125.2	126.1	142.4	142.3	144.2	144.2
Normal (640x480x16) (Frames Per Second)	120.3	120.1	140.1	137.3	143.3	140.1
Max (1024x768x32) (Frames Per Second)	107.7	107.5	137.1	139.5	139.6	138.1
Highest Quality(1280X1024X32) (Frames Per Second)	92.1	81.5	120.8	130.4	122.3	126.6
Quake III Arena						
Normal (640x480x16) (Frames Per Second)	482.1	486.0	553.1	553.2	558.7	554.8
High (800x600x32) (Frames Per Second)	372	371	544	545	545	545
Max (1024x768x32) (Frames Per Second)	229	229	468	504	466.3	499.9
Highest Quality(1280X1024X32) (Frames Per Second)	146	146	328	399	330	389
VulpineGL mark (Synthetic Benchmark)						
Normal (640x480x16) (Frames Per Second)	104.6	106.1	142.5	199	194	194.1
High (800x600x32) (Frames Per Second)	94.5	94.5	130.7	179	167.9	172.1
Max (1024x768x32) (Frames Per Second)	82.7	82.7	117.6	157.5	139.7	147.6
Highest Quality(1280X1024X32) (Frames Per Second)	61.5	61.8	96.8	124	106.4	114.3
3D - Direct3D: 3DMark2003 (Synthetic Benchmark)						
Low End (800x600x32)	3629	3655	5173	6236	5179	5516
High End (1024x768x32)	2727	2798	4064	4924	4055	4429
GunMetal Benchmark (Pure DirectX 9 Benchmark)						
Normal (640x480x16) (Frames Per Second)	70.24	81.75	77.9	78.46	78	78.33
High (800x600x32) (Frames Per Second)	29.24	29.4	38.82	43.87	38.83	38.98
Max (1024x768x32) (Frames Per Second)	24.57	25.07	34.4	41.07	34.3	35.12
Highest Quality(1280X1024X32) (Frames Per Second)	19.12	20.26	29.28	35.93	29.29	30.21
UT2003: Normal (640x480x16) (Frames Per Second)						
Flyby	232.23	233.78	224.97	226.76	224.04	226.09
Botmatch	80	81	78	78	78	78
High (800x600x32) (Frames Per Second)						
Flyby	196.48	198.55	225.59	227.13	224.12	225.97
Botmatch	79	80	78	79	78	79
Max (1024x768x32) (Frames Per Second)						
Flyby	133.81	134.76	221.71	225.88	220.17	224.28
Botmatch	75	76	78	79	78	78
Highest Quality(1280X960X32) (Frames Per Second)						
Flyby	91.45	91.93	187.82	211.28	187.23	199.27
Botmatch	57	58	78	78	78	78
Image QualityTests: 3D Image Quality (Scale of 5)						
UT2003 CTF	4.5	4.5	4.5	4.5	4.5	4.5
Overall Performance (Out of 100)	44.25	44.78	65.00	76.83	65.26	69.96

OVERALL SCORE

Features (10%)	5.71	5.71	5.71	5.71	7.14	5.71
Performance Total (90%)	40	40	58	69	59	63
Features+Performance	45.54	46.02	64.21	74.86	65.88	68.68
Value For Money (VFM)	2.70	3.07	2.42	3.04	2.58	2.87
Grade	🔲	🔲+	🔲	🔲+	🔲	🔲

CONTACT

Vendor name	Mediatech India	Digi- Giga Systems Ltd	Asus - India	Mediatech India	Rashi Peripherals	Mediatech India
Phone	022-56396696	022-26526696	022-56926013	022-56396696	022-28260258	022-56396696
E-mail	sales@ mediatechindia.com	sales@ dlink.co.in	info_india@ asus.com.tw	sales@ mediatechindia.com	ho@ rptechindia.com	sales@ mediatechindia.com
Price (Rs)	16,875	15,000	26,500	24,650	25,500	23,950

HIGH-END

	PixelView	MSI	Gainward	Club3D	Club3D	GigaByte	Hercules	Hercules
	GeForceFX 5900 (128 MB)	FX 5900 (128 MB)	GeForce FX 5900 Ultra (256 MB)	Radeon 9700 PRO (128 MB)	Radeon 9800 PRO (128 MB)	9800 PRO (256 MB)	3D Prophet Radeon 9800 PRO (128 MB)	3D Prophet Radeon 9800 (128 MB)
	GeForceFX 5900	GeForce FX 5900	GeForce FX 5900 Ultra	Radeon 9700 PRO	Radeon 9800 PRO	Radeon 9800 PRO	Radeon 9800 PRO	Radeon 9800
	✔	✔	✔	✔	✔	✔	✔	✔
	✔	✔	✔	✔	✔	✔	✔	✔
	✘	✔	✔	✘	✘	✘	✘	✘
	✔	✔	✔	✔	✔	✔	✔	✔
	✘	✘	✘	✘	✘	✘	✘	✘
	✘	✘	✘	✘	✘	✘	✘	✘
	✔	✔	✔	✔	✔	✔	✔	✔
	57	71	71	57	57	57	57	57
	142.8	144.8	143.2	126.3	128.4	127.4	128.4	123.6
	142.5	141.5	140.9	123.7	123.1	123.7	124.5	122.7
	140.3	138	137.6	120.1	120.5	121	115	114.2
	128.3	128.5	131	106.8	113.6	113.4	114.6	107.7
	555.7	558.2	557.4	487.1	485.3	488.3	487.8	483.4
	547	549	549	472	479	482	485	477
	505.5	506.6	514.5	348.9	412.3	417.1	415.7	380.6
	406	407	436	226	277	285	280	248
	198.1	142.3	142.6	108.2	107.1	108.7	108.5	107.2
	175.5	131.1	130.8	99.9	99.3	100.3	101.3	99
	150.3	121.3	124.6	96.5	98.8	100.6	99.6	97.9
	116.3	102.2	107.5	83.9	91.6	92.7	92.5	87.8
	5651	5637	6226	5038	5918	5970	5895	5231
	4540	4536	4977	3857	4606	4664	4579	4024
	78.28	78.08	78.41	83.46	83.4	83.22	83.37	83.46
	39.12	39.16	41.84	43.79	47.79	50.05	49.47	44.72
	35.1	35.13	38.83	37.4	40.55	44.82	43.74	38.78
	30.3	30.31	34.11	28.4	31.11	35.84	34.53	30.29
	225.69	226.62	226.02	241.18	243.06	240.66	241.85	241.66
	78	78	78.41	81	82	81	81	81
	226.54	226.1	226.09	235.9	242.84	239.21	240.62	237.83
	78	79	78.48	81	82	81	81	81
	224.31	225.32	225.94	192.77	236.93	221.17	219.4	202.1
	78	78	78.37	81	82	81	81	81
	202.7	202.36	214	134.89	200.31	168.49	165.95	143.87
	78	78	78.08	76	81	80	80	77
	4	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	71.50	71.11	77.05	60.70	70.91	71.51	70.56	63.11
	5.71	7.14	7.14	5.71	5.71	5.71	5.71	5.71
	64	64	69.35	55	64	64	64	57
	70.06	71.15	76.49	60.34	69.53	70.07	69.22	62.51
	2.42	2.37	2.02	3.02	2.48	1.59	2.14	2.55
	Rashi Peripherals	Cyberstar	Mediatech India	Prime ABGB Pvt Ltd	Prime ABGB Pvt Ltd	Digi- Giga Systems Ltd	Mediatech India	Mediatech India
	022-28260258	080-51144075	022-56396696	022-23896600	022-23896600	022-26526696	022-56396696	022-56396696
	ho@ rptechindia.com	narend@ cyberstarin.net	sales@ mediatechindia.com	primeservices@ vsnl.com	primeservices@ vsnl.com	sales@ dlink.co.in	sales@ mediatechindia.com	sales@ mediatechindia.com
	29,000	30,000	37,875	20,000	28,000	44,000	32,395	24,495

Recognise that character!

OCR software come in handy when you just need to **have** an image file of that magazine. Here's how we **recognised** and characterised **the** software that does **character** reading **in** the true sense of the **word**…

Though OCR (Optical Character Recognition) software still has a long way to go, there are a couple out there that make it easy for you to feed any kind of document into your scanner, and expect a faithful reproduction without nagging formatting errors. Some software do a decent job of OCRing when there are no smudges, formatting idiosyncrasies and such, but falter when these are present. The new breed of OCR software is being infused with AI. This holds promise, but AI technology in OCR seems to be still in its infancy.

So why do you need OCR software—just use your imagination. You could scan newspaper articles and save them as a searchable library, instead of maintaining a bulk of yellowing newsprint. All those business faxes could go into a neat folder. What about those ancient dot-matrix printouts you can't afford to throw away? OCR and de-paper them.

With most OCR software available today, OCRing essentially requires you to first scan your document, and then press the 'recognise' button. What happens after that varies considerably from software to software. As our test results show, there are good as well as poor OCR programs out there. Use our results to decide what's best for your OCRing needs.

Cuneiform Pro 6.0
An Average Performer

Cuneiform does an ordinary job of scanning ordinary documents, i.e., standard inkjet or laser printouts. However, don't expect it to handle newspaper clips or Microsoft Excel

sheets in short, anything that might confuse it with graphs, images, columns, multiple fonts and so on. Cuneiform is light—both in terms of performance and price.

The vertical white lines that appear in a fax flummoxed the software, and recognition was poor. Ditto for photocopies. Cuneiform also cannot read 'reverse font', i.e., white print on a black background. It doesn't seem to have any in-built intelligence engine: if your document is scanned sideways, you need to manually rotate it in Cuneiform before it will recognise it. The worst of Cuneiform we saw was for the newspaper clip: it recognised virtually nothing, and all we got was one line of text, without any column retention.

Coming to the positive points, it has a batch-recognition mode for, say, scanning a textbook. Simply save all your scanned images in one directory, and instruct Cuneiform to recognise the images one by one. The menus and buttons are simple and intuitive—for example, it has buttons for 'Scan Image' and 'Load Image', instead of the slightly ambiguous 'acquire' in other software.

You can help Cuneiform help you—there is a good manual

layout feature available that lets you define areas of text, images and so on, in the image, thus ensuring that the software does not get confused or thrown off at the interfaces.

The documented help is pretty good, and online help is available at the click of a button. The text editor that is used after OCRing is comprehensive, and has all the standard formatting buttons. The spell-checker is satisfactory, and Cuneiform highlights suspect words while showing you the point in the original document where they occur. You can opt to retain or ignore fonts, italics and so on. It also has a bundled editor of its own, which is akin to a word processor that you can use independent of OCRing. The quick-recognise feature helps you bypass starting up the software—simply run quick-recognise by going to Start > Programs > Cuneiform > Quick-recognise, and give
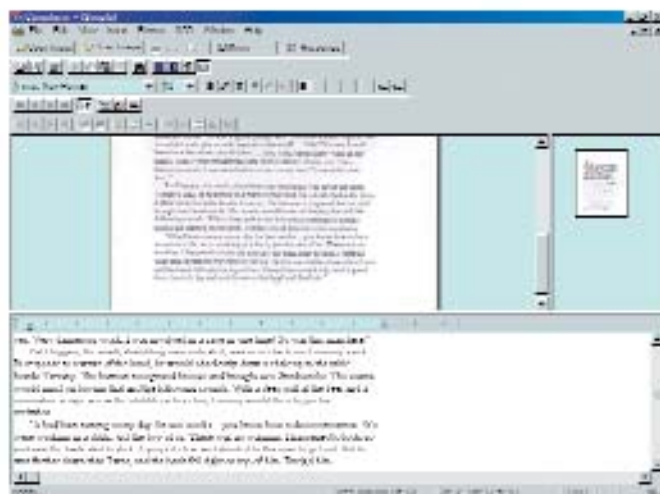
Cuneiform can't recognise the orientation of the image

How We Tested

The test bed used to test the OCR software was a Pentium III 500 MHz, with 128 MB RAM, running Windows XP and a UMAX PowerLook II scanner. All the documents were scanned at 24-bit colour depth and at 300 dpi—anything above 300 dpi makes no difference to the OCR software. The software were tested with their default settings, and the results were stored in Microsoft Word and Excel formats.

We evaluated the software on the following parameters:

Performance: OCR software is used in an environment where different types of documents have to be recognised, ranging from common Word documents to newspaper clippings, Excel tables and so on. Hence, we prepared a range of documents and checked the output for the level of accuracy in reproducing the original and the level of formatting retained. The following types of document were scanned and used in the test process: among the simpler ones were an Inkjet printout, a photocopy, a fax document, a dot-matrix printout and a typewrit-

ten document; and among the complex ones—an Excel sheet, a newspaper clip, a magazine page with reverse fonts, and a document with several different symbols. The documents had different weightages in our tests because, for example, one scans Inkjet documents more often than Excel sheets.

The inkjet printout was a generic Word document with all the possible formatting—bold, italics, indents, different font types and sizes—thrown in. The photocopy, fax document and the dot-matrix printouts were simple documents produced using their respective machines—these documents were used because they are still prevalent in Indian offices. The Excel page was a printout of an Excel sheet with frills such as coloured cells, graphs and vertical text. The newspaper clip had pictures and several columns. A magazine page with reverse fonts, i.e., a black background with white and yellow fonts, was used. The document with symbols had all the common symbols such as '@' and '&', and accented letters such as 'é'.

Features: OCR software should have features that minimise the need for manual intervention during the conversion process. It should have features such as support for importing images directly from a scanner. It should also support a variety of file formats, for both input and output. A learning mode that allows the software to learn from the corrections you make is an added advantage. Features such as batch processing would allow easy processing of multiple documents. The scanned images might not have a proper orientation, and the software should be able to correct such human errors. We gave weightages to features based on their importance.

Ease of use: We looked at the user-friendliness of the interface. Apart from having self-explanatory icons, the relevant ones should be easily accessible. The presence of a wizard that takes the user through the entire task—right from importing images to recognising the text and exporting them—is a must. We looked at how good the help and documentation was, along with the online help.

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it an image to work with. Also, right-click on an image and the option to recognise it using Cuneiform shows up.

At $69 (Rs 3,300), Cuneiform is a good solution for the non-demanding user who needs to OCR simple documents.

+ Inexpensive, reasonably accurate
– Gets thrown off by images and multiple fonts

OmniPage Pro 12
Makes life simple

OmniPage is one of the heavyweights—it's full-featured and tremendously accurate. One of its most useful features is its ability to accurately convert PDF documents—just enter a PDF filename, and the software spits out a Microsoft Word document, with all the fonts and tables retained! You hardly need to bother double-checking the output; you can always assume the job has been done perfectly. Text gets auto-selected—you don't need to specify where on the image the text is, though you can do this for complex documents. The image also gets de-skewed automatically, in case the page got tilted when you scanned it.

The interface is impeccable, and there's a wizard that makes it easy for a 10-year

OmniPage has an attractive interface, and all the tools you'll ever need

old to OCR a document. It guides you through the entire three-step process—importing a document into the software, OCRing it and saving it as a file. You do have options, but if you're new to this and don't want to experiment, just keep clicking OK and you're done. Advanced users can manually specify the layout of the document, so that OmniPage doesn't get confused by graphics and the like. After OCRing, you can send your document directly as e-mail, with a single click, or save it in the .doc, .rtf and .txt file formats.
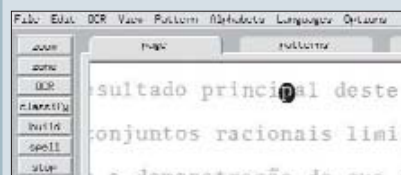
The OCR Proofreader appears immediately after OCRing. The intelli-train feature takes input from the corrections you make during proofing—and the program remem-

bers the character shape and the changed solution for this shape, and searches other similar character shapes in the document. Also included is a user dictionary, similar

to the one in Microsoft Word. The post-OCR text editor is comprehensive, just like in most of the other software we reviewed. The list of output file formats is absolutely huge—you can export your results to just about any application.

'OCR scheduling' lets you schedule OmniPage to OCR a list of documents at a particular time. Another feature is 'Direct OCR' that allows you to recognise pages while working in a word processor or other application. It lets you scan, recognise and paste recognition results directly into your current file at the cursor position, without leaving the application.

OmniPage did falter a bit when presented with less-than-perfect scans such as photocopies. Also, when presented with a magazine page that was laid out in a haphazard way—with text and images close to each other, and reverse fonts and quotes all over the place—OmniPage did manage to recognise all the individual words, but not in quite the same order and spacing as in the original. Coloured text didn't remain coloured either.

But all in all, OmniPage is an excellent piece of software. For the serious user-especially business users— the price tag of $600 (Rs 28,000) is well justified.

+ Comprehensive tools; high accuracy
− Expensive, imperfect at times

ABBYY FineReader Professional 6.0
Almost perfect

FineReader is one of the best OCR software available. The best thing about FineReader is its sheer versatility—whether it's about file formats, or the kinds of document it can recognise.

When FineReader scanned the newspaper clip in our tests, every bit of the layout and formatting, all the fonts and images—just about everything—was retained. The resulting file looked just like the original newspaper clipping!
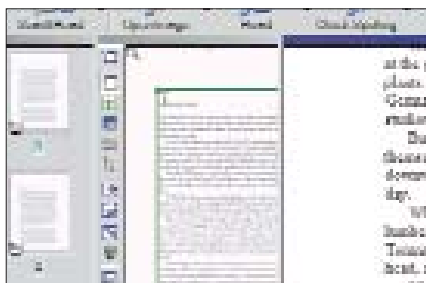
FineReader has many more features than you would probably use

FineReader has wizards all over the place, so that you can get to work even without knowing how the software works.

The main screen is well-laid out, with four buttons-Open, Read, Spell-check and Save. Each of these has drop-down lists with options, for example, specifying properties of the document, whether to retain formatting, how FineReader will work with the images and many more. The process is not complex though—you can use the default options and let FineReader do everything for you.

Features-wise, FineReader is packed to the brim. You can scan and read multiple images at the click of a button. There are options galore; such as 'Despeckle Image' in case you have a poor-quality document. FineReader ensures that you'll never have scanner problems—a single click sends FineReader searching for your scanner.

The spell-check options rival those available in Microsoft Word. Get pages recognised with FineReader running in the background, so you don't have to sit and look at the screen while doing the OCR. Customising almost everything is a breeze—the way your scanned pages are displayed, the way different panes appear, and so on. There's also a pattern editor that enables you to customise FineReader to suit particular special characters or formats. FineReader boasts a thorough and comprehensive help menu, and online help is provided.

FineReader 7.0 has just been

How does OCR work?

First, the software segregates the image into paragraphs, lines and characters. Then, the traditional method of visual mapping between the image and the database is done. The latest breed of OCRers use optimisation algorithms, neural networks and some AI concepts. For example, FineReader's Integrity Purposefulness

Adaptability (IPA) technology guesses that a character is an 'H' even if the scanned image doesn't contain a horizontal bar in the character. It is actually based on the recognising pattern humans follow, using which it tries to guess the character as a whole. It then looks at all possibilities and tries to arrive at a hypothesis. The software adapts from what it has learnt.

Indian Languages

One of the important features of any OCR package is the number of languages it supports. Having additional language support translates to practically creating a new OCR engine. Chitrakan is one such OCR tool that supports Hindi and Marathi, apart from English. It has a pretty decent list of tools, and comes for Rs 10,000 for a single license. You can extract images directly from any TWAIN-compliant scanner or camera. The company claims the use of some advanced Digital Signal Processing algorithms for removing the noise and 'Back Page Reflection' to get more accurate results. Chitrankan is a product in the line of software using Graphics and Intelligence-based Script Technology (GIST) to facilitate the use of Indian languages in IT.

There are other products such as iLeap—a word processor, Leap mail—a mail client and LISM—a tool that enables the use of Indian languages on Linux-based applications.

released—it claims to have 25 per cent better accuracy overall, and 45 per cent for PDF conversion. You can export the scanned document to XML and Power-Point, and also to PDF format—so you don't need the Acrobat writer. FineReader 7.0 supports remote installation, the jpeg2000 format, Intel hyperthreading technology, barcode recognition and full text search, with morphology support. There are new legal and medical dictionaries, which, ABBYY claims, improves recognition of legal and medical documents by 30 to 40 per cent.

Suffice it to say that with FineReader, you've reached the end of the road as far as OCRing is concerned, you simply won't need anything else—if you can afford the $300 (Rs 13,800) cost.

+ Unparalleled accuracy; well worth the price
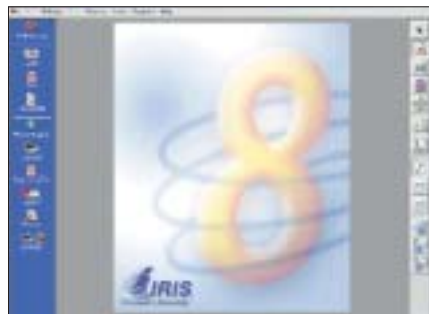- None

Readiris Pro 8
Needs spectacles

The interface is the first thing that would strike anyone new to using Readiris Pro. It consists of two vertical bars that contain the relevant icons. Readiris comes with an OCR wizard that takes you through the text-recognition process. You can take the ➜

Readiris Pro has a friendly interface

input directly from a scanner, or from an image file. Input can be in a variety of image formats such as bmp, tif, pcx, png and, notably, pdf files too. Readiris supports all the output formats you'd need, from common ones such as Microsoft Word and Excel to html, pdf, Wordstar and WordPerfect. The program automatically recognises the layout and separates the image into text, pictures and tables. It demarcates these by placing coloured boxes around them whose size and type may be manually corrected. This feature is found in almost all the software in our tests.

It fared decently on the easier tests such as the typewritten and fax documents. In the inkjet document test, it did a fairly decent job of recognising the document and also retained most of its formatting. However, when it came to the real test such as the newspaper, magazine and Excel pages, it gave very poor results. Readiris failed to recognise a single character from the magazine page. In the newspaper test, it retained the layout for the main news columns, but the headlines were in disarray.

It does come with a learning capability so that the software learns from the clarification that you provide for a character. Yet, in the inkjet test, it failed to recognise

the '®' symbol even after manually entering it twice in the learn mode.

All in all, at $402 (Rs 18,492) consider Readiris only if you need basic-level OCR with support for different document types, but not if you intend working exclusively with newspaper clippings.

+ Support for various document formats
– Not suitable for complex documents; expensive

TypeReader 6.0
Can do without

TypeReader was pretty accurate in the simpler tests involving inkjet-type documents. However, like Readiris, while recognising complex documents such as newspaper clips and Excel sheets, it yield-
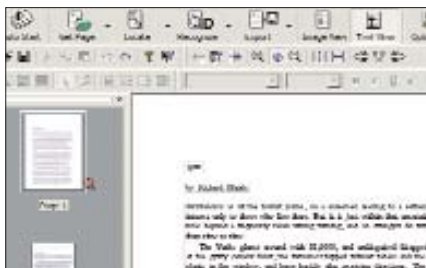
TypeReader is suitable for recognising simple documents

ed very poor, practically unusable results.

The software also lacks the auto-orientation feature. This might mean that you won't be able to do batch processing, if you're your documents are oriented sideways.

TypeReader allows OCRing several documents sequentially in a single step. You can start the application and click the Auto Start button to start up the wizard, select all the files that need to be recog-

nised and click Get. All unrecognised characters are replaced by the '~' symbol, which can be changed manually. All suspect characters are highlighted.

TypeReader lacks support for processing PDF files. Recognised data can be exported as Word or Excel files, or to an e-mail client. A preview of all the imported images is shown in a pane. However, you cannot group documents, and store output files accordingly in different folders.

TypeReader allows you to create and save templates. You can supply the template in which the location of the text, picture and table are specified. Any document in the same format can be recognised using that saved template. This comes handy while processing invoices and similar documents that have a standard layout.

The final verdict—consider TypeReader only if you have a lot of simple documents that need to be OCRed. A price tag of $249 (Rs 11,454) isn't justified.

+ Support for creating document templates
– Mediocre results

SimpleOCR
For simple requirements

The only edge that SimpleOCR had over the other tested software is that it's free. The least accurate of the pack, it's suitable for those who rarely use OCR, and are ready to correct errors patiently. It failed to retain even the most basic formatting such as Bold and Italics. It was able to recognise text in the Excel test, but the output was totally unformatted. The results of the newspaper and magazine page tests are not even worthy of a comment.

Input can be from a scanner or from an image file. It supports only the .tif, .jpg and .bmp file formats. You can open multiple documents and save them as batch files that can be later opened to import all the images. It doesn't have a wizard to simplify extraction of text from images, but the self-explanatory buttons are sufficient. Import the images and click on 'Convert to
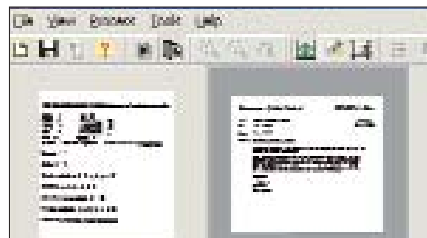
SimpleOCR was the least accurate of the pack

Leave it to ABBYY

1 The Welcome screen displays Tutorial and other such buttons. If you'd like help at this stage, click on one of the buttons or else, click 'Close'.

2 You now see the 'Scan and Read', 'Scan', 'Read', buttons. Place your document, after brushing off any dust from it, in your scanner, and click 'Scan'.

3 After you've pressed 'Scan', FineReader invokes your scanner's built-in scanning software. The software then asks what you want it to do. Choose 'Scan Now'.

4 The scanned image appears in a new pane, and you can now press 'Read' to recognise the scan.

5 After recognition, the text appears in the text window for you to edit.

6 Finally, choose the Save Wizard from the drop-down menu on the 'Save' button. The wizard asks you what you want to do—save it as a file in the application of your choice, export it to your Web browser, or copy the text to the Windows clipboard, and so on. Make your selection and let the wizard complete the process.

text' to start the conversion process. Perhaps its best feature is the error correction method. It highlights all suspect words, and the probable matches are listed in a drop-down box. A Merge button lets you combine adjacent words by removing the space between them. Once you are finished with correcting the document, you can save it in either the Word or the txt formats.

SimpleOCR comes bundled with a 14-day trial version of CharacTell, a handwriting recognition software, priced at $79.95 (Rs 3,678). Consider SimpleOCR only if you need basic-level OCR for free.

+ Free; easy to correct errors
− Very poor accuracy

And the winner is...

ABBYY FineReader is the undisputed champion. The only software that could give it a run for its money was OmniPage. And the newspaper-clip test helped us decide between the two, since an OCR software that faithfully reproduces a newspaper clip in its entirety has to be the winner.

In terms of accuracy, OmniPage and FineReader are pretty close; but FineReader wins on sheer versatility and features.

Summing up....

Choosing the OCR software for your needs is pretty easy. There are the heavyweights, the middleweights and the lightweights—and which is which is amply demonstrated by our tests. Generally, the better the software, the more expensive it is, without much exception. Occasional users might try SimpleOCR or Cuneiform; business and other high-end users should certainly consider investing in FineReader or OmniPage; and the other software are for those who lie in the middle of the user spectrum.

Finally, remember that once you have an OCR software installed, you might come up with lots of uses for it!

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SCORE BOARD

CATEGORY	OCR SOFTWARE					
Name	Cuneiform Pro 6.0	ABBYY FineReader 6.0	OmniPage Pro 12.0	Readiris Pro 8	Typereader 6.0 Professional	SimpleOCR 3.1
FEATURES (20%)						
Ease of reading from scanner (1-3)	1	3	3	3	3	1
Digital Camera Support	✘	✔	✘	✘	✘	✘
Auto rotate	✘	✔	✔	✔	✘	✘
Auto Processing	✔	✔	✔	✔	✔	✔
Deskew	✔	✔	✔	✔	✔	✔
Several input formats	✔	✔	✔	✔	✔	✘
Batch Processing	✔	✔	✔	✘	✔	✘
Save as .doc	✔	✔	✔	✔	✔	✔
Save as .html	✘	✔	✔	✔	✘	✘
Save as .pdf	✘	✔	✔	✔	✘	✘
Save as .xls	✘	✔	✔	✘	✔	✘
ODMA support	✘	✘	✔	✘	✘	✘
Good suspect-word checker)	✔	✔	✔	✘	✔	✔
Learning/training capability	✘	✔	✔	✔	✘	✘
Layout selection options (1-3)	1	3	3	3	3	2
Full-featured text editor	✔	✔	✔	✘	✔	✔
Business Cards	✘	✘	✘	✘	✘	✘
Total score for features	60	93	92	70	72	39
EASE OF USE (10%)						
Easy Icons	✔	✔	✔	✔	✔	✔
Ease of navigation (1-3)	2	3	3	2	2	1
Wizards (1-3)	1	3	3	1	2	1
Help (1-3)	1	3	3	2	2	2
Online Help	✔	✔	✔	✔	✔	✘
Total score for Ease of use	63	100	100	70	80	57
ACCURACY (70%) (SCORES OUT OF 100)						
Inkjet Printout	62	84	87	66	75	43
Photocopy of Inkjet document	65	100	86	86	86	55
Dot-matrix Printout	71	100	100	100	100	57
Typewritten Document	46	84	98	90	86	62
Excel Sheet	35	82	62	47	7	13
Fax Printout	71	100	100	100	100	43
Magazine page with white on black	0	94	59	0	0	0
Newspaper Scan	0	100	65	65	28	0
Page with several symbols	18	53	50	53	53	28
Total score for Accuracy	47	93	84	77	70	37
OVERALL SCORE						
FEATURES (20%)	12.066	18.6	18.4	13	14.4	7.734
EASE OF USE (10%)	6.333	10	10	7	8	5.667
ACCURACY (70%)	32.62	64.855	58.94	53.62	48.825	26.005
Overall Grade	D	A	A	B+	B+	C+
CONTACT						
Vendor	OCR.COM	NetSpider	HCL Infosystems	I.R.I.S.	ExperVision	SimpleOCR
E-mail	sales@ocr.com	sales@netspiderindia.com	seigell@hclinsys.com	info@irisusa.com	marketing@expervision.com	Info@simpleocr.com
Web site	www.ocr.com	www.netspiderindia.com	www.hclinfosystems.com	www.irislink.com	www.expervision.com	www.simpleocr.com
Price (Rs)	5,392	13,800	27,600	18,492	11,454	0
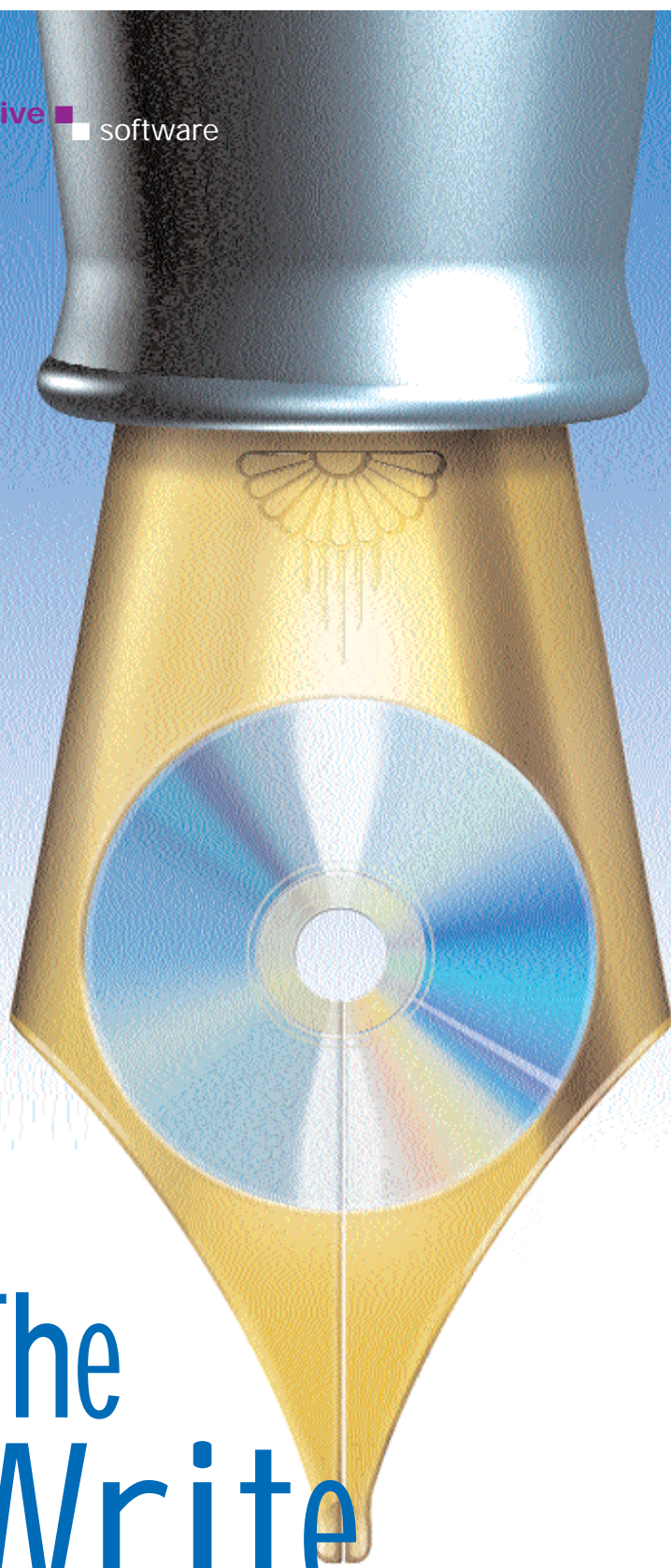
CD-writing software make a huge difference when you have to get your work done quickly, but when it comes to features, how do they stack up against each other?

The Write Ability

With their various purposes of back up, storage and good ol' sharing, CD-Writers are fast becoming a granted in every system configuration—and they don't cost an arm and a leg either. The new criteria, thus, is not of cost, but of purpose. The CD-Writers available today are really fast, and many of them perform at the absolute limits that current technology allows—and so, most 48X and 52X drives, whoever the manufacturer may be, offer similar performance and features. Therefore, the software can play an important role in your CD writing experience. Today's software have features that can help you with specific tasks such as boot-up CD creation and VCD creation, to more general tasks such as CD copying and data backup. We tried to classify them according to what they were specifically good at.

Pinnacle Instant CD/DVD

Pinnacle's Instant CD/DVD is a full-featured CD-burning software that has goodies such as video capture and audio editing. It has a friendly interface, with single-click access to the most commonly used tasks. It's good for both novices, as well as power users—for infrequent users, Pinnacle Instant CD/DVD has wizards that guide you step-by-step through the procedure for burning data or multimedia CDs. It can write on CDs and DVDs. You can create bootable CDs, and creating ISO images is also not a problem. Another good feature supported is video-encoding—you can edit MPEG and AVI files using the included editor, and also burn these files onto VCDs. It has a CD copying feature which can be used for backing up of your favourite CDs and DVDs, and you can use the provided label creator for labelling them. A unique

Find it on the Mindware CD
VCD Easy 1.1.6, Clone CD 4.2.02

How We Tested

CD-writing software should be easy enough for anyone to use, and also provide features for a power user. Also, the interface is of paramount importance, at least for the non-geeks amongst us. So we looked at how intuitive the application menus are, whether there are wizards that help you along, and so on. Then we looked for the different types of format supported, including video formats such as VCD and SVCD, and audio formats such as MP3, WMV and WAV. As far as data CDs were concerned, we looked at data backup capabilities, exact-copy creation capabilities, file browsing capabilities for when you're preparing your CDs for burning, and so on. We also checked how resource-hungry these software are,

both while they're idle, as well as while they're at work.

Almost all CD-burning software come bundled with some useful utilities, as a separate package or as an additional feature. These include CD label creators, basic audio and video editors, backup creators and others. We took these into account too.

Compatibility with CD-Writers is an important factor, since there is nothing more frustrating than getting a new CD-Writer and then finding out that your software won't work with it. And finally, we looked for extra features such as support for DVD writing, overburning, virus checking, bootable CD creation, multi-session CD writing and so on.

The Pinnacle start screen gives you access to every option you need

feature is the ability to emulate CD-ROMs on your hard disk. This is popularly known as a virtual drive. It also has a ripping tool to save your Audio CDs onto your hard disk in the MP3, WMA, or WAV formats. A backup tool comes as a separate utility, though even Nero 6 and Record Max have this feature.

Instant CD/DVD supports packet-writing technology through a bundled utility called Instant Write. Using Instant Write, you can use your CD-RW drive as though it were a hard or floppy disk, by simply dragging and dropping a file that needs to be burnt onto the CD drive letter.

You can capture movies from DV camcorders, import photos from digital cameras, record sound from microphones and edit the resulting files before writing them onto CD.

Instant CD/DVD is perfect for home use and is good for professional users too, but the advanced features are not as comprehensive as that of Nero 6.

RecordNow MAX 4.5

RecordNow MAX 4.5 from Stomp Inc. has a one- click installation process, which first-time users will love. Also, it has wizards for doing almost all the writing-related tasks. The file browser, however, doesn't support drag-and-drop functionality.

RecordNow MAX supports all major audio and video CD formats except SVCD, which is disappointing. Also, it cannot build ISO images, a feature found on all the other CD-writing software. A useful feature is disc spanning, that is, you can burn a large file onto multiple disks. This feature isn't present in Nero 6 and NTI CD
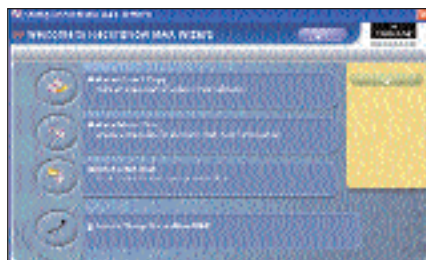
RecordNow MAX has easy-to-use wizards, to make life easier

Maker. You can also create bootable CDs from image files. Burning can be done from ISO and GI image files, but not from CUE files. RecordMAX has another feature called Drive Letter Access, which uses packet writing technology—you drag-and-drop files onto your CD-RW icon to burn files onto the disk. When you burn a CD, you can set an option to test the media before writing, and to verify the CD after

completing the writing process. This ensures error free burning. There's another feature called DJ Burn that is essentially a music format converter. It can convert your MP3 and WMA files to CDA files, which can then be used to write Audio CDs. There's also a bundled backup creation tool for an easy backup of your entire hard disk. The Microphone to CD feature allows recording sound directly from a microphone, or other source, onto CD. Finally, RecordNow MAX is the only utility that supports DDCD creation.

Nero 6 Ultra Edition

Nero 6 is the latest offering from Ahead Software that sports a new interface—Nero Express. All wizards that were in the previous versions have been removed, but

Nero 6 has a brand new, user-friendly interface

What is Finalizing?

Finalizing is the process of closing a session on a disk. An open disk is one on which you can add data. A single-session disk has three areas: the lead-in, the program area and the lead-out. The lead-in contains the Table of Contents (ToC), the program area holds the data and the lead-out is used to pad the remaining portion of the disk with zeroes. When the session is closed, the ToC is written to the lead-in area, which enables all CD-ROMs and CD players to read the ToC and access the data. However, the disc cannot be opened again to write more data on it, and so the remaining space is wasted. However, if the data is written to the disc, and the session is not closed, the ToC is not written to the lead-in area; instead it is written to a separate area called the Program Memory Area (PMA). CD recorders are capable of looking into the PMA to find the ToC of the open session, and then continue to add more data in a new session. Thus, to make a disc multi-session, the burn process should not be finalized.

Nero Express is a user-friendly interface that provides easy access to all features. Nero 6 supports almost all the popular CD formats, even the HFS file system.

A disadvantage with Nero 6 was its lack of the network browsing feature—you need to use the Windows browser to burn files onto your network CDs. You can easily create ISO images, and can burn bootable and regular CDs from ISO and CUE images. A novel feature is its support for Mini DVD discs—you can write onto these small DVD discs which hold up to 1.4 GB of data. It also supports multiple recorders—so you can create multiple copies of a disc simultaneously—as well as packet-writing, through IN CD or Direct CD for convenient drag-and-drop CD-writing. Another good feature in Nero 6, is the addition of a virus-checker and a backup tool. You can even create your own copy protected audio CDs using Nero 6—this excellent fea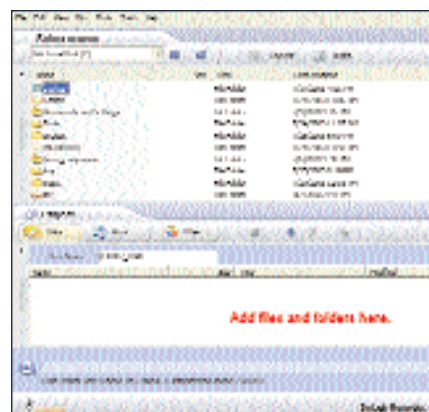ture is absent in all other software; the same goes for its virus checking feature. By adding a new, improved interface, Nero has become more appealing to new users—but it is not as user-friendly as NTI or Easy CD/DVD. For advanced users, it supports several pleasing options such as overburning, changing buffer size and so on.

Easy CD/ DVD Creator 6

Easy CD/DVD Creator 6 from Roxio is the most user-friendly CD-writing software available today, and it also sports the best-looking interface. It consists of five separate utilities bundled into a nice package, with a common interface to start from. These five are Disc Copier, Audio Central, DVD Builder, Photosuite and Creator classic. Disc Copier allows you to create exact copies of any CD. Audio Central is a powerful tool for playing, encoding and editing audio files. DVD Builder is a complete video authoring tool for creating VCDs and DVDs. It has support for video capture

Easy CD/ DVD Creator features an extremely easy-to-use file browser interface

? Jargon Buster

Hybrid CD: A CD that's readable by both MACs and PCs. It is created by making a copy of each file in both, the ISO (for PC) and HFS (for MAC) formats.

HFS CD: HFS CDs can be read only by Apple computers. To create a HFS CD, you need to use a hard disk with the HFS file system connected to a PC, and a CD-writing software that supports the file system such as Nero 6.

Mixed Mode CD: A CD that contains a data track, and one or more audio tracks. The data is located in track number one, and audio in the following tracks.

UDF: A file system that is optimised to handle large data sizes, and to minimise the changes necessary when a file is added or deleted. Windows 98 and higher versions can write to and read from the UDF file system, without any special driver support. This is the best format for DVD-RW drives where the data size goes into GBs.

Simulation: This is the process of testing the recording process without actually doing so. The writing is done by sending the data to the recorder, whilst keeping the laser off. This way, the blank CD remains intact. Simulation is used to check if the recording will be successful.

CD Extra: A CD format that combines a music CD with a regular data CD-ROM. These discs have audio tracks in the first part, and computer data in the second. You can play the discs on music players, and also use them as regular data CDs.
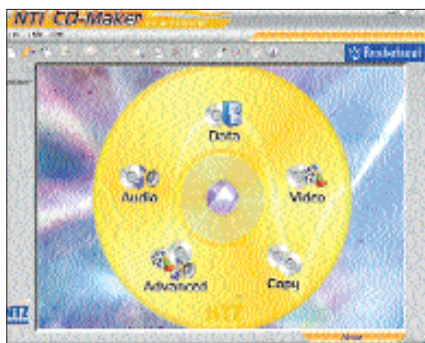
Overburning: A technique by which you burn more data onto a CD than its specified capacity. For overburning, the CD recorder should support this feature, and the writing should be done in the 'Disc-at-once' mode. How much data can be overburned, depends on the medium and the recorder.

DDCD: Expanding to mean Double Density CD, it allows data capacity to be doubled to 1.3 GB. DDCD is made possible by a few simple modifications to the regular CD format, such as miniaturisation of track pitch and minimum pit length. DDCD is mainly targeted at the mass data backup segment. The media is not backward compatible.

TAO: It refers to Track At Once CD-writing. In this method, a gap of 2 seconds is introduced between tracks at the time of writing to ensure proper synchronisation, and to conform to standards. During these gaps, the laser is turned off for 2 seconds.

DAO: In the Disc At Once method, the laser is never turned off, and hence no gap or delay is necessary. This mode is much faster than Track At Once, but the recorder should support it.

SAO: Session at Once is the mode used in multi-session CD-writing. In this mode, a session is written without turning off the laser just as in DAO, but the session is closed only after the data and the ToC are written into the Program Memory Area.

from DV camcorders and from VHS tapes, too. With Photosuite, you can capture, edit and organise any type of image easily. Creator Classic is just the usual Explorer-type interface, but for advanced users.

Easy CD/ DVD Creator supports ISO file writing, but does not support CUE files. It supports disc spanning for larger files, and it has a tool for browsing files spanned onto different discs, which is useful for copying the files back onto your hard disk. It has packet writing, with a drop-in-basket interface that sits in your system tray. For writing to your CD-RW, all you have to do is drag-and-drop a file into this basket, and the software takes care of the rest. Overall, Easy CD/ DVD Creator is best suited for capturing videos, editing them and writing them onto VCDs.

NTI CD-Maker 6 Platinum

This is yet another CD-writing software targeted at first-time users. It has a friendly interface, and you can access all the features with a couple of mouse-clicks. The file browser is user-friendly, and also supports network browsing. It does not have

NTI CD-Maker has a creative interface that makes working with it a pleasure

Choose WinONCD for its easy network browsing

any wizards as such, but the interface is intuitive enough to not need one. It can burn CDs from ISO images and create ISO images too. CD-Maker supports all popular CD formats, including mixed-mode CD and CD Extra. Music CD creation is supported in the MP3 and WMA formats; Creating a bootable CD is not possible, however. With Build Video CD, you can create a VCD from MPEG and even AVI files. It does the required encoding before writing it onto your CD, which can then be played on any VCD player. It supports packet-writing through FileCD, with the ease of drag-and-drop. It comes with a CD label creator. Other utilities include a music player and a WAVE editor.

This software supports recording of sound from a microphone or any other line input, directly onto CD. CD-Maker 6 had one significant disadvantage—it did not detect five out of eight drives during our compatibility test, so beware! Get this software only if ease of use is your primary concern—and if you have a compatible CD-Writer.

WinOnCD 6 Power Edition
The file browser in WinOnCD is easy to use, and supports network browsing. Creating VCDs and Audio CDs is simple—just select the files, do the editing you need to, using the provided video and audio editor, and click the record button. WinOnCD supports data and video spanning too. You can create bootable and auto-play disks using its in-built options. It also supports the MAC file system. This program has an integrated Web browser, and with this, you can write music files directly from any music server. It can also search for music files and MP3 ID3 tags on a server. It has an audio grabber with jitter correction for saving audio tracks from CDs onto hard disk. Overall, WinOnCD is good for novice users, but it can be a bit unfriendly.
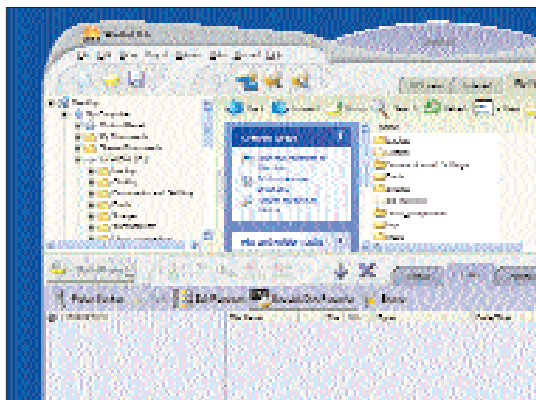
Wrap-up
From the comparison tests, it's clear that all the software manufacturers are trying to make their products as user-friendly as possible. The effect is that user-friendliness has reached such a level that even a 10-year-old can easily operate a CD-Writer, using such software as NTI CD-Maker and Easy CD/DVD Creator.

NTI CD-Maker showed incompatibility with many popular CD drives. RecordNow Max turned out to be the least resource hungry, and Nero the most. Pinnacle Instant CD/DVD is a relative newcomer, but it performed surprisingly well, and gave Nero a tough fight. Without a doubt, Instant CD/DVD is the best software for multimedia professionals, but in the end, Nero 6, with its new interface and aplenty options, emerged the overall winner.

Short bytes
There are several small and simple utilities available that do a particular job well. We take a look at some of these:

Blaze Audio RipEditBurn 2.10: A complete solution for music enthusiasts, it can rip tracks from audio CDs, and edit them too. The WAV editor can be used for removing hiss and periods of silence. RipEditBurn supports a number of effects that can be applied onto the WAV file, such as amplify, echo, fade-in, fade-out, chorus and so on. You can even convert your tapes into digital format.

The interface is easy to use. After ripping and editing, you can create MP3 and RealAudio files, and then burn them onto CDs using the provided minimalist writer.

VCDEasy 1.1.6: If you have a large video collection on your hard disk, and want to convert them into VCDs, VCDEasy is the perfect utility for you. It has all the features you need for creating VCDs and SVCDs from BIN and ISO files. It has several advanced options, but for the basic user, creating VCDs is as simple as selecting files and clicking a button. Besides creating VCDs, you can rip VCDs and store them as MPEG files. You can convert DAT files to true MPEG files, but VCDEasy cannot convert AVI to MPEG. For professionals, VCDEasy has features such as customised gaps and fillings, playback control, editing CD-I configuration files and much more.

Burn-to-the Brim 2.6.1: When you want to back up a large number of files on one or more CDs, finding a combination from those files to fill up a perfect CD can be a difficult task. Burn-to-the Brim helps you with that. All you have to do is select the folder that you want to back up, and the tool will

Packet writing
Packet writing is a technique by which a normal CD-R or CD-RW can be used like a floppy or zip drive. You can save an MS Word document, or any file directly onto the CD whenever you want. Normally, when a CD is burned, the table of content (ToC) is generated first, then the burning begins, and finally the ToC is written onto it. This allows the OS to retrieve the files from the CD the way it is meant to be, but once the ToC is burnt in, more data can't be written onto the CD. The idea behind packet writing is that if one need not worry about the TOC, one can write data to a CD-R in blocks or packets. By writing an appropriate set of functions into the OS, a vendor can provide packet capability for writers with suitable hardware and firmware. However since the ToC will not present the usual way, the ToC information has to be conveyed to the OS in some other manner. This is done by including a header along with each packet that contains the information on the file it represents, including its length. This also tells the OS where the next packet begins. In this way the OS can read the CD contents. However, adding this additional information decreases the disc's capacity.

Creating a bootable CD on Nero 6

For creating a bootable disk, we will use Nero 6 Express, which is the easiest way to do it. Start the application, and from the Nero Express menu, select the 'Bootable data disc' option under the Data menu. This takes you to another window, which asks for any files that you want to add onto the bootable CD. If you don't want to add any files, skip this by clicking Next.

At the next window,

Creating a boot-able floppy in Windows XP

you need to have a bootable floppy disk. To create one in Windows XP, click My Computer and right-click the floppy drive icon. Then select Format from the menu, and select 'Create an MS-DOS startup disk'. Click Start in Windows 98, go to 'Add / Remove Programs' in the Control Panel and select the 'Startup Disk' tab.

Insert a blank floppy disk into the drive and click Create Disk.

Insert floppy containing the bootable image

The final step

Now that you have a floppy disk ready, insert the floppy containing the bootable image into your floppy drive. Select the recorder, give a name for the CD, enter the number of copies you want and click Burn.

The bootable disc will be created in a few minutes, depending on the writing speed of your CD-writer, and the medium used.

find the perfect combination for filling a CD completely. If it can't all fit on one CD, the software shows you how many CDs are required, and shows the files it will include in a tree structure. You then create ISO images from these files, and burn them onto your CD. This takes a lot of time, however, when the size of your backup increases, and requires more than two CDs to write it on.

Clone CD 4.2.02: Use this utility to create perfect backups of your CD collection. There's a wizard-like interface which is easy to use, even for first-time users. You can save images of your CDs on hard disk, and also write CDs from image

files—this means you can make a copy of a CD using just one CD-RW drive. Another nice feature is its logging ability: it creates a complete log of all the activities that take place during the CD-copy process so that you can check the log files if something goes wrong.

Exact Audio Copy: This one is tailor-made for audiophiles—it's the perfect audio grabber, comes for free and has a friendly interface. Exact Audio Copy supports useful features such as jitter correction, automatic speed reduction on errors, normalization of extracted audio and many more. It has a CD-writing tool that can automatically detect drive features, and work according to that. It also helps you convert WAV files to the MP3 format by installing the LAME MP3 encoder on your system.

CD Catalog Expert 8.0: If you have a gigantic music and video collection on hundreds of CDs, this indispensable tool can organise and maintain a catalogue of it. You can create your own categories and shuffle files around by category. It has a search facility to search through catalogues using file name, folder name, catalogue name and even catalogue comment. Another good feature is report creation—you can generate reports in HTML based on catalogue and category. ◻

SHIJU THOMAS
shiju_thomas@thinkdigit.com

MPV Vs. HighMAT

MPV and HighMAT are two new CD formats that have recently entered the market. The USP of these formats is that any device supporting them will allow easy sharing and management of image, music and movie files. MPV is developed by the Optical Storage Technology Association (OSTA). The list of vendors supporting OSTA is huge, but currently no one has released a drive that supports the format.

HighMAT is a proprietary specification developed jointly by Microsoft and Matsushita. Many of HighMAT's features overlap with those in MPV, but MPV enjoys support on many more platforms.

SCORE BOARD — digit

CATEGORY			CD-WRITING TOOLS			
	Ahead	New Tech Infosytems	Pinnacle	Stomp Inc	Roxio	Roxio
Product Name	Nero 6 Ultra Edition	NTI CD Maker 6	Instant CD/ DVD	Record Now MAX 4.5	Easy CD/ DVD Creator 6	Win On CD 6
EASE OF USE						
Installation (Scale of 5)	4	4	4	4	4	4
Interface (Scale of 5)	4.5	4.5	4	4	4.5	4
Wizards (Scale of 5)	2	2	4	4	2	2
File Browser / Layout (Scale of 5)	3	4	3	3	4	4
Documentation (Scale of 5)	4.5	4	4	4	4	4
PERFORMANCE — MEMORY USAGE (KB)						
Idle state	15852	7144	13540	8712	15588	20212
Burning state	63104	24392	53256	8764	19720	28412
PAGE FILE (PF) USAGE (MB)						
Idle state	134	121	116	111	118	126
Burning state	179	148	160	133	125	133
COMPATIBILITY (15%)						
ASUS	✔	✔	✔	✔	✔	✔
PLEXTOR	✔	✗	✔	✔	✔	✔
SONY	✔	✗	✔	✔	✔	✔
AOPEN	✔	✔	✔	✔	✔	✔
LITE-ON	✔	✔	✔	✔	✔	✔
SAMSUNG	✔	✗	✔	✔	✔	✔
BENQ	✔	✗	✔	✔	✔	✔
LG	✔	✗	✔	✔	✔	✔
FEATURES (30%) — SUPPORTED FORMATS						
Audio CD (Y/N)	✔	✔	✔	✔	✔	✔
Video CD (Y/N)	✔	✔	✔	✔	✔	✔
Mixed-mode CD (Y/N)	✔	✔	✔	✔	✔	✗
Super Video CD (Y/N)	✔	✔	✔	✗	✔	✔
CD Extra (Y/N)	✔	✔	✔	✔	✔	✔
Bootable CD (Y/N)	✔	✗	✔	✔	✔	✔
FILE SYSTEMS SUPPORTED						
HFS (Y/N)	✔	✗	✔	✗	✗	✔
ISO/ HFS Hybrid (Y/N)	✔	✗	✗	✗	✗	✔
UDF (Y/N)	✔	✔	✔	✔	✔	✔
UDF/ISO Bridge (Y/N)	✔	✔	✔	✔	✔	✔
OTHER FEATURES						
Format CD (Y/N)	✔	✔	✔	✔	✔	✔
Quick Erase (Y/N)	✔	✔	✔	✔	✔	✔
CD Copier (Y/N)	✔	✔	✔	✔	✔	✔
DVD Writing (Y/N)	✔	✔	✔	✔	✔	✗
Mini DVD Writing (Y/N)	✔	✗	✗	✗	✗	✗
Multi-Session Recording (Y/N)	✔	✔	✔	✔	✔	✔
Drag and Drop (Y/N)	✔	✔	✔	✔	✔	✔
CD Images Created (Scale of 5)	4	4	3	1	3	4
Over-Burning Support (Y/N)	✔	✔	✗	✔	✗	✔
VIDEO ENCODING						
MPEG-to-DAT (Y/N)	✔	✔	✔	✔	✔	✔
DivX AVI-to- MPEG (Y/N)	✗	✔	✔	✗	✗	✗
RAW Mode Writing (Y/N)	✔	✔	✔	✔	✔	✔
Multiple Recorders (Y/N)	✔	✗	✔	✔	✗	✗
Automatic Shutdown after burning (Y/N)	✔	✗	✗	✗	✗	✗
Microphone-to-CD (Y/N)	✗	✗	✔	✔	✔	✗
Copy Protection Support (Y/N)	✔	✗	✗	✗	✗	✗
Disk Spanning (Y/N)	✗	✗	✔	✗	✔	✔
BUNDLED UTILITIES						
CD label Creator (Y/N)	✔	✔	✔	✔	✔	✔
Virus Checker (Y/N)	✔	✗	✗	✗	✗	✗
Video Editor (Y/N)	✗	✗	✔	✗	✔	✔
Audio Editor (Y/N)	✔	✔	✔	✗	✔	✔
Testing Utilities (Y/N)	✔	✔	✔	✔	✔	✗
Packet Writing (Y/N)	✔	✔	✔	✔	✔	✔
Backup tool (Y/N)	✔	✗	✔	✔	✗	✗
OVERALL SCORE						
Ease of Use (30%)	21.6	22.2	22.8	22.8	22.2	21.6
Performance (5%)	0.96	2.40	1.13	4.29	2.14	1.55
Compatibility (15%)	15	5.6	15	15	15	15
Features (30%)	27.36	21.17	24.42	19.48	21.92	22.90
Bundled Utilities (20%)	17.14	11.43	17.14	11.43	14.28	11.43
Grade	🏅	🏅	🏅	🏅	🏅	🏅
GI						
Web site	www.nero.com	www.nticdmaker.com	www.pinnaclesys.com	www.stompinc.com	www.roxio.com	www.roxio.de
Price (In Dollars $)	$59.99	$49.99	$99.99	$49	$69.95	$49

*Disclaimers: All prices are subject to variation, * Lower scores indicate better performance*

*** if possible repairs or else replacement*

The A-List

A list of the best products in different hardware and software categories

Products that topped our performance tests

CPU
Pentium 4 3.2 GHz 800 MHz FSB
+ Supports 800 MHz FSB and Hyperthreading
- Very expensive
Contact: Nebula Technologies
Phone: 022-26730567
E-mail: pratik@nebulatech.com
Price: Rs 38,000

Motherboard
Intel 875 PBZ
+ Native support for SATA
- No possibility of over-clocking
Contact: Nebula Technologies
Phone: 022-26848612
E-mail: pratik@nebulatechnologies.com
Price: Rs 13,000

Primary Storage
Maxtor 250 GB MaxLine Plus II
+ Tons of space
- Gets heated
Contact: Cyberstar
Phone: 011-6438216
E-mail: yogi@maxtor.com
Price: Rs 21,000

Secondary Storage
CD-Writer
Sony CRX 300A
+ Top performance, vertical mountable, half height, Mt. Rainer support
- No CD-R/CD-RW media
Contact: Rashi Peripherals
Phone: 022-28260258
E-mail: ho@rptechindia.com
Price: Rs 6,250

Graphics Card
Gainward GeForce FX 5900 Ultra 256 MB
+ Unmatched performance
- Very expensive
Contact: Mediatech India
Phone: 022-56396696
E-mail: sales@mediatechindia.com
Price: Rs 37,875

Speakers
Creative Megaworks THX 5.1 550
+ Mindblowing sound
- No digital inputs
Contact: Creative Technology Ltd
Phone: 9820357713
E-mail: rajshekhar_bhatt@ctl.creative.com
Price: Rs 25,999

Input Devices
Microsoft Multimedia Keyboard
+ Great feel
- Comes at a high price
Contact: Microsoft Corporation Pvt Ltd
Phone: 011-26292640
E-mail: connect@microsoft.com
Price: Rs 1,600

Microsoft Wireless Optical Desktop
+ High precision and sensitivity
- Batteries make it heavy
Contact: Microsoft Corporation
Phone: 011-26292640
E-mail: connect@microsoft.com
Price: Rs 4,500

Display
LCD Monitor
SONY SDM-N80 18.1-inch
+ Stylish looks combined with great performance
- External power supply takes up extra space
Contact: Rashi Peripherals
Phone: 022-28260258
E-mail: ho@rptechindia.com
Price: Rs 1,49,000

Laptop
Dell Latitude D600
+ Good design, has dual band 2.4 GHz and 5 GHz wireless
- Temperature shoots up after prolonged use
Contact: Dell Computers Asia Pvt Ltd
Phone: 1600 33 8044 (Toll free)
E-mail: marketing_response@dell.com
Price: Rs 1,53,366

Laser Printer
Samsung ML-1710
+ Extremely fast
- Does not support USB 2.0
Contact: Samsung Electronics India information and Telecommunication Ltd
Phone: 011-51511234
E-mail: farrukh@samsungindia.com
Price: Rs 16,000

Inkjet Printer
Canon S530D
+ Supports direct printing from digital cameras
- Expensive
Contact: Canon India Ltd
Phone: 011-26806572
E-mail: rajeev.singh@canon.co.in
Price: Rs 21,747

Multi-functional Device
Canon MP 370
+ Lots of features, easy to use and low running cost
- Bulky
Contact: Canon India Pvt Ltd
Phone: 011-26806572/7317
E-mail: rajeev.singh@canon.co.in
Price: Rs 34,995

Sound Card
Creative SoundBlaster Audigy 2 Platinum
+ 6.1-channel output
- Expensive
Contact: Creative Technology Ltd
Phone: 9820357713
E-mail: rajshekhar_bhatt@ctl.creative.com
Price: Rs 15,199

Scanner
HP Scanjet 4570C
+ Excellent scan quality
- Heavy and bulky
Contact: HP India Ltd
Phone: 011-28260000
E-mail: ashwini-k_aggarwal@hp.com
Price: Rs 17,999

PDA
Sony CLIE PEG-TG50
+ Runs on Palm OS5 and has a 320 x 320 TFT LCD display
- Rapid battery consumption
Contact: Solar Systems
Phone: 022-56916834
E-mail: solarsystems@vsnl.net
Price: Rs 27,000

Mobile Phone
Sony Ericsson P800
+ Easy and intutive navigation
- Blocky design makes it bulky
Contact: Sony Ericsson Mobile Communications International
Phone: 011-26180808
E-mail: sudhin.mathur@sonyericsson.com
Price: Rs 35,500

Digital Camera
Canon IXUS 400
+ Cerabrite body, better buttons layout, wide shutter speed range
- Ultra compact body hampers handling
Contact: Canon India Pvt Ltd
Phone: 011-2680 6572
E-mail: Shyam@canon.co.in
Price: Rs 49,995

MP3 Player
Creative LX 100
+ Decent feature set, easy to install, large LCD
- No bundled software, no ID3 tag support
Contact: Creative Labs Asia
Phone: 9820357713
E-mail: rajshekhar_bhatt@ctl.creative.com
Price: Rs 9,799

BEST VALUE
digit
OCTOBER 2003

Products that are the best value buy

CPU
AMD XP 1800+
+ sufficient power for normal desktop use
- Difficult to install the heat sink
Contact: AMD Far East India Ltd
Phone: 011-26238620
E-mail: amd@surfgold.com
Price: Rs 3,800

Motherboard
ASUS A7S266
+ Support DDR and SD, onboard video, onboard sound, onboard graphics, USB 2.0
- Not appropriate for gamers
Contact: Neoteric Infomatique
Phone: 022-24172600
E-mail: sales@neoteric-info.com
Price: Rs 3,900

Primary Storage
Samsung SV1203N 120 GB
+ Noise Guard and ImpacGuard
- 5400 rpm drive
Contact: Samsung Electronics India Information Telecommunication India Pvt. Ltd
Phone: 011-6322517
E-mail: marketing@samsungindia.com
Price: Rs 7,200

Secondary Storage
CD-Writer
Benq CRW5224W
+ Cheap
- Data cable not bundled
Contact: BenQ India Pvt Ltd
Phone: 022-25705231
E-mail: salesenquiryin@benq.com
Price: Rs 2,800

Graphics Card
Compro Paladyne FX 5600 128 MB
+ DirectX 9.0 compatible
- Very expensive
Contact: Mediatech India
Phone: 022-56396696
E-mail: sales@mediatechindia.com
Price: Rs 11,275

Speakers
Adcom ACSPSW-660 2.1
+ 2 satellite speakers and one mini sub-woofer, performance in the gaming sector was quite good
- Maximum volume causes distortion
Contact: SABS
Phone: 022-23808564
E-mail: sabs@vsnl.net
Price: Rs 550

Display
CRT Monitor
LG StudioWorks 700S
+ High resolutions, great performance, anti-static, anti-glare, anti-reflection surface treatment
- No extra accessories
Contact: LG Electronics India Pvt Ltd
Phone: 0120-2560900
E-mail: response@lgezbuy.com
Price: Rs 9,400

Input Devices
Samsung PC Keyboard
+ Unmatched value for money
- No multimedia buttons, wrist support not bundled
Contact: Samsung Asia Pvt Ltd
Phone: 022-2281/ 4886
E-mail: marketing@samsungindia.com
Price: Rs 300

Logitech scroll mouse
+ Ambidexterous design
Contact: Rashi Peripherals
Phone: 022-28260258/ 59
E-mail: ho@rptechindia.com
Price: Rs 550

Laptop
ACI Emerald PIV
+ Integrated Web Camera, FireWire port and an Ethernet connection, can play games such as *Quake III*
- Bulky, no manual
Contact: Allied Computer International (Asia) Pvt Ltd
Phone: 022-26366800
E-mail: sales@aci-asia.com
Price: Rs 89,990

Multi-function Devices
HP PSC 2110
+ Good print quality
- No fax capabilities
Contact: Hewlett Packard India Ltd
Phone: 011-26826000
E-mail: seema.dawar@hp.com
Price: Rs 9,999

Laser Printer
Wipro Laser 1540
+ Maximum resolution of 1200 dpi, 2 MB buffer, USB and parallel port
Contact: Wipro Peripherals
Phone: 022- 26397418
E-mail: helpdesk.mumbai@wepindia.com
Price: Rs 10,750

Inkjet Printer
HP 3325
+ Very small form factor

- 765 KB of buffer memory
Contact: HP India Ltd
Phone: 011-26826000
E-mail: ashwini-k_aggarwal@hp.com
Price: Rs 2,999

Scanner
HP 2300
+ Low warm-up time
Contact: HP India Ltd
Phone: 011-26826000
E-mail: ashwini-k_aggarwal@hp.com
Price: Rs 3,499

PDA
Palm Zire
+ Affordable, good battery life, comprehensive PIM applications
- No Palm Universal Connector, no backlight, no expansion slots
Contact: Tech Pacific Technology (India) Limited
Phone: 022-55960101
E-mail: aparna@corvoshandwick.co.in
Price: Rs 7,000

Digital Camera
Kodak DX6340
+ 3.1 megapixel camera with 4X optical zoom
- only 16 MB memory provided
Contact: Neoteric Infomatique
Phone: 022-24172600
E-mail: rajeev@neoteric-info.com
Price: Rs 20,900

Mobile Phone
Sony Ericsson T200
+ Light-weight, perfect grip, WAP 1.2.1 browser and 43.2 Kpbs GPRS, PIM features
- Keys are hard and noisy, unusual socket for the charger
Contact: Sony Ericsson Mobile Communications International
Phone: 011-26180808
E-mail: sudhin.mathur@sonyericsson.com
Price: Rs 6,495

MP3 Player
Creative MuVo 64 MB
+ Good audio quality, user-friendly, long battery life
- No LCD, no voice recording, no FM tuner, no playlist or folder support
Contact: Creative Labs Asia
Phone: 9820357713
E-mail: rajshekhar_bhatt@ctl.creative.com
Price: Rs 5,999

Bazaar

We test the latest and the best hardware and software products available in the market

Samsung SGH-V200C

Twist, smile, click!

The SGH-V200C gives you a 180 degree rotating camera; and lets you flip and zoom images right while taking pictures. Apart from being Tri-band, MMS and GPRS enabled, it is also sleek and stylish, with a crisp, vibrant 16-bit display. However, the external antenna does get in the way.

Menu operations in this model are far simpler as compared to the earlier R220. The easy to use four-way scroll key allows you to hop directly to predefined menus. You can save upto 500 names, and it also has an extra 32K SIM capacity for 250 names with 16 MB of internal memory, it allows you to store a sizeable number of images, ring tones and messages. The device also comes with an extra set of batteries.

The phone has an Infra-red port, but for some reason it failed to receive any sort of data in our tests. Even though it is MMS enabled, you can't add audio to your messages, and the T9 dictionary does not allow you to save custom names.

Overall, this is a nice phone, but does not justify the price tag of Rs 29,999.

Price: Rs 29,999
Contact: Samsung Electronics India Information & Telecommunication Ltd
Phone: 011-51511234
Fax: 011-51608818
E-mail: chandrasekar@samsungindia.com
Web site: www.samsungindia.com

SPECIFICATIONS

16-bit display, 355 x 288 camera resolution, 500 entry address book, 16 MB inbuilt memory, GPRS and Tri-band enabled, MMS capability and two sets of Li-ion batteries

Samsung SGH -V200C	B
Performance	
Features	
Ease of use	
Value for money	

Tech-Com Pen Tablet

Digital canvas

A Pen-Tablet is the perfect solution for creating art on your computer. It replaces the traditional mouse with a flexible pen, giving you a more natural way to draw, trace, scribble and design.

The installation process is a lot harder than it seems. After connecting the USB cable connector to the USB port of your computer, you need to refer to the quick installation guide. The pen has a two-way button for right and double-clicking functions, and its tip can be used to left-click. The Pen uses electro-magnetic technology to sense the movement on the tablet that is relatively well mapped to your monitor screen.

The tablet is too sensitive and the mouse cursor tends to move too fast. It will take a little while to get accustomed to it.

SPECIFICATIONS

Package contents: Tablet with 6 x 4-inches working area, Stylus pen, pen holder, USB connector, drivers and manual on Installation CD, Art Dabber CD

Price: Rs 2,100
Contact: Shree Sagarmatha Distributors Pvt Ltd
Phone: 011-26428541
Fax: 011-26428540
E-mail: sagarmatha_dlh@bol.net.in

Tech-Com Pen Tablet	B+
Performance	
Features	
Ease of use	
Value for money	

Pushpam HandsPC 1600

Touch me not

The HandsPC 1600 has an elegant silver body and chrome-finished buttons. It looks quite like an iPAQ, and at first glance, it's hard to distinguish it as a locally made product.

The 1600 comes with a bright white backlight, which is not crisp or sharp enough for reading. The touch screen also lacks accuracy, but the handwriting recognition is excellent. The user interface is similar to that of the Palm OS.

This PDA is packed with an MP3 player, a Dictaphone and powerful PIM functionality. The bundled software that is customised for Indian professionals—one for accountants, and the other for LIC agents.

The 1600 is priced at Rs 19,200, which is a little steep.

Price: Rs 19,200
Contact: Pushpam Infotech Corporation
Phone: 020-4215162
E-mail: sachin@pushpam.com
Web site: www.pushpam.com

SPECIFICATIONS

33 MHz Motorola Dragon Ball processor, Penbex OS, 2-inch 12-bit colour display, IR port, 64 MB Compact Flash, serial connection

Pushpam HandsPC 1600	B
Performance	
Features	
Ease of use	
Value for money	

Drive Image 7
Crash helmet for your PC

Drive Image 7 is built to resolve banish backup blues. All you need to do is use its wizard for backing up your drives according to your preferences, and it does the rest for you, fast. Installation was a breeze—you have the option of storing your drive image to a hard disk, a network drive, a CD, or DVD-R or RW.

You can specify the amount of space on each CD or disk to be used so that the backup image can span across disks, and you can make the software ignore bad sectors on the hard drive. A compressed-backup feature is available too.

In our tests, Drive Image took 1 minute and 16 seconds to make an image of a 601 MB drive, and 4 minutes to restore a 549 MB folder. It performed all the tasks it claims to do—fast backing up, restoring single files, and verifying file integrity—at just Rs 2,997. So the next time you want to back up your data, you know what to use.

Price: Rs 2,997
Contact: Sonata Information Technology Ltd
Phone: 080-6575800
Fax: 080-6567487
E-mail: charudutt.gurkar@sonata-software.com
Web site: www.powerquest.com

SYSTEM REQUIREMENTS

Drive Image 7.0 for Windows XP & 2000: 256 MB RAM, Pentium compatible or higher processor and CD-ROM drive
Drive Image 2002 for Windows 9x, Me, NT Workstation 4.0 (SP6a): 32 MB RAM, Pentium compatible or higher processor and CD-ROM drive

Drive Image 7				A-
Performance	▶	▶	▶	▶
Features	▶	▶	▶	▶
Ease of use	▶	▶	▶	▶
Value for money	▶	▶	▶	▶

Stellar Phoenix 9.1 FAT Data Recovery
On the recovery trail!

Stellar Phoenix is a data recovery tool that allows a user to recover vital data from a logically damaged hard disk drive.

This software is surprisingly easy to use. In case of a hard disk crash, all you need to do is attach your crashed hard drive to another system, configure it as a secondary drive and install the program on a healthy hard disk. The Phoenix software will then try and recover the data from your crashed drive.

Apart from this, it also has features such as File Filter that lets you include or exclude certain files on the basis of their extensions, before transferring data. Suppose, for instance, you want to recover files with .DOC and .PPT extensions, all you need to do is add these extensions to the File Filter option and press Include. After recovery, only files with these extensions will be transferred. It also has a File Mask feature that displays only those files or folders that match a specified file mask.

Overall, the software is a must for all desktop users who want to recover data after a crashed system, or accidental deletion.

Price: Rs 4,000
Contact: Stellar Information Systems Ltd
Phone: 011-641 8809
E-mail: sales@stellarinfo.com
Web site: www.stellarinfo.com

SYSTEM REQUIREMENTS

Pentium class processor, Windows 9X, Me, NT, 2K, XP, 64 MB RAM (128 MB recommended), 5 MB of free hard disk space.

Stellar Phoenix 9.1 FAT Data Recovery				A-
Performance	▶	▶	▶	▶
Features	▶	▶	▶	▶
Ease of use	▶	▶	▶	▶
Value for money	▶	▶	▶	▶

Creative MegaWorks THX 2.1 250 D
Monstrous sound system

MegaWorks 250D is a 2.1 speaker system from Creative that is targeted at the high-end PC market, where quality wins over affordability. It has two satellite speakers rated at 75 Watts (RMS) one sub-woofer at 150 Watts (RMS) and a BASH amplifier. It has a rated frequency response range of 25 Hz to 20 KHz—typical for any good quality speaker system. The sub-woofer is built using wood, which ensures deeper, richer bass.

It accepts both digital and analog inputs, and we tested the speakers with an Audigy2 Platinum Edition sound card on an AMD Athlon XP 2400+ system with 256 MB RAM. We played a set of audio files that stress the speaker at both low and high frequencies. Its powerful sub-woofer reproduced low frequencies with absolutely no distortion, even at maximum volume. The satellites did the job well in the high frequency sound test.

The MegaWorks 250D is priced at Rs 16,500, and though its performance is exemplary, we still feel it's a little overpriced.

Price: Rs 16,499
Contact: Creative Labs Asia
Phone: 98203-57713
E-mail: rajshekhar_bhatt@ctl.creative.com
Web site: www.creative.com

SPECIFICATIONS

Speaker system with one sub-woofer and two satellite speakers, Power rating: 150 Watts (RMS) sub-woofer, 2 X 75 Watt (RMS) satellite speakers, wired remote control

Creative MegaWorks THX 2.1 250 D				B
Performance	▶	▶	▶	▶
Features	▶	▶	▶	▶
Build quality	▶	▶	▶	▶
Value for money	▶	▶	▶	▶

Monarch MV5
Capture it!

The MV-5 kit consists of a PCI Video capture card and the MV5 software that is used to capture the video stream. The PCI capture card has two RCA video-in jacks and one S-video connector for video capture, and a stereo Audio-in mini-jack for audio capture. The kit also bundles an RCA video cable for connecting the card to a video source and an RCA to mini-jack cable for connecting the card to the audio source. Monarch has also provided Ulead Video Studio 6.0, Ulead DVD Movie Factory and Flip album 5.0.
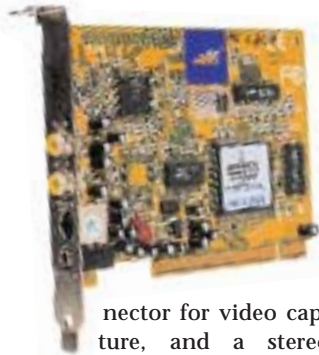
The conversion process couldn't be simpler—you just need to connect the audio and video outputs of the VCR to the input of the capture card, and the MV5 software takes care of the rest. The interface is simple to use and understand. A playback window is integrated in the software interface and shows the playback from the VCR. Select the proper parameters for your VCD, and click on Record to start the capturing process. The software also allows you to define the recording time duration, so that you can split the file into multiple VCDs.

Priced at Rs 9,500, it offers good value for money.

Price: Rs 9,500
Contact: Monarch Video Vision
Phone: 022-22619022
Fax: 022-22618706
E-mail: viren@bom2.vsnl.net.in
Web site: www.monarchvision.com

SPECIFICATIONS

Output file In MPEG, 64 to 6 Mbps video bit rate, two RCA jacks for composite input, one S-video and one 3.5 mm stereo audio jack

Monarch MV5	B+
Performance	
Features	
Ease of use	
Value for money	

Ulead MediaStudio Pro 7
Feature rich movie maker

The new Ulead MediaStudio Pro 7 for audio and video editing consists of multiple components, the most important of these is the Video Editor, a complete non-linear video editing tool. Each individual application has a Switch menu that helps in toggling between them, but this can be cumbersome, as each has to be invoked separately.

While the documentation mentions support for Quick-Time files, it was not possible to use them in any operation. Pro 7 adds a new meaning to fast real-time previewing and on the fly video editing. Even if you don't have realtime enabled hardware, you can use the on-the-fly editing and rendering features; we recommend RT hardware. The DVD authoring tools have been completely revamped in this new release of MediaStudio by replacing the DVDPlugin with DVD-VR Wizard and DVD Movie Factory (Light Edition).

It crashed miserably on one of our three test beds—a Pentium 4 (2.8 GHz) 512 MB RAM, GeForce3 (64 MB) running Windows XP—but ran perfectly well on the other two.

While Pro 7 is SMP enabled, no significant performance gain was observed on the Dual Xeon test bed. Another unique feature is the support for Sony MICROMV format. Overall, Ulead Media Studio Pro 7 is an excellent product but lost crucial points due to its tendency to crash on some of the test benches.

Price: Rs 27,500
Contact: Micrographics
Phone: 011-22092423
E-mail: micrographics@vsnl.com
Web site: www.asiapac.ulead.com

SYSTEM REQUIREMENTS

Intel Pentium III 500 MHz, Windows 98 SE, 2000, ME, 2000, XP, 128 MB RAM (256 MB or higher recommended), 300 MB free disk space, 4 GB disk space for DVD capture, CD or DVD-ROM drive, 1024 x 768 display card, Windows-compatible sound card.

Ulead MediaStudio Pro 7	A-
Performance	
Features	
Value for money	
Ease of use	

Sony ATRAC CD Walkman D-NE511
Music wherever you go

The Sony D-NE511 is a portable CD player that supports playback of audio CDs, MP3 and the proprietary ATRAC3 or ATRAC3plus formats. It sports a four-way navigation and playback key, a jog dial, four keys to control various functions and an open button for the lid. The LCD displays the track ID3 information, battery status, file number, etc.

Use the bundled Sonic-Stage Simple Burner software to convert audio CDs or MP3 tracks to ATRAC3plus or ATRAC3 formats. We were able to accommodate about 275 assorted tracks on a standard 700 MB CD-RW using ATRAC3plus at 64 Kbps. The device supports m3u playlists burnt on to MP3 CDs.

It has a two-level G-Protection function—one for normal use and the other enhanced level for use while jogging and exercising. This can be controlled from a small switch under the lid of the player.

The device is powered using two AA batteries. The audio quality is excellent.

However, at Rs 8,000, the device seems a little overpriced.

Price: Rs 7,990
Contact: Sony India Pvt. Ltd.
Phone: 011-26959990
Fax: 011-26959141
E-mail: mktginfo@sid.in.
sony.com.sg
Web site: www.sony.net/walkman

SPECIFICATIONS

Compact disc digital audio system, Supported formats: Audio CD, ATRAC3, ATRAC3plus, MP3, Frequency response: 20 Hz to 20 KHz, Output: Approximately 5 mW at 16 ohms, Dimensions (WxHxD): 136 x 26.3 x 156.3 mm, Weight: 202 gms

Sony ATRAC CD Walkman D-NE511	B
Performance	
Features	
Ease of use	
Value for money	

IBM 64MB USB 2.0 Memory Key

Big Blue's data key chain

IBM was the first to introduce high-capacity micro drives. With the popularisation of flash memories, IBM has made its presence felt with USB key-drives that are available in capacities ranging from 64 MB to 256 MB. The

accessories bundled with the drives comprise a small leather pouch, a neck sling and a clip attached with the cap. The 64MB USB 2.0 Memory Key drive sports a translucent black body with a small LED to indicate the drive status. The drive is automatically detected in Windows 2000, Me and XP, and the drivers required for Windows 98 and NT are provided in the bundled CD.

Price: Rs 4,500
Contact: IBM
Phone: 080-2063000
080-2063702
E-mail: bvasudev@in.ibm.com
Web site: www.ibm.com

The LED blinks when data is transferred, and the bundled encryption software helps protect your data.

We were able to transfer 54 MB of data from the drive in just 42 seconds. The drive is priced at Rs 4,500, which is quite expensive—the same capacity iOmega drive is priced around Rs 3,200. Overall, it is a product with good looks, but over priced. If you want the fastest drive available, and cost isn't a factor, we recommend this drive.

SPECIFICATIONS

64 MB and 256 MB capacities available, Compatible with USB 1.1 and 2.0, Weight 15 g, Drivers for Windows 98 and Windows NT 4.0 provided.

IBM 64MB USB 2.0 Memory Key	**B+**
Performance	
Features	
Build quality	
Value for money	

Microsoft Wireless Optical Desktop Elite

Black pearl

Microsoft input devices have always being a delight to use, and the latest Wireless Optical Desktop Elite keyboard-mouse combination is no exception.

The black and silver grey keyboard is studded with translucent buttons. The characters are etched in white over the translucent black keys producing an excellent contrast for viewing. The multimedia keys are placed on the top of the keyboard, and a small Internet scroll

wheel with Back and Forward buttons on the extreme left. The scroll wheel allows vertical as well as horizontal scrolling. The keyboard comes with nine pre-defined keys for instant access to pre-defined folders. It also has eight multimedia keys for volume control and playing a CD. It also has five programmable keys, that you can use to quickly launch your favourite programs.

This keyboard has a soft palm rest with a smooth leather finish, for extreme comfort. The button layout is perfectly contoured with respect to the palm rest, giv-

ing you a perfect typing angle for stress-free usage.
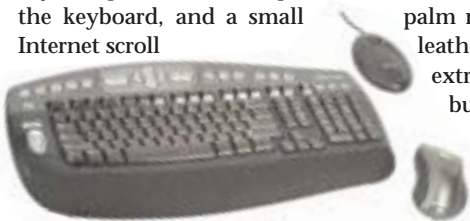
The mouse comes with Microsoft's new Tilt technology that allows scrolling in both horizontal and vertical directions. It is uni-dextrously designed for right-handed people, with contoured grooves. The mouse has the normal three buttons as well as two extra buttons, all of which are programmable. The scroll wheel is too smooth, and lacks tactile feel. The mouse is extremely precise and is not

Price: Rs 7,250
Contact: Microsoft Connect
Phone: 1600-1111-00
Web site: www.microsoft.com/india/connect

plagued with a line of sight problem due to the use of radio frequency. The combination requires five AA batteries.

At Rs 7,250, it's a great product for your desktop if you can afford the price.

SYSTEM REQUIREMENTS

Windows 2000 or XP (for using the tilt wheel), 128 MB of RAM, Pentium 133 MHz or above, 60 MB of disk space and PS/2 ports for the combination

Microsoft Wireless Optical Desktop Elite	**B**
Performance	
Features	
Value for money	
Ergonomics	

Sony SDM HS53 LCD Monitor

High on performance, low on features

The Sony SDM HS53 is an extremely good looking 15-inch LCD monitor. It weighs only 3.8 Kg and lacks in-built speakers. It has an intuitive on-screen display, but the buttons are inconveniently placed below the front panel.

We ran a couple of tests to check its sharpness, colour reproduction and various other properties. To our surprise, it performed extremely well on almost all the tests. The images were sharp and barring a little bit of colour streaks, It showed very little ghosting. The screen showed uniform brightness throughout; even though it supported only 60 Hz at a resolution of 1024 x 768, we found no flickering. The only negative point, is its mild reflective

Price: Rs 31,500
Contact: Rashi Peripherals
Phone: 022-28260258
Fax: 022-28221012
E-mail: ho@rptechindia.com
Web site: www.rptechindia.com

nature—it was difficult to view dark scenes.

It ships with a user guide and a utility CD, but no drivers. It supports only analog connectivity, and an analog data cable is provided. It has a wide viewable angle, and can be comfortably positioned. At Rs 31,500, one expects more features such as in-built speakers, height adjustment, etc. Overall, this monitor loses out on value for money and features.

SPECIFICATIONS

15-inch LCD monitor, maximum resolution of 1024 x 768 at 60 Hz, 0.297 dot pitch, 3.8 Kgs weight.

Sony SDM HS53 LCD Monitor	**B+**
Performance	
Features	
Build Quality	
Value for money	

UPS

XXXX xxxxxxx

The D-NE511 from Sony is a portable CD player that supports playback of audio CDs, MP3 and the proprietary ATRAC3 or ATRAC3plus formats. Encased in a silver body, the D-NE511 sports a 2 line dot-matrix LCD, a four-way navigation and playback key, a jog dial, four keys to control various functions and an open button for the lid. The LCD displays the track ID3 information, battery status, file number, playing time, etc. A button at the side can be used to enhance bass levels and also to activate the automatic volume limiter system.

If you have a CD-Writer, the bundled SonicStage Simple Burner Software can be used to convert your existing audio CDs or MP3 tracks to ATRAC3plus or ATRAC3 formats. These formats offer higher levels of compression than MP3, so you can fit more tracks on a CD-R or CD-RW. We were able to accommodate about 275 assorted tracks on a standard 700 MB CD-RW using ATRAC3plus at 64 Kbps. Keep in mind that tracks burnt in ATRAC3 or ATRAC3plus formats cannot be played back on a computer, so using a CD-RW for burning songs is a good idea, which will let you overwrite the songs when you are bored with them.

As far as playback options are concerned, you can play

Price: Rs 7,990
Contact: Sony India Pvt. Ltd.
Phone: 011-26959990
Fax: 011-26959141
E-mail: mktginfo@sid.in.
sony.com.sg
Web site: www.sony.net/walkman

SPECIFICATIONS

Compact disc digital audio system, Supported formats: Audio CD, ATRAC3, ATRAC3plus, MP3, Frequency response: 20Hz to 20 KHz, Output: Approximately 5 mW at 16 ?, Dimensions (WxHxD): 136 x 26.3 x 156.3 mm, Weight: 202 gms

UPS	B-
Performance	
Features	
Value for money	
Ergonomics	

HP PSC 1210 All-in-One

Magic box

The PSC 1210 is a simple and compact multifunctional product from HP. It converges printing, scanning and copying into one single unit that is not larger than a full size inkjet printer. The software required for all its tasks comes bundled.

The printer resolution is 1200 x 1200 on plain paper, and 4800 x 1200 on photo quality paper. It took just 18 seconds for a full sized text test page in normal mode. The photo-quality test prints were comparable to the best in the low-end printer class.

The flat-bed scanner can scan A4 size paper at a maximum optical resolution of 600 x 2400 dpi and 36-bit colour depth. Twenty seconds for a text document was what the scanner took, and the quality of the scan was acceptable. The results were disappointing for high quality photo. The OCR software gives a minimum of errors. A press of a button copies a document.

The HP PSC 1210 is the ideal device for home use where you print and scan occasionally. We don't recommend it for colour copies and scans, however. But finally, at just Rs 7,999, it is the best

Price: Rs 7,999
Contact: Hewlett Packard India ltd
Phone: 011-26826000
Fax: 011-26826056
E-mail: rajiv_rao@in1.exch.hp.com
Web site: www.hp.com

thing to hit the market in recent times. Go ahead and buy it!

SPECIFICATIONS

1200 x 1200 dpi maximum resolution (4800 x 1200 optimised dpi when printing from a computer on premium photo papers using 1200 x 1200 input dpi), 600x2400 dpi maximum scanning resolution at 36 bit colour, USB interface, 8 MB buffer, 2 cartridge printing (colour, black).

HP PSC 1210 All-in-One	A-
Performance	
Build Quality	
Value for money	
Features	

Adobe Photoshop Album 1.0

The perfect digital photo album

Adobe Photoshop Album is a photograph manager which manages nearly all types of images on your hard drive, no matter where they're located. It allows you to capture photos directly from a digital camera, scanner, or folders across your network, into a central repository. Besides this, you can also incorporate video and audio clips into your Photoshop Album, and organise and view them.

When you start the Photoshop Album, the QuickStart guide window automatically opens, and points you to all the major tasks. It provides powerful tools such as the Timeline tool that organises photos by date. The Calendar view allows you to view the photos according to the day you took the photos. Thumbnails are displayed on dates of photographs. The Tags option allows you to add information in order to organise your photos, and it allows you to burn your imags to a CD. Searching for your images is also very fast. All this makes Rs 2,500 not too much to pay.

Price: Rs 2,500
Contact: Adobe Systems India
Phone: 0120-2444711
Fax: 0120-2537681
E-mail: sandeepm@adobe.com
Web site: www.adobe.com
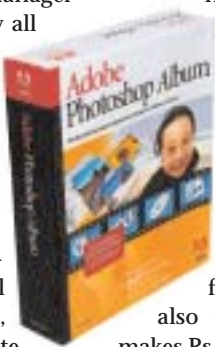
SPECIFICATIONS

Intel Pentium III or IV; Windows 98SE, Me, 2000 or XP; 128 MB or more RAM (256 MB recommended); 250 MB or more hard disk space; colour monitor capable of displaying thousands of colours at 800 x 600 resolution; CD-ROM drive

BenQ M100 Optical Mouse	A-
Performance	
Ease of use	
Value for money	
Features	

Creative Sound Blaster External USB Sound System

PC Boom-box

Creative has come out with yet another external USB sound device. It is targeted at laptop, as well as desktop users, who want a quick sound upgrade to be done quickly and simply. This small device comes with a clip and Velcro straps allowing easy attachment of the device to your laptop or desktop. Other accessories include a USB cable and a Y-splitter cable.

The sound chip of this device supports EAX, which provides enhanced environmental sound effects. It has audio line-in ports; for connecting to external audio players such as MP3 players, cassette players and audio line-out; for connecting to a 2.1 speaker system. It supports high-end 5.1 and 6.1 speaker syatems via an optical-out port. It also has an optical-in port to connect external players. It also supports microphones and headphones, and has its own volume control. The product comes with an installation CD that contains drivers and Creative Media Source software, which can be used for enhancing your music experience. The software lets you control virtual surround and a 10-band graphics equalizer with bass boost. Setting up the sound card is as simple as connecting the USB cable and installing the driver.

We tried some Indian and western music on this sound card, and it showed mediocre performance throughout our tests. It

Price: Rs 4,299
Contact: Creative Labs Asia
Phone: 98203-57713
E-mail: rajshekhar_bhatt@ctl.creative.com
Web site: www.soundblaster.com

SPECIFICATIONS

USB 1.1 interface, (all jacks are gold plated) Analog line out, Head phone output, SPDIF Optical output, Analog-Digital output selector, MIC input.

Creative Sound Blaster External USB Sound System	B
Performance	▮▮▮▮▯
Features	▮▮▮▮▯
Value for money	▮▮▮▮▯
Ease of use	▮▮▮▮▯

WinTasks 4 Professional

Ask the task manager

Without efficient resource and task management, a lot of your hardware bucks may go down the drain. WinTasks 4 Professional allows you to control the potential of your computer's resources.

WinTasks makes it easy to find and remove unnecessary background processes, and to assign resources to higher-priority tasks. The statistics window shows you the CPU usage and how the internal memory is used. Buttons allow you to stop, increase or decrease the priority level of processes. You can get a description of the processes, and the DLLs that they use; launch scripts; view CPU and memory usage statistics; record program logs; and enable, disable, add or remove programs from the registry.

The Event log window automatically logs information about all the programs that were run. You can save this information in a file for later analysis. Using the 'built-in script', you can create functions to automate handling of processes and resources.

The lack of support for Windows Me, and the fact that the CPU and Memory usage is not available for Windows 98, was disappointing.

Overall, priced at Rs1,997, WinTasks 4 is well worth it.

Price: Professional: Rs 1,997.50, Upgrade: Rs 1,250, Standard: Rs 1,497.50, Elements: Rs 997.50 per license for 100 or more licenses.
Contact: Liutilties
E-mail: contact@litutilties.com
Web site: www.liutilities.com

SPECIFICATIONS

Pentium 200 MHz or higher; Windows 98/NT/2000/XP; 10MB hard disk space; 32 MB RAM; 4X CD-ROM Drive

WinTasks 4 Professional	B+
Performance	▮▮▮▮▮
Ease of Use	▮▮▮▮▮
Value for money	▮▮▮▮▮
Features	▮▮▮▮▮

WinBackup

An easy to use backup utility

This utility has a nice interface that is made intuitively with easy to understand icons, names and tool tips. The interface is neatly divided into two sections, which consist of data backup and data restore. It has a flexible file and folder selection window, similar to Windows Explorer, and supports various storage media for backing up data-you can use your CD-Writer for efficient back up. It even allows CD-backups to be done automatically at scheduled intervals.

You can use wizards to select the files for backup, and specify the storage destination. The back up process always runs in the background, so that it does not interfere with the normal functioning of your system. The restoration of a backup file can also be done easily. Just select the backup file and give the location for restoration. The compression and decompression of the files during these processes are done on the fly, so that maximum performance is gained. It also supports the scheduling of various backup processes. Backup files can be spanned to more than one CD, so that large files can be backed up. You can also encrypt the backup files using 128 or 256-

Price: Rs 1,840 (approx) for single user license
Contact: Liutilties
E-mail: contact@litutilties.com
Web site: www.liutilities.com

SPECIFICATIONS

Pentium class processor at 233 or higher, 32 MB RAM and 64 MB for Windows 2000 and XP, Windows 95, 98, NT, 2000, or XP

WinBackup	B
Performance	▮▮▮▮▯
Features	▮▮▮▮▯
Value for money	▮▮▮▮▯
Ease of use	▮▮▮▮▯

Creative Sound Blaster External USB Sound System

PC Boom-box

performed especially poorly with Indian music-this involves high frequencies. However, it had excellent bass response, and its bass booster and graphic equalizer were accurate at controlling the output.

At a price of only Rs 4,300, you get portability and simplicity. The audio quality is better than the integrated audio found on most laptops, but desktop users can get a high quality sound card, with far more features, at the same cost. Overall, a great product for laptop users, but desktop users are advised to stick to their onboard six-channel, or opt for a Live series sound card.

WinBackup

An easy to use backup utility

bit encryption standards, as well as password protect your backed up data. WinBackup can be configured to require a log in, so that anybody who wants to use the program has to log in using your password.

You can also configure this utility to back up special files such as your mailbox, My Documents, address book, etc. It also features a search facility to find backup files, as well as a logging facility. Overall this software showed excellent performance and it does its job of backup and restoration perfectly. The only feature lacking is the ability to automatically back up a file at specific intervals, without user intervention.

UPS

XXXX xxxxxxx

tracks at random, repeat tracks, play them within a selected group or those with bookmarks, or play selected playlists. The device supports m3u playlists burnt on to MP3 CDs. Depending upon the format of the CD (ATRAC3plus, ATRAC3 or MP3), you can add bookmarks for a fixed number of tracks for up to 10 CDs.

To ensure a skip-free operation, the player has a two-level G-Protection function-one for normal use and the other enhanced level for use while jogging and exercising. This can be controlled from a small switch under the lid of the player, which is slightly inconvenient as you will have to remove the CD to change the setting.

The device is powered using two AA batteries or the bundled AC adaptor for tethered playback. The player is a hefty bundle to carry around, and there is no carry case provided-there is provision to attach a strap though.

Audio quality is excellent and the bundled stereo earphones reproduce sound with great clarity. However, at Rs 8,000, the device seems a little overpriced, and there are many cheaper options available.

e-Monitor
PC Spy

e-Monitor and e-Monitor Pro are PC monitoring software products from Access Online Pvt Ltd. The basic distinction between the products is that e-Monitor only sends an e-mail of reports it generates to the e-mail ID of the administrator, whereas e-Monitor Pro provides an interface through which the system administrator can keep a real-time check on a user's computer.

The programs capture information about running applications, visited websites, files/folder accessed, chat sessions and even print-related activities-such as number of prints, location of prints and the file being printed. It also acts as a key logger, creating detailed reports of every key that was pressed.

Installation of both products is simple and straightforward. For e-Monitor, you need to specify the e-mail ID of the administrator, and for e-Monitor Pro, you need to install the server on the administrator's machine and specify its IP address on each e-Monitor Pro client. An important point to remember is that when you install the product, it asks you for its location, along with the product key and validation key. If you forget the location you won't be able to install the product again.

You need a username and password to log into the system, after which you get a screen where you can select the report to view. You need to get hold of the username and password separately from Access Online, since they do not disclose it in the documentation.

This product offers all the features that other similar products have, but the pricing isn't competitive with its rivals. However, the version meant for single-user systems has a more competitive price and is definitely a good buy.

System Requirements: Windows95/98/Me/NT/2000/XP, Pentium 100 MHz or equivalent, 16 MB RAM, E-mail ID for the Administrator.

Performance: 3.5
Ease of Use: 4
Value of Money: 4
Features: 3
Overall: 3.5
Grade: B+

Price:
e-Monitor Rs 1,950/-
e-Monitor Pro Rs 13,300/- for 5 users
Company: Access Online Pvt Ltd
Phone: 022 - 590 7541
Fax: 022 - 568 4405
E-mail: info@accessonline.com
Web site:
www.accessonline.co.in

Lean Mean Portable Machine

Agent 001 goes the extra lap in mobility

I woke up yesterday with an itch. A decidedly technology-related itch. I realised I needed something slim and trendy on my arm; something that would place me with the jet-setters, the Who's who; something that would scream my importance. In short, I needed a laptop. Of course I haven't made my thousands yet, let alone my millions, so price was a question. And with a reputation to live up to, I also wanted the best and latest hardware. So that's how began another trip to Lamington Road.

Three shops down, and not a laptop in sight; the fourth one sold branded PCs. The only guy in the shop was sitting comfortably behind a desk. Upon hearing "...laptop", he offered his assistance with a suspiciously sweet smile. He told me a Compaq with an AMD processor, 20 GB hard disk, 128 MB RAM and a CD-ROM would cost me Rs 75,000. Since I wanted a CD-Writer too, he suggested another model for Rs 1,07,000 with a combination

drive. This was another AMD, but he couldn't tell me what model it was. In fact, he didn't even have any literature, or brochures. A little more probing brought out the truth—he didn't sell anything but Compaq, and had little or no knowledge about computers.

A few hops later, I landed at a swanky-looking shop with some laptops on display. I gave the man a quick rundown of my requirements, and he immediately whipped out an IBM leaflet with two ThinkPad models—one was the 2684B2A with a Pentium 4 1.8 GHz M processor, 128 MB DDR RAM, 20 GB hard drive and a 24x CD-ROM drive. This was listed as Rs 89,500, which he offered for Rs 80,000. There was also the 2682RA5 with a 2 GHz processor, 256 MB RAM, a 40 GB hard disk, combination drive and 32 MB of video memory. This baby would lighten my bank balance by Rs 1,09,000, and had a 3-year international warranty. This guy knew what he was talking about. He also pointed out that Firewire was missing and could be found on Sony laptops. Unfortunately, Sony has two caveats, "They don't service in India and start at Rs 1.2 lakhs." That quickly erased them from my mind, and I asked for something even cheaper than the IBMs. He offered me refurbished Compaq laptops, brought from the US. He explained that companies buy back laptops, fix them and re-sell them. He had a 500 MHz Pentium III with 64 MB RAM, a DVD ROM drive and an external floppy drive—all for Rs 42,000, but without guarantee. He offered me a 1 year comprehensive warranty (supported by him, not Compaq), for Rs 5000 extra. I was tempted, but considered the extra costs—an external CD-Writer (Rs 5,700), 64 MB RAM (Rs 1,000) and a PCMCIA Ethernet Card (Rs 1,500). Too much! I moved on.

I decided to check out some PC retail outlets. The first one I visited did not have any laptops on display, but had a printed sheet listing the specifications of all the units on offer—all Compaq. The salesman recommended an AMD processor-based laptop. According to him the only difference between AMD and P4, is all the hype surrounding the P4—thanking him, I beat a hasty retreat.

The next shop had a few laptops on display which I could actually go play with, whilst I waited for a salesman. Two of them caught my eye; one was a very stylish Toshiba Tecra with a spacious

ILLUSTRATOR: Mahesh Benkar

15-inch screen. The other was an average-looking Acer, but what was so interesting about it was the fact that it ran Linux! Once a salesman was free, I asked about what was on offer. Again I got a printed sheet. A quick scan revealed that the Tecra that I loved was a whopping Rs 1,30,000 whilst the Acer 233FX was a measly Rs 55,000, but only featured a CD-ROM drive. The Tecra S1 comes with Intel Centrino technology that includes WiFi. Also packed in was a 1.4 GHz Pentium M processor and 256 MB DDR RAM.

I decided to give myself a day or two to think over it. I went home to find an advertisement for an Acer 2.4 GHz Celeron for just 49,999. Intrigued, I called the local dealer and found out that I would have to add Rs 2,000 for freight, insurance and a carry bag; an additional 4 per cent for sales tax and 5.5 per cent more for Octroi. Still a sweet deal! The only thing that disappointed me was the lack of a CD-Writer. So I decided to wait a while, let the prices fall and my bank balance rise, so I could get something that would make me smile. ∎

SHOPPING TIP
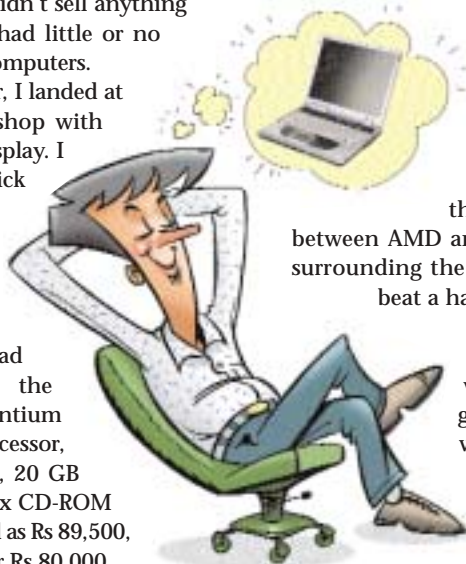
■ A 15-inch screen looks great, but adds a lot in weight and price. Similarly a 3 GHz CPU will exhaust your battery very quickly, and won't be of any use on long trips. So choose carefully.

■ If you want a CD-Writer, make sure you buy a laptop with one included—an external device takes away from the mobility of a laptop.

■ Firewire, USB2, WiFi and Infra-red are important features that will connect your laptop with your existing devices. Be sure to look for them.

■ Handle the device before buying it. No specification sheet or comparison table will tell you that the build quality is flimsy, or that 4 Kgs is more than your arm can take.

■ Try the various pointing devices to determine which works best for you.

■ Check the repair policies of the manufacturer, the warranty type and how conveniently the service centers are located.

Accelerate
those downloads!

The tricks necessary to free you from download blues…

There is no such thing as a free lunch, or too much bandwidth. Be it a cable connection, or dial-up, we all know the kinds of obstacles we face when downloading files from the Net— frequent disconnections, poor connection speeds and impossible file sizes are the bane of every surfer. But don't despair—there's hope, with a few tweaks and some good software.

Mirror, mirror on the Net

Tackle it head on: when you're downloading a file, you need to know the factors involved. First off, the location you download it from is important. If the file is not commonly found, you have no choice but to download it from the link you found it at; but if it is commonly available, you could find alternate servers. These are called mirrors. Always try to download a file from a mirror close to your geographical location. That is, if you have a Web site with a link in the UK and a mirror hosting the same file in China, download the file from the mirror.

Second, look at the pings and hops to the server and act accordingly (*See box 'Ping Pong!'*). But this should not be taken as a rule—a mirror with no traffic can give you better speeds, even if it is relatively far and takes more hops.

Nowadays, many servers offer queuing options to allow everyone a fair share of the bandwidth. It may be well worth the wait if the Web site offers good bandwidth. A queue server could have a high waiting time, and yet be able to allow high speeds. Try to find a server that is not clogged by other users. Then, identify its location and determine its peak hours, so that you can avoid them. Also, try to download from a site that supports download resuming.

Download managers

If you don't want to worry about pings, hops and mirrors, the best solution is a download manager. This typically monitors for download triggers, and proceeds with the transfer. The best download managers automatically ping mirrors, and decide which location is the best for downloading from.

Also, download managers provide the useful feature of resuming downloads. If you have a quirky connection (and who doesn't?), the resume feature is crucial. Basically, the resume feature is a series of checkpoints that the manager maintains. If the connection fails, the manager will resume the download from the last checkpoint. Most servers today support this.

Download managers also improve the speed of transfer using various techniques such assegmentation, best site selection andmirror search. Though most of these features are application dependent, all download managers have common functions that you need to bring some life to a slow connection.

There are many download managers available on the Internet. Here are a few that can help get your job done.

Mass Downloader 2.5 (*www.metaproducts.com*) follows a minimalist interface to guide you through your downloads. The program monitors Web addresses by mouse-clicks in the browser, and by clipboard entries. The triggering is quite accurate, and Mass Downloader also follows redirected links. This ensures that you will not download HTML pages instead of the actual file. Also, to download files, you can drag and drop links onto the download basket. The program automatically follows the link and proceeds to download the file. You can also schedule downloads to begin at a particular time.

Mass Downloader has another interesting feature that is quite useful while downloading archives. It allows you to view the contents of the
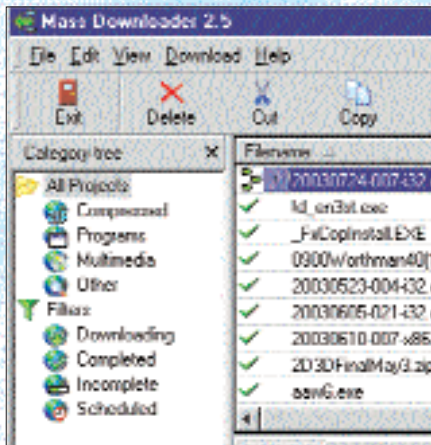
Mass downloader supports categorised downloading, so you can sort your files

archive, and download only selected files. These files then show up as a new archive. Apart from this, Mass Downloader fully supports download resuming. Different threads, from different mirror sites can be downloaded simultaneously to improve transfer speeds. The program also supports categorised downloading, which is quite useful when you have a large number of downloads on the list, as well as a speed-limiting feature that is useful if you want to simultaneously surf the Internet. Mass Downloader integrates with most major browsers such as Internet Explorer, and manages the downloads instead of letting the browser do so. For those who regularly use File Transport Protocol (FTP) sites for download, the program has a fully featured internal FTP browser. Finally, if you have used other download managers before, the program allows you to import incomplete downloads to the program.

FlashGet 1.40 (*www.amazesoft. com*) is a download manager that encompasses many features to give you a great downloading experience. It's received awards from ZDNet and Webattack.com for its features. Like Mass Downloader, FlashGet also supports segmented downloading from up to 10 sources; it supports categorised downloading; the scheduling features are powerful; and it features drag-and-drop support.

Short bytes

Download Accelerator Plus 5.3 (*www.speedbit.com*) is probably one of the most popular download managers available today. It provides most of the useful features, and sports an intuitive interface. Choose from three types of accelerations—No Acceleration, Acceleration, Medium Acceleration and High Acceleration—while downloading to set the download speed. The only problem is the constant advertisements and lesser control over download options.

GetRight 5.0.2 (*www.getright.com*) allows you to download all your files safely and speedily. It is packed with features such as synchronization of downloads and cookie support, and allows for segmentation.

Though P2P networks and file-sharing programs are infamous for illegal downloads, these networks are still a great way to find files that are hard to get. Searching for files is extremely simple— all you have to do is type in the program name and the category, and you get the

Hop, Skip and Download...

Data is sent from a Web site to your computer across the Internet, from server to server. These passes across the Internet are known as hops. The fewer the hops, the better the transfer speed. This is because there are fewer agents between the Web site and your PC. To calculate the number of hops between your PC and the site, you can use the 'tracert' command. To do this, go to the command prompt and type '*tracert*' followed by the name of the Web site. You should see a screen such as the one shown below.

C:\>tracert download.com
Tracing route to download.com [206.16.0.148] over a maximum of 30 hops:
1   1 ms   <10 ms   <10 ms 128.128.130.99
* 2   6 ms   6 ms   7 ms 202.46.193.201*
…
10 534 ms 467 ms   373 ms acr1-ae0.SanFrancisco.cw.net [206.24.211.33]
* 11 489 ms 461 ms   436 ms cw-gw.sffca.ip.att.net [192.205.32.109]*
* 12 444 ms 452 ms   442 ms tbr1-p012201.sffca.ip.att.net [12.123.13.189]*
…
*17 410 ms 496 ms   *   download.com [206.16.0.148]*
* 18 439 ms 421 ms   508 ms download.com [206.16.0.148]*
Trace complete.

Don't get confused—all you have to do is look at the last number, which indicates the number of hops. In this case, the number of hops is 18, and that means the data passes through 18 locations before reaching the site. Use ping and hops as an indication to the best mirror to download your file. The best choice is a responsive server that is not far away in terms of hops.

FlashGet uses Multipoint Downloading which improves speed

DAP sports a slick interface and a host of features

search results. While selecting a user to download a file from, remember a few things: try to download from a set of users rather than a single user. This means segmentation, and is similar to the mirror-download technique. Also, you can view the connection type of the user and the ping time. Use a faster connection type (for example, an 128 K ISDN is faster than a 56 K), with a lower ping for the fastest downloads. Avoid entering user queues while downloading, as these typically take a long time. Along with this, always check the file size—find the file size on a Web site, or compare with other search results. While searching for files on a P2P network, look for file information. This is necessary because P2P networks may have files that are illegal or corrupted.

WinMX 3.31 (*www.winmx.com*) is a powerful software that has a large number of established users. The program has a customisable interface that displays the core features of the program up front. The program does not place a restriction on the file type. This makes it ideal for downloading freeware applications. It also supports OpenNap networks that

give you a much larger database to search from. The program has multi-point downloading that allows you to resume a particular download from a different user—this does not leave you dependant on a single user.

KaZaA (*www.kazaa.com*) is the most popular P2P application available. It sports a clean interface, and you'll get acclimatised pretty quickly. The program does a good job of keeping the process simple, while using all its automated features to give you a comfortable download. It also sports a simplistic media player that can be used while previewing media files. The interface is fully skinnable. KaZaA has

a problem, though, with spyware add-ons during installation.

If you wish to download songs the legal way, check out Altnet for KaZaA. In every search result, Altnet inserts listings for the song you are looking for. These files are either promotional content, or require you to pay. Such systems also help bridge the gap between the music industry and file-sharing networks.

Open thy files

After you download a file, what do you do with it? If it's an archive, you'll need an extraction software. Compression formats usually need specific programs, but if you do not want to overload your PC with compression software, try using these popular software programs that can decompress almost any format.
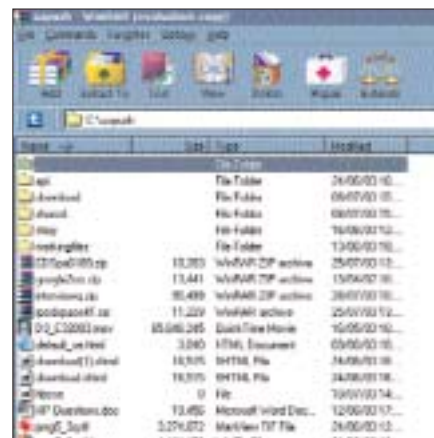
WinRAR has a slew of features not found in many compression programs

Ping-Pong!

To find out how far the server is from your location, try to ping the site. To do this, go to the Command Prompt and type '*ping*', followed by the Web site address. So, to ping Google, enter the command '*ping www.google.com.*' You will see a test result similar to this:

C:\>ping google.com
Pinging google.com [216.239.53.100] with 32 bytes of data:
Reply from 216.239.53.100: bytes=32 time=478ms TTL=53
Reply from 216.239.53.100: bytes=32 time=474ms TTL=53
Reply from 216.239.53.100: bytes=32 time=625ms TTL=53
Reply from 216.239.53.100: bytes=32 time=703ms TTL=53
Ping statistics for 216.239.53.100:
*   Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),*
Approximate round trip times in milli-seconds:
*   Minimum = 474ms, Maximum = 703ms, Average = 570ms*

Pay attention to the number stated as 'Average'. According to the result shown above, it will take an average of 570 milliseconds for a packet of 32 bytes to reach Google.com, and a response to be sent. Hence, if a Web site has servers in different locations, select to download from the one that provides a response in the least time.

Ready to download but don't know from where? Use these popular download sites as a reference when you feel the urge to download…

Download.com is one of the most popular download sites on the Internet

Software: Download.com (*www.download.com*) and Tucows (*www.tucows.com*) are probably the most popular download sites on the Web. They have a huge collection of files and several mirror locations. Tucows has six mirrors in India! **Linux:** If you need to download a distribution of Linux, check out LinuxISO (*www.linuxiso.org*). It contains links to popular variants of Linux that are available. Also, you may want to check out Source Forge (*www.sourceforge.net*) and FreshMeat (*www.freshmeat.net*) to download interesting Linux projects.

Music Downloads: No—this is not a link to illegal downloads. Rather, Epitonic *(www.epitonic.com)* hosts songs which are free for download. If you are still interested, you may find the site worth your time.

Working with archives is easy with WinZIP

load managers support download categories—each category will have a separate directory. While downloading, select the relevant category and you are done. If you would rather download files to a central location, try to use file organizers such as SoftPrime's Advanced File Organizer. It is a comprehensive database, and provides a centralised view to all related files. It allows you to create reports and sort files to your hearts content.

Finally, do keep updating your download manager periodically so that they can give you their best. Also, as far as possible, do try to download during off-peak hours. This way, you ensure effective use of your bandwidth and get the most out of your Internet connection.

AAYUSH IYER
aayush_iyer@thinkdigit.com

WinAce 2.20 *(www.winace.com)* is a powerful program that supports compression and decompression in multiple formats. The program uses its own ACE format, which packs data at a good compression level. In addition to this, it can compress in popular archive formats such as ZIP and MS-CAB, and can recognize and extract popular archive formats such as RAR and ARJ.

The interface is simple and the extraction process is quite fast. The program allows you to build self-extracting volumes for the ACE and ZIP formats. Also, it allows you to span a file across multiple volumes—this is useful as it allows you to carry a large archive in smaller segments.

WinRAR 3.20 (*www.rarlab.com*) is a popular compression software that allows you to read a variety of formats. It has a slew of great features that are not commonly found in other archiving software. One of the best ones is that most of it can be operated without opening a window. The interface is minimalist, and the extraction and compression process can be done in the background. It can also read ISO images.

Arguably the most popular compression software, WinZIP 8.1 (*www.winzip.com*) features a simple interface and provides for an easy way to extract your archives. It is tightly integrated with the Explorer and allows you to create self-extracting archives.

PowerArchiver 2003 (*www.powerarchiver.com*) is another variant that is packed with all the features you'd need in a compression software. It has support for a large number of compression formats. It also has a password management system to access frequently used archives. The internal file viewer allows you to preview a variety of file formats. The program is fully skinnable, supports the popular Windows Blinds software for skinning, and also has tools to repair corrupted ZIP files.

If you download files regularly, indexing and cataloguing downloaded files becomes important. Most down-

ILLUSTRATOR: Parag Joshi
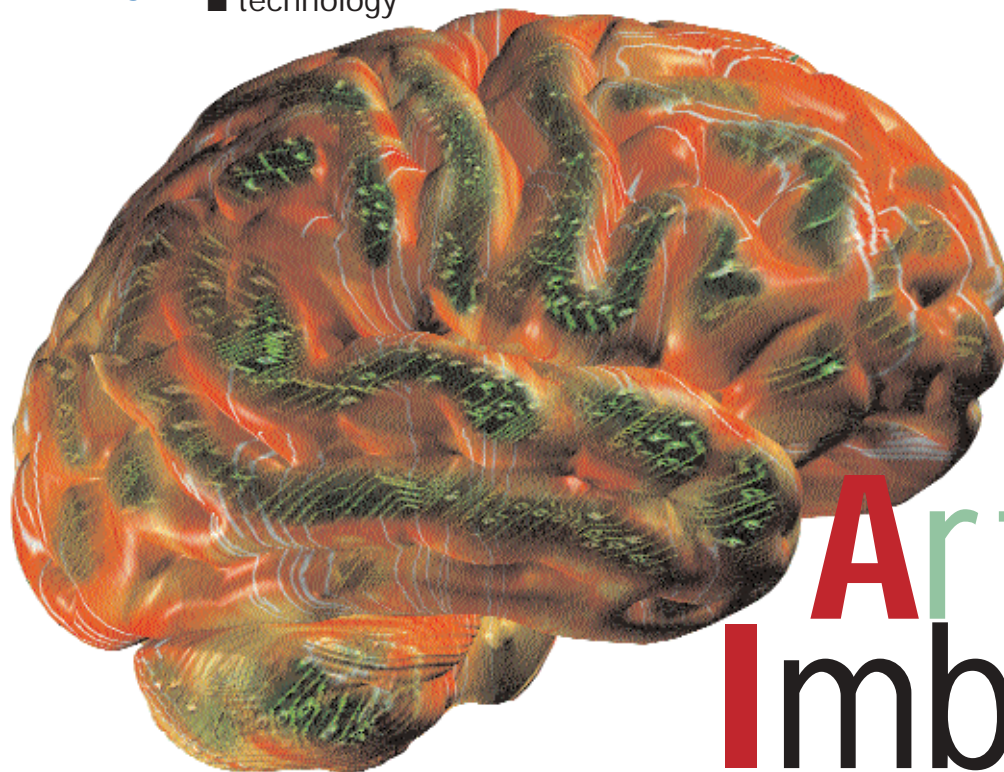
CREATING
Artificial
Imbeciles

"It's the year 2000, but where are the flying cars? I was promised flying cars."
— Avery Brooks, IBM commercial

The term AI spans everything from 'The Logic Theorist'—a simple theorem-proving program, to the scary idea that we might be ruled by an army of robots. It's interesting to know what comes to most people's minds when they hear the word AI: movies, smart robots and games. Generally, the idea is of intelligent machines, or machines that think, talk and so on. In fact, that idea is pretty close to what the pioneers of the field known as Artificial Intelligence imagined. But AI means different things to different people. To some, AI is not a given thing; they ask whether AI will be possible, that is, whether a machine can ever be truly intelligent. To others, the answer is a definite Yes, and their questions are about how to infuse a machine with intelligence. There are others who couldn't care less, and simply build systems that do intelligent things.

So what is AI? There are three important aspects to that question. The first is about whether machines can think, and why is it difficult to create an intelligent machine. The second is about AI as a technology. And the third is the rather interesting history of the field—its ups and downs, shifts of focus and its sometimes over-optimistic predictions.

Perspective

As far as history goes, AI is not, and never was, a single technology at all. Coined in 1956 by John McCarthy, the term indicated intelligent behaviour by machines, but the term has encompassed many technologies. At the backdrop of it all is Marvin Minsky—the undisputed champion of AI; a scientist who has always maintained that a brain is nothing but a machine, and who's always saying that we'll have superrobots soon (*see box 'Minsky's Mind-Brain Musings'*). Whether that happens or not is, naturally, open to debate.

In 1943, Warren McCulloch and Walter Pitts, both computer scientists as well as mathemeticians, found that a network of artificial neurons could model some functions of the brain. That event started off the field of Artificial Neural Networks (ANN). ANNs are different from regular intelligent systems, because they can learn. The Dartmouth Conference that was held in 1956, can be called the event that gave birth to AI. Proposals for how a computer might be taught to use a language, how a machine might learn, how it might get to be creative and so on, were laid out.

Between 1956 and 1966, several primitive AI programs such as 'Student'—a program that could solve algebra-type word problems, and 'The Logic Theorist', which could prove mathematical theorems, were developed. The enthusiasm for the new field at that time was such that renowned computer scientist, Herbert Simon stated that by 1985, machines would be capable of doing anything a person could do.

In 1967, however, Minsky and Seymour Papert—who, with Minsy, was co-founder of the AI Lab at MIT—showed that ANNs could not solve certain pattern

The Story So Far...

Honda's Asimo humanoid robot moves freely around, and can climb and descend stairways and slopes. It can listen to and guide customers.

In 1995, an automatic vision system steered a vehicle across the United States.

Face recognition technology has made it possible to monitor large crowds from a central location, as was done in Florida.

AI has made human inventions duplicable—state-of-the-art patents have been re-engineered by AI agents.

In 1999, an AI agent ran a satellite beyond Mars for over a day without ground control.

recognition problems. That effectively ended funding for ANN research. Another setback came in the early 70's; the Lighthill Report convinced the British government to end support for AI research because there hadn't been sufficient applied success by then.

However, the 1970s saw various researchers doing pioneering work in several different aspects of what was, by now, recognised as an established field. As an example of how successful AI had been so far, the American Medical Association said in 1979 that Mycin—an automatic system for medical diagnosis—was as good as human experts. And then, ANNs made a big comeback in the 1980s: John Hopfield, an AI pioneer, came up with an algorithm which enabled ANNs to do what Minsky and Papert had said they couldn't.

In and after the 1980s, AI diversified into several very distinct disciplines—current fields of exploration include robotics, learning and reasoning, knowledge representation and extraction, computer vision, speech recognition, and several others. And in the 1990s, the cognitive sciences that deal with the study of how our minds work were born. Over the years, cognitive science has grown in importance because people are becoming increasingly interested in figuring out how human brains and minds operate.

Intelligence and AI

But Simon had said that by 1985, we would have machines that would be capable of doing anything a person could do! Where were those machines?

The pioneers at the time had grossly underestimated several things. They had not anticipated the complexity of brain functions that were revealed in the 1960s and the 1970s. Also, AI is tied up, by its very nature, with fields such as philosophy, biology, linguistics and so on. The pioneers had not given sufficient importance to the considerations and techniques that these fields offer.

The question now is, "Why is it so difficult to build an intelligent machine?" In order to build an intelligent machine, we first need to know what intelligence is. Words that come to mind are creativity, memory, thinking and so on. It happens, somewhat paradoxically, that the things that computers do best are things that some of the greatest human minds cannot do, and some of the things that computers cannot do as yet, are things that are easily done by any child. For example, computers can defeat grandmasters at chess, but robots cannot, as yet, easily find an object in a room, lift it and place it somewhere else!

Why is this? There are several reasons. The first, is that we think in ways that are

not easily definable; and in order to program a machine, everything needs to be defined. The second reason is that we filter out unnecessary inputs from the environment very easily. Therefore, we seem to easily figure out what is important and what is not—unlike a machine. For example, presented with a supposed fact that a white elephant is driving, we realise that the fact that the elephant is driving is more striking than that it is white.

Third, we seem to have an innate flair for pattern matching. For example, in the position below, it is obvious that white can draw, simply by moving the

Most AI programs use position values to play chess—and fail to see obvious patterns

king around. But there was a very advanced chess-playing program that actually took the rook, and opened up the wall of pawns!

One of the most obvious difficulties in building smart machines is that computers lack common sense. We acquire common sense through years of learning, and it is not an easy task to transfer this to our machines.

But, what about learning? Can a machine not learn, and become intelligent? Yes and no. We learn mostly by analogy; we tell a child that ten times two is twenty— "just add a zero to the two"; and that ten times three is thirty—"just add a zero", again. The child will probably figure that ten times four is forty, by adding a zero— without being told this, but machines don't seem to be able to learn this way.

Machines can learn, and that's where ANNs come in. ANNs learn by interacting with a teacher, and they are built by training them in the following manner: When a question is put to the ANN, and it gives the wrong answer, its input is changed to reflect the deviation of its answer from the correct one, and so on, until it outputs the correct answer. For example, an ANN can be trained to find whether a sentence is grammatically correct, or not. But it also turns out that intelligent behaviour is better exhibited by computers by training them according to rule-based systems.

Both the ANN approach and the regular or symbolic approach, go into the field called AI. Again, AI means many different things: a science, a philosophy, a range of technologies, a range of beliefs, a field of engineering—and more.
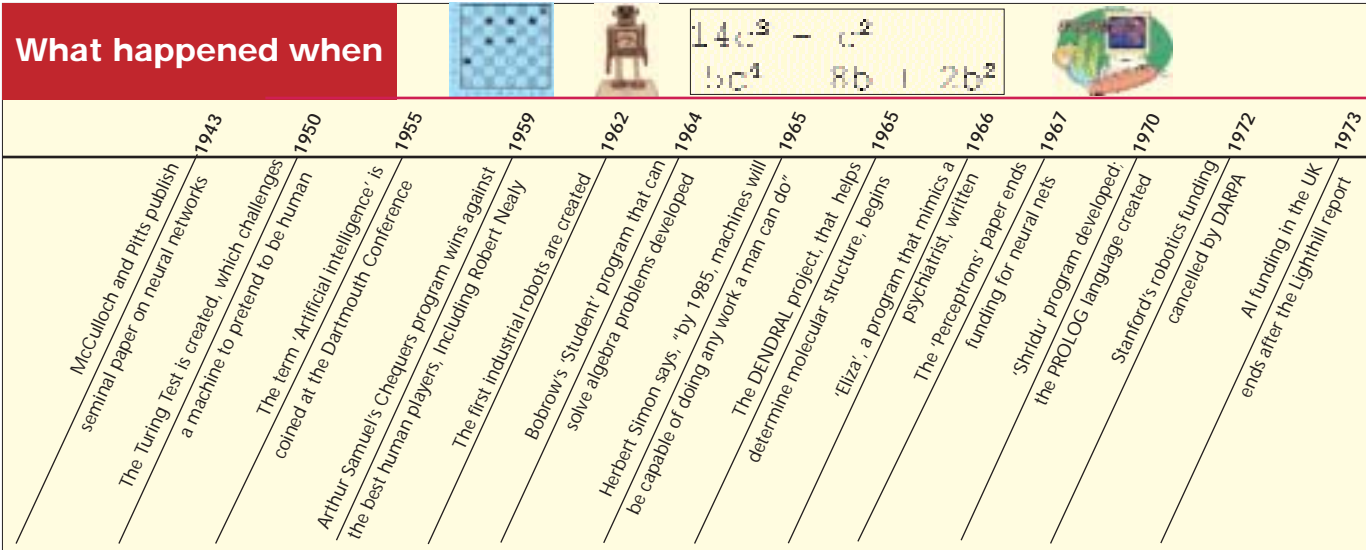
The AI philosophy

As a philosophy, AI is the idea that a machine can do whatever any brain can do. But this is one version of it, called strong AI. Weak AI, as the name suggests, says that a machine can do quite a lot of what a brain can do. Operational AI says that …well, there are lots of flavours of AI: to each his own belief. Minsky said that brains were machines made of meat; this statement almost defines Strong AI. The Strong AI viewpoint is AI at its most extreme: it says that we are machines, and predicts that everything you see in any sci-fi movie that involves robots, and more, is possible. Minsky's dream involves one of the biggest AI controversies, and in all of science—as well as in popular-science culture: whether we can ever pass on our intelligence to our pet robots.

You can try and build machines that just behave in an intelligent manner, or you can try and find ways to build one that actually is intelligent, and understands what it is doing. To a Strong AI practitioner, these two are essentially the same thing—if a machine behaved intelligently, there was no way you could say it did not understand what it was doing. And to adherents of the viewpoint that human intelligence can never, even in theory, be enacted on a machine, it was very important indeed whether a machine actually understood what it was doing. We could say that most people working on AI

What happened when

Year	Event
1943	McCulloch and Pitts publish seminal paper on neural networks
1950	The Turing Test is created, which challenges a machine to pretend to be human
1955	The term 'Artificial intelligence' is coined at the Dartmouth Conference
1959	Arthur Samuel's Chequers program wins against the best human players, including Robert Nealy
1962	The first industrial robots are created
1964	Bobrow's 'Student' program that can solve algebra problems developed
1965	Herbert Simon says, "by 1985, machines will be capable of doing any work a man can do"
1965	The DENDRAL project, that helps determine molecular structure, begins
1966	'Eliza', a program that mimics a psychiatrist, written
1967	The 'Percepitrons' paper ends funding for neural nets
1970	Shridu program developed: the PROLOG language created
1972	Stanford's robotics funding cancelled by DARPA
1973	AI funding in the UK ends after the Lighthill report

don't bother about this, and the split seems to be between AI workers—who build, say, intelligent controllers, and take Strong AI for granted—and cognitive scientists, who study what understanding and consciousness are.

John Searle sparked off a debate in the 1980s, which openly challenged the likes of Minsky, with his famous Chinese-Room thought experiment (*see box 'Searle's Chinese Room'*). It's a very simple argument, but it led to a fabulous number of debates. So many that even today, people devote large amounts of space in Masters and Doctoral theses to discuss the Chinese Room and its counter-arguments.

Machine understanding?

So, do machines understand what they are doing? Can they? Does it make sense to say that a machine is thinking, feeling, and understanding? Strong AIers says that they can; but proponents of other AI viewpoints, as well as many in the general public, say no. One thing that propels people into not believing in strong AI is that people don't like being compared to machines. Some feel indignant if it is suggested that they might be nothing more than something that can be built in a laboratory. That 'nothing more' is at the heart of the problem, philosophically speaking: we have not yet found what it means to be human.

Whereas the previous holy grail of AI, the wonder-robot, has been replaced by the real mystery of consciousness and awareness. You can get a flavour for the kind of debates that rage on at sites such as *http://KurzweilAI.net*, *http://edge.org*, *http://AI.about.com*, and others. Hence, although the state of the art of AI reach-

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Searle's Chinese Room

Searle's Chinese Room is a thought experiment, i.e., an argument that one ponders, and draws conclusions from. It involves the idea that even if a robot does things that seem intelligent, such as answering questions about a story it has been told, it does not really understand anything at all.

Imagine a Chinese story-understanding system, where a man who knows no Chinese at all is sitting inside a closed room. This man corresponds to the robot's understanding. He communicates with the world by reading slips of paper, with Chinese on them, thrown in to him in his room—which correspond to the questions about a story input to the robot. He throws out slips of paper—the answers to those questions—in Chinese, according to rules that have been assigned to him. These rules correspond to the rules according to which a robot might operate. So, when the system is working, the man receives slips of paper, looks up his rule book, and throws out appropriate paper slips. Hence, it appears to a Chinese person, as though the system is doing something intelligent; but the man inside understands nothing of the story at all!

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es out to such stupendous achievements as intelligent controllers guiding satellites near Mars, all by themselves, a lot of the focus today is still in understanding how our brains work. Thousands of people are studying how cognition takes place. Research in this area does not actually produce gizmos; but it is a science that will last us a long while, and it is one of the most exciting fields in AI today.

Will robots inherit the earth?

As Minsky said, the true majesty of general intelligence still awaits our attack. Explore some of the material out there, and come to your own conclusions: Is robot intelligence possible? But the point is that we may not need to build one super-robot for Minsky's Dream to come alive; it can be done in stages. We alre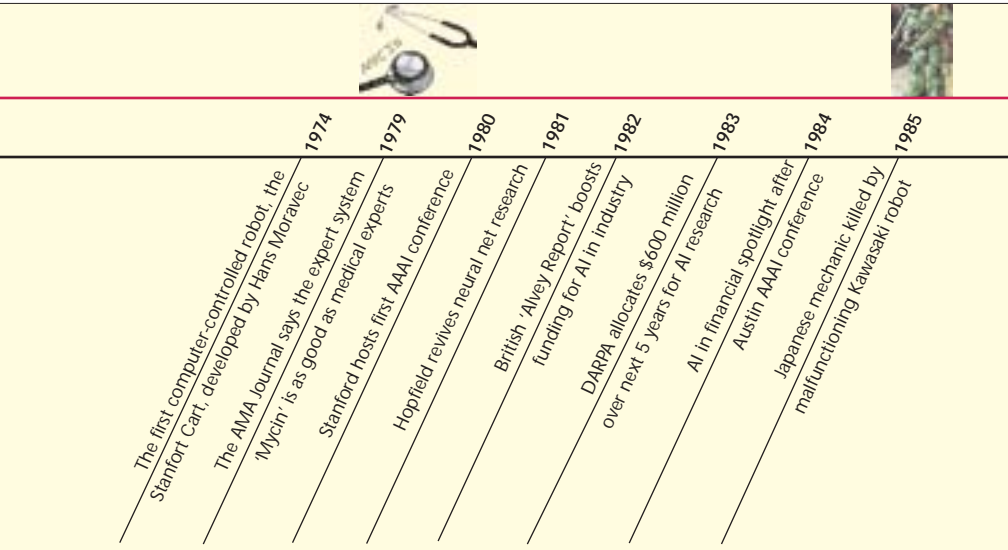ady have people who augment their bodies at the tissue and sensor level. If tissues can be replaced, what about major organs? And when it comes to the brain, we already know that certain areas of the brain control certain aspects of our senses and perceptions; electrodes placed at specific locations can cause specific sensations. So can we not have an array of electrodes, so that we can feel exactly the way we want to feel?

We also know that our thoughts are governed by certain nerve impulses. If the specifics were mapped out, may we not be able to think in a particular way, whenever we want, wherever we want? What about attaching various thought-modules to ourselves, to be used as and when required? And hence, in the near future, can we expect our race to be composed of entities that are part human, part robot? And after that, can we anticipate pure robots, without any organic tissue? Where is the dividing line?

Equally compelling are the questions and arguments of nay-sayers: scientists and thinkers who believe that we will never be able to adequately explain how our brains work; that mechanical devices in our brains may make them faster or change our mood, but will never be able to make a fundamental difference; that no machine will ever be able to understand things the way we do; and so on.

These are profound issues, these are interesting times, and what was science fiction, may soon be reality. Of course, we've heard that phrase several times before: "what was fiction may become reality". But there's a difference here. We're talking about ourselves.

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The first computer-controlled robot, the Stanford Cart, developed by Hans Moravec — 1974

The AMA Journal says the expert system 'Mycin' is as good as medical experts — 1979

Stanford hosts first AAAI conference — 1980

Hopfield revives neural net research — 1981

British Alvey Report' boosts funding for AI in industry — 1982

DARPA allocates $600 million over next 5 years for AI research — 1983

AI in financial spotlight after Austin AAAI conference — 1984

Japanese mechanic killed by malfunctioning Kawasaki robot — 1985

30Minutes Expert

What's in the password?

In the world that is the Internet, since a time when everything was free, people have been hoarding online accounts offering free access to everything imaginable. It's free, how could you not sign up? So now you've signed up for free e-mail, access to forums, online shopping accounts, and all by way of that combination of characters that we call a password. The problem now is to remember all those passwords. A popular solution is to have one common password for all your online accounts; a safer bet is to recruit a simple program that will remember all your passwords for you, and even fill them in when required. AI RoboForm (*www.roboform.com*) is one such tool which integrates brilliantly with Internet Explorer and compatible browsers such as MyIE2 and Slim Browser. It works with other browsers too but does not offer as much functionality.

Begin the setup, and follow the on-screen instructions. After selecting the language, you are presented with three choices for setting up your identity. The first option that allows you to enter all your personal data from scratch is the ideal choice. The second and third options are for previous users of Gator and AI Robo-Form. Once the program files are copied, you are asked for your name and e-mail address. Enter your details, and continue to the next screen where you can set a master password. This master password will be the only password you have to remember from now on and it cannot be recovered if you forget it. Select all three checkboxes to password-protect all your information. You can also set the time-out period for the automatic logoff so that others don't have access to your accounts while you are away from your desk..

Enter a name for your new identity, and your place (choose 'Other' for India). Fill out all your personal details. In some cases, you may not want to give accurate private information to a particular Web site. To get around this, you can have multiple identities, one identity with complete and accurate information, and another with less than accurate informa-

The Identities form is the last form you ever have to fill

tion. Fill out the first one with all your details, and then right-click Identity Name on the list of identities, and select Clone. Enter a new name, and then edit the details you want to change.

After you're done creating all your identities, click on Finish Setup. You're automatically taken to the RoboForm Web site, where you fill up a test form on their site. This will acquaint you with how forms are filled automatically. Ensure that you can see the RoboForm toolbar in your browser. If you cannot, go to *View > Toolbars > RoboForm* in the Internet Explorer.

When you visit a page with a form, the AutoFill window pops up. Select an identity, and then click the Fill Forms button. If you've entered all your details right, this should work like a breeze. It can't achieve 100 per cent accuracy, and fell short in some cases where there were drop-down boxes. Nevertheless, this will definitely make filling forms much quicker.

The Fill Form box comes up when you visit any page with a form

AI RoboForm lets you log in to your online accounts automatically. Saving this information couldn't be simpler. Simply go to the Web site you wish to log in to, and proceed to enter your username and password. As soon as you click the Submit button, a window will come up asking to AutoSave your login information as a Passcard. Enter a name, and save it. You can do this one by one for all your accounts right now, or simply save the information for the next time you want to log in to each account. Over a period of time, all your logins will be automatically saved here,

Passwords are saved automatically

and you can then log in to each one automatically, as needed.

After restarting your PC, when you attempt to log in to any of your Passcards, you will be asked for your master password. You only have to enter this once to access all your accounts. To log in to any of your accounts, go to the RoboForm Toolbar and click on Passcards. From the list that comes up, select the account you want to log in to. Your browser will automatically go to the site, and RoboForm will log in for you. Bear in mind that it's just as easy for someone else with access to your desktop, to log in to any of your accounts and read your sensitive data. Worse still, they can view and edit the data that you have saved in RoboForm itself. To stop this from happening, remember to click Logoff on the toolbar whenever you leave your desk.∎

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LIGHTS!
CAMERA!
PHOTOSHOP
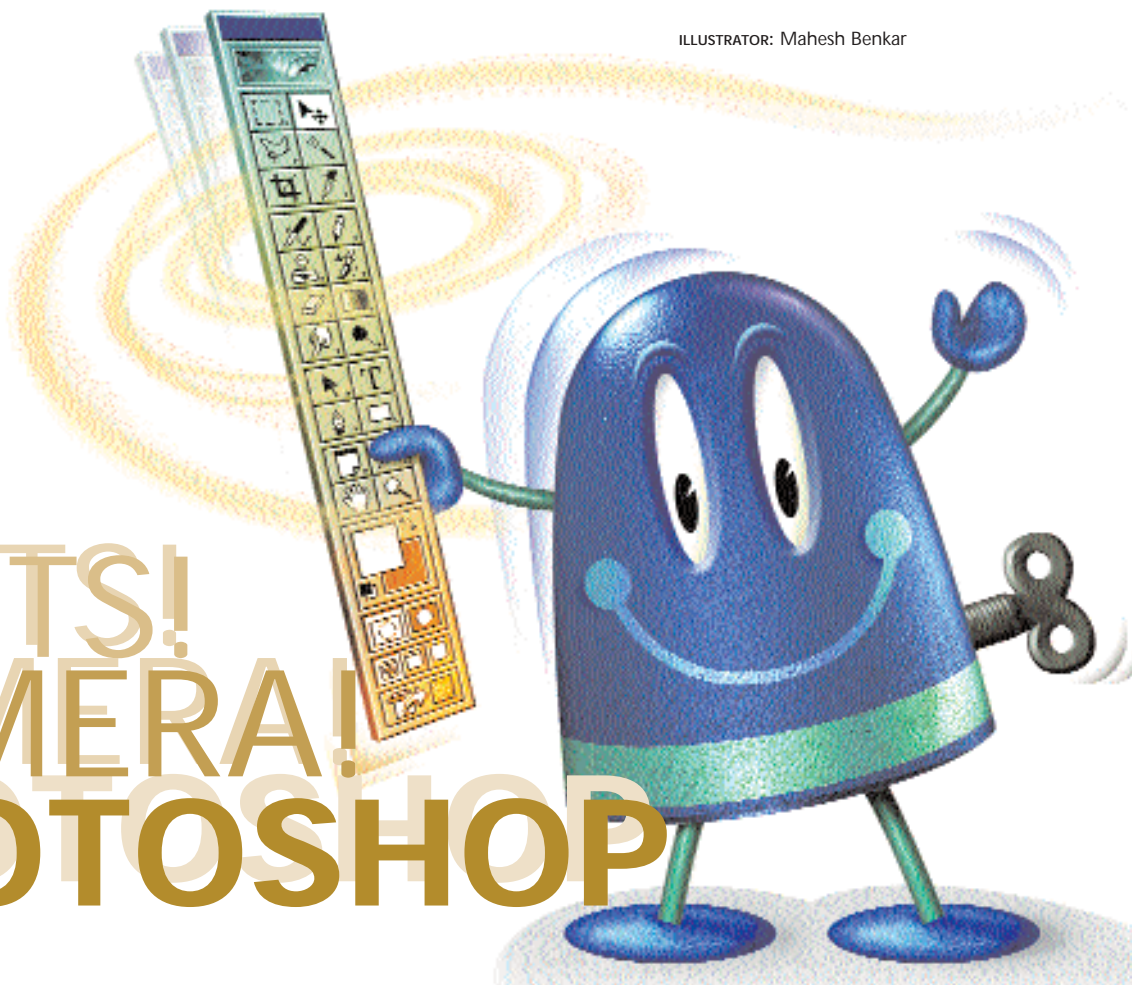
Use Actions in Photoshop to save sets of commands for a more efficient image editing experience

Action! No, this isn't some director shouting on a movie set. This is a tool in Photoshop that lets you accumulate a series of commands into a single action. Say, you have devised a way to give your text an 'exploding' look. Unfortunately, this involves 18 steps and commands, and there's no way you will remember all 18, leave alone in the order of execution, the next time you want this effect. This is where actions help, all you need to do is record your actions and then play them back on any text to get the same effect.

So what are actions? An action is a series of commands that can be played back on a single file or a batch of files. It can be compared with macros in Microsoft Word. Actions are the most important aspect of automating work in Photoshop. All other automate commands, directly or indirectly, depend upon actions. For example, an action can be created to change an image into a thumbnail, followed by the Outer Bevel command to give it a button-like look, and a Save command that saves the file in a specified format. The best part is once you define an action, it can be applied to any number of files, as many times as you like.

You can record almost any command and tool operation as an action. Photoshop comes with many predefined actions and more can be downloaded from the Internet, *(See box, 'Sites to Visit')*. All actions are accessible from the Actions palette.

Most tasks related to actions are performed using the Actions palette. This palette can be turned on and off by pressing [F9] or by going to *Window > Actions*. There are two modes in which the palette is displayed: the List mode and the Button mode. In the default List mode, sets, actions and commands can be collapsed and expanded. To do this, click the triangle to the left of the set, or action, in the Actions palette. If [Alt] is kept pressed while clicking the triangle, all actions in that set, or all commands in that action are expanded or collapsed. If the name of the action is clicked, that particular action is selected.
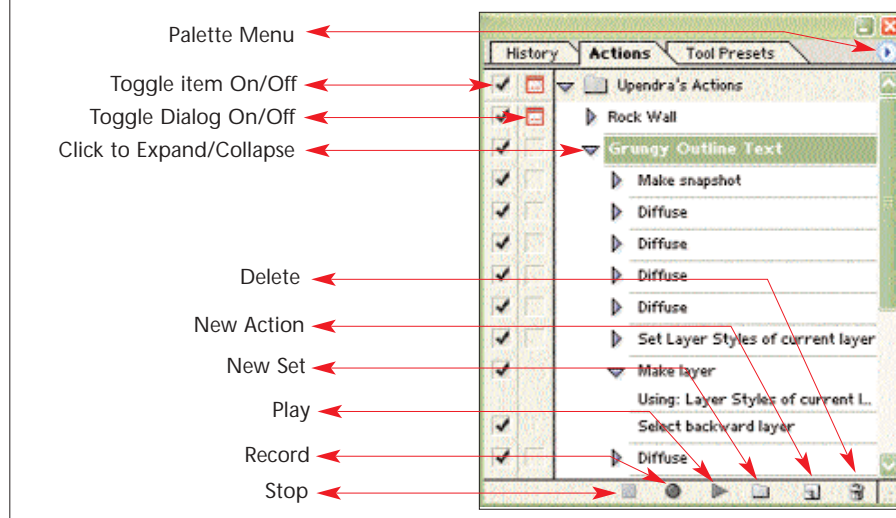
Recording… please wait!

Before you begin recording actions, remember that actions recorded for a particular file might not yield the same result on another—for example, a 3-pixel Gaussian blur won't create the same effect on a 72-ppi file as on a 144-ppi file. Also remember that when recording actions that include dialog box and palette settings, only the changed settings are recorded. Since the tools that record position use the units currently specified by the ruler, it is a good idea to set the ruler units to per cent. This helps while applying actions to files of different sizes.

To create a new action, open a file. In the Actions palette, click New Action, or choose New Action from the palette menu that pops up when you click the triangle at the top right corner of the palette. In the dialog box that pops up, enter a name for the action. Assign a keyboard shortcut and a colour—for the action to be displayed in Button mode—if you want. Now press Record and the Record button in the Actions palette turns red. Whatever commands and operations are performed now, will be recorded in the action. Press Stop when you're done. While using the *File > Save As…* command, do not change

What's Where...

Palette Menu

Toggle item On/Off

Toggle Dialog On/Off

Click to Expand/Collapse

Delete

New Action

New Set

Play

Record

Stop

Using Snapshots

Often you may apply an action to a file and be dissatisfied with the results. The history palette keeps track of only the last 20 commands. So if you want to revert to something you did 20 commands ago, you'll need a little help. Always take a Snapshot of the image before applying an action.

The Snapshot command make a temporary copy of any state of the

Use Snapshots to revert to any state of your image

image. To revert to the previous state, just click the name of the Snapshot that you want to revert to. You can also create duplicate images for any snapshot.

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the filename, else all files you run the action on will be saved with the exact same filename.

Cut!

If you want to apply a particular command to only a selected area of an image, you can use actions by inserting a Stop. You can insert a Stop while recording an action or even after it is recorded. When the action is applied, it will stop and allow you make changes, such as using the Paint Brush, adjusting the Hue and saturation, etc. You can then continue the action by pressing Play.
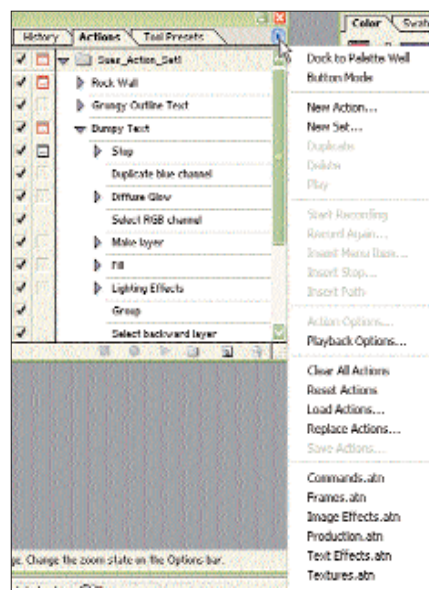
The Palette menu is the place you will find most of the commands to create, edit and play actions

To insert a Stop while recording an action, click the triangle at top right-hand corner of the Actions palette and choose 'Insert Stop…' from menu that pops up. Enter a message that you want to be displayed. If you want to allow yourself to continue the action without doing anything, check the 'Allow Continue' checkbox. Now, click OK to continue recording the action.

Fine tuning…

In the Actions palette, you will see two icons to the left of every step. The first is a checkmark that shows that this particular command will be executed when the action containing it is played. In case you want to execute only selected commands of a particular action, unselected the commands you don't want to execute by clicking this icon. The icon next to the check mark shows whether the command is a modal command or not. When a modal command is reached, the action is paused and a dialog box pops up, asking you for permission. The most common example will be the Stop command. This icon is very useful when you want to make your action more flexible. For example, suppose you are recording an action. At one point, you adjust the colour balance. Now every time the action is played, the same values of colour are used. But every image is different, and there is usually a need for different parameters. In this case, you need to enable the dialog box for that command. To do that, simply click on modal icon in the palette. Now the dialog box will wait for you to enter the values before continuing with the rest of the action.

One problem with actions is that they don't record painting and toning tools, tool options, view commands and window commands. However, many of these can be inserted using the 'Insert Menu Item'. To do this, select 'Insert Menu Item' from the Actions palette menu. Now, with the dialog box open, choose the command you want to insert from its menu. Click OK. Unlike other commands, this one is not executed while recording; it will be executed only when the action is played. Also, if a command that opens a dialog box in inserted, you cannot disable the modal control from the Actions palette.

Piecing it all together

Once you've recorded and customised your actions, it's time to put them to the test. Simply open a file, select the action you want to play by clicking on it and click Play. You can also choose Play from the palette menu; If you assigned a shortcut key at the time of recording the action, you can use that as well.

You can use actions to execute a list of commands, but what if you only want one or some of the commands listed under the action? To execute a single command from

an action, open the actions palette and hold down [Ctrl] and double-click the command. You can also select a command in the actions palette and then press Play. This will execute the command you selected and all commands after that.

When you play any action, the individual commands are executed too fast to see their effect. If something goes wrong, you will not be able to trace the command that erred. Fortunately, you can control the action speed. In the actions palette, you will find Playback Options. This is where you can control the speed of the action. The default option here is Accelerated. If you choose 'Step by Step', after each command the image will be redrawn. You can also specify the amount of time to pause between each command.

Often you will need to edit or modify actions, especially if you have downloaded action scripts off the Internet. Repeating them step by step and changing a few commands can be painful. You may also want to rearrange commands, add a few commands, duplicate commands, or just delete a few commands. Most of this
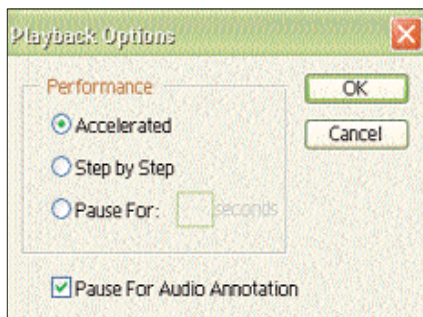
Use Playback Options to select how fast actions should play

can be achieved by dragging and dropping with your mouse.

To rearrange commands within an action, go to the actions palette and just drag a command and drop it to the chosen place on the list. To add commands at the end of the list, just press record and perform the command. Alternatively, you can select a command, press record and execute the action you want to add—this will add the new command just after the selected command.

To rearrange actions, drag the action to its new location before or after another action. When the highlighted line appears in the desired position, release the mouse button. Use the same procedure to arrange commands within actions to change their order of execution. If you want to re-record any command, just double-click on it, enter new values and click OK. But if you want to record the whole action, click the name of the action and choose 'Record Again…' from the palette menu. To copy a command, simply hold the [Alt] key and drag it to a new location. For deleting sets, actions or commands, select them and click on the trash icon, or drag them to the trash icon. You can also choose 'Clear All Actions' from the Actions palette menu to delete all your actions.

Photoshop 7 automatically saves all actions in the actions palette on exit to the *Settings > Actions Palette* folder. However, if you want to choose a location, so that you can share them with your friends or even on the Internet, open the Actions palette, select a set and click on Save Actions. The actions will be saved as .atn files. If you hold *[Ctrl] + [Alt]* while clicking on Save Actions, all the commands in that action will be saved as a text file. However, this text file can only be used as reference or for printing, and cannot be loaded into Photoshop again.

Once you have saved your Actions as .atn files, you can play them on any

machine running Photoshop. The Action files, which are available on the Internet are also in this format. To use these Actions, first you will have to load them by choosing 'Load Actions' from the Actions palette menu, and then locating and selecting the action set file, and then clicking Load. Now you will see all the Actions contained in that .atn file in the Actions palette.

If you have a few images, you can open them individually and perform an action, but if you have too many, you will need to use the Batch command by going to *File > Automate > Batch*. This lets you play an action on a folder of files and subfolders. You can choose to leave all the files open, close and save over the originals, or save the modified versions of the files to a new location.

Choose the desired set and action that you want to play, and choose the source folder of the files. Select 'Override Action "Open" Commands' if you want 'Open commands' in the action to refer to the batched files, rather than the filenames specified in the action. Remember, if you select this option, the action must contain an Open command because the Batch command will not automatically open the source files. Now, Select 'Include All Sub-folders' to process files in subfolders. Select 'Suppress Color Profile Warnings' to turn off all Color Policy messages. Choose a destination for the processed files from the Destination menu. Select 'Override Action "Save As" Commands' if you want all 'Save As' commands in the action to refer to the batched files. If you chose Folder as the destination, specify a file-naming convention and select file compatibility options for the processed files.

Saving files using the Batch command options always saves the files in the same format as the original files. To create a batch process that saves files in a new format, record the Save As command followed by the Close command as part of your original action. Then choose 'Override Action "Save In" Commands' for the Destination when setting up the batch process. Now, click OK to begin the batch execution of the files.

There are other Photoshop features that are based on actions, such as Droplets, Picture Package, Contact Sheet and Web Photo Gallery. Explore them, and you will surely be amazed by their power and ease. You can also download actions files from the Internet and try them out. Happy Actioning!

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Adobe Studio Exchange: Here you will find more than 4,000 actions in assorted categories, as well as plug-ins, extensions and tutorials. You can also share your own custom made actions here.
http://share.studio.adobe.com/

About: Your one stop destination for downloading free and paid Photoshop Actions! This site also links to hundreds of other sites where you can download tons of Actions.
http://graphicssoft.about.com/cs/ photoshopactions

Action Addiction: This site features many actions available for download. Apart from that, this site also features tutorials on actions, reviews of related software and books, and an online bookstore.
http://www.actionaddiction.com/

Web Teknique: A good site for with actions classified according to categories such as Glass and Plastic Effects, Metal Effects, Fun Effects Liquid Effects, Food Effects, etc.
http://www.webteknique.com/photo-shop_actions.asp

Share your Windows

Find out how you can share your Windows XP system with others and give them the right privileges

In small offices, colleagues may often be required to share computers. This compromises your privacy, making your PC vulnerable to prying eyes. Early versions of Windows, such as Windows 95, did not provide any sort of privacy between the different users of the system. A system's security does not depend solely on the software used; It also depends on the file system. The popular file system FAT32, does not provide any form of security at the lower level. To overcome this limitation, Microsoft developed the NTFS file system that has advanced features to allow it to define exactly what actions each user can perform.

Not so simple file-sharing

Windows XP comes with two file-sharing features—simple file-sharing and shared documents. The former allows you to decide the level at which other users can access shared documents over the network. Simple file sharing is enabled by default. Now to share a folder, right-click on it, select Sharing and Security, and enable the 'Share this folder on the network' option. Give it a sharename that can be used by everyone to access it with equal rights. All users over the network will be able to view the contents of the shared folder, and its sub-folders—they will not have access to any other folder. Give write-access to the shared folder by enabling the 'Allow network users to change my files' option.

To share documents using the latter method, drag the files and folders that you want to share into the Shared Documents folder. The contents of this folder will be visible to all the users who log into the machine locally. The shared documents can be accessed locally through the My Computer window. The contents of the My Documents folder are only visible to the administrators of the system, and the respective users. If you need to secure some folders in the My Documents folder from all the users, including the administrators, then right-click the folder, select 'Sharing and Security' and then select the 'Make this folder private' option. Remember that this will work only for the sub-folders in the My Documents folder.

Sharing securely

These are many simple ways of sharing data, but this may not be helpful if you wish to, say, share the company balance sheet with just your boss and the company's financial consultant. Such specific requirements can be achieved using Windows XP, but you have to turn off the simple file sharing feature. Doing this allows you to configure a whole new set of options. Assume that you have to configure the system for two sets of people with different functions—designers and accountants. Each group should be authorised to run a set of applications,

Check the 'Share this folder on the network' checkbox in the Sharing tab to share the folder

and more importantly, documents created by them should be visible only to them. The accountants also need to share critical financial data with their auditor over the network. Make sure that the operating system is installed on an NTFS partition for the following to work, and that simple file sharing is turned off. Also, the partition where the data is going to be stored has to be in the NTFS format.

All about users

There are some pre-defined users in Windows XP, such as the administrator, guest and two more users for providing remote help—HelpAssistant and Support. The administrator has full control over
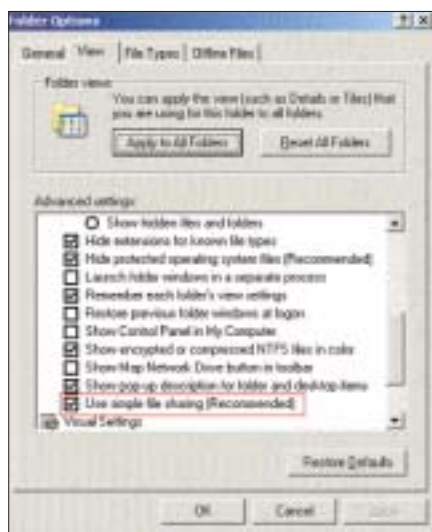
You will need to disable the Simple file sharing option to access advanced sharing features

Creating an NTFS Partition

NTFS (New Technology File System) is an advanced file system that is used by Windows XP, 2000 and NT. The most important NTFS feature is the ability to encrypt files and folders to protect your data. It also supports large volumes and powerful storage solutions such as RAID. Existing FAT16 and FAT32 partitions can be converted to NTFS partitions without losing any data. If you use other operating systems, such as Windows 9x, or Linux, it's preferable to have Windows installed on a FAT32 partition, since an NTFS partition does not support multi-booting.

The command line tool in Windows XP allows you to convert an existing FAT32-based partition into a NTFS partition. Go to the command prompt, and enter '*Convert volume /FS:NTFS*': Here, volume is your drive letter, followed by a colon.

If you try to convert the partition, in which Windows is installed into NTFS, the conversion will start when you restart the system. Note that there is no built-in utility to convert NTFS to FAT32, so be careful before you change your file system.

the system. You cannot delete the administrator account; in fact, you can't delete any of the built-in users and groups. The guest account has the lowest privileges in the system—it provides minimal access to the system. By default, the guest account is turned off.

Users can be classified under different groups, based on the privileges that are assigned to them. In the example being discussed, your system should have two groups—accountants and designers. Privileges can be assigned specifically to each group. Hence, the designers will only be allowed to run photo-editing applications, while the accountants will be provided exclusive privileges to view the balance sheet. Whenever you create a user, add him or her to the corresponding group. By doing so, the new user is automatically assigned the rights that are provided to that group.

You can create users in two ways. The simpler method is through the Control Panel. Go to *Control Panel > User Accounts*. From here, you can create new users, assign the rights they are privileged to

and make changes to existing ones, provided that you have administrative privileges. You can also create a user, either with administrative privileges, or as a limited user.

Power users is also a pre-defined group that has more privileges than the normal user, but less than an Administrator—he or she can rename and modify only the users they have created. To create a power user, or a user with more specific privileges, right-click My Computer, and select Manage. In the left pane of the window that appears, expand 'Local Users and Groups'. Select Users, and a list of all the users created for the system will be displayed. You will find entries such as Administrator, Guest and HelpAssistant. These are all in-built users that cannot be deleted. Create a new user by right-clicking in the right pane, and selecting New User. Here, enter the username and the values for some optional self-explanatory fields, such as the Password, and the 'User must change password at the next logon' field, etc. By default, any user created in this manner will become a member of the Users group.

In the left pane, below the users entry, you will find the Group entry.

TIP Use the Local Security Settings tool that is present in the Administrative Tools folder in the Control Panel to have greater control over the PC. In the tool, select *Local Policies > User Rights Assignment*. You will find a list of policies, and a list of users and groups assigned to it. Right-click a policy, and select Properties to make changes to it.

Select the entry to find the Groups currently in your system. Double-click on any group to see the members of that group. You can add a group by right-clicking on the right pane, and selecting New Group. Now, create two groups and name them Accountants and Designers.
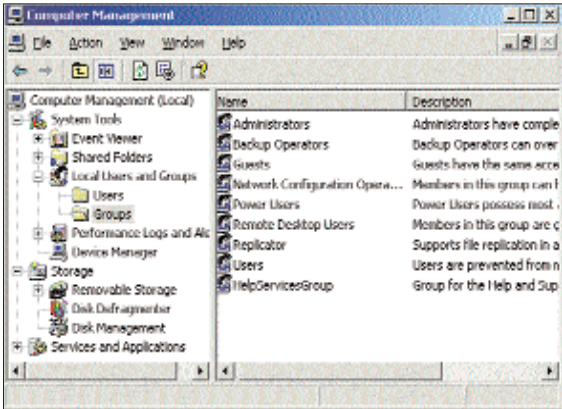
For the advanced users, Computer Management console is the place to create users and groups

Next, click Add to add users to the corresponding group. Then, select the Users group, and remove the users that you created, so that they remain exclusive to one group. If any user is a member of more than one group, then that user will have the least rights of both the groups. For example, assume that a user is a member of two groups—one of which permits the execution of a specific application, while the other doesn't. In this case, the user will not be allowed to execute that application.

Assigning permissions

After creating the users and grouping them, you can assign specific rights, and privileges to each group. Before that, you need to know about the different file permissions. Each NTFS partition will have some permissions associated with it, describing the rights of the users over the partition. Similarly, each folder will have some permissions associated with it. To view the permissions of the partition or the folder, right-click on it, select Properties, and then select Security. Note that you will not be able to see the Security tab if simple file sharing is enabled. In Properties, you will see a list of users and groups. Select any entry in this list to view its corresponding permissions at the bottom. These are the permissions for the partition. Any folder that is created in this partition will inherit these permissions. Similarly, when you create any sub-folder, it will inherit permissions from the folder in which it is created.

Now, create a folder where the designers can keep their documents securely. Assign permissions by using the 'Allow and Deny' checkboxes. If any checkbox is greyed, it means that permission has been inherited from the parent folder or partition. To pre-

Use the Allow and Deny checkbox to give specific permissions
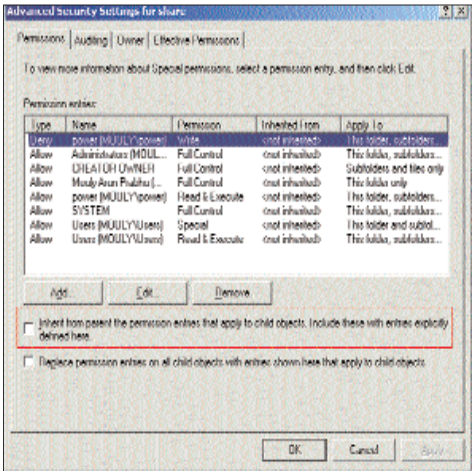
Uncheck this checkbox to disable the inheritance of permissions from Parent

vent inheritance of permissions, in the same Security window, click on Advanced. Here, uncheck 'Inherit from parent the permission…'; You will be asked if you want to copy the permission from the parent so that you can modify them, or if you want to give the permissions from scratch. Click 'Copy' to select the former option. In the 'Groups or user names' list, select users group and remove them. Now, click Add and enter the group name 'Designers' in the 'Enter object names to select:' field. At the bottom of the window, you can assign specific rights to the groups. There will be corresponding Allow and Deny checkboxes, for each type of permission. Although they are mutually exclusive, it is recommended that you use the Accept checkbox to assign permissions, i.e., select Assign if you want to give the permission, and uncheck it if you don't

The Keymaker

Whenever you create a user in the system, the operating system generates a random key that can be used to encrypt files and folders.

To encrypt a file, right-click on it, go to *Properties > General > Advanced*. Here, select 'Encrypt contents to secure data'. Note that if you remove the user after encrypting the data, you won't be able to retrieve it. Even if you create another user with the same name, retrieving data will not be possible, since it was encrypted using a random key. Hence, when you encrypt the data, take a back up of the certificate, which contains the random key.

Go to Run and type '*mmc*'. In the MMC window, navigate to *File > Add/Remove Snap-in...* Under the Standalone tab, click ADD. Select Certificates,

click Add, Finish, Close and then OK, on the respective 'Add to…' windows that pop up. Select 'My user account', click Finish. Then click Close on both the windows.

In the left pane of the MMC console, navigate to *'Certificates - Current User' > Personal > Certificates*. In the right pane, right-click on the user name whose certificate needs to be backed up. Select 'All tasks' and select Export.

Follow the instructions in the Certificate Export Wizard to export the certificate and the associated private key to a .pfx file format. You will be asked to password-protect your keys (it will be verified when imported later).

Run this PFX file before opening the encrypted file.

want to give the permission. Also, the checkboxes will be altered if you try to give some inconsistent choices, such as assigning the Write permission without the Read permission. Give Full Control permission to the Designers, and assign rights to other users and groups based on their need. You can make the administrator view the files, but not modify it, etc. Once you are finished with the folder for Designers, do the same for Accountants. Thus, you can ensure that the two groups don't meddle with each other's documents.

Now, if you want the applications to remain exclusive to a specific group, then you can do so by assigning rights over the folder where the application is installed. Go to the Security settings of the folder, and check 'Read & Execute'. Thus, both the groups will be in their separate worlds within the system.

Over the network

It is possible to control the number of users who can view your documents when you share it over a network. You can even share a folder that is visible over the network only to a specific user such as the auditor in our example. First, you have to create a user in your local system for the auditor, using which he or she can access the folder. Don't forget to password-protect the account, or else anyone can log in using that username. Then, create a folder within the accountant's directory, which will be shared with the auditor. Right-click the folder, and select 'Sharing and Security'. Select Share this folder, give it a share name and click on Permissions. In the groups list, select Everyone and click on Remove. Click on Add, and enter the auditor's username. Now, assign permissions such as Read only or Full Access.

Give the share name and assign rights to users over the shared folder

The auditor has to log in using the same username and password, and connect to the shared folder to have access. The auditor's system can run any version of Windows. However, in Windows 2000 or XP, he or she may not be able to use the same username since he or she may have used it to access another shared folder. In that case, go to *My Computer > Tools > Map My Network Drive.* Enter the shared folder address, and click on 'Connect using different username'. Then, enter the username and password created in the system that has the shared folder.

This is just the tip of the iceberg. There are a whole lot of settings you can play around with that will give you total control over your Windows XP PC. You can also use these settings to configure your family PC so that Dad, Mom and your siblings can make use of it amicably. ∎

MOULY ARUN PRABHU

(mouly_arunprabhu@thinkdigit.com)

Want to play games? Find out a shortcut? Retrieve a password? Tell the difference between master and slave? Read on...

I want shortcuts

Q. I have PIII 1.13 GHz processor with Windows 98 SE and Internet Explorer 6. When I want to type a site name, I have to type '*www.yahoo.com*' to open it, but on another PC, I can just type '*yahoo.com*' and press [Enter] to open it. What is the solution?
Pradeep Gade

A. You don't even need to type site-name.com for sites that begin with 'www.', and end with '.com', like www.yahoo.com; just type '*yahoo*' and press *[Ctrl] + [Enter]*. IE6 will fill up the rest. Depending on the browser you use, there are different shortcuts for Web addresses.

Back home

Q. I have a PIII 500 MHz system with 64 MB RAM and a 10 GB hard drive with three partitions, running Windows 98 and Mandrake Linux. I want to change the file system of the Linux partition back to FAT32. When I run Partition Magic, it gives

sos@jasubhai.com
E-mail us your computing problems, and we may answer them here! Since we get more mails per day than we can handle, it may take some time for your query to be answered. Rest assured, we are listening!

the message 'disk geometry error'. How do I convert the partition?
Sumit

A. Oops! Looks like you botched the partitioning process. Relax, it's possible to make amends using the latest version of Partition Magic, viz., Partition Magic 8 (*www.powerquest.com*). Alternatively, you can even begin the partitioning process from scratch. Note that since Linux uses the EXT3 type partition to function, you stand to lose all your data when you convert the partition.

Forgot something

Q. I have a Pentium III 850 MHz computer with 128 MB SD RAM, 20 GB Seagate hard drive, running Windows 98. When I start Windows, I get an error message that 'A required .DLL file, IMBROWSE.DLL is missing.' Please tell me how to rectify the problem.
Srikanth

A. The file probably belongs to an application you have recently uninstalled or re-installed. Start Windows in Safe Mode (Press [F5] when starting), go to *Start > Control Panel > Add/Remove Programs*, and remove all unnecessary programs. If that doesn't work, go to *Start > Run* and type '*regedit*'. Press [F3] to bring up the Search box, type '*IMBROWSE.DLL*' in the box, and remove

all instances that are found. Restart your computer.

Some play, but some do not

Q. I have installed quite a few games such as *Max Payne, Need for Speed: Hot Pursuit 2, Quake III*, etc. *Quake III* works fine, but when I run *Max Payne*, or *Need for Speed*, my computer restarts and I see the paths '*D:\windows\minidump\mini072303-01.dmp*' and '*D:\documents\SPF743~1.sen\local~1\temp\wer6c.tmp.dir00\sysdata.xml*' mentioned. D: is the partition I have installed Windows XP on.

I also have a problem playing files that I saved from CDs in Winamp 3. Strangely, I have no problem playing the same files in Winamp 2.8. Please help!
Nabarun Sengupta

A. Your computer could be acting up for various reasons. There could be a problem with your drivers, or with DirectX. Since *Quake III* uses OpenGL, it might not face the same problem. Update its drivers for all your hardware, and then upgrade the DirectX version to 9.0b.

This can also happen if you possess a high-end video card, but a weak power supply. If you have such a card, make sure you have a power supply of at least 300 Watts to eliminate this problem. Also, remember to re-install the games after updating your drivers, so as to replace any corrupted files.

We suggest you stick with Winamp 2.8, as it is known to be more stable. To enable enqueuing in Winamp 2.8, press [Ctrl] + [P] to enter Preferences, move to 'File Types', and check the 'Enqueue as default action' checkbox in the bottom right.

Graphics card for game

Q. I just bought an old Hercules Stingray PCI 128/3D model S3318 card, and would like to know the Web site from where I can download its drivers. Also, do let me know if I can play *Grand Theft Auto 3* using this card.
Sanjana Sinha

A Visit *http://us.hercules.com/support/old _driver.php3* to download the drivers for this card. Click on the appropriate operating system to get the drivers. Unfortunately, you will not be able to play *Grand Theft Auto 3*, as the card does not meet the minimum requirements for the game.

Expired, but locked

Q. I have installed a shareware version of Style XP to enhance the look of my XP. Now, the software has expired the trial period, but my XP was not restored to the older condition. The Fast user switching remains disabled, and it prompts for administrator password each time I try to log off, by displaying a message that my computer is locked. What can I do to restore my XP to the original default settings?
Ram Kishore

A In most cases, uninstalling the program should restore your system settings. You'll need to boot into Safe Mode—press [F8] at startup and choose 'Safe Mode'. Then go to 'Add/Remove Programs' in the Control Panel. Windows XP offers the 'System Restore' option in Safe Mode. If you haven't turned

Use System Restore to revert to a stable, previous state

Word, Excel and Outlook crash

Q. I have a Pentium III 500 MHz, 256 MB Ram, 20 GB hard disk, nVidia TNT 64 graphics card and run Windows Me. I have also installed Office 2000 Professional and Vcom System Suite along with many other freeware and shareware programs. I have the latest Windows and Office updates. Of late, when I start either Word, Excel or MS Outlook, I get this error message: 'Excel (Word or MS Outlook) has caused an error in MSO9.DLL. Excel (Word or MS Outlook) will now close. If you continue to experience problems try restarting your computer'. When I start either PowerPoint or MS Access, this problem does not occur. I have tried repairing the Office application, but to no avail. I have run the Office SR patches and tried removing the MSO9.DLL file, but still the problem persists. What do I do?
Parin A Jhaveri

A The procedure is pretty simple, just make sure you follow it carefully. For

ILLUSTRATIONS: Farzana Cooper

Windows Me, go to *Start > Search > For Files or Folders*, and type *'mso9.dll'*. In the Look In box, select My Computer, and click Search Now. When the file is found, right-click on it, and select Rename. Change the extension of the file to .old (mso9.dll.old), press [Enter], and close the Find Files window. Go to *Start > Settings > Control Panel > Add/Remove Programs*, and select Microsoft Office. Click on Add/Remove, and in the pop up box, select Repair Office. Now, click 'Repair Errors in my Office 2000 installation', and click Finish.

You could also try un-installing and then reinstalling Office.

the feature off, you'll be able to restore your system to the exact state it was in before you installed the program. Simply select the corresponding restore point.

Misleading information

Q. I recently purchased a Samsung 40 GB hard disk, but it does not get detected in the BIOS. When I refer my motherboard manual, it says that my system chipset is 'Intel 82440ZX PCIset (82443ZX + 82371EB) w/AGP solution' and also mentions 'Dual ultra DMA/33 IDE ports support greater than 8.4 GB HDD'. Why is my 40 GB hard drive not getting detected?
Rahul A Kavthankar

A Your manual only mentions 'greater than 8.4 GB', what it doesn't tell you is that it cannot support hard disks above the 32 GB limit. Your 40 GB hard disk has a jumper setting at the back that says '32 GB clip'. Setting the jumper to this position will let your motherboard detect the hard disk. Remember, enabling this also sets your hard disk to the slave position, so ensure that it doesn't clash with another device on the same channel.

Bad is really bad

Q. Though my computer is only a year old, my hard disk has already developed bad sectors. I am surprised that computers in cyber cafes are used extensively and do not get such problem, yet my sparingly used hard disk does. What is the main reason for bad sectors in hard disks?
Vijayananth

A Bad sectors are the bane of our existence. They can be caused by a myriad of reasons such as a malfunctioning device, a failing magnetic medium, severe jerks during transportation, etc. Voltage fluctuation and power outages can also result in the head touching the disk surface and causing physical damage. Please do check your mains for any voltage fluctuations, and verify whether you have a 350 Watts of power supply.

I am stuck with 580 x 600

Q. The current resolution of my computer is 580 x 600 with 16 colours. Whenever I change my display settings, it prompts me to restart the computer though I have set it to 'Change settings without restarting'. Even after I restart, I get an error message that says, "There is a problem with your display settings. The adapter type is incorrect, or the current settings do not work with your hardware". How do I fix this?
Gurpreet Singh Kalsi

Lost partition

Q. I have Intel Celeron 1.7 GHz processor, with 128 DDR RAM and a 40 GB hard disk, running Windows 98 and XP. The problem is that when I boot my system into Windows XP, it shows four partitions. However, when I boot into Windows 98, it just shows three partitions. It omits the partition in which Windows XP is installed. What should I do?
Soman Dubey

A. Soman, you will need to purchase a utility called Paragon NTFS for Windows 98 (*http://www.paragongmbh. com/n_ntfs.htm*), which will mount the Windows XP NTFS partition in Windows 98. Alternatively, you can re-install Windows XP and convert the partiton into FAT32.

What's the name again?

Q. I installed Red Hat Linux 8.0 on my pc. While installing, I was asked to enter root password, I entered it as 'mahendra'. Then I was asked to make users, but I didn't. Now when I boot my PC, I am asked to enter username and password, since I had not created any user. What should I do?
*Mahendra*

A. Don't worry, Linux always creates a root user that acts as the administrator of the computer. Simply enter 'root' as the username, and 'mahendra' as the password.

Where is DMA?

Q. I use the Parashar Jyotish software, but when I try to print a page it shows box like characters, instead of actual font. I have installed the software in all the versions of Windows—Me, 98, 2000 and XP. I am yet to find a solution. Can you help me? Also, I want to know where the DMA option is located in Windows XP.
Krishn Kant Pandey

A. To access the DMA option in Windows XP, go to the Control Panel and double-click on System. Go to Hardware and click on Device Manager. Double-click on the 'IDE ATA/ATAPI Controllers' category, and then double-click on 'Primary IDE Channel' to
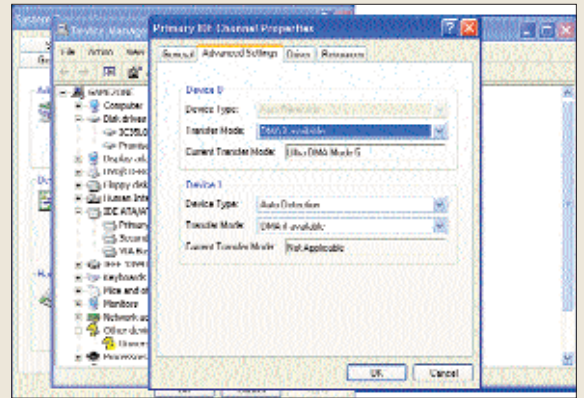
Access the DMA settings in the Advanced Settings tab

bring up the Properties sheet. In the Advanced Settings tab, you'll find the necessary settings. Access the DMA settings for 'Secondary IDE Channel' in the same manner.

Regarding your problems with the printout, it is program plus printer specific. Most likely, the program uses a font that the printer doesn't support. Check the printer's Web site for updated drivers. Alternatively, you may contact the software manufacturer to check if they have a software update for the application.

A. The fault, Gurpreet, lies with your graphics card's drivers. An incorrectly installed driver can cause this problem. You haven't specified your system configuration, so you'll have to locate your manufacturer's Web site and download the latest drivers for your operating system from there.

Buying a RAM

Q. I have a Compaq system Celeron 333 MHz, with 64 MB SD RAM and Windows Me. My computer is very slow, so I have decided to increase the RAM. Are there any technical specifications that I have to note before buying the RAM? I'm not sure about my motherboard, but I found (using Dr.Hardware), that my motherboard uses the Intel 440EX PCI chipset.
Vinay Nair

A. The specifications you need to keep in mind are the RAM type and its speed. In your case, the type is SDRAM, the speed could be 66 MHz or 100 MHz. Look for a 100 MHz module for the upgrade. In case you decide to keep your old stick, remem-

ber to buy the same speed RAM or else system conflicts will occur. You can buy RAM on a testing warranty basis to check for system compatibility.

Who came first? Master or slave

Q. I have a Pentium III 1.13 GHz machine running Windows 98 SE and Windows XP. My hard disk is connected as secondary master. When I connect another hard disk to my PC (as secondary slave), it does not boot from my secondary master hard disk, and boots from secondary the slave instead. CMOS setting shows first boot device as HDD0. Please give me a solution.
Pradeep Gade

A. First, connect the hard drive that has your operating system to the primary IDE channel, and configure it as your primary master. Next, connect the other drive to the secondary channel and configure it as a secondary slave. This will solve your problem.

Dreaded blue screen plague

Q. I have a Pentium IV with Windows XP

Professional and 512 MB RAM. For months now, I have been plagued with a recurring problem that leaves me frustrated. Every now and then, my PC crashes, leaving me with the dreaded blue screen saying, "A problem has been detected and Windows has been shut down to prevent damage to your computer". This is followed by some generic advice about how to fix the problem. Further, two important things that show up are: a program called win32k.sys along with a memory address, and second, 'IRQL_NOT_LESS_OR_EQUAL'. How can I fix this problem?
Mark

A. The problem can occur due to reasons, such as incompatible hardware or software, or a conflicting device driver. Pin-pointing the exact cause is difficult since you have not mentioned the exact error message. However, you can visit *http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/winxppro/reskit/prmd_stp_hwpg.asp* for the detailed steps to help you diagnose and rectify the problem.

Hard disk woes

I recently partitioned my 40 GB HDD using fdisk from DOS. The partition structure of my hard disk is as follows C: (Fat32), D: (Ext2), E: (Linux Swap), F: (NTFS), G: (FAT32), H: (FAT32). I had installed Windows Me on the C drive, Windows XP on the F drive, and Linux on the D drive. After repeated attempts I was unable to install X-Windows in Linux, so I removed Linux and re-installed Windows Me. Now my boot loader shows Windows XP and Windows Me, but boots only to WinME. 'fdisk' does not run and hangs the machine. I tried loading Partition Magic 6.0 but this shows an error 'Disk Geometry error. Partition's drive letter cannot be identified'. Please help me solve this problem.
Amit Paul

Nothing to worry about Amit, just use a Windows XP bootable CD to repair the Windows installation. If that doesn't solve it, run the XP setup and delete the Linux partition when you are prompted to partition your hard disk. XP will automatically detect previous versions and configure the boot loader accordingly.

Speed Boosters

I have a Pentium III 933 MHz PC with 128 MB SD RAM. My computer takes a long time to start. Secondly, the CD-ROM drive takes a long time to access when I click on My Computer. I want to make my PC faster, is there any software available that will do this?
Nitish Trikannad

Tsk, Tsk! Always remember to mention the operating system you use. In general, uninstalling all unnecessary applications, closing all background programs, and deleting unused fonts from the 'Windows\Fonts' directory will speed up your computer. You can use 'msconfig', an inbuilt utility to do most of this (go to Start > Run and type 'msconfig', and press [Enter]). As for your CD-ROM, it probably has a faulty lens and therefore takes time to identify CDs. Replace the drive if it's within the warranty period.

Graphic Card for Game

I have bought an old Hercules stingray PCI 128/3D model S3318 card. Can you please tell me the site from where I can download the drivers of the card? Also tell me if I can play Grand Theft Auto 3 using this card.
Sanjana sinha

The drivers for this card can be found at http://us.hercules.com/support/old_driver.php3. Click on the appropriate operating system to get the drivers. Unfortunately, you will not be able to play GTA 3 as the card does not meet the minimum requirements for the game (16 MB 3D video card).

Ring tone on Infrared

I have a Nokia 8250. It has an infrared communication system. I would like to send Ring tone from PC to my mobile. What are the things I will require.

In order to send a ring tone from your PC, you must first connect your phone to it. This can be done either via a data cable or using an infrared port. So you need to purchase a compatible data cable or get an external infrared port if your PC does not have one. You will also need connectivity software such as Nokia PC suite. Once connected, depending on the software you use, you will be able to send a ring tone across. If you use a Nokia PC suite, you can compose your ring tone and click on the 'Send to phone' button

www.Blank.page

Whenever I try to open Web pages (both offline or online), the Internet Explorer 6 window appears blank, but I can see the title and icons. I have a Pentium III, SM56 Motorola Internal modem, and runs Windows XP Professional.
Sudeep

This problem occurs due to a rendering fault with IE. Try installing an alternate browser, such as Opera, to see if it persists. If Opera works well, then you need to re-install Internet Explorer.

Haunted computer

Q. Over the past few days, whenever I move my mouse, the pointer starts running by itself and opens unwanted applications. At first, I thought that it might be some sort of virus, so I formatted and reinstalled with an up-to-date version of Norton AntiVirus 2003, but I still face the same problem. I have even removed and re-installed my mouse driver. It worked for a while, but started acting up again. What's wrong with my PC?
Praveen Tanwar

A Calm down Praveen, there's no need to go chasing mice all over the place! The solution is actually quite simple. You are probably using Microsoft Office XP with Speech Recognition enabled. The problem is that you haven't configured the Speech Recognition, which often results in 'haunted computer' syndrome. There's no need to go about uninstalling Speech Recognition either, as you might want to use it at a later stage. What you can do immediately is disable it, and later if you want, you can configure it to your voice. To disable it, go to *Start > Settings > Control Panel > Regional and Language Options*, in the applet go to *Languages > Details*, and check the

Web camera stopped working

Q. I have Windows 98 installed on my machine. The Web camera installed on my system was working perfectly until recently—it just doesn't activate anymore. I tried re-installing the drivers, but the installation failed. The camera is not detected when I plug it in either. I have checked the BIOS, and found the USB port is enabled. I also tried installing another camera, but even that wasn't detected. Finally, I installed my camera on another system and found that it works perfectly. What do I do?
Narender Negi

A Now that you've narrowed down the possibilities, we suspect that the USB port is the culprit. As you have already checked it is enabled, the port is probably malfunctional. To be doubly sure, you can install a version of Windows with better USB support, such as Windows XP. If the problem persists, your USB port is definitely kaput! You are then left with two options—either buy new USB ports with cables that connect to the USB header on your motherboard (if your motherboard has such headers), or buy a USB PCI card for new USB ports to connect your devices to.

Tweaking Windows XP

Q. I have an AMD Athlon XP 1700+ with Asus-A7V8X motherboard, 256 MB DDR 266 RAM and run Windows XP as the operating system. The problem is that my machine takes a very long time to boot up.
Santosh Choudhury

A Anytime an operating system is booting up, it requires time to load device drivers, start-up programs, etc. The loading time is further dependent on devices being initialised by their drivers. Sometimes a slow device such as an external modem can increase boot up time. Windows XP is a big step forward from previous versions—it brings along a lot of excess baggage in terms of services that start when you boot. To reduce the boot up time, you can use tweaking utilities such as bootvis, available at *http://www.microsoft.com/whdc/hwdev/ platform/performance/fastboot/bootvis. mspx*. If you want more information on how to tweak Windows XP to improve performance, take a look at the *Tips & Tricks special* that came along with the June 2003 issue of Digit.

Too many drives

Q. I have a Athlon XP 2000+ processor, 40 GB Seagate hard disk, 128 MB DDR RAM, ASUS motherboard and run Windows 2000 Professional. I also have a Sony 52X CD-ROM and an LG 48X CD-Writer. Recently, I bought a 16X DVD-ROM. The problem is that my vendor says it's not possible to install all three at the same time, reason being that the PC won't be able to locate both, the DVD-ROM as well as CD-ROM at the same time. Is this true? If yes, what is the solution?
Dipanshu Banerjee

A PCs are normally limited to four IDE devices. From the information that you have provided, you already have a hard disk, CD-ROM and CD-Writer installed. This leaves one IDE connector to which you can connect your DVD-ROM. If you do not have a free IDE connector, then you need to buy a combination drive that accommodates both a CD-Writer and a DVD-ROM. Use of a splitter in case you do not have a spare power connector for the drive. Also, you might run short of drive bays. Some cabinets have only two bays for optical drives. If so, you will have to buy a new cabinet with three bays. ■

tips&tricks
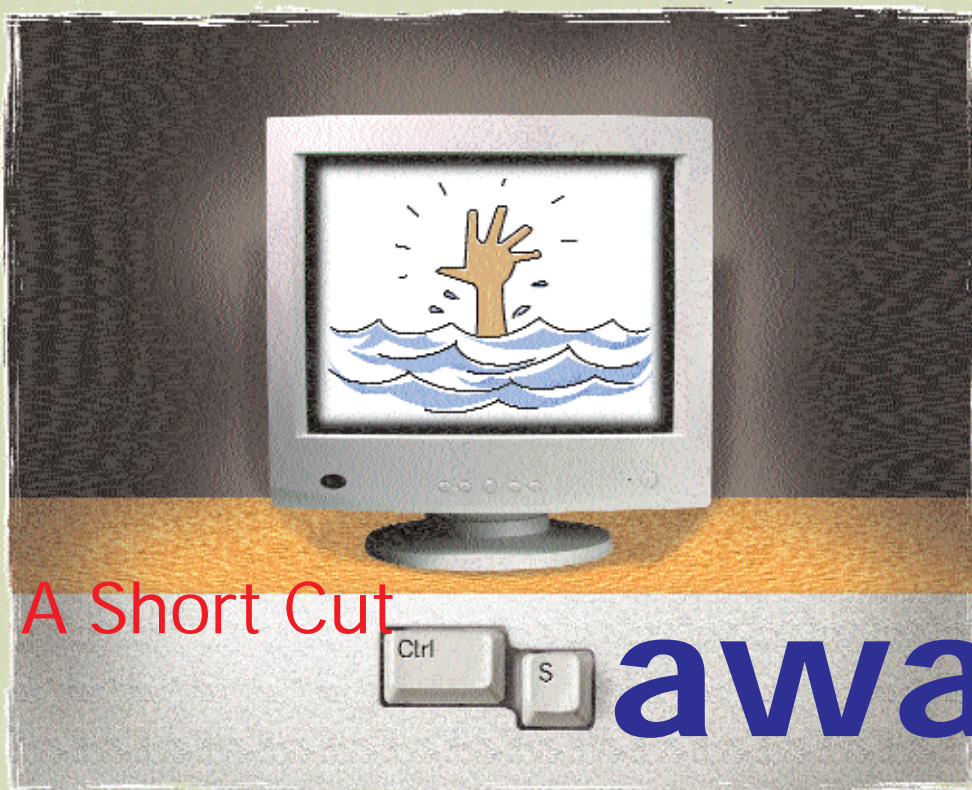
Here are a whole bunch of keyboard shortcuts to rescue yourself from those tiresome ambles with the mouse...

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contents

A Short Cut **away**

IILUSTRATOR: Mahesh Benkar

WINDOWS

If you want to...	Press
Select a menu; select or clear a check box by the letter under-lined in the menu name	*[Alt] + [Letter]*, where the [Letter] is the underlined letter in a menu command
Select or deselect an active item—after selecting a group of items using [Ctrl]	*[Ctrl] + [Spacebar]*
Select the main toolbar, beginning from the first item (generally File). After the first option is activated, navigate through menu options using the appropriate arrow keys. Press [F10] or [Alt] to exit	*[F10]*, or *[Alt]*
Rename a selected item	*[F2]*
Open the drop-down list box in Windows Explorer	*[F4]*, Pressing *[F4]* again moves the keyboard focus back to the previously used item
Bypass the AutoPlay feature when you insert a CD-ROM; to suppress the AutoExec macro in MS Word	*[Shift]* (while inserting the CD, or while opening Word)
Delete items permanently, without moving them to the Recycle Bin	*[Shift] + [Delete]*
Make a selection from the last selected item, to the current item, in any extended selection dialog box, combo box, or list box	*[Shift] + [Spacebar]*
Display a shortcut menu that shows a list of commands	*[Shift] + [F10]*, or the Application key (the key

If you want to...	Press
relevant to a selected object—same as right-clicking the mouse	next to the right-hand Windows key)
Close an active window	*[Alt] + [Spacebar] + [C]* or *[Alt] + [F4]*
Minimize an active window	*[Alt] + [Spacebar] + [N]*
Restore an active window	*[Alt] + [Spacebar] + [R]*
Maximize an active window	*[Alt] + [Spacebar] + [X]*
Expand the view of everything under the current selection, when working in Windows Explorer	[*] (on the numeric keypad)
Go one folder level up in My Computer or Windows Explorer	[Backspace]
Display the properties of a selected item, while working in a window	*[Alt] + [Enter]*
Display the document menu —the same as left-clicking the top left of a window	*[Alt] + [-]*, or *[Alt] + [Spacebar]*
Copy or cut a selected file to a folder by dragging it there	Hold [Ctrl] and drag on the file will copy a file. Holding [Shift] and dragging a file will move it

SPECIAL SHORTCUTS

If you want to	Press
Display Windows Help	*[Windows] + [F1]*
Open the Start menu	*[Windows]*, *[Ctrl] + [Esc]*
Open the System Properties dialog box	*[Windows] + [Pause Break]*
Open the Find Computer dialog box	*[Windows] + [Ctrl] + [F]*
Open Windows Explorer	*[Windows] + [E]*
Open the Find All Files dialog box	*[Windows] + [F]*
Minimize all open windows	*[Windows] + [M]*
Expand previously opened windows, and go back to the window you were working in last	*[Windows] + [Shift] + M*
Display the Run dialog box	*[Windows] + [R]*
Select and cycle through the taskbar buttons	*[Windows] + [Tab]*
Set focus on a notification (only in Windows XP)	*[Windows] + [B]*

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MICROSOFT OFFICE

Microsoft Word

If you want to...	Press
Insert the copyright symbol (©)	[Alt] + [Ctrl] + [C]
Insert the euro symbol (€)	[Alt] + [Ctrl] + [E]
Insert a comment	[Alt] + [Ctrl] + [M]
Switch to Normal view	[Alt] + [Ctrl] + [N]
Switch to Outline view	[Alt] + [Ctrl] + [O]
Switch to Page Layout view	[Alt] + [Ctrl] + [P]
Move the cursor to the top of the window	[Alt] + [Ctrl] + [Page Up]
Insert an ellipsis	[Alt] + [Ctrl] + [.]
Insert the trademark symbol	[Alt] + [Ctrl] + [T]
Go back to the cursor's previous location	[Alt] + [Ctrl] + [Z]
Return cursor to first cell in a row, when working with a table	[Alt] + [Home]
Move to the first cell in a column when working with a table	[Alt] + [Page Up]
Insert a Date field into a document	[Alt] + [Shift] + [D]
Insert a Page Number field into a document	[Alt] + [Shift] + [P]
Insert a Time field into a document	[Alt] + [Shift] + [T]
Expand text below a heading, while working in a document outline	[Alt] + [Shift] + [+]
Move between a master document and its associated sub-documents	[Ctrl] + [\]
Increase the font size of selected text by 1 point	[Ctrl] + []] (])

If you want to...	Press
Insert or delete one line space preceding a paragraph	[Ctrl] + [0]
Single-space the lines of selected text within a document	[Ctrl] + [1]
Double-space the lines of selected text within a document	[Ctrl] + [2]
Set the spacing between lines of selected text to 1.5	[Ctrl] + [5]
Centre align a paragraph where the cursor is located	[Ctrl] + [E]
Insert a page break at the cursor's position in a document	[Ctrl] + [Enter]
Apply subscript formatting (with automatic spacing) to selected text	[Ctrl] + [=]
Indent a paragraph from the left	[Ctrl] + [M]
Move cursor's position to the top of the next page	[Ctrl] + [Page Down]
Move cursor's position to the top of the previous page	[Ctrl] + [Page Up]
Remove current formatting of selected paragraph	[Ctrl] + [Q]
Remove a command from a menu	[Alt] + [Ctrl] + [-], and then select the menu item to remove
Display Customize Keyboard dialog box and create a shortcut key for a menu command	[Alt] + [Ctrl] + [+], select a menu command and add, change, or remove the desired shortcut key from within the dialog box
Add a toolbar button to a menu bar	[Alt] + [Ctrl] + [=], select the toolbar button—Word automatically adds the button to the appropriate menu
Increase the font size of selected characters	[Ctrl] + [Shift] + [>]
Format selected letters as all capitals	[Ctrl] + [Shift] + [A]
Double-underline a selection of text	[Ctrl] + [Shift] + [D]
Insert a column break at the cursor's position	[Ctrl] + [Shift] + [Enter]
Select the font field on the main taskbar, to change the font of the selected text	[Ctrl] + [Shift] + [F]
Reduce the selection size	[Shift] + [F8]

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If you want to...	Press
Apply hidden text formatting to a selection	[Ctrl] + [Shift] + [H]
Format selected letters as small capitals	[Ctrl] + [Shift] + [K]
Remove a paragraph indent from the left	[Ctrl] + [Shift] + [M]
Select the font size field on the window toolbar to change the font size of selected text	[Ctrl] + [Shift] + [P]
Underline selected text, but not the spaces in between the words	[Ctrl] + [Shift] + [W]
Activate the ruler while working in a document	[F10] + [Ctrl] + [Shift]
Display a shortcut menu	[F10] + [Shift]
Display Save As dialog box	[F12]
Change the cases of selected letters	[F3] + [Shift]
Activate Extend mode, EXT appears in the lower right corner of the window; pressing [F8] repeatedly extends the selection to the word, the line, the document; press [ESC] to cancel.	[F8], EXT appears at the bottom right-hand corner of the window. Pressing [F8] repeatedly expands the selection; press [Esc] to cancel

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KEYBOARD CONTROL FOR DESKTOP

Ever thought of browsing your desktop using only the keyboard? Here's how you can do it:

- Press *[Windows] + [D]* to show the desktop
- Press the *[Windows]*, to bring up the Start menu
- Press *[Esc]* to make the Start menu disappear, but keep the taskbar active)
- Press *[Shift] + [Tab]* once to toggle between the taskbar and the desktop. Your desktop will now be active, although you may not notice any visual indication of it
- Press [Down Arrow] to see which desktop icon is active, and continue to use the cursor keys to move to the icon you want to use
- Press *[Enter]* to run the icon, or press *[Shift] + [F10]* to see the context menu for that icon

MS PowerPoint

If you want to...	Press
Advance to the next slide	[N], Left-Click, [Spacebar], [→], [↓], [Enter], or [Page Down]
Return to the previous slide	[P], [Backspace], [←], [↑], or [Page Up]
Go to a particular slide	[Number] + [Enter]
Blacken or un-blacken the screen	[B], or [.]
Whiten or un-whiten the screen	[W], or [,]
Show or hide the arrow pointer	[A], or [=]
Stop or restart automatic show	[S], or [+]
End, or exit slideshow	[Esc], [Ctrl] + [Break], or [-]
Erase drawing on screen	[E]
Go to hidden slide	[H]
Rehearse-use new time	[T]
Rehearse-use original time	[O]
Rehearse-advance on mouse-click	[M]
Change pointer to pen	[Ctrl] + [P]
Change pointer to arrow	[Ctrl] + [A]
Change pointer to eraser	[Ctrl] + [E]
Hide pointer and button	[Ctrl] + [H]
Automatically show or hide arrow	[Ctrl] + [U]
All Slides dialog box	[Ctrl] + [5]
View taskbar	[Ctrl] + [H]
Show or hide ink mark-up	[Ctrl] + [M]

MS Excel

If you want to...	Press
Select a Help topic while using Office Assistant	[Alt] + [Number] (hitting [1] selects the leftmost option, [2] the next, and so on)
Move to the left between nonadjacent selections	[Ctrl] + [Alt] + [←]
Display the Style command; works even in a spreadsheet	[Alt] + [']
Insert the AutoSum formula; works within a cell, or formula bar of a spreadsheet	[Alt] + [=]
Select the entire active column	[Ctrl] + [Spacebar]

If you want to...	Press	If you want to...	Press
Select a folder or a file in the Open and Save As dialog boxes—use the arrow keys to move through the listed folders and files	[Alt] + [0]	With scroll lock on, extend the selection to the cell in the lower-right corner of the window	[Shift] + [End]
Scroll through a block of data within a row or column, in the direction of the arrow key	[End] + Arrow key	Extend a selection to the end of a field, when working in Data form	[Shift] + [End]
Move to the last cell in the current row that isn't blank—only works if you haven't selected the Transition navigation keys check box on the Transition tab	[End] + [Enter]	Select from the insertion point to the end of the text box entry	[Shift] + [End]
Move to the last cell on the worksheet	[End] + [Home]	Complete a cell entry and move up in a selection	[Shift] + [Enter]
Insert a new worksheet into a workbook	[F1] + [Alt] + [Shift]	Display a shortcut menu that shows a list of commands relevant to the selected object	[Shift] + [F10]
Open Office Assistant in order to display context sensitive Help, or to reveal formatting of selected characters	[F1] + [Shift]	Move to the previous pane	[Shift] + [F6]
		Move a selected field into the Page area when working with the Pivot Table Wizard	[Alt] + [P]
Maximize or restore the workbook window	[F10] + [Ctrl]	Open Microsoft Outlook Message Options dialog box when sending an e-mail	[Alt + [P]
Create a chart	[F11]	Display next screen to the right, while working in a worksheet or workbook	[Alt] + [Page Down]
Display Visual Basic Editor	[F11] + [Alt]		
Insert a new worksheet into a workbook	[F11] + [Shift]	Display previous screen to the left, while working in a worksheet or workbook	[Alt] + [Page Up]
Display Save As dialog box (file menu)	[F12]	Open the Address book while working in the To: field, when sending an e-mail	[Alt] + [.]
Edit a cell comment	[F2] + [Shift]		
Paste a function into a formula	[F3] + [Shift]	Move a selected field into the row area while working within the Pivot Table Wizard	[Alt] + [R]
Repeat the last action	[F4]	Send the active spreadsheet as an e-mail	[Alt] + [S]
Display the Go To tab on the Find and Replace dialog box	[F5]	Select only visible cells in the active window	[Alt] + [;]
Turn Extend mode on. This allows you to select as much of a worksheet or workbook as you want	[F8] to turn on, [Esc] to quit	Ungroup selected Pivot Table items, while working with Pivot Table	[Alt] + [Shift] + [←]
Increase the size of selected area	[F8] + [Shift]	Ungroup rows or columns in an outlined spreadsheet	[Alt] + [Shift] + [←]
Display the AutoFilter list for the current column	[Alt] + [↓]	Group selected Pivot Table items, while working within a Pivot Table	[Alt] + [Shift] + [→]
Extend or reduce a selection by one cell	[Shift] + Arrow Key	Group rows or columns while working within a worksheet	[Alt] + [Shift] + [→]
If multiple cells are selected, select only the active cell	[Shift] + [Backspace]		

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WINDOWS MEDIA PLAYER 9

If you want to...	Press
Play an item	[Enter], [Spacebar]
Switch to full mode (on the anchor window menu)	[Ctrl] + [1]
Display the skin shortcut menu (in skin mode)	[Shift] + [F10]
Shuffle the playback order of items in a playlist (in skin mode)	[Ctrl] + [H]
Repeat the playlist (in skin mode)	[Ctrl] + [T]
Increase the volume	[F10]
Decrease the volume	[F9]
Mute the volume	[F8]
Switch to full mode (in skin mode)	[Ctrl] + [1]
Access the Features Taskbar	[Ctrl] + [Tab]
Play or pause	[Ctrl] + [P]
Stop playback	[Ctrl] + [S]
Play the previous item	[Ctrl] + [B]
Play the next item	[Ctrl] + [F]
Rewind (available only when playing video files)	[Ctrl] + [Shift] + [B]
Fast-forward (available only when playing video files)	[Ctrl] + [Shift] + [F]
Display the menu bar in full mode	[Ctrl] + [M]
Display video in full screen	[Alt] + [Enter]
Zoom to 50 per cent	[Alt] + [1]
Zoom to 100 per cent	[Alt] + [2]
Zoom to 200 per cent	[Alt] + [3]
Eject the CD or DVD	[Ctrl] + [E]

WINAMP

Action	Shortcut
Miscellaneous Commands	
Always on top toggle (all but playlist editor).	[Ctrl] + [A]
Cycle through the Winamp windows	[Ctrl] + [Tab]
Go to Preferences	[Ctrl] + [P]
Jump to time in current track	[Ctrl] + [J]
Open new Winamp window	[Ctrl] + [Alt] + [N]
Main window Shortcuts	
Toggle the Repeat option.	[R]
Toggle the Shuffle option.	[S]
Open the current file info box	[Alt] + [3]
Playback Controls	
Play or restart a track	[X], [5] on the numeric keypad
Stop a track	[V]
Stop a track with fade-out	[Shift] + [V]
Pause or restart a track	[C]
Play the next track	[B], [6] on the numeric keypad
Play the previous track	[Z], [4] on the numeric keypad
Rewind 5 seconds	[←], [7] on the numeric keypad
Fast-Forward 5 seconds	[→], [9] on the numeric keypad
Open or play a file	[L], [0] on the numeric keypad
Open or play a directory	[Shift] + [L], [Insert]
Turn the volume up	[↑], [8] on the numeric keypad
Turn the volume down	[↓], [2] on the numeric keypad

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GRAPHIC SOFTWARE

Paintshop Pro 8

If you want to...	Press
Start a capture	[Shift] + [C]
Paste the clipboard contents into the current document as a new layer	[Ctrl] + [L]
Paste data from the clipboard into the current image as a new selection	[Ctrl] + [E]
Paste vector data from the clipboard into the current image as a new vector selection	[Ctrl] + [G]
Paste data from the clipboard into the current image using no background colour	[Ctrl] + [Shift] + [E]
Use the Crop Tool to eliminate or crop areas of an image.	[Shift] + [R]
Flip an image	[Ctrl] + [I]
Apply rotation to an image.	[Ctrl] + [R]
Adjust brightness and contrast	[Shift] + [B]
Apply gamma correction to the image	[Shift] + [G]
Adjust the hue, saturation and lightness.	[Shift] + [H]
Convert the current regular selection into a floating selection	[Ctrl] + [F]
Invert the current selection area	[Ctrl] + [Shift] + [I]

Photoshop 7

If you want to...	Press
Viewing	
Fit an image in the window	[Ctrl] + [0]
Get 100 per cent magnification	[Alt] + [Ctrl] + [0]
Scroll left, right, up or down 10 units	[Shift] + [Page Up] to go up, [Shift] + [Page Down] to go down, [Ctrl] + [Page Up] to go left and [Ctrl] + [Page Down] to go right.
Toggles layer mask on or off	[\]
Editing	
Move type in image	[Ctrl] + drag type when Type layer is selected
Align left, centre, or right	[Shift] + [Ctrl] + [L], [Shift] + [Ctrl] + [C], or [Shift] + [Ctrl] + [R] (while the type tool is selected)
Align top, centre, or bottom	[Shift] + [Ctrl] + [L], [Shift] + [Ctrl] + [C], or [Shift] + [Ctrl] + [R] (while the Vertical type tool is selected)
Show or hide a selection on selected type	[Ctrl] + [H]
Toggle Small Caps on or off	[Shift] + [Ctrl] + [H]
Toggle Superscript on or off	[Shift] + [Ctrl] + [+]
Toggle Subscript on or off	[Shift] + [Alt] + [Ctrl] + [+]
Toggle paragraph hyphenation on or off	[Shift] + [Alt] + [Ctrl] + [H]
Toggle single and every-line composer on or off	[Shift] + [Alt] + [Ctrl] + [T]
Decrease or increases type size of selected text by 2 points or pixels	[Shift] + [Ctrl] + [<], or [Shift] + [Ctrl] + [>], hold down [Alt] to decrease or increase by a factor of 10
Path editing	
Select multiple anchor points	[Shift] + left-click, while the Direct Selection tool is selected
Select the entire path	[Alt] + left-click, while the Direct Selection tool is selected.
Switch from Path Selection tool, or Pen tools to Direct Selection Tool	[Ctrl]
Switch from Direct Selection Tool to Convert Point Tool	[Alt] + [Ctrl]

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INTERNET

Keyboard shortcuts are useful when you need that little extra control over your surfing ways. Indeed, they are of great help when when filling Web forms, moving to a different tab, completing a Web address that's been typed over a million times, etc. Here are some useful key combinations that give you a tighter grip over your Web cruises

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Command	Internet Explorer	Opera	Netscape
Add Bookmark	[Ctrl] + [D]	[Ctrl] + [T]	[Ctrl] + [D]
Back	[Backspace], [Alt] + [←]	[Backspace] or [Alt] + [←], [Ctrl] + [←], [Z]	[Backspace] or [Alt] + [←]
Access Bookmarks	[Ctrl] + [I]	[F4]	[Ctrl] + [B]
Close Window	[Ctrl] + [W]	[Ctrl] + [W]	[Ctrl] + [W]
Auto-complete .com Address	[Ctrl] + [Enter]	NA	NA
Decrease Text Size	NA	[9]	NA
Delete	[Delete]	[Delete]	[Delete]
Find Again	[F3]	[F3]	[F3]
Find on page	[Ctrl] + [F]	[Ctrl] + [F]	[Ctrl] + [F]
Forward	[Shift] + [Backspace] or [Alt] + [→]	[Shift] + [Backspace] or [Alt] + [→] or [Ctrl] + [→], [X]	[Alt] + [→]
Full Screen	[F11]	[F11]	[F11]
History	[Ctrl] + [H]	Show entire forward history: [Alt] + [X] Show entire backward history: [Alt] + [Z]	[Ctrl] + [H]
Home Page	[Alt] + [Home]	[Ctrl] + [Space]	[Alt] + [Home]
Increase Text Size	NA	NA	[Ctrl] + [+]
Move to Next Frame	[F6]	NA	NA
Move to Previous Frame	[Ctrl] + [Shift] + [Tab]	NA	NA
New Tab	NA	NA	[Ctrl] + [T]
Next Tab	NA	NA	[Ctrl] + [Page Down]
New Window	[Ctrl] + [N]	[Ctrl] + [N]	[Ctrl] + [N]
Open File	[Ctrl] + [O]	[Ctrl] + [O]	[Ctrl] + [O]
Open Address in New Tab	NA	NA	NA
Page Source	[Ctrl] + [F3]	[Ctrl] + [F3]	[Ctrl] + [U]
Previous Tab	NA	NA	[Ctrl] + [Page Up]
Reload	[F5], [Ctrl] + [R]	[F5], [Ctrl] + [R]	[Ctrl] + [R]
Reload (override cache)	[Ctrl] + [F5]	NA	NA
Select Location Bar	[Alt] + [D], [F6], [F4], [Ctrl] + [Tab]	[Ctrl] + [H], [F8]	[Ctrl] + [L]
Select Search Bar	[CTRL] + [E]	[Shift] + [F8]	NA

STAROFFICE SHORTCUTS

Calc - Cell Formatting ShortCuts

If you want to	Press
Switch to Decimal number format.	[Ctrl] + [Shift] + [1]
Switch to Exponent number format.	[Ctrl] + [Shift] + [2]
Switch to Date number format.	[Ctrl] + [Shift] + [3]
Switch to Currency number format.	[Ctrl] + [Shift] + [4]
Switch to Percent number format.	[Ctrl] + [Shift] + [5]
Switch to Standard number format.	[Ctrl] + [Shift] + [6]
If used after entering data into a selected block, assigns the new number format if the previous one is incompatible.	[Shift] + [Alt] + [Enter]
Data area selection hot key.	[Ctrl] + [*]
Decrease the row height by .17 inch.	[Alt] + [Up Arrow]
Increase the row height by .17 inch.	[Alt] + [Down Arrow]
Decrease the row width by .17 inch.	[Alt] + [Left Arrow]
Increase the row width by .17 inch.	[Alt] + [Right Arrow]
Optimize the row height and width for the current data cell.	[Alt] + [Shift] + Arrow

Shortcuts for Running a Presentation

If you want to	Press
End the Presentation.	[Esc]
Advance to the next animation or slide.	[Spacebar], [Enter], [Right Arrow]
Advance to a particular slide.	[Slide Number] + [Enter]
Return to the previous slide.	[Left Arrow]
Move to first slide.	HOME
Move to last slide.	END
Return to the previous page.	Page Up
Advance to the next page.	Page Down

Special Key Combinations for Presentations and Drawings

| If you want to	Press
Move the page view toward the direction of the cursor.	[Ctrl] + [Cursor]
Move the selected object in the desired direction.	[Shift] + Drag
Make changes to occur outward from the centre when modifying the size of an object.	[Alt] + drag
Select overlapping objects.	[Alt] + Click, or [Alt] + [Shift] + Click
Add object to, or remove object from, the current selection.	Hold [Shift] while selecting
Increase an object proportionally.	Hold [Shift] while increasing
Select individual objects in the order in which they were built, from first to last.	[Tab]
Select individual objects in the order in which they were built, from last to first.	[Shift] + [Tab]
Enable changing the length of a measured line.	[Shift] + drag (while in Edit Points mode)

4

Ad will come

Off the Shelf

Grandia II
More than a tale…

Grandia II is a typical fairy tale—complete with a dashing hero and a damsel to escort across unknown and dangerous lands. Try it out after casting away your first impressions, and you will soon discover that a game is seldom to be judged by its appearance. *Grandia II* is anything but a fairy tale.

Gameplay is arguably the most important element that can make or break a game and thankfully, *Grandia II* scores high in this regard. At first glance, you cannot help comparing the combat mechanics with the hugely popular

CHILDREN'S DAY: Saving the world before bedtime
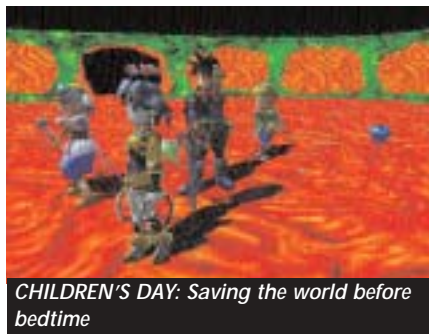
Final Fantasy series. However, you will discover that the combat system works quite differently than the seminal games of that series. For example, in *Grandia II*, you can see your enemies in the open and can thus sneak up on them. Of course, turnaround is fair play, and at times, enemy forces will waylay you if you do not observe your surroundings carefully.

Grandia II offers solid graphics, a good story, and great gameplay. Though it's fairly lengthy, like a good RPG ought to be, the ensuing action makes the time fly. By the end of it, you are sure to have a very fulfilling gaming experience.

Genre: Role-playing game ■ **Developer:** Game Arts ■ **Publisher:** Ubisoft ■ **System Requirements:** PII 350, 64 MB RAM, 16 MB VRAM, DirectX 8.0 ■ **Phone:** 022 - 8381614 ■ **Web site:** www.ubisoft.com
Rating: ★★★★☆

Charlie's Angels: Angel X
X misses the spot

The *Charlie's Angels* franchise is well liked for the over-the-top shenanigans of a cloth-deprived trio of femme fatales. Surprisingly, none of those strengths are carried over to this game. None of the movie's principal characters appear in the game and the soundtrack tends to be repetitive.

Angel X's high points are the basic punch attack and some special moves to despatch a steady stream of enemies. Gain more strike moves as the game progresses, but since those that oppose you are just as mechanical as yourself, these are not really needed. The AI has been schooled to punch as fast as possible, and the best answer to that frame of existence is to

Dishing out pain. In spades

counter-punch faster than what's possible.

Missions are not novel in any manner and involve either simplistic puzzles, or dull path-finding chores. The game is also quite buggy in many departments. The collision engine (whose presence is suspect), registers hits with the alacrity of a government tube-light.

The tacky menu interface offers more challenges. Controlling the Angel with the mouse is quite a feat. Angel X will frequently run into walls, doors and sundry surfaces; and attacking an enemy is a frustrating battle between you and the mouse.

Thanks to the sorry engine, the game looks like a retired Angel. The pixel-clear graphics lend a rough and unfinished look to the product. To sum up, the game is not worth trying out.
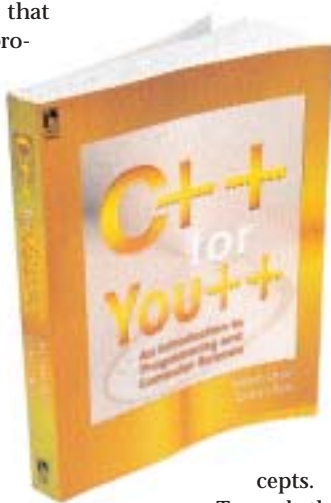
Genre: Action/Strategy ■ **Developer:** 7 Studios ■ **Publisher:** Sony Interactive ■ **Distributor:** Sony Interactive ■ **System requirements:** Microsoft Windows 98 SE, ME, 2000, or XP, PIII 733 or equivalent, 128 MB RAM, 100 MB hard disk space, Direct X compatible 3D video card with 32 MB RAM, DirectX 8.1 ■ **Price:** $19.99 (Rs 920) ■ **Web site:** www.sonypictures.com/movies/charliesangels2/game
Rating: ★★☆☆☆

C++ for You++
Enchiridion of C++ Programming

There are way too many books that offer an introduction to C++ programming. What sets *C++ for You++* apart is that it doesn't give long essays describing simple concepts, or bamboozle you with advanced explanations. In this dichotomous book, the first section contains the explanation of C++ programming, and the second explains implementation details, such as classes and data structures. The book starts off with an introduction to computers in general, touching briefly upon both hardware and software. The second chapter introduces a C++ program containing all the basic elements such as Preprocessor, loops, library functions, etc. From here, all the concepts are explained in detail, in separate chapters. There is an exercise with answers provided at the end of each chapter.

The second section starts with a chapters on linked list, stacks, queues, etc, and proceeds to explain the related concepts.

Towards the end, the authors deal with algorithms, starting with the analysis of algorithms and finishing off with chapters on searching, hashing and sorting. A sore point of the book is the numbering of the pages. Each page is numbered as XXX-DD, where XXX is the abbreviation of the chapter name and DD gives the page number within that chapter—This makes it difficult to reach to a specific page directly.

This book is definitely not recommended for those who are already fluent in C and want to learn C++. Concepts such as Object Oriented Programming and related concepts are treated very lightly in the Chapter 22. Also, the book places more emphasis on practical implementation, rather than the theoretical aspects of programming. The book is aimed at those who want to start off by learning C++, and it serves this purpose pretty well.

Publisher: Vikas Publishing House Pvt Ltd ■ **Author:** Maria Litvin, Gary Litvin ■ **Distributor:** Vikas Publishing House Pvt Ltd	
Phone: 91-11-24314605 ■ **Fax:** 91-11-24310879 ■ **E-mail:** orders@gobookshopping.com ■ **Price:** Rs 295	
Rating: ★★★☆☆	

Red Hat Linux 9 for Dummies
You would not be a dummy after reading this!

Aimed at beginners, this series has long been popular. This book is also in line with this trend, and is for Windows users who want to switch to Linux, and don't know much about it. It talks about installing as well as using it at home—and yes, it covers networking too.

Divided into six parts and 19 chapters, the first part deals with installing Red Hat Linux 9 and details everything—right from partitioning to post-install configuration. The second, comprising four chapters, helps you set up the Internet and tells how to configure the dial-up modem, broadband connections, the LAN and the firewall. The next part is about running various applications on the GNOME desktop environment. It tells you how to play songs, video and even burn CDs. There is also a chapter that introduces you to OpenOffice, the counter part of MS Office for Linux. The only conspicious by its absence are words on the KDE desktop.

From this point onward, the book is no more for dummies. It talks about the nitty gritty of setting up a network and maintaining it for over 80 pages. Solutions to common Linux issues are discussed in the penultimate part of the book. The Appendices talk about advanced topics such as using the Red Hat Package Manager.

The book does a good job of realising the issues with Linux, and clearly highlights the problems you will encounter and their workarounds. It also lists out security vulnerabilities in Linux, and follows the regular traditions of the Dummies series and notifies you of tips, warnings and facts. This makes the information easy to digest.

All in all, the book makes for an entertaining and informative must-read for a newbie.

Publisher: Wiley Dreamtech India Pvt Ltd ■ **Author:** Jon 'maddog' Hall & Paul G. Sery ■ **Distributor:** Wiley Dreamtech	
Phone: 011-23260844 ■ **Fax:** 011-23275895 ■ **E-mail:** wdt@vsnl.net ■ **Web Site:** www.dummies.com ■ **Price:** Rs 299	
Rating: ★★★★☆	

Testing Times

In any magazine, the editorial is force to reckon with. Not only can wage war with words, they also have the power to misspell your name in the magazine, should you ever offend them. At Jasubhai Digital Media, the force is even more easily irked, as they battle to hold their own amongst all the geek-speak.

Synapse devised online tests that each writer, copy-editor and reviewer had to take each Friday—needless to say, without any online assistance. The weekly tests would go on for the next 6 months, speckled with visits to Goa for more hands-on sessions. Now some had been a bit corrupted by sms shrt tlk and 2much time online ;), and others had never really understood the functions of the humble comma. So Friday brought back bitter-sweet memories of school as everyone rushed through the study material at the last minute possible, and *eenie-meennie-mynie-moed* the multiple choices. A few were even bribed to 'proxy' the tests for the others.

As weeks passed by, many felt braver, and lunch-time conversation was about what she wrote for question number 23,

ILLUSTRATOR: Mahesh Benkar

and how he thought 'irksome' meant 'interesting'. Soon there was rubbing one's high scores in the faces of others who scored a percent lower, and how some of the ratings were completely unfair as they did not take into account the fact that some Web site said the stated answer was wrong!

The entire editorial team closed their respective magazines to attend sessions in Goa. With 40 of us gone, the building is sure to look deserted.

Aliens, Anguish and AMD

There was fervour all around the Digit Test Centre this month. The AMD guys stopped by to drop off their little wonder-the AMD Athlon FX 64. Yippie! 64-bit desktop computing at last! There was much shoving and elbowing to get a glimpse of the 64-bit marvel; there were even fights to settle who got to test it. The AMD representatives, in turn, were the object of a tirade of questions, varying from "What's 64-bit?" (obviously not a TC guy), "When do you see a market for 64-bit applications in India?", (the marketing) to "I want 64-bit games!" (that was Badri Narayan, our in-house gaming specialist). Arvind Chandrasekar, Technical Specialist AMD, was intrigued by the TC's Streamsicle streaming music server

concoction, and spent a while listening to Badri boast about it.

This was an opportunity that just couldn't be ignored, and despite the fact that there were only 72 hours left for issue closing, it was decided that the Athlon 64 just had to be tested. Praveen Kurup was selected to test it, and all hell broke loose. The first thing everyone realised was that we didn't have any 64-bit applications or operating systems. After much deliberation and arguing, it was decided that the Athlon 64 would have to be tested in Pure Legacy (32-bit) mode. Praveen ran into a wall with this—all the benchmarks we had were just not designed or optimised for the Athlon 64, and he got some strange results. Even AMD's own 32-bit proces-

sors fared better than the 64-bit wonder. Scratching his head, pacing about the office like a barmy scientist, he was a hysterical wreck.

Meanwhile, Badri was busy running the SETI client on the Athlon64. He sat staring at the screen yelling, "Hey, I'm the first human to search for Extra Terrestrial Intelligence on a 64-bit computer!"

Finally Praveen had a Eureka moment, came trotting back in, promptly deleted SETI, flicked Badri away, and got to work. The solution? Load Linux, compile Unix benchmarks and test the processor.

So the latest catchphrase around the office is '64-bit', and it seems that we may be headed that way a little sooner than we expected.

Name the Indian behind the Google News project?

a. Vijay Patnekar

b. Ram Kumar

c. Krishna Bharat

d. Sabeer Bhatnagar

2 Who is Jim Allchin?
a. CEO of Acer
b. Vice-President Microsoft Corp.
c. Technology specialist Intel Labs
d. Chairman of Intel

3 Name this female gamer who defeated the developer of Quake in a death match with the nick name killcreek.

a. Stevana Case
b. Carly Fiorina
c. Campbell Bellman
d. Stella Morrison

4 Which Indian was the co-founder of Sun Microsystems?
a. Vikram Bharat
b. Sabeer Bhatia
c. Vinod Khosla
d. Ajay Kumar

5 Cyberspace—a popular term used to describe the Internet—was coined by
a. William Gibson
b. John McCarthy
c. Al Gore
d. Bill Gates

6 This Linux enthusiast was the anonymous donor of $200,000 for the Linux on the Microsoft XBox contest...
a. Michael Robertson
b. Mark Tonnes
c. Richard Stallman
d. Larry Ellison

7 "I think there is a world market for maybe five computers." Famous lines by...
a. Thomas Watson
b. Charles Babbage
c. Andy Moore
d. Robert Lewis

8 Click! Who invented the mouse?
a. Gary Starkweather
b. Douglas Engelbart
c. Martin Taylor
d. Fitzwilliam Hartner

9 Phil Zimmermann—What does the name remind you of?
a. PGP
b. The first virus
c. Lotus 1-2-3
d. Developed Unix

10 S, in the RSA encryption algorithm, stands for...
a. Shamir
b. Secure
c. Scholes
d. Security

11 Who is the pioneer of stored program concept?
a. Jim Murray
b. John von Neumann
c. Herman Hollerith
d. Dave Schroeder

12 "You go to your TV set when you want to turn your brain off. You go to your computer when you want to turn your brain on" were the words of
a. Steve Jobs
b. Bill Gates
c. Larry Page
d. Larry King

13 This duo founded HP...
a. Hillary Winer and Paul Neumann
b. David Packard and Bill Hewlett
c. Mark Packard and Benson Hewlett
d. Steve Packard and Gary Hewlett

14 Besides being the brain behind *Doom*, this cyber elite also co-founded id software with John Carmack. He is...
a. John Romero
b. Bill Joy
c. Sean Parker
d. Jim Hardy

15 Who squashed out the first computer bug?
a. Dennis Ritchie
b. Grace Murray Hopper
c. Lady Lovelace
d. Charles Babbage

did you know

Bill Gates' confessed on the David Letterman show that he programmed his high school timetable organiser to schedule all the girls to his class!

numberette

$1 CEO Steve Jobs' salary

$75 Apple also gave him some stocks and a bonus

million

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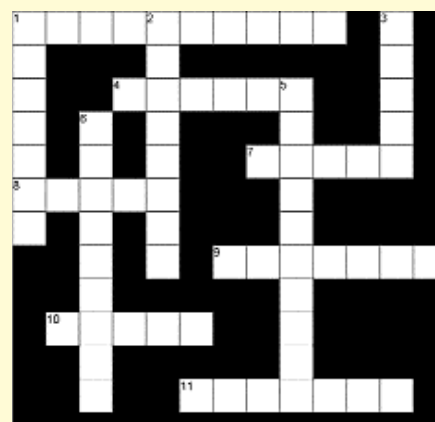*Got an interesting question? Send it in with the correct answer to quiz@thinkdigit.com*

Across
1. Tailored the Internet
4. Hottest Indian
7. "640k ought to be enough for anybody"
8. Microsoft Co Founder
9. Art of Deception
10. Robot's Czech connection
11. Linus Travolds sings national anthem of _____.

Down
1. Pioneer of Indian Supercomputer
2. Robert Metcalfe's ubiquitous protocol
3. Origin of Amazon
5. Charles Babbage's Engine
6. Incumbent IBM patriarch